

**BEHAVIOR OF TENSILE ANCHORS IN CONCRETE:
STATISTICAL ANALYSIS AND DESIGN
RECOMMENDATIONS**

by

Mansour Shirvani, B.S.

Thesis

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**BEHAVIOR OF TENSILE ANCHORS IN CONCRETE:
STATISTICAL ANALYSIS AND DESIGN
RECOMMENDATIONS**

**Approved by
Supervising Committee:**

Richard E. Klingner

John E. Breen

Dedication

To my great family for their continuous support, love, and encouragement

Acknowledgments

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Mansour Shirvani

Austin, Texas

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Disclaimer

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Abstract

BEHAVIOR OF TENSILE ANCHORS IN CONCRETE: STATISTICAL ANALYSIS AND DESIGN RECOMMENDATIONS

Mansour Shirvani, M.S.E

The University of Texas at Austin, 1998

Supervisor: Richard E. Klingner

The overall objective of this thesis is to evaluate three different procedures for predicting the concrete breakout capacity of tensile anchors under static and dynamic loading, and in uncracked and cracked concrete.

The first phase was to evaluate and add to an existing large data base of tensile anchors. The second phase was to compare the actual test results with the equations of the three predictive methods: the 45-Degree Cone Method; the CC Method; and a “Theoretical Method.”

The third phase was to evaluate each predictive method using Monte Carlo analyses. The evaluation was based on the probability of tensile failure of anchors governed by concrete breakout, using the design framework of ACI 349-90, Appendix B “Steel Embedments.” Based on the results of this evaluation and on other information, procedures are proposed for designing such anchors.

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- Figure 7. 9 Probability of failure under known loads for different cases of tensile anchors, including effect of variations in concrete strength, ductile design approach, Category One (“Anchor Case” refers to Table 7.8) (File o-k-i.xls)
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- Figure 7. 10 Probability of brittle failure independent of load for different categories of tensile anchors, including effects of variations in concrete strength, ductile design approach, Static, Uncracked (“Anchor Category” refers to Table 7.9) (File su-u-i.xls)
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- Figure 7. 11 Probability of brittle failure independent of load for different cases of tensile anchors, including effects of variations in concrete strength, ductile design approach, Category One (“Anchor Case” refers to Table 7.10) (File o-u-i.xls)
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- Figure 7. 12 Probability of failure under known loads for different categories of tensile anchors, ductile design approach, Static, Uncracked (“Anchor Category” refers to Table 7.12) (File cv-k-n.xls)**Error! Bookmark not defined.**
- Figure 7. 13 Probability of brittle failure independent of load for different categories of tensile anchors, ductile design approach, Static, Uncracked (“Anchor Category” refers to Table 7.13) (File cv-k-i.xls).....**Error! Bookmark not defined.**
- Figure 8. 1 Ratios of Observed to Predicted Concrete Tensile Breakout Capacities, CC Method, Single Anchors with Shallower Embedments, Hilti Tests, Sleeve Anchors Only (File H-Slv.xls)**Error! Bookmark not defined.**
- Figure 8. 2 Ratios of Observed to Predicted Concrete Tensile Breakout Capacities, CC Method, Single Anchors with Shallower Embedments, Hilti Tests, Expansion Anchors only (File H-Exp.xls)**Error! Bookmark not defined.**
- Figure 8. 3 Ratios of Observed to Predicted Concrete Tensile Breakout Capacities, CC Method, Single Anchors with Shallower Embedments, Uncracked Concrete, Static Loading, UC and CIP Anchors (File T1us01.xls)**Error! Bookmark not defined.**
- Figure 8. 4 Ratios of Observed to Predicted Concrete Tensile Breakout Capacities, CC Method, Single Anchors with Shallower Embedments, Uncracked Concrete, Static Loading, UC and CIP Anchors (File T1cs01.xls)**Error! Bookmark not defined.**
- Figure 8. 5 Ratios of Observed to Predicted Concrete Tensile Breakout Capacities, CC Method, Single Anchors with Shallower Embedments, Uncracked Concrete, Hilti Tests, Sleeve Anchors only (File H-Slv.xls)**Error! Bookmark not defined.**
- Figure 8. 6 Ratios of Observed to Predicted Concrete Tensile Breakout Capacities, CC Method, Single Anchors with Shallower Embedments, Cracked Concrete, Hilti Tests, Sleeve Anchors only (File H-Slv.xls)**Error! Bookmark not defined.**
- Figure 8. 7 Ratios of Observed to Predicted Concrete Tensile Breakout Capacities, CC Method, Single Anchors with Shallower Embedments, Cracked Concrete, Hilti Tests, Sleeve Anchors only (File H-Slv.xls)**Error! Bookmark not defined.**
- Figure 8. 8 Ratios of Observed to Predicted Concrete Tensile Breakout Capacities, CC Method, Single Anchors with Shallower Embedments, Uncracked Concrete, Hilti Tests, Expansion Anchors only (File H-Exp.xls)**Error! Bookmark not defined.**

Figure 8. 9 Ratios of Observed to Predicted Concrete Tensile Breakout Capacities, CC Method, Single Anchors with Shallower Embedments, Cracked Concrete, Hilti Tests, Expansion Anchors only (File H-Exp.xls)....**Error! Bookmark not defined.**

Figure 8. 10 Ratios of Observed to Predicted Concrete Tensile Breakout Capacities, CC Method, Single Anchors with Shallower Embedments, Uncracked Concrete, Static Loading, UC and CIP Anchors (File T1us01.xls)**Error! Bookmark not defined.**

Figure 8. 11 Ratios of Observed to Predicted Concrete Tensile Breakout Capacities, CC Method, Single Anchors with Shallower Embedments, Uncracked Concrete, Dynamic Loading, UC and CIP Anchors (File T1ud01.xls)**Error! Bookmark not defined.**

Figure 8. 12 Ratios of Observed to Predicted Concrete Tensile Breakout Capacities, CC Method, Single Anchors with Shallower Embedments, Uncracked Concrete, Static Loading, Expansion Anchors only (File ud-exp.xls)145

Figure 8. 13 Ratios of Observed to Predicted Concrete Tensile Breakout Capacities, CC Method, Single Anchors with Shallower Embedments, Uncracked Concrete, Dynamic Loading, Expansion Anchors only (File us-exp.xls)**Error! Bookmark not defined.**

Figure 8. 14 Ratios of Observed to Predicted Concrete Tensile Breakout Capacities, CC Method, Single Anchors with Shallower Embedments, Uncracked Concrete, Static Loading, Sleeve Anchors only (File us-slv.xls)**Error! Bookmark not defined.**

Figure 8. 15 Ratios of Observed to Predicted Concrete Tensile Breakout Capacities, CC Method, Single Anchors with Shallower Embedments, Uncracked Concrete, Dynamic Loading, Sleeve Anchors only (File ud-slv.xls)**Error! Bookmark not defined.**

CHAPTER ONE

INTRODUCTION

1.1 GENERAL

Although many anchors to concrete are widely, the knowledge about their behavior is generally limited.

Many design recommendations and equations exist, some based on empirical models, and others based on theoretical models.

The best way to determine which design method is the most appropriate, is to compare different design recommendations with the test results. That is the purpose of this thesis.

1.2 SCOPE AND OBJECTIVE OF RESEARCH PROGRAM

The US Nuclear Regulatory Commission (NRC) has sponsored a testing program at The University of Texas at Austin to evaluate the behavior of anchors under static and dynamic loading and located in uncracked and cracked concrete. The program consists of the following three tasks:

Task 1: Prepare a report summarizing the guidance in documents such as :

a) ACI 349, Appendix B; b) ACI 355; c) ACI 318 (anchorage proposal); and d) USI a-46, SQUG Reports.

Task 2: Review and evaluate available sources of test data to establish trends in test results (for example, group and edge effects).

Task 3: Prepare a comprehensive report which covers aspects of anchorage design.

The objective of this project is to provide the US Nuclear Regulatory Commission (NRC) with a comprehensive document that can be used to establish regulatory positions regarding anchorage to concrete. Current and proposed approaches for the design, analysis and testing of anchorages to concrete will be reviewed (Klingner, 1996).

1.3 SCOPE OF THESIS

This thesis addresses portions of all three tasks where they relate to tension. The tensile behavior of anchors under static and dynamic loading in uncracked and cracked concrete is evaluated. In particular, four types of anchors bolts are addressed in this study.

- 1) Cast-In-Place (CIP)
- 2) Undercut (UC1, UC2)
- 3) Sleeve
- 4) Expansion (EAI)

These anchors are described in chapter 2 of this thesis. A large data base containing anchors tested under static loading and in uncracked concrete is available. This data base was partitioned into 6 anchor categories, each category was analyzed separately.

- a) Single tensile anchors, effective embedment ≤ 188 mm, no edge effects

- b) Single tensile anchors, effective embedment > 188 mm, no edge effects
- c) Single tensile anchors, effective embedment ≤ 188 mm, edge effects
- d) Single tensile anchors, effective embedment > 188 mm, edge effects
- e) 2- and 4-tensile anchor groups, effective embedment ≤ 188 mm, no edge effects
- f) 4-tensile anchor groups, effective embedment > 188 mm, no edge effects

This categorization then was used to evaluate other anchors tested under dynamic loading and cracked concrete. The four cases studied are:

- 1) static loading, uncracked concrete
- 2) static loading, cracked concrete
- 3) dynamic loading, uncracked concrete
- 4) dynamic loading, cracked concrete

These cases comprise the above 6 categories, as shown in Figure 1.1.

1.4 OBJECTIVE OF THESIS

The objective of this thesis is to investigate and determine which of the existing models or methods best predicts the tensile capacity of anchors as governed by failure of the concrete. The three existing methods evaluated in this thesis are:

- 1) 45-Degree Cone Method
- 2) Concrete Cone Method (CC Method), and its variation
- 3) Theoretical Method

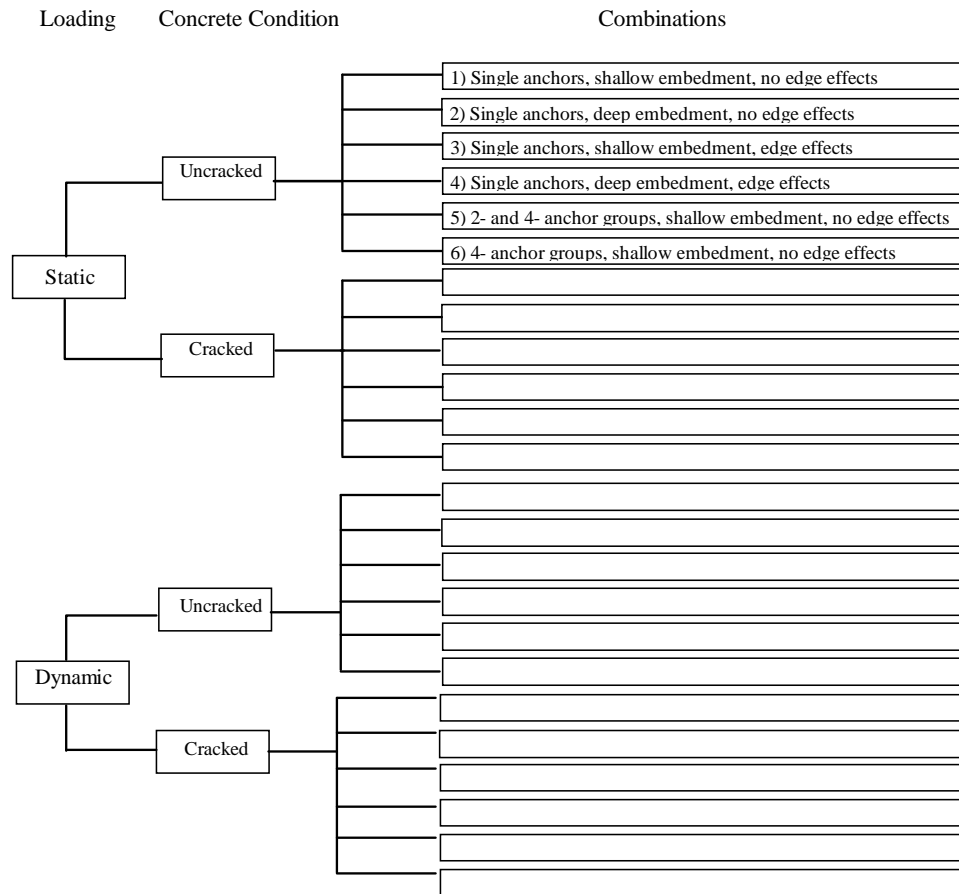


Figure 1.1 Summary of possible cases and categories of tensile anchors

CHAPTER TWO

BACKGROUND

2.1 INTRODUCTION

Depending on the concrete strength, the connection geometry, the embedment depth, the edge distance and the steel strength of the anchor itself, an anchor exhibits different failure modes, such as steel failure, concrete failure, and some failure modes related only to particular types of anchors. To fully understand the behavior of various types of anchors, a great amount of research has been conducted in the past years and is extensively summarized in CEB (1991).

Most tests on connections have been conducted under quasi-static monotonic loading to determine ultimate capacities. A few studies have investigated the effects on connections of different types of loading, such as impact loading, seismic loading and reversed loading (Malik 1980, Cannon 1981, Copley et al. 1985, Collins et al. 1989). In most of those tests, the loading patterns involved a particular dynamic loading pattern at a magnitude much smaller than the anchor's ultimate capacity, followed by a monotonic load to failure to investigate the effects of dynamic loading on ultimate load-displacement behavior (Copley et al. 1985, Collins et al. 1989). Few data were available on the dynamic behavior of anchors with small embedment. Only a few investigations (Eibl and Keintzel 1989) existed regarding the influence of loading rate on the entire load-displacement behavior of anchors, including earlier tests in this project by Rodriguez (1995) and Lotze (1997).

In addition, most connections had been tested in uncracked concrete. Some tests had been conducted in cracked concrete or in high-moment regions (Cannon 1981, Copley et al. 1985, Eligehausen et al. 1987, Eibl and Keintzel 1989, and Eligehausen and Balogh 1995). However, some of those tests focused only on load-displacement behavior of anchors under service or factored loads (Cannon 1981, Copley et al. 1985).

In this chapter, the basic types of anchor systems are first explained. The static behavior of connections in uncracked concrete, observed in previous research, is then discussed.

2.2 CONNECTION TERMINOLOGY

2.2.1 Definition and Classifications of Anchors

Attachments (structural or mechanical elements) that are attached into concrete (or masonry) structures using anchors can be subject to various types of loading. Loads on the attachments are transferred into the base concrete through anchors as concentrated loads, by friction, mechanical interlock, bond, or a combination of these mechanisms. Many types of anchors are currently used. The load-transfer mechanisms of anchors determine their performance characteristics.

Anchors may be broadly classified as cast-in-place anchors or post-installed anchors. They may be further classified according to their principal load-transfer mechanisms:

- 1) Cast-in-place anchors

Cast-in-place anchors are placed in position before concrete is cast.

A cast-in-place anchor can be a headed bolt of standard structural steel, placed with its head in the concrete. It can also be a standard threaded rod and a hexagonal nut, with the nut end embedded in concrete. Finally, it

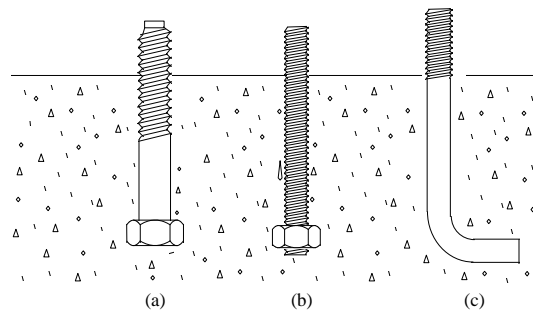


Figure 2.1 Typical Cast-in-Place anchors

can be a bar bent at one end and threaded at the other end, with the bent end placed in concrete. Figure 2.1 shows these variations.

A headed cast-in-place anchor depends on mechanical interlock at the bolt head for load transfer. Some bond may also exist between the anchor shank and surrounding concrete.

Other types of cast-in-place anchors, (such as inserts) are not discussed here. In this study.

2) Post-installed anchors

Post-installed anchors are installed in existing concrete or masonry structures. They are widely used in repair and strengthening work, as well as in new construction, due to advances in drilling technology, and to the flexibility of installation that they offer.

There are many different types of post-installed anchors, classified according to their load-transfer mechanisms. In the following sections, the types

of the anchors studied in this program and their load-transfer mechanisms are explained.

a) Expansion anchors

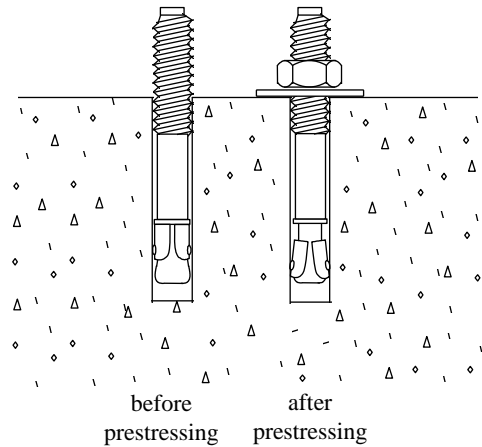


Figure 2.2 Expansion Anchors

An expansion anchor consists of an anchor shank with a conical wedge and expansion element at the bottom end (Figure 2.2). The spreading element is expanded by the conical wedge during installation and throughout the life of the anchor. The spreading element is forced against the concrete wall of the hole as the wedge is pulled by tension on the anchor shank. The external load is transferred by the frictional resistance from the conical wedge to the spreading element, and from the spreading element to the surrounding concrete.

Depending on the relative diameters of the bolt and the drilled hole, expansion anchors are classified as either bolt-type or sleeve-type anchors. For a bolt-type anchor, the nominal diameter of the drilled hole equals that of the anchor bolt. For a sleeve-type anchor, the nominal diameter of hole equals that of

the sleeve encasing the bolt. A wedge anchor is the most common bolt-type anchor.

Both a typical wedge-type anchor (referred as Expansion Anchor II, or EAI for short) and a typical sleeve-type (referred to as Sleeve) anchor were analyzed in this study.

b) Undercut anchors

An undercut anchor is installed in a hole in the base material that is locally widened (undercut). The undercut hole accommodates the expansion elements of the anchor, expanded during installation. Undercut anchors mainly rely on bearing to transfer tension load.

Different undercut geometries are used for various undercut anchor systems. Figure 2.3 shows two different geometries of undercut anchors, namely Undercut Anchor 1 and Undercut Anchor 2, designated as UC1 and UC2 respectively. It can be seen from this figure that Anchor UC2

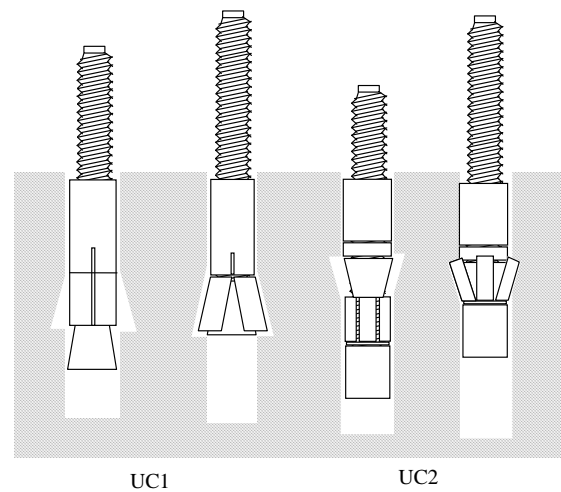


Figure 2.3 Undercut Anchors

has a much smaller bearing area on the surrounding concrete than Anchor UC1.

2.2.2 Definition of Embedment Depth

Anchors are commonly identified by a nominal embedment depth, used primarily to indicate the required hole depth. For most of the anchors studied here, that nominal embedment depth was the length of the anchor (Sleeve, most UC). For CIP anchors, it is the depth to the bearing surface. Nominal embedment depths are defined in Figure 2.4a.

The effective embedment depth of an anchor is the distance between the concrete surface and the bearing portion of the anchor head. For most anchors

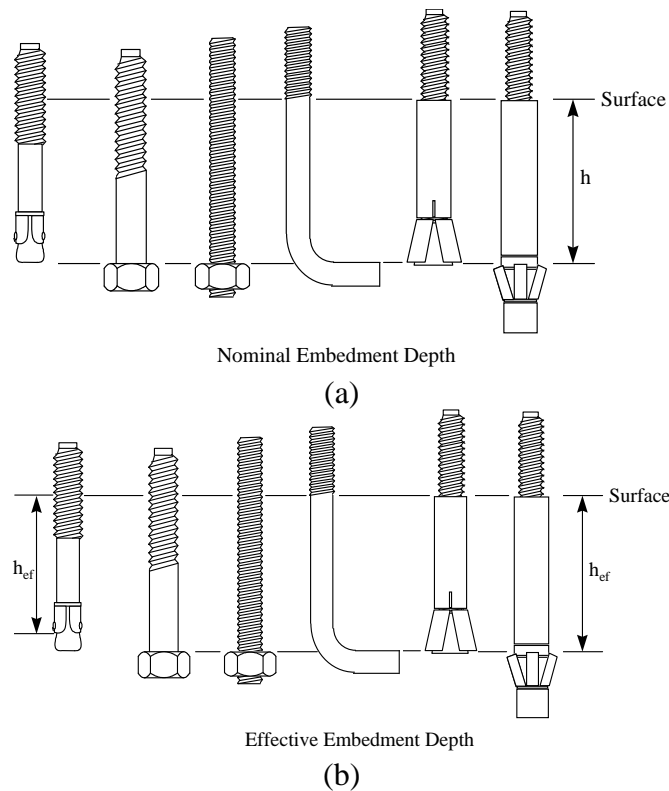


Figure 2.4 Demonstration of Anchor Embedment Depths Defined in This Study

studied here, the effective and nominal embedment depths were equal. An exception was the Expansion Anchor, whose contact point (a dimple on the clip) is considerably above the end of the anchor. Effective embedment depths are defined as shown in Figure 2.4b.

For the anchors analyzed here, nominal embedment depths are given in the text and tables describing each test series. Effective embedment depths are given in Appendix B, along with the test results.

2.3 BEHAVIOR OF SINGLE-ANCHOR CONNECTIONS TO CONCRETE

2.3.1 Tensile Load-Displacement Behavior

Depending on the type of anchor, the strength of the anchor steel, the strength of the surrounding concrete embedment, and sometimes also on the condition of the drilled hole during installation, an anchor can exhibit different failure modes, each with a corresponding failure capacity. The following section explains all the failure modes of anchors in tension and the corresponding calculation procedures, if available.

2.3.1.1 Tensile Failure Modes and Failure Loads

a) Steel failure in tension

Steel failure occurs by yield and fracture of the steel shank of the anchor as shown in Figure 2.5. The maximum fracture capacity of the anchor shank can be simply calculated from the effective tensile stress area of the anchor and the tensile strength of the anchor steel:

$$T_{nt} = A_s F_{ut} \quad (2-1)$$

where: T_{nt} = tensile strength of the anchor shaft;

A_s = effective tensile stress area of the anchor;

F_{ut} = tensile strength of anchor steel.

When a threaded connection is involved, the effective tensile stress area should include the effect of the threads:

$$A_s = 0.7854 \left[D - \frac{0.9743}{n} \right]^2 \quad (2-2)$$

where: D = the major diameter of the threaded part, inch; and

n = the number of threads per inch.

Steel failure can also occur by thread stripping. In tests, this usually happened at almost the ultimate capacity.

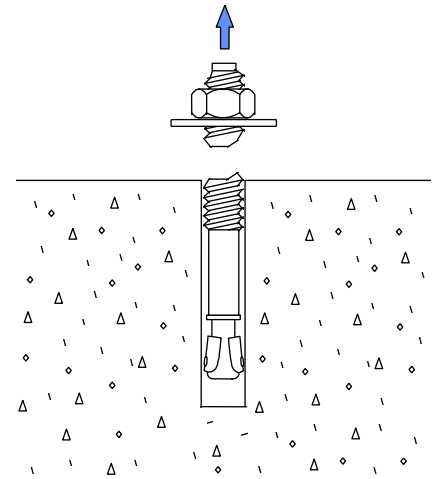


Figure 2.5 Anchor Steel Failure under Tensile Load

b) Concrete cone breakout in tension

Concrete breakout failure occurs by the propagation of a roughly conical fracture surface from the bearing edge of the anchor head of a cast-in-place anchor, or from the tip of the expansion mechanism of an

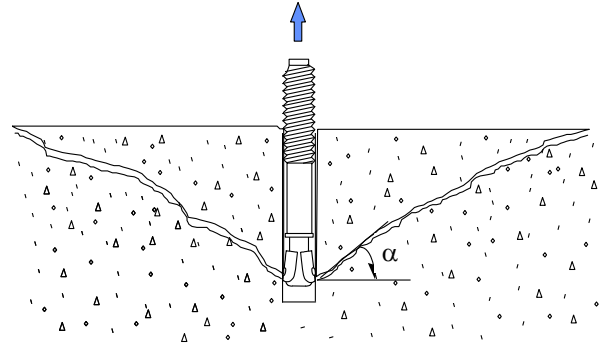


Figure 2.6 Concrete Breakout Failure

expansion or an undercut anchor. The angle of the cone (α in Figure 2.6), as measured from the concrete surface, increases from around 35° at shallow embedments, to about 45° at deep embedments.

The primary factors determining the concrete breakout capacity are the anchor embedment depth and the concrete strength. Many empirical formulas have been proposed to calculate this capacity. These formulas have been compared with available databases of test results (Klingner and Mendonca 1982a, CEB 1991, Sutton and Meinheit 1991, Frigui 1992, Farrow 1992, Fuchs et al. 1995). A 45-degree breakout cone model has traditionally been used, and is used by ACI 349 Appendix B (1990) and *PCI Design Handbook* (1992). More recently, the Concrete Capacity Method (Fuchs et al. 1995) has been proposed as a derivative of the so-called Kappa Method (CEB 1991). The 45-degree cone method and the CCD Method has been compared against a large database of test results (Frigui 1992, Farrow 1992, Fuchs et al. 1995). In this report a Theoretical

Method was also compared against a large database of test results. The CCD method has been shown to be a more accurate predictor of anchor capacity with less systematic error and somewhat more conservative for design purposes. It is also somewhat more designer-friendly for dealing with breakout cones involving edge effects or multiple anchors (Fuchs et al. 1995). In the following, only the 45-Degree Cone Method used in ACI 349 and the CCD Method are presented.

45-Degree Cone Method

The 45-Degree Cone Method assumes that a constant tensile stress of $4\sqrt{f'_c}$ acts on the projected area of a 45-degree cone radiating towards the free surface from the bearing edge of the anchor (Figure 2.7). Therefore, for a single tensile anchor far from edges, the cone breakout capacity is determined by:

$$T_o = 4\sqrt{f'_c} \pi h_{ef}^2 (1 + d_h/h_{ef}) \quad \text{lb} \quad (2-3a)$$

$$T_o = 0.96\sqrt{f'_c} \pi h_{ef}^2 (1 + d_h/h_{ef}) \quad \text{N} \quad (2-3b)$$

where:

f'_c = specified concrete compressive cylinder strength (psi in US units, MPa in SI units);

d_h = diameter of anchor head (inch in US units, mm in SI units); and

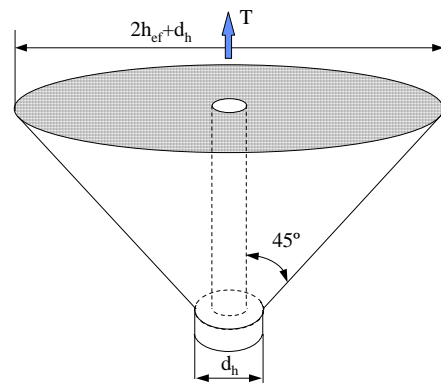


Figure 2.7 Concrete Tensile Breakout Cone as Idealized in ACI 349 Appendix B

h_{ef} = effective embedment (inch in US units, mm in SI units).

If the cone is affected by edges ($c < h_{ef}$) or by an adjacent concrete breakout cone, the breakout capacity is:

$$T_n = \frac{A_N}{A_{No}} T_o \quad (2-4)$$

where: A_N = actual projected area of failure cone or cones;

$$\begin{aligned} A_{No} &= \text{projected area of a single cone unaffected by edges;} \\ &= \pi h_{ef}^2 \left(1 + d_h/h_{ef}\right). \end{aligned}$$

Concrete Capacity Method (CC Method)

The CC Method, based on a large amount of test results and to some extent on fracture mechanics (Eligehausen and Sawade 1989), computes the concrete

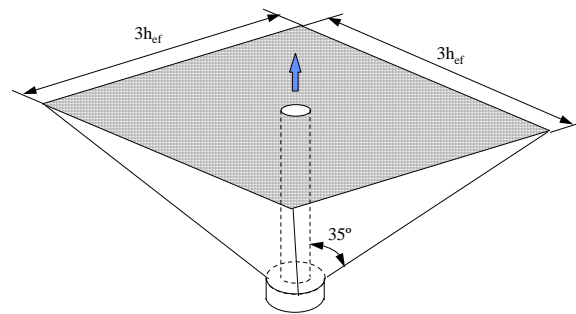


Figure 2. 8

Tensile Concrete Breakout Cone for Single Anchor as Idealized in CC-Method

breakout capacity of a single tensile anchor far from edges as:

$$T_o = k\sqrt{f'_c}h_{ef}^{1.5} \quad (2-5)$$

where: T_o = tension cone breakout capacity;

k = constant; for anchors in uncracked concrete the mean values

originally

proposed based on previous tests are: 35 for expansion and

undercut

anchors, 40 for headed anchors, in US units; or 15.5 for expansion

and

undercut anchors, 17 for headed anchors, in SI units;

f'_c = specified concrete compressive strength (6 × 12 cylinder) (inch in

US

units, MPa in SI units.);

h_{ef} = effective embedment depth (inch in US unit, MPa in SI unit).

In design codes, different values for k based on 5% fractile may be used.

In the CC Method, the breakout body is idealized as a pyramid with an inclination of about 35 degrees between the failure surface and the concrete member surface (Figure 2.8). As a result, the base of the pyramid measures $3h_{ef}$ by $3h_{ef}$.

If the failure pyramid is affected by edges or by other concrete pyramids, the concrete capacity is calculated according the following equation:

$$T_n = \frac{A_N}{A_{No}} \psi_2 T_{no} \quad (2-6)$$

where: A_{No} = projected area of a single anchor at the concrete surface without edge

influences or adjacent-anchor effects, idealizing the failure cone as

a

pyramid with a base length of $s_{cr} = 3h_{ef}$ ($A_{no} = 9 h_{ef}^2$);

A_N = actual projected area at the concrete surface;

ψ_2 = tuning factor to consider disturbance of the radially symmetric stress

distribution caused by an edge,

$$= 1, \text{ if } c_1 \geq 1.5h_{ef};$$

$$= 0.7 + 0.3 \frac{c_1}{1.5h_{ef}}, \text{ if } c_1 \leq 1.5h_{ef};$$

where: c_1 = edge distance to the nearest edge.

Theoretical Method

The Theoretical Method is based on linear elastic fracture mechanics, in which the failure criterion is expressed in terms of the energy consumed per unit crack length increment. This method uses axisymmetric finite element analysis and the nonlocal microplane model to study the influence of embedment depth (h_{ef}) on the failure load. Analysis show that concrete cone failures are caused by circumferential cracking. For different embedment depths, the failure loads increase by a factor of approximately 5.7 when tripling the embedment depth. This is attributed to the size effect (Eligehausen and Ozbolt 1990). Dimensional analysis shows that, for structures that are geometrically similar (that is, having the same shape), the nominal stress at failure varies as $(1+\lambda/\lambda_0)^{-0.5}$ where λ_0 is a constant and λ is the ratio of the size of the structure to the maximum size of the aggregate (Bazant 1984). The Theoretical Method uses the Bazant's size effect law (1984) to calculate the failure loads (as a concrete cone) for anchors in tension.

The Theoretical Method equation for calculating the failure load (Eligehausen, Ozbolt 1990) is as follows:

$$N_u = N_n \cdot B \cdot \left(1 + \frac{h_{ef}}{h_0}\right)^{-0.5} \quad (2.7)$$

where: N_u = failure load including size effect

N_n = failure load without size effect

$$= \alpha \cdot (f_c)^{0.5} \cdot h_{ef}^2$$

α = factor

B, h_0 = constants to be calculated from a linear regression analysis of the obtained failure loads.

Preliminary studies by author shows that “k” values for Cast-In-Place and Undercut anchors is close to 2.75, and 2.5 for Expansion and Sleeve anchors. Also Eligehausen suggested to use 50 mm for h_0 . Equation 2-10 then can be modified to the following:

$$N_n = \frac{k \cdot \sqrt{f_{cc}} \cdot h_{ef}^2}{\left(1 + \frac{h_{ef}}{50}\right)^{0.5}} \quad (2-8)$$

where : N_n = predicted concrete cone failure load (kN)

f_{cc} = actual tested strength of a 200-mm concrete cube (MPa)

h_{ef} = effective embedment (mm)

k = 2.75 for UC and CIP anchors, 2.5 for Expansion anchors.

Figure 2.9 compares the graph of the Predicted Concrete Capacity vs. Embedment Depth, for both CC Method and Theoretical Method. This graph shows that at the shallow embedments ($h_{ef} \leq 188$ mm) both methods give almost the same predicted concrete capacity. However, as the embedment depth increases the Theoretical Method predicts higher concrete capacity than the CC Method. However, The CC Method predicted higher predicted concrete capacity for embedment depth less than 75 mm, than The Theoretical Method. At the

embedment depth of 75 mm, both methods give almost the same result, this is been illustrated in Figure 2.10.

Predicted Concrete Capacity vs. Embedment Depth for both CC and Theoretical Methods

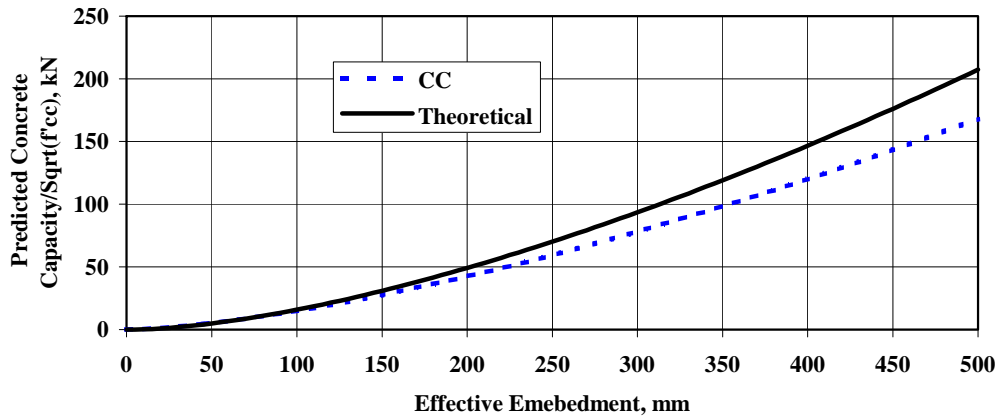


Figure 2. 9 Comparison of the Theoretical Method with the CC Method

Predicted Concrete Capacity vs. Embedment Depth for both CC and Theoretical Methods

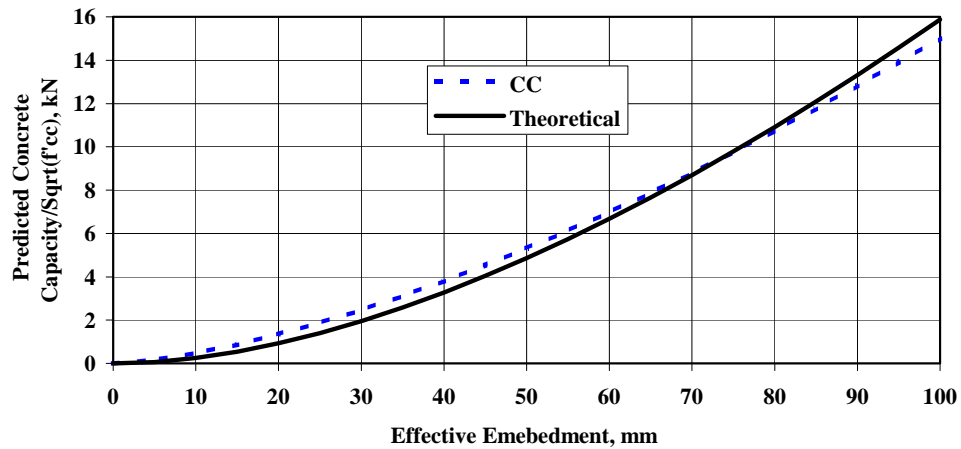


Figure 2. 10 Comparison of the Theoretical Method with the CC Method

c) Pullout failure in tension

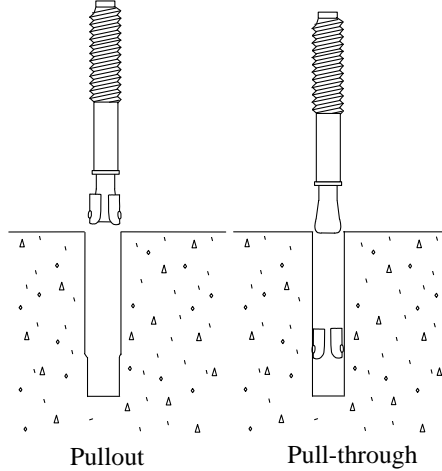


Figure 2.11 Pullout and Pull-through Failure

Pullout failure (Figure 2.11) occurs when the anchor pulls completely out of the hole. It is usually accompanied by crushing of the concrete above the head of the anchor. Sometimes, the anchor pulls out part way, and then re-engage the concrete at a smaller embedment, and subsequently fails by concrete cone breakout. Currently, there is no theoretical formula to predict this type of failure load.

This kind of failure is most likely to occur with expansion anchors.

d) Pull-through failure in tension

Pull-through failure occurs when the cone of the anchor shank slides through the expansion clip or sleeve (Figure 2.11), leaving the clip or sleeve inside the hole. This usually happens with expansion anchors with large embedment depths, when the tensile force exceeds the frictional resistance between the expansion sleeve and the cone. Several factors affect the pull-through

failure of an anchor, such as the surface condition of the cone and the clip or sleeve, the inclination of the cone, and the relative diameters of the hole and the anchor.

The capacity associated with this type of failure depends on the expansion mechanism, the condition of the hole, and the concrete strength and stiffness. Currently, there is no theoretical method to calculate this capacity.

e) Lateral blowout failure in tension

If an anchor is placed too close to a free edge and has a relatively large embedment depth (compared to the edge distance), the high bearing stresses generated by the anchor head can cause the concrete between the anchor head and the adjacent free surface to spall off in the form of a conical body (Figure 2.12).

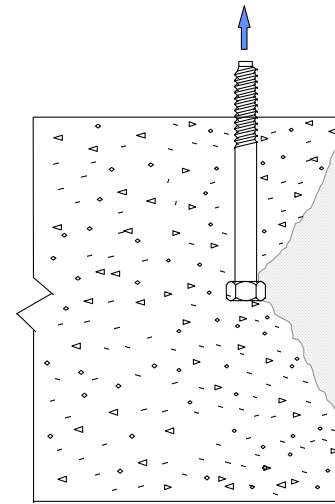


Figure 2.12 Concrete Lateral Blowout

In ACI 349 Appendix B, a 45-degree cone model is again assumed to calculate the lateral blowout capacity. The lateral blowout force is taken as 40% of the tension in the anchor.

Recent research by Fuchs and Eligehausen (1991) suggests that the ACI 349 approach overestimates lateral blowout capacity for large edge distances. It indicates that lateral blowout capacity is a function of concrete strength, anchor bearing area, and edge distance, as shown in Equation 2-9. However, since those tests were conducted on specimens with only one concrete strength, the effect of concrete strength needs to be investigated further. Furthermore, the effect of different geometry of various types of anchors also needs to be examined. They suggest:

$$F_n = 200 m \sqrt{A_b f'_c} \quad \text{lb} \quad (2-9a)$$

$$F_n = 16.8 m \sqrt{A_b f'_c} \quad \text{N} \quad (2-9b)$$

where: F_n = average lateral blowout capacity;

m = edge distance (inch in US units, mm in SI units);

A_b = bearing area of anchor head (sq in in US units, mm² in SI units); and

f'_c = specified concrete compressive strength (psi in US units, MPa in SI units).

Based on test results on T-headed reinforcing bars, Bashandy (1996) proposed a pyramid model similar to the tension model of the CC Method, but with a base dimension of 6 times the edge distance, to estimate the lateral blowout capacity of a group of anchors. However, those bars were placed very close to

concrete member edges. Therefore, the value of ϕ might underestimate the ultimate strength for anchors with a larger edge distance.

f) Splitting failure in tension

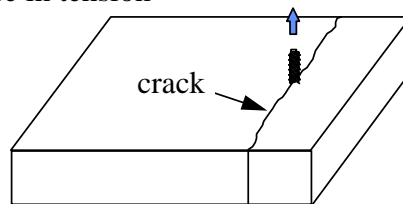


Figure 2. 13 Splitting Failure

Splitting failure is characterized by the propagation of a crack in a plane containing the anchor. This happens when an anchor is installed in a thin member, or close to an member edge (Figure 2.13). This phenomenon generally is limited to anchors with very large expansion force, such as expansion or some undercut anchors. Currently, there is no theoretical formula for predicting capacity as governed by this type of failure.

2.3.1.2 Load Displacement Behavior of Anchors in Tension

The total displacement of an anchor in tension is the summation of the steel elongation of the anchor shank, the concrete deformation, and the relative slip of the anchor head due to local crushing of the concrete. If the anchor fails by cone breakout, the concrete deformation consists of local concrete plastic

crushing, concrete crack opening, and elastic deformation of the cracked concrete body. Figure 2-14 shows some typical load-displacement curves associated with different failure modes.

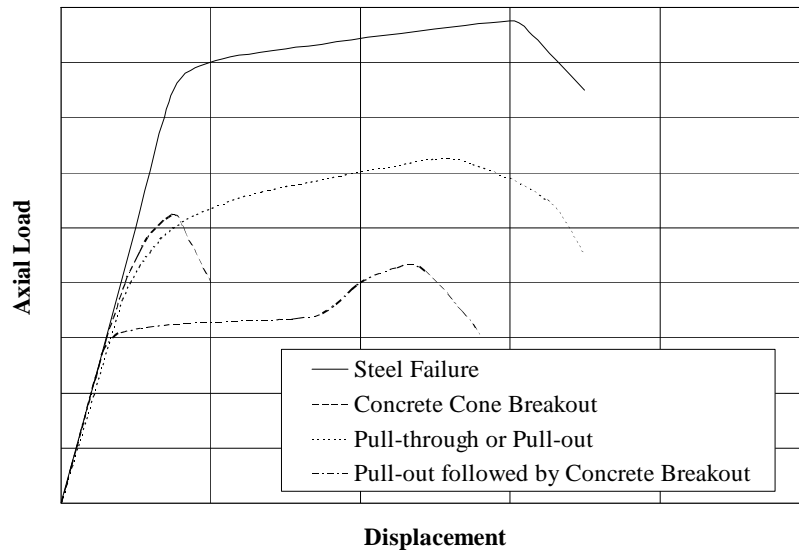


Figure 2. 14 Typical Load-Displacement Curves of Different Failure Modes in Tension

2.4 EFFECT OF DYNAMIC TENSILE LOADING ON ANCHOR BEHAVIOR

The results from dynamic tension tests were compared with each of the three mentioned methods. The conclusions from actual tests done previously on single anchor and two anchor connections under dynamic loading (Rodriguez 1995, Lotze 1997) are as follows:

- 1) For undercut and grouted anchors, the capacity generally increased with the loading rate. In those tests, the capacity increased by 10% to 20%.

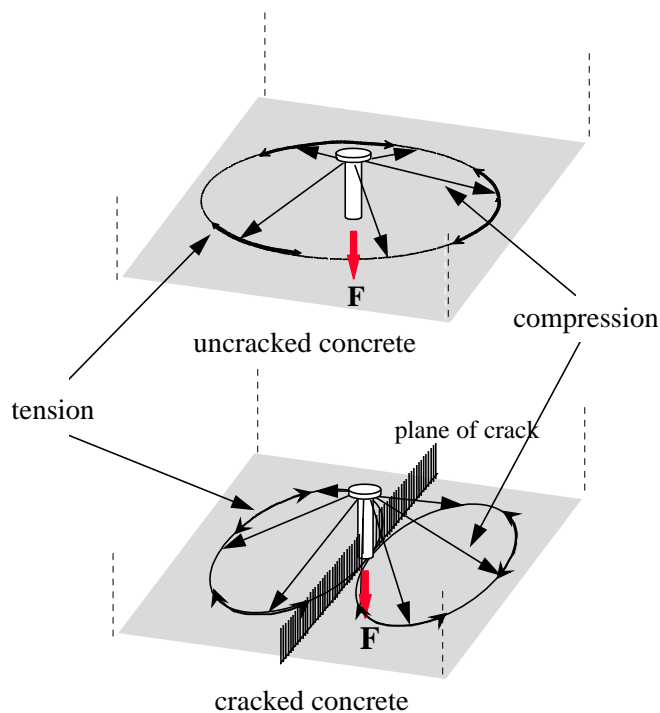


Figure 2. 15 *Effect of Cracking on Load-Transfer Mechanism of Headed Anchors in Tension (Eligehausen and Fuchs 1987)*

- 2) For clip-type expansion anchors, the tendency for pull-through failure increased with the loading rate, probably due to the smaller dynamic friction coefficient (Rabinowicz 1995). It also varies with each anchor, due to individual design of expansion mechanisms.
- 3) In the tests without pullout failure, the loading rate did not affect the cone breakout shape.

2.5 EFFECT OF CRACKS ON ANCHOR CAPACITY

In general, cracks decrease anchor capacity as governed by concrete breakout. This effect could be explained by the hypothesis of Eligehausen and Fuchs (1987), shown in Figure 2.15. The crack interrupts the tensile stress field

in the concrete surrounding the anchor, thereby altering the stresses distribution in the concrete.

Although the scatter of the test results is rather large, the reduction of ultimate load of concrete breakout generally increases with initial crack width. An effort was also made by Eligehausen and Ozbolt (1992) to determine the effect of cracks numerically with a finite element method. Previous test results (Eligehausen et al. 1987, CEB 1991, Eligehausen and Balogh 1995, Takiguchi and Hotta 1995) and numerical modeling show that concrete breakout capacity decreases with an increasing crack width up to 0.15 mm, to approximately 70% of the breakout capacity in uncracked concrete for undercut and cast-in-place anchors. The crack results in a significant reduction of the expansion force of an expansion anchor. The effect of crack width on the ultimate load of an expansion anchor is greater than for undercut or cast-in-place anchors. Figure 2.16 shows the average reduction of the ultimate capacity of pullout tests of headed anchors (Eligehausen and Balogh 1995). These tests compared large numbers of anchors of all kinds in particular uncracked concrete, with large numbers of anchors of all kind, in different concrete.

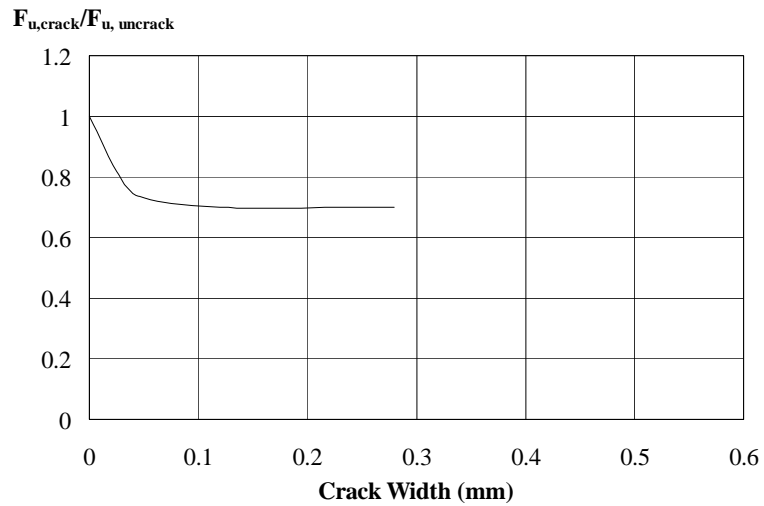


Figure 2.16 Influence of Crack Width on Concrete Cone Breakout Capacity (Eligehausen and Balogh 1995)

For anchors in shear failing by lateral concrete breakout, the cracks reduce the ultimate load capacity of concrete breakout in the same manner as in tension (CEB 1991).

2.7 LOAD-DISPLACEMENT BEHAVIOR OF MULTIPLE-ANCHOR CONNECTIONS

Loading conditions on a multiple-anchor connections can be very complex. The external load can usually be categorized into pure tension, pure shear, eccentric shear, or combined eccentric shear and tension.

2.7.1 Tension Loading

If a group of equally loaded tensile anchors fails in steel, the capacity of the connection is the summation of the tensile steel capacity of each individual anchor. In case of an eccentric tension load, the anchor with the greatest load determines the failure load of the group.

CHAPTER THREE

COMPARISON OF TEST RESULTS WITH 45-DEGREE CONE METHOD

Predicted capacities are computed according to the 45-Degree Cone Method. Results from the actual tests are then divided by the predicted capacities calculated using the 45-Degree Cone Method, and plotted against the effective embedment (h_{ef}). Graphical interpretations show that 45-Degree Cone Method has a large systematic error (slope of the line). Also, it gives larger COV compared to other existing methods. For these reasons, only the six categories under the static loading in uncracked concrete were analyzed. This method was not analyzed for other cases (dynamic, cracked).

3.1 STATIC LOADING, UNCRACKED CONCRETE

The following graphs show the ratio of the test results over the predicted capacity (N_{obs}/N_{pre}) using the 45-Degree Cone Method, verses effective embedment, under static loading in uncracked concrete.

3.1.1 Category One (45-Degree Cone Method)

A total of 1130 test results are available for single tensile anchors, effective embedments ≤ 188 mm, no edge effects (Sheet 1).

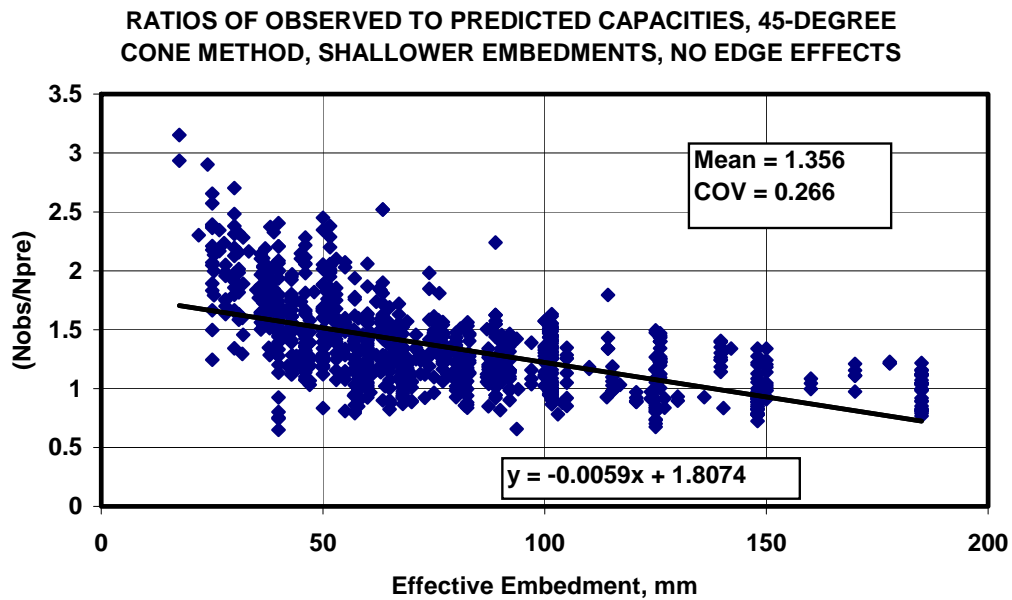


Figure 3.1 Ratios of Observed to Predicted Concrete Tensile Breakout Capacities, 45-Degree Cone Method, Single Anchors with Shallower Embedments (File aciutiwb.xls, Sheet 1)

3.1.2 Category Two (45-Degree Cone Method)

A total of 77 test results are available for single tensile anchors, effective embedment > 188 mm, no edge effects (Sheet 4).

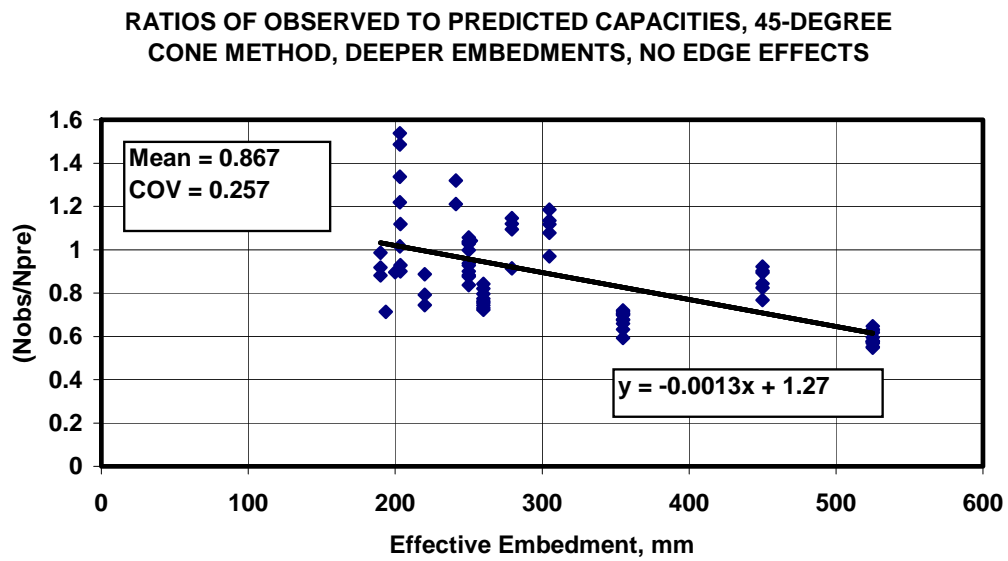


Figure 3.2 Ratios of Observed to Predicted Concrete Tensile Breakout Capacities, 45-Degree Cone, Single Anchors, Deeper Embedments (File aciutiwb.xls, Sheet 4)

3.1.3 Category Three (45-Degree Cone Method)

A total of 137 test results are available for single tensile anchors, effective embedment ≤ 188 mm, with edge effects (Sheet 2).

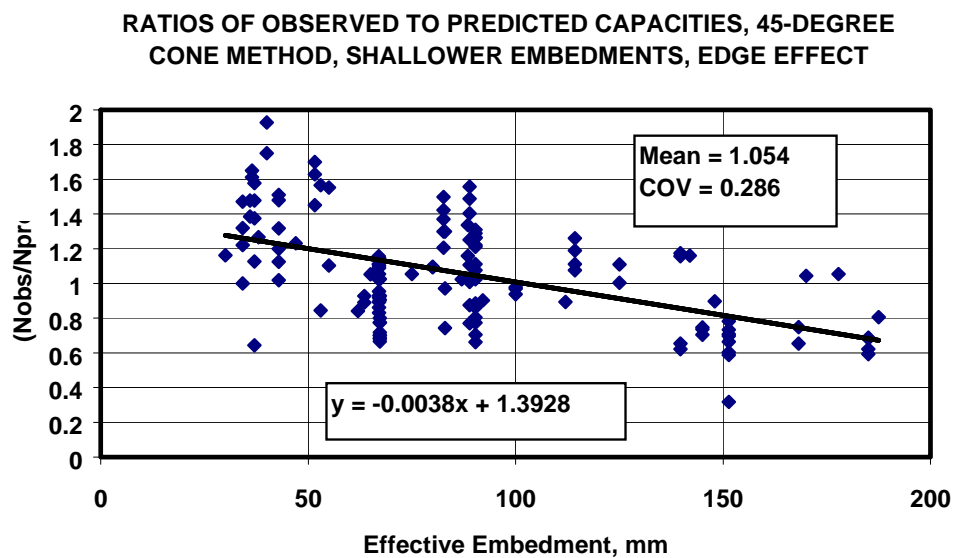


Figure 3.3 Ratios of Observed to Predicted Concrete Tensile Capacities, 45-Degree Cone Method, Shallower Embedments, Edge Effects (File aciutiwb.xls, Sheet 2)

3.1.4 Category Four (45-Degree Cone Method)

A total of 33 test results are available for single tensile anchors, effective embedment > 188 mm, with edge effects (Sheet 5).

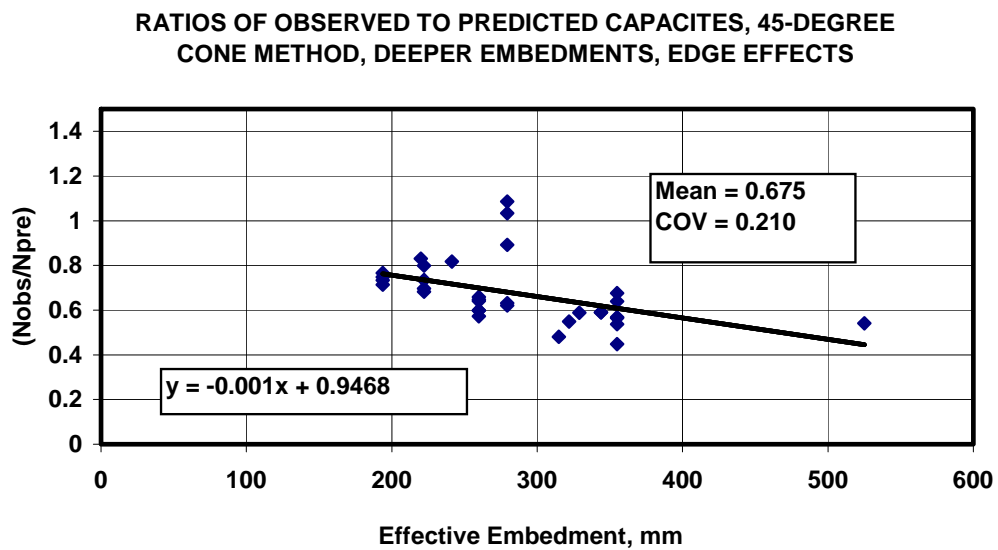


Figure 3. 4 Ratios of Observed to Predicted Concrete Tensile Breakout Capacities, 45-Degree Cone Method, Deeper Embedments, Edge Effects (File aciutiwb.xls, Sheet 5)

3.1.5 Category Five (45-Degree Cone Method)

A total of 170 test results are available for 2- and 4-tensile anchor groups, effective embedment ≤ 188 mm, no edge effects (Sheet 3).

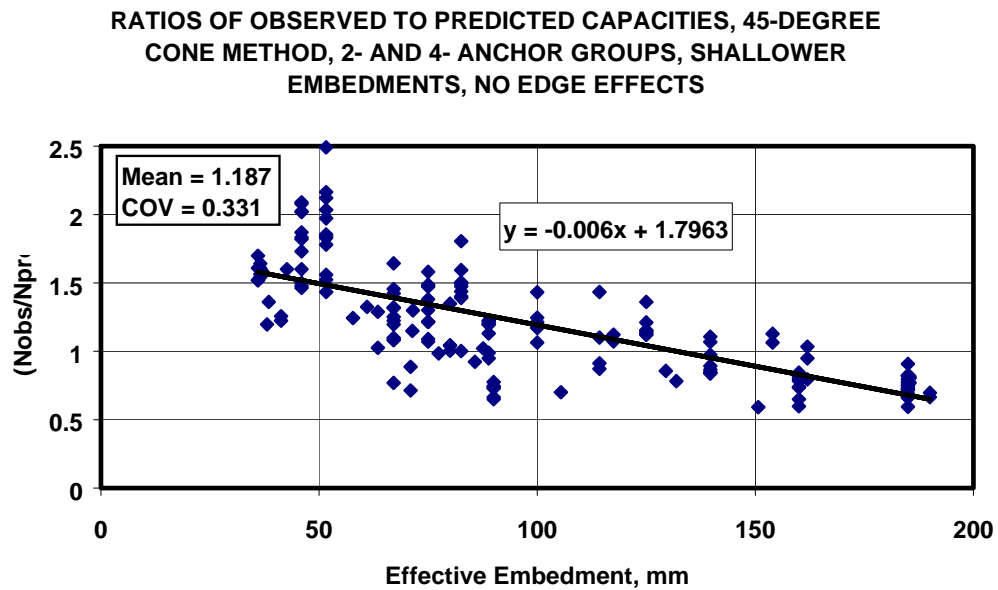


Figure 3. 5 Ratios of Observed to Predicted Concrete Tensile Capacities, 45-Degree Cone Method, 2- and 4-Anchor Groups, Shallower Embedments, No Edge Effects (File aciutiwb.xls, Sheet 3)

3.1.6 Category Six (45-Degree Cone Method)

A total of 19 test results are available for 4-tensile anchor groups, effective embedment > 188 mm, no edge effects (Sheet 6).

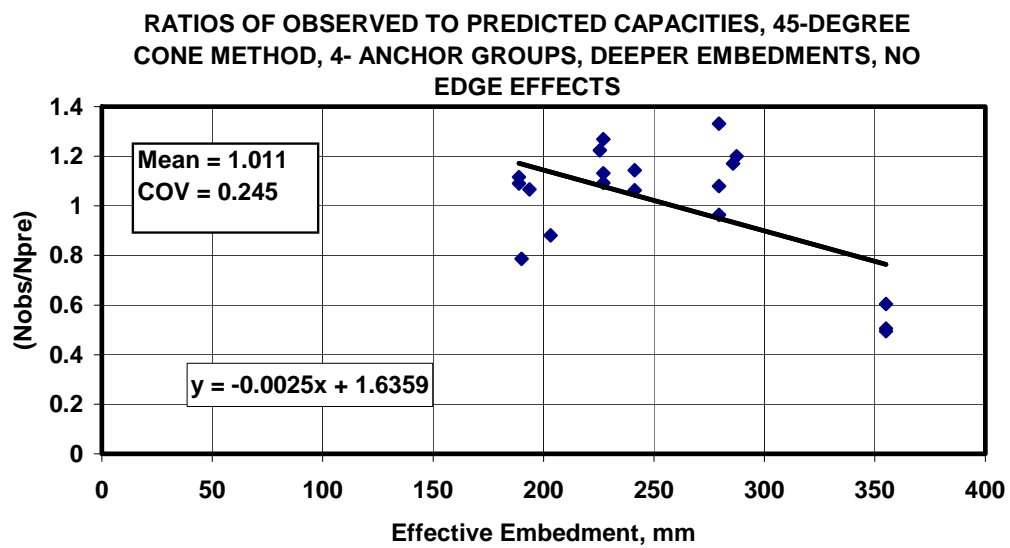


Figure 3. 6 Ratios of Observed to Predicted Concrete Tensile Breakout Capacities, 45-Degree Cone Method, 4-Anchor Groups, Deeper Embedments, No Edge Effects (File aciutiwb.xls, Sheet 6)

CHAPTER FOUR

COMPARISON OF TEST RESULTS WITH CC METHOD

Predicted capacities are computed according to CC Method. The results from the actual tests are then divided by the predicted capacities calculated using the CC Method equations, and plotted against the effective embedment (h_{ef}). Graphical interpretations show that CC Method has lesser systematic error (slope of the line), than both the 45-Degree Cone Method and the Theoretical Method.

4.1 STATIC LOADING, UNCRACKED CONCRETE

The following graphs show the ratio of the test results over the predicted capacity (N_{obs}/N_{pre}) using the CC Method, verses effective embedment, under static loading in uncracked concrete.

4.1.1 Category One (CC Method)

A total of 1130 test results are available for single tensile anchors, effective embedments ≤ 188 mm, no edge effects (Sheet 1).

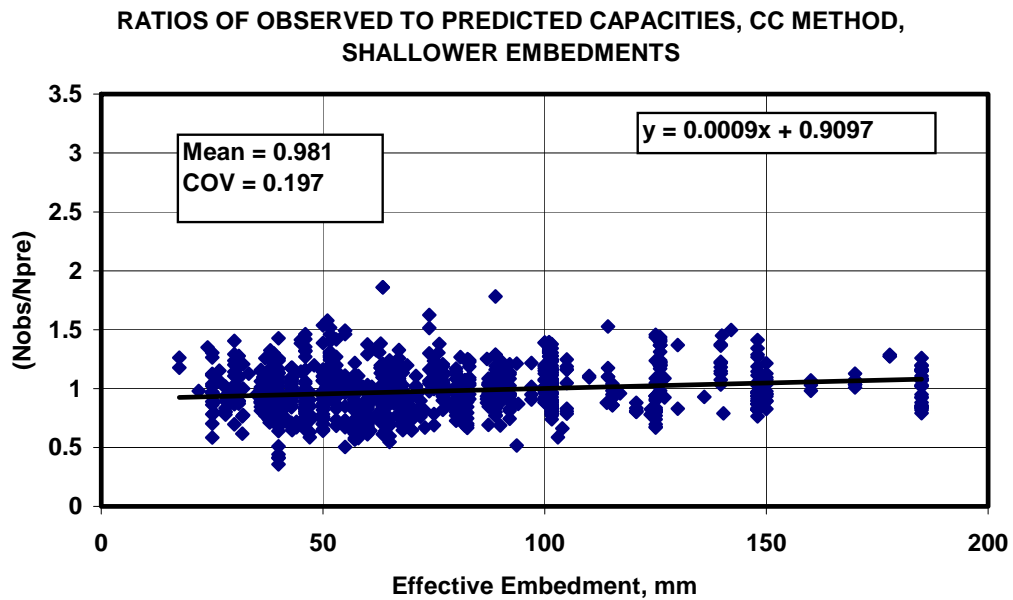


Figure 4.1 Ratios of Observed to Predicted Concrete Tensile Breakout Capacities, CC Method, Single Anchors with Shallower Embedments (File aciutiwb.xls, Sheet 1)

4.1.2 Category Two (CC Method)

A total of 77 test results are available for single tensile anchors, effective embedment > 188 mm, no edge effects (Sheet 4).

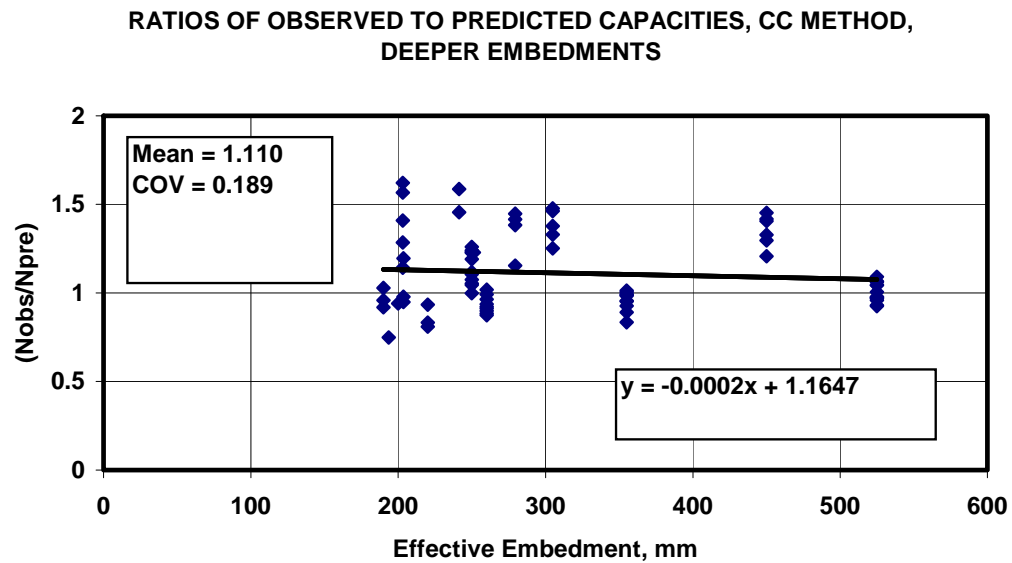


Figure 4. 2 Ratios of Observed to Predicted Concrete Tensile Breakout Capacities, CC Method, Single Anchors, Deeper Embedments (File aciutiwb.xls, Sheet 4)

4.1.3 Category Three (CC Method)

A total of 137 test results are available for single tensile anchors, effective embedment ≤ 188 mm, with edge effects (Sheet 2).

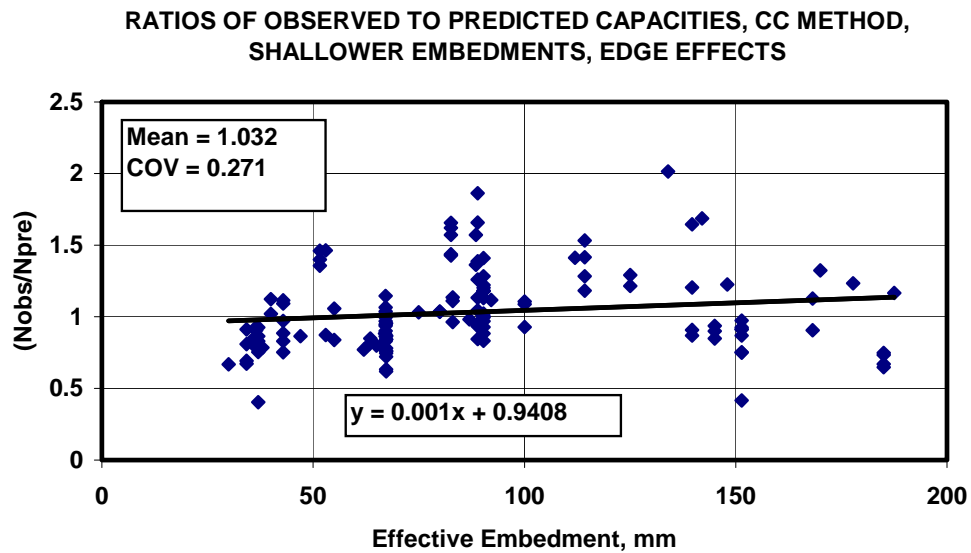


Figure 4. 3 Ratios of Observed to Predicted Concrete Tensile Capacities, CC Method, Shallower Embedments, Edge Effects (File aciutiwb.xls, Sheet 2)

4.1.4 Category Four (CC Method)

A total of 33 test results are available for single tensile anchors, effective embedment > 188 mm, with edge effects (Sheet 5).

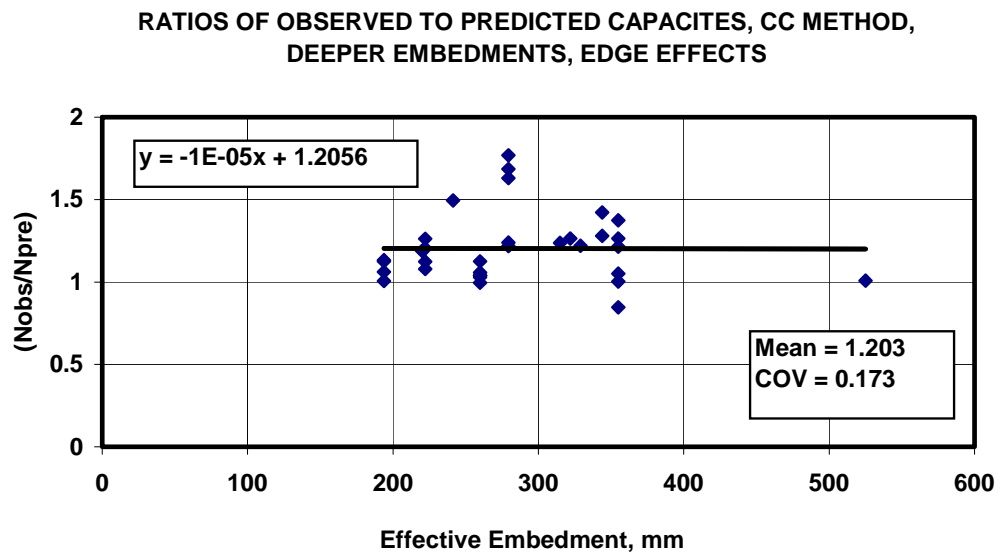


Figure 4.4 Ratios of Observed to Predicted Concrete Tensile Breakout Capacities, CC Method, Deeper Embedments, Edge Effects (File aciutiwb.xls, Sheet 5)

4.1.5 Category Five (CC Method)

A total of 170 test results are available for 2- and 4-tensile anchor groups, effective embedment ≤ 188 mm, no edge effects (Sheet 3).

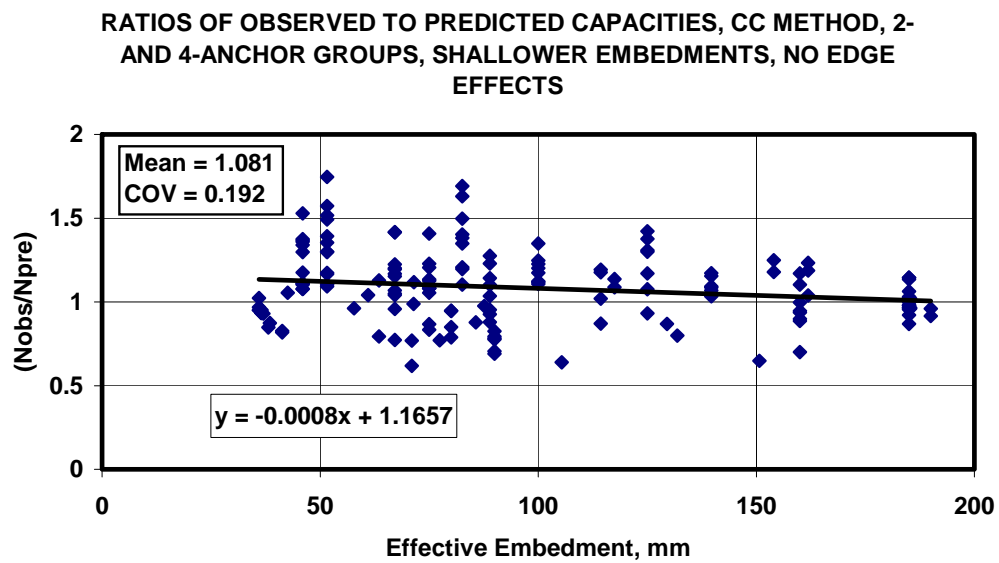


Figure 4. 5 Ratios of Observed to Predicted Concrete Tensile Capacities, CC Method, 2- and 4-Anchor Groups, Shallower Embedments, No Edge Effects (File aciutiwb.xls, Sheet 3)

4.1.6 Category Six (CC Method)

A total of 19 test results are available for 4-tensile anchor groups, effective embedment > 188 mm, no edge effects (Sheet 6).

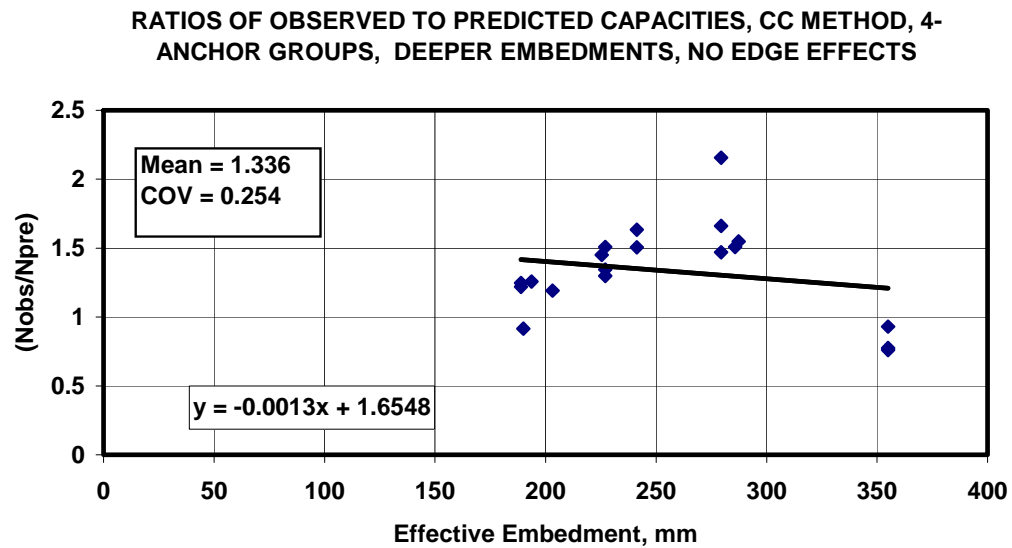


Figure 4.6 Ratios of Observed to Predicted Concrete Tensile Breakout Capacities, CC Method, 4-Anchor Groups, Deeper Embedments, No Edge Effects (File aciutiwb.xls, Sheet 6)

4.2 STATIC LOADING, CRACKED CONCRETE

The following graphs show the ratio of the test results over the predicted capacity (N_{obs}/N_{pre}) using the CC Method, versus effective embedment, under static loading in cracked concrete.

Results from tests (Zhang 1997, Hallowel 1996) in cracked concrete showed that generally the concrete breakout capacity of an anchor in cracked concrete decreases between 10% to 30% depending on the anchor type. In this thesis and for the purpose of comparison the following factors were used for different anchors in cracked concrete:

Crack Factor = 0.9 for UC and CIP anchors

Crack Factor = 0.7 for all sleeve and Expansion anchors

The factors should be multiplied by the concrete capacity calculated for anchors in uncracked concrete to give a reasonable concrete capacity in cracked concrete.

4.2.1 Category One

A total of 35 test results are available for single tensile anchors, effective embedments ≤ 188 mm, no edge effects. Based on the anchor types, these test were further divided into two files for further studies. One file includes all the Cast-In-Place and Undercut anchors (25 tests), and the other file includes Expansion and Sleeve anchors (10 tests).

4.2.1.1 Cast-In-Place and Undercut Anchors (CC Method)

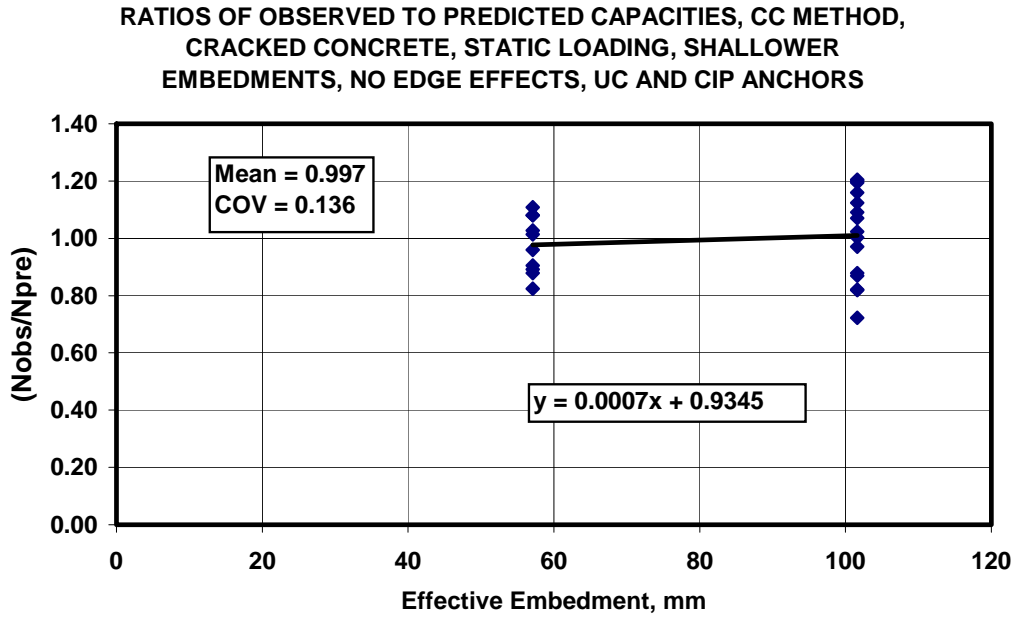


Figure 4.7 Ratios of Observed to Predicted Concrete Tensile Breakout Capacities, CC Method, Single Anchors, Cracked Concrete, Static Loading, Shallower Embedments with No Edge Effects. UC and CIP Anchors only (File t1cs01.xls)

4.2.1.2 Expansion and Sleeve Anchors (CC Method)

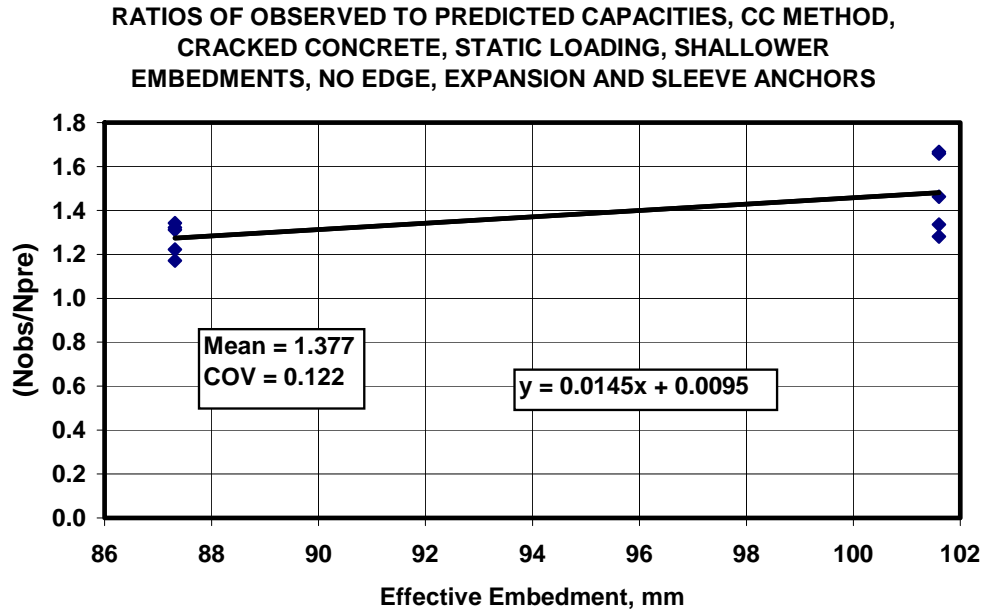


Figure 4. 8 Ratios of Observed to Predicted Concrete Tensile Breakout Capacities, CC Method, Single Anchors, Cracked Concrete, Static Loading, Shallower Embedments with No Edge Effects. Expansion and Sleeve Anchors only (File t1cs02.xls)

4.3 DYNAMIC LOADING, UNCRACKED CONCRETE

The following graphs show the ratio of the test results over the predicted capacity (N_{obs}/N_{pre}) using the CC Method, versus effective embedment, under dynamic loading in uncracked concrete.

Results from tests performed at the University of Texas at Austin by Zhang and Hallowel under dynamic loading showed that generally the concrete breakout capacity of an anchor under dynamic loading increases about 25%, except for Expansion anchors. There was no change observed in concrete capacity for Expansion anchors under dynamic loading. In this thesis and for the purpose of comparison the following factors were used for different anchors under dynamic loading:

Dynamic Factor = 1.25 for UC, CIP, and sleeve anchors

Dynamic Factor = 1.0 for Expansion anchors

The factors should be multiplied by the concrete capacity calculated for anchors under static loading to give a reasonable concrete capacity under dynamic loading.

4.3.1 Category One

A total of 87 test results are available for single tensile anchors, effective embedments ≤ 188 mm, no edge effects. Based on the anchor types, these test were further divided into two files for further studies. One file includes all the Cast-In-Place and Undercut anchors (35 tests), and the other file includes Expansion and Sleeve anchors (52 tests).

4.3.1.1 Cast-In-Place and Undercut Anchors (CC Method)

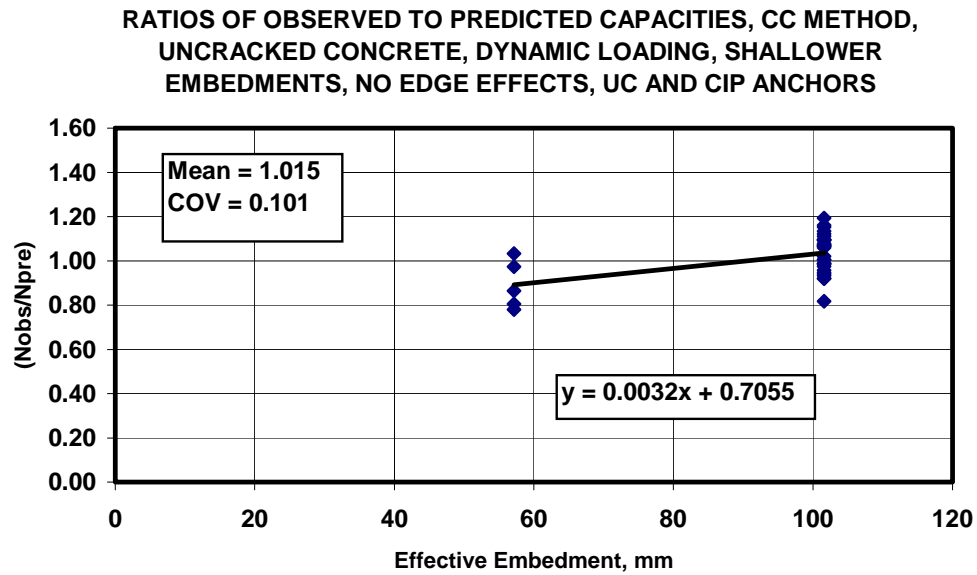


Figure 4.9 Ratios of Observed to Predicted Concrete Tensile Breakout Capacities, CC Method, Single Anchors, Uncracked Concrete, Dynamic Loading, Shallower Embedments with No Edge Effects. CIP and UC Anchors only (File t1ud01.xls)

4.3.1.2 Expansion and Sleeve Anchors (CC Method)

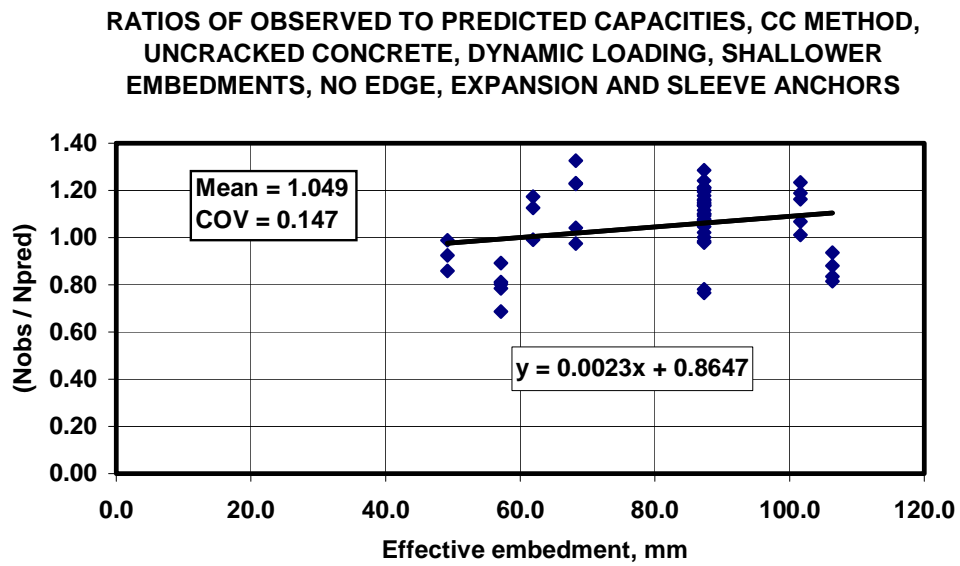


Figure 4. 10 Ratios of Observed to Predicted Concrete Tensile Breakout Capacities, CC Method, Single Anchors, Uncracked Concrete, Dynamic Loading, Shallower Embedments with No Edge Effects. Expansion and Sleeve Anchors only (File t1ud02.xls)

4.4 DYNAMIC LOADING, CRACKED CONCRETE

The same factors (dynamic factors and crack factors) as mentioned earlier were used for analysis here.

4.4.1 Category One

A total of 35 test results are available for single tensile anchors, effective embedments ≤ 188 mm, no edge effects. Based on the anchor types, these test were further divided into two files for further studies. One file includes all the Cast-In-Place and Undercut anchors (20 tests), and the other file includes Expansion and Sleeve anchors(15 tests).

4.4.1.1 Cast-In-Place and Undercut Anchors (CC Method)

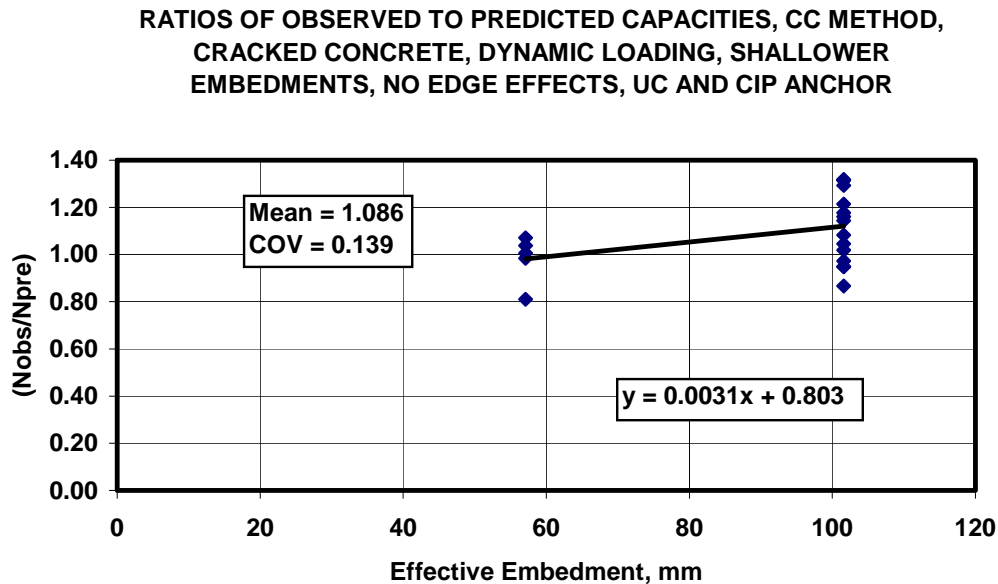


Figure 4. 11 Ratios of Observed to Predicted Concrete Tensile Breakout Capacities, CC Method, Single Anchors, Cracked Concrete, Dynamic Loading, Shallower Embedments with No Edge Effects. CIP and UC Anchors only (File t1cd01.xls)

4.4.1.2 Expansion and Sleeve Anchors (CC Method)

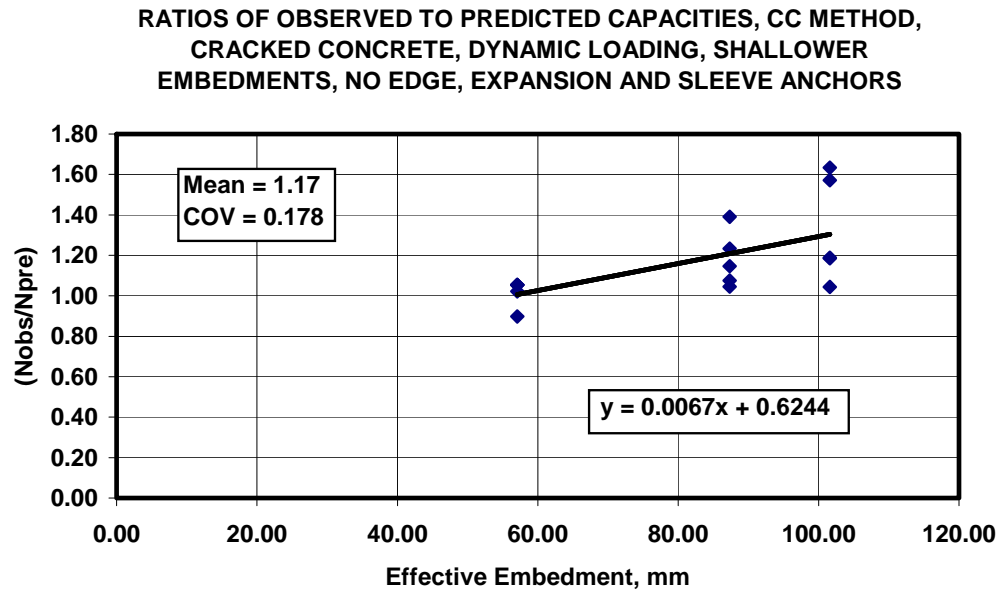


Figure 4. 12 Ratios of Observed to Predicted Concrete Tensile Breakout Capacities, CC Method, Single Anchors, Cracked Concrete, Dynamic Loading, Shallower Embedments with No Edge Effects. Expansion and Sleeve Anchors only (File t1cd02.xls)

CHAPTER FIVE

COMPARISON OF TEST RESULTS WITH THEORETICAL METHOD

Predicted capacities are computed according to the Theoretical Method. The results from the actual tests are then divided by the predicted capacities calculated using the Theoretical Method equations, and plotted against the effective embedment (h_{ef}). Graphical interpretations show that the Theoretical Method has lesser systematic error (slope of the line), than the 45-Degree Cone Method but higher than the CC Method.

5.1 STATIC LOADING, UNCRACKED CONCRETE

The following graphs show the ratio of the test results over the predicted capacity (N_{obs}/N_{pre}) using the Theoretical Method, versus effective embedment, under static loading in uncracked concrete.

5.1.1 Category One (Theoretical Method)

A total of 1130 test results are available for single tensile anchors, effective embedments ≤ 188 mm, no edge effects (Sheet 1).

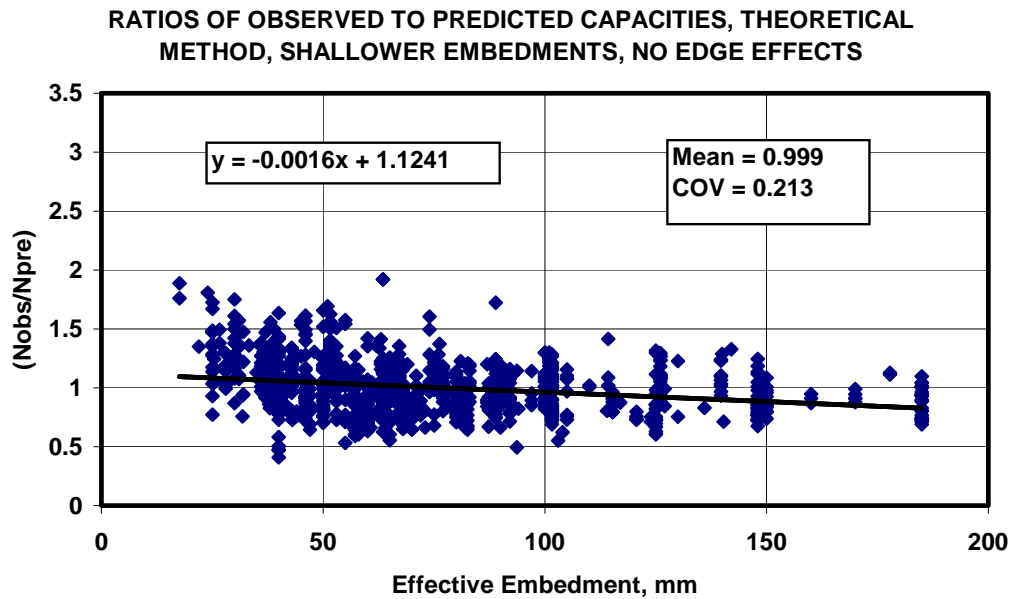


Figure 5.1 Ratios of Observed to Predicted Concrete Tensile Breakout Capacities, Theoretical Method, Single Anchors with Shallower Embedments (File aciutiwb.xls, Sheet 1)

5.1.2 Category Two (Theoretical Method)

A total of 77 test results are available for single tensile anchors, effective embedment > 188 mm, no edge effects (Sheet 4).

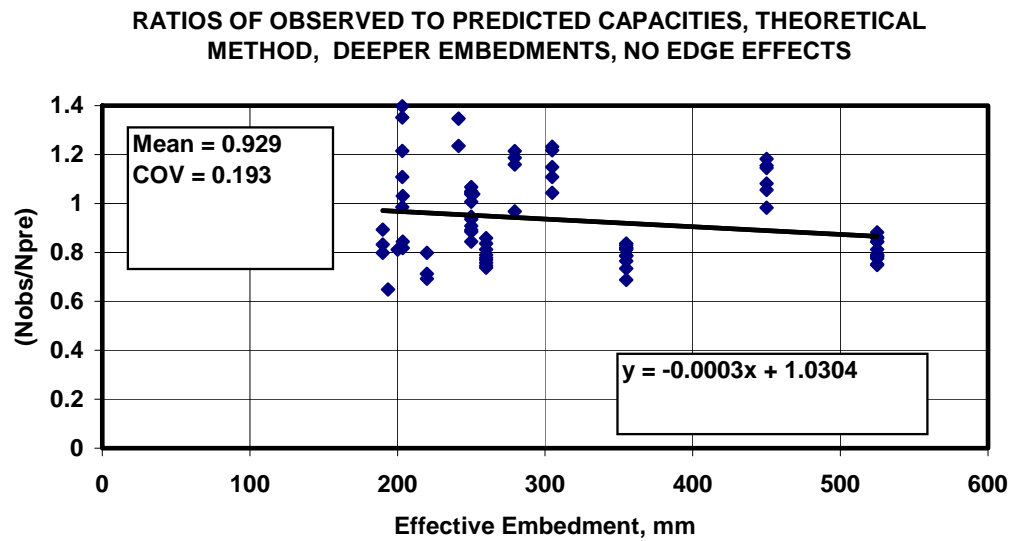


Figure 5.2 Ratios of Observed to Predicted Concrete Tensile Breakout Capacities, Theoretical Method, Single Anchors, Deeper Embedments (File aciutiwb.xls, Sheet 4)

5.1.3 Category Three (Theoretical Method)

A total of 137 test results are available for single tensile anchors, effective embedment ≤ 188 mm, with edge effects (Sheet 2).

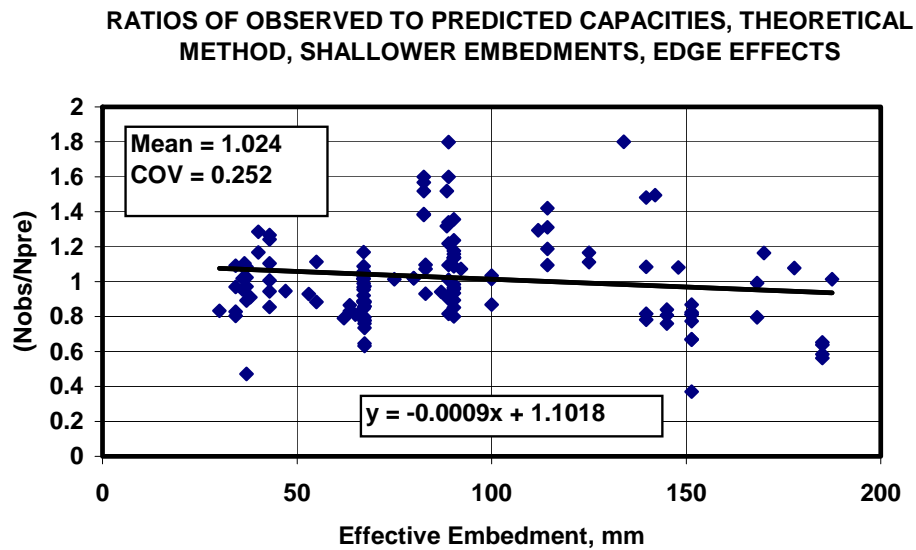


Figure 5.3 Ratios of Observed to Predicted Concrete Tensile Capacities, Theoretical Method, Shallower Embedments, Edge Effects (File aciutiwb.xls, Sheet 2)

5.1.4 Category Four (Theoretical Method)

A total of 33 test results are available for single tensile anchors, effective embedment > 188 mm, with edge effects (Sheet 5).

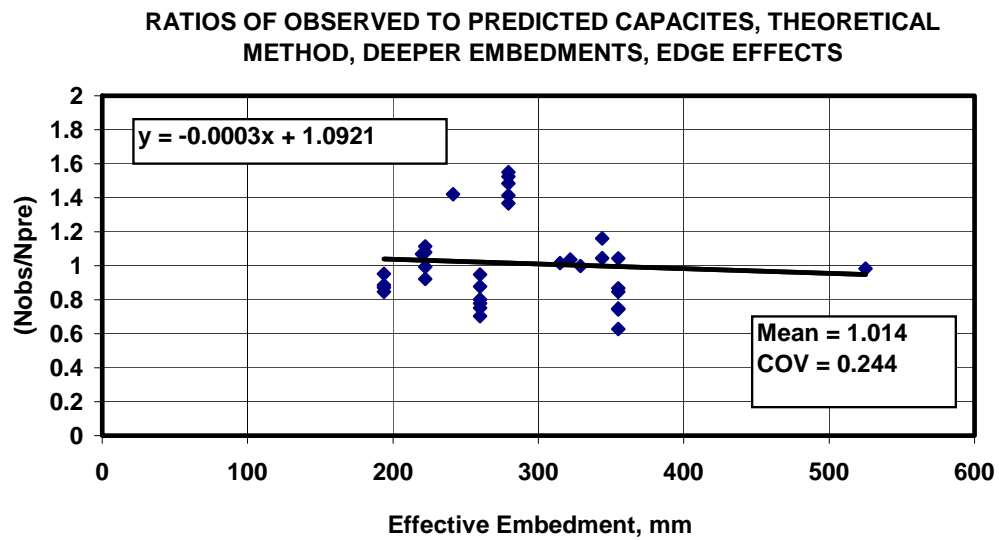


Figure 5.4 Ratios of Observed to Predicted Concrete Tensile Breakout Capacities, Theoretical Method, Deeper Embedments, Edge Effects (File aciutiwb.xls, Sheet 5)

5.1.5 Category Five (Theoretical Method)

A total of 170 test results are available for 2- and 4-tensile anchor groups, effective embedment ≤ 188 mm, no edge effects (Sheet 3).

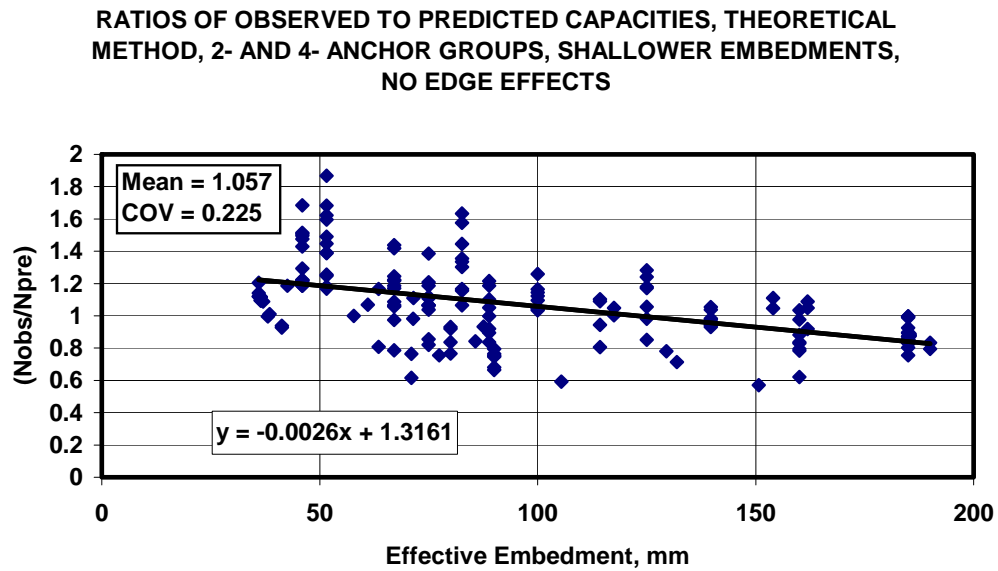


Figure 5. 5 Ratios of Observed to Predicted Concrete Tensile Capacities, Theoretical Method, 2- and 4-Anchor Groups, Shallower Embedments, No Edge Effects (File aciutiwb.xls, Sheet 3)

5.1.6 Category Six (Theoretical Method)

A total of 19 test results are available for 4-tensile anchor groups, effective embedment > 188 mm, no edge effects (Sheet 6).

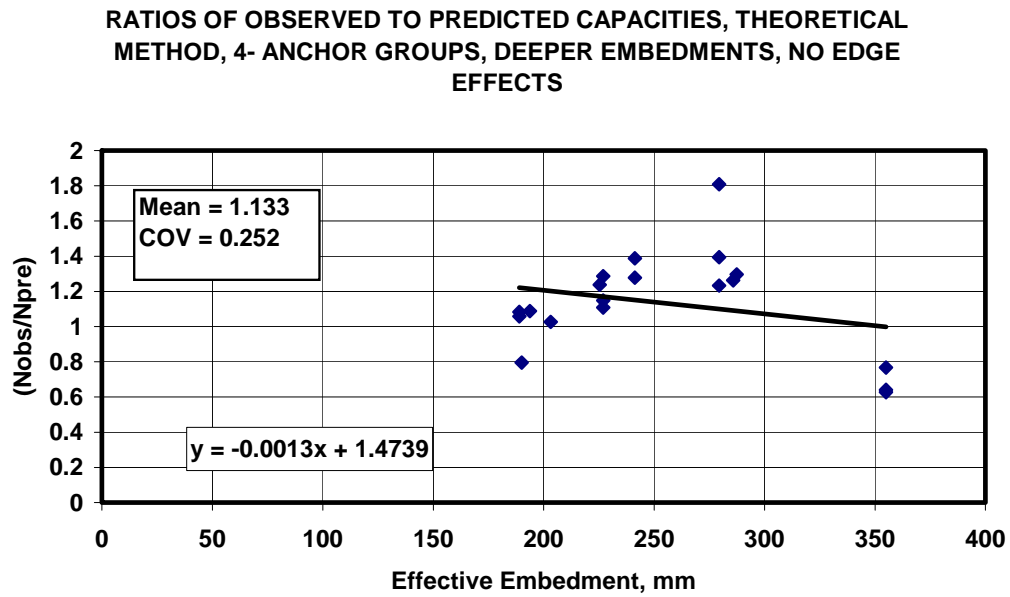


Figure 5.6 Ratios of Observed to Predicted Concrete Tensile Breakout Capacities, Theoretical Method, 4-Anchor Groups, Deeper Embedments, No Edge Effects (File aciutiwb.xls, Sheet 6)

5.2 STATIC LOADING, CRACKED CONCRETE

The following graphs show the ratio of the test results over the predicted capacity (N_{obs}/N_{pre}) using the Theoretical Method, verses effective embedment, under static loading in cracked concrete.

Results from tests performed at the University of Texas at Austin by Zhang and Hallowel in cracked concrete showed that generally the concrete breakout capacity of an anchor in cracked concrete decreases between 10% to 30% depending on the anchor type. In this thesis and for the purpose of comparison the following factors were used for different anchors in cracked concrete:

Crack Factor = 0.9 for UC and CIP

Crack Factor = 0.7 for all Sleeve and Expansion

The factors should be multiplied by the concrete capacity calculated for anchors in uncracked concrete to give a reasonable concrete capacity in cracked concrete.

5.2.1 Category One

A total of 35 test results are available for single tensile anchors, effective embedments ≤ 188 mm, no edge effects. Based on the anchor types, these test were further divided into two files for further studies. One file includes all the Cast-In-Place and Undercut anchors (25 tests), and the other file includes Expansion and Sleeve anchors(10 tests).

5.2.1.1 Cast-In-Place and Undercut Anchors (Theoretical Method)

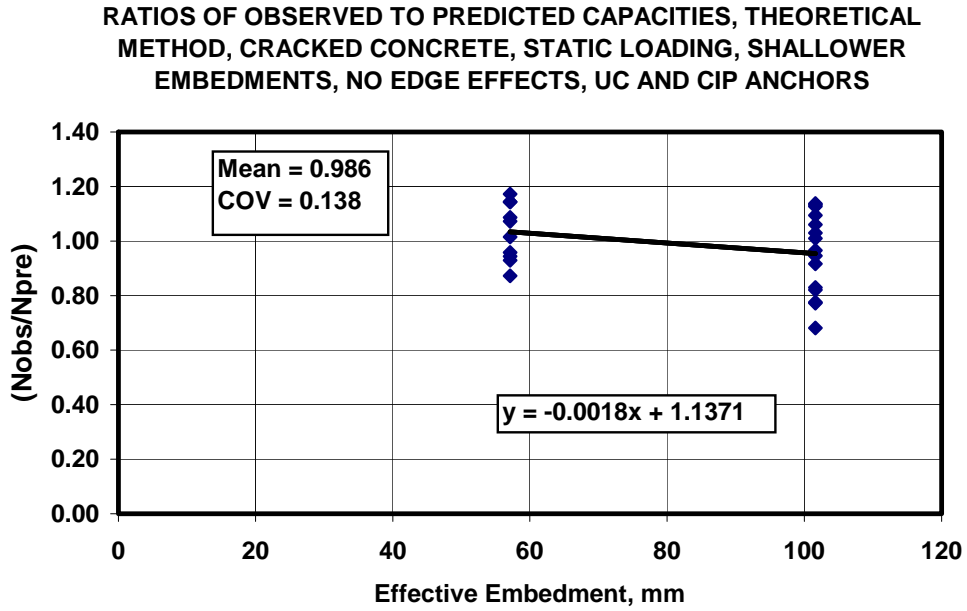


Figure 5.7 Ratios of Observed to Predicted Concrete Tensile Breakout Capacities, Theoretical Method, Single Anchors, Cracked Concrete, Static Loading, Shallower Embedments with No Edge Effects. UC and CIP Anchors only (File t1cs01.xls)

5.2.1.2 Expansion and Sleeve Anchors (Theoretical Method)

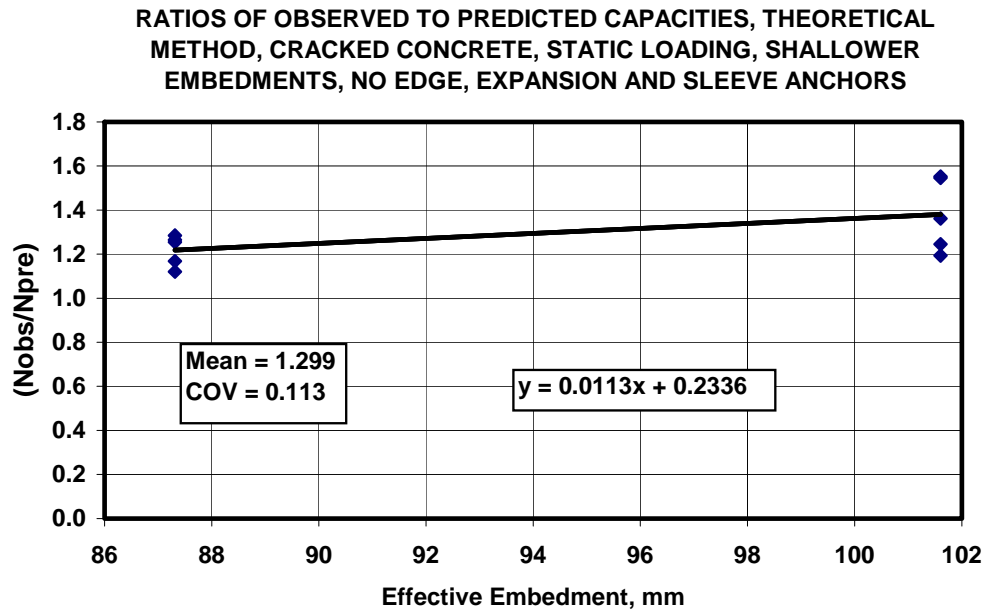


Figure 5. 8 Ratios of Observed to Predicted Concrete Tensile Breakout Capacities, Theoretical Method, Single Anchors, Cracked Concrete, Static Loading, Shallower Embedments with No Edge Effects. Expansion and Sleeve Anchors only (File t1cs02.xls)

5.3 DYNAMIC LOADING, UNCRACKED CONCRETE

The following graphs show the ratio of the test results over the predicted capacity (N_{obs}/N_{pre}) using the CC Method, versus effective embedment, under dynamic loading in uncracked concrete.

Results from tests performed at the University of Texas at Austin by Zhang and Hallowel under dynamic loading showed that generally the concrete breakout capacity of an anchor under dynamic loading increases about 25%, except for Expansion anchors. There was no change observed in concrete capacity for Expansion anchors under dynamic loading. In this thesis and for the purpose of comparison the following factors were used for different anchors under dynamic loading:

Dynamic Factor = 1.25 for UC, CIP, and Sleeve

Dynamic Factor = 1.0 for Expansion

The factors should be multiplied by the concrete capacity calculated for anchors under static loading to give a reasonable concrete capacity under dynamic loading.

5.3.1 Category One

A total of 87 test results are available for single tensile anchors, effective embedments ≤ 188 mm, no edge effects. Based on the anchor types, these test were further divided into two files for further studies. One file includes all the Cast-In-Place and Undercut anchors (35 tests), and the other file includes Expansion and Sleeve anchors (52 tests).

5.3.1.1 Cast-In-Place and Undercut Anchors (Theoretical Method)

RATIOS OF OBSERVED TO PREDICTED CAPACITIES, THEORETICAL METHOD, UNCRACKED CONCRETE, DYNAMIC LOADING, SHALLOWER EMBEDMENTS, NO EDGE EFFECTS, UC AND CIP ANCHORS

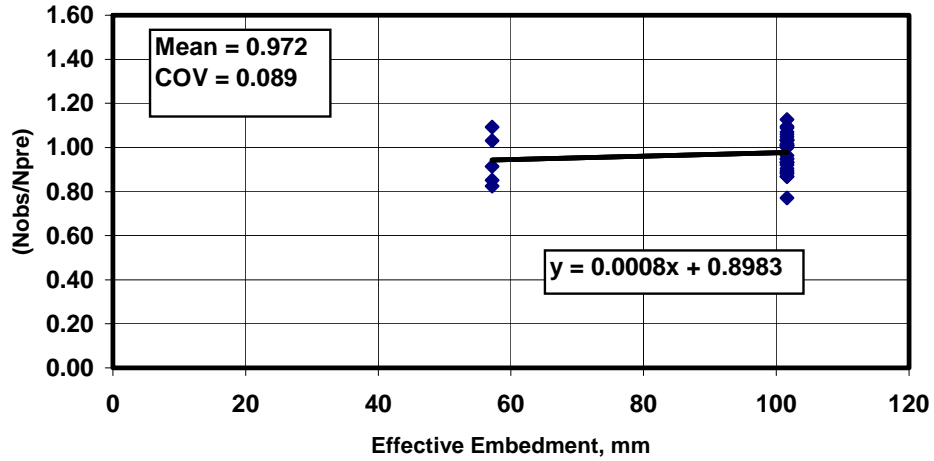


Figure 5.9 Ratios of Observed to Predicted Concrete Tensile Breakout Capacities, Theoretical Method, Single Anchors, Uncracked Concrete, Dynamic Loading, Shallower Embedments with No Edge Effects. CIP and UC Anchors only (File t1ud01.xls)

5.3.1.2 Expansion and Sleeve Anchors (Theoretical Method)

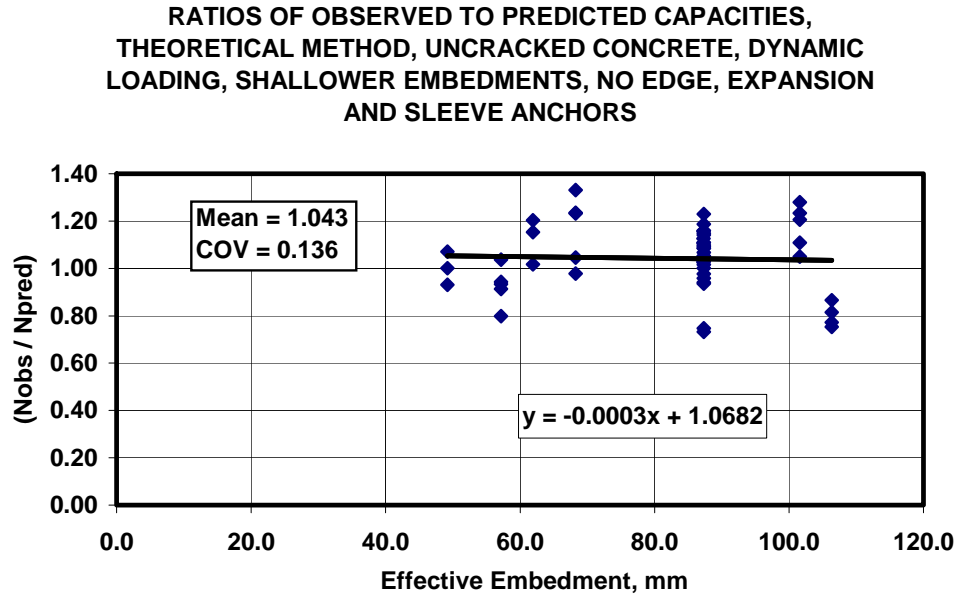


Figure 5. 10 Ratios of Observed to Predicted Concrete Tensile Breakout Capacities, Theoretical Method, Single Anchors, Uncracked Concrete, Dynamic Loading, Shallower Embedments with No Edge Effects. Expansion and Sleeve Anchors only (File t1ud02.xls)

5.4 DYNAMIC LOADING, CRACKED CONCRETE

The same factors (dynamic factors and crack factors) as mentioned earlier were used for analysis here.

5.4.1 Category One

A total of 35 test results are available for single tensile anchors, effective embedments ≤ 188 mm, no edge effects. Based on the anchor types, these test were further divided into two files for further studies. One file includes all the Cast-In-Place and Undercut anchors (20 tests), and the other file includes Expansion and Sleeve anchors (15 tests).

5.4.1.1 Cast-In-Place and Undercut Anchors (Theoretical Method)

RATIOS OF OBSERVED TO PREDICTED CAPACITIES, THEORETICAL METHOD, CRACKED CONCRETE, DYNAMIC LOADING, SHALLOWER EMBEDMENTS, NO EDGE EFFECTS, UC AND CIP ANCHOR

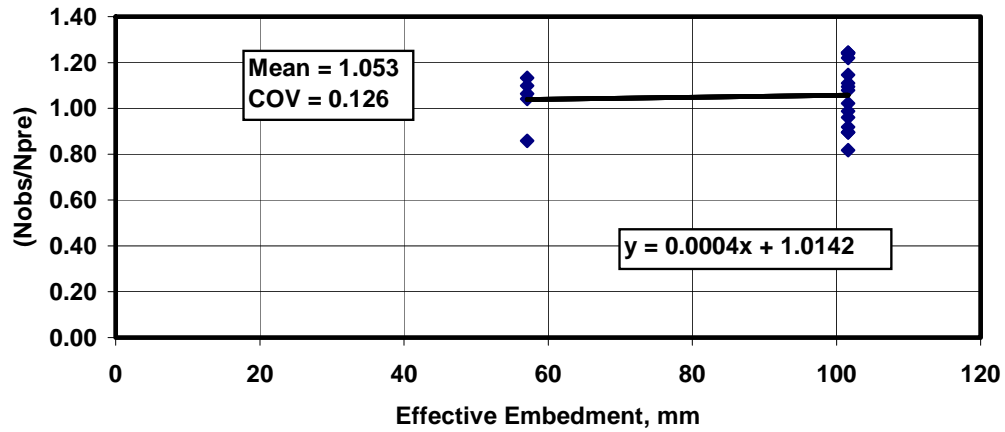


Figure 5. 11 Ratios of Observed to Predicted Concrete Tensile Breakout Capacities, Theoretical Method, Single Anchors, Cracked Concrete, Dynamic Loading, Shallower Embedments with No Edge Effects. CIP and UC Anchors only (File t1cd01.xls)

5.3.1.2 Expansion and Sleeve Anchors (Theoretical Method)

RATIOS OF OBSERVED TO PREDICTED CAPACITIES, THEORETICAL METHOD, CRACKED CONCRETE, DYNAMIC LOADING, SHALLOWER EMBEDMENTS, NO EDGE, EXPANSION AND SLEEVE ANCHORS

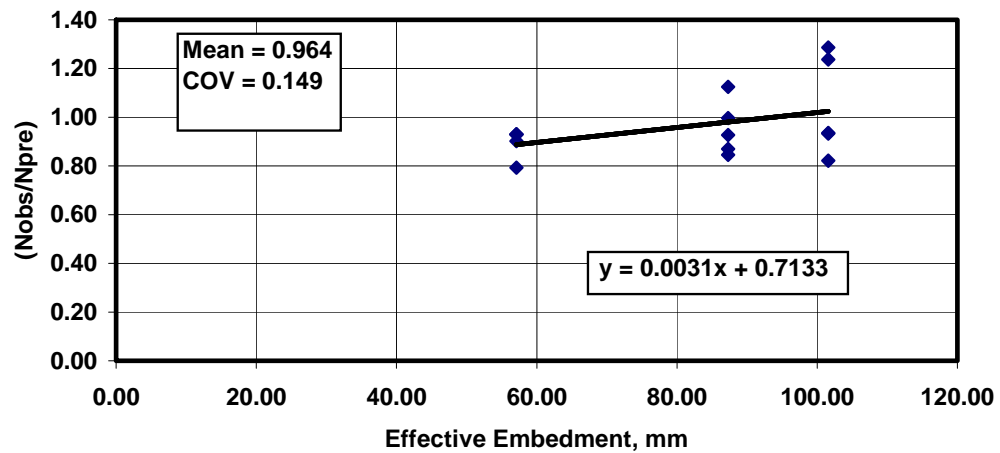


Figure 5. 12 Ratios of Observed to Predicted Concrete Tensile Breakout Capacities, Theoretical Method, Single Anchors, Cracked Concrete, Dynamic Loading, Shallower Embedments with No Edge Effects. Expansion and Sleeve Anchors only (File t1cd02.xls)

CHAPTER SIX

COMPARISON OF THE TEST RESULTS WITH THE VARIATION ON THE CC METHOD

As a result of previous work in ACI Committees 318 and 349 (Subcommittee 3), it has been proposed to modify the CC Method slightly, changing the exponent of the method from 1.5 to 1.67 at an effective embedment depth of 250 mm (9.84 in).

- for embedments less than or equal to 250 mm (9.84 in),

$$N_n = 35 \text{ or } 39 \sqrt{f'_c} h_e^{1.5} \quad (6.1)$$

- for embedments greater than 250 mm (9.84 in),

$$N_n = 23.7 \text{ or } 26.4 \sqrt{f'_c} h_e^{1.67} \quad (6.2)$$

The coefficient of 26.6 is used for cast-in-place and undercut anchors; the coefficient of 23.7 is used for expansion anchors. These coefficients are selected so that this variation will give the same values as the original CC Method for an effective embedment of 250 mm (9.84 in).

The data base “Aciutiwb.xls” is partitioned into 6 categories. This variation on the CC Method will affect only Categories 2, 4 and 6 (embedments > 188 mm). Because the variation on the CC Method affects only the formula for the basic tensile capacity of the anchor (not the interaction of adjacent anchors, nor proximity to a free edge), the capacity of any deeply embedded anchor ($h_{ef} > 250$ mm) or anchor group is

simply its capacity according to the original CC Method, multiplied by the ratio of the second of the above two formulas, divided by the first.

In other words,

$$N_{n \text{ new}} = N_{n \text{ old}} \left(\frac{26.4 \sqrt{f'_c} h_e^{1.67}}{39 \sqrt{f'_c} h_e^{1.5}} \right) \quad \text{or} \quad N_{n \text{ old}} \left(\frac{23.7 \sqrt{f'_c} h_e^{1.67}}{35 \sqrt{f'_c} h_e^{1.5}} \right) = N_{n \text{ old}} (0.678 h_e^{0.17})$$

(6.3)

Using this modification, the ratios of observed to predicted capacities are modified in Categories 2, 4 and 6, for the CC Method only. The resulting plots are shown in Figures 6.1 through 6.3 below, and the results are summarized in Table 7.?.

6.1 STATIC LOADING, UNCRACKED CONCRETE

The following graphs show the ratio of the test results over the predicted capacity ($N_{\text{obs}}/N_{\text{pre}}$) using the Variation on CC Method, verses effective embedment, under static loading in uncracked concrete.

6.1.1 Category Two (CC Variation)

A total of 77 test results are available for single tensile anchors, effective embedment > 188 mm, no edge effects (Sheet 4).

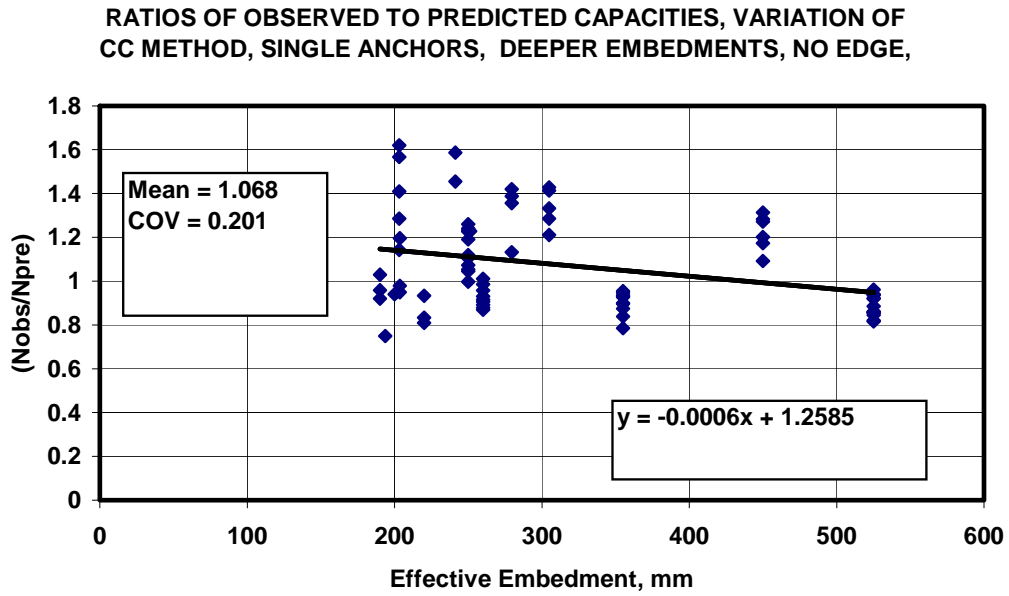


Figure 6.1 Ratios of Observed to Predicted Concrete Tensile Breakout Capacities, Variation on The CC Method, Single Anchors, Deeper Embedments (File aciutiwb.xls, Sheet 4)

6.1.2 Category Four (CC Variation)

A total of 33 test results are available for single tensile anchors, effective embedment > 188 mm, with edge effects (Sheet 5).

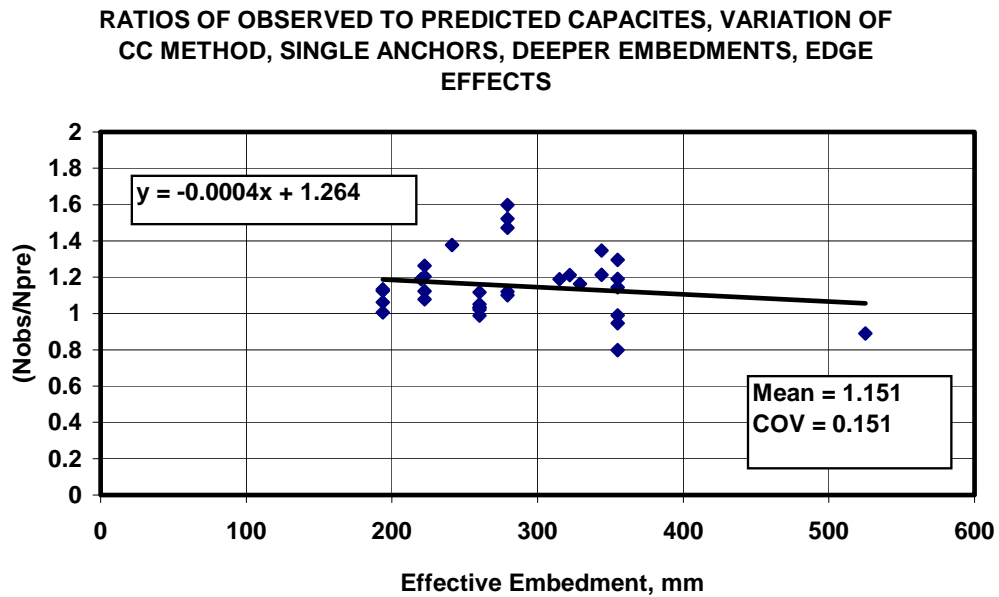


Figure 6. 2 Ratios of Observed to Predicted Concrete Tensile Breakout Capacities, Variation on The CC Method, Deeper Embedments, Edge Effects (File aciutiwb.xls, Sheet 5)

6.1.3 Category Six (CC Variation)

A total of 19 test results are available for 4-tensile anchor groups, effective embedment > 188 mm, no edge effects (Sheet 6).

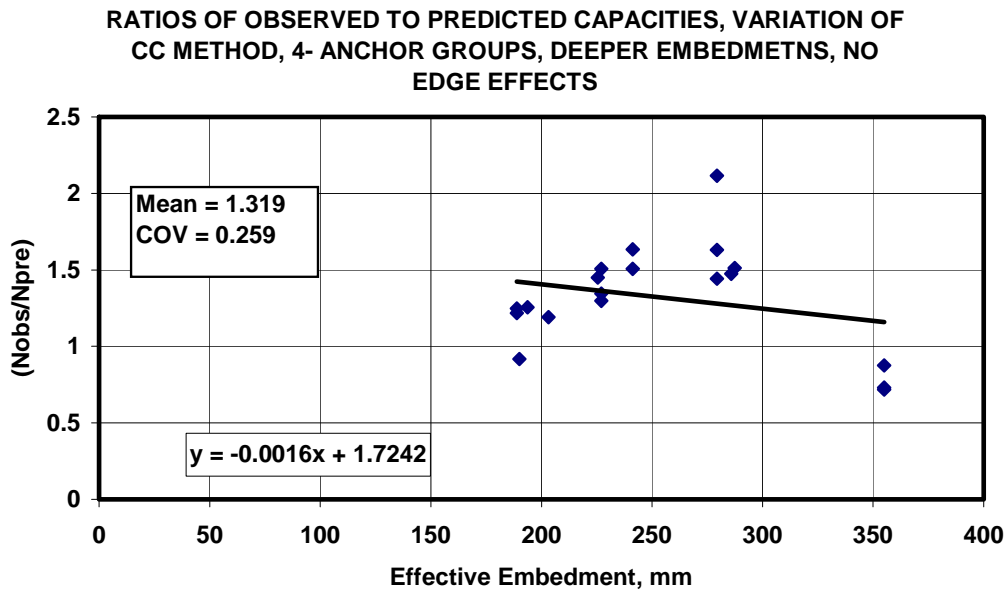


Figure 6.3 Ratios of Observed to Predicted Concrete Tensile Breakout Capacities, 45-Degree Cone Method, 4-Anchor Groups, Deeper Embedments, No Edge Effects (File aciutiwb.xls, Sheet 6)

CHAPTER SEVEN

STATISTICAL EVALUATION OF PARTITIONED DATABASE

7.1 GENERAL

In this chapter, the statistical results for three existing Methods (CC Method, 45-Degree Cone Method, and Theoretical Method) are analyzed and reviewed. The anchor data base used for the statistical analysis for this chapter is the updated version of the file ACITEMP5.xls, which was partitioned into 6 anchor categories. This data base consists of 1566 tests for anchors under static loading and in uncracked concrete. The new data base is called ACIUTIWB.xls, and the anchor categories are as follows:

- a) Single tensile anchors, effective embedment ≤ 188 mm, no edge effects (1130 tests)
- b) Single tensile anchors, effective embedment > 188 mm, no edge effects (77 tests)
- c) Single tensile anchors, effective embedment ≤ 188 mm, edge effects (137 tests)
- d) Single tensile anchors, effective embedment > 188 mm, edge effects (33 tests)
- e) and 4-tensile anchor groups, effective embedment ≤ 188 mm, no edge effects (170 tests)
- f) 4-tensile anchor groups, effective embedment > 188 mm, no edge effects (19 tests)

7.2 COMPARISON OF MEAN AND COV FOR ALL THREE METHODS, STATIC LOADING, UNCRACKED CONCRETE

Average ratios of observed to predicted capacity for each anchor category are shown in Table 7.1. The categories shown in Table 7.1 fall under case one (static loading, uncracked concrete).

Table 7.1 Ratios and COV's of Observed to Predicted Capacities for Different Categories of Tensile Anchors, Static, Uncracked

ANCHOR CATEGORY	CC METHOD		45-DEGREE METHOD		THEORETICAL METHOD	
	Average Ratio	COV	Average Ratio	COV	Average Ratio	COV
Single Anchors, Shallower Embedments	0.981	0.197	1.356	0.266	0.999	0.231
Single Anchors, Deeper Embedments	1.110	0.189	0.867	0.257	0.929	0.192
Single Anchors, Shallower Embedments, Edge Effects	1.032	0.271	1.024	0.252	1.054	0.286
Single Anchors, Deeper Embedments, Edge Effects	1.203	0.173	0.675	0.210	1.014	0.244
2- and 4-Anchor Groups, Shallower Embedments, No Edge Effects	1.081	0.192	1.188	0.331	1.057	0.225
4-Anchor Groups, Deeper Embedments, No Edge Effects	1.336	0.254	0.93	0.229	1.133	0.252

Examination of figures in chapters Three through Five leads to the following observations:

- The CC Method and the Theoretical Method usually have less scatter than the 45-Degree Cone Method (smaller COV), and usually are more accurate (mean values closer to unity).

- In the CC Method, the “k”-values used are 28 and 25. Multiplication by 1.4 (for the “no cracking” case) gives values of 39 for “headed studs” (original German nomenclature), and 35 for “metallic anchors” (again, original German nomenclature). Because the overall mean value (Figure 1.1) is close to 1.0, these values are mean values.
- Examination of the slopes of the trend lines for each figure shows how the ratios of observed to predicted capacities vary with effective embedment. Relatively large slopes indicate relatively large systematic error. For all categories of anchor, the CC Method has smaller systematic error than both 45-Degree Cone Method and the Theoretical Method. The Theoretical Method has systematic error somewhere between the CC Method and the 45-Degree Cone Method. However, both the CC Method and the Theoretical Method still have significant systematic error for the last category (4-anchor groups, deeper embedments, no edge effects). This error is significantly affected by the lack of data for groups at large embedments. Inclusion or exclusion of the 3 data points at 360 mm in Figures 3.6, 4.6 and 5.6 would greatly change the slope of the trend line through the data.

7.3 COMPARISON OF MEAN AND COV FOR THE CC AND THEORETICAL METHODS FOR STATIC/CRACKED, DYNAMIC/UNCRAKED, DYNAMIC/CRACKED CASES

Average ratios of observed to predicted capacity for each anchor case are shown in Table 7.2. All anchor cases in Table 7.2 fall under Category One (shallow embedment, no edge effects).

Table 7.2 Ratios and COV's of Observed to Predicted Capacities for Different Cases of Tensile Anchors, Category One

ANCHOR CASE	CC METHOD		THEORETICAL METHOD	
	Average Ratio	COV	Average Ratio	COV
Dynamic Loading, Uncracked Concrete, CIP and UC	1.015	0.101	0.972	0.089
Dynamic Loading, Uncracked Concrete, Expansion and Sleeve	1.049	0.147	1.043	0.136
Static Loading, Cracked Concrete, CIP and UC	0.997	0.136	0.986	0.139
Static Loading, Cracked Concrete, Expansion and Sleeve	1.194	0.276	1.137	0.242
Dynamic Loading, Cracked Concrete, CIP and UC	1.086	0.139	1.053	0.126
Dynamic Loading, Cracked Concrete, Expansion and Sleeve	1.17	0.178	0.964	0.149

Since 45-Degree Cone Method generally gave higher COV than both the CC and Theoretical Methods, it was decided to exclude it for analysis for other cases, namely static/cracked, dynamic/uncracked, and dynamic/cracked cases.

Examination of figures in chapters Three through Five leads to the following observations:

- Average ratios of observed to predicted capacity for each anchor case are shown in Table 7.2.
- Figures in chapters Three through Five and Table 7.2 show that the CC Method and the Theoretical Method give very close results for both Mean and COV values.
- Examination of slopes of the trend lines for each figure shows how the ratios of observed to predicted capacities vary with effective embedment. The Theoretical Method seems to give less systematic error (flatter slopes) in most cases. However, the difference is not great.

7.4 STATISTICAL EVALUATION OF PARTITIONED DATABASE, DUCTILE DESIGN APPROACH

Using the overall ratios of concrete breakout capacity, appropriately approximated by normal distributions, probabilities of failure were computed for an assumed statistical distribution of loads, and the probabilities of brittle failure were computed for unlimited loads, for single anchors designed according to each method for predicting concrete breakout capacity. This statistical evaluation was carried out using the Monte Carlo approach, and assuming the ductile design framework and current load and understrength factors of ACI 349-90, Appendix B.

The Monte Carlo approach of Farrow et al. (1995, 1996) was used to calculate probabilities of failure in anchors designed using the flow of ACI 349-90, Appendix B, computing concrete capacities using the 45-Degree Cone Method, the CC Method and the Theoretical Method. This process involves the following steps. This description is based on normal distributions for all variables. If different distributions are used (as noted subsequently), the basic process is the same; only the distributions are different:

- 1) The statistical distribution of applied load is assumed. The mean live load is assumed to have a mean value of 1.0, and a COV of 0.20. The unfactored design load is assumed to be a 95% fractile of the actual load. Assuming a normal distribution, this corresponds to 1.645 standard deviations above the mean, or 0.329. The unfactored design load therefore is assumed to have a value of 1.329. This assumption affects the calculated probabilities of failure under known loads. It does not affect the calculated probabilities of failure under unlimited loads.

- 2) Steel is selected so that steel capacity (the smaller of either $\phi A_s f_y$ or $0.8 A_s f_{ut}$), reduced by the appropriate ϕ -factor, exceeds the factored design load. For the high-strength anchors comprising the data base, the former value always governs, and the required steel resistance is calculated based on the yield criterion. The minimum required steel resistance is equal to the design load (the 95% fractile of the load distribution, or 1.329), multiplied by the load factor for live load (1.7), and divided by the ϕ -factor of ACI 349-90 for steel

(0.90). The minimum required steel resistance therefore has a mean value of

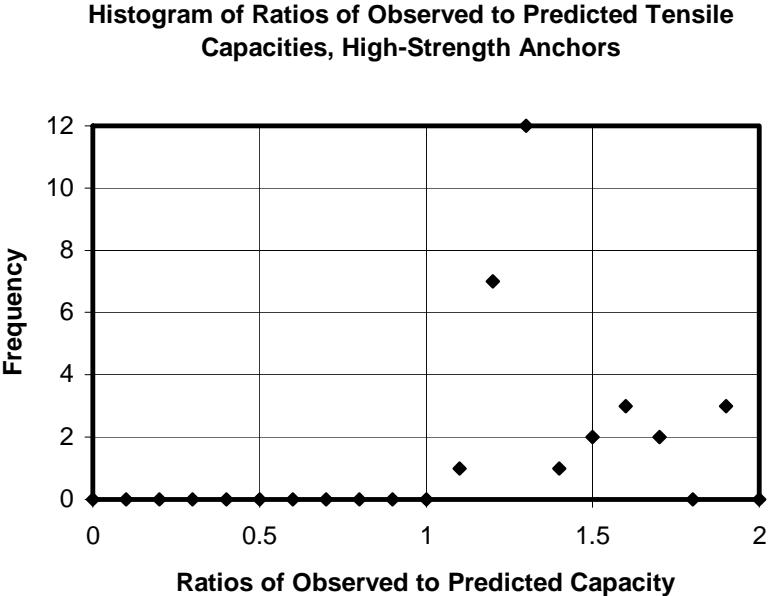


Figure 7.1 Histogram of ratios of actual to predicted steel capacities, high-strength anchors (32hstl02.xls)

2.510.

- 3) The actual resistance of this steel is calculated. Based on the steel data base previously compiled at The University of Texas at Austin, and using mean ratios and COV's for high-strength steels only, the mean ratio of actual to predicted steel capacities is 1.444, with a COV of 0.156. The histogram of corresponding test results is shown in Figure 7.1.

- 4) According to the provisions of ACI 349-90, Appendix B, the required nominal capacity of the anchor as governed by concrete breakout, reduced by a ϕ -factor of 0.65, must at least equal the specified ultimate tensile capacity of the

anchor steel. From above, the required nominal yield capacity of the anchor is 2.510. Thus, the required nominal capacity of the anchor as governed by concrete breakout failure is 2.510, multiplied by the ratio of specified ultimate strength to specified yield strength (typically 1.2), and increased by the reciprocal of the ϕ -factor for concrete breakout (0.65). The theoretical concrete breakout capacity is therefore $2.510 \times 1.2 \times (1/0.65)$, or 4.634.

- 5) The actual mean concrete breakout capacity is calculated by multiplying the theoretical capacity (4.634) by the ratio of actual concrete capacity divided by predicted capacity. These values are first given neglecting the differences between actual and specified concrete strength, and then including the differences. In Farrow et al. (1995, 1996), the breakout capacity ratios were computed separately for different embedment depths, or different ratios of spacing or edge distance to embedment depth. That breakdown is not done here.
- 6) The above steps give three classes of distributions:
 - a) the first class comprises a single distribution: the assumed normal distribution for applied loads, with an arbitrary mean of 1.0, an assumed COV of 20%, and an assumed design value at the 95% fractile (1.329).
 - b) The second class also comprises a single distribution: the histogram of actual steel capacities. It has a mean value equal to 3.624 (the product of the required mean steel capacity of 2.510, times the average ratio of actual to predicted steel capacity of 1.444), and a COV of 0.156.

- c) The third class comprises six histograms of actual concrete breakout capacities, computed separately for each of the six categories of anchor (Appendix B). Each histogram in the third class has a mean value equal to the product of 4.634 (the required concrete capacity), multiplied by the mean values from Table 7.1. In each category, COV's are from Table 7.1.
- 7) Using the computer program “VaP” (“Variables Processor”), a general-purpose, Windows-based program for evaluating stochastic quantities (Schneider 1996), 100,000 Monte Carlo trials are conducted to determine the probability of anchor failure under the assumed loads. This probability is computed as the summation of the probability of steel failure plus the probability of concrete failure. The trials are conducted using 100,000 random numbers. The trials can be conducted using the actual histograms. This practice is justified if large numbers of test data are available, so that the histogram can be taken as representative of the entire data set. Because of the small numbers of data points in most categories, it is probably preferable to use a theoretically justifiable distribution. For this reason, the concrete and steel capacities were assumed to be distributed normally.

Using the Monte Carlo analysis, the probability of failure is computed directly as the number of trials giving failure, divided by the total number of trials. In typical studies of structural reliability, probabilities of failure are quite small. To make it easier to compare small

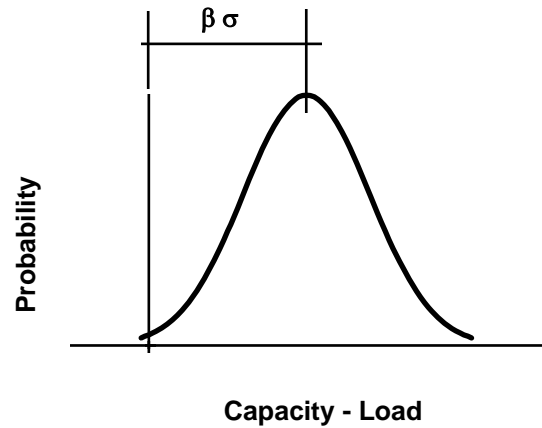


Figure 7.2 Definition of Safety Index

probabilities of failure, the probability of failure can be expressed in terms of the number of standard deviations (denoted by σ) between zero and the mean of the “Capacity - Load” distribution. This number is referred to as the “safety index,” and is designated by the Greek letter “ β .” As shown in Figure 7.2, because the total area under the (Capacity - Load) curve is unity, the probability of failure is the area under the (Capacity - Load) curve, to the left of the vertical axis. For any type of distribution, the relationship between β and the probability of failure can be calculated. Figure 2.3 shows the relationship between β and the probability of failure for a normal distribution of (Capacity - Load). The safety index β is often used instead of probability of failure because it is mathematically convenient (especially for small probabilities) and also more abstract. In this case, since the exact forms of the Load and Capacity distributions were known, it would have been possible to get the same results as would have been obtained from the Monte Carlo analysis, using a so-called FORM (first-order reliability method) analysis.

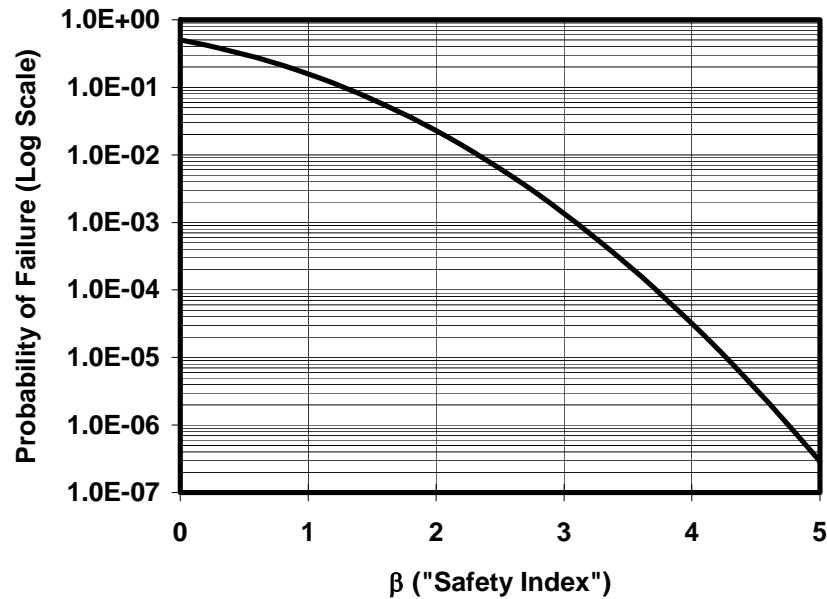


Figure 7.3 Probability of Failure versus β , Normal Distribution

- 8) In the same manner, using the “VaP” computer program, 100,000 Monte Carlo trials are conducted to determine the probability that the anchor will fail by concrete breakout rather than steel fracture, independent of the load. This is referred to as the “probability of concrete failure under unlimited loads.” It represents the probability of concrete failure in any situation in which the applied load is difficult or impossible to calculate -- for example, large thermal loads, pipe whip problems, or strong earthquakes. For this Monte Carlo analysis, only two histograms are used: steel and concrete capacities. Using the same procedure as above, 100,000 values are generated for (Concrete Capacity - Steel Capacity). The number of trials for which Concrete Capacity is less than Steel Capacity (that is, concrete breakout capacity will be exceeded before the steel fractures), divided by the total number

of trials, is the probability of brittle failure under unlimited loads. Using the relationship shown in Figure 7.3, this probability of failure can also be expressed in terms of β . This definition of ductile failure is quite conservative: the anchor is required to fracture (not merely yield) before concrete breakout occurs. This criterion is believed justified. In many high-strength anchors, actual available deformation capacity is low, because the stress-strain behavior of the steel itself shows little or no yield plateau, and also because yielding occurs only over a short length of the anchor shank. If desired, the steel strength distribution could be modified to reflect the distribution of an actual or a presumed “yield” value. For instance, the mean fracture value could be divided by 1.2. So far, this has not been done. If the ductile failure criterion is accepted as very conservative, then comparatively high probabilities of brittle failure (by that criterion) ought not to be so alarming.

7.5 SUMMARY OF RESULTS OF STATISTICAL ANALYSES, DUCTILE DESIGN APPROACH

7.5.1 Summary of Results for Known Loads, Ductile Design Approach

7.5.1.1 Static Loading, Uncracked Concrete

For known loads, for the CC Method, the 45-Degree Cone Method and the Theoretical Method, results of the statistical analyses are summarized in Table 7.3. They are presented graphically in Figure 7.4. In that figure, the “Anchor Categories” are taken from Table 7.1.

Table 7.3 Probability of failure under known loads for different categories of tensile anchors, ductile design approach, Static, Uncracked

ANCHOR CATEGORY	CC METHOD		45-DEGREE METHOD		THEORETICAL METHOD	
	Probability of Failure	β	Probability of Failure	β	Probability of Failure	β
Single Anchors, Shallower Embedments	5.46E-05	3.87	8.56E-04	3.14	1.57E-04	3.6
Single Anchors, Deeper Embedments	1.39E-05	4.19	1.99E-03	2.88	5.10E-05	3.89
Single Anchors, Shallower Embedments, Edge Effects	1.92E-03	2.89	1.00E-03	3.09	2.92E-03	2.76
Single Anchors, Deeper Embedments, Edge Effects	1.70E-06	4.65	9.87E-04	3.09	7.41E-04	3.18
2- and 4-Anchor Groups, Shallower Embedments, No Edge Effects	2.23E-05	4.08	1.79E-03	2.91	2.53E-04	3.48
4-Anchor Groups, Deeper Embedments, No Edge Effects	5.23E-04	3.28	5.08E-04	3.29	7.45E-04	3.18

**PROBABILITY OF FAILURE UNDER KNOWN LOADS,
DUCTILE DESIGN APPROACH, STATIC, UNCRACKED**

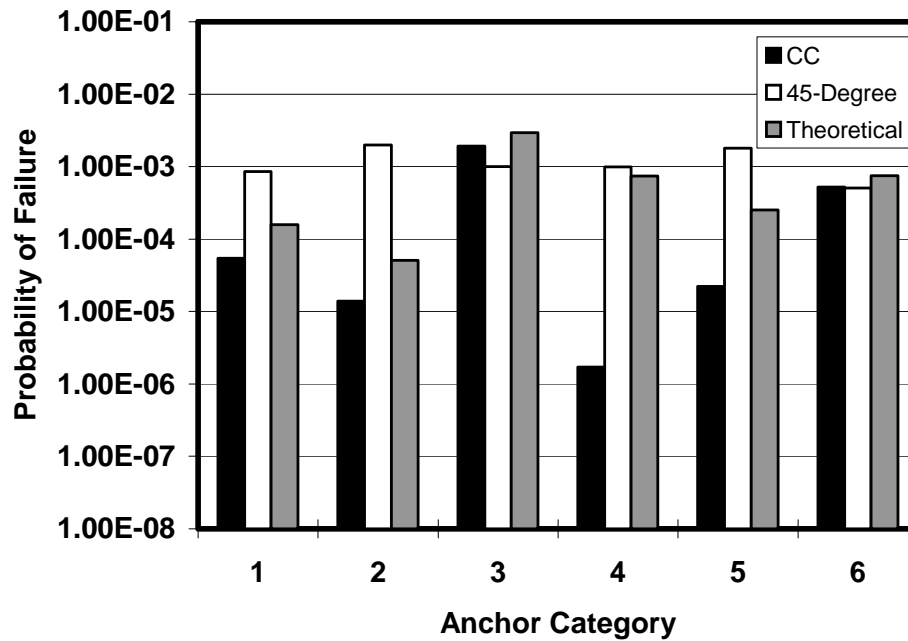


Figure 7.4 Probability of failure under known loads for different categories of tensile anchors, ductile design approach, Static, Uncracked (“Anchor Category” refers to Table 7.2) (File su-k-n.xls)

Results are probably not statistically significant in Anchor Categories Four and Six, since the number of the tests are low (33 and 19 tests for Category 4, and 6 respectively).

7.5.1.2 All Other Cases (Static/Cracked, Dynamic/Uncracked, Dynamic/Cracked)

For known loads, for the CC Method, and the Theoretical Method, results of the statistical analyses are summarized in Table 7.4. They are presented graphically in Figure 7.5. In that figure, the “Anchor Cases” are taken from Table 7.2. All the cases analyzed here fall under Category One (single anchors, shallow embedment, no edge effect).

Table 7.4 Probability of failure under known loads for different cases of tensile anchors, ductile design approach, Category One

ANCHOR CASE	CC METHOD		THEORETICAL METHOD	
	Probability of Failure	β	Probability of Failure	β
Dynamic Loading, Uncracked Concrete, CIP and UC	2.94E-13	7.2	6.47E-15	7.7
Dynamic Loading, Uncracked Concrete, Expansion and Sleeve	9.78E-08	5.2	1.20E-08	5.58
Static Loading, Cracked Concrete, CIP and UC	2.10E-08	5.48	3.80E-08	5.38
Static Loading, Cracked Concrete, Expansion and Sleeve	1.60E-03	2.95	4.68E-04	3.31
Dynamic Loading, Cracked Concrete, CIP and UC	1.58E-08	5.53	9.07E-10	6.01
Dynamic Loading, Cracked Concrete, Expansion and Sleeve	3.62E-06	4.49	3.02E-07	4.94

**PROBABILITY OF FAILURE UNDER KNOWN LOADS,
DUCTILE DESIGN APPROACH, CATEGORY ONE**

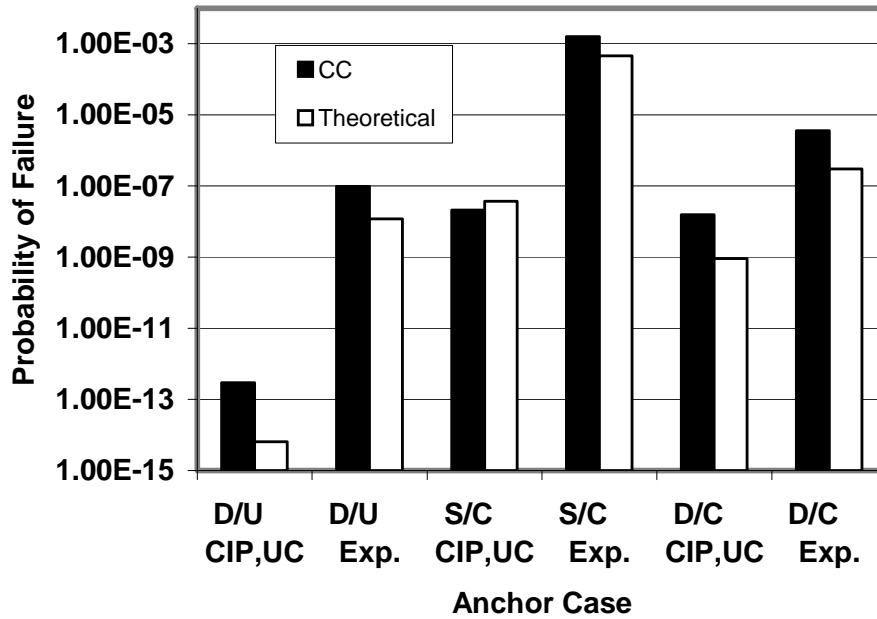


Figure 7.5 Probability of failure under known loads for different cases of tensile anchors, ductile design approach, Category One (“Anchor Case” refers to Table 7.4) (File o-k-n.xls)¹

Results are probably not statistically significant in all cases (due to low number of tests) except for S/C Exp., and D/U Exp. Anchor Cases, where the number of tests are 225, and 52 respectively.

¹ D = Dynamic, S = Static, U = Uncracked, C = Cracked, CIP = Cast-In-Place, UC = Undercut Exp. = Expansion and Sleeve

7.5.1.3 Comments on Computed Probabilities of Failure for Known Loads, Ductile Design Approach

- The probability of failure under known loads is the probability of failure in steel under known loads, plus the probability of failure in concrete. In all cases examined here, the probability of failure in steel under known loads was essentially zero, so the probability of failure under known loads is the probability of concrete breakout failure.
- These values depend on the assumed coefficient of variation of the known loads. These calculations used an assumed COV of 0.20. This value is appropriate for gravity live loads on office buildings.
- Because the statistical distribution of loads is assumed, absolute values of probabilities of failure are not as significant as relative values. The latter would be expected to remain about the same, even if different statistical distributions of loads were assumed, or if different statistical distributions of capacities were tried.
- The results of Table 7.3 and Figure 7.4 show that generally, both the CC Method and the Theoretical Method have lower probability of failure under known loads, than the 45-Degree Cone Method.
- The results presented here are somewhat different from those of Farrow et al. (1995, 1996). There are two primary reasons for this. First, the anchors were categorized differently in that work (edge distance / embedment, spacing / embedment). Second, this work used an expanded data base that was not previously available.

7.5.2 Summary of Results for Unlimited Loads, Ductile Design Approach

7.5.2.1 Static Loading, Uncracked Concrete

For unlimited loads, for the CC Method, the 45-Degree Cone Method and the Theoretical Method, results of the statistical analyses are summarized in Table 7.5. They are presented graphically in Figure 7.6. In that figure, the “Anchor Categories” are taken from Table 7.1.

Table 7.5 Probabilities of brittle failure under unlimited loads for different categories of tensile anchors, ductile design approach, Static, Uncracked

ANCHOR CATEGORY	CC METHOD		45-DEGREE METHOD		THEORETICAL METHOD	
	Probability of Brittle Failure	β	Probability of Brittle Failure	β	Probability of Brittle Failure	β
Single Anchors, Shallower Embedments	0.178	0.922	0.066	1.51	0.188	0.884
Single Anchors, Deeper Embedments	0.088	1.36	0.369	0.335	0.248	0.68
Single Anchors, Shallower Embedments, Edge Effects	0.206	0.821	0.198	0.848	0.201	0.837
Single Anchors, Deeper Embedments, Edge Effects	0.0405	1.75	0.717	0.573	0.2	0.841
2- and 4-Anchor Groups, Shallower Embedments, No Edge Effects	0.107	1.24	0.125	1.15	0.152	1.03
4-Anchor Groups, Deeper Embedments, No Edge Effects	0.0621	1.54	0.273	0.603	0.129	1.13

**PROBABILITY OF FAILURE UNDER UNLIMITED LOADS,
DUCTILE DESIGN APPROACH, STATIC, UNCRACKED**

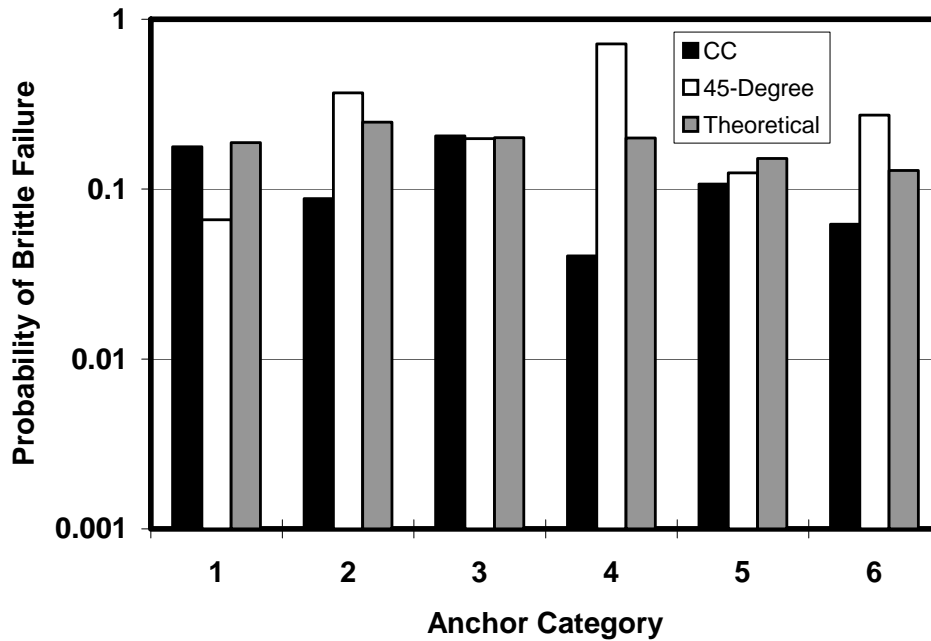


Figure 7.6 Probability of brittle failure under unlimited loads for different categories of tensile anchors, ductile design approach, Static, Uncracked (“Anchor Category” refers to Table 7.5) (File su-u-n.xls)

Results are probably not statistically significant in Anchor Categories Four and Six, since the number of the tests are low (33 and 19 tests for Category 4, and 6 respectively).

7.5.2.2 All Other Cases (Static/Cracked, Dynamic/Uncracked, Dynamic/Cracked)

For known loads, for the CC Method, and the Theoretical Method, results of the statistical analyses are summarized in Table 7.6. They are presented graphically in Figure 7.7. In that figure, the “Anchor Cases” are taken from Table 7.2. All the cases analyzed here fall under Category One (single anchors, shallow embedment, no edge effect).

Table 7.6 Probabilities of brittle failure under unlimited loads for different cases of tensile anchors, ductile design approach, Category One

ANCHOR CASE	CC METHOD		THEORETICAL METHOD	
	Probability of Brittle Failure	β	Probability of Brittle Failure	β
Dynamic Loading, Uncracked Concrete, CIP and UC	7.16E-02	1.46	1.03E-01	1.26
Dynamic Loading, Uncracked Concrete, Expansion and Sleeve	8.73E-02	1.36	8.15E-02	1.4
Static Loading, Cracked Concrete, CIP and UC	1.19E-01	1.18	1.33E-01	1.11
Static Loading, Cracked Concrete, Expansion and Sleeve	1.20E-01	1.17	1.19E-01	1.18
Dynamic Loading, Cracked Concrete, CIP and UC	5.89E-02	1.56	6.61E-02	1.51
Dynamic Loading, Cracked Concrete, Expansion and Sleeve	5.74E-02	1.61	1.67E-01	0.97

**PROBABILITY OF FAILURE UNDER UNLIMITED
LOADS, DUCTILE DESIGN APPROACH, CATEGORY
ONE**

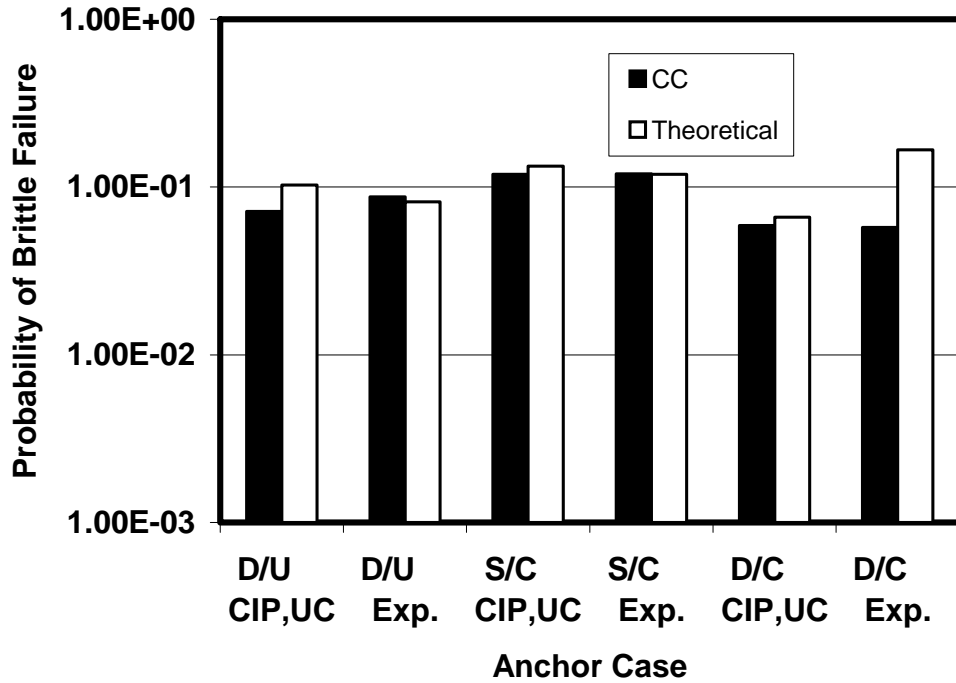


Figure 7.7 Probability of brittle failure under unlimited loads for different cases of tensile anchors, ductile design approach, Category One (“Anchor Case” refers to Table 7.6) (File o-u-n.xls)²

Results are probably not statistically significant in all cases (due to low number of tests) except for S/C Exp., and D/U Exp. Anchor Cases, where the number of tests are 225, and 52 respectively

² D = Dynamic, S = Static, U = Uncracked, C = Cracked, CIP = Cast-In-Place, UC = Undercut Exp. = Expansion and Sleeve

7.5.2.3 Comments on Computed Probabilities of Brittle Failure under Unlimited Loads, Ductile Design Approach

- These probabilities of failure are completely independent of the assumed statistical distribution of the loads. The ductile failure criterion, which requires actual steel fracture before concrete breakout, is quite severe. As a result, these computed probabilities of brittle failure are conservative (high).
- Results from Tables 7.5, and 7.6 and Figures 7.6, and 7.7 imply that generally the CC Method gives lower probability of brittle failure than the 45-Degree Cone Method and the Theoretical Method.
- The results presented here are somewhat different from those of Farrow et al. (1995, 1996). There are two primary reasons for this. First, the anchors were categorized differently in that work (edge distance / embedment, spacing / embedment). Second, this work used an expanded data base that was not previously available.
- These probabilities of brittle failure under unlimited loads, using the CC Method, correspond to mean “k”-values rather than 5% fractiles. This suggests that ACI 349-90 might reasonably be modified to incorporate the CC Method, using mean “k”-values, and using a ϕ -factor for concrete breakout of the current value of 0.65.

7.6 EVALUATE EFFECTS OF VARIATION IN CONCRETE STRENGTH, DUCTILE DESIGN APPROACH (KLINGNER 1997)

The means and coefficients of variation of the ratios between observed and predicted tensile cone breakout capacities are shown in Table 7.1 and 7.2. Those ratios were computed assuming that the actual tested concrete strength (f_c) is equal to that specified (f'_c).

In fact, this would not be the case. The actual tested strength of lab-cured concrete cylinders customarily exceeds the specified concrete strength by about 600 psi. However, it might also be argued that the fabrication and curing of those cylinders would be better than the actual concrete on the job. Data are not available on this point. Using data from the past several years of testing at The University of Texas at Austin, the ratios of the compressive strengths of field-cured cylinders, divided by the corresponding specified compressive strengths of those same cylinders, gives a mean ratio of actual to specified cylinder strength of 1.30, with a COV of 0.30. This variation is assumed to be normally distributed. If job-site data are available for the relationship between field-cured cylinder strength and specified strength, those data should be used instead.

In this section, the influence of those variations in concrete strength are examined, using the above ratio of actual to specified cylinder strengths. The objective of this example is to demonstrate the effect of this variation in concrete strengths, on the probabilities of failure presented previously.

Assuming that concrete breakout strength is proportional to the square root of the concrete compressive strength, the above Monte Carlo analyses were re-run using

a limit state function in which the concrete capacities were multiplied by the square roots of the above concrete compressive strength ratio.

The effect of the statistical variation of actual concrete strengths with respect to specified values was not addressed in prior statistical studies of anchor design equations Farrow et al. (1995, 1996). As discussed later here, it can significantly increase the probability of failure. As expected, inclusion of the difference between actual and specified concrete strengths tends to increase the mean ratio of observed to predicted breakout capacities. However, it also increases the scatter of the results. This is because another random variable has been introduced into the problem -- the more variables, the more scatter.

7.6.1 Summary of Results for Known Loads, including Effects of Concrete Strength Variations, Ductile Design Approach

7.6.1.1 Static Loading, Uncracked Concrete

For known loads, and including the effects of variations in concrete strength, results of the statistical analyses are summarized in Table 7.7. Probabilities of failure for known loads, without and with the effects of variations in concrete strength, are shown in Figure 7.8. In that figure, the “Anchor Categories” are taken from Table 7.7.

Table 7.7 *Probability of failure under known loads for different categories of tensile anchors, including effects of variations in concrete strengths, ductile design approach, Static, Uncracked*

ANCHOR CATEGORY	CC METHOD		45-DEGREE METHOD		THEORETICAL METHOD	
	Probability of Failure	β	Probability of Failure	β	Probability of Failure	β
Single Anchors, Shallower Embedments	1.03E-04	3.71	6.84E-04	3.2	1.14E-04	3.68
Single Anchors, Deeper Embedments	3.61E-05	3.97	1.47E-03	2.97	1.14E-04	3.68
Single Anchors, Shallower Embedments, Edge Effects	1.48E-03	2.97	7.55E-04	3.17	2.30E-03	2.83
Single Anchors, Deeper Embedments, Edge Effects	1.21E-05	4.22	1.26E-03	3.02	5.51E-04	3.26
2- and 4-Anchor Groups, Shallower Embedments, No Edge Effects	4.92E-05	3.89	1.42E-03	2.98	1.85E-04	3.56
4-Anchor Groups, Deeper Embedments, No Edge Effects	4.10E-04	3.35	3.70E-04	3.37	5.69E-04	3.25

**EFFECT OF VARIATIONS IN CONCRETE STRENGTH ON
PROBABILITIES OF FAILURE UNDER KNOWN LOADS,
STATIC, UNCRACKED**

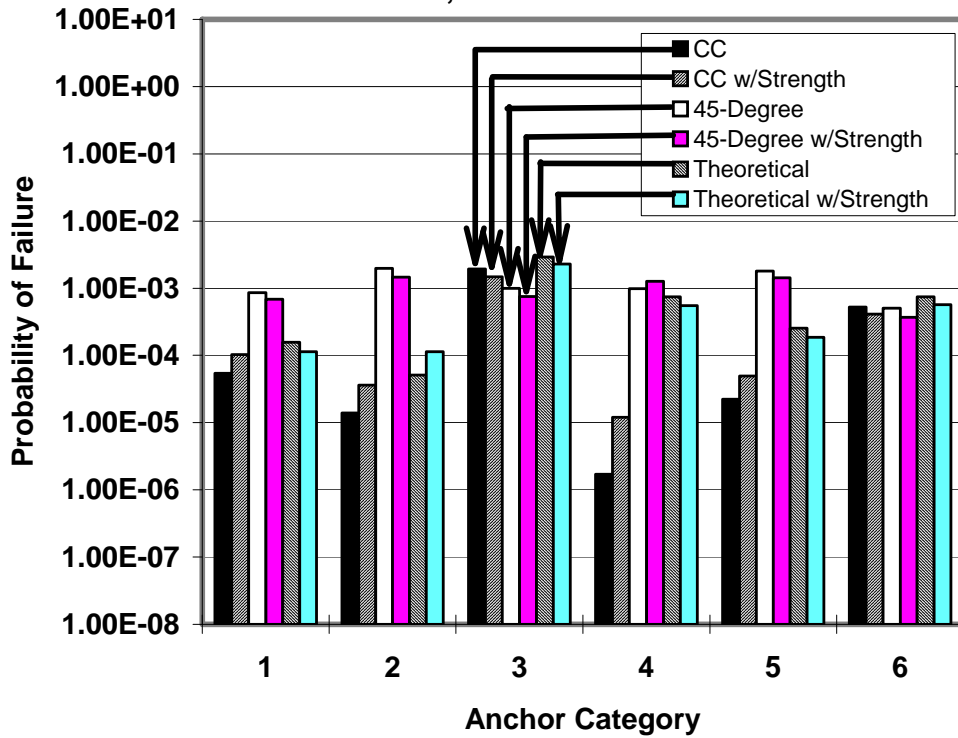


Figure 7.8 Probability of failure under known loads for different categories of tensile anchors, including effect of variations in concrete strength, ductile design approach, Static, Uncracked (“Anchor Category” refers to Table 7.7) (File suk-i.xls)

Results are probably not statistically significant in Anchor Categories Four and Six, since the number of the tests are low (33 and 19 tests for Category 4, and 6 respectively).

7.6.1.2 All Other Cases (Static/Cracked, Dynamic/Uncracked, Dynamic/Cracked)

For known loads, and including the effects of variations in concrete strength, results of the statistical analyses are summarized in Table 7.8. Probabilities of failure for known loads, without and with the effects of variations in concrete strength, are shown in Figure 7.9. In that figure, the “Anchor Cases” are taken from Table 7.8. All the cases analyzed here fall under Category One (single anchors, shallow embedment, no edge effect).

Table 7.8 *Probability of failure under known loads for different cases of tensile anchors, including effects of variations in concrete strengths, ductile design approach, Category One*

ANCHOR CASE	CC METHOD		THEORETICAL METHOD	
	Probability of Failure	β	Probability of Failure	β
Dynamic Loading, Uncracked Concrete, CIP and UC	1.26E-05	4.21	1.61E-05	4.16
Dynamic Loading, Uncracked Concrete, Expansion and Sleeve	1.29E-05	4.21	1.15E-05	4.23
Static Loading, Cracked Concrete, CIP and UC	1.51E-05	4.17	1.66E-05	4.15
Static Loading, Cracked Concrete, Expansion and Sleeve	1.27E-03	3.02	3.50E-04	3.39
Dynamic Loading, Cracked Concrete, CIP and UC	9.35E-06	4.28	1.01E-05	4.26
Dynamic Loading, Cracked Concrete, Expansion and Sleeve	1.73E-05	4.14	2.26E-05	4.08

**PROBABILITY OF FAILURE UNDER KNOWN LOADS,
DUCTILE DESIGN APPROACH, INCLUDING EFFECTS OF
CONCRETE STRENGTH VARIATION, CATEGORY ONE**

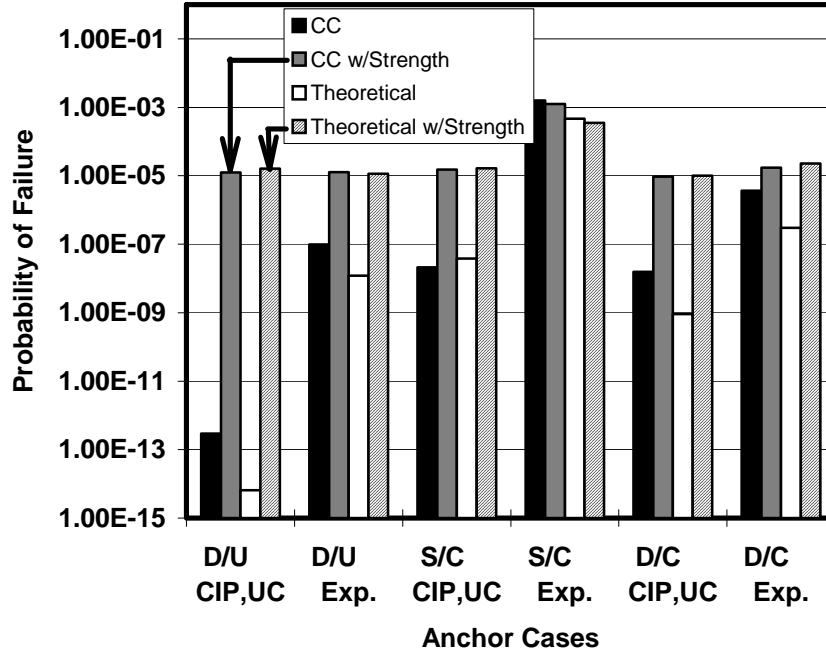


Figure 7.9 Probability of failure under known loads for different cases of tensile anchors, including effect of variations in concrete strength, ductile design approach, Category One (“Anchor Case” refers to Table 7.8) (File o-k-i.xls)³

Results are probably not statistically significant in all cases (due to low number of tests) except for S/C Exp., and D/U Exp. Anchor Cases, where the number of tests are 225, and 52 respectively

³ D = Dynamic, S = Static, U = Uncracked, C = Cracked, CIP = Cast-In-Place, UC = Undercut Exp. = Expansion and Sleeve

7.6.1.3 Comments on Effects of Variations in Concrete Strength, on Computed Probabilities of Failure for Known Loads, Ductile Design Approach

- Table 7.7 and Figure 7.8 show that practically all anchor categories, for all three methods, inclusion of the effects of variations in concrete strength from the specified value has the effect of reducing the probabilities of failure under known loads. There are some minor exceptions with the CC Method. However, probabilities of failure are still quite low in all cases.
- It seems that Table 7.8 and Figure 7.9 do not agree with the results given in Table 7.7 and Figure 7.8. Figure 7.9 shows that in most cases (except in S/C Exp. case) inclusion of the effects of variations in concrete strength from the specified value has the effect of increasing the probabilities of failure under known loads. This is somewhat misleading. The probable reason behind this is the low number of tests for the cases analyzed here. Only the S/C Exp. (static/cracked, Expansion and sleeve anchors) case, which has comparably high number of tests (225 tests) can be statistically analyzed here. In this Case (S/C Exp. case), the result are the same as in Table 7.7 and Figure 7.8.

7.6.2 Summary of Results for Unlimited Loads, Including Effects of Concrete Strength Variation, Ductile Design Approach

7.6.2.1 Static Loading, Uncracked Concrete

For unlimited loads, and including the results of variations in concrete strength, results of the statistical analyses are summarized in Table 7.9. Probabilities of brittle failure, without and with the effects of variations in concrete strength, are presented in Figure 7.10. In that figure, the “Anchor Categories” are taken from Table 7.9.

Table 7.9 Probabilities of brittle failure under unlimited loads for different categories of tensile anchors, including effects of variations in concrete strength, ductile design approach, Static, Uncracked

ANCHOR CATEGORY	CC METHOD		45-DEGREE METHOD		THEORETICAL METHOD	
	Probability of Brittle Failure	β	Probability of Brittle Failure	β	Probability of Brittle Failure	β
Single Anchors, Shallower Embedments	0.124	0.15	0.046	1.69	0.123	1.16
Single Anchors, Deeper Embedments	0.061	1.55	0.253	0.67	0.159	1.00
Single Anchors, Shallower Embedments, Edge Effects	0.206	0.82	0.134	1.11	0.140	1.08
Single Anchors, Deeper Embedments, Edge Effects	0.033	1.84	0.521	0.05	0.134	1.11
2- and 4-Anchor Groups, Shallower Embedments, No Edge Effects	0.072	1.46	0.087	1.36	0.101	1.28
4-Anchor Groups, Deeper Embedments, No Edge Effects	0.043	1.72	0.180	0.91	0.088	1.36

**EFFECT OF VARIATIONS IN CONCRETE STRENGTH ON
PROBABILITIES OF FAILURE UNDER UNLIMITED
LOADS, STATIC, UNCRACKED**

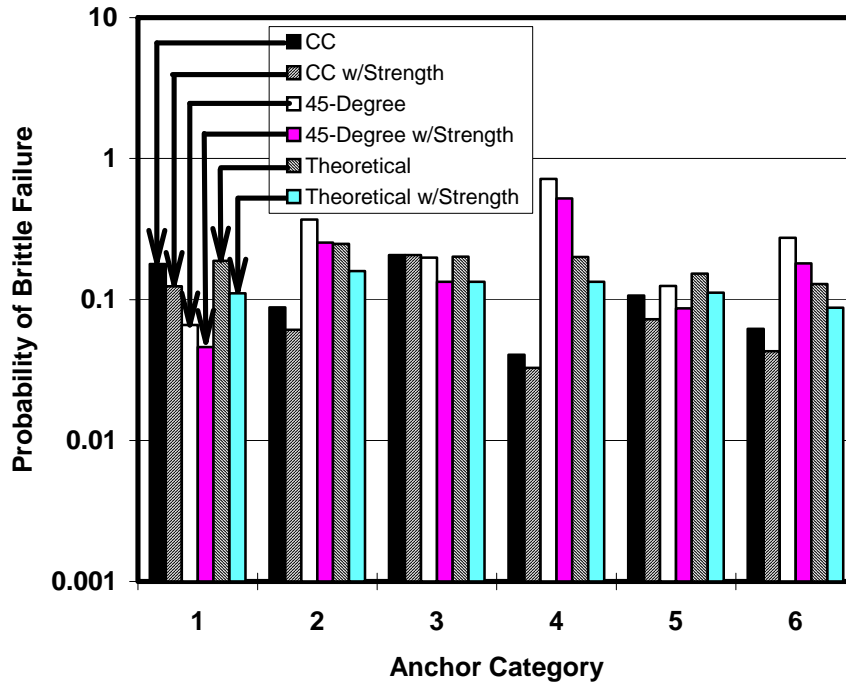


Figure 7.10 Probability of brittle failure under unlimited loads for different categories of tensile anchors, including effects of variations in concrete strength, ductile design approach, Static, Uncracked (“Anchor Category” refers to Table 7.9) (File su-u-i.xls)

Results are probably not statistically significant in Anchor Categories Four and Six, since the number of the tests are low (33 and 19 tests for Category 4, and 6 respectively).

7.6.2.2 All Other Cases (Static/Cracked, Dynamic/Uncracked, Dynamic/Cracked)

For unlimited loads, and including the results of variations in concrete strength, results of the statistical analyses are summarized in Table 7.10. Probabilities of brittle failure, without and with the effects of variations in concrete strength, are presented in Figure 7.11. In that figure, the “Anchor Cases” are taken from Table 7.10. All the cases analyzed here fall under Category One (single anchors, shallow embedment, no edge effect).

Table 7. 10 Probabilities of brittle failure under unlimited loads for different cases of tensile anchors, including effects of variations in concrete strength, ductile design approach, Category One

ANCHOR CASE	CC METHOD		THEORETICAL METHOD	
	Probability of Brittle Failure	β	Probability of Brittle Failure	β
Dynamic Loading, Uncracked Concrete, CIP and UC	6.40E-02	1.52	8.22E-02	1.39
Dynamic Loading, Uncracked Concrete, Expansion and Sleeve	6.47E-02	1.52	6.31E-02	1.53
Static Loading, Cracked Concrete, CIP and UC	8.39E-02	1.38	9.08E-02	1.34
Static Loading, Cracked Concrete, Expansion and Sleeve	8.30E-02	1.38	8.04E-02	1.4
Dynamic Loading, Cracked Concrete, CIP and UC	4.95E-02	1.62	5.62E-02	1.59
Dynamic Loading, Cracked Concrete, Expansion and Sleeve	4.08E-02	1.74	1.09E-01	1.23

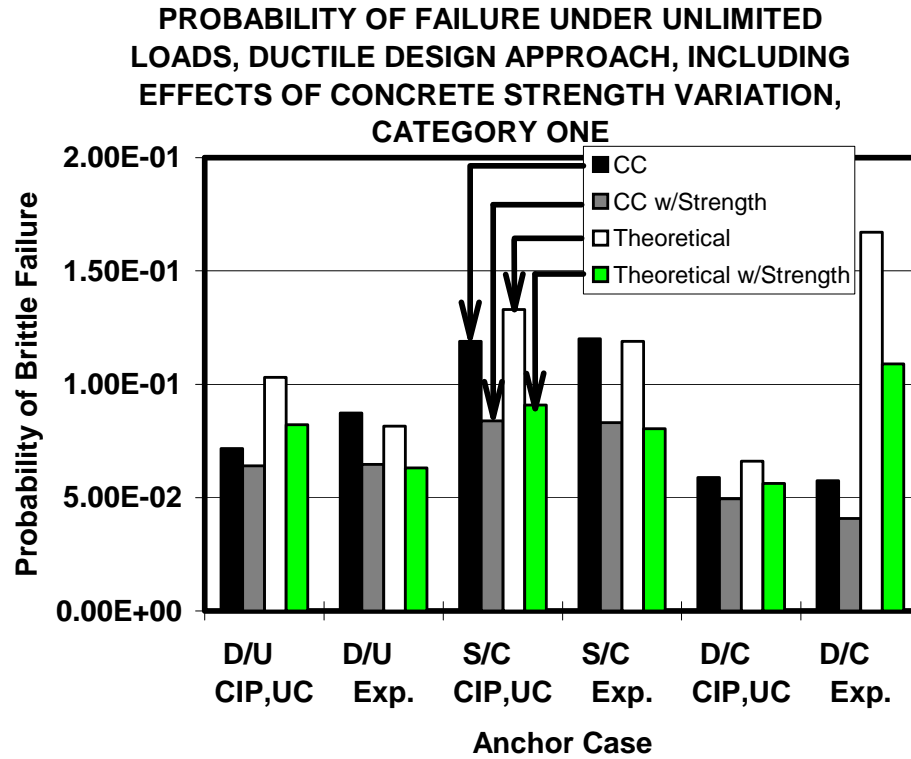


Figure 7. 11 Probability of brittle failure under unlimited loads for different cases of tensile anchors, including effects of variations in concrete strength, ductile design approach, Category One (“Anchor Case” refers to Table 7.10) (File o-u-i.xls)⁴

Results are probably not statistically significant in all cases (due to low number of tests) except for S/C Exp., and D/U Exp. Anchor Cases, where the number of tests are 225, and 52 respectively

⁴ D = Dynamic, S = Static, U = Uncracked, C = Cracked, CIP = Cast-In-Place, UC = Undercut Exp. = Expansion and Sleeve

7.6.2.3 Comments on Effects of Variations in Concrete Strength, on Computed Probabilities of Brittle Failure under Unlimited Loads, Ductile Design Approach

Examinations of Tables 7.9, and 7.10 and Figures 7.10, and 7.11 show that increases in mean concrete strength, result in decreased probabilities of brittle failure under unlimited loads, for all methods, in all anchor cases and categories.

7.7 VARIATION ON THE CC METHOD, DUCTILE DESIGN APPROACH

In this section the Variation on the CC Method will be statistically analyzed and compared with the original CC Method and the Theoretical Method.

7.7.1 Comparison of Mean and COV for CC Method, Variation on the CC, and the Theoretical methods, Static Loading, Uncracked Concrete

Average ratios of observed to predicted capacity for each anchor category are shown in Table 7.11. The categories shown in Table 7.1 fall under case one (static loading, uncracked concrete).

Table 7.11 Ratios and COV's of Observed to Predicted Capacities for Different Categories of Tensile Anchors, Static, Uncracked

ANCHOR CATEGORY	CC METHOD		VARIATION OF CC METHOD		THEORETICAL METHOD	
	Average Ratio	COV	Average Ratio	COV	Average Ratio	COV
Single Anchors, Shallower Embedments	0.993	0.195	0.993	0.195	1.026	0.217
Single Anchors, Deeper Embedments	1.110	0.189	1.068	0.201	0.929	0.192
Single Anchors, Shallower Embedments, Edge Effects	1.027	0.273	1.027	0.273	1.024	0.252
Single Anchors, Deeper Embedments, Edge Effects	1.203	0.173	1.151	0.151	1.014	0.244
2- and 4-Anchor Groups, Shallower Embedments, No Edge Effects	1.081	0.192	1.081	0.192	1.049	0.238
4-Anchor Groups, Deeper Embedments, No Edge Effects	1.336	0.254	1.319	0.259	1.133	0.252

7.7.2 Summary of Results for Known Loads. CC Method, Variation on the CC Method, and the Theoretical Method, Ductile Design Approach

For known loads, for the CC Method, Variation on the CC Method and the Theoretical Method, results of the statistical analyses are summarized in Table 7.12. They are presented graphically in Figure 7.12. In that figure, the “Anchor Categories” are taken from Table 5.2. These analyses were done only for anchors under Case One (static loading, uncracked concrete).

Table 7.12 Probability of failure under known loads for different categories of tensile anchors, ductile design approach, Static, Uncracked

ANCHOR CATEGORY	CC METHOD		VARIATION OF CC METHOD		THEORETICAL METHOD	
	Probability of Failure	β	Probability of Failure	β	Probability of Failure	β
Single Anchors, Shallower Embedments	4.46E-05	3.92	4.46E-05	3.92	1.76E-04	3.57
Single Anchors, Deeper Embedments	3.27E-06	4.51	4.89E-05	3.89	5.10E-05	3.89
Single Anchors, Shallower Embedments, Edge Effects	2.12E-03	2.86	2.12E-03	2.86	1.00E-03	3.09
Single Anchors, Deeper Embedments, Edge Effects	1.70E-06	4.65	8.84E-08	5.01	7.41E-04	3.18
2- and 4-Anchor Groups, Shallower Embedments, No Edge Effects	2.23E-05	4.08	2.23E-05	4.08	5.04E-04	3.29
4-Anchor Groups, Deeper Embedments, No Edge Effects	5.36E-04	3.27	6.78E-04	3.14	7.45E-04	3.18

**PROBABILITY OF FAILURE UNDER KNOWN LOADS,
DUCTILE DESIGN APPROACH, STATIC, UNCRACKED**

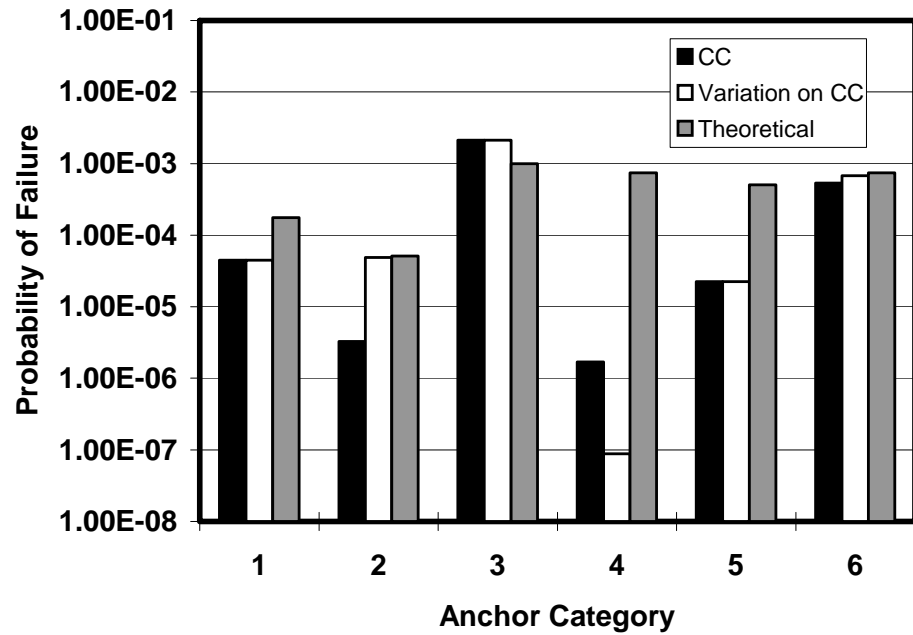


Figure 7.12 Probability of failure under known loads for different categories of tensile anchors, ductile design approach, Static, Uncracked (“Anchor Category” refers to Table 7.12) (File cv-k-n.xls)

Results are probably not statistically significant in Anchor Categories Four and Six, since the number of the tests are low (33 and 19 tests for Category 4, and 6 respectively).

7.7.2.1 Comments on Computed Probabilities of Failure for Known Loads, Variation on CC Method, Ductile Design Approach

- Although the variation on the CC Method has a higher systematic error than the original CC Method and the Theoretical Method, its probabilities of failure for known loads are only slightly higher for the deeper embedment categories. The decreased probability of failure in Anchor Category 4 is believed to result from a difference in computational techniques due to the very low probability of failure. The probabilities of failure are of course identical in Anchor Categories 1,3, and 5, since the method is identical to the CC Method for shallower embedments.
- The Theoretical Method generally gives higher probability of failure, than the variation on the CC Method.

7.7.3 Summary of Results for Unlimited Loads, CC Method, Variation on the CC Method, and the Theoretical Method, Ductile Design Approach

For unlimited loads, for the CC Method, the variation on the CC Method and the Theoretical Method, results of the statistical analyses are summarized in Table 7.13. They are presented graphically in Figure 7.13. In that figure, the “Anchor Categories” are taken from Table 7.13. These analyses were done only for anchors under Case One (static loading, uncracked concrete).

Table 7.13 Probabilities of brittle failure under unlimited loads for different categories of tensile anchors, ductile design approach, Static, Uncracked

ANCHOR CATEGORY	CC METHOD		VARIATION OF CC METHOD		THEORETICAL METHOD	
	Probability of Brittle Failure	β	Probability of Brittle Failure	β	Probability of Brittle Failure	β
Single Anchors, Shallower Embedments	0.178	0.92	0.178	0.92	0.168	0.961
Single Anchors, Deeper Embedments	0.088	1.35	0.123	0.16	0.248	0.68
Single Anchors, Shallower Embedments, Edge Effects	0.212	0.801	0.212	0.801	0.198	0.848
Single Anchors, Deeper Embedments, Edge Effects	0.0405	1.75	0.0411	1.74	0.2	0.841
2- and 4-Anchor Groups, Shallower Embedments, No Edge Effects	0.107	1.24	0.107	1.24	0.168	0.96
4-Anchor Groups, Deeper Embedments, No Edge Effects	0.0621	1.54	0.0694	1.48	0.129	1.13

**PROBABILITY OF FAILURE UNDER KNOWN LOADS,
DUCTILE DESIGN APPROACH, STATIC, UNCRACKED**

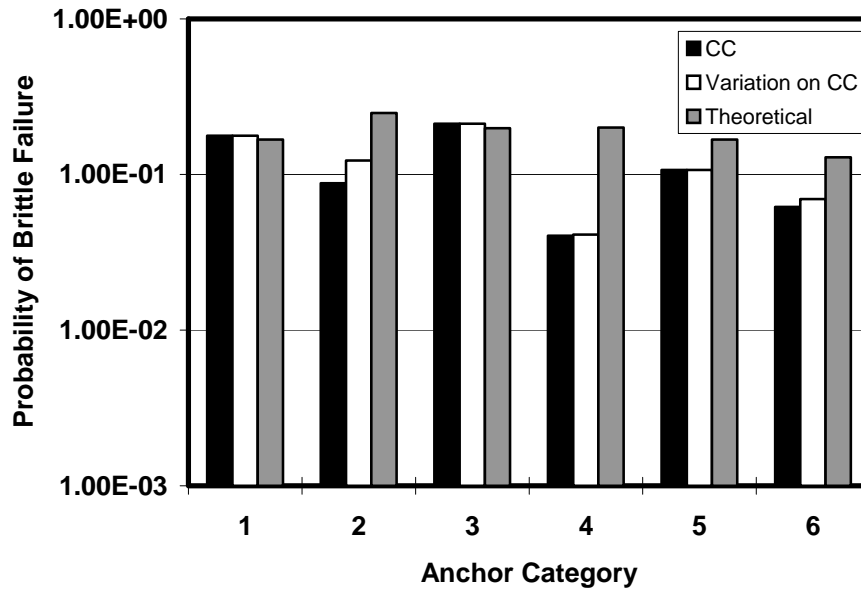


Figure 7.13 Probability of brittle failure under unlimited loads for different categories of tensile anchors, ductile design approach, Static, Uncracked (“Anchor Category” refers to Table 7.13) (File cv-k-i.xls)

Results are probably not statistically significant in Anchor Categories Four and Six, since the number of the tests are low (33 and 19 tests for Category 4, and 6 respectively).

7.7.3.1 Comments on Computed Probabilities of Brittle Failure under Unlimited Loads, Variation on CC Method, Ductile Design Approach

- Just as for known loads, the probabilities of brittle failure under unlimited loads are only slightly higher for the variation on the CC Method and the Theoretical Method, than for the original CC Method, in the three categories corresponding to deeper embedments. For the CC Method and the variation on CC Method probabilities of brittle failure are of course identical in the anchor categories corresponding to shallower embedments.

CHAPTER NINE

SUMMARY, CONCLUSION, AND RECOMMENDATIONS

9.1 SUMMARY

In this research project, sponsored by the US Nuclear Regulatory Commission (NRC), the test results of concrete cone breakout capacity of single and multiple anchor connections under both static and dynamic loading, and in both uncracked and cracked concrete were compared against three existing methods. The three methods compared in this thesis are:

- * 45-Degree Cone Method (ACI 349-90)
- * CC Method
- * Theoretical Method

Each of the above methods are briefly described in chapter two. The comparison of the test results with each of the above methods are shown in chapters 3 through 5. In chapter 6 the Variation of CC method was compared with the original CC method against 3 deeper embedment categories (Categories 2, 4, and 6)

There are a total of 1938 test results available in different categories for Undercut, Cast-In-Place, Sleeve, and Expansion II anchors. These data have been placed on different data bases in terms of SI units and concrete cube strength (200 mm cube). The number of data points in each of the 4 cases and the 6 categories are as follows:

- 1) Static Loading, Uncracked Concrete
 - single anchors, shallower embedment, no edge effects 1130
 - single anchors, deeper embedment, no edge effects 77

single anchors, shallower embedment, edge effects	137
single anchors, deeper embedment, edge effects	33
group anchors, shallower embedment, no edge effects	170
group anchors, deeper embedment, no edge effects	19
2) Static Loading, Cracked Concrete	
single anchors, shallower embedment, no edge effects	
CIP and Undercut anchors	25
Expansion and Sleeve anchors	225
3) Dynamic Loading, Uncracked Concrete	
single anchors, shallower embedment, no edge effects	
CIP and Undercut anchors	35
Expansion and Sleeve anchors	52
4) Dynamic Loading, Cracked Concrete	
single anchors, shallower embedment, no edge effects	
CIP and Undercut anchors	20
Expansion and Sleeve anchors	15

9.2.1 General Conclusions

- Comparing results of the three existing methods show that the CC Method and the Theoretical Method give closer predicted concrete breakout capacities to the actual tested capacity, than the 45-Degree Cone Method. For this reason the 45-Degree Cone Method was not used for analysis and comparison for cases involving dynamic loading and/or cracked concrete.
- The primary advantage of the 45-Degree Cone Method approach is its conical idealization of the failure surface. However, calculations of net projected area for multiple anchors are very complex in practice. Concrete Capacity Method (CC Method) uses the basic principle of idealizing the failure surface along with a relatively simple calculation for net projected area. For this reason, the CC Method can be regarded as much more designer-friendly (Farrow 1992).
- Sleeve anchors behave better than Expansion anchors under the same type of loading and concrete status. Sleeve anchors behave somewhat between Expansion anchors and CIP and Undercut anchors. Usually Sleeve anchors give around 20% higher $N_{obs/pre}$ than Expansion anchors. This indicates that Sleeve anchors and Expansion anchors should not be analyzed under the same condition, using the same “ k ” value. Test results (from Hilti Company) show that under static loading and in uncracked concrete Expansion anchors give the mean value of 0.86 for $N_{obs/pre}$, where Sleeve anchors give $N_{obs/pre}$ equal to 1.06. Under the same load condition but in cracked concrete Expansion anchors give $N_{obs/pre}$ equal to 0.86, but $N_{obs/pre}$ for Sleeve anchors is equal to 1.34. Adding the two anchor types

- Based on the limited test results available on dynamic tests and cracked concrete, the following factors prove to estimate the behavior of the concrete capacity well:

Crack Factor = 0.9 for UC and CIP anchors

Crack Factor = 0.7 for all others

Dynamic Factor = 1.25 for UC, CIP, and Sleeve anchors

Dynamic Factor = 1.0 for Expansion anchors

These factors should be multiplied by the predicted static/uncracked capacity of an anchor to produce the desired capacity. For example, concrete breakout capacity of an UC anchor under dynamic load = 1.25 x concrete breakout capacity of the same anchor under static loading in uncracked concrete.

- Generally the Variation on CC Method does not give better predicted capacity than original CC Method. Actually, Variation on CC Method always gives more systematic error (steeper slope of the $N_{obs/pre}$ vs. Embedment line), than the original CC Method.

9.2.2 Probabilities of Failure

Results are probably not statistically significant in anchor categories with test numbers less than 30.

9.2.2.1 Probabilities of Failure for Known Loads, Ductile Design Approach

- The probability of failure under known loads is the probability of failure in steel under known loads, plus the probability of failure in concrete. In all cases, the probability of failure in steel under known loads was essentially zero, so the probability of failure under known loads is the probability of concrete breakout failure.
- These values depend on the assumed coefficient of variation of the known loads. These calculations used an assumed COV of 0.20. This value is appropriate for gravity live loads on office buildings.
- The results show that generally, both the CC Method and the Theoretical Method have lower probability of failure under known loads, than the 45-Degree Cone Method. The results for CC Method are consistent with those of Farrow et al. (1995, 1996). The differences are particularly striking for deeper embedments. Generally, CC Method has lower probability of failure under known loads, than the Theoretical Method.
- The results presented in this thesis are somewhat different from those of Farrow et al. (1995, 1996). There are two primary reasons for this. First, the anchors were categorized differently in that work (edge distance / embedment, spacing / embedment). Second, this work used an expanded data base that was not previously available.
- The results imply that with both the CC Method and the Theoretical Method, the probability of failure of an individual anchor under known loads is lower than with the 45-Degree Cone Method, in most of the anchor categories. The fundamental reasons for it are the larger coefficient of

variation associated with the 45-Degree Cone Method. Current design practice for reinforced concrete structures typically accepts designs giving β values of 3.0 to 3.5 (MacGregor 1988). When the CC Method and the 45-Degree Cone Method are used with the general framework of ACI 349-90, both give values of β at least equivalent to this. However, within the same framework, the 45-Degree Cone Method does not. This implies that for the 45-Degree Cone Method to be used safely within the framework of ACI 349-90, the ϕ -factor associated with concrete breakout failure should be reduced. Although Figures in chapter 4 imply that the 45-Degree Cone Method is “conservative,” in reality its large scatter gives undesirably high probabilities of failure under known loads, when used within the current framework and ϕ -factors of ACI 349-90. These conclusions are similar to those reached by Farrow et al. (1995) for anchors affected by adjacent edges or other anchors.

9.2.2.2 Probabilities of Failure for Known Loads including the effects of Variation in Concrete Strength, Ductile Design Approach

- In practically all anchor categories, for all three methods, inclusion of the effects of variations in concrete strength from the specified value has the effect of reducing the probabilities of failure under known loads. There are some minor exceptions with the CC Method. However, probabilities of failure are still quite low in all cases.

9.2.2.3 Probabilities of Brittle Failure under Unlimited Loads, Ductile Design Approach

- These probabilities of failure are completely independent of the assumed statistical distribution of the loads. The ductile failure criterion, which requires actual steel fracture before concrete breakout, is quite severe. As a result, the computed probabilities of brittle failure are high.
- These probabilities of brittle failure under unlimited loads, using the CC Method, correspond to mean “k”-values rather than 5% fractiles. This suggests that ACI 349-90 might reasonably be modified to incorporate the CC Method, using mean “k”-values, and using a ϕ -factor for concrete breakout of the current value of 0.65.

9.2.2.4 Probabilities of Brittle Failure under Unlimited Loads including the effects of Variation in Concrete Strength, Ductile Design Approach

- Increases in mean concrete strength, result in decreased probabilities of brittle failure under unlimited loads, for all three methods, in all anchor categories.

9.3 RECOMMENDATIONS

9.3.1 General Recommendations

- 1) Generally, the CC Method is more reliable than other two methods (45-Degree Cone Method, and Theoretical Method). It usually has lower probability of failure, less scatter (smaller COV), and more accurate (mean values closer to unity).
- 2) More researches are needed to study the behavior of the Sleeve anchors and their differences and similarities with both Undercut/Cast-In-Place anchors and Expansion anchors. The value of the “ k ” for both Sleeve and Expansion anchors should be re-analyzed.
- 3) Although in some cases the Theoretical Method gives better results than the CC Method or the 45-Degree Cone Method, but there are not enough reasons to use this method over the CC method.

9.3.2 Recommendations for Future Studies

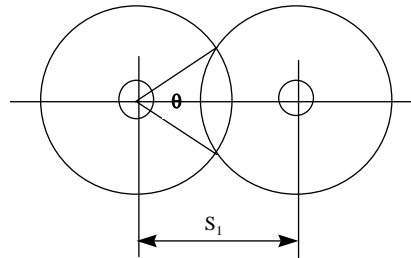
- 1) Obtain additional test results for anchors in deep embedment for all cases and categories (static, dynamic, uncracked, and cracked).
- 2) Obtain additional test results for anchors under dynamic loading for all categories.
- 3) Obtain additional test results for anchors in cracked concrete for all categories.
- 4) Obtain additional test results for anchors with overlapping failure surface (group anchors) for all cases and categories.
- 5) For future tests it would be very useful if the following information are recorded (in addition to what's been recorded so far) as test results:
 - Initial crack width
 - final crack width (crack width at the maximum load)
 - crack type (parallel, cross, or cycled)
 - displacement
 - angle of cone
 - depth of cone
 - member thickness
 - average aggregate diameter
 - water/cement ratio
 - Strength of steel (f_y)
- 6) The research can be broadened to include the followings [Farrow 1992]:
 - lightweight concrete

- high strength concrete
- adhesive anchors
- eccentrically loaded anchors
- cyclically loaded anchors

Appendix A

Calculation of Projected Area of Group Anchors
in 45-Degree Cone Method and CC Method

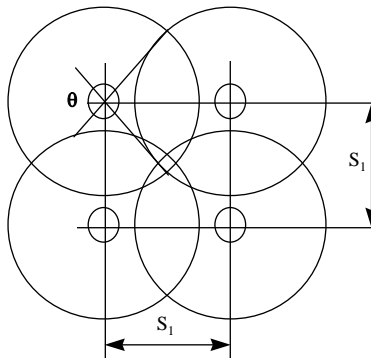
For an anchor group loaded in tension or shear, the formulas below are used for calculating the projected area:



$$s_1 \leq 2h_{ef} + d_h$$

$$A_N = \left(2\pi - \frac{\theta}{180} \pi + \sin \theta \right) \left(h_{ef} + \frac{d_h}{2} \right)^2 - \frac{\pi}{2} d_h^2$$

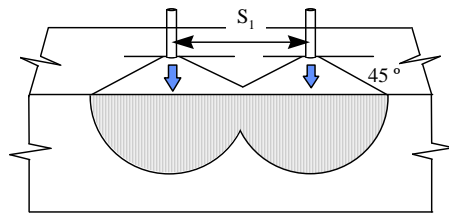
$$\theta = 2 \cos^{-1} \frac{s_1}{2h_{ef} + d_h}$$



$$s_1 \leq \sqrt{2} (h_{ef} + d_h/2)$$

$$A_N = \left(3\pi - \frac{\theta}{90} \pi + 2 \sin \theta - 2 \cos \theta + 2 \right) \left(h_{ef} + \frac{d_h}{2} \right)^2 - \frac{\pi}{2} d_h^2$$

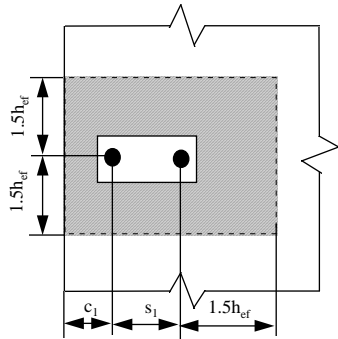
$$\theta = 2 \cos^{-1} \frac{s_1}{2h_{ef} + d_h}$$



$$A_V = \left(\pi - \frac{\pi\theta}{180} + \sin \theta \right) c_1^2$$

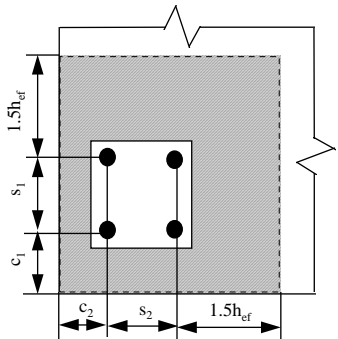
$$\theta = 2 \cos^{-1} \left(\frac{s_1}{2c_1} \right)$$

The following is the CC Method for calculating the projected area of an anchor group in tension and shear:



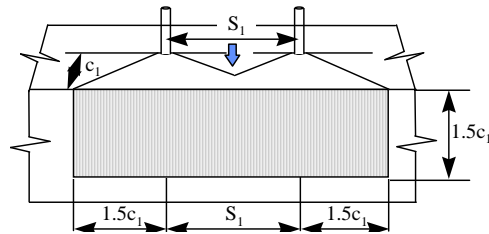
$$A_N = (3h_{ef} + s_1)(3h_{ef})$$

if: $s_1 \leq 3h_{ef}$



$$A_N = (c_1 + s_1 + 1.5h_{ef})(c_2 + s_2 + 1.5h_{ef})$$

if: $c_1, c_2 \leq 1.5h_{ef}; s_1, s_2 \leq 3h_{ef}$

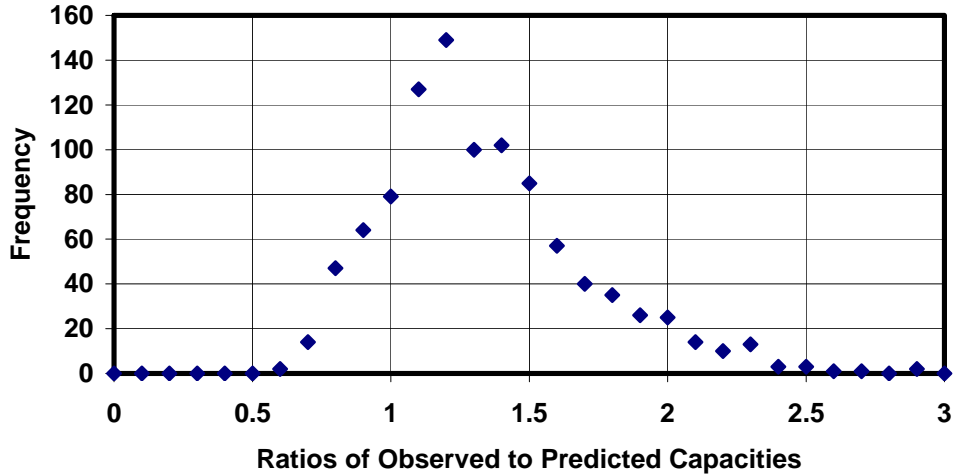


$$A_V = (3.0c_1 + s_1)(1.5c_1)$$

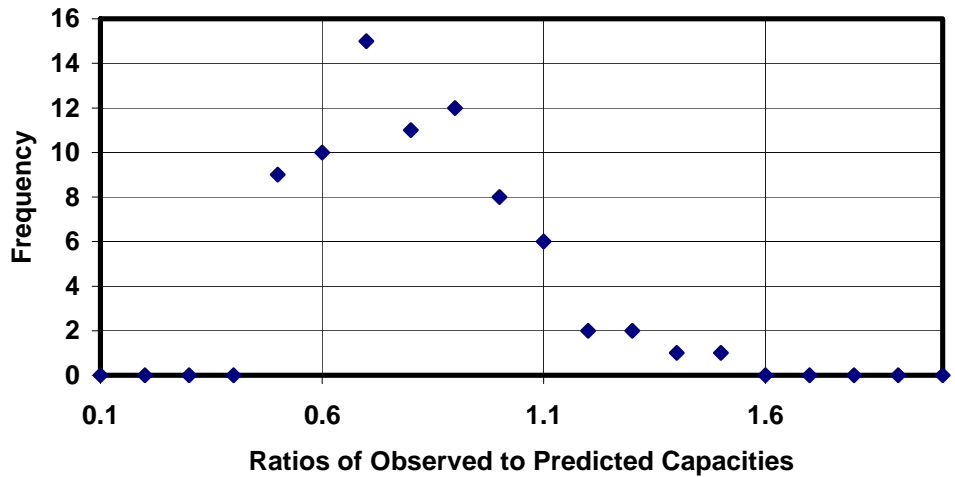
if: $h \geq 1.5c_1; s_1 \leq 1.5c_1$

Histograms for 45-Degree Cone Method (Static, Uncracked)

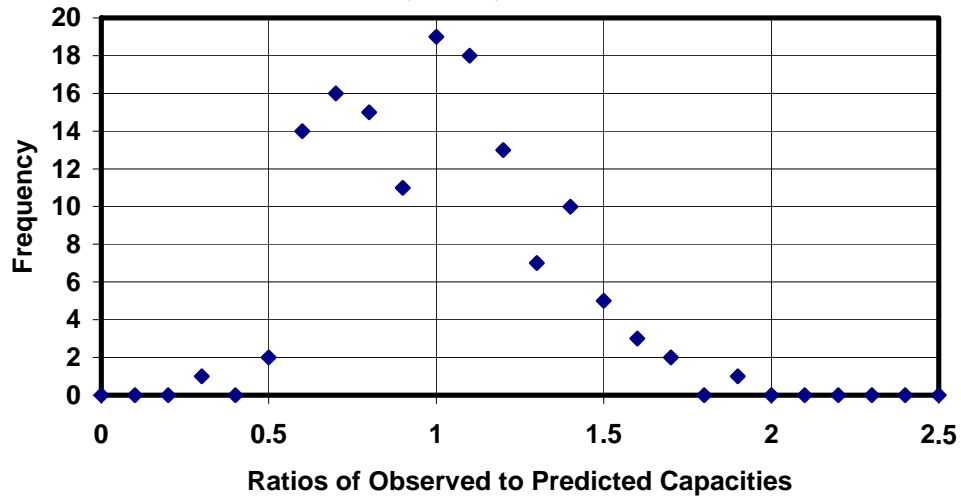
Histogram of Ratios of Observed to Predicted Capacities, 45-Degree Cone Method, Single, Shallower Embedments, No Edge Effects, Static, Uncracked



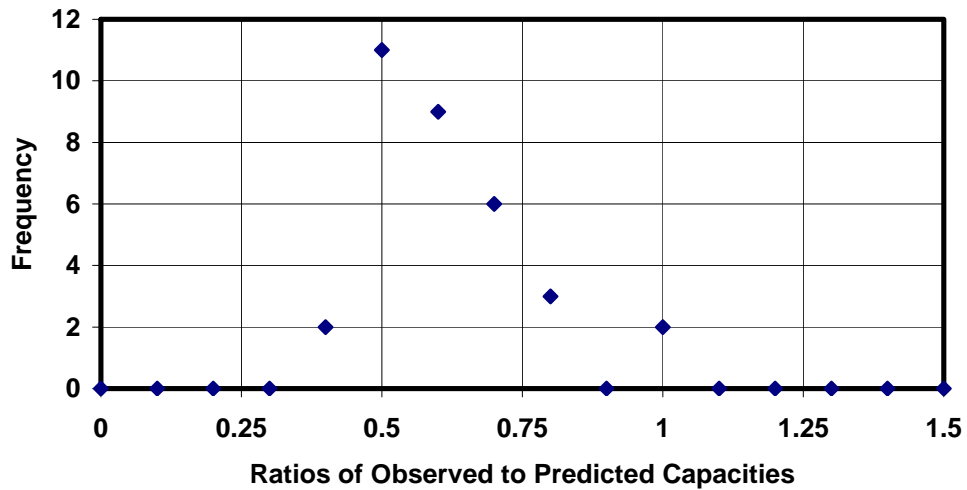
Histogram of Ratios of Observed to Predicted Capacities, 45-Degree Cone Method, Single, Deeper Embedments, No Edge Effects, Static, Uncracked



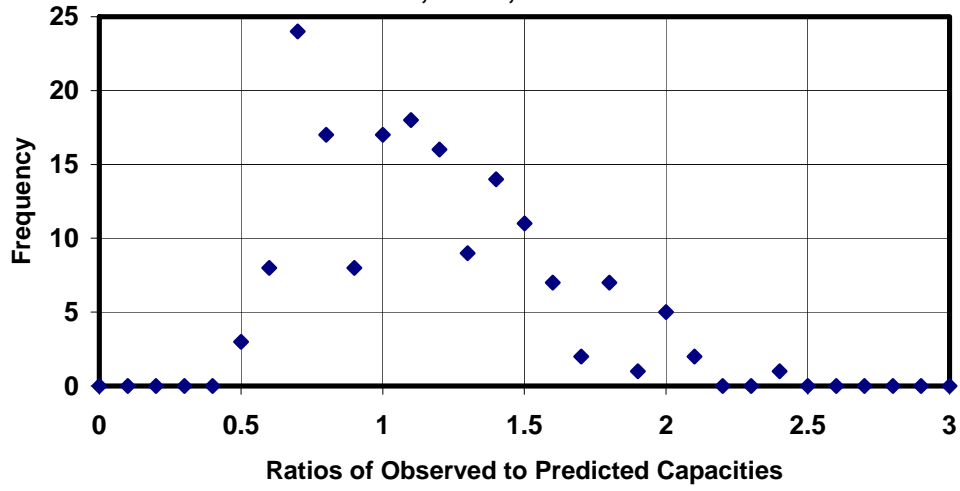
Histogram of Ratios of Observed to Predicted Capacities, 45-Degree Cone Method, Single, Deeper Embedments, Edge Effects, Static, Uncracked



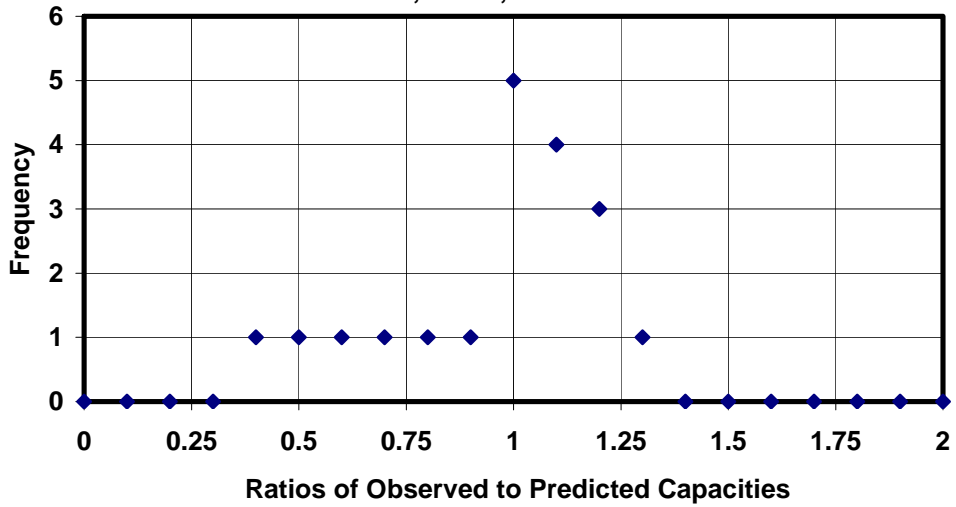
Histogram of Ratios of Observed to Predicted Capacities, 45-Degree Cone Method, Single, Deeper Embedments, Edge Effects, Static, Uncracked



Histogram of Ratios of Observed to Predicted Capacities, 45-Degree Cone Method, Group, Shallow Embedments, No Edge Effects, Static, Uncracked

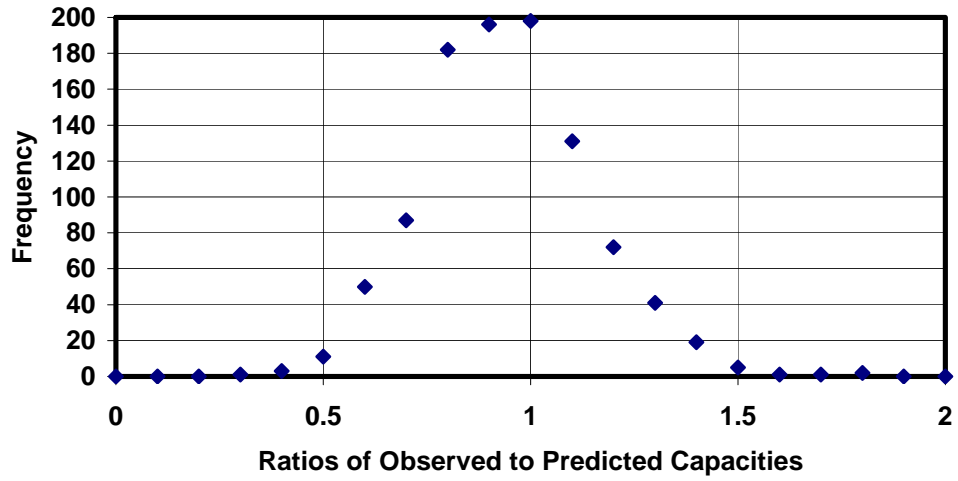


Histogram of Ratios of Observed to Predicted Capacities, 45-Degree Cone Method, Group, Deeper Embedments, No Edge Effects, Static, Uncracked

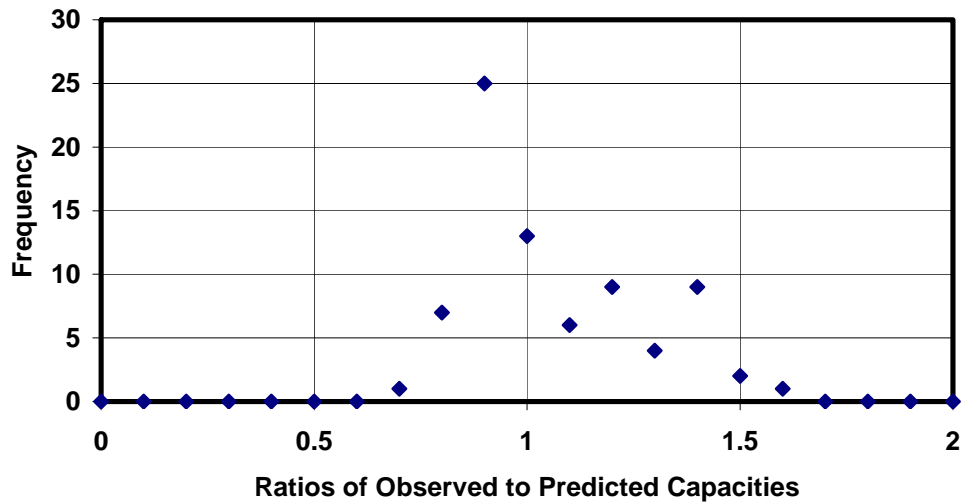


Histograms for CC Method (Static, Uncracked)

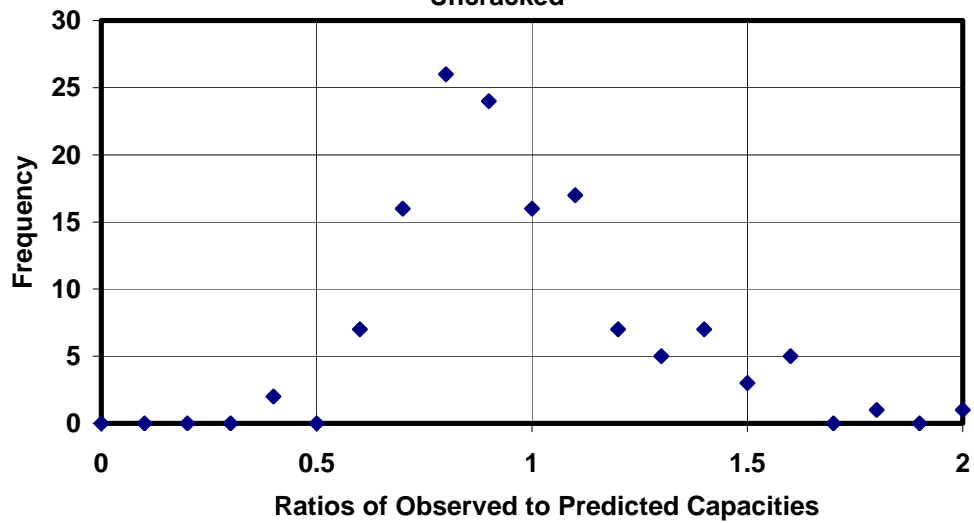
Histogram of Ratios of Observed to Predicted Capacities, CC Method, Single, Shallower Embedments, No Edge Effects, Static, Uncracked



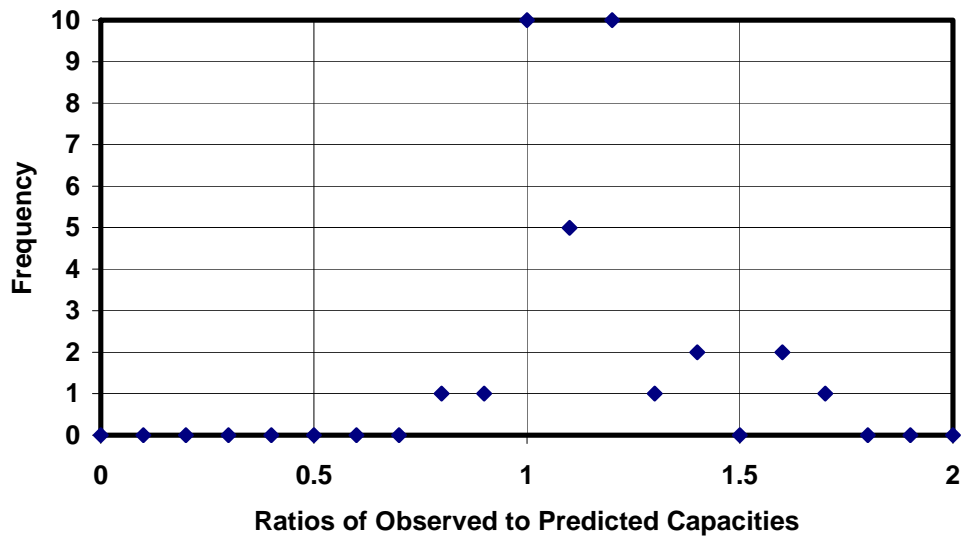
Histogram of Ratios of Observed to Predicted Capacities, CC Method, Deeper Embedments, No Edge Effects, Static, Uncracked



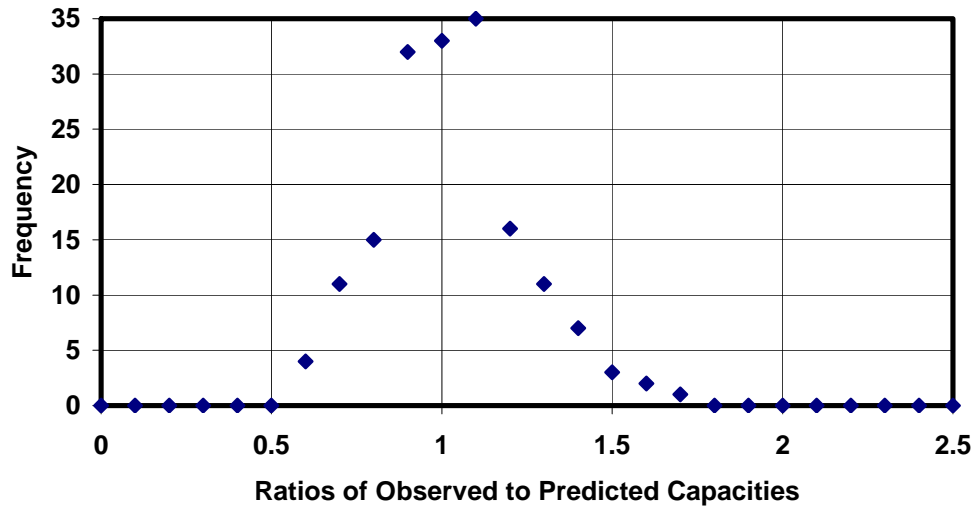
Histogram of Ratios of Observed to Predicted Capacities, CC Method, Shallower Embedments, Edge Effects, Static, Uncracked



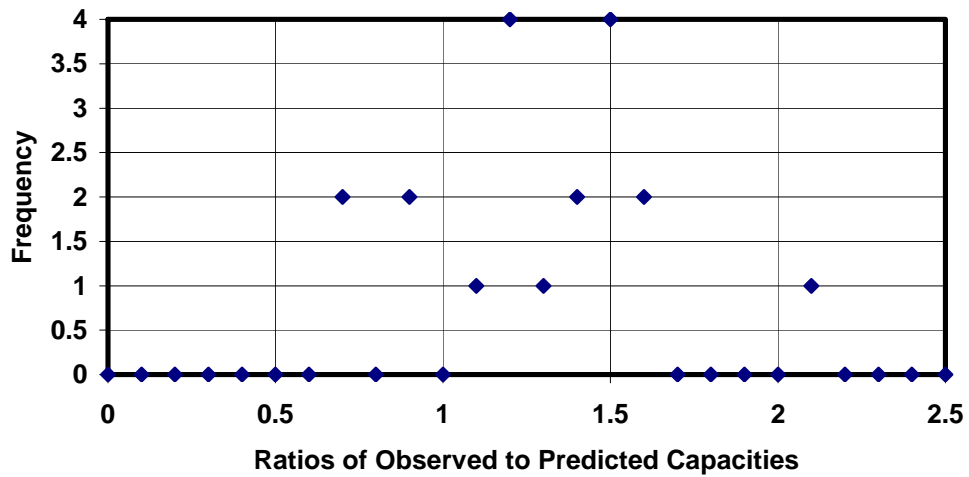
Histogram of Ratios of Observed to Predicted Capacities, CC Method, Deeper Embedments, Edge Effects, Static, Uncracked



Histogram of Ratios of Observed to Predicted Capacities, CC Method, Groups, Shallower Embedments, No Edge Effects, Static, Uncracked

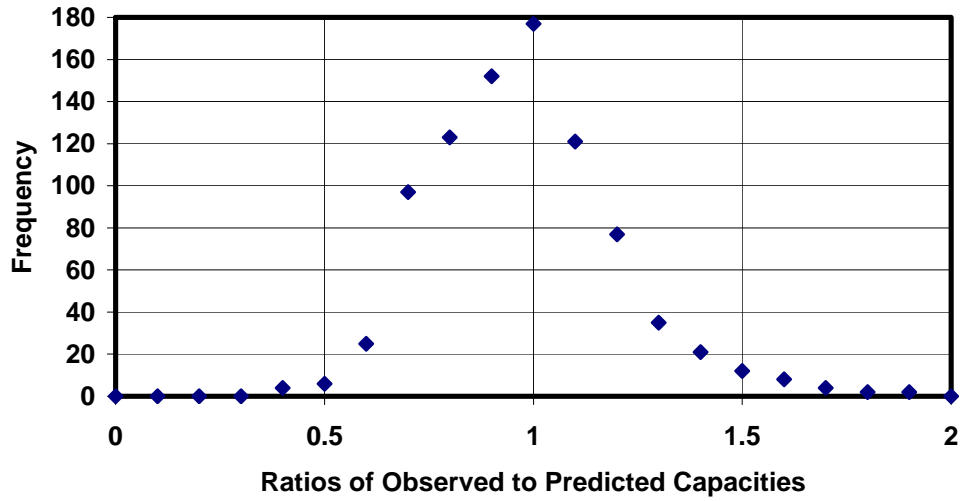


Histogram of Ratios of Observed to Predicted Capacities, CC Method, Groups, Deeper Embedments, No Edge Effects, Static, Uncracked

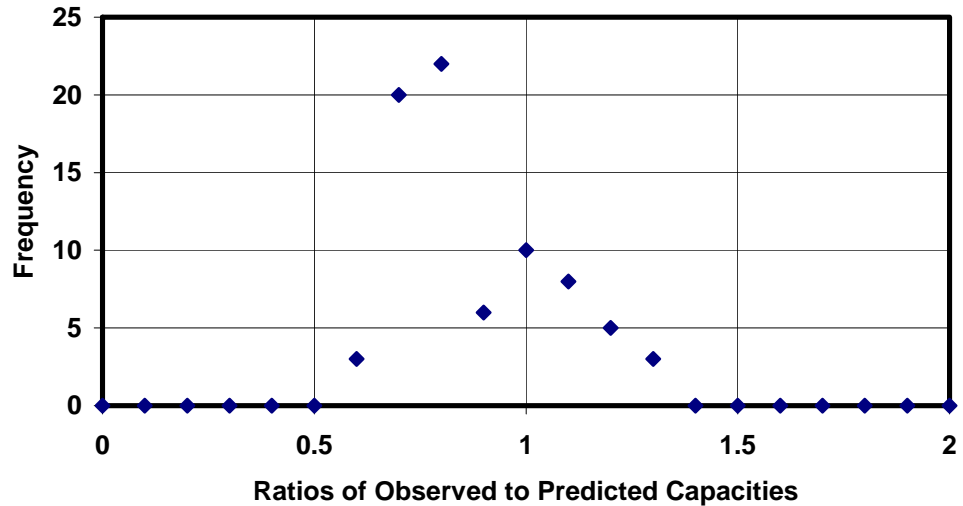


Histograms for Theoretical Method (Static, Uncracked)

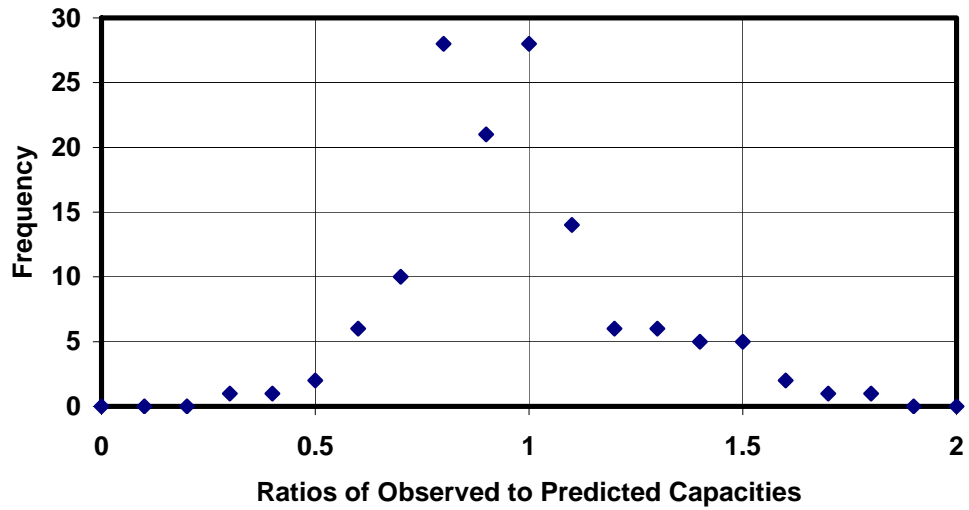
Histogram of Ratios of Observed to Predicted Capacities,
Theoretical Method, Shallower Embedments, No Edge Effects,
Static, Uncracked



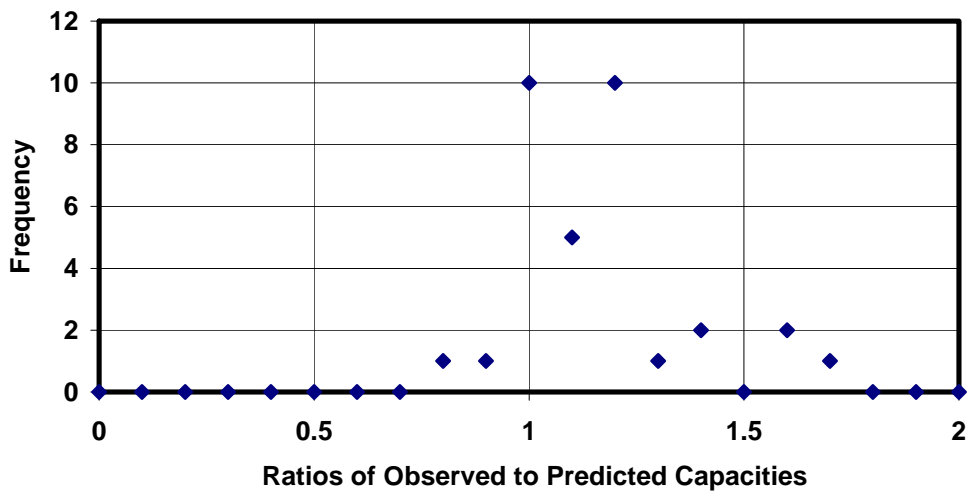
Histogram of Ratios of Observed to Predicted Capacities,
Theoretical Method, Deeper Embedments, No Edge Effects,
Static, Uncracked



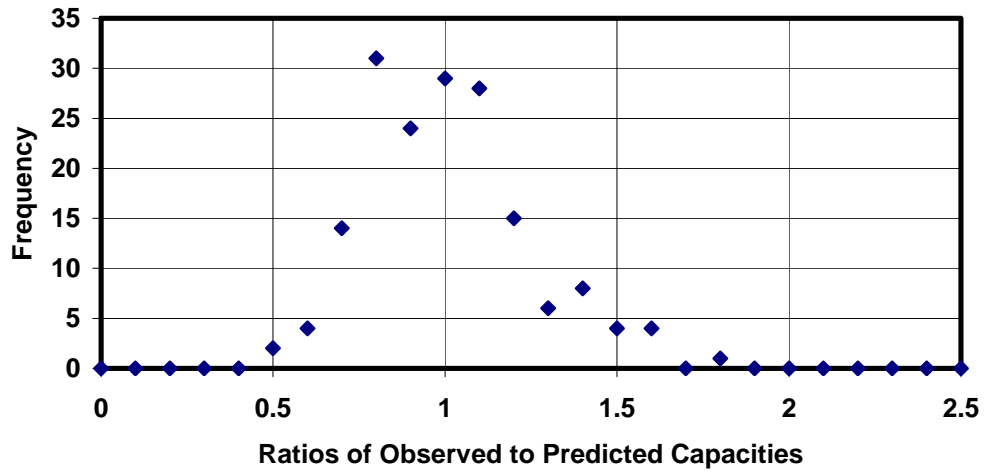
Histogram of Ratios of Observed to Predicted Capacities,
Theoretical Method, Shallower Embedments, Edge Effects,
Static, Uncracked



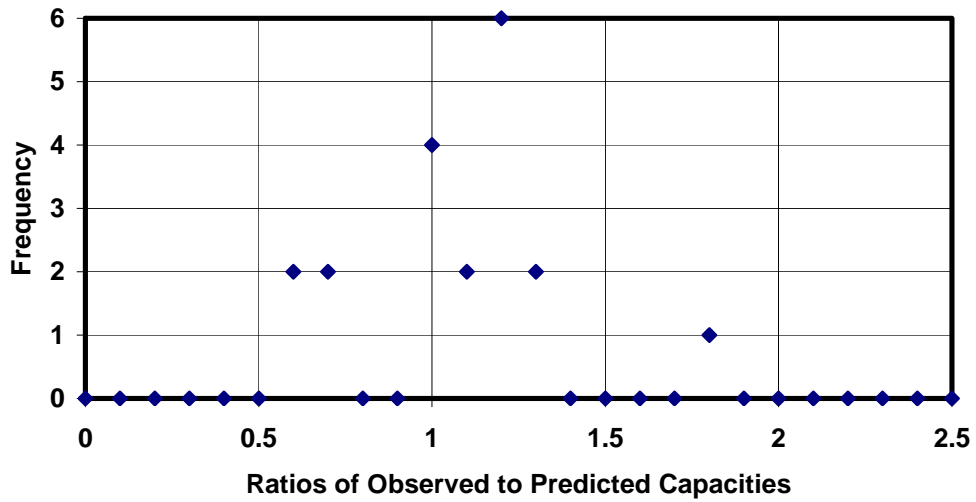
Histogram of Ratios of Observed to Predicted Capacities,
Theoretical Method, Deeper Embedments, Edge Effects, Static,
Uncracked



Histogram of Ratios of Observed to Predicted Capacities,
Theoretical Method, Groups, Shallower Embedments, No Edge
Effects, Static, Uncracked

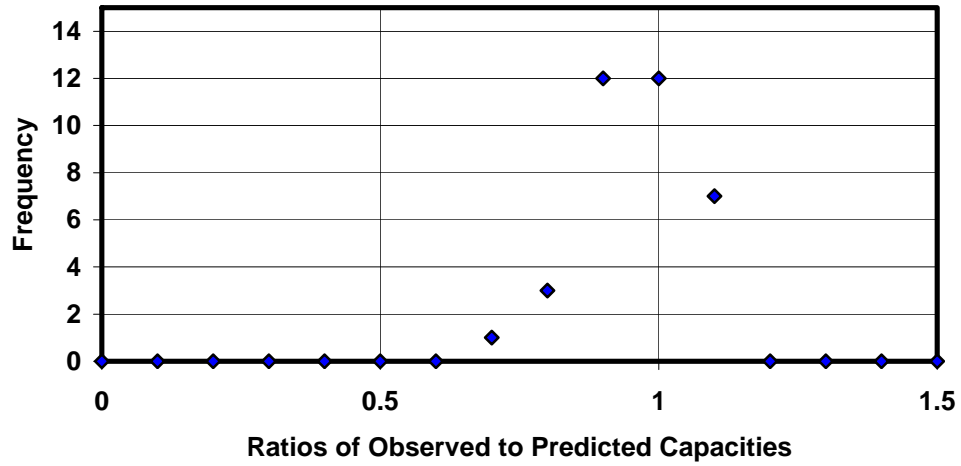


Histogram of Ratios of Observed to Predicted Capacities,
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Effects, Static, Uncracked

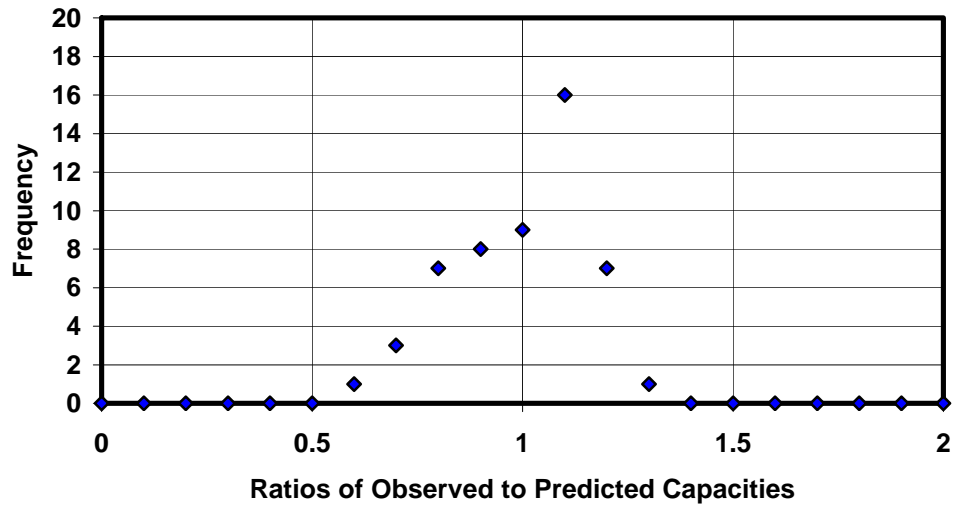


Histograms for CC Method (All other Cases)

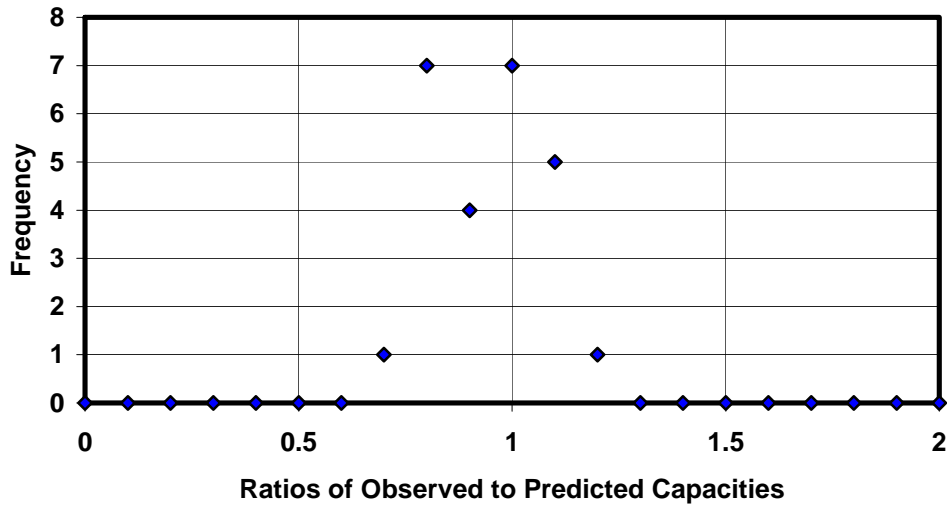
Histogram of Ratios of Observed to Predicted Capacities, CC Method, Single, Shallower Embedments, No Edge Effects, Dynamic, Uncracked, CIP and UC



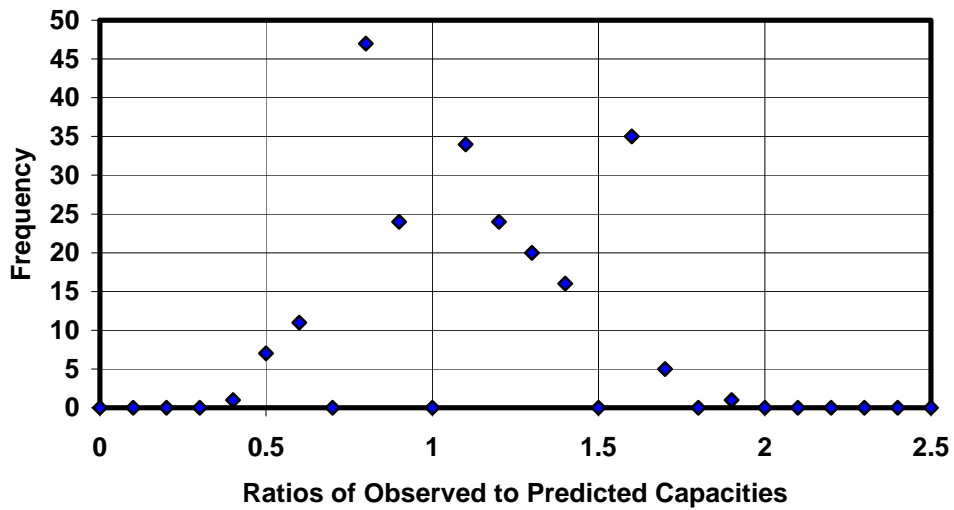
Histogram of Ratios of Observed to Predicted Capacities, CC Method, Shallow Embedments, No Edge Effects, Dynamic, Uncracked, Sleeve and Exp.



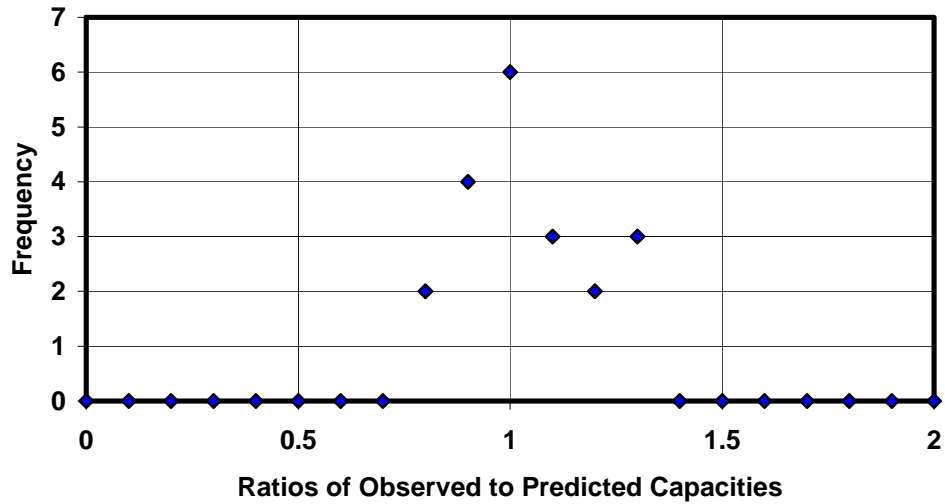
Histogram of Ratios of Observed to Predicted Capacities, CC Method, Single, Shallower Embedments, No Edge Effects, Static, Cracked, CIP and UC



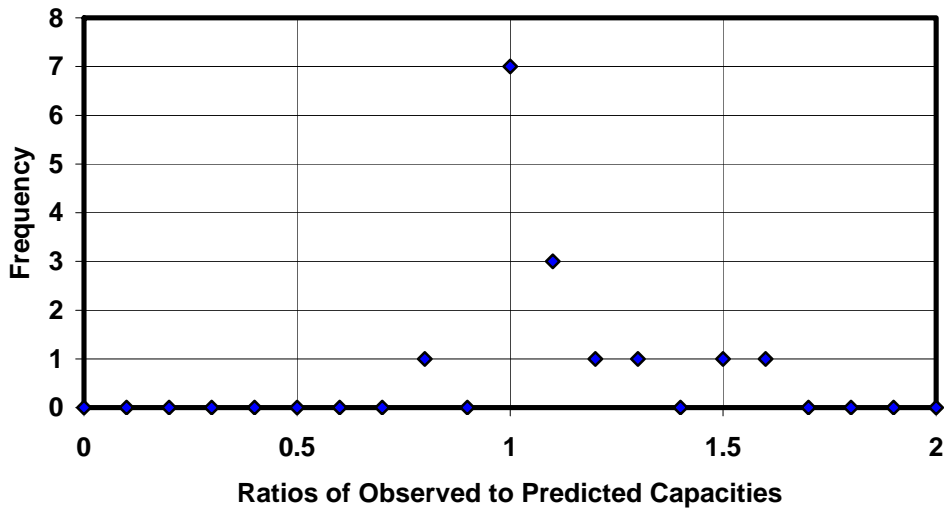
Histogram of Ratios of Observed to Predicted Capacities, CC Method, Single, Shallower Embedments, No Edge Effects, Static, Cracked, Sleeve, Exp.



Histogram of Ratios of Observed to Predicted Capacities, CC Method, Single, Shallower Embedments, No Edge Effects, Dynamic, Cracked, CIP and UC

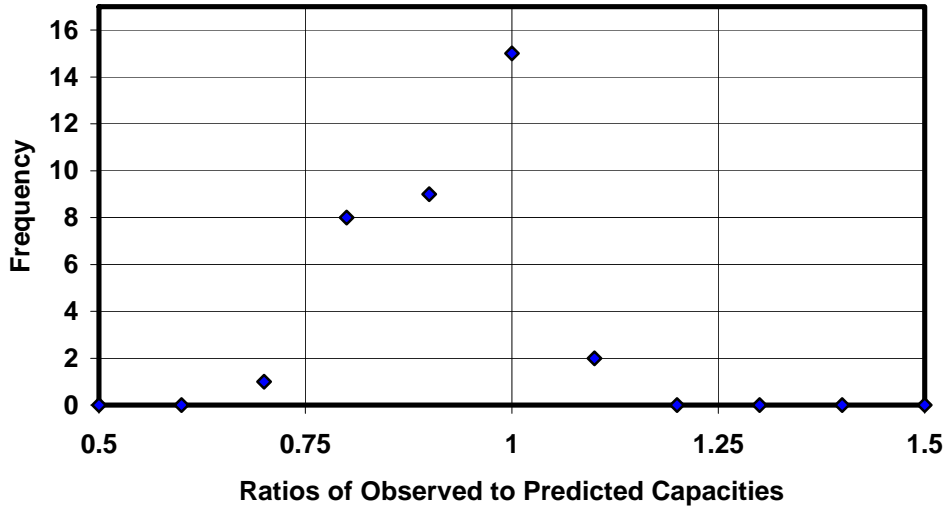


Histogram of Ratios of Observed to Predicted Capacities, CC Method, Single, Shallower Embedments, No Edge Effects, Dynamic, Cracked, Sleeve and Exp.

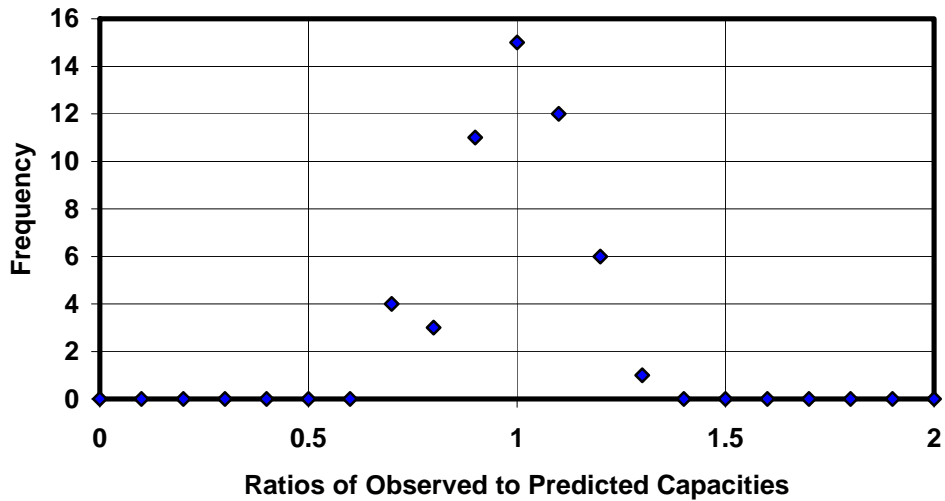


Histograms for Theoretical Method (All other Cases)

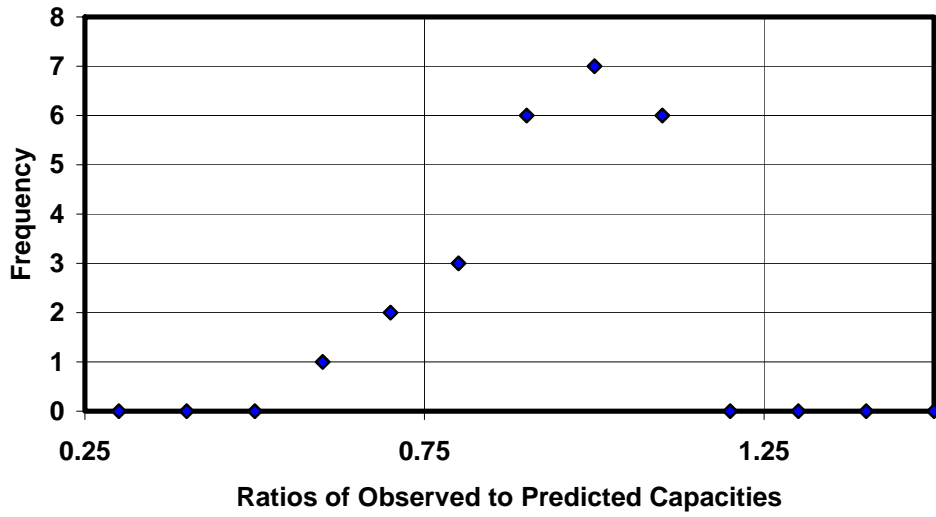
Histogram of Ratios of Observed to Predicted Capacities,
Theoretical Method, Shallower Embedments, No Edge Effects,
Dynamic, Uncracked, CIP and UC



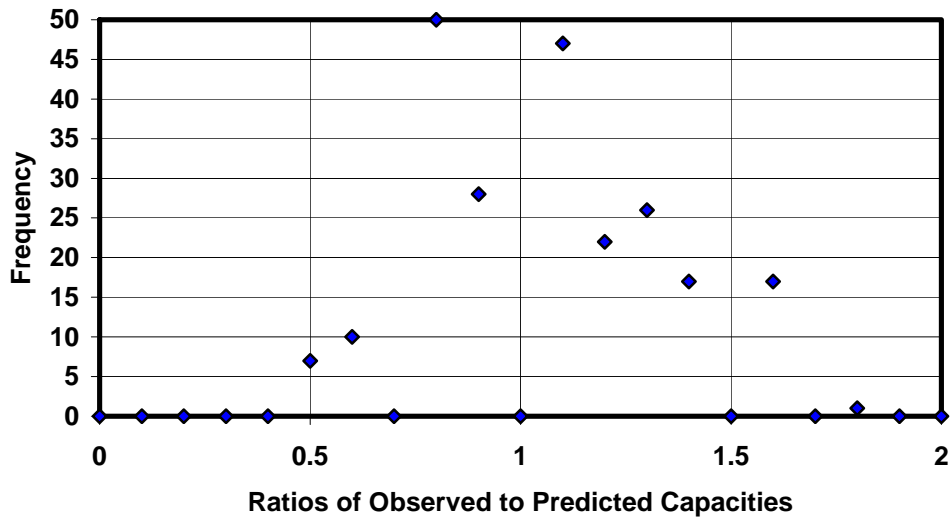
Histogram of Ratios of Observed to Predicted Capacities,
Theoretical Method, Shallower Embedments, No Edge Effects,
Dynamic, Uncracked, Sleeve and Exp.



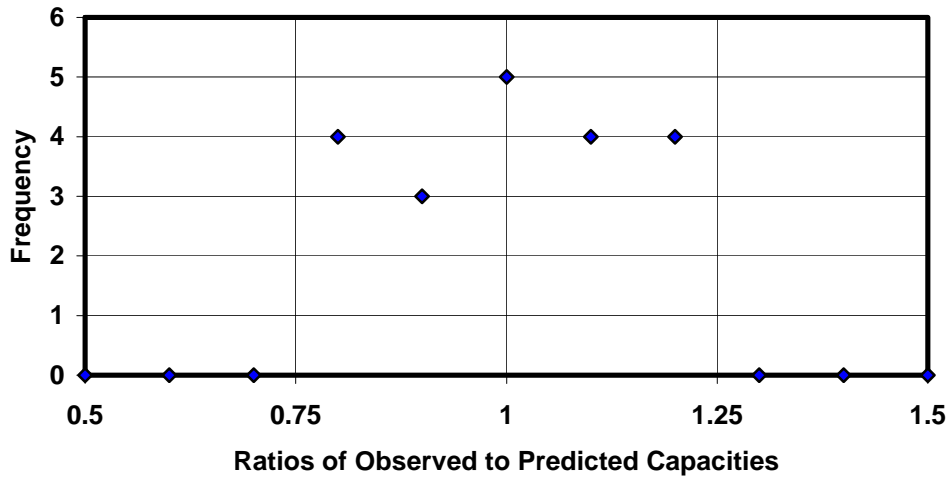
**Histogram of Ratios of Observed to Predicted Capacities,
Theoretical Method, Shallower Embedments, No Edge Effects,
Static, Cracked, CIP and UC**



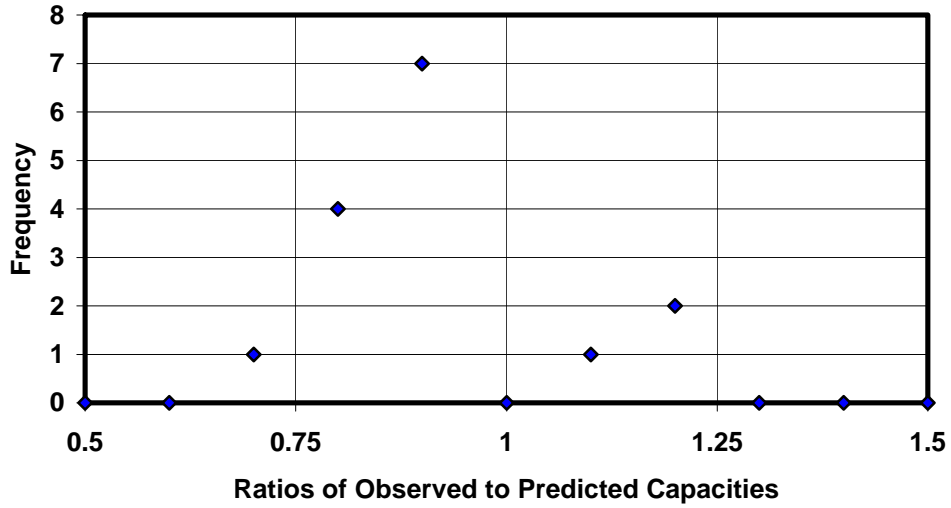
**Histogram of Ratios of Observed to Predicted Capacities,
Theoretical Method, Shallower Embedments, No Edge Effects,
Static, Cracked, Sleeve and Exp.**



**Histogram of Ratios of Observed to Predicted Capacities,
Theoretical Method, Shallower Embedments, No Edge Effects,
Dynamic, Cracked, CIP and UC**



**Histogram of Ratios of Observed to Predicted Capacities,
Theoretical Method, Shallower Embedments, No Edge Effects,
Dynamic, Cracked, Sleeve and Exp.**



This table should be used as a reference for other tables in this Appendix

Data Source	References
1	Versuche der Laing Testing Laboratories, London, mit Metalldübeln, unpublished
2	Versuche mit ... Dübeln, Versuche von ..., IWB und FMPA, Stuttgart, unpublished
3	Pusill-Wachtsmuth, P.: Tragverhalten von Metallspreizdübeln unter zentrischer Zugbeanspruchung bei den Versagensarten Betonausbruch und Spalten des Betons. Dissertation, Universität Stuttgart, Stuttgart, 1982
4	Versuche mit ... Dübeln, Versuche von ... und FMPA, Stuttgart, unpublished
5	Versuche mit ... Dübeln, Versuche von ... und TH Darmstadt, unpublished
6	Versuchsdaten aus den USA, entnommen aus dem Schriftwechsel zwischen Robert Cannon und Rolf Eligehausen, Stuttgart, unpublished
7	Versuche mit ... Dübeln, Versuche von ..., Rankweil, IWB und FMPA, Stuttgart, unpublished
8	Versuche mit ... Dübeln, Versuche von ..., MPA Karlsruhe, IWB und FMPA, Stuttgart, unpublished
9	Bode, H. und Hanenkamp, w. Zur Tragfähigkeit von Kopfbolzen bei Zugbeanspruchung, Bauingenieur, 1985, S. 361-367
10	Versuche mit Kopfbolzen, durchgeführt von Hochtief und der VA der Universität Karlsruhe, 1983, unpublished
11	Versuche mit Kopfbolzen, durchgeführt am IBS, München und der FMPA Stuttgart, 1985, unpublished
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16	Hawkins N. : Strength in Shear and Tension Cast-In-Place Anchor Bolts. Special Publication, ACI SP-103, S. 233-256
17	Versuche der Statens Provinganstalt (SP), Boras, Sweden mit Metalldübeln, 1990, unpublished
18	Senkiw, George A. : Concrete Anchor Tests at Ontario Hydro Mechanical

Data Source	References
	Research Department, Ontario Hydro, Toronto, Ontario, Canada, 1990, unpublished
19	Dusel, John P. And Harrigton, Craig N. : The Evaluation of Mechanical Expansion Anchors. Final Report No. FHWA/CA/TL 86/09. California Department of Transportation, Sacramento, July 1986
20	Walther, Richard A. and Sutton, Douglas C. : Behavior of Expansion Anchors Loaded in Tension with Experimental Investigation of Deeply Embedded Anchors in Uncracked, Unreinforced Concrete. School of Civil Engineering, Purdue University, West Lafayette, September 1986
21	Wiewel, Harry: Load Capacity of the Sleeve Anchor Installed in Stone Aggregate Concrete. Techmar Inc. Long Beach, June 1983, unpublished
22	Wiewel, Harry: The Wedge Anchor, Discussion and Analysis of Various Test Programs on Wedge Anchors. Techmar Inc., Long Beach, September 1985, unpublished
23	ACI 349-85 Code Requirements for Nuclear Safety Related Concrete Structures. American Concrete Institute, March 1986
24	Cook, R.A., Doerr, G.T., Klingner, R.E.: Design Guide for Steel-to-Concrete Connections. Research Report 1126-4F, University of Texas at Austin, March 1989
25	Data from Maxi Bolt
26	Data provided by Dr. Peter Pusill-Wachtsmich
27	Rodriguez 1995: Rodriguez, M., "Behavior of Anchors in Uncracked Concrete under Static and Dynamic Loading," M.S. Thesis, The University of Texas at Austin, August, 1995.
28	Hallowell 1996: Hallowell, J. M., "Tensile and Shear Behavior of Anchors in Uncracked and Cracked Concrete under Static and Dynamic Loading," M.S. Thesis, The University of Texas at Austin, August, 1996.
29	Zhang 1997: Zhang, Y. "Dynamic Behavior of Multiple Anchor Connections," Ph.D. Dissertation, The University of Texas at Austin, May 1997.
30	Data from Bucknell University
99	Unrecognized source

Notes

- "d" is the diameter of the shank (mm)
- "do" is the outer diameter of the head for cast-in-place anchors, and the sleeve diameter for sleeve and undercut anchors (mm)
- "h_{ef}" is the Effective Embedment depth of the anchor (mm)
- "c1" is the perpendicular distance from the anchor axis to the nearest free edge
- "c2" is the perpendicular distance from the anchor axis to the other free edge, in the direction perpendicular to "c1" (in the case where anchor is located at the corner of the member)
- "s1" is the distance to nearest anchor measured center to center of anchors (in direction 1)
- "s2" is the distance to nearest anchor in a direction perpendicular to "s1" (in direction 2), this is used in the case of 4- anchor groups
- "f_y" is the tensile yield stress of the anchor (MPa)
- "f_c" is the actual tested cylinder strength of concrete (MPa). If "f_{c200}" is originally given, "f_c" is calculated as $f_{c200}/1.18$
- "f_{c200}" is the actual tested strength of a 200-mm concrete cube. If "f_c" is originally given, "f_{c200}" is calculated as $1.18 f_c$
- "A_n" is the actual projected area of the breakout volume associated with an anchor or an anchor group (mm²)
- "A_{no}" is the projected area of the breakout volume of the anchor(s), not limited by edge or spacing influence (mm²)
- "N_{obs}/N_{pre}" is the ratio of the observed to the predicted anchor capacities

- "Displac." is the axial displacement of the anchor at maximum load (mm)
- "Member Thickness" is the member thickness parallel to the axis of the anchor (mm).
- "Failure Mode" is the tested failure mode of the anchor. It represents the dominant failure mode at the maximum load, not necessarily the final appearance of the failure cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm)

Data Source	Test Number	Anchor						Concrete		
		Type	Number	Diameter	Outside Diameter	Embedment	Strength of Steel	Aggregate Diameter	Strength of Concrete	
			n	d (mm)	do/dh (mm)	hef (mm)	fy (MPa)	dagg (mm)	fc (MPa)	fcc200 (MPa)
8	GER3-001	E-TC	1	6	6	17.6	630	16	18.64	22
8	GER3-002	E-TC	1	6	6	17.6	630	16	41.53	49.0
1	ENG2-11	E-TW	1	6	6	22		20	22.37	26.4
1	ENG2-12	E-TW	1	8	8	24		20	22.37	26.4
1	ENG2-36	E-DI	1	6	6	25		20	22.37	26.4
1	ENG2-37	E-DI	1	6	6	25		20	23.81	28.1
3	GER3-003	E-DI	1	8	8	25		16	21.19	25.0
3	GER3-004	E-DI	1	8	8	25		16	21.19	25.0
3	GER3-005	E-DI	1	8	8	25		16	21.19	25.0
3	GER3-006	E-DI	1	6	6	25		16	18.64	22.0
3	GER3-007	E-DI	1	6	6	25		16	41.53	49.0
3	GER3-008	E-DI	1	8	8	25		16	9.49	11.2
3	GER3-009	E-DI	1	8	8	25		16	18.90	22.3
3	GER3-010	E-DI	1	8	8	25		16	10.59	12.5
3	GER3-011	E-DI	1	8	8	25		16	20.85	24.6
3	GER3-012	E-DI	1	8	8	25		16	25.08	29.6
3	GER3-013	E-DI	1	8	8	25		16	36.19	42.7
3	GER3-014	E-DI	1	8	8	25		16	42.97	50.7
19	USA04-001	E-TC	1	6	6	25.4		25	27.37	32.3
19	USA04-02	E-TC	1	6	6	25.4		25	27.37	32.3
19	USA04-03	E-TC	1	6	6	25.4		25	27.37	32.3
8	GER3-015	E-TC	1	9	9	26.6	684	16	18.64	22.0
8	GER3-016	E-TC	1	9	9	26.6	684	16	41.53	49.0
6	USA04-05	E-SD	1	6	6	27.7			24.15	28.5
3	GER3-017	E-SD	1	6	6	28		16	13.90	16.4
3	GER3-018	E-SD	1	6	6	28		16	17.37	20.5
3	GER3-019	E-SD	1	6	6	28		16	27.37	32.3
3	GER3-020	E-SD	1	10	10	28		16	38.81	45.8
3	GER3-021	E-SD	1	6	6	28		16	50.42	59.5
3	GER3-022	E-SD	1	10	10	28		16	48.14	56.8
18	USA04-06	E-SD	1	6	6	28	393		38.90	45.9
1	ENG2-13	E-TW	1	10	10	30		20	22.37	26.4
1	ENG2-38	E-DI	1	8	8	30		20	22.37	26.4
1	ENG2-39	E-DI	1	8	8	30		20	23.81	28.1
1	ENG2-40	E-DI	1	8	8	30		20	22.37	26.4
3	GER3-023	E-DI	1	10	10	30		16	21.19	25.0
3	GER3-024	E-DI	1	10	10	30		16	21.19	25.0
3	GER3-025	E-DI	1	10	10	30		16	21.19	25.0
3	GER3-026	E-DI	1	10	10	30		16	11.10	13.1
3	GER3-027	E-DI	1	10	10	30		16	18.98	22.4
3	GER3-028	E-DI	1	10	10	30		16	17.46	20.6
3	GER3-029	E-DI	1	10	10	30		16	15.68	18.5
3	GER3-030	E-DI	1	10	10	30		16	22.37	26.4

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure Mode
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
GER3-001	999	999	999	999	2787.84	2787.84	UNKNOWN	5.9	Cone
GER3-002	999	999	999	999	2787.84	2787.84	UNKNOWN	8.2	Cone
ENG2-11	999	999	999	999	4356	4356	UNKNOWN	7	Cone
ENG2-12	999	999	999	999	5184	5184	UNKNOWN	11	Cone
ENG2-36	999	999	999	999	5625	5625	UNKNOWN	9	Cone
ENG2-37	999	999	999	999	5625	5625	UNKNOWN	10	Cone
GER3-003	50	999	999	999	5625	5625	UNKNOWN	6.6	Cone
GER3-004	63	999	999	999	5625	5625	UNKNOWN	8.2	Cone
GER3-005	75	999	999	999	5625	5625	UNKNOWN	7.5	Cone
GER3-006	999	999	999	999	5625	5625	UNKNOWN	10	Cone
GER3-007	999	999	999	999	5625	5625	UNKNOWN	15.4	Cone
GER3-008	999	999	999	999	5625	5625	UNKNOWN	3.3	Cone
GER3-009	999	999	999	999	5625	5625	UNKNOWN	5.6	Cone
GER3-010	999	999	999	999	5625	5625	UNKNOWN	6.1	Cone
GER3-011	999	999	999	999	5625	5625	UNKNOWN	7.2	Cone
GER3-012	999	999	999	999	5625	5625	UNKNOWN	10.2	Cone
GER3-013	999	999	999	999	5625	5625	UNKNOWN	10.6	Cone
GER3-014	999	999	999	999	5625	5625	UNKNOWN	13.5	Cone
USA04-001	999	999	999	999	5806.44	5806.44	UNKNOWN	7.8	Cone
USA04-02	999	999	999	999	5806.44	5806.44	UNKNOWN	8.7	Cone
USA04-03	999	999	999	999	5806.44	5806.44	UNKNOWN	9.3	Cone
GER3-015	999	999	999	999	6368.04	6368.04	UNKNOWN	10	Cone
GER3-016	999	999	999	999	6368.04	6368.04	UNKNOWN	13.8	Cone
USA04-05	49	999	999	999	6905.61	6905.61	UNKNOWN	10.7	Cone
GER3-017	999	999	999	999	7056	7056	UNKNOWN	6.3	Cone
GER3-018	999	999	999	999	7056	7056	UNKNOWN	8.1	Cone
GER3-019	999	999	999	999	7056	7056	UNKNOWN	9.1	Cone
GER3-020	999	999	999	999	7056	7056	UNKNOWN	11.3	Cone
GER3-021	999	999	999	999	7056	7056	UNKNOWN	12.4	Cone
GER3-022	999	999	999	999	7056	7056	UNKNOWN	15.3	Cone
USA04-06	999	999	999	999	7056	7056	UNKNOWN	12.7	Cone
ENG2-13	999	999	999	999	8100	8100	UNKNOWN	16	Cone
ENG2-38	999	999	999	999	8100	8100	UNKNOWN	11	Cone
ENG2-39	999	999	999	999	8100	8100	UNKNOWN	13	Cone
ENG2-40	999	999	999	999	8100	8100	UNKNOWN	13	Cone
GER3-023	60	999	999	999	8100	8100	UNKNOWN	9.6	Cone
GER3-024	75	999	999	999	8100	8100	UNKNOWN	11.3	Cone
GER3-025	90	999	999	999	8100	8100	UNKNOWN	11.4	Cone
GER3-026	999	999	999	999	8100	8100	UNKNOWN	5.6	Cone
GER3-027	999	999	999	999	8100	8100	UNKNOWN	9.8	Cone
GER3-028	999	999	999	999	8100	8100	UNKNOWN	10	Cone
GER3-029	999	999	999	999	8100	8100	UNKNOWN	11.8	Cone
GER3-030	999	999	999	999	8100	8100	UNKNOWN	13.7	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
GER3-001	4669.33	1.26	3123.84	1.89	1871.39	3.15
GER3-002	6968.53	1.18	4662.03	1.76	2792.87	2.94
ENG2-11	7148.42	0.98	5180.91	1.35	3040.26	2.30
ENG2-12	8145.03	1.35	6081.82	1.81	3790.45	2.90
ENG2-36	8659.37	1.04	6555.06	1.37	4071.78	2.21
ENG2-37	8933.82	1.12	6762.82	1.48	4200.83	2.38
GER3-003	8426.63	0.78	6378.88	1.03	3962.34	1.67
GER3-004	8426.63	0.97	6378.88	1.29	3962.34	2.07
GER3-005	8426.63	0.89	6378.88	1.18	3962.34	1.89
GER3-006	7904.88	1.27	5983.92	1.67	3885.96	2.57
GER3-007	11797.29	1.31	8930.43	1.72	5799.43	2.66
GER3-008	5640.18	0.59	4269.56	0.77	2652.11	1.24
GER3-009	7958.60	0.70	6024.58	0.93	3742.26	1.50
GER3-010	5958.53	1.02	4510.55	1.35	2801.80	2.18
GER3-011	8358.95	0.86	6327.64	1.14	3930.52	1.83
GER3-012	9169.17	1.11	6940.97	1.47	4311.50	2.37
GER3-013	11012.81	0.96	8336.59	1.27	5178.40	2.05
GER3-014	12000.19	1.12	9084.03	1.49	5642.69	2.39
USA04-001	9809.03	0.80	7464.63	1.04	4354.04	1.79
USA04-02	9809.03	0.89	7464.63	1.17	4354.04	2.00
USA04-03	9809.03	0.95	7464.63	1.25	4354.04	2.14
GER3-015	8675.77	1.15	6703.25	1.49	4266.49	2.34
GER3-016	12947.76	1.07	10003.96	1.38	6367.34	2.17
USA04-05	10493.40	1.02	8214.79	1.30	4786.96	2.24
GER3-017	8089.71	0.78	6355.00	0.99	3703.28	1.70
GER3-018	9044.57	0.90	7105.11	1.14	4140.40	1.96
GER3-019	11353.05	0.80	8918.57	1.02	5197.16	1.75
GER3-020	13518.98	0.84	10620.05	1.06	6916.76	1.63
GER3-021	15408.83	0.80	12104.65	1.02	7053.81	1.76
GER3-022	15055.16	1.02	11826.82	1.29	7702.72	1.99
USA04-06	13533.73	0.94	10631.64	1.19	6195.43	2.05
ENG2-13	11383.03	1.41	9139.54	1.75	5922.59	2.70
ENG2-38	11383.03	0.97	9139.54	1.20	5922.59	1.86
ENG2-39	11743.81	1.11	9429.22	1.38	6110.30	2.13
ENG2-40	11383.03	1.14	9139.54	1.42	5922.59	2.19
GER3-023	11077.10	0.87	8893.91	1.08	5763.41	1.67
GER3-024	11077.10	1.02	8893.91	1.27	5763.41	1.96
GER3-025	11077.10	1.03	8893.91	1.28	5763.41	1.98
GER3-026	8018.47	0.70	6438.11	0.87	4172.01	1.34
GER3-027	10485.28	0.93	8418.73	1.16	5455.49	1.80
GER3-028	10055.17	0.99	8073.39	1.24	5231.70	1.91
GER3-029	9528.88	1.24	7650.83	1.54	4957.87	2.38
GER3-030	11383.03	1.20	9139.54	1.50	5922.59	2.31

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
3	GER3-031	E-DI	1	10	10	30		16	33.14	39.1
3	GER3-032	E-SD	1	12	12	31		16	21.19	25.0
3	GER3-033	E-SD	1	12	12	31		16	9.24	10.9
3	GER3-034	E-SD	1	12	12	31		16	12.12	14.3
3	GER3-035	E-SD	1	12	12	31		16	16.02	18.9
3	GER3-036	E-SD	1	12	12	31		16	22.63	26.7
3	GER3-037	E-SD	1	12	12	31		16	25.34	29.9
3	GER3-038	E-SD	1	12	12	31		16	36.53	43.1
3	GER3-039	E-SD	1	12	12	31		16	54.07	63.8
19	USA04-08	E-TC	1	6	6	31.8		25	27.37	32.3
19	USA04-09	E-TC	1	6	6	31.8		25	27.37	32.3
2	GER3-040	E-TC	1	6	6	32		16	19.66	23.2
17	SWE1-01	E-TW	1	10	10	32	540		19.66	23.2
17	SWE1-02	E-TW	1	10	10	32	560		22.63	26.7
6	USA04-10	E-SD	1	8.9	8.9	33.3			24.15	28.5
17	SWE1-03	E-TW	1	8	8	35	550		34.32	40.5
22	USA04-13	E-TW	1	9.5	9.5	35.5	483	25	13.64	16.1
17	SWE1-04	E-TW	1	8	8	36	550		22.03	26.0
17	SWE1-05	E-TW	1	10	10	36	540		19.66	23.2
1	ENG2-17	E-TC	1	6	6	37		20	21.61	25.5
3	GER3-065	E-DI	1	12	12	37		16	21.19	25.0
3	GER3-070	E-DI	1	12	12	37		16	21.19	25.0
3	GER3-072	E-DI	1	12	12	37		16	21.19	25.0
3	GER3-074	E-DI	1	12	12	37		16	21.19	25.0
3	GER3-076	E-DI	1	12	12	37		16	10.59	12.5
3	GER3-077	E-TC	1	14	14	37		16	19.41	22.9
3	GER3-080	E-DI	1	12	12	37		16	22.37	26.4
3	GER3-081	E-TC	1	14	14	37		16	53.81	63.5
17	SWE1-06	E-TW	1	8	8	37	550		34.41	40.6
22	USA04-14	E-TW	1	9.5	9.5	37.8	565	25	29.24	34.5
3	GER3-082	E-TC	1	10	10	38		16	21.19	25.0
3	GER3-083	E-TC	1	10	10	38		16	21.69	25.6
3	GER3-084	E-SD	1	14	14	38		16	11.69	13.8
3	GER3-085	E-SD	1	14	14	38		16	17.37	20.5
3	GER3-086	E-SD	1	14	14	38		16	21.19	25.0
3	GER3-087	E-SD	1	14	14	38		16	23.05	27.2
3	GER3-088	E-SD	1	14	14	38		16	30.51	36.0
3	GER3-089	E-SD	1	14	14	38		16	37.37	44.1
3	GER3-090	E-SD	1	14	14	38		16	53.47	63.1
17	SWE1-07	E-TW	1	8	8	38	550		21.78	25.7
6	USA04-15	E-SD	1	10	10	38.9			24.15	28.5
22	USA04-16	E-TW	1	9.5	9.5	38.9	483	25	15.76	18.6
3	GER3-091	E-TC	1	13	13	39		16	17.54	20.7

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure Mode
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
GER3-031	999	999	999	999	8100	8100	UNKNOWN	17.9	Cone
GER3-032	60	999	999	999	8649	8649	UNKNOWN	12.9	Cone
GER3-033	999	999	999	999	8649	8649	UNKNOWN	6.7	Cone
GER3-034	999	999	999	999	8649	8649	UNKNOWN	8.8	Cone
GER3-035	999	999	999	999	8649	8649	UNKNOWN	9	Cone
GER3-036	999	999	999	999	8649	8649	UNKNOWN	10.8	Cone
GER3-037	999	999	999	999	8649	8649	UNKNOWN	15.1	Cone
GER3-038	999	999	999	999	8649	8649	UNKNOWN	19.5	Cone
GER3-039	999	999	999	999	8649	8649	UNKNOWN	20.3	Cone
USA04-08	999	999	999	999	9101.16	9101.16	UNKNOWN	8.5	Cone
USA04-09	999	999	999	999	9101.16	9101.16	UNKNOWN	10.5	Cone
GER3-040	999	999	999	999	9216	9216	UNKNOWN	9.1	Cone
SWE1-01	100	999	999	999	9216	9216	UNKNOWN	14.2	Cone
SWE1-02	999	999	999	999	9216	9216	UNKNOWN	12.6	Cone
USA04-10	58	999	999	999	9980.01	9980.01	UNKNOWN	15.6	Cone
SWE1-03	80	999	999	999	11025	11025	UNKNOWN	16.9	Cone
USA04-13	999	999	999	999	11342.25	11342.25	UNKNOWN	10.9	Cone
SWE1-04	80	999	999	999	11664	11664	UNKNOWN	14.1	Cone
SWE1-05	100	999	999	999	11664	11664	UNKNOWN	16.1	Cone
ENG2-17	100	999	999	999	12321	12321	UNKNOWN	13	Cone
GER3-065	70	999	999	999	12321	12321	UNKNOWN	13.8	Cone
GER3-070	80	999	999	999	12321	12321	UNKNOWN	15.8	Cone
GER3-072	100	999	999	999	12321	12321	UNKNOWN	16.2	Cone
GER3-074	120	999	999	999	12321	12321	UNKNOWN	16.8	Cone
GER3-076	999	999	999	999	12321	12321	UNKNOWN	11.7	Cone
GER3-077	999	999	999	999	12321	12321	UNKNOWN	14.5	Cone
GER3-080	999	999	999	999	12321	12321	UNKNOWN	19.6	Cone
GER3-081	999	999	999	999	12321	12321	UNKNOWN	23	Cone
SWE1-06	80	999	999	999	12321	12321	UNKNOWN	16.6	Cone
USA04-14	999	999	999	999	12859.56	12859.56	UNKNOWN	13.6	Cone
GER3-082	100	999	999	999	12996	12996	UNKNOWN	13.6	Cone
GER3-083	999	999	999	999	12996	12996	UNKNOWN	11.4	Cone
GER3-084	999	999	999	999	12996	12996	UNKNOWN	11.9	Cone
GER3-085	999	999	999	999	12996	12996	UNKNOWN	13	Cone
GER3-086	999	999	999	999	12996	12996	UNKNOWN	15.7	Cone
GER3-087	999	999	999	999	12996	12996	UNKNOWN	19.2	Cone
GER3-088	999	999	999	999	12996	12996	UNKNOWN	19.9	Cone
GER3-089	999	999	999	999	12996	12996	UNKNOWN	23.1	Cone
GER3-090	999	999	999	999	12996	12996	UNKNOWN	25.9	Cone
SWE1-07	80	999	999	999	12996	12996	UNKNOWN	15.5	Cone
USA04-15	113	999	999	999	13618.89	13618.89	UNKNOWN	22.7	Cone
USA04-16	999	999	999	999	13618.89	13618.89	UNKNOWN	14.4	Cone
GER3-091	999	999	999	999	13689	13689	UNKNOWN	14.7	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
GER3-031	13853.02	1.29	11122.72	1.61	7207.72	2.48
GER3-032	11635.54	1.11	9437.91	1.37	6402.19	2.01
GER3-033	7682.98	0.87	6231.88	1.08	4227.38	1.58
GER3-034	8800.04	1.00	7137.96	1.23	4842.02	1.82
GER3-035	10116.90	0.89	8206.10	1.10	5566.59	1.62
GER3-036	12024.65	0.90	9753.52	1.11	6616.28	1.63
GER3-037	12724.84	1.19	10321.47	1.46	7001.54	2.16
GER3-038	15277.60	1.28	12392.09	1.57	8406.15	2.32
GER3-039	18587.76	1.09	15077.04	1.35	10227.48	1.98
USA04-08	13740.93	0.62	11233.21	0.76	6562.18	1.30
USA04-09	13740.93	0.76	11233.21	0.93	6562.18	1.60
GER3-040	11755.55	0.77	9628.58	0.95	6247.91	1.46
SWE1-01	11755.55	1.21	9628.58	1.47	6218.30	2.28
SWE1-02	12611.15	1.00	10329.37	1.22	6670.88	1.89
USA04-10	13831.30	1.13	11466.04	1.36	7206.22	2.16
SWE1-03	17766.57	0.95	14947.86	1.13	9200.09	1.84
USA04-13	11442.73	0.95	9667.44	1.13	6157.18	1.77
SWE1-04	14849.59	0.95	12597.01	1.12	7758.36	1.82
SWE1-05	14027.23	1.15	11899.39	1.35	7661.83	2.10
ENG2-17	15323.10	0.85	13102.04	0.99	8435.25	1.54
GER3-065	15172.13	0.91	12972.95	1.06	8707.55	1.58
GER3-070	15172.13	1.04	12972.95	1.22	8707.55	1.81
GER3-072	15172.13	1.07	12972.95	1.25	8707.55	1.86
GER3-074	15172.13	1.11	12972.95	1.30	8707.55	1.93
GER3-076	10728.32	1.09	9173.26	1.28	6157.17	1.90
GER3-077	14520.93	1.00	12416.14	1.17	8673.97	1.67
GER3-080	15591.17	1.26	13331.25	1.47	8948.04	2.19
GER3-081	24180.40	0.95	20675.48	1.11	14443.98	1.59
SWE1-06	19334.80	0.86	16532.25	1.00	10190.73	1.63
USA04-14	18404.39	0.74	15833.28	0.86	10087.66	1.35
GER3-082	15791.36	0.86	13605.70	1.00	8760.38	1.55
GER3-083	15979.73	0.71	13768.00	0.83	8864.88	1.29
GER3-084	11732.46	1.01	10108.59	1.18	7051.06	1.69
GER3-085	14299.68	0.91	12320.48	1.06	8593.93	1.51
GER3-086	15791.36	0.99	13605.70	1.15	9490.41	1.65
GER3-087	16471.53	1.17	14191.73	1.35	9899.19	1.94
GER3-088	18949.63	1.05	16326.84	1.22	11388.49	1.75
GER3-089	20973.40	1.10	18070.50	1.28	12604.75	1.83
GER3-090	25087.89	1.03	21615.51	1.20	15077.51	1.72
SWE1-07	16010.91	0.97	13794.86	1.12	8512.09	1.82
USA04-15	17463.08	1.30	15145.92	1.50	9754.59	2.33
USA04-16	14107.66	1.02	12235.73	1.18	7799.73	1.85
GER3-091	14940.19	0.98	12967.15	1.13	8863.01	1.66

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
3	GER3-092	E-TC	1	13	13	39		16	20.34	24.0
3	GER3-093	E-TC	1	13	13	39		16	41.53	49.0
17	SWE1-08	E-TW	1	10	10	39	540		34.41	40.6
18	USA04-17	E-SD	1	10	10	39	393		38.90	45.9
22	USA04-18	E-TW	1	9.5	9.5	39.3	745	25	29.24	34.5
1	ENG2-14	E-TW	1	12	12	40		20	22.37	26.4
1	ENG2-41	E-DI	1	10	10	40		20	22.37	26.4
1	ENG2-42	E-DI	1	10	10	40		20	23.81	28.1
1	ENG2-43	E-DI	1	10	10	40		20	25.25	29.8
3	GER1-06	E-TC	1	10	10	40		16	21.19	25.0
8	GER3-099	E-DI	1	9	9	40		16	18.64	22.0
8	GER3-100	E-DI	1	9	9	40		16	41.53	49.0
3	GER3-101	E-TC	1	10	10	40		16	13.31	15.7
3	GER3-102	E-TC	1	10	10	40		16	18.56	21.9
3	GER3-103	E-DI	1	12	12	40		16	11.10	13.1
3	GER3-104	E-DI	1	12	12	40		16	17.03	20.1
3	GER3-105	E-DI	1	12	12	40		16	17.46	20.6
3	GER3-106	E-TC	1	10	10	40		16	33.81	39.9
3	GER3-107	E-DI	1	12	12	40		16	17.46	20.6
3	GER3-108	E-TC	1	12	12	40		16	25.85	30.5
3	GER3-109	E-DI	1	12	12	40		16	22.20	26.2
3	GER3-110	E-DI	1	12	12	40		16	18.47	21.8
3	GER3-111	E-DI	1	12	12	40		16	22.20	26.2
3	GER3-112	E-DI	1	12	12	40		16	39.92	47.1
3	GER3-113	E-TC	1	12	12	40		16	61.02	72.0
2	GER3-119	E-TC	1	7	7	40	900	16	29.66	35.0
2	GER3-120	E-TC	1	7	7	40	900	16	29.66	35.0
18	USA04-21	E-TC	1	8.9	8.9	40	393		26.95	31.8
18	USA04-22	E-TC	1	8.9	8.9	40	393		26.95	31.8
18	USA04-23	E-TC	1	8.9	8.9	40	393		26.95	31.8
18	USA04-24	E-TC	1	8.9	8.9	40	393		26.95	31.8
18	USA04-25	E-TC	1	8.9	8.9	40	393		26.95	31.8
17	SWE1-09	E-TW	1	10	10	41	540		22.03	26.0
17	SWE1-10	E-TW	1	10	10	41	540		34.32	40.5
19	USA04-26	E-DI	1	6	6	41.3		25	25.76	30.4
2	GER3-125	E-TC	1	8	8	42		16	19.66	23.2
1	ENG2-18	E-TC	1	6	6	43	640	20	27.37	32.3
1	ENG2-19	E-TC	1	8	8	43		20	20.93	24.7
1	ENG2-20	E-TC	1	10	10	43		20	21.61	25.5
1	ENG2-44	E-DI	1	10	10	43		20	22.37	26.4
3	GER3-126	E-TC	1	10	10	44		16	18.56	21.9
3	GER3-127	E-TC	1	10	10	44		16	23.31	27.5
3	GER3-128	E-TC	1	16	16	45		16	18.22	21.5

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure Mode
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
GER3-092	999	999	999	999	13689	13689	UNKNOWN	17.5	Cone
GER3-093	999	999	999	999	13689	13689	UNKNOWN	27.9	Cone
SWE1-08	100	999	999	999	13689	13689	UNKNOWN	19.5	Cone
USA04-17	999	999	999	999	13689	13689	UNKNOWN	16.7	Cone
USA04-18	999	999	999	999	13900.41	13900.41	UNKNOWN	14.1	Cone
ENG2-14	999	999	999	999	14400	14400	UNKNOWN	16	Cone
ENG2-41	999	999	999	999	14400	14400	UNKNOWN	16	Cone
ENG2-42	999	999	999	999	14400	14400	UNKNOWN	19	Cone
ENG2-43	999	999	999	999	14400	14400	UNKNOWN	19	Cone
GER1-06	60	999	999	999	14400	14400	UNKNOWN	10.9	Cone
GER3-099	999	999	999	999	14400	14400	UNKNOWN	19.8	Cone
GER3-100	999	999	999	999	14400	14400	UNKNOWN	34.1	Cone
GER3-101	999	999	999	999	14400	14400	UNKNOWN	10.6	Cone
GER3-102	999	999	999	999	14400	14400	UNKNOWN	10.8	Cone
GER3-103	999	999	999	999	14400	14400	UNKNOWN	11.5	Cone
GER3-104	999	999	999	999	14400	14400	UNKNOWN	13.2	Cone
GER3-105	999	999	999	999	14400	14400	UNKNOWN	14.9	Cone
GER3-106	999	999	999	999	14400	14400	UNKNOWN	15.5	Cone
GER3-107	999	999	999	999	14400	14400	UNKNOWN	16.3	Cone
GER3-108	999	999	999	999	14400	14400	UNKNOWN	16.8	Cone
GER3-109	999	999	999	999	14400	14400	UNKNOWN	18.4	Cone
GER3-110	999	999	999	999	14400	14400	UNKNOWN	18.6	Cone
GER3-111	999	999	999	999	14400	14400	UNKNOWN	19.8	Cone
GER3-112	999	999	999	999	14400	14400	UNKNOWN	21.4	Cone
GER3-113	999	999	999	999	14400	14400	UNKNOWN	24.6	Cone
GER3-119	999	999	999	999	14400	14400	UNKNOWN	25.3	Cone
GER3-120	999	999	999	999	14400	14400	UNKNOWN	25.3	Cone
USA04-21	999	999	999	999	14400	14400	UNKNOWN	6.9	Cone
USA04-22	999	999	999	999	14400	14400	UNKNOWN	7.9	Cone
USA04-23	999	999	999	999	14400	14400	UNKNOWN	8	Cone
USA04-24	999	999	999	999	14400	14400	UNKNOWN	8.5	Cone
USA04-25	999	999	999	999	14400	14400	UNKNOWN	9.8	Cone
SWE1-09	100	999	999	999	15129	15129	UNKNOWN	14.8	Cone
SWE1-10	100	999	999	999	15129	15129	UNKNOWN	21.3	Cone
USA04-26	999	999	999	999	15351.21	15351.21	UNKNOWN	15	Cone
GER3-125	999	999	999	999	15876	15876	UNKNOWN	12.6	Cone
ENG2-18	999	999	999	999	16641	16641	UNKNOWN	14	Cone
ENG2-19	999	999	999	999	16641	16641	UNKNOWN	13	Cone
ENG2-20	65	999	999	999	16641	16641	UNKNOWN	21	Cone
ENG2-44	999	999	999	999	16641	16641	UNKNOWN	23	Cone
GER3-126	999	999	999	999	17424	17424	UNKNOWN	12.9	Cone
GER3-127	999	999	999	999	17424	17424	UNKNOWN	14.8	Cone
GER3-128	999	999	999	999	18225	18225	UNKNOWN	18.2	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
GER3-092	16087.06	1.09	13962.55	1.25	9543.37	1.83
GER3-093	22986.30	1.21	19950.66	1.40	13636.22	2.05
SWE1-08	20923.49	0.93	18160.27	1.07	11696.39	1.67
USA04-17	22247.30	0.75	19309.26	0.86	12436.41	1.34
USA04-18	19510.68	0.72	16970.47	0.83	10820.57	1.30
ENG2-14	17525.32	0.91	15318.83	1.04	10265.81	1.56
ENG2-41	17525.32	0.91	15318.83	1.04	10265.81	1.56
ENG2-42	18080.78	1.05	15804.36	1.20	10591.19	1.79
ENG2-43	18619.68	1.02	16275.41	1.17	10906.86	1.74
GER1-06	17054.31	0.64	14907.12	0.73	9605.68	1.13
GER3-099	15998.36	1.24	13984.12	1.42	9497.52	2.08
GER3-100	23876.03	1.43	20869.97	1.63	14174.14	2.41
GER3-101	13514.93	0.78	11813.36	0.90	7612.16	1.39
GER3-102	15961.96	0.68	13952.30	0.77	8990.42	1.20
GER3-103	12345.25	0.93	10790.94	1.07	7231.48	1.59
GER3-104	15291.92	0.86	13366.63	0.99	8957.55	1.47
GER3-105	15480.95	0.96	13531.86	1.10	9068.28	1.64
GER3-106	21545.20	0.72	18832.60	0.82	12135.13	1.28
GER3-107	15480.95	1.05	13531.86	1.20	9068.28	1.80
GER3-108	18837.10	0.89	16465.45	1.02	11034.21	1.52
GER3-109	17458.81	1.05	15260.70	1.21	10226.85	1.80
GER3-110	15925.47	1.17	13920.41	1.34	9328.67	1.99
GER3-111	17458.81	1.13	15260.70	1.30	10226.85	1.94
GER3-112	23408.55	0.91	20461.35	1.05	13712.03	1.56
GER3-113	28942.12	0.85	25298.22	0.97	16953.43	1.45
GER3-119	20178.93	1.25	17638.34	1.43	11456.52	2.21
GER3-120	20178.93	1.25	17638.34	1.43	11456.52	2.21
USA04-21	19234.36	0.36	16812.69	0.41	10595.23	0.65
USA04-22	19234.36	0.41	16812.69	0.47	10595.23	0.75
USA04-23	19234.36	0.42	16812.69	0.48	10595.23	0.76
USA04-24	19234.36	0.44	16812.69	0.51	10595.23	0.80
USA04-25	19234.36	0.51	16812.69	0.58	10595.23	0.92
SWE1-09	18048.31	0.82	15883.96	0.93	10241.62	1.45
SWE1-10	22525.65	0.95	19824.38	1.07	12782.32	1.67
USA04-26	19730.40	0.76	17399.09	0.86	10346.09	1.45
GER3-125	17676.33	0.71	15659.35	0.80	10571.10	1.19
ENG2-18	21606.18	0.65	19262.90	0.73	12441.53	1.13
ENG2-19	18894.06	0.69	16844.92	0.77	11290.36	1.15
ENG2-20	19197.60	1.09	17115.54	1.23	11888.90	1.77
ENG2-44	19533.44	1.18	17414.96	1.32	11672.43	1.97
GER3-126	18415.15	0.70	16519.18	0.78	10680.62	1.21
GER3-127	20635.71	0.72	18511.12	0.80	11968.53	1.24
GER3-128	18871.75	0.96	17029.72	1.07	12226.15	1.49

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number	Diameter	Outside Diameter	Embedment	Strength of Steel	Aggregate Diameter	Strength of Concrete	
			n	d (mm)	do/dh (mm)	hef (mm)	fy (MPa)	dagg (mm)	fc (MPa)	fcc200 (MPa)
3	GER3-129	E-TC	1	17	17	45		16	17.54	20.7
3	GER3-130	E-TC	1	17	17	45		16	20.34	24.0
3	GER3-131	E-TC	1	17	17	45		16	41.53	49.0
3	GER3-132	E-DI	1	15	15	46		16	21.19	25.0
3	GER3-133	E-DI	1	15	15	46		16	21.19	25.0
3	GER3-134	E-DI	1	15	15	46		16	21.19	25.0
3	GER3-135	E-DI	1	15	15	46		16	21.19	25.0
3	GER3-136	E-DI	1	15	15	46		16	21.19	25.0
3	GER3-137	E-DI	1	15	15	46		16	10.51	12.4
3	GER3-138	E-DI	1	15	15	46		16	24.41	28.8
3	GER3-139	E-DI	1	15	15	46		16	30.76	36.3
3	GER3-140	E-DI	1	15	15	46		16	41.95	49.5
17	SWE1-13	E-TW	1	10	10	46	540		15.42	18.2
1	ENG2-21	E-TC	1	8	8	47	640	20	27.37	32.3
3	GER3-141	E-TC	1	6	6	47		16	12.46	14.7
3	GER3-142	E-TC	1	12	12	47		16	7.46	8.8
3	GER3-143	E-TC	1	12	12	47		16	19.24	22.7
3	GER3-144	E-TC	1	12	12	47		16	15.85	18.7
3	GER3-145	E-TC	1	12	12	47		16	19.24	22.7
3	GER3-146	E-TC	1	12	12	47		16	19.15	22.6
3	GER3-147	E-TC	1	12	12	47		16	21.69	25.6
3	GER3-148	E-TC	1	12	12	47		16	31.86	37.6
3	GER3-149	E-TC	1	12	12	47		16	33.81	39.9
17	SWE1-14	E-TW	1	16	16	48	425		21.10	24.9
1	ENG2-01	E-TW	1	8	8	50	850	20	19.49	23.0
1	ENG2-06	E-TW	1	8	8	50	850	20	19.49	23.0
1	ENG2-22	E-TC	1	10	10	50		20	20.93	24.7
1	ENG2-23	E-TC	1	10	10	50		20	20.93	24.7
1	ENG2-45	E-DI	1	12	12	50		20	22.37	26.4
1	ENG2-46	E-DI	1	12	12	50		20	23.81	28.1
1	ENG2-47	E-DI	1	12	12	50		20	25.25	29.8
3	GER3-151	E-DI	1	15	15	50		16	11.10	13.1
3	GER3-152	E-DI	1	15	15	50		16	18.98	22.4
3	GER3-153	E-DI	1	15	15	50		16	20.42	24.1
3	GER3-154	E-TC	1	13	13	50		16	20.34	24.0
3	GER3-155	E-DI	1	15	15	50		16	20.42	24.1
19	USA04-27	E-TW	1	12.7	12.7	50.8	483	25	15.25	18.0
19	USA04-28	E-TW	1	12.7	12.7	50.8	483	25	15.25	18.0
1	ENG2-10	E-TW	1	16	16	51		20	23.73	28.0
2	GER3-162	E-TC	1	10	10	51		16	19.66	23.2
17	SWE1-15	E-TW	1	16	16	51	430		21.78	25.7
6	USA04-29	E-SD	1	12.7	12.7	51.6			22.03	26.0
6	USA04-30	E-SD	1	12.7	12.7	51.6			21.36	25.2

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure Mode
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
GER3-129	999	999	999	999	18225	18225	UNKNOWN	21.2	Cone
GER3-130	999	999	999	999	18225	18225	UNKNOWN	27.6	Cone
GER3-131	999	999	999	999	18225	18225	UNKNOWN	40.3	Cone
GER3-132	100	999	999	999	19044	19044	UNKNOWN	22.3	Cone
GER3-133	125	999	999	999	19044	19044	UNKNOWN	27.7	Cone
GER3-134	150	999	999	999	19044	19044	UNKNOWN	26.7	Cone
GER3-135	175	999	999	999	19044	19044	UNKNOWN	22	Cone
GER3-136	200	999	999	999	19044	19044	UNKNOWN	27.8	Cone
GER3-137	999	999	999	999	19044	19044	UNKNOWN	17.2	Cone
GER3-138	999	999	999	999	19044	19044	UNKNOWN	30.6	Cone
GER3-139	999	999	999	999	19044	19044	UNKNOWN	36	Cone
GER3-140	999	999	999	999	19044	19044	UNKNOWN	43.3	Cone
SWE1-13	100	999	999	999	19044	19044	UNKNOWN	17.6	Cone
ENG2-21	999	999	999	999	19881	19881	UNKNOWN	21	Cone
GER3-141	999	999	999	999	19881	19881	UNKNOWN	9.8	Cone
GER3-142	999	999	999	999	19881	19881	UNKNOWN	11	Cone
GER3-143	999	999	999	999	19881	19881	UNKNOWN	13.1	Cone
GER3-144	999	999	999	999	19881	19881	UNKNOWN	13.8	Cone
GER3-145	999	999	999	999	19881	19881	UNKNOWN	15.1	Cone
GER3-146	999	999	999	999	19881	19881	UNKNOWN	15.8	Cone
GER3-147	999	999	999	999	19881	19881	UNKNOWN	19.9	Cone
GER3-148	999	999	999	999	19881	19881	UNKNOWN	20.8	Cone
GER3-149	999	999	999	999	19881	19881	UNKNOWN	26.6	Cone
SWE1-14	999	999	999	999	20736	20736	UNKNOWN	26.8	Cone
ENG2-01	999	999	999	999	22500	22500	UNKNOWN	15	Cone
ENG2-06	80	999	999	999	22500	22500	UNKNOWN	16	Cone
ENG2-22	999	999	999	999	22500	22500	UNKNOWN	18	Cone
ENG2-23	999	999	999	999	22500	22500	UNKNOWN	23	Cone
ENG2-45	999	999	999	999	22500	22500	UNKNOWN	24	Cone
ENG2-46	999	999	999	999	22500	22500	UNKNOWN	28	Cone
ENG2-47	999	999	999	999	22500	22500	UNKNOWN	40	Cone
GER3-151	999	999	999	999	22500	22500	UNKNOWN	16.4	Cone
GER3-152	999	999	999	999	22500	22500	UNKNOWN	19.1	Cone
GER3-153	999	999	999	999	22500	22500	UNKNOWN	19.2	Cone
GER3-154	999	999	999	999	22500	22500	UNKNOWN	24.9	Cone
GER3-155	999	999	999	999	22500	22500	UNKNOWN	25.8	Cone
USA04-27	999	999	999	999	23225.76	23225.76	UNKNOWN	21	Cone
USA04-28	999	999	999	999	23225.76	23225.76	UNKNOWN	24	Cone
ENG2-10	999	999	999	999	23409	23409	UNKNOWN	41	Cone
GER3-162	999	999	999	999	23409	23409	UNKNOWN	22	Cone
SWE1-15	160	999	999	999	23409	23409	UNKNOWN	29.3	Cone
USA04-29	89	999	999	999	23963.04	23963.04	UNKNOWN	23.8	Cone
USA04-30	90	999	999	999	23963.04	23963.04	UNKNOWN	28	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
GER3-129	18517.32	1.14	16709.88	1.27	12193.19	1.74
GER3-130	19938.78	1.38	17992.60	1.53	13129.19	2.10
GER3-131	28489.90	1.41	25709.06	1.57	18759.89	2.15
GER3-132	21032.01	1.06	19088.64	1.17	13476.77	1.65
GER3-133	21032.01	1.32	19088.64	1.45	13476.77	2.06
GER3-134	21032.01	1.27	19088.64	1.40	13476.77	1.98
GER3-135	21032.01	1.05	19088.64	1.15	13476.77	1.63
GER3-136	21032.01	1.32	19088.64	1.46	13476.77	2.06
GER3-137	14812.27	1.16	13443.61	1.28	9491.32	1.81
GER3-138	22573.93	1.36	20488.08	1.49	14464.79	2.12
GER3-139	25343.36	1.42	23001.62	1.57	16239.37	2.22
GER3-140	29594.67	1.46	26860.10	1.61	18963.49	2.28
SWE1-13	17945.13	0.98	16286.99	1.08	10556.25	1.67
ENG2-21	24690.06	0.85	22533.89	0.93	15138.37	1.39
GER3-141	16656.34	0.59	15201.75	0.64	9174.04	1.07
GER3-142	12887.31	0.85	11761.87	0.94	7901.68	1.39
GER3-143	20698.26	0.63	18890.69	0.69	12690.86	1.03
GER3-144	18786.32	0.73	17145.72	0.80	11518.58	1.20
GER3-145	20698.26	0.73	18890.69	0.80	12690.86	1.19
GER3-146	20652.62	0.77	18849.03	0.84	12662.87	1.25
GER3-147	21980.67	0.91	20061.10	0.99	13477.15	1.48
GER3-148	26638.81	0.78	24312.45	0.86	16333.22	1.27
GER3-149	27441.47	0.97	25045.02	1.06	16825.36	1.58
SWE1-14	22373.59	1.20	20530.24	1.31	14724.79	1.82
ENG2-01	22860.88	0.66	21194.78	0.71	13359.49	1.12
ENG2-06	22860.88	0.70	21194.78	0.75	13359.49	1.20
ENG2-22	23690.68	0.76	21964.10	0.82	15276.60	1.18
ENG2-23	23690.68	0.97	21964.10	1.05	15276.60	1.51
ENG2-45	24492.38	0.98	22707.38	1.06	16040.34	1.50
ENG2-46	25268.66	1.11	23427.08	1.20	16548.73	1.69
ENG2-47	26021.79	1.54	24125.32	1.66	17041.96	2.35
GER3-151	17253.01	0.95	15995.60	1.03	11299.19	1.45
GER3-152	22560.73	0.85	20916.50	0.91	14775.27	1.29
GER3-153	23401.17	0.82	21695.69	0.88	15325.69	1.25
GER3-154	23352.57	1.07	21650.64	1.15	14823.28	1.68
GER3-155	23401.17	1.10	21695.69	1.19	15325.69	1.68
USA04-27	20711.23	1.01	19277.84	1.09	13146.25	1.60
USA04-28	20711.23	1.16	19277.84	1.24	13146.25	1.83
ENG2-10	25984.14	1.58	24209.38	1.69	17368.09	2.36
GER3-162	23652.30	0.93	22036.81	1.00	15903.85	1.38
SWE1-15	24894.07	1.18	23193.76	1.26	16639.48	1.76
USA04-29	25482.11	0.93	23810.27	1.00	16250.83	1.46
USA04-30	25087.01	1.12	23441.09	1.19	15998.86	1.75

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
6	USA04-31	E-SD	1	12.7	12.7	51.6			34.49	40.7
6	USA04-32	E-SD	1	12.7	12.7	51.6			21.36	25.2
6	USA04-33	E-SD	1	12.7	12.7	51.6			24.15	28.5
6	USA04-34	E-SD	1	12.7	12.7	51.6			21.36	25.2
6	USA04-35	E-SD	1	12.7	12.7	51.6			34.49	40.7
6	USA04-36	E-SD	1	12.7	12.7	51.6			42.71	50.4
6	USA04-37	E-SD	1	12.7	12.7	51.6			42.71	50.4
6	USA04-38	E-SD	1	12.7	12.7	51.6			34.49	40.7
6	USA04-39	E-SD	1	12.7	12.7	51.6			42.71	50.4
6	USA04-40	E-SD	1	12.7	12.7	51.6			22.03	26.0
6	USA04-41	E-SD	1	12.7	12.7	51.6			22.03	26.0
6	USA04-42	E-SD	1	12.7	12.7	51.6			22.03	26.0
6	USA04-43	E-SD	1	12.7	12.7	51.6			22.03	26.0
6	USA04-44	E-SD	1	12.7	12.7	51.6			22.03	26.0
18	USA04-45	E-SD	1	12.7	12.7	52	393		38.90	45.9
1	ENG2-07	E-TW	1	16	16	53		20	28.81	34.0
1	ENG2-15	E-TW	1	16	16	53		20	22.37	26.4
1	ENG2-48	E-DI	1	12	12	53		20	22.37	26.4
3	GER3-163	E-SD	1	17	17	53		16	21.19	25.0
3	GER3-164	E-TC	1	12	12	53		16	21.19	25.0
3	GER3-165	E-TC	1	12	12	53		16	14.66	17.3
3	GER3-166	E-SD	1	17	17	53		16	9.58	11.3
3	GER3-167	E-SD	1	17	17	53		16	12.20	14.4
3	GER3-168	E-SD	1	17	17	53		16	18.64	22.0
3	GER3-169	E-SD	1	17	17	53		16	24.66	29.1
3	GER3-170	E-SD	1	17	17	53		16	38.56	45.5
3	GER3-171	E-DI	1	20	20	55		16	21.19	25.0
3	GER3-172	E-DI	1	20	20	55		16	21.19	25.0
3	GER3-173	E-DI	1	20	20	55		16	21.19	25.0
3	GER3-174	E-TC	1	10	10	55		16	17.37	20.5
3	GER3-175	E-TC	1	10	10	55		16	17.71	20.9
3	GER3-176	E-TC	1	12	12	55		16	22.12	26.1
3	GER3-177	E-TC	1	14	14	55		16	19.07	22.5
3	GER3-178	E-DI	1	20	20	55		16	20.68	24.4
3	GER3-179	E-TC	1	14	14	55		16	22.20	26.2
3	GER3-180	E-DI	1	20	20	55		16	22.37	26.4
3	GER3-181	E-TC	1	14	14	55		16	46.95	55.4
3	GER3-182	E-TC	1	14	14	55		16	59.58	70.3
3	GER3-183	E-DI	1	20	20	55		16	42.97	50.7
3	GER3-184	E-TC	1	8	8	55		16	19.66	23.2
17	SWE1-16	E-TW	1	10	10	55	560		19.83	23.4
1	ENG2-24	E-TC	1	10	10	57	640	20	27.37	32.3
3	GER3-185	E-TC	1	14	14	57		16	19.24	22.7

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure Mode
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
USA04-31	90	999	999	999	23963.04	23963.04	UNKNOWN	32.7	Cone
USA04-32	90	999	999	999	23963.04	23963.04	UNKNOWN	32.9	Cone
USA04-33	90	999	999	999	23963.04	23963.04	UNKNOWN	34.7	Cone
USA04-34	90	999	999	999	23963.04	23963.04	UNKNOWN	36.6	Cone
USA04-35	90	999	999	999	23963.04	23963.04	UNKNOWN	40.9	Cone
USA04-36	90	999	999	999	23963.04	23963.04	UNKNOWN	44.9	Cone
USA04-37	90	999	999	999	23963.04	23963.04	UNKNOWN	46.3	Cone
USA04-38	90	999	999	999	23963.04	23963.04	UNKNOWN	48.4	Cone
USA04-39	90	999	999	999	23963.04	23963.04	UNKNOWN	49.8	Cone
USA04-40	102	999	999	999	23963.04	23963.04	UNKNOWN	30.2	Cone
USA04-41	114	999	999	999	23963.04	23963.04	UNKNOWN	31.7	Cone
USA04-42	127	999	999	999	23963.04	23963.04	UNKNOWN	29.1	Cone
USA04-43	140	999	999	999	23963.04	23963.04	UNKNOWN	27.9	Cone
USA04-44	152	999	999	999	23963.04	23963.04	UNKNOWN	32.5	Cone
USA04-45	999	999	999	999	24336	24336	UNKNOWN	35	Cone
ENG2-07	999	999	999	999	25281	25281	UNKNOWN	43	Cone
ENG2-15	999	999	999	999	25281	25281	UNKNOWN	28	Cone
ENG2-48	999	999	999	999	25281	25281	UNKNOWN	32	Cone
GER3-163	100	999	999	999	25281	25281	UNKNOWN	31.2	Cone
GER3-164	130	999	999	999	25281	25281	UNKNOWN	19.1	Cone
GER3-165	999	999	999	999	25281	25281	UNKNOWN	14.8	Cone
GER3-166	999	999	999	999	25281	25281	UNKNOWN	19.1	Cone
GER3-167	999	999	999	999	25281	25281	UNKNOWN	22.7	Cone
GER3-168	999	999	999	999	25281	25281	UNKNOWN	26.6	Cone
GER3-169	999	999	999	999	25281	25281	UNKNOWN	30.8	Cone
GER3-170	999	999	999	999	25281	25281	UNKNOWN	44.6	Cone
GER3-171	120	999	999	999	27225	27225	UNKNOWN	26.5	Cone
GER3-172	150	999	999	999	27225	27225	UNKNOWN	30.5	Cone
GER3-173	180	999	999	999	27225	27225	UNKNOWN	29.4	Cone
GER3-174	999	999	999	999	27225	27225	UNKNOWN	12.6	Cone
GER3-175	999	999	999	999	27225	27225	UNKNOWN	18	Cone
GER3-176	999	999	999	999	27225	27225	UNKNOWN	20.5	Cone
GER3-177	999	999	999	999	27225	27225	UNKNOWN	22.2	Cone
GER3-178	999	999	999	999	27225	27225	UNKNOWN	29.5	Cone
GER3-179	999	999	999	999	27225	27225	UNKNOWN	29.8	Cone
GER3-180	999	999	999	999	27225	27225	UNKNOWN	42.2	Cone
GER3-181	999	999	999	999	27225	27225	UNKNOWN	42.4	Cone
GER3-182	999	999	999	999	27225	27225	UNKNOWN	48.5	Cone
GER3-183	999	999	999	999	27225	27225	UNKNOWN	57.3	Cone
GER3-184	999	999	999	999	27225	27225	UNKNOWN	19.2	Cone
SWE1-16	999	999	999	999	27225	27225	UNKNOWN	17.9	Cone
ENG2-24	999	999	999	999	29241	29241	UNKNOWN	31	Cone
GER3-185	999	999	999	999	29241	29241	UNKNOWN	17.4	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
USA04-31	31882.02	1.03	29790.29	1.10	20332.28	1.61
USA04-32	25087.01	1.31	23441.09	1.40	15998.86	2.06
USA04-33	26679.09	1.30	24928.72	1.39	17014.19	2.04
USA04-34	25087.01	1.46	23441.09	1.56	15998.86	2.29
USA04-35	31882.02	1.28	29790.29	1.37	20332.28	2.01
USA04-36	35478.39	1.27	33150.71	1.35	22625.81	1.98
USA04-37	35478.39	1.31	33150.71	1.40	22625.81	2.05
USA04-38	31882.02	1.52	29790.29	1.62	20332.28	2.38
USA04-39	35478.39	1.40	33150.71	1.50	22625.81	2.20
USA04-40	25482.11	1.19	23810.27	1.27	16250.83	1.86
USA04-41	25482.11	1.24	23810.27	1.33	16250.83	1.95
USA04-42	25482.11	1.14	23810.27	1.22	16250.83	1.79
USA04-43	25482.11	1.09	23810.27	1.17	16250.83	1.72
USA04-44	25482.11	1.28	23810.27	1.36	16250.83	2.00
USA04-45	34251.96	1.02	32065.50	1.09	21894.86	1.60
ENG2-07	30333.84	1.42	28529.73	1.51	20482.95	2.10
ENG2-15	26729.44	1.05	25139.70	1.11	18049.08	1.55
ENG2-48	26729.44	1.20	25139.70	1.27	17787.50	1.80
GER3-163	26011.05	1.20	24464.04	1.28	17818.54	1.75
GER3-164	26011.05	0.73	24464.04	0.78	16545.78	1.15
GER3-165	21637.69	0.68	20350.79	0.73	13763.86	1.08
GER3-166	17487.48	1.09	16447.40	1.16	11979.57	1.59
GER3-167	19741.00	1.15	18566.90	1.22	13523.32	1.68
GER3-168	24400.53	1.09	22949.30	1.16	16715.27	1.59
GER3-169	28063.02	1.10	26393.96	1.17	19224.21	1.60
GER3-170	35090.83	1.27	33003.79	1.35	24038.52	1.86
GER3-171	27497.18	0.96	26093.10	1.02	19811.72	1.34
GER3-172	27497.18	1.11	26093.10	1.17	19811.72	1.54
GER3-173	27497.18	1.07	26093.10	1.13	19811.72	1.48
GER3-174	24899.75	0.51	23628.31	0.53	15548.23	0.81
GER3-175	25141.51	0.72	23857.72	0.75	15699.19	1.15
GER3-176	28095.61	0.73	26660.97	0.77	18083.64	1.13
GER3-177	26086.11	0.85	24754.09	0.90	17291.44	1.28
GER3-178	27165.21	1.09	25778.09	1.14	19572.53	1.51
GER3-179	28149.38	1.06	26712.00	1.12	18659.09	1.60
GER3-180	28256.61	1.49	26813.76	1.57	20358.89	2.07
GER3-181	40932.95	1.04	38842.81	1.09	27132.81	1.56
GER3-182	46110.07	1.05	43755.58	1.11	30564.52	1.59
GER3-183	39158.15	1.46	37158.63	1.54	28213.44	2.03
GER3-184	26488.79	0.72	25136.21	0.76	17151.21	1.12
SWE1-16	26602.72	0.67	25244.32	0.71	16611.62	1.08
ENG2-24	32975.22	0.94	31556.16	0.98	22093.40	1.40
GER3-185	27643.90	0.63	26454.27	0.66	18521.42	0.94

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
3	GER3-186	E-TC	1	20	20	57		16	16.27	19.2
3	GER3-187	E-TC	1	20	20	57		16	41.36	48.8
3	GER3-188	E-TC	1	20	20	57		16	53.81	63.5
17	SWE1-17	E-TW	1	12	12	57	560		36.10	42.6
19	USA04-46	E-TC	1	8.9	8.9	57		25	28.81	34.0
19	USA04-47	E-TC	1	15.9	15.9	57		25	26.78	31.6
21	USA04-48	E-TW	1	12.7	12.7	57.5	483	25	27.63	32.6
1	ENG2-25	E-TC	1	12	12	58	640	20	27.37	32.3
17	SWE1-18	E-TW	1	16	16	58	430		21.78	25.7
22	USA04-49	E-TW	1	12	12	58.2	745	25	14.49	17.1
22	USA04-50	E-TW	1	12	12	58.9	565	25	25.00	29.5
3	GER3-189	E-TC	1	16	16	59		16	13.31	15.7
3	GER3-190	E-TC	1	16	16	59		16	53.39	63.0
1	ENG2-49	E-DI	1	16	16	60		20	22.37	26.4
1	ENG2-50	E-DI	1	16	16	60		20	25.25	29.8
3	GER3-194	E-TC	1	14	14	60		16	21.19	25.0
3	GER3-195	E-TC	1	19	19	60		16	58.05	68.5
0	GER3-200	E-TC	1	10	10	60		16	47.46	56.0
3	GER3-201	E-TC	1	10	10	60	900	16	26.27	31.0
22	USA04-51	E-TW	1	12	12	60.2	565	25	12.97	15.3
22	USA04-52	E-TW	1	12	12	60.7	745	25	27.63	32.6
22	USA04-53	E-TW	1	12	12	60.8	483	25	13.64	16.1
3	GER3-213	E-TC	1	15	15	61		16	17.20	20.3
3	GER3-214	E-TC	1	15	15	61		16	53.39	63.0
1	ENG2-26	E-TC	1	8	8	62	640	20	27.37	32.3
8	GER3-215	E-DI	1	15	15	62		16	18.64	22.0
8	GER3-216	E-DI	1	15	15	62		16	41.53	49.0
6	USA04-54	E-SD	1	15.9	15.9	62.7			24.15	28.5
3	GER3-217	E-SD	1	21	21	63		16	21.19	25.0
3	GER3-218	E-SD	1	21	21	63		16	9.15	10.8
3	GER3-219	E-SD	1	21	21	63		16	11.69	13.8
3	GER3-220	E-SD	1	21	21	63		16	15.08	17.8
3	GER3-221	E-SD	1	21	21	63		16	18.56	21.9
3	GER3-222	E-SD	1	21	21	63		16	26.10	30.8
3	GER3-223	E-SD	1	21	21	63		16	36.27	42.8
34	USA04-55	E-TC	1	15.9	15.9	63.5		9	30.25	35.7
34	USA04-56	E-TC	1	15.9	15.9	63.5		9	30.25	35.7
34	USA04-57	E-TC	1	15.9	15.9	63.5		9	30.25	35.7
34	USA04-58	E-TC	1	15.9	15.9	63.5		9	30.25	35.7
34	USA04-59	E-TC	1	15.9	15.9	63.5		9	43.98	51.9
34	USA04-60	E-TC	1	15.9	15.9	63.5		9	43.98	51.9
34	USA04-61	E-TC	1	15.9	15.9	63.5		9	43.98	51.9
15	USA04-62	E-TC	1	12.7	12.7	63.5			24.07	28.4

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure Mode
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
GER3-186	999	999	999	999	29241	29241	UNKNOWN	27.7	Cone
GER3-187	999	999	999	999	29241	29241	UNKNOWN	40.4	Cone
GER3-188	999	999	999	999	29241	29241	UNKNOWN	48.9	Cone
SWE1-17	999	999	999	999	29241	29241	UNKNOWN	31	Cone
USA04-46	999	999	999	999	29241	29241	UNKNOWN	30.7	Cone
USA04-47	999	999	999	999	29241	29241	UNKNOWN	33.4	Cone
USA04-48	999	999	999	999	29756.25	29756.25	UNKNOWN	32.6	Cone
ENG2-25	999	999	999	999	30276	30276	UNKNOWN	35	Cone
SWE1-18	160	999	999	999	30276	30276	UNKNOWN	33.4	Cone
USA04-49	999	999	999	999	30485.16	30485.16	UNKNOWN	21.3	Cone
USA04-50	999	999	999	999	31222.89	31222.89	UNKNOWN	23.2	Cone
GER3-189	999	999	999	999	31329	31329	UNKNOWN	24.6	Cone
GER3-190	999	999	999	999	31329	31329	UNKNOWN	37.8	Cone
ENG2-49	999	999	999	999	32400	32400	UNKNOWN	29	Cone
ENG2-50	999	999	999	999	32400	32400	UNKNOWN	47	Cone
GER3-194	140	999	999	999	32400	32400	UNKNOWN	27.7	Cone
GER3-195	999	999	999	999	32400	32400	UNKNOWN	50.5	Cone
GER3-200	999	999	999	999	32400	32400	UNKNOWN	48.3	Cone
GER3-201	999	999	999	999	32400	32400	UNKNOWN	33.7	Cone
USA04-51	999	999	999	999	32616.36	32616.36	UNKNOWN	19	Cone
USA04-52	999	999	999	999	33160.41	33160.41	UNKNOWN	23.4	Cone
USA04-53	999	999	999	999	33269.76	33269.76	UNKNOWN	19	Cone
GER3-213	999	999	999	999	33489	33489	UNKNOWN	29.4	Cone
GER3-214	999	999	999	999	33489	33489	UNKNOWN	45.8	Cone
ENG2-26	999	999	999	999	34596	34596	UNKNOWN	29	Cone
GER3-215	999	999	999	999	34596	34596	UNKNOWN	30.2	Cone
GER3-216	999	999	999	999	34596	34596	UNKNOWN	61	Cone
USA04-54	110	999	999	999	35381.61	35381.61	UNKNOWN	46.7	Cone
GER3-217	120	999	999	999	35721	35721	UNKNOWN	38.2	Cone
GER3-218	999	999	999	999	35721	35721	UNKNOWN	19.4	Cone
GER3-219	999	999	999	999	35721	35721	UNKNOWN	23.8	Cone
GER3-220	999	999	999	999	35721	35721	UNKNOWN	33.5	Cone
GER3-221	999	999	999	999	35721	35721	UNKNOWN	37.8	Cone
GER3-222	999	999	999	999	35721	35721	UNKNOWN	44	Cone
GER3-223	999	999	999	999	35721	35721	UNKNOWN	61	Cone
USA04-55	999	999	999	999	36290.25	36290.25	UNKNOWN	33.9	Cone
USA04-56	999	999	999	999	36290.25	36290.25	UNKNOWN	36.4	Cone
USA04-57	999	999	999	999	36290.25	36290.25	UNKNOWN	36.4	Cone
USA04-58	999	999	999	999	36290.25	36290.25	UNKNOWN	36.4	Cone
USA04-59	999	999	999	999	36290.25	36290.25	UNKNOWN	49.6	Cone
USA04-60	999	999	999	999	36290.25	36290.25	UNKNOWN	53.9	Cone
USA04-61	999	999	999	999	36290.25	36290.25	UNKNOWN	56.4	Cone
USA04-62	999	999	999	999	36290.25	36290.25	UNKNOWN	29.8	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
GER3-186	25423.60	1.09	24329.51	1.14	18473.29	1.50
GER3-187	40531.84	1.00	38787.59	1.04	29451.24	1.37
GER3-188	46235.25	1.06	44245.56	1.11	33595.46	1.46
SWE1-17	37869.64	0.82	36239.95	0.86	24657.94	1.26
USA04-46	33831.86	0.91	32375.93	0.95	21039.13	1.46
USA04-47	32615.94	1.02	31212.34	1.07	22437.48	1.49
USA04-48	33564.85	0.97	32185.87	1.01	24377.22	1.34
ENG2-25	33846.78	1.03	32521.49	1.08	24064.17	1.45
SWE1-18	30191.36	1.11	29009.20	1.15	20900.39	1.60
USA04-49	24754.64	0.86	23804.30	0.89	16228.79	1.31
USA04-50	33102.29	0.70	31919.25	0.73	21787.16	1.06
GER3-189	24210.40	1.02	23354.23	1.05	16841.91	1.46
GER3-190	48497.84	0.78	46782.78	0.81	33737.40	1.12
ENG2-49	32196.08	0.90	31176.91	0.93	23690.34	1.22
ENG2-50	34206.54	1.37	33123.73	1.42	25169.67	1.87
GER3-194	31330.76	0.88	30338.99	0.91	21324.61	1.30
GER3-195	51861.64	0.97	50219.97	1.01	37683.54	1.34
GER3-200	46891.59	1.03	45407.25	1.06	32907.73	1.47
GER3-201	34888.46	0.97	33784.07	1.00	23842.35	1.41
USA04-51	24632.84	0.77	23871.13	0.80	16330.80	1.16
USA04-52	36405.41	0.64	35345.76	0.66	24202.49	0.97
USA04-53	25647.34	0.74	24910.09	0.76	17059.88	1.11
GER3-213	28941.22	1.02	28130.10	1.05	20064.09	1.47
GER3-214	50984.61	0.90	49555.68	0.92	35346.13	1.30
ENG2-26	37407.86	0.78	36492.25	0.79	25046.83	1.16
GER3-215	30872.58	0.98	30116.93	1.00	23520.32	1.28
GER3-216	46074.40	1.32	44946.66	1.36	35101.84	1.74
USA04-54	35735.33	1.31	34947.86	1.34	25272.06	1.85
GER3-217	33709.70	1.13	33001.74	1.16	25416.63	1.50
GER3-218	22156.28	0.88	21690.96	0.89	16705.51	1.16
GER3-219	25045.20	0.95	24519.21	0.97	18883.72	1.26
GER3-220	28444.28	1.18	27846.90	1.20	21446.58	1.56
GER3-221	31550.55	1.20	30887.94	1.22	23788.66	1.59
GER3-222	37416.25	1.18	36630.45	1.20	28211.31	1.56
GER3-223	44106.93	1.38	43180.61	1.41	33255.99	1.83
USA04-55	40763.25	0.83	39976.86	0.85	28937.20	1.17
USA04-56	40763.25	0.89	39976.86	0.91	28937.20	1.26
USA04-57	40763.25	0.89	39976.86	0.91	28937.20	1.26
USA04-58	40763.25	0.89	39976.86	0.91	28937.20	1.26
USA04-59	49149.42	1.01	48201.24	1.03	34890.41	1.42
USA04-60	49149.42	1.10	48201.24	1.12	34890.41	1.54
USA04-61	49149.42	1.15	48201.24	1.17	34890.41	1.62
USA04-62	36357.49	0.82	35656.09	0.84	24769.43	1.20

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
15	USA04-63	E-TC	1	12.7	12.7	63.5			24.07	28.4
15	USA04-64	E-TC	1	12.7	12.7	63.5			24.07	28.4
15	USA04-65	E-TC	1	12.7	12.7	63.5			24.07	28.4
15	USA04-66	E-TC	1	12.7	12.7	63.5			31.36	37.0
15	USA04-67	E-TC	1	12.7	12.7	63.5			32.71	38.6
15	USA04-68	E-TC	1	12.7	12.7	63.5			32.71	38.6
15	USA04-69	E-TC	1	12.7	12.7	63.5			32.71	38.6
1	ENG2-51	E-DI	1	16	16	64		20	23.81	28.1
1	ENG2-02	E-TW	1	8	8	65	850	20	19.49	23.0
1	ENG2-27	E-TC	1	12	12	65		20	19.49	23.0
1	ENG2-52	E-DI	1	16	16	65		20	22.37	26.4
3	GER3-224	E-TC	1	10	10	65		16	12.46	14.7
3	GER3-225	E-TC	1	10	10	65		16	25.85	30.5
3	GER3-226	E-DI	1	20	20	65		16	16.53	19.5
3	GER3-227	E-DI	1	20	20	65		16	17.37	20.5
3	GER3-228	E-DI	1	20	20	65		16	16.53	19.5
3	GER3-229	E-DI	1	20	20	65		16	22.97	27.1
3	GER3-230	E-DI	1	20	20	65		16	42.37	50.0
8	GER3-231	E-TC	1	10	10	65	640	16	24.41	28.8
8	GER3-232	E-TC	1	10	10	65	640	16	47.20	55.7
8	GER3-233	E-TC	1	10	10	65	640	16	24.41	28.8
8	GER3-234	E-TC	1	10	10	65	640	16	24.41	28.8
8	GER3-235	E-TC	1	10	10	65	640	16	47.20	55.7
17	SWE1-22	E-TW	1	16	16	65	430		17.54	20.7
3	GER3-236	E-TC	1	15	15	66		16	19.66	23.2
3	GER3-237	E-TC	1	16	16	67		16	21.19	25.0
3	GER3-238	E-TC	1	16	16	67		16	7.46	8.8
3	GER3-239	E-TC	1	16	16	67		16	18.81	22.2
3	GER3-240	E-TC	1	16	16	67		16	27.20	32.1
3	GER3-241	E-TC	1	16	16	67		16	61.44	72.5
3	GER3-242	E-TC	1	12	12	67		16	18.64	22.0
17	SWE1-23	E-TW	1	16	16	67	430		34.32	40.5
1	ENG2-16	E-TW	1	20	20	68		20	22.37	26.4
1	ENG2-08	E-TW	1	20	20	69		20	28.81	34.0
3	GER3-243	E-TC	1	18	18	70		16	19.15	22.6
3	GER3-244	E-TC	1	18	18	70		16	21.69	25.6
3	GER3-245	E-TC	1	18	18	70		16	31.86	37.6
7	GER3-246	E-TC	1	10	10	70	640	16	40.68	48.0
7	GER3-247	E-TC	1	10	10	70	640	16	30.51	36.0
7	GER3-248	E-TC	1	10	10	70	640	16	40.68	48.0
3	GER3-249	E-TC	1	19	19	71		16	21.19	25.0
3	GER3-250	E-TC	1	19	19	71		16	14.92	17.6
3	GER3-251	E-TC	1	19	19	71		16	20.34	24.0

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure Mode
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
USA04-63	999	999	999	999	36290.25	36290.25	UNKNOWN	30.3	Cone
USA04-64	999	999	999	999	36290.25	36290.25	UNKNOWN	22.3	Cone
USA04-65	999	999	999	999	36290.25	36290.25	UNKNOWN	29.6	Cone
USA04-66	999	999	999	999	36290.25	36290.25	UNKNOWN	32.7	Cone
USA04-67	999	999	999	999	36290.25	36290.25	UNKNOWN	35.9	Cone
USA04-68	999	999	999	999	36290.25	36290.25	UNKNOWN	37	Cone
USA04-69	999	999	999	999	36290.25	36290.25	UNKNOWN	37	Cone
ENG2-51	999	999	999	999	36864	36864	UNKNOWN	35	Cone
ENG2-02	999	999	999	999	38025	38025	UNKNOWN	25	Cone
ENG2-27	999	999	999	999	38025	38025	UNKNOWN	42	Cone
ENG2-52	999	999	999	999	38025	38025	UNKNOWN	40	Cone
GER3-224	999	999	999	999	38025	38025	UNKNOWN	14.8	Cone
GER3-225	999	999	999	999	38025	38025	UNKNOWN	23.3	Cone
GER3-226	999	999	999	999	38025	38025	UNKNOWN	29.6	Cone
GER3-227	999	999	999	999	38025	38025	UNKNOWN	29.7	Cone
GER3-228	999	999	999	999	38025	38025	UNKNOWN	36.5	Cone
GER3-229	999	999	999	999	38025	38025	UNKNOWN	40	Cone
GER3-230	999	999	999	999	38025	38025	UNKNOWN	52	Cone
GER3-231	999	999	999	999	38025	38025	UNKNOWN	36.4	Cone
GER3-232	999	999	999	999	38025	38025	UNKNOWN	37.1	Cone
GER3-233	999	999	999	999	38025	38025	UNKNOWN	38.1	Cone
GER3-234	999	999	999	999	38025	38025	UNKNOWN	38.1	Cone
GER3-235	999	999	999	999	38025	38025	UNKNOWN	39.7	Cone
SWE1-22	160	999	999	999	38025	38025	UNKNOWN	27.9	Cone
GER3-236	999	999	999	999	39204	39204	UNKNOWN	30.5	Cone
GER3-237	150	999	999	999	40401	40401	UNKNOWN	29	Cone
GER3-238	999	999	999	999	40401	40401	UNKNOWN	19.2	Cone
GER3-239	999	999	999	999	40401	40401	UNKNOWN	33.1	Cone
GER3-240	999	999	999	999	40401	40401	UNKNOWN	45.5	Cone
GER3-241	999	999	999	999	40401	40401	UNKNOWN	59.9	Cone
GER3-242	999	999	999	999	40401	40401	UNKNOWN	32.2	Cone
SWE1-23	150	999	999	999	40401	40401	UNKNOWN	47.1	Cone
ENG2-16	999	999	999	999	41616	41616	UNKNOWN	40	Cone
ENG2-08	999	999	999	999	42849	42849	UNKNOWN	54	Cone
GER3-243	999	999	999	999	44100	44100	UNKNOWN	29.9	Cone
GER3-244	999	999	999	999	44100	44100	UNKNOWN	31.6	Cone
GER3-245	999	999	999	999	44100	44100	UNKNOWN	40.7	Cone
GER3-246	999	999	999	999	44100	44100	UNKNOWN	35.3	Cone
GER3-247	999	999	999	999	44100	44100	UNKNOWN	34.8	Cone
GER3-248	999	999	999	999	44100	44100	UNKNOWN	35.6	Cone
GER3-249	160	999	999	999	45369	45369	UNKNOWN	38.4	Cone
GER3-250	999	999	999	999	45369	45369	UNKNOWN	34.3	Cone
GER3-251	999	999	999	999	45369	45369	UNKNOWN	40.5	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
USA04-63	36357.49	0.83	35656.09	0.85	24769.43	1.22
USA04-64	36357.49	0.61	35656.09	0.63	24769.43	0.90
USA04-65	36357.49	0.81	35656.09	0.83	24769.43	1.20
USA04-66	41498.80	0.79	40698.22	0.80	28272.07	1.16
USA04-67	42386.58	0.85	41568.87	0.86	28876.89	1.24
USA04-68	42386.58	0.87	41568.87	0.89	28876.89	1.28
USA04-69	42386.58	0.87	41568.87	0.89	28876.89	1.28
ENG2-51	36592.93	0.96	35948.91	0.97	27374.14	1.28
ENG2-02	33885.04	0.74	33401.56	0.75	21858.90	1.14
ENG2-27	33885.04	1.24	33401.56	1.26	24853.27	1.69
ENG2-52	36303.30	1.10	35785.31	1.12	27268.57	1.47
GER3-224	27089.61	0.55	26703.09	0.55	17954.01	0.82
GER3-225	39020.61	0.60	38463.85	0.61	25861.44	0.90
GER3-226	31200.49	0.95	30755.31	0.96	23435.69	1.26
GER3-227	31990.50	0.93	31534.05	0.94	24029.09	1.24
GER3-228	31200.49	1.17	30755.31	1.19	23435.69	1.56
GER3-229	36781.44	1.09	36256.63	1.10	27627.72	1.45
GER3-230	49960.77	1.04	49247.91	1.06	37527.13	1.39
GER3-231	37917.56	0.96	37376.54	0.97	26604.69	1.37
GER3-232	52731.70	0.70	51979.30	0.71	36998.96	1.00
GER3-233	37917.56	1.00	37376.54	1.02	26604.69	1.43
GER3-234	37917.56	1.00	37376.54	1.02	26604.69	1.43
GER3-235	52731.70	0.75	51979.30	0.76	36998.96	1.07
SWE1-22	32146.18	0.87	31687.50	0.88	23009.74	1.21
GER3-236	34820.42	0.88	34437.20	0.89	24734.38	1.23
GER3-237	36970.58	0.78	36681.89	0.79	26708.59	1.09
GER3-238	21934.50	0.88	21763.21	0.88	15846.10	1.21
GER3-239	34838.77	0.95	34566.72	0.96	25168.51	1.32
GER3-240	41892.75	1.09	41565.61	1.09	30264.50	1.50
GER3-241	62958.64	0.95	62467.01	0.96	45483.10	1.32
GER3-242	34681.48	0.93	34410.66	0.94	25779.36	1.25
SWE1-23	47055.87	1.00	46688.42	1.01	33994.49	1.39
ENG2-16	38845.39	1.03	38663.73	1.03	29533.96	1.35
ENG2-08	45059.59	1.20	44987.22	1.20	34395.90	1.57
GER3-243	37538.37	0.80	37591.07	0.80	28129.57	1.06
GER3-244	39952.24	0.79	40008.33	0.79	29938.42	1.06
GER3-245	48418.92	0.84	48486.90	0.84	36282.96	1.12
GER3-246	54706.86	0.65	54783.67	0.64	39783.65	0.89
GER3-247	47377.53	0.73	47444.05	0.73	34453.65	1.01
GER3-248	54706.86	0.65	54783.67	0.65	39783.65	0.89
GER3-249	40330.32	0.95	40505.97	0.95	30690.15	1.25
GER3-250	33839.03	1.01	33986.42	1.01	25750.48	1.33
GER3-251	39515.48	1.02	39687.58	1.02	30070.08	1.35

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
3	GER3-252	E-TC	1	19	19	71		16	20.34	24.0
22	USA04-70	E-TW	1	15.9	15.9	71.6	483	25	13.56	16.0
1	ENG2-28	E-TC	1	10	10	72	640	20	27.37	32.3
3	GER3-253	E-TC	1	14	14	73		16	17.37	20.5
3	GER3-254	E-TC	1	14	14	73		16	19.49	23.0
3	GER3-255	E-DI	1	25	25	74		16	21.19	25.0
3	GER3-256	E-DI	1	25	25	74		16	21.19	25.0
3	GER3-257	E-DI	1	25	25	74		16	21.19	25.0
3	GER3-258	E-DI	1	25	25	74		16	10.34	12.2
3	GER3-259	E-DI	1	25	25	74		16	15.68	18.5
3	GER3-260	E-DI	1	25	25	74		16	24.92	29.4
3	GER3-261	E-DI	1	25	25	74		16	47.97	56.6
1	ENG2-03	E-TW	1	12	12	75	850	20	19.49	23.0
1	ENG2-05	E-TW	1	12	12	75	850	20	19.49	23.0
3	GER3-262	E-TC	1	16	16	75		16	21.19	25.0
3	GER3-263	E-TC	1	16	16	75		16	21.19	25.0
3	GER3-264	E-TC	1	16	16	75		16	21.19	25.0
3	GER3-265	E-TC	1	18	18	75		16	17.54	20.7
3	GER3-266	E-TC	1	18	18	75		16	24.83	29.3
3	GER3-267	E-TC	1	18	18	75		16	34.15	40.3
3	GER3-268	E-TC	1	18	18	75		16	33.14	39.1
3	GER3-269	E-TC	1	18	18	75		16	48.31	57.0
1	ENG2-09	E-TW	1	25	25	76		20	28.81	34.0
1	ENG2-29	E-TC	1	12	12	78	640	20	27.37	32.3
3	GER3-270	E-TC	1	20	20	78		16	19.75	23.3
3	GER3-271	E-TC	1	20	20	78		16	21.95	25.9
3	GER3-272	E-TC	1	20	20	78		16	59.15	69.8
1	ENG2-53	E-DI	1	20	20	80		20	22.37	26.4
2	GER3-273	E-SD	1	12	12	80	640	16	20.34	24.0
2	GER3-274	E-SD	1	12	12	80	640	16	20.34	24.0
2	GER3-275	E-SD	1	12	12	80	640	16	20.34	24.0
3	GER3-276	E-DI	1	25	25	80		16	16.53	19.5
2	GER3-277	E-SD	1	12	12	80	640	16	41.53	49.0
2	GER3-278	E-SD	1	12	12	80	640	16	41.53	49.0
2	GER3-279	E-TC	1	10	10	80		16	25.85	30.5
2	GER3-280	E-TC	1	10	10	80		16	25.85	30.5
8	GER3-281	E-TC	1	12	12	80	640	16	34.58	40.8
7	GER3-282	E-TC	1	12	12	80	640	16	22.80	26.9
7	GER3-283	E-TC	1	12	12	80	640	16	24.83	29.3
8	GER3-284	E-TC	1	12	12	80	640	16	25.42	30.0
8	GER3-285	E-TC	1	12	12	80	640	16	25.42	30.0
8	GER3-286	E-TC	1	12	12	80	640	16	34.58	40.8
8	GER3-287	E-TC	1	12	12	80	640	16	34.58	40.8

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)		Ultimate Load Nu (kN)	Failure Mode
GER3-252	999	999	999	999	45369	45369	UNKNOWN	43.8	Cone
USA04-70	999	999	999	999	46139.04	46139.04	UNKNOWN	31.6	Cone
ENG2-28	999	999	999	999	46656	46656	UNKNOWN	42	Cone
GER3-253	999	999	999	999	47961	47961	UNKNOWN	25.5	Cone
GER3-254	999	999	999	999	47961	47961	UNKNOWN	32.8	Cone
GER3-255	160	999	999	999	49284	49284	UNKNOWN	41.9	Cone
GER3-256	200	999	999	999	49284	49284	UNKNOWN	49.9	Cone
GER3-257	240	999	999	999	49284	49284	UNKNOWN	65	Cone
GER3-258	999	999	999	999	49284	49284	UNKNOWN	31.3	Cone
GER3-259	999	999	999	999	49284	49284	UNKNOWN	39.3	Cone
GER3-260	999	999	999	999	49284	49284	UNKNOWN	60.5	Cone
GER3-261	999	999	999	999	49284	49284	UNKNOWN	105	Cone
ENG2-03	999	999	999	999	50625	50625	UNKNOWN	29	Cone
ENG2-05	120	999	999	999	50625	50625	UNKNOWN	33	Cone
GER3-262	160	999	999	999	50625	50625	UNKNOWN	43.7	Cone
GER3-263	200	999	999	999	50625	50625	UNKNOWN	46.4	Cone
GER3-264	240	999	999	999	50625	50625	UNKNOWN	48.3	Cone
GER3-265	999	999	999	999	50625	50625	UNKNOWN	40.1	Cone
GER3-266	999	999	999	999	50625	50625	UNKNOWN	54.2	Cone
GER3-267	999	999	999	999	50625	50625	UNKNOWN	62.6	Cone
GER3-268	999	999	999	999	50625	50625	UNKNOWN	67.6	Cone
GER3-269	999	999	999	999	50625	50625	UNKNOWN	79.3	Cone
ENG2-09	999	999	999	999	51984	51984	UNKNOWN	68	Cone
ENG2-29	999	999	999	999	54756	54756	UNKNOWN	53	Cone
GER3-270	999	999	999	999	54756	54756	UNKNOWN	39.1	Cone
GER3-271	999	999	999	999	54756	54756	UNKNOWN	46.6	Cone
GER3-272	999	999	999	999	54756	54756	UNKNOWN	68.9	Cone
ENG2-53	999	999	999	999	57600	57600	UNKNOWN	58	Cone
GER3-273	140	999	999	999	57600	57600	UNKNOWN	42.4	Cone
GER3-274	140	999	999	999	57600	57600	UNKNOWN	45.5	Cone
GER3-275	160	999	999	999	57600	57600	UNKNOWN	45.1	Cone
GER3-276	999	999	999	999	57600	57600	UNKNOWN	48.8	Cone
GER3-277	999	999	999	999	57600	57600	UNKNOWN	75.8	Cone
GER3-278	999	999	999	999	57600	57600	UNKNOWN	76	Cone
GER3-279	999	999	999	999	57600	57600	UNKNOWN	46.4	Cone
GER3-280	999	999	999	999	57600	57600	UNKNOWN	46.4	Cone
GER3-281	999	999	999	999	57600	57600	UNKNOWN	52.8	Cone
GER3-282	999	999	999	999	57600	57600	UNKNOWN	45.6	Cone
GER3-283	999	999	999	999	57600	57600	UNKNOWN	53.2	Cone
GER3-284	999	999	999	999	57600	57600	UNKNOWN	38.4	Cone
GER3-285	999	999	999	999	57600	57600	UNKNOWN	40.8	Cone
GER3-286	999	999	999	999	57600	57600	UNKNOWN	49.3	Cone
GER3-287	999	999	999	999	57600	57600	UNKNOWN	51.6	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
GER3-252	39515.48	1.11	39687.58	1.10	30070.08	1.46
USA04-70	32674.10	0.97	32873.37	0.96	24071.83	1.31
ENG2-28	46813.82	0.90	47153.22	0.89	33803.40	1.24
GER3-253	38074.60	0.67	38458.74	0.66	27621.49	0.92
GER3-254	40329.45	0.81	40736.35	0.81	29257.29	1.12
GER3-255	42913.28	0.98	43465.79	0.96	35185.61	1.19
GER3-256	42913.28	1.16	43465.79	1.15	35185.61	1.42
GER3-257	42913.28	1.51	43465.79	1.50	35185.61	1.85
GER3-258	29977.93	1.04	30363.90	1.03	24579.61	1.27
GER3-259	36915.40	1.06	37390.69	1.05	30267.80	1.30
GER3-260	46536.67	1.30	47135.84	1.28	38156.51	1.59
GER3-261	64569.87	1.63	65401.22	1.61	52942.35	1.98
ENG2-03	41998.13	0.69	42653.67	0.68	30058.86	0.96
ENG2-05	41998.13	0.79	42653.67	0.77	30058.86	1.10
GER3-262	43786.07	1.00	44469.53	0.98	32779.38	1.33
GER3-263	43786.07	1.06	44469.53	1.04	32779.38	1.42
GER3-264	43786.07	1.10	44469.53	1.09	32779.38	1.47
GER3-265	39842.92	1.01	40464.83	0.99	30482.99	1.32
GER3-266	47402.34	1.14	48142.25	1.13	36266.54	1.49
GER3-267	55592.80	1.13	56460.54	1.11	42532.89	1.47
GER3-268	54758.86	1.23	55613.59	1.22	41894.86	1.61
GER3-269	66115.52	1.20	67147.52	1.18	50583.60	1.57
ENG2-09	52087.55	1.31	53040.35	1.28	42993.47	1.58
ENG2-29	52785.82	1.00	54026.96	0.98	40878.52	1.30
GER3-270	44832.60	0.87	45886.74	0.85	35442.70	1.10
GER3-271	47267.85	0.99	48379.25	0.96	37367.90	1.25
GER3-272	77596.78	0.89	79421.29	0.87	61344.62	1.12
ENG2-53	49569.10	1.17	50984.16	1.14	41458.10	1.40
GER3-273	47262.28	0.90	48611.49	0.87	37044.08	1.14
GER3-274	47262.28	0.96	48611.49	0.94	37044.08	1.23
GER3-275	47262.28	0.95	48611.49	0.93	37044.08	1.22
GER3-276	42601.65	1.15	43817.80	1.11	35630.73	1.37
GER3-277	67531.61	1.12	69459.45	1.09	52931.14	1.43
GER3-278	67531.61	1.13	69459.45	1.09	52931.14	1.44
GER3-279	53279.36	0.87	54800.34	0.85	40869.03	1.14
GER3-280	53279.36	0.87	54800.34	0.85	40869.03	1.14
GER3-281	61622.48	0.86	63381.63	0.83	48299.57	1.09
GER3-282	50036.30	0.91	51464.70	0.89	39178.50	1.16
GER3-283	52220.72	1.02	53711.48	0.99	40888.90	1.30
GER3-284	52840.84	0.73	54349.30	0.71	41416.54	0.93
GER3-285	52840.84	0.77	54349.30	0.75	41416.54	0.99
GER3-286	61622.48	0.80	63381.63	0.78	48299.57	1.02
GER3-287	61622.48	0.84	63381.63	0.81	48299.57	1.07

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
18	USA04-71	E-TC	1	12	12	80	393		39.92	47.1
18	USA04-72	E-TC	1	12	12	80	393		29.92	35.3
18	USA04-73	E-TC	1	12	12	80	393		39.92	47.1
1	ENG2-54	E-DI	1	19	19	81		20	23.81	28.1
3	GER3-289	E-TC	1	18	18	81		16	17.37	20.5
3	GER3-290	E-TC	1	20	20	82		16	19.24	22.7
2	GER3-291	E-TC	1	16	16	82		16	19.66	23.2
6	USA04-74	E-SD	1	19.5	19.5	82.6			24.15	28.5
6	USA04-75	E-SD	1	19.5	19.5	82.6			25.51	30.1
6	USA04-76	E-SD	1	19.5	19.5	82.6			25.51	30.1
1	ENG2-55	E-DI	1	20	20	83		20	22.37	26.4
3	GER3-292	E-SD	1	25	25	83		16	21.19	25.0
3	GER3-293	E-SD	1	25	25	83		16	15.17	17.9
3	GER3-294	E-SD	1	25	25	83		16	12.12	14.3
3	GER3-295	E-SD	1	25	25	83		16	16.53	19.5
3	GER3-296	E-SD	1	25	25	83		16	24.32	28.7
3	GER3-297	E-SD	1	25	25	83		16	43.14	50.9
3	GER3-298	E-SD	1	25	25	83		16	58.31	68.8
18	USA04-77	E-SD	1	19.5	19.5	83	248		38.90	45.9
3	GER3-299	E-TC	1	22	22	87		16	21.19	25.0
3	GER3-300	E-TC	1	22	22	87		16	19.07	22.5
3	GER3-301	E-TC	1	22	22	87		16	23.05	27.2
3	GER3-302	E-TC	1	22	22	87		16	47.12	55.6
22	USA04-78	E-TW	1	19.5	19.5	87.4	483	25	13.56	16.0
3	GER3-303	E-TC	1	24	24	89		16	21.19	25.0
3	GER3-304	E-TC	1	24	24	89		16	19.15	22.6
3	GER3-305	E-TC	1	24	24	89		16	19.24	22.7
3	GER3-306	E-TC	1	24	24	89		16	31.86	37.6
1	ENG2-30	E-TC	1	16	16	90		20	19.49	23.0
1	ENG2-31	E-TC	1	16	16	90		20	19.49	23.0
3	GER3-307	E-TC	1	22	22	90		16	17.37	20.5
3	GER3-308	E-TC	1	22	22	90		16	57.63	68.0
6	USA04-79	E-SD	1	22.2	22.2	93.7			24.15	28.5
3	GER3-309	E-TC	1	25	25	94		16	21.19	25.0
3	GER3-310	E-TC	1	24	24	97		16	21.19	25.0
3	GER3-311	E-TC	1	24	24	97		16	16.44	19.4
3	GER3-312	E-TC	1	24	24	97		16	17.20	20.3
3	GER3-313	E-TC	1	24	24	97		16	38.14	45.0
1	ENG2-04	E-TW	1	12	12	100	850	20	19.49	23.0
3	GER3-315	E-TC	1	24	24	100		16	21.19	25.0
3	GER3-316	E-TC	1	24	24	100		16	21.19	25.0
3	GER3-317	E-TC	1	24	24	100		16	21.19	25.0
3	GER3-318	E-TC	1	25	25	100		16	20.76	24.5

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
USA04-71	999	999	999	999	57600	57600	UNKNOWN	59	Cone
USA04-72	999	999	999	999	57600	57600	UNKNOWN	62	Cone
USA04-73	999	999	999	999	57600	57600	UNKNOWN	54.7	Cone
ENG2-54	999	999	999	999	59049	59049	UNKNOWN	66	Cone
GER3-289	999	999	999	999	59049	59049	UNKNOWN	40.7	Cone
GER3-290	999	999	999	999	60516	60516	UNKNOWN	32.8	Cone
GER3-291	999	999	999	999	60516	60516	UNKNOWN	49	Cone
USA04-74	144	999	999	999	61404.84	61404.84	UNKNOWN	66.3	Cone
USA04-75	210	999	999	999	61404.84	61404.84	UNKNOWN	57.4	Cone
USA04-76	229	999	999	999	61404.84	61404.84	UNKNOWN	69.4	Cone
ENG2-55	999	999	999	999	62001	62001	UNKNOWN	54	Cone
GER3-292	160	999	999	999	62001	62001	UNKNOWN	60.5	Cone
GER3-293	999	999	999	999	62001	62001	UNKNOWN	41.1	Cone
GER3-294	999	999	999	999	62001	62001	UNKNOWN	41.4	Cone
GER3-295	999	999	999	999	62001	62001	UNKNOWN	55.3	Cone
GER3-296	999	999	999	999	62001	62001	UNKNOWN	67.7	Cone
GER3-297	999	999	999	999	62001	62001	UNKNOWN	76	Cone
GER3-298	999	999	999	999	62001	62001	UNKNOWN	92.4	Cone
USA04-77	999	999	999	999	62001	62001	UNKNOWN	63	Cone
GER3-299	200	999	999	999	68121	68121	UNKNOWN	48.2	Cone
GER3-300	999	999	999	999	68121	68121	UNKNOWN	47.4	Cone
GER3-301	999	999	999	999	68121	68121	UNKNOWN	53.3	Cone
GER3-302	999	999	999	999	68121	68121	UNKNOWN	102.2	Cone
USA04-78	999	999	999	999	68748.84	68748.84	UNKNOWN	37.3	Cone
GER3-303	250	999	999	999	71289	71289	UNKNOWN	58.7	Cone
GER3-304	999	999	999	999	71289	71289	UNKNOWN	46.5	Cone
GER3-305	999	999	999	999	71289	71289	UNKNOWN	50.5	Cone
GER3-306	999	999	999	999	71289	71289	UNKNOWN	62.9	Cone
ENG2-30	999	999	999	999	72900	72900	UNKNOWN	57	Cone
ENG2-31	999	999	999	999	72900	72900	UNKNOWN	67	Cone
GER3-307	999	999	999	999	72900	72900	UNKNOWN	51	Cone
GER3-308	999	999	999	999	72900	72900	UNKNOWN	90.9	Cone
USA04-79	164	999	999	999	79017.21	79017.21	UNKNOWN	79.2	Cone
GER3-309	250	999	999	999	79524	79524	UNKNOWN	53.5	Cone
GER3-310	200	999	999	999	84681	84681	UNKNOWN	58.5	Cone
GER3-311	999	999	999	999	84681	84681	UNKNOWN	53.9	Cone
GER3-312	999	999	999	999	84681	84681	UNKNOWN	70.6	Cone
GER3-313	999	999	999	999	84681	84681	UNKNOWN	87.6	Cone
ENG2-04	999	999	999	999	90000	90000	UNKNOWN	57	Cone
GER3-315	210	999	999	999	90000	90000	UNKNOWN	77.7	Cone
GER3-316	260	999	999	999	90000	90000	UNKNOWN	80.3	Cone
GER3-317	263	999	999	999	90000	90000	UNKNOWN	79	Cone
GER3-318	999	999	999	999	90000	90000	UNKNOWN	60.7	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
USA04-71	66209.38	0.89	68099.47	0.87	48519.51	1.22
USA04-72	57318.71	1.08	58955.00	1.05	42004.25	1.48
USA04-73	66209.38	0.83	68099.47	0.80	48519.51	1.13
ENG2-54	52102.05	1.27	53717.10	1.23	43719.20	1.51
GER3-289	44501.90	0.91	45881.37	0.89	34875.89	1.17
GER3-290	47698.84	0.69	49292.25	0.67	38278.51	0.86
GER3-291	48221.30	1.02	49832.16	0.98	40367.10	1.21
USA04-74	54033.94	1.23	55915.96	1.19	43247.03	1.53
USA04-75	55529.97	1.03	57464.10	1.00	44444.41	1.29
USA04-76	55529.97	1.25	57464.10	1.21	44444.41	1.56
ENG2-55	52383.34	1.03	54257.20	1.00	44241.71	1.22
GER3-292	50975.47	1.19	52798.96	1.15	43052.66	1.41
GER3-293	43133.80	0.95	44676.78	0.92	36429.77	1.13
GER3-294	38553.10	1.07	39932.21	1.04	32561.02	1.27
GER3-295	45020.32	1.23	46630.78	1.19	38023.08	1.45
GER3-296	54617.55	1.24	56571.32	1.20	46128.67	1.47
GER3-297	72736.12	1.04	75338.03	1.01	61431.18	1.24
GER3-298	84563.99	1.09	87589.01	1.05	71420.71	1.29
USA04-77	69071.29	0.91	71542.11	0.88	55365.14	1.14
GER3-299	54704.49	0.88	57157.50	0.84	45545.33	1.06
GER3-300	51897.24	0.91	54224.37	0.87	43208.10	1.10
GER3-301	57060.74	0.93	59619.41	0.89	47507.08	1.12
GER3-302	81581.25	1.25	85239.45	1.20	67922.12	1.50
USA04-78	44065.76	0.85	46080.22	0.81	35898.58	1.04
GER3-303	56601.65	1.04	59383.75	0.99	48302.16	1.22
GER3-304	53816.24	0.86	56461.43	0.82	45925.17	1.01
GER3-305	53935.17	0.94	56586.20	0.89	46026.66	1.10
GER3-306	69414.95	0.91	72826.85	0.86	59236.65	1.06
ENG2-30	55207.97	1.03	58037.66	0.98	47264.97	1.21
ENG2-31	55207.97	1.21	58037.66	1.15	47264.97	1.42
GER3-307	52121.25	0.98	54792.73	0.93	43839.50	1.16
GER3-308	94927.56	0.96	99793.09	0.91	79844.15	1.14
USA04-79	65283.87	1.21	69119.13	1.15	55689.53	1.42
GER3-309	61437.83	0.87	65083.29	0.82	53724.57	1.00
GER3-310	64402.35	0.91	68593.00	0.85	56370.93	1.04
GER3-311	56732.58	0.95	60424.17	0.89	49657.64	1.09
GER3-312	58033.63	1.22	61809.87	1.14	50796.44	1.39
GER3-313	86404.82	1.01	92027.17	0.95	75629.54	1.16
ENG2-04	64660.35	0.88	69221.87	0.82	51595.29	1.10
GER3-315	67413.07	1.15	72168.78	1.08	59555.22	1.30
GER3-316	67413.07	1.19	72168.78	1.11	59555.22	1.35
GER3-317	67413.07	1.17	72168.78	1.09	59555.22	1.33
GER3-318	66735.53	0.91	71443.45	0.85	59432.11	1.02

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
3	GER3-319	E-TC	1	24	24	100		16	15.51	18.3
3	GER3-320	E-TC	1	25	25	100		16	20.85	24.6
3	GER3-321	E-TC	1	24	24	100		16	16.86	19.9
3	GER3-322	E-TC	1	24	24	100		16	34.15	40.3
3	GER3-323	E-TC	1	25	25	100		16	47.63	56.2
3	GER3-324	E-TC	1	24	24	100		16	33.14	39.1
3	GER3-325	E-TC	1	24	24	100		16	52.29	61.7
3	GER3-327	E-TC	1	28	28	105		16	7.46	8.8
3	GER3-328	E-TC	1	28	28	105		16	19.24	22.7
3	GER3-329	E-TC	1	25	25	105		16	19.24	22.7
3	GER3-330	E-TC	1	28	28	105		16	21.19	25.0
3	GER3-331	E-TC	1	28	28	105		16	27.37	32.3
3	GER3-332	E-TC	1	28	28	105		16	52.71	62.2
3	GER3-333	E-TC	1	28	28	105		16	63.90	75.4
1	ENG2-32	E-TC	1	20	20	110		20	21.61	25.5
1	ENG2-33	E-TC	1	20	20	110		20	21.61	25.5
3	GER3-334	E-TC	1	28	28	114		16	19.24	22.7
1	ENG2-34	E-TC	1	16	16	117	640	20	27.37	32.3
3	GER3-340	E-TC	1	28	28	125		16	15.51	18.3
3	GER3-341	E-TC	1	28	28	125		16	20.51	24.2
3	GER3-342	E-TC	1	28	28	125		16	33.14	39.1
3	GER3-343	E-TC	1	28	28	125		16	47.03	55.5
8	GER3-344	E-TC	1	16	16	125	640	16	24.92	29.4
8	GER3-346	E-TC	1	16	16	125	640	16	21.02	24.8
8	GER3-347	E-TC	1	16	16	125	640	16	21.02	24.8
8	GER3-348	E-TC	1	16	16	125	640	16	46.53	54.9
8	GER3-349	E-TC	1	16	16	125	640	16	49.49	58.4
14	SWE2-03	E-TC	1	30	30	130	736		48.05	56.7
1	ENG2-35	E-TC	1	20	20	136	640	20	27.37	32.3
14	SWE2-01	E-TC	1	27	27	140	736		26.19	30.9
14	SWE2-02	E-TC	1	27	27	142	736		26.19	30.9
3	GER3-350	E-TC	1	32	32	148		16	15.51	18.3
3	GER3-351	E-TC	1	32	32	148		16	22.12	26.1
3	GER3-352	E-TC	1	32	32	148		16	36.36	42.9
3	GER3-353	E-TC	1	32	32	148		16	39.49	46.6
18	USA04-80	E-TC	1	20	20	170	248		22.97	27.1
2	GER3-041	UE	1	10	10	36	640	16	20.34	24.0
2	GER3-042	UE	1	10	10	36	640	16	50.00	59.0
2	GER3-043	UE	1	10	10	36	640	16	20.34	24.0
2	GER3-044	UE	1	10	10	36	640	16	50.00	59.0
2	GER3-045	UE	1	10	10	36	640	16	20.34	24.0
2	GER3-046	UE	1	10	10	36	640	16	50.00	59.0
2	GER3-047	UE	1	10	10	36	640	16	20.34	24.0

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)		Ultimate Load Nu (kN)	Failure Mode
GER3-319	999	999	999	999	90000	90000	UNKNOWN	62.1	Cone
GER3-320	999	999	999	999	90000	90000	UNKNOWN	65.5	Cone
GER3-321	999	999	999	999	90000	90000	UNKNOWN	72.2	Cone
GER3-322	999	999	999	999	90000	90000	UNKNOWN	96.6	Cone
GER3-323	999	999	999	999	90000	90000	UNKNOWN	102.9	Cone
GER3-324	999	999	999	999	90000	90000	UNKNOWN	117.2	Cone
GER3-325	999	999	999	999	90000	90000	UNKNOWN	147.3	Cone
GER3-327	999	999	999	999	99225	99225	UNKNOWN	45.1	Cone
GER3-328	999	999	999	999	99225	99225	UNKNOWN	54.5	Cone
GER3-329	999	999	999	999	99225	99225	UNKNOWN	57.4	Cone
GER3-330	999	999	999	999	99225	99225	UNKNOWN	86.2	Cone
GER3-331	999	999	999	999	99225	99225	UNKNOWN	95.7	Cone
GER3-332	999	999	999	999	99225	99225	UNKNOWN	133	Cone
GER3-333	999	999	999	999	99225	99225	UNKNOWN	157	Cone
ENG2-32	999	999	999	999	108900	108900	UNKNOWN	86	Cone
ENG2-33	999	999	999	999	108900	108900	UNKNOWN	87	Cone
GER3-334	999	999	999	999	116964	116964	UNKNOWN	68.8	Cone
ENG2-34	999	999	999	999	123201	123201	UNKNOWN	93	Cone
GER3-340	999	999	999	999	140625	140625	UNKNOWN	84.5	Cone
GER3-341	999	999	999	999	140625	140625	UNKNOWN	114.6	Cone
GER3-342	999	999	999	999	140625	140625	UNKNOWN	171.6	Cone
GER3-343	999	999	999	999	140625	140625	UNKNOWN	201.8	Cone
GER3-344	999	999	999	999	140625	140625	UNKNOWN	81.8	Cone
GER3-346	999	999	999	999	140625	140625	UNKNOWN	72.3	Cone
GER3-347	999	999	999	999	140625	140625	UNKNOWN	76.5	Cone
GER3-348	999	999	999	999	140625	140625	UNKNOWN	93.5	Cone
GER3-349	999	999	999	999	140625	140625	UNKNOWN	100.5	Cone
SWE2-03	300	999	999	999	152100	152100	UNKNOWN	206	Cone
ENG2-35	999	999	999	999	166464	166464	UNKNOWN	113	Cone
SWE2-01	300	999	999	999	176400	176400	UNKNOWN	180	Cone
SWE2-02	300	999	999	999	181476	181476	UNKNOWN	190	Cone
GER3-350	999	999	999	999	197136	197136	UNKNOWN	90.4	Cone
GER3-351	999	999	999	999	197136	197136	UNKNOWN	142	Cone
GER3-352	999	999	999	999	197136	197136	UNKNOWN	204.6	Cone
GER3-353	999	999	999	999	197136	197136	UNKNOWN	222.6	Cone
USA04-80	999	999	999	999	260100	260100	UNKNOWN	157.3	Cone
GER3-041	75	999	999	999	11664	11664	UNKNOWN	12.9	Cone
GER3-042	75	999	999	999	11664	11664	UNKNOWN	21.9	Cone
GER3-043	75	999	999	999	11664	11664	UNKNOWN	16.1	Cone
GER3-044	75	999	999	999	11664	11664	UNKNOWN	22.2	Cone
GER3-045	100	999	999	999	11664	11664	UNKNOWN	16.9	Cone
GER3-046	100	999	999	999	11664	11664	UNKNOWN	24.6	Cone
GER3-047	100	999	999	999	11664	11664	UNKNOWN	18.4	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
GER3-319	57676.60	1.08	61745.45	1.01	50953.66	1.22
GER3-320	66871.59	0.98	71589.11	0.91	59553.28	1.10
GER3-321	60145.15	1.20	64388.15	1.12	53134.47	1.36
GER3-322	85590.71	1.13	91628.78	1.05	75614.02	1.28
GER3-323	101074.65	1.02	108205.05	0.95	90013.22	1.14
GER3-324	84306.78	1.39	90254.27	1.30	74479.74	1.57
GER3-325	105905.05	1.39	113376.22	1.30	93560.47	1.57
GER3-327	43032.78	1.05	46438.60	0.97	39793.34	1.13
GER3-328	69114.79	0.79	74584.86	0.73	63911.94	0.85
GER3-329	69114.79	0.83	74584.86	0.77	62470.31	0.92
GER3-330	72531.73	1.19	78272.24	1.10	67071.66	1.29
GER3-331	82444.05	1.16	88969.06	1.08	76237.79	1.26
GER3-332	114407.17	1.16	123461.90	1.08	105794.78	1.26
GER3-333	125963.21	1.25	135932.54	1.15	116480.90	1.35
ENG2-32	78547.65	1.09	85392.65	1.01	73632.57	1.17
ENG2-33	78547.65	1.11	85392.65	1.02	73632.57	1.18
GER3-334	78188.76	0.88	85472.36	0.80	74085.67	0.93
ENG2-34	96973.74	0.96	106424.04	0.87	90060.50	1.03
GER3-340	80605.50	1.05	89320.58	0.95	78587.79	1.08
GER3-341	92692.97	1.24	102714.96	1.12	90372.70	1.27
GER3-342	117822.30	1.46	130561.28	1.31	114872.99	1.49
GER3-343	140373.66	1.44	155550.89	1.30	136859.85	1.47
GER3-344	102167.50	0.80	113213.88	0.72	97266.30	0.84
GER3-346	93835.02	0.77	103980.49	0.70	89333.54	0.81
GER3-347	93835.02	0.82	103980.49	0.74	89333.54	0.86
GER3-348	139612.82	0.67	154707.79	0.60	132915.28	0.70
GER3-349	143994.38	0.70	159563.09	0.63	137086.65	0.73
SWE2-03	150480.65	1.37	167674.49	1.23	220968.75	0.93
ENG2-35	121530.06	0.93	136253.48	0.83	121762.10	0.93
SWE2-01	124149.62	1.45	139728.03	1.29	138295.20	1.30
SWE2-02	126819.45	1.50	142998.12	1.33	141787.29	1.34
GER3-350	103846.58	0.87	117717.60	0.77	109468.18	0.83
GER3-351	124018.63	1.14	140584.07	1.01	130732.21	1.09
GER3-352	158999.34	1.29	180237.23	1.14	167606.55	1.22
GER3-353	165714.16	1.34	187848.96	1.18	174684.87	1.27
USA04-80	155572.25	1.01	179306.55	0.88	161515.90	0.97
GER3-041	15897.54	0.81	13313.10	0.97	8589.03	1.50
GER3-042	24925.88	0.88	20873.70	1.05	13466.81	1.63
GER3-043	15897.54	1.01	13313.10	1.21	8589.03	1.87
GER3-044	24925.88	0.89	20873.70	1.06	13466.81	1.65
GER3-045	15897.54	1.06	13313.10	1.27	8589.03	1.97
GER3-046	24925.88	0.99	20873.70	1.18	13466.81	1.83
GER3-047	15897.54	1.16	13313.10	1.38	8589.03	2.14

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
2	GER3-048	UE	1	10	10	36	640	16	50.00	59.0
2	GER3-049	UE	1	10	10	36	640	16	11.02	13.0
2	GER3-050	UE	1	10	10	36	640	16	32.20	38.0
2	GER3-051	UE	1	10	10	36	640	16	23.73	28.0
2	GER3-052	UE	1	10	10	36	640	16	46.61	55.0
2	GER3-053	UE	1	8	8	36.5	640	16	21.19	25.0
2	GER3-054	UE	1	8	8	36.5	640	16	47.46	56.0
2	GER3-055	UE	1	8	8	36.5	640	16	21.19	25.0
2	GER3-056	UE	1	8	8	36.5	640	16	47.46	56.0
2	GER3-057	UE	1	8	8	36.5	640	16	21.19	25.0
2	GER3-058	UE	1	8	8	36.5	640	16	47.46	56.0
2	GER3-059	UE	1	8	8	36.5	640	16	21.19	25.0
2	GER3-060	UE	1	8	8	36.5	640	16	47.46	56.0
2	GER3-061	UE	1	8	8	36.5	640	16	11.02	13.0
2	GER3-062	UE	1	8	8	36.5	640	16	23.73	28.0
2	GER3-063	UE	1	8	8	36.5	640	16	32.20	38.0
2	GER3-064	UE	1	8	8	36.5	640	16	47.46	56.0
2	GER3-066	UE	1	6	6	37	640	16	20.34	24.0
2	GER3-067	UE	1	6	6	37	640	16	20.34	24.0
2	GER3-068	UE	1	6	6	37	640	16	20.34	24.0
2	GER3-069	UE	1	6	6	37	640	16	20.34	24.0
2	GER3-071	UE	1	6	6	37	640	16	20.34	24.0
2	GER3-073	UE	1	6	6	37	640	16	20.34	24.0
2	GER3-075	UE	1	6	6	37	640	16	11.02	13.0
2	GER3-078	UE	1	6	6	37	640	16	23.73	28.0
2	GER3-079	UE	1	6	6	37	640	16	32.20	38.0
25	USA09-02	U	1	6.35	6.35	38.1	0	32	33.10	39.1
25	USA09-03	U	1	6.35	6.35	38.1	0	32	33.10	39.1
25	USA09-04	U	1	6.35	6.35	38.1	0	32	33.10	39.1
25	USA09-05	U	1	6.35	6.35	38.1	0	32	33.10	39.1
25	USA09-15	U	1	9.525	9.525	38.1	0	32	47.68	56.3
7	GER3-094	UE	1	8	8	40	640	16	19.49	23.0
7	GER3-095	UE	1	8	8	40	640	16	50.00	59.0
5	GER3-096	UE	1	8	8	40	640	16	22.03	26.0
5	GER3-097	UE	1	8	8	40	640	16	25.25	29.8
5	GER3-098	UE	1	8	8	40	640	16	38.73	45.7
7	GER3-114	UE	1	8	8	40	640	16	25.51	30.1
7	GER3-115	UE	1	8	8	40	640	16	25.51	30.1
7	GER3-116	UE	1	8	8	40	640	16	54.32	64.1
7	GER3-117	UE	1	8	8	40	640	16	54.32	64.1
8	GER3-118	UE	1	6	6	40		16	26.27	31.0
2	GER3-121	UE	1	8	8	40	640	16	22.46	26.5
2	GER3-122	UE	1	8	8	40	640	16	22.46	26.5

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
GER3-048	100	999	999	999	11664	11664	UNKNOWN	22	Cone
GER3-049	999	999	999	999	11664	11664	UNKNOWN	10.4	Cone
GER3-050	999	999	999	999	11664	11664	UNKNOWN	16.9	Cone
GER3-051	999	999	999	999	11664	11664	UNKNOWN	17	Cone
GER3-052	999	999	999	999	11664	11664	UNKNOWN	23.5	Cone
GER3-053	75	999	999	999	11990.25	11990.25	UNKNOWN	15	Cone
GER3-054	75	999	999	999	11990.25	11990.25	UNKNOWN	22.3	Cone
GER3-055	75	999	999	999	11990.25	11990.25	UNKNOWN	15.5	Cone
GER3-056	75	999	999	999	11990.25	11990.25	UNKNOWN	24.2	Cone
GER3-057	100	999	999	999	11990.25	11990.25	UNKNOWN	17.6	Cone
GER3-058	100	999	999	999	11990.25	11990.25	UNKNOWN	25.5	Cone
GER3-059	100	999	999	999	11990.25	11990.25	UNKNOWN	17.5	Cone
GER3-060	100	999	999	999	11990.25	11990.25	UNKNOWN	25.7	Cone
GER3-061	999	999	999	999	11990.25	11990.25	UNKNOWN	13.1	Cone
GER3-062	999	999	999	999	11990.25	11990.25	UNKNOWN	16.2	Cone
GER3-063	999	999	999	999	11990.25	11990.25	UNKNOWN	16.3	Cone
GER3-064	999	999	999	999	11990.25	11990.25	UNKNOWN	20.3	Cone
GER3-066	70	999	999	999	12321	12321	UNKNOWN	14.3	Cone
GER3-067	75	999	999	999	12321	12321	UNKNOWN	13.9	Cone
GER3-068	75	999	999	999	12321	12321	UNKNOWN	16.1	Cone
GER3-069	80	999	999	999	12321	12321	UNKNOWN	15.1	Cone
GER3-071	100	999	999	999	12321	12321	UNKNOWN	16.9	Cone
GER3-073	100	999	999	999	12321	12321	UNKNOWN	17.1	Cone
GER3-075	999	999	999	999	12321	12321	UNKNOWN	9.5	Cone
GER3-078	999	999	999	999	12321	12321	UNKNOWN	15.7	Cone
GER3-079	999	999	999	999	12321	12321	UNKNOWN	16.1	Cone
USA09-02	999	999	999	999	13064.49	13064.49	ARKANSAS	17.796448	Cone
USA09-03	999	999	999	999	13064.49	13064.49	ARKANSAS	21.354848	Cone
USA09-04	999	999	999	999	13064.49	13064.49	ARKANSAS	21.901952	Cone
USA09-05	999	999	999	999	13064.49	13064.49	ARKANSAS	23.271936	Cone
USA09-15	999	999	999	999	13064.49	13064.49	ARKANSAS	35.143648	Cone
GER3-094	999	999	999	999	14400	14400	UNKNOWN	15	Cone
GER3-095	999	999	999	999	14400	14400	UNKNOWN	26.2	Cone
GER3-096	999	999	999	999	14400	14400	UNKNOWN	16	Cone
GER3-097	999	999	999	999	14400	14400	UNKNOWN	18.1	Cone
GER3-098	999	999	999	999	14400	14400	UNKNOWN	23	Cone
GER3-114	999	999	999	999	14400	14400	UNKNOWN	22.9	Cone
GER3-115	999	999	999	999	14400	14400	UNKNOWN	23.6	Cone
GER3-116	999	999	999	999	14400	14400	UNKNOWN	24	Cone
GER3-117	999	999	999	999	14400	14400	UNKNOWN	27.4	Cone
GER3-118	999	999	999	999	14400	14400	UNKNOWN	14.5	Cone
GER3-121	999	999	999	999	14400	14400	UNKNOWN	16.9	Cone
GER3-122	999	999	999	999	14400	14400	UNKNOWN	16.9	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
GER3-048	24925.88	0.88	20873.70	1.05	13466.81	1.63
GER3-049	11700.28	0.89	9798.17	1.06	6321.36	1.65
GER3-050	20003.97	0.84	16751.95	1.01	10807.63	1.56
GER3-051	17171.31	0.99	14379.79	1.18	9277.21	1.83
GER3-052	24066.10	0.98	20153.70	1.17	13002.29	1.81
GER3-053	16564.56	0.91	13927.25	1.08	8624.94	1.74
GER3-054	24791.57	0.90	20844.40	1.07	12908.63	1.73
GER3-055	16564.56	0.94	13927.25	1.11	8624.94	1.80
GER3-056	24791.57	0.98	20844.40	1.16	12908.63	1.87
GER3-057	16564.56	1.06	13927.25	1.26	8624.94	2.04
GER3-058	24791.57	1.03	20844.40	1.22	12908.63	1.98
GER3-059	16564.56	1.06	13927.25	1.26	8624.94	2.03
GER3-060	24791.57	1.04	20844.40	1.23	12908.63	1.99
GER3-061	11944.88	1.10	10043.08	1.30	6219.53	2.11
GER3-062	17530.28	0.92	14739.22	1.10	9127.78	1.77
GER3-063	20422.16	0.80	17170.67	0.95	10633.54	1.53
GER3-064	24791.57	0.82	20844.40	0.97	12908.63	1.57
GER3-066	16564.52	0.86	13981.93	1.02	8305.27	1.72
GER3-067	16564.52	0.84	13981.93	0.99	8305.27	1.67
GER3-068	16564.52	0.97	13981.93	1.15	8305.27	1.94
GER3-069	16564.52	0.91	13981.93	1.08	8305.27	1.82
GER3-071	16564.52	1.02	13981.93	1.21	8305.27	2.03
GER3-073	16564.52	1.03	13981.93	1.22	8305.27	2.06
GER3-075	12191.16	0.78	10290.42	0.92	6112.51	1.55
GER3-078	17891.73	0.88	15102.21	1.04	8970.72	1.75
GER3-079	20843.23	0.77	17593.54	0.92	10450.57	1.54
USA09-02	22079.38	0.81	18793.53	0.95	11618.38	1.53
USA09-03	22079.38	0.97	18793.53	1.14	11618.38	1.84
USA09-04	22079.38	0.99	18793.53	1.17	11618.38	1.89
USA09-05	22079.38	1.05	18793.53	1.24	11618.38	2.00
USA09-15	26501.01	1.33	22557.13	1.56	14816.65	2.37
GER3-094	18227.39	0.82	15728.25	0.95	9581.98	1.57
GER3-095	29193.53	0.90	25190.83	1.04	15346.79	1.71
GER3-096	19379.71	0.83	16722.57	0.96	10187.75	1.57
GER3-097	20747.64	0.87	17902.95	1.01	10906.86	1.66
GER3-098	25693.23	0.90	22170.45	1.04	13506.71	1.70
GER3-114	20851.82	1.10	17992.84	1.27	11425.38	2.00
GER3-115	20851.82	1.13	17992.84	1.31	11425.38	2.07
GER3-116	30429.14	0.79	26257.02	0.91	16673.10	1.44
GER3-117	30429.14	0.90	26257.02	1.04	16673.10	1.64
GER3-118	21161.26	0.69	18259.85	0.79	10888.97	1.33
GER3-121	19565.17	0.86	16882.60	1.00	10423.69	1.62
GER3-122	19565.17	0.86	16882.60	1.00	10423.69	1.62

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
2	GER3-123	UE	1	8	8	40	640	16	24.92	29.4
2	GER3-124	UE	1	8	8	40	640	16	24.92	29.4
9	GER4-001	S	1	9.5	9.5	42.9	350	16	11.69	13.8
9	GER4-002	S	1	9.5	9.5	42.9	350	16	11.69	13.8
9	GER4-003	S	1	9.5	9.5	42.9	350	16	11.69	13.8
9	GER4-004	S	1	9.5	9.5	42.9	350	16	24.07	28.4
9	GER4-005	S	1	9.5	9.5	42.9	350	16	24.07	28.4
9	GER4-006	S	1	9.5	9.5	42.9	350	16	24.07	28.4
9	GER4-007	S	1	9.5	9.5	42.9	350	16	23.64	27.9
9	GER4-008	S	1	9.5	9.5	42.9	350	16	24.07	28.4
9	GER4-009	S	1	9.5	9.5	42.9	350	16	21.27	25.1
9	GER4-010	S	1	9.5	9.5	42.9	350	16	21.27	25.1
9	GER4-011	S	1	9.5	9.5	42.9	350	16	23.64	27.9
9	GER4-012	S	1	9.5	9.5	42.9	350	16	23.64	27.9
9	GER4-013	S	1	9.5	9.5	42.9	350	16	21.27	25.1
9	GER4-014	S	1	9.5	9.5	42.9	350	16	21.27	25.1
9	GER4-015	S	1	9.5	9.5	42.9	350	16	23.64	27.9
9	GER4-016	S	1	9.5	9.5	42.9	350	16	23.64	27.9
9	GER4-017	S	1	9.5	9.5	42.9	350	16	21.27	25.1
9	GER4-018	S	1	9.5	9.5	42.9	350	16	23.64	27.9
9	GER4-019	S	1	9.5	9.5	42.9	350	16	29.83	35.2
9	GER4-020	S	1	9.5	9.5	42.9	350	16	24.07	28.4
9	GER4-021	S	1	9.5	9.5	42.9	350	16	21.27	25.1
9	GER4-022	S	1	9.5	9.5	42.9	350	16	30.93	36.5
9	GER4-023	S	1	9.5	9.5	42.9	350	16	30.93	36.5
9	GER4-024	S	1	9.5	9.5	42.9	350	16	29.83	35.2
9	GER4-025	S	1	9.5	9.5	42.9	350	16	30.93	36.5
9	GER4-026	S	1	9.5	9.5	42.9	350	16	29.83	35.2
9	GER4-027	S	1	9.5	9.5	42.9	350	16	29.83	35.2
9	GER4-028	S	1	9.5	9.5	42.9	350	16	29.83	35.2
9	GER4-029	S	1	9.5	9.5	42.9	350	16	29.83	35.2
17	SWE1-11	UE	1	6	6	43	855		19.58	23.1
17	SWE1-12	UE	1	6	6	44	855		21.86	25.8
99	CSFR1-27	S	1	8	8	50			27.63	32.6
99	CSFR1-28	S	1	8	8	50			25.17	29.7
99	CSFR1-29	S	1	8	8	50			28.14	33.2
99	CSFR1-30	S	1	8	8	50			24.83	29.3
99	CSFR1-31	S	1	8	8	50			24.83	29.3
99	CSFR1-32	S	1	8	8	50			23.98	28.3
99	CSFR1-33	S	1	8	8	50			23.98	28.3
99	CSFR1-34	S	1	8	8	50			29.15	34.4
99	CSFR1-35	S	1	8	8	50			29.15	34.4
99	CSFR1-36	S	1	8	8	50			29.15	34.4

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
GER3-123	999	999	999	999	14400	14400	UNKNOWN	18.2	Cone
GER3-124	999	999	999	999	14400	14400	UNKNOWN	18.2	Cone
GER4-001	80	999	999	999	16563.69	16563.69	UNKNOWN	13.2	Cone
GER4-002	80	999	999	999	16563.69	16563.69	UNKNOWN	14	Cone
GER4-003	80	999	999	999	16563.69	16563.69	UNKNOWN	14.8	Cone
GER4-004	80	999	999	999	16563.69	16563.69	UNKNOWN	20.2	Cone
GER4-005	80	999	999	999	16563.69	16563.69	UNKNOWN	21.2	Cone
GER4-006	80	999	999	999	16563.69	16563.69	UNKNOWN	21.2	Cone
GER4-007	200	999	999	999	16563.69	16563.69	UNKNOWN	15.2	Cone
GER4-008	200	999	999	999	16563.69	16563.69	UNKNOWN	16	Cone
GER4-009	200	999	999	999	16563.69	16563.69	UNKNOWN	18.2	Cone
GER4-010	200	999	999	999	16563.69	16563.69	UNKNOWN	19.2	Cone
GER4-011	200	999	999	999	16563.69	16563.69	UNKNOWN	20.6	Cone
GER4-012	200	999	999	999	16563.69	16563.69	UNKNOWN	20.6	Cone
GER4-013	200	999	999	999	16563.69	16563.69	UNKNOWN	20.8	Cone
GER4-014	200	999	999	999	16563.69	16563.69	UNKNOWN	20.8	Cone
GER4-015	200	999	999	999	16563.69	16563.69	UNKNOWN	21	Cone
GER4-016	200	999	999	999	16563.69	16563.69	UNKNOWN	21.2	Cone
GER4-017	200	999	999	999	16563.69	16563.69	UNKNOWN	22	Cone
GER4-018	200	999	999	999	16563.69	16563.69	UNKNOWN	22.6	Cone
GER4-019	200	999	999	999	16563.69	16563.69	UNKNOWN	23	Cone
GER4-020	200	999	999	999	16563.69	16563.69	UNKNOWN	24	Cone
GER4-021	200	999	999	999	16563.69	16563.69	UNKNOWN	24.8	Cone
GER4-022	200	999	999	999	16563.69	16563.69	UNKNOWN	25	Cone
GER4-023	200	999	999	999	16563.69	16563.69	UNKNOWN	25	Cone
GER4-024	200	999	999	999	16563.69	16563.69	UNKNOWN	25.5	Cone
GER4-025	200	999	999	999	16563.69	16563.69	UNKNOWN	27	Cone
GER4-026	200	999	999	999	16563.69	16563.69	UNKNOWN	27	Cone
GER4-027	200	999	999	999	16563.69	16563.69	UNKNOWN	27	Cone
GER4-028	200	999	999	999	16563.69	16563.69	UNKNOWN	27.5	Cone
GER4-029	200	999	999	999	16563.69	16563.69	UNKNOWN	29.5	Cone
SWE1-11	999	999	999	999	16641	16641	UNKNOWN	13.7	Cone
SWE1-12	999	999	999	999	17424	17424	UNKNOWN	15	Cone
CSFR1-27	999	999	999	999	22500	22500	K	25.8	Cone
CSFR1-28	999	999	999	999	22500	22500	K	40.2	Cone
CSFR1-29	999	999	999	999	22500	22500	K	35.6	Cone
CSFR1-30	999	999	999	999	22500	22500	K	27.2	Cone
CSFR1-31	999	999	999	999	22500	22500	K	26.1	Cone
CSFR1-32	999	999	999	999	22500	22500	K	21.5	Cone
CSFR1-33	999	999	999	999	22500	22500	K	30.2	Cone
CSFR1-34	999	999	999	999	22500	22500	K	29.3	Cone
CSFR1-35	999	999	999	999	22500	22500	K	33.2	Cone
CSFR1-36	999	999	999	999	22500	22500	K	29.6	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
GER3-123	20607.93	0.88	17782.39	1.02	10979.24	1.66
GER3-124	20607.93	0.88	17782.39	1.02	10979.24	1.66
GER4-001	15681.81	0.84	13793.17	0.96	9475.79	1.39
GER4-002	15681.81	0.89	13793.17	1.01	9475.79	1.48
GER4-003	15681.81	0.94	13793.17	1.07	9475.79	1.56
GER4-004	22496.54	0.90	19787.17	1.02	13593.62	1.49
GER4-005	22496.54	0.94	19787.17	1.07	13593.62	1.56
GER4-006	22496.54	0.94	19787.17	1.07	13593.62	1.56
GER4-007	22297.63	0.68	19612.21	0.78	13582.26	1.12
GER4-008	22496.54	0.71	19787.17	0.81	13703.43	1.17
GER4-009	21149.18	0.86	18602.07	0.98	12882.70	1.41
GER4-010	21149.18	0.91	18602.07	1.03	12882.70	1.49
GER4-011	22297.63	0.92	19612.21	1.05	13582.26	1.52
GER4-012	22297.63	0.92	19612.21	1.05	13582.26	1.52
GER4-013	21149.18	0.98	18602.07	1.12	12882.70	1.61
GER4-014	21149.18	0.98	18602.07	1.12	12882.70	1.61
GER4-015	22297.63	0.94	19612.21	1.07	13582.26	1.55
GER4-016	22297.63	0.95	19612.21	1.08	13582.26	1.56
GER4-017	21149.18	1.04	18602.07	1.18	12882.70	1.71
GER4-018	22297.63	1.01	19612.21	1.15	13582.26	1.66
GER4-019	25045.40	0.92	22029.05	1.04	15256.02	1.51
GER4-020	22496.54	1.07	19787.17	1.21	13703.43	1.75
GER4-021	21149.18	1.17	18602.07	1.33	12882.70	1.93
GER4-022	25503.69	0.98	22432.15	1.11	15535.18	1.61
GER4-023	25503.69	0.98	22432.15	1.11	15535.18	1.61
GER4-024	25045.40	1.02	22029.05	1.16	15256.02	1.67
GER4-025	25503.69	1.06	22432.15	1.20	15535.18	1.74
GER4-026	25045.40	1.08	22029.05	1.23	15256.02	1.77
GER4-027	25045.40	1.08	22029.05	1.23	15133.78	1.78
GER4-028	25045.40	1.10	22029.05	1.25	15256.02	1.80
GER4-029	25045.40	1.18	22029.05	1.34	15133.78	1.95
SWE1-11	20360.07	0.67	17919.22	0.76	10660.48	1.29
SWE1-12	22272.02	0.67	19722.82	0.76	11742.97	1.28
CSFR1-27	30327.35	0.85	27756.62	0.93	17193.90	1.50
CSFR1-28	28947.02	1.39	26493.29	1.52	16411.33	2.45
CSFR1-29	30605.16	1.16	28010.88	1.27	17351.41	2.05
CSFR1-30	28751.43	0.95	26314.28	1.03	16300.45	1.67
CSFR1-31	28751.43	0.91	26314.28	0.99	16300.45	1.60
CSFR1-32	28256.53	0.76	25861.33	0.83	16019.87	1.34
CSFR1-33	28256.53	1.07	25861.33	1.17	16019.87	1.89
CSFR1-34	31153.36	0.94	28512.61	1.03	17662.20	1.66
CSFR1-35	31153.36	1.07	28512.61	1.16	17662.20	1.88
CSFR1-36	31153.36	0.95	28512.61	1.04	17662.20	1.68

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
99	CSFR1-37	S	1	8	8	50			29.15	34.4
99	EUR1-1	S	1	22	22	50			26.55	31.3
99	EUR1-2	S	1	22	22	50			26.55	31.3
99	EUR1-3	S	1	22	22	50			26.55	31.3
5	GER3-150	UE	1	8	8	50	640	16	22.03	26.0
7	GER3-156	UE	1	8	8	50	640	16	23.90	28.2
7	GER3-157	UE	1	8	8	50	640	16	23.90	28.2
7	GER3-158	UE	1	8	8	50	640	16	51.44	60.7
7	GER3-159	UE	1	8	8	50	640	16	51.44	60.7
8	GER3-160	UE	1	8	8	50		16	26.27	31.0
7	GER3-161	UE	1	8	8	50	640	16	29.66	35.0
8	GER3-191	UE	1	10	10	60	640	16	24.15	28.5
8	GER3-192	UE	1	10	10	60	640	16	57.03	67.3
8	GER3-193	UE	1	8	8	60	640	16	21.61	25.5
2	GER3-196	UE	1	10	10	60	640	16	23.73	28.0
2	GER3-197	UE	1	10	10	60	640	16	23.73	28.0
2	GER3-198	UE	1	10	10	60	640	16	43.22	51.0
2	GER3-199	UE	1	10	10	60	640	16	43.22	51.0
8	GER3-202	UE	1	8	8	60	640	16	19.49	23.0
8	GER3-203	UE	1	8	8	60	640	16	21.61	25.5
8	GER3-204	UE	1	8	8	60	640	16	21.61	25.5
7	GER3-205	UE	1	10	10	60	833	16	46.78	55.2
2	GER3-206	UE	1	10	10	60	886	16	16.36	19.3
2	GER3-207	UE	1	10	10	60	886	16	16.36	19.3
8	GER3-208	UE	1	10	10	60		16	28.81	34.0
8	GER3-209	UE	1	10	10	60	640	16	24.15	28.5
8	GER3-210	UE	1	10	10	60	640	16	24.15	28.5
8	GER3-211	UE	1	10	10	60	640	16	24.15	28.5
8	GER3-212	UE	1	10	10	60	640	16	25.08	29.6
17	SWE1-19	UE	1	8	8	60	795		22.80	26.9
17	SWE1-20	UE	1	10	10	63	855		36.10	42.6
99	EUR1-4	S-U	1	19.5	19.5	63.5			21.44	25.3
13	USA05-05	S-U	1	19.5	19.5	63.5	345		21.44	25.3
25	USA09-16	U	1	9.525	9.525	63.5	0	32	33.10	39.1
25	USA09-17	U	1	9.525	9.525	63.5	0	32	33.10	39.1
25	USA09-18	U	1	9.525	9.525	63.5	0	32	33.10	39.1
25	USA09-19	U	1	9.525	9.525	63.5	0	32	33.10	39.1
25	USA09-20	U	1	9.525	9.525	63.5	0	32	33.10	39.1
25	USA09-24	U	1	12.7	12.7	63.5	0	32	47.68	56.3
17	SWE1-21	UE	1	10	10	64	855		19.58	23.1
9	GER4-030	S	1	22.2	22.2	65.3	350	16	25.85	30.5
9	GER4-031	S	1	22.2	22.2	65.3	350	16	25.85	30.5
9	GER4-032	S	1	22.2	22.2	65.3	350	16	25.85	30.5

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Geometry						Remarks	Test Results Ultimate Load Nu (kN)	Failure Mode
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
CSFR1-37	999	999	999	999	22500	22500	K	35.6	Cone
EUR1-1	999	999	999	999	22500	22500	KEUSER	19.1	Cone
EUR1-2	999	999	999	999	22500	22500	KEUSER	28.3	Cone
EUR1-3	999	999	999	999	22500	22500	KEUSER	27.2	Cone
GER3-150	999	999	999	999	22500	22500	UNKNOWN	21.2	Cone
GER3-156	999	999	999	999	22500	22500	UNKNOWN	24.6	Cone
GER3-157	999	999	999	999	22500	22500	UNKNOWN	27.2	Cone
GER3-158	999	999	999	999	22500	22500	UNKNOWN	30.5	Cone
GER3-159	999	999	999	999	22500	22500	UNKNOWN	30.8	Cone
GER3-160	999	999	999	999	22500	22500	UNKNOWN	20.7	Cone
GER3-161	999	999	999	999	22500	22500	UNKNOWN	26.6	Cone
GER3-191	999	999	999	999	32400	32400	UNKNOWN	37.3	Cone
GER3-192	999	999	999	999	32400	32400	UNKNOWN	54.7	Cone
GER3-193	999	999	999	999	32400	32400	UNKNOWN	30	Cone
GER3-196	999	999	999	999	32400	32400	UNKNOWN	35.6	Cone
GER3-197	999	999	999	999	32400	32400	UNKNOWN	35.6	Cone
GER3-198	999	999	999	999	32400	32400	UNKNOWN	43.8	Cone
GER3-199	999	999	999	999	32400	32400	UNKNOWN	43.8	Cone
GER3-202	999	999	999	999	32400	32400	UNKNOWN	27.7	Cone
GER3-203	999	999	999	999	32400	32400	UNKNOWN	29.6	Cone
GER3-204	999	999	999	999	32400	32400	UNKNOWN	30.5	Cone
GER3-205	999	999	999	999	32400	32400	UNKNOWN	50.7	Cone
GER3-206	999	999	999	999	32400	32400	UNKNOWN	22.5	Cone
GER3-207	999	999	999	999	32400	32400	UNKNOWN	22.5	Cone
GER3-208	999	999	999	999	32400	32400	UNKNOWN	29.7	Cone
GER3-209	999	999	999	999	32400	32400	UNKNOWN	37.1	Cone
GER3-210	999	999	999	999	32400	32400	UNKNOWN	37.4	Cone
GER3-211	999	999	999	999	32400	32400	UNKNOWN	38.1	Cone
GER3-212	999	999	999	999	32400	32400	UNKNOWN	49.1	Cone
SWE1-19	999	999	999	999	32400	32400	UNKNOWN	26.7	Cone
SWE1-20	999	999	999	999	35721	35721	UNKNOWN	35	Cone
EUR1-4	381	999	999	999	36290.25	36290.25	KLINGNER	71.1	Cone
USA05-05	381	999	999	999	36290.25	36290.25	CBF	71.1	Cone
USA09-16	999	999	999	999	36290.25	36290.25	ARKANSAS	52.01936	Cone
USA09-17	999	999	999	999	36290.25	36290.25	ARKANSAS	54.75488	Cone
USA09-18	999	999	999	999	36290.25	36290.25	ARKANSAS	52.01936	Cone
USA09-19	999	999	999	999	36290.25	36290.25	ARKANSAS	49.279392	Cone
USA09-20	999	999	999	999	36290.25	36290.25	ARKANSAS	57.494848	Cone
USA09-24	999	999	999	999	36290.25	36290.25	ARKANSAS	59.251808	Cone
SWE1-21	999	999	999	999	36864	36864	UNKNOWN	23.7	Cone
GER4-030	200	999	999	999	38376.81	38376.81	UNKNOWN	30.5	Cone
GER4-031	200	999	999	999	38376.81	38376.81	UNKNOWN	41.4	Cone
GER4-032	200	999	999	999	38376.81	38376.81	UNKNOWN	42.4	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
CSFR1-37	31153.36	1.14	28512.61	1.25	17662.20	2.02
EUR1-1	29730.75	0.64	27210.59	0.70	22850.58	0.84
EUR1-2	29730.75	0.95	27210.59	1.04	22850.58	1.24
EUR1-3	29730.75	0.91	27210.59	1.00	22850.58	1.19
GER3-150	27083.97	0.78	24788.17	0.86	15183.66	1.40
GER3-156	28206.57	0.87	25815.60	0.95	16399.61	1.50
GER3-157	28206.57	0.96	25815.60	1.05	16399.61	1.66
GER3-158	41382.81	0.74	37874.95	0.81	24060.43	1.27
GER3-159	41382.81	0.74	37874.95	0.81	24060.43	1.28
GER3-160	29573.76	0.70	27066.90	0.76	16793.40	1.23
GER3-161	31423.87	0.85	28760.19	0.92	18298.61	1.45
GER3-191	37275.20	1.00	35632.50	1.05	22768.45	1.64
GER3-192	57280.27	0.95	54755.96	1.00	34987.96	1.56
GER3-193	35258.81	0.85	33704.97	0.89	20954.72	1.43
GER3-196	36946.78	0.96	35318.55	1.01	22781.33	1.56
GER3-197	36946.78	0.96	35318.55	1.01	22781.33	1.56
GER3-198	49863.48	0.88	47666.03	0.92	30745.75	1.42
GER3-199	49863.48	0.88	47666.03	0.92	30745.75	1.42
GER3-202	33485.86	0.83	32010.15	0.87	20564.41	1.35
GER3-203	35258.81	0.84	33704.97	0.88	21653.22	1.37
GER3-204	35258.81	0.87	33704.97	0.90	21682.32	1.41
GER3-205	51876.07	0.98	49589.92	1.02	32671.83	1.55
GER3-206	30674.41	0.73	29322.60	0.77	18913.79	1.19
GER3-207	30674.41	0.73	29322.60	0.77	18913.79	1.19
GER3-208	40713.36	0.73	38919.15	0.76	25103.80	1.18
GER3-209	37275.20	1.00	35632.50	1.04	23383.82	1.59
GER3-210	37275.20	1.00	35632.50	1.05	23383.82	1.60
GER3-211	37275.20	1.02	35632.50	1.07	23383.82	1.63
GER3-212	37987.73	1.29	36313.63	1.35	23830.81	2.06
SWE1-19	36213.76	0.74	34617.84	0.77	22120.11	1.21
SWE1-20	49032.75	0.71	47387.56	0.74	30689.83	1.14
EUR1-4	38237.68	1.86	37019.24	1.92	28226.04	2.52
USA05-05	38237.68	1.86	37019.24	1.92	28226.04	2.52
USA09-16	47507.26	1.09	45993.45	1.13	30256.20	1.72
USA09-17	47507.26	1.15	45993.45	1.19	30256.20	1.81
USA09-18	47507.26	1.09	45993.45	1.13	30256.20	1.72
USA09-19	47507.26	1.04	45993.45	1.07	30256.20	1.63
USA09-20	47507.26	1.21	45993.45	1.25	30256.20	1.90
USA09-24	57021.09	1.04	55204.11	1.07	37287.54	1.59
SWE1-21	36969.76	0.64	35853.47	0.66	23253.53	1.02
GER4-030	43781.47	0.70	42646.10	0.72	34710.35	0.88
GER4-031	43781.47	0.95	42646.10	0.97	34710.35	1.19
GER4-032	43781.47	0.97	42646.10	0.99	34710.35	1.22

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number	Diameter	Outside Diameter	Embedment	Strength of Steel	Aggregate Diameter	Strength of Concrete	
			n	d (mm)	do/dh (mm)	hef (mm)	fy (MPa)		dagg (mm)	fc (MPa)
9	GER4-033	S	1	15.9	15.9	67.1	350	16	11.69	13.8
9	GER4-034	S	1	15.9	15.9	67.1	350	16	11.69	13.8
9	GER4-035	S	1	15.9	15.9	67.1	350	16	11.69	13.8
9	GER4-036	S	1	15.9	15.9	67.1	350	16	24.07	28.4
9	GER4-037	S	1	15.9	15.9	67.1	350	16	24.07	28.4
9	GER4-038	S	1	15.9	15.9	67.1	350	16	24.07	28.4
9	GER4-039	S	1	15.9	15.9	67.1	350	16	19.24	22.7
9	GER4-040	S	1	15.9	15.9	67.1	350	16	19.24	22.7
9	GER4-041	S	1	15.9	15.9	67.1	350	16	19.24	22.7
9	GER4-042	S	1	15.9	15.9	67.1	350	16	19.24	22.7
9	GER4-043	S	1	15.9	15.9	67.1	350	16	19.24	22.7
9	GER4-044	S	1	15.9	15.9	67.1	350	16	19.24	22.7
9	GER4-045	S	1	15.9	15.9	67.1	350	16	9.66	11.4
9	GER4-046	S	1	15.9	15.9	67.1	350	16	9.66	11.4
9	GER4-047	S	1	15.9	15.9	67.1	350	16	9.66	11.4
9	GER4-048	S	1	15.9	15.9	67.1	350	16	19.24	22.7
9	GER4-049	S	1	15.9	15.9	67.1	350	16	19.24	22.7
9	GER4-050	S	1	15.9	15.9	67.1	350	16	19.24	22.7
9	GER4-051	S	1	15.9	15.9	67.1	350	16	19.24	22.7
9	GER4-052	S	1	15.9	15.9	67.1	350	16	19.24	22.7
9	GER4-053	S	1	15.9	15.9	67.1	350	16	19.24	22.7
9	GER4-054	S	1	15.9	15.9	67.1	350	16	39.32	46.4
9	GER4-055	S	1	15.9	15.9	67.1	350	16	39.32	46.4
9	GER4-056	S	1	15.9	15.9	67.1	350	16	39.32	46.4
9	GER4-057	S	1	15.9	15.9	67.1	350	16	31.61	37.3
9	GER4-058	S	1	15.9	15.9	67.1	350	16	31.61	37.3
9	GER4-059	S	1	15.9	15.9	67.1	350	16	31.61	37.3
9	GER4-060	S	1	15.9	15.9	67.1	350	16	39.32	46.4
9	GER4-061	S	1	15.9	15.9	67.1	350	16	39.32	46.4
9	GER4-062	S	1	15.9	15.9	67.1	350	16	39.32	46.4
?	EUR1-5	S	1	19.05	19.05	68			17.46	20.6
?	EUR1-6	S	1	19.05	19.05	68			17.46	20.6
?	EUR1-7	S	1	19.05	19.05	68			38.05	44.9
?	EUR1-8	S	1	19.05	19.05	68			40.08	47.3
17	SWE1-24	UE	1	12	12	72	795		22.80	26.9
17	SWE1-25	UE	1	12	12	72	795		37.03	43.7
30	USA05-14	S	1	25.4	25.4	76	248		22.97	27.1
25	USA09-74	U	1	19.05	19.05	76.2	0	32	31.65	37.3
7	GER3-288	UE	1	12	12	80	978	16	46.78	55.2
24	USA05-18	S	1	15.9	15.9	87.3	345		20.59	24.3
24	USA05-19	S	1	15.9	15.9	87.3	345		20.59	24.3
24	USA05-20	S	1	15.9	15.9	87.3	345		20.59	24.3
24	USA05-21	S	1	19	19	87.3	345		20.59	24.3

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
GER4-033	120	999	999	999	40521.69	40521.69	UNKNOWN	32	Cone
GER4-034	120	999	999	999	40521.69	40521.69	UNKNOWN	32.8	Cone
GER4-035	120	999	999	999	40521.69	40521.69	UNKNOWN	33.2	Cone
GER4-036	120	999	999	999	40521.69	40521.69	UNKNOWN	47.6	Cone
GER4-037	120	999	999	999	40521.69	40521.69	UNKNOWN	49.6	Cone
GER4-038	120	999	999	999	40521.69	40521.69	UNKNOWN	52.8	Cone
GER4-039	200	999	999	999	40521.69	40521.69	UNKNOWN	37	Cone
GER4-040	200	999	999	999	40521.69	40521.69	UNKNOWN	40.5	Cone
GER4-041	200	999	999	999	40521.69	40521.69	UNKNOWN	42	Cone
GER4-042	200	999	999	999	40521.69	40521.69	UNKNOWN	43.5	Cone
GER4-043	200	999	999	999	40521.69	40521.69	UNKNOWN	44	Cone
GER4-044	200	999	999	999	40521.69	40521.69	UNKNOWN	49.5	Cone
GER4-045	300	999	999	999	40521.69	40521.69	UNKNOWN	29	Cone
GER4-046	300	999	999	999	40521.69	40521.69	UNKNOWN	32	Cone
GER4-047	300	999	999	999	40521.69	40521.69	UNKNOWN	37	Cone
GER4-048	300	999	999	999	40521.69	40521.69	UNKNOWN	37.5	Cone
GER4-049	300	999	999	999	40521.69	40521.69	UNKNOWN	39	Cone
GER4-050	300	999	999	999	40521.69	40521.69	UNKNOWN	40	Cone
GER4-051	300	999	999	999	40521.69	40521.69	UNKNOWN	40	Cone
GER4-052	300	999	999	999	40521.69	40521.69	UNKNOWN	42	Cone
GER4-053	300	999	999	999	40521.69	40521.69	UNKNOWN	45	Cone
GER4-054	300	999	999	999	40521.69	40521.69	UNKNOWN	54	Cone
GER4-055	300	999	999	999	40521.69	40521.69	UNKNOWN	56	Cone
GER4-056	300	999	999	999	40521.69	40521.69	UNKNOWN	57	Cone
GER4-057	300	999	999	999	40521.69	40521.69	UNKNOWN	57.5	Cone
GER4-058	300	999	999	999	40521.69	40521.69	UNKNOWN	58	Cone
GER4-059	300	999	999	999	40521.69	40521.69	UNKNOWN	59	Cone
GER4-060	300	999	999	999	40521.69	40521.69	UNKNOWN	59	Cone
GER4-061	300	999	999	999	40521.69	40521.69	UNKNOWN	60	Cone
GER4-062	300	999	999	999	40521.69	40521.69	UNKNOWN	61	Cone
EUR1-5	200	999	999	999	41616	41616	SATTTLER	43.4	Cone
EUR1-6	200	999	999	999	41616	41616	SATTTLER	45.1	Cone
EUR1-7	200	999	999	999	41616	41616	SATTTLER	55	Cone
EUR1-8	200	999	999	999	41616	41616	SATTTLER	55.6	Cone
SWE1-24	999	999	999	999	46656	46656	UNKNOWN	40	Cone
SWE1-25	999	999	999	999	46656	46656	UNKNOWN	46.3	Cone
USA05-14	229	999	999	999	51984	51984	UNKNOWN	62.3	Cone
USA09-74	999	999	999	999	52257.96	52257.96	ARKANSAS	84.320736	Cone
GER3-288	999	999	999	999	57600	57600	UNKNOWN	75.8	Cone
USA05-18	305	999	999	999	68591.61	68591.61	UNKNOWN	62.3	Cone
USA05-19	305	999	999	999	68591.61	68591.61	UNKNOWN	55.2	Cone
USA05-20	305	999	999	999	68591.61	68591.61	UNKNOWN	41.8	Cone
USA05-21	305	999	999	999	68591.61	68591.61	UNKNOWN	62.3	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
GER4-033	30675.66	1.04	30055.49	1.06	23680.26	1.35
GER4-034	30675.66	1.07	30055.49	1.09	23680.26	1.39
GER4-035	30675.66	1.08	30055.49	1.10	23680.26	1.40
GER4-036	44006.17	1.08	43116.50	1.10	33970.83	1.40
GER4-037	44006.17	1.13	43116.50	1.15	33970.83	1.46
GER4-038	44006.17	1.20	43116.50	1.22	33970.83	1.55
GER4-039	39342.99	0.94	38547.59	0.96	30371.05	1.22
GER4-040	39342.99	1.03	38547.59	1.05	30371.05	1.33
GER4-041	39342.99	1.07	38547.59	1.09	30371.05	1.38
GER4-042	39342.99	1.11	38547.59	1.13	30371.05	1.43
GER4-043	39342.99	1.12	38547.59	1.14	30371.05	1.45
GER4-044	39342.99	1.26	38547.59	1.28	30371.05	1.63
GER4-045	27880.90	1.04	27317.23	1.06	21522.83	1.35
GER4-046	27880.90	1.15	27317.23	1.17	21522.83	1.49
GER4-047	27880.90	1.33	27317.23	1.35	21522.83	1.72
GER4-048	39342.99	0.95	38547.59	0.97	30371.05	1.23
GER4-049	39342.99	0.99	38547.59	1.01	30371.05	1.28
GER4-050	39342.99	1.02	38547.59	1.04	30371.05	1.32
GER4-051	39342.99	1.02	38547.59	1.04	30371.05	1.32
GER4-052	39342.99	1.07	38547.59	1.09	30371.05	1.38
GER4-053	39342.99	1.14	38547.59	1.17	30371.05	1.48
GER4-054	56248.82	0.96	55111.63	0.98	43421.61	1.24
GER4-055	56248.82	1.00	55111.63	1.02	43421.61	1.29
GER4-056	56248.82	1.01	55111.63	1.03	43421.61	1.31
GER4-057	50432.31	1.14	49412.71	1.16	38931.52	1.48
GER4-058	50432.31	1.15	49412.71	1.17	38931.52	1.49
GER4-059	50432.31	1.17	49412.71	1.19	38931.52	1.52
GER4-060	56248.82	1.05	55111.63	1.07	43421.61	1.36
GER4-061	56248.82	1.07	55111.63	1.09	43421.61	1.38
GER4-062	56248.82	1.08	55111.63	1.11	43421.61	1.40
EUR1-5	38235.58	1.14	37568.87	1.16	29646.31	1.46
EUR1-6	38235.58	1.18	37568.87	1.20	29646.31	1.52
EUR1-7	56449.12	0.97	55464.83	0.99	43768.35	1.26
EUR1-8	57938.15	0.96	56927.89	0.98	44922.88	1.24
SWE1-24	47604.23	0.84	47334.62	0.85	32283.40	1.24
SWE1-25	60675.05	0.76	60331.41	0.77	41147.54	1.13
USA05-14	51817.41	1.20	52088.79	1.20	48264.75	1.29
USA09-74	61068.55	1.38	61420.37	1.37	46608.52	1.81
GER3-288	79868.44	0.95	81095.27	0.93	56123.04	1.35
USA05-18	60408.10	1.03	62346.78	1.00	49233.11	1.27
USA05-19	60408.10	0.91	62346.78	0.89	49233.11	1.12
USA05-20	60408.10	0.69	62346.78	0.67	49233.11	0.85
USA05-21	60408.10	1.03	62346.78	1.00	51837.38	1.20

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
13	USA05-08	S-U	1	19.5	19.5	88.9	345		21.44	25.3
24	USA05-22	S	1	19	19	88.9	345		20.59	24.3
24	USA05-23	S	1	19	19	88.9	345		20.59	24.3
24	USA05-24	S	1	19	19	88.9	345		20.59	24.3
24	USA05-25	S	1	19	19	88.9	345		20.59	24.3
24	USA05-26	S	1	22.2	22.2	88.9	345		20.59	24.3
24	USA05-27	S	1	22.2	22.2	88.9	345		20.59	24.3
24	USA05-28	S	1	22.2	22.2	88.9	345		20.59	24.3
25	USA09-25	U	1	12.7	12.7	88.9	0	32	30.17	35.6
25	USA09-26	U	1	12.7	12.7	88.9	0	32	30.17	35.6
25	USA09-27	U	1	12.7	12.7	88.9	0	32	30.17	35.6
25	USA09-28	U	1	12.7	12.7	88.9	0	32	30.17	35.6
25	USA09-29	U	1	12.7	12.7	88.9	0	32	30.17	35.6
25	USA09-30	U	1	12.7	12.7	88.9	0	32	30.17	35.6
25	USA09-31	U	1	12.7	12.7	88.9	0	32	30.17	35.6
25	USA09-38	U	1	15.875	15.875	88.9	0	32	30.17	35.6
25	USA09-61	U	1	19.05	19.05	88.9	0	32	31.65	37.3
25	USA09-75	U	1	19.05	19.05	88.9	0	32	31.65	37.3
25	USA09-76	U	1	19.05	19.05	88.9	0	32	31.65	37.3
99	CHI1-1	S	1	22	22	90			29.49	34.8
99	CHI1-2	S	1	22	22	90			29.49	34.8
99	CHI1-3	S	1	22	22	90			29.49	34.8
99	CHI1-4	S	1	22	22	90			21.02	24.8
99	CHI1-5	S	1	22	22	90			21.02	24.8
9	GER4-063	S	1	22.2	22.2	90.3	350	16	11.69	13.8
9	GER4-064	S	1	22.2	22.2	90.3	350	16	11.69	13.8
9	GER4-065	S	1	22.2	22.2	90.3	350	16	11.69	13.8
9	GER4-066	S	1	22.2	22.2	90.3	350	16	24.07	28.4
9	GER4-067	S	1	22.2	22.2	90.3	350	16	24.07	28.4
9	GER4-068	S	1	22.2	22.2	90.3	350	16	24.07	28.4
9	GER4-069	S	1	22.2	22.2	90.3	350	16	25.85	30.5
9	GER4-070	S	1	22.2	22.2	90.3	350	16	25.85	30.5
9	GER4-071	S	1	22.2	22.2	90.3	350	16	25.85	30.5
9	GER4-072	S	1	22.2	22.2	90.3	350	16	39.32	46.4
9	GER4-073	S	1	22.2	22.2	90.3	350	16	39.32	46.4
9	GER4-074	S	1	22.2	22.2	90.3	350	16	39.32	46.4
9	GER4-075	S	1	22.2	22.2	90.3	350	16	39.32	46.4
9	GER4-076	S	1	22.2	22.2	90.3	350	16	39.32	46.4
9	GER4-077	S	1	22.2	22.2	90.3	350	16	39.32	46.4
9	GER4-078	S	1	22.2	22.2	90.3	350	16	23.64	27.9
9	GER4-079	S	1	22.2	22.2	90.3	350	16	23.64	27.9
9	GER4-080	S	1	22.2	22.2	90.3	350	16	23.64	27.9
9	GER4-081	S	1	22.2	22.2	90.3	350	16	23.64	27.9

**Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow
Embedment (<=188mm), (Continued)**

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
USA05-08	381	999	999	999	71128.89	71128.89	CBF	112.9	Cone
USA05-22	305	999	999	999	71128.89	71128.89	UNKNOWN	48	Cone
USA05-23	305	999	999	999	71128.89	71128.89	UNKNOWN	48	Cone
USA05-24	305	999	999	999	71128.89	71128.89	UNKNOWN	55.2	Cone
USA05-25	305	999	999	999	71128.89	71128.89	UNKNOWN	52	Cone
USA05-26	305	999	999	999	71128.89	71128.89	UNKNOWN	48	Cone
USA05-27	305	999	999	999	71128.89	71128.89	UNKNOWN	55.2	Cone
USA05-28	305	999	999	999	71128.89	71128.89	UNKNOWN	62.3	Cone
USA09-25	999	999	999	999	71128.89	71128.89	ARKANSAS	84.231776	Cone
USA09-26	999	999	999	999	71128.89	71128.89	ARKANSAS	78.422688	Cone
USA09-27	999	999	999	999	71128.89	71128.89	ARKANSAS	84.231776	Cone
USA09-28	999	999	999	999	71128.89	71128.89	ARKANSAS	65.705856	Cone
USA09-29	999	999	999	999	71128.89	71128.89	ARKANSAS	62.970336	Cone
USA09-30	999	999	999	999	71128.89	71128.89	ARKANSAS	60.230368	Cone
USA09-31	999	999	999	999	71128.89	71128.89	ARKANSAS	62.970336	Cone
USA09-38	999	999	999	999	71128.89	71128.89	ARKANSAS	89.796224	Cone
USA09-61	999	999	999	999	71128.89	71128.89	ARKANSAS	89.24912	Cone
USA09-75	999	999	999	999	71128.89	71128.89	ARKANSAS	99.105888	Cone
USA09-76	999	999	999	999	71128.89	71128.89	ARKANSAS	99.105888	Cone
CHI1-1	900	999	999	999	72900	72900	ZHAO	74	Cone
CHI1-2	900	999	999	999	72900	72900	ZHAO	52.1	Cone
CHI1-3	900	999	999	999	72900	72900	ZHAO	77.4	Cone
CHI1-4	900	999	999	999	72900	72900	ZHAO	61.9	Cone
CHI1-5	900	999	999	999	72900	72900	ZHAO	70.1	Cone
GER4-063	160	999	999	999	73386.81	73386.81	UNKNOWN	46.2	Cone
GER4-064	160	999	999	999	73386.81	73386.81	UNKNOWN	46.4	Cone
GER4-065	160	999	999	999	73386.81	73386.81	UNKNOWN	47.8	Cone
GER4-066	160	999	999	999	73386.81	73386.81	UNKNOWN	66.8	Cone
GER4-067	160	999	999	999	73386.81	73386.81	UNKNOWN	70.4	Cone
GER4-068	160	999	999	999	73386.81	73386.81	UNKNOWN	71.2	Cone
GER4-069	200	999	999	999	73386.81	73386.81	UNKNOWN	69.2	Cone
GER4-070	200	999	999	999	73386.81	73386.81	UNKNOWN	71.2	Cone
GER4-071	200	999	999	999	73386.81	73386.81	UNKNOWN	76	Cone
GER4-072	200	999	999	999	73386.81	73386.81	UNKNOWN	78.5	Cone
GER4-073	200	999	999	999	73386.81	73386.81	UNKNOWN	80	Cone
GER4-074	200	999	999	999	73386.81	73386.81	UNKNOWN	81.5	Cone
GER4-075	200	999	999	999	73386.81	73386.81	UNKNOWN	82	Cone
GER4-076	200	999	999	999	73386.81	73386.81	UNKNOWN	83.5	Cone
GER4-077	200	999	999	999	73386.81	73386.81	UNKNOWN	92	Cone
GER4-078	300	999	999	999	73386.81	73386.81	UNKNOWN	62	Cone
GER4-079	300	999	999	999	73386.81	73386.81	UNKNOWN	64	Cone
GER4-080	300	999	999	999	73386.81	73386.81	UNKNOWN	64.8	Cone
GER4-081	300	999	999	999	73386.81	73386.81	UNKNOWN	65.6	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
USA05-08	63340.80	1.78	65588.90	1.72	50426.43	2.24
USA05-22	62076.39	0.77	64279.61	0.75	50808.96	0.94
USA05-23	62076.39	0.77	64279.61	0.75	50808.96	0.94
USA05-24	62076.39	0.89	64279.61	0.86	50808.96	1.09
USA05-25	62076.39	0.84	64279.61	0.81	50808.96	1.02
USA05-26	62076.39	0.77	64279.61	0.75	52113.91	0.92
USA05-27	62076.39	0.89	64279.61	0.86	52113.91	1.06
USA05-28	62076.39	1.00	64279.61	0.97	56155.05	1.11
USA09-25	75131.22	1.12	77797.79	1.08	54463.40	1.55
USA09-26	75131.22	1.04	77797.79	1.01	54463.40	1.44
USA09-27	75131.22	1.12	77797.79	1.08	54463.40	1.55
USA09-28	75131.22	0.87	77797.79	0.84	54463.40	1.21
USA09-29	75131.22	0.84	77797.79	0.81	54463.40	1.16
USA09-30	75131.22	0.80	77797.79	0.77	54463.40	1.11
USA09-31	75131.22	0.84	77797.79	0.81	54463.40	1.16
USA09-38	75131.22	1.20	77797.79	1.15	57010.80	1.58
USA09-61	76955.17	1.16	79686.47	1.12	61004.08	1.46
USA09-75	76955.17	1.29	79686.47	1.24	61004.08	1.62
USA09-76	76955.17	1.29	79686.47	1.24	61004.08	1.62
CHI1-1	75670.05	0.98	78528.68	0.94	63748.54	1.16
CHI1-2	75670.05	0.69	78528.68	0.66	63748.54	0.82
CHI1-3	75670.05	1.02	78528.68	0.99	63748.54	1.21
CHI1-4	63879.32	0.97	66292.52	0.93	53815.39	1.15
CHI1-5	63879.32	1.10	66292.52	1.06	53815.39	1.30
GER4-063	47889.67	0.96	49728.33	0.93	40342.21	1.15
GER4-064	47889.67	0.97	49728.33	0.93	40342.21	1.15
GER4-065	47889.67	1.00	49728.33	0.96	40342.21	1.18
GER4-066	68700.75	0.97	71338.43	0.94	57873.45	1.15
GER4-067	68700.75	1.02	71338.43	0.99	57873.45	1.22
GER4-068	68700.75	1.04	71338.43	1.00	57873.45	1.23
GER4-069	71195.44	0.97	73928.91	0.94	59974.98	1.15
GER4-070	71195.44	1.00	73928.91	0.96	59974.98	1.19
GER4-071	71195.44	1.07	73928.91	1.03	59974.98	1.27
GER4-072	87813.50	0.89	91184.99	0.86	73974.01	1.06
GER4-073	87813.50	0.91	91184.99	0.88	73974.01	1.08
GER4-074	87813.50	0.93	91184.99	0.89	73974.01	1.10
GER4-075	87813.50	0.93	91184.99	0.90	73974.01	1.11
GER4-076	87813.50	0.95	91184.99	0.92	73974.01	1.13
GER4-077	87813.50	1.05	91184.99	1.01	73974.01	1.24
GER4-078	68093.30	0.91	70707.66	0.88	57361.74	1.08
GER4-079	68093.30	0.94	70707.66	0.91	57361.74	1.12
GER4-080	68093.30	0.95	70707.66	0.92	57361.74	1.13
GER4-081	68093.30	0.96	70707.66	0.93	57361.74	1.14

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc fcc200 (MPa)	
9	GER4-082	S	1	22.2	22.2	90.3	350	16	21.27	25.1
9	GER4-083	S	1	22.2	22.2	90.3	350	16	23.64	27.9
9	GER4-084	S	1	22.2	22.2	90.3	350	16	23.64	27.9
9	GER4-085	S	1	22.2	22.2	90.3	350	16	24.07	28.4
9	GER4-086	S	1	22.2	22.2	90.3	350	16	29.83	35.2
9	GER4-087	S	1	22.2	22.2	90.3	350	16	21.27	25.1
9	GER4-088	S	1	22.2	22.2	90.3	350	16	24.07	28.4
9	GER4-089	S	1	22.2	22.2	90.3	350	16	29.83	35.2
9	GER4-090	S	1	22.2	22.2	90.3	350	16	29.83	35.2
9	GER4-091	S	1	22.2	22.2	90.3	350	16	21.27	25.1
9	GER4-092	S	1	22.2	22.2	90.3	350	16	30.93	36.5
9	GER4-093	S	1	22.2	22.2	90.3	350	16	24.07	28.4
9	GER4-094	S	1	22.2	22.2	90.3	350	16	21.27	25.1
9	GER4-095	S	1	22.2	22.2	90.3	350	16	25.85	30.5
9	GER4-096	S	1	22.2	22.2	90.3	350	16	25.85	30.5
9	GER4-097	S	1	22.2	22.2	90.3	350	16	29.83	35.2
9	GER4-098	S	1	22.2	22.2	90.3	350	16	21.27	25.1
9	GER4-099	S	1	22.2	22.2	90.3	350	16	21.27	25.1
9	GER4-100	S	1	22.2	22.2	90.3	350	16	29.83	35.2
9	GER4-101	S	1	22.2	22.2	90.3	350	16	25.85	30.5
9	GER4-102	S	1	22.2	22.2	90.3	350	16	30.93	36.5
9	GER4-103	S	1	22.2	22.2	90.3	350	16	30.93	36.5
9	GER4-104	S	1	22.2	22.2	90.3	350	16	29.83	35.2
9	GER4-105	S	1	15.9	15.9	92.1	350	16	13.14	15.5
9	GER4-106	S	1	15.9	15.9	92.1	350	16	13.14	15.5
9	GER4-107	S	1	15.9	15.9	92.1	350	16	13.14	15.5
9	GER4-108	S	1	15.9	15.9	92.1	350	16	9.66	11.4
9	GER4-109	S	1	15.9	15.9	92.1	350	16	9.66	11.4
9	GER4-110	S	1	15.9	15.9	92.1	350	16	9.66	11.4
9	GER4-111	S	1	15.9	15.9	92.1	350	16	31.61	37.3
9	GER4-112	S	1	15.9	15.9	92.1	350	16	31.61	37.3
9	GER4-113	S	1	15.9	15.9	92.1	350	16	31.61	37.3
13	USA05-02	S	1	19.5	19.5	92.1	345		20.68	24.4
13	USA05-04	S	1	19.5	19.5	92.1	345		35.68	42.1
13	USA05-06	S	1	19.5	19.5	92.1	345		20.68	24.4
13	USA05-07	S	1	19.5	19.5	92.1	345		35.68	42.1
13	USA05-09	S	1	19.5	19.5	92.1	345		20.68	24.4
13	USA05-10	S	1	19.5	19.5	92.1	345		35.68	42.1
24	USA05-17	S	1	12.7	12.7	93.7	345		20.59	24.3
99	EUR1-10	S	1	22	22	100			26.55	31.3
99	EUR1-11	S	1	22	22	100			26.55	31.3
99	EUR1-9	S	1	22	22	100			26.55	31.3
2	GER3-314	UE	1	16	16	100	640	16	29.66	35.0

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
GER4-082	300	999	999	999	73386.81	73386.81	UNKNOWN	67.6	Cone
GER4-083	300	999	999	999	73386.81	73386.81	UNKNOWN	68.4	Cone
GER4-084	300	999	999	999	73386.81	73386.81	UNKNOWN	68.4	Cone
GER4-085	300	999	999	999	73386.81	73386.81	UNKNOWN	69	Cone
GER4-086	300	999	999	999	73386.81	73386.81	UNKNOWN	73	Cone
GER4-087	300	999	999	999	73386.81	73386.81	UNKNOWN	73.2	Cone
GER4-088	300	999	999	999	73386.81	73386.81	UNKNOWN	74	Cone
GER4-089	300	999	999	999	73386.81	73386.81	UNKNOWN	74	Cone
GER4-090	300	999	999	999	73386.81	73386.81	UNKNOWN	74	Cone
GER4-091	300	999	999	999	73386.81	73386.81	UNKNOWN	75.6	Cone
GER4-092	300	999	999	999	73386.81	73386.81	UNKNOWN	76	Cone
GER4-093	300	999	999	999	73386.81	73386.81	UNKNOWN	76	Cone
GER4-094	300	999	999	999	73386.81	73386.81	UNKNOWN	76	Cone
GER4-095	300	999	999	999	73386.81	73386.81	UNKNOWN	76.8	Cone
GER4-096	300	999	999	999	73386.81	73386.81	UNKNOWN	77.6	Cone
GER4-097	300	999	999	999	73386.81	73386.81	UNKNOWN	78	Cone
GER4-098	300	999	999	999	73386.81	73386.81	UNKNOWN	78.8	Cone
GER4-099	300	999	999	999	73386.81	73386.81	UNKNOWN	79.2	Cone
GER4-100	300	999	999	999	73386.81	73386.81	UNKNOWN	80	Cone
GER4-101	300	999	999	999	73386.81	73386.81	UNKNOWN	80	Cone
GER4-102	300	999	999	999	73386.81	73386.81	UNKNOWN	82	Cone
GER4-103	300	999	999	999	73386.81	73386.81	UNKNOWN	82.5	Cone
GER4-104	300	999	999	999	73386.81	73386.81	UNKNOWN	85	Cone
GER4-105	200	999	999	999	76341.69	76341.69	UNKNOWN	43.2	Cone
GER4-106	200	999	999	999	76341.69	76341.69	UNKNOWN	47.6	Cone
GER4-107	200	999	999	999	76341.69	76341.69	UNKNOWN	50	Cone
GER4-108	300	999	999	999	76341.69	76341.69	UNKNOWN	42	Cone
GER4-109	300	999	999	999	76341.69	76341.69	UNKNOWN	46	Cone
GER4-110	300	999	999	999	76341.69	76341.69	UNKNOWN	51	Cone
GER4-111	300	999	999	999	76341.69	76341.69	UNKNOWN	88	Cone
GER4-112	300	999	999	999	76341.69	76341.69	UNKNOWN	91	Cone
GER4-113	300	999	999	999	76341.69	76341.69	UNKNOWN	98	Cone
USA05-02	305	999	999	999	76341.69	76341.69	UNKNOWN	53.3	Cone
USA05-04	305	999	999	999	76341.69	76341.69	MSF C1-1	82.2	Cone
USA05-06	305	999	999	999	76341.69	76341.69	NS	48.9	Cone
USA05-07	305	999	999	999	76341.69	76341.69	MSF C1-2	82.2	Cone
USA05-09	305	999	999	999	76341.69	76341.69	NS	62.2	Cone
USA05-10	305	999	999	999	76341.69	76341.69	MSF C1-3	76.9	Cone
USA05-17	305	999	999	999	79017.21	79017.21	UNKNOWN	34.7	Cone
EUR1-10	999	999	999	999	90000	90000	KEUSER	81.1	Cone
EUR1-11	999	999	999	999	90000	90000	KEUSER	74.6	Cone
EUR1-9	999	999	999	999	90000	90000	KEUSER	90	Cone
GER3-314	999	999	999	999	90000	90000	UNKNOWN	82.2	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
GER4-082	64586.11	1.05	67065.82	1.01	54407.29	1.24
GER4-083	68093.30	1.00	70707.66	0.97	57361.74	1.19
GER4-084	68093.30	1.00	70707.66	0.97	57361.74	1.19
GER4-085	68700.75	1.00	71338.43	0.97	57873.45	1.19
GER4-086	76484.53	0.95	79421.06	0.92	64430.50	1.13
GER4-087	64586.11	1.13	67065.82	1.09	54407.29	1.35
GER4-088	68700.75	1.08	71338.43	1.04	57873.45	1.28
GER4-089	76484.53	0.97	79421.06	0.93	64430.50	1.15
GER4-090	76484.53	0.97	79421.06	0.93	64430.50	1.15
GER4-091	64586.11	1.17	67065.82	1.13	54407.29	1.39
GER4-092	77884.08	0.98	80874.35	0.94	65609.48	1.16
GER4-093	68700.75	1.11	71338.43	1.07	57873.45	1.31
GER4-094	64586.11	1.18	67065.82	1.13	54407.29	1.40
GER4-095	71195.44	1.08	73928.91	1.04	59974.98	1.28
GER4-096	71195.44	1.09	73928.91	1.05	59974.98	1.29
GER4-097	76484.53	1.02	79421.06	0.98	64430.50	1.21
GER4-098	64586.11	1.22	67065.82	1.17	54407.29	1.45
GER4-099	64586.11	1.23	67065.82	1.18	54407.29	1.46
GER4-100	76484.53	1.05	79421.06	1.01	64430.50	1.24
GER4-101	71195.44	1.12	73928.91	1.08	59974.98	1.33
GER4-102	77884.08	1.05	80874.35	1.01	65609.48	1.25
GER4-103	77884.08	1.06	80874.35	1.02	65609.48	1.26
GER4-104	76484.53	1.11	79421.06	1.07	64430.50	1.32
GER4-105	52278.84	0.83	54476.07	0.79	43154.38	1.00
GER4-106	52278.84	0.91	54476.07	0.87	43154.38	1.10
GER4-107	52278.84	0.96	54476.07	0.92	43154.38	1.16
GER4-108	44834.52	0.94	46718.87	0.90	37009.35	1.13
GER4-109	44834.52	1.03	46718.87	0.98	37009.35	1.24
GER4-110	44834.52	1.14	46718.87	1.09	37009.35	1.38
GER4-111	81098.82	1.09	84507.32	1.04	66944.28	1.31
GER4-112	81098.82	1.12	84507.32	1.08	66944.28	1.36
GER4-113	81098.82	1.21	84507.32	1.16	66944.28	1.46
USA05-02	65592.63	0.81	68349.42	0.78	54144.45	0.98
USA05-04	86159.10	0.95	89780.28	0.92	71121.37	1.16
USA05-06	65592.63	0.75	68349.42	0.72	54144.45	0.90
USA05-07	86159.10	0.95	89780.28	0.92	71121.37	1.16
USA05-09	65592.63	0.95	68349.42	0.91	54144.45	1.15
USA05-10	86159.10	0.89	89780.28	0.86	71121.37	1.08
USA05-17	67171.21	0.52	70205.58	0.49	52842.41	0.66
EUR1-10	84091.26	0.96	88869.40	0.91	72584.20	1.12
EUR1-11	84091.26	0.89	88869.40	0.84	72584.20	1.03
EUR1-9	84091.26	1.07	88869.40	1.01	72584.20	1.24
GER3-314	88880.13	0.92	93930.38	0.88	65920.44	1.25

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number	Diameter	Outside Diameter	Embedment	Strength of Steel	Aggregate Diameter	Strength of Concrete	
			n	d (mm)	do/dh (mm)	hef (mm)	fy (MPa)		dagg (mm)	fc (MPa)
17	SWE1-26	UE	1	16	16	103	815		24.49	28.9
17	SWE1-27	UE	1	16	16	104	815		36.27	42.8
7	GER3-326	UE	1	12	12	105	640	16	34.75	41.0
25	USA09-35	U	1	15.875	15.875	114.3	0	32	30.17	35.6
25	USA09-36	U	1	15.875	15.875	114.3	0	32	30.17	35.6
25	USA09-37	U	1	15.875	15.875	114.3	0	32	30.17	35.6
25	USA09-43	U	1	19.05	19.05	114.3	0	32	47.68	56.3
9	GER4-114	S	1	19	19	115.3	350	16	17.20	20.3
9	GER4-115	S	1	19	19	115.3	350	16	17.20	20.3
9	GER4-116	S	1	19	19	115.3	350	16	17.20	20.3
9	GER4-117	S	1	22.2	22.2	115.3	350	16	25.85	30.5
9	GER4-118	S	1	22.2	22.2	115.3	350	16	25.85	30.5
9	GER4-119	S	1	22.2	22.2	115.3	350	16	25.85	30.5
8	GER3-335	UE	1	16	16	123.9	640	16	53.39	63.0
8	GER3-336	UE	1	16	16	124	640	16	29.66	35.0
8	GER3-337	UE	1	16	16	124.5	640	16	29.66	35.0
7	GER1-32	UE	1	16	16	125	902	16	31.95	37.7
7	GER3-338	UE	1	16	16	125	902	16	31.95	37.7
7	GER3-339	UE	1	16	16	125	902	16	31.95	37.7
7	GER3-345	UE	1	16	16	125	902	16	31.95	37.7
17	SWE1-28	UE	1	16	16	125	660		13.81	16.3
30	USA05-15	S	1	25.4	25.4	127	248		21.44	25.3
30	USA05-16	S	1	25.4	25.4	127	248		21.36	25.2
11	GER4-120	S	1	22	22	130	350	16	23.47	27.7
25	USA09-39	U	1	19.05	19.05	139.7	0	32	43.82	51.7
25	USA09-40	U	1	19.05	19.05	139.7	0	32	43.82	51.7
25	USA09-41	U	1	19.05	19.05	139.7	0	32	43.82	51.7
25	USA09-44	U	1	19.05	19.05	139.7	0	32	30.17	35.6
25	USA09-45	U	1	19.05	19.05	139.7	0	32	30.17	35.6
25	USA09-46	U	1	19.05	19.05	139.7	0	32	30.17	35.6
25	USA09-78	U	1	25.4	25.4	139.7	0	32	31.65	37.3
25	USA09-79	U	1	25.4	25.4	139.7	0	32	31.65	37.3
25	USA09-80	U	1	25.4	25.4	139.7	0	32	31.65	37.3
9	GER4-121	S	1	22.2	22.2	140.3	350	16	15.93	18.8
99	CSFR1-38	S-U	1	24	24	150			27.63	32.6
99	CSFR1-39	S-U	1	24	24	150			25.17	29.7
99	CSFR1-40	S-U	1	24	24	150			28.14	33.2
99	CSFR1-41	S-U	1	24	24	150			24.83	29.3
99	CSFR1-42	S-U	1	24	24	150			24.83	29.3
99	CSFR1-43	S-U	1	24	24	150			23.98	28.3
99	CSFR1-44	S-U	1	24	24	150			23.98	28.3
99	CSFR1-45	S-U	1	24	24	150			29.15	34.4
99	CSFR1-46	S-U	1	24	24	150			29.15	34.4

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)		Ultimate Load Nu (kN)	Failure Mode
SWE1-26	999	999	999	999	95481	95481	UNKNOWN	49.6	Cone
SWE1-27	999	999	999	999	97344	97344	UNKNOWN	69	Cone
GER3-326	999	999	999	999	99225	99225	UNKNOWN	83.5	Cone
USA09-35	999	999	999	999	117580.4	117580.4	ARKANSAS	128.676192	Cone
USA09-36	999	999	999	999	117580.4	117580.4	ARKANSAS	120.460736	Cone
USA09-37	999	999	999	999	117580.4	117580.4	ARKANSAS	120.460736	Cone
USA09-43	999	999	999	999	117580.4	117580.4	ARKANSAS	210.288096	Cone
GER4-114	300	999	999	999	119646.8	119646.8	UNKNOWN	72	Cone
GER4-115	300	999	999	999	119646.8	119646.8	UNKNOWN	72	Cone
GER4-116	300	999	999	999	119646.8	119646.8	UNKNOWN	87.2	Cone
GER4-117	300	999	999	999	119646.8	119646.8	UNKNOWN	94.4	Cone
GER4-118	300	999	999	999	119646.8	119646.8	UNKNOWN	97.6	Cone
GER4-119	300	999	999	999	119646.8	119646.8	UNKNOWN	100.8	Cone
GER3-335	999	999	999	999	138160.9	138160.9	UNKNOWN	128.2	Cone
GER3-336	999	999	999	999	138384	138384	UNKNOWN	101.3	Cone
GER3-337	999	999	999	999	139502.3	139502.3	UNKNOWN	101.8	Cone
GER1-32	188	999	999	999	140625	140625	UNKNOWN	120.9	Cone
GER3-338	188	999	999	999	140625	140625	UNKNOWN	120.9	Cone
GER3-339	250	999	999	999	140625	140625	UNKNOWN	120.6	Cone
GER3-345	999	999	999	999	140625	140625	UNKNOWN	121.2	Cone
SWE1-28	999	999	999	999	140625	140625	UNKNOWN	76.2	Cone
USA05-15	584	999	999	999	145161	145161	UNKNOWN	100.1	Cone
USA05-16	584	999	999	999	145161	145161	UNKNOWN	117.4	Cone
GER4-120	550	999	999	999	152100	152100	UNKNOWN	97.2	Cone
USA09-39	999	999	999	999	175644.8	175644.8	ARKANSAS	219.01952	Cone
USA09-40	999	999	999	999	175644.8	175644.8	ARKANSAS	210.808512	Cone
USA09-41	999	999	999	999	175644.8	175644.8	ARKANSAS	191.64208	Cone
USA09-44	999	999	999	999	175644.8	175644.8	ARKANSAS	169.740128	Cone
USA09-45	999	999	999	999	175644.8	175644.8	ARKANSAS	153.313664	Cone
USA09-46	999	999	999	999	175644.8	175644.8	ARKANSAS	167.004608	Cone
USA09-78	999	999	999	999	175644.8	175644.8	ARKANSAS	208.615648	Cone
USA09-79	999	999	999	999	175644.8	175644.8	ARKANSAS	206.974336	Cone
USA09-80	999	999	999	999	175644.8	175644.8	ARKANSAS	184.52528	Cone
GER4-121	300	999	999	999	177156.8	177156.8	UNKNOWN	85.6	Cone
CSFR1-38	999	999	999	999	202500	202500	K	150	Cone
CSFR1-39	999	999	999	999	202500	202500	K	161.7	Cone
CSFR1-40	999	999	999	999	202500	202500	K	131.4	Cone
CSFR1-41	999	999	999	999	202500	202500	K	133.3	Cone
CSFR1-42	999	999	999	999	202500	202500	K	181.7	Cone
CSFR1-43	999	999	999	999	202500	202500	K	160.7	Cone
CSFR1-44	999	999	999	999	202500	202500	K	165.7	Cone
CSFR1-45	999	999	999	999	202500	202500	K	151.5	Cone
CSFR1-46	999	999	999	999	202500	202500	K	167.7	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
SWE1-26	84425.85	0.59	89659.30	0.55	63293.81	0.78
SWE1-27	104241.96	0.66	110878.13	0.62	78426.82	0.88
GER3-326	103501.47	0.81	110261.11	0.76	79435.47	1.05
USA09-35	109531.03	1.17	118246.57	1.09	89937.76	1.43
USA09-36	109531.03	1.10	118246.57	1.02	89937.76	1.34
USA09-37	109531.03	1.10	118246.57	1.02	89937.76	1.34
USA09-43	137703.26	1.53	148660.51	1.41	117188.09	1.79
GER4-114	83803.59	0.86	90591.59	0.79	73403.73	0.98
GER4-115	83803.59	0.86	90591.59	0.79	73403.73	0.98
GER4-116	83803.59	1.04	90591.59	0.96	73403.73	1.19
GER4-117	102722.25	0.92	111042.65	0.85	91870.75	1.03
GER4-118	102722.25	0.95	111042.65	0.88	91870.75	1.06
GER4-119	102722.25	0.98	111042.65	0.91	91870.75	1.10
GER3-335	164455.31	0.78	179672.16	0.71	140091.20	0.92
GER3-336	122726.18	0.83	134097.43	0.76	104290.69	0.97
GER3-337	123469.22	0.82	134987.24	0.75	105347.97	0.97
GER1-32	128915.86	0.94	141022.81	0.86	103950.82	1.16
GER3-338	128915.86	0.94	141022.81	0.86	103950.82	1.16
GER3-339	128915.86	0.94	141022.81	0.86	103950.82	1.16
GER3-345	128915.86	0.94	141022.81	0.86	103950.82	1.17
SWE1-28	84767.52	0.90	92728.34	0.82	72230.10	1.05
USA05-15	108152.48	0.93	118576.54	0.84	109222.50	0.92
USA05-16	107938.53	1.09	118341.96	0.99	140238.61	0.84
GER4-120	117199.45	0.83	128916.36	0.75	108441.44	0.90
USA09-39	178373.85	1.23	198126.59	1.11	161816.76	1.35
USA09-40	178373.85	1.18	198126.59	1.06	161816.76	1.30
USA09-41	178373.85	1.07	198126.59	0.97	161816.76	1.18
USA09-44	148000.25	1.15	164389.48	1.03	134262.51	1.26
USA09-45	148000.25	1.04	164389.48	0.93	134262.51	1.14
USA09-46	148000.25	1.13	164389.48	1.02	134262.51	1.24
USA09-78	151593.21	1.38	168380.32	1.24	148408.09	1.41
USA09-79	151593.21	1.37	168380.32	1.23	148408.09	1.39
USA09-80	151593.21	1.22	168380.32	1.10	148408.09	1.24
GER4-121	108252.04	0.79	120307.46	0.71	102376.15	0.84
CSFR1-38	157585.53	0.95	176642.02	0.85	143145.41	1.05
CSFR1-39	150413.14	1.08	168602.28	0.96	136630.24	1.18
CSFR1-40	159029.10	0.83	178260.15	0.74	144456.69	0.91
CSFR1-41	149396.82	0.89	167463.06	0.80	135707.06	0.98
CSFR1-42	149396.82	1.22	167463.06	1.09	135707.06	1.34
CSFR1-43	146825.26	1.09	164580.52	0.98	133371.13	1.20
CSFR1-44	146825.26	1.13	164580.52	1.01	133371.13	1.24
CSFR1-45	161877.60	0.94	181453.12	0.83	147044.18	1.03
CSFR1-46	161877.60	1.04	181453.12	0.92	147044.18	1.14

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
99	EUR1-12	S	1	22	22	150			26.55	31.3
99	EUR1-13	S	1	22	22	150			26.55	31.3
99	EUR1-14	S	1	22	22	150			26.55	31.3
99	CHI1-6	S	1	22	22	160			21.02	24.8
99	CHI1-7	S	1	22	22	160			21.02	24.8
99	CHI1-8	S	1	22	22	160			21.02	24.8
7	GER1-34	UE	1	20	20	170	1047	16	23.98	28.3
7	GER3-354	UE	1	20	20	170	1047	16	23.98	28.3
7	GER3-355	UE	1	20	20	170	1047	16	23.98	28.3
7	GER3-356	UE	1	20	20	170	1047	16	23.98	28.3
25	USA09-50	U	1	25.4	25.4	177.8	0	32	30.17	35.6
25	USA09-51	U	1	25.4	25.4	177.8	0	32	30.17	35.6
25	USA09-52	U	1	25.4	25.4	177.8	0	32	30.17	35.6
12	GER4-122	S	1	22	22	185	350	16	21.02	24.8
11	GER4-123	S	1	22	22	185	900	16	18.81	22.2
11	GER4-124	S	1	22	22	185	900	16	18.81	22.2
11	GER4-125	S	1	22	22	185	900	16	18.81	22.2
12	GER4-126	S	1	22	22	185	350	16	22.97	27.1
12	GER4-127	S	1	22	22	185	350	16	22.97	27.1
12	GER4-128	S	1	22	22	185	350	16	23.90	28.2
12	GER4-129	S	1	22	22	185	350	16	25.17	29.7
12	GER4-130	S	1	22	22	185	350	16	25.08	29.6
12	GER4-131	S	1	22	22	185	350	16	28.05	33.1
12	GER4-132	S	1	22	22	185	350	16	22.97	27.1
12	GER4-133	S	1	22	22	185	350	16	25.08	29.6
12	GER4-134	S	1	22	22	185	350	16	23.56	27.8
12	GER4-135	S	1	22	22	185	350	16	22.97	27.1
12	GER4-136	S	1	22	22	185	350	16	25.17	29.7
12	GER4-137	S	1	22	22	185	350	16	25.42	30.0
12	GER4-138	S	1	22	22	185	350	16	25.08	29.6
11	GER4-139	S	1	22	22	185	900	16	18.81	22.2
12	GER4-140	S	1	22	22	185	350	16	13.22	15.6
12	GER4-141	S	1	22	22	185	350	16	13.90	16.4
12	GER4-142	S	1	22	22	185	350	16	13.90	16.4
12	GER4-143	S	1	22	22	185	350	16	13.22	15.6
12	GER4-144	S	1	22	22	185	350	16	17.12	20.2
12	GER4-145	S	1	22	22	185	350	16	17.12	20.2
12	GER4-146	S	1	22	22	185	350	16	16.86	19.9
12	GER4-147	S	1	22	22	185	350	16	16.86	19.9
11	GER4-148	S	1	22	22	185	900	16	18.81	22.2
28	9SMG5706	UC1	1	19.1	19.05	101.6	-	-	29.75	35.1
28	9SMG5707	UC1	1	19.1	19.05	101.6	-	-	29.75	35.1
28	9SMG5708	UC1	1	19.1	19.05	101.6	-	-	29.75	35.1

**Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow
Embedment (<=188mm), (Continued)**

Test Number	Geometry						Remarks	Test Results Ultimate Load Nu (kN)	Failure Mode
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
EUR1-12	999	999	999	999	202500	202500	KEUSER	147.4	Cone
EUR1-13	999	999	999	999	202500	202500	KEUSER	150.9	Cone
EUR1-14	999	999	999	999	202500	202500	KEUSER	138.6	Cone
CHI1-6	900	999	999	999	230400	230400	ZHAO	148.8	Cone
CHI1-7	900	999	999	999	230400	230400	ZHAO	155.8	Cone
CHI1-8	900	999	999	999	230400	230400	ZHAO	161.9	Cone
GER1-34	255	999	999	999	260100	260100	UNKNOWN	183.2	Cone
GER3-354	255	999	999	999	260100	260100	UNKNOWN	183.2	Cone
GER3-355	340	999	999	999	260100	260100	UNKNOWN	190.7	Cone
GER3-356	999	999	999	999	260100	260100	UNKNOWN	199.6	Cone
USA09-50	999	999	999	999	284515.6	284515.6	ARKANSAS	273.7744	Cone
USA09-51	999	999	999	999	284515.6	284515.6	ARKANSAS	271.03888	Cone
USA09-52	999	999	999	999	284515.6	284515.6	ARKANSAS	271.03888	Cone
GER4-122	400	999	999	999	308025	308025	UNKNOWN	173.5	Cone
GER4-123	447	999	999	999	308025	308025	UNKNOWN	150.6	Cone
GER4-124	449	999	999	999	308025	308025	UNKNOWN	151.7	Cone
GER4-125	450	999	999	999	308025	308025	UNKNOWN	145.6	Cone
GER4-126	450	999	999	999	308025	308025	UNKNOWN	187	Cone
GER4-127	450	999	999	999	308025	308025	UNKNOWN	200	Cone
GER4-128	450	999	999	999	308025	308025	UNKNOWN	207	Cone
GER4-129	450	999	999	999	308025	308025	UNKNOWN	223	Cone
GER4-130	450	999	999	999	308025	308025	UNKNOWN	223	Cone
GER4-131	450	999	999	999	308025	308025	UNKNOWN	223	Cone
GER4-132	450	999	999	999	308025	308025	UNKNOWN	226	Cone
GER4-133	450	999	999	999	308025	308025	UNKNOWN	228	Cone
GER4-134	450	999	999	999	308025	308025	UNKNOWN	230	Cone
GER4-135	450	999	999	999	308025	308025	UNKNOWN	236	Cone
GER4-136	450	999	999	999	308025	308025	UNKNOWN	239	Cone
GER4-137	450	999	999	999	308025	308025	UNKNOWN	241	Cone
GER4-138	450	999	999	999	308025	308025	UNKNOWN	259	Cone
GER4-139	550	999	999	999	308025	308025	UNKNOWN	148.4	Cone
GER4-140	650	999	999	999	308025	308025	UNKNOWN	128	Cone
GER4-141	650	999	999	999	308025	308025	UNKNOWN	128.4	Cone
GER4-142	650	999	999	999	308025	308025	UNKNOWN	135	Cone
GER4-143	650	999	999	999	308025	308025	UNKNOWN	138.6	Cone
GER4-144	650	999	999	999	308025	308025	UNKNOWN	181.5	Cone
GER4-145	650	999	999	999	308025	308025	UNKNOWN	182.3	Cone
GER4-146	650	999	999	999	308025	308025	UNKNOWN	182.7	Cone
GER4-147	650	999	999	999	308025	308025	UNKNOWN	201	Cone
GER4-148	875	999	999	999	308025	308025	UNKNOWN	141.3	Cone
9SMG5706	999	999	999	999	92903.04	92903.04	Hallowell	116.36	Cone
9SMG5707	999	999	999	999	92903.04	92903.04	Hallowell	98.46	Cone
9SMG5708	999	999	999	999	92903.04	92903.04	Hallowell	113.80	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
EUR1-12	154485.51	0.95	173167.11	0.85	149200.85	0.99
EUR1-13	154485.51	0.98	173167.11	0.87	149200.85	1.01
EUR1-14	154485.51	0.90	173167.11	0.80	149200.85	0.93
CHI1-6	151417.64	0.98	171070.00	0.87	149248.01	1.00
CHI1-7	151417.64	1.03	171070.00	0.91	149248.01	1.04
CHI1-8	151417.64	1.07	171070.00	0.95	149248.01	1.08
GER1-34	177148.41	1.03	201556.78	0.91	165053.16	1.11
GER3-354	177148.41	1.03	201556.78	0.91	165053.16	1.11
GER3-355	177148.41	1.08	201556.78	0.95	165053.16	1.16
GER3-356	177148.41	1.13	201556.78	0.99	165053.16	1.21
USA09-50	212503.19	1.29	242997.34	1.13	223228.61	1.23
USA09-51	212503.19	1.28	242997.34	1.12	223228.61	1.21
USA09-52	212503.19	1.28	242997.34	1.12	223228.61	1.21
GER4-122	188258.28	0.92	216198.69	0.80	194692.12	0.89
GER4-123	178116.74	0.85	204551.99	0.74	184203.98	0.82
GER4-124	178116.74	0.85	204551.99	0.74	184203.98	0.82
GER4-125	178116.74	0.82	204551.99	0.71	184203.98	0.79
GER4-126	196794.47	0.95	226001.78	0.83	203520.04	0.92
GER4-127	196794.47	1.02	226001.78	0.88	203520.04	0.98
GER4-128	200748.73	1.03	230542.91	0.90	207609.43	1.00
GER4-129	206018.62	1.08	236594.94	0.94	213059.42	1.05
GER4-130	205671.50	1.08	236196.29	0.94	212700.44	1.05
GER4-131	217491.48	1.03	249770.54	0.89	224924.37	0.99
GER4-132	196794.47	1.15	226001.78	1.00	203520.04	1.11
GER4-133	205671.50	1.11	236196.29	0.97	212700.44	1.07
GER4-134	199319.89	1.15	228902.02	1.00	206131.76	1.12
GER4-135	196794.47	1.20	226001.78	1.04	203520.04	1.16
GER4-136	206018.62	1.16	236594.94	1.01	213059.42	1.12
GER4-137	207056.50	1.16	237786.86	1.01	214132.78	1.13
GER4-138	205671.50	1.26	236196.29	1.10	212700.44	1.22
GER4-139	178116.74	0.83	204551.99	0.73	184203.98	0.81
GER4-140	149310.57	0.86	171470.54	0.75	154413.34	0.83
GER4-141	153091.18	0.84	175812.26	0.73	158323.16	0.81
GER4-142	153091.18	0.88	175812.26	0.77	158323.16	0.85
GER4-143	149310.57	0.93	171470.54	0.81	154413.34	0.90
GER4-144	169904.13	1.07	195120.50	0.93	175710.70	1.03
GER4-145	169904.13	1.07	195120.50	0.93	175710.70	1.04
GER4-146	168637.75	1.08	193666.17	0.94	174401.04	1.05
GER4-147	168637.75	1.19	193666.17	1.04	174401.04	1.15
GER4-148	178116.74	0.79	204551.99	0.69	184203.98	0.77
9SMG5706	91159.54	1.28	96593.17	1.20	74979.44	1.55
9SMG5707	91159.54	1.08	96593.17	1.02	74979.44	1.31
9SMG5708	91159.54	1.25	96593.17	1.18	74979.44	1.52

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
28	9SMG5709	UC1	1	19.1	19.05	101.6	-	-	29.75	35.1
28	9SMG5710	UC1	1	19.1	19.05	101.6	-	-	29.75	35.1
28	11SC5701	CIP	1	19.1	19.05	101.6	-	-	30.21	35.6
28	11SC5702	CIP	1	19.1	19.05	101.6	-	-	30.21	35.6
28	11SC5703	CIP	1	19.1	19.05	101.6	-	-	30.21	35.6
28	11SC5704	CIP	1	19.1	19.05	101.6	-	-	30.21	35.6
28	11SC5705	CIP	1	19.1	19.05	101.6	-	-	30.21	35.6
27	1SML5726	UC1	1	19.1	19.05	101.6	-	-	29.23	34.5
27	1SML5727	UC1	1	19.1	19.05	101.6	-	-	29.23	34.5
27	1SML5728	UC1	1	19.1	19.05	101.6	-	-	29.23	34.5
27	1SML5729	UC1	1	19.1	19.05	101.6	-	-	29.23	34.5
27	1SML5730	UC1	1	19.1	19.05	101.6	-	-	29.23	34.5
27	5SML5411	UC1	1	19.1	19.05	57.15	-	-	33.62	39.7
27	5SML5412	UC1	1	19.1	19.05	57.15	-	-	33.62	39.7
27	5SML5413	UC1	1	19.1	19.05	57.15	-	-	33.62	39.7
27	5SML5414	UC1	1	19.1	19.05	57.15	-	-	33.62	39.7
27	5SML5415	UC1	1	19.1	19.05	57.15	-	-	33.62	39.7
27	3SML3716	UC1	1	19.1	19.05	101.6	-	-	21.68	25.6
27	3SML3717	UC1	1	19.1	19.05	101.6	-	-	21.68	25.6
27	3SML3718	UC1	1	19.1	19.05	101.6	-	-	21.68	25.6
27	3SML3719	UC1	1	19.1	19.05	101.6	-	-	21.68	25.6
27	3SML3720	UC1	1	19.1	19.05	101.6	-	-	21.68	25.6
27	5SMR5721	UC1	1	19.1	19.05	101.6	-	-	32.78	38.7
27	5SMR5722	UC1	1	19.1	19.05	101.6	-	-	32.78	38.7
27	5SMR5723	UC1	1	19.1	19.05	101.6	-	-	32.78	38.7
27	5SMR5727	UC1	1	19.1	19.05	101.6	-	-	32.78	38.7
27	5SMR5725	UC1	1	19.1	19.05	101.6	-	-	32.78	38.7
27	5SSL5726	UC2	1	19.1	19.05	101.6	-	-	31.84	37.6
27	5SSL5727	UC2	1	19.1	19.05	101.6	-	-	31.84	37.6
27	5SSL5728	UC2	1	19.1	19.05	101.6	-	-	31.84	37.6
27	5SSL5729	UC2	1	19.1	19.05	101.6	-	-	31.84	37.6
27	5SSL5730	UC2	1	19.1	19.05	101.6	-	-	31.84	37.6
28	9SKG5701	EAll	1	19.05	19.05	87.3	-	-	29.75	35.1
28	9SKG5702	EAll	1	19.05	19.05	87.3	-	-	29.75	35.1
28	9SKG5703	EAll	1	19.05	19.05	87.3	-	-	29.75	35.1
28	9SKG5704	EAll	1	19.05	19.05	87.3	-	-	29.75	35.1
28	9SKG5705	EAll	1	19.05	19.05	87.3	-	-	29.75	35.1
27	0SKL5701	EAll	1	19.05	19.05	120.65	-	-	29.23	34.5
27	0SKL5702	EAll	1	19.05	19.05	120.65	-	-	29.23	34.5
27	0SKL5703	EAll	1	19.05	19.05	120.65	-	-	29.23	34.5
27	0SKL5704	EAll	1	19.05	19.05	120.65	-	-	29.23	34.5
27	0SKL5705	EAll	1	19.05	19.05	120.65	-	-	29.23	34.5
27	0SKL5721	EAll	1	19.05	19.05	82.55	-	-	29.23	34.5

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Geometry						Remarks	Test Results Ultimate Load Nu (kN)	Failure Mode
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
9SMG5709	999	999	999	999	92903.04	92903.04	Hallowell	122.32	Cone
9SMG5710	999	999	999	999	92903.04	92903.04	Hallowell	116.36	Cone
11SC5701	999	999	999	999	92903.04	92903.04	Hallowell	104.36	Cone
11SC5702	999	999	999	999	92903.04	92903.04	Hallowell	95.34	Cone
11SC5703	999	999	999	999	92903.04	92903.04	Hallowell	102.21	Cone
11SC5704	999	999	999	999	92903.04	92903.04	Hallowell	94.05	Cone
11SC5705	999	999	999	999	92903.04	92903.04	Hallowell	94.48	Cone
1SML5726	999	999	999	999	92903.04	92903.04	Rodriguez	97.11	Cone
1SML5727	999	999	999	999	92903.04	92903.04	Rodriguez	93.45	Cone
1SML5728	999	999	999	999	92903.04	92903.04	Rodriguez	86.15	Cone
1SML5729	999	999	999	999	92903.04	92903.04	Rodriguez	106.24	Cone
1SML5730	999	999	999	999	92903.04	92903.04	Rodriguez	97.71	Cone
5SML5411	999	999	999	999	29395.1	29395.1	Rodriguez	35.81	Cone
5SML5412	999	999	999	999	29395.1	29395.1	Rodriguez	35.81	Cone
5SML5413	999	999	999	999	29395.1	29395.1	Rodriguez	34.50	Cone
5SML5414	999	999	999	999	29395.1	29395.1	Rodriguez	43.67	Cone
5SML5415	999	999	999	999	29395.1	29395.1	Rodriguez	41.49	Cone
3SML3716	999	999	999	999	92903.04	92903.04	Rodriguez	82.56	Cone
3SML3717	999	999	999	999	92903.04	92903.04	Rodriguez	80.38	Cone
3SML3718	999	999	999	999	92903.04	92903.04	Rodriguez	83.86	Cone
3SML3719	999	999	999	999	92903.04	92903.04	Rodriguez	96.03	Cone
3SML3720	999	999	999	999	92903.04	92903.04	Rodriguez	90.38	Cone
5SMR5721	999	999	999	999	92903.04	92903.04	Rodriguez	107.02	Cone
5SMR5722	999	999	999	999	92903.04	92903.04	Rodriguez	99.50	Cone
5SMR5723	999	999	999	999	92903.04	92903.04	Rodriguez	100.83	Cone
5SMR5727	999	999	999	999	92903.04	92903.04	Rodriguez	111.00	Cone
5SMR5725	999	999	999	999	92903.04	92903.04	Rodriguez	110.56	Cone
5SSL5726	999	999	999	999	92903.04	92903.04	Rodriguez	96.93	Cone
5SSL5727	999	999	999	999	92903.04	92903.04	Rodriguez	101.87	Cone
5SSL5728	999	999	999	999	92903.04	92903.04	Rodriguez	117.58	Cone
5SSL5729	999	999	999	999	92903.04	92903.04	Rodriguez	107.25	Cone
5SSL5730	999	999	999	999	92903.04	92903.04	Rodriguez	109.05	Cone
9SKG5701	999	999	999	999	68591.61	68591.61	Hallowell	57.117	Cone
9SKG5702	999	999	999	999	68591.61	68591.61	Hallowell	62.659	Cone
9SKG5703	999	999	999	999	68591.61	68591.61	Hallowell	68.200	Cone
9SKG5704	999	999	999	999	68591.61	68591.61	Hallowell	70.757	Cone
9SKG5705	999	999	999	999	68591.61	68591.61	Hallowell	61.380	Cone
0SKL5701	999	999	999	999	131007.8	131007.8	Rodriguez	87.670	Cone
0SKL5702	999	999	999	999	131007.8	131007.8	Rodriguez	84.320	Cone
0SKL5703	999	999	999	999	131007.8	131007.8	Rodriguez	84.627	Cone
0SKL5704	999	999	999	999	131007.8	131007.8	Rodriguez	85.232	Cone
0SKL5705	999	999	999	999	131007.8	131007.8	Rodriguez	92.234	Cone
0SKL5721	999	999	999	999	61330.52	61330.52	Rodriguez	41.702	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
9SMG5709	91159.54	1.34	96593.17	1.27	74979.44	1.63
9SMG5710	91159.54	1.28	96593.17	1.20	74979.44	1.55
11SC5701	91854.06	1.14	97329.08	1.07	70296.92	1.48
11SC5702	91854.06	1.04	97329.08	0.98	70296.92	1.36
11SC5703	91854.06	1.11	97329.08	1.05	70296.92	1.45
11SC5704	91854.06	1.02	97329.08	0.97	70296.92	1.34
11SC5705	91854.06	1.03	97329.08	0.97	70296.92	1.34
1SML5726	90363.83	1.07	95750.03	1.01	74324.96	1.31
1SML5727	90363.83	1.03	95750.03	0.98	74324.96	1.26
1SML5728	90363.83	0.95	95750.03	0.90	74324.96	1.16
1SML5729	90363.83	1.18	95750.03	1.11	74324.96	1.43
1SML5730	90363.83	1.08	95750.03	1.02	74324.96	1.31
5SML5411	40881.55	0.88	38644.39	0.93	29464.76	1.22
5SML5412	40881.55	0.88	38644.39	0.93	29464.76	1.22
5SML5413	40881.55	0.84	38644.39	0.89	29464.76	1.17
5SML5414	40881.55	1.07	38644.39	1.13	29464.76	1.48
5SML5415	40881.55	1.01	38644.39	1.07	29464.76	1.41
3SML3716	77813.15	1.06	82451.26	1.00	64001.93	1.29
3SML3717	77813.15	1.03	82451.26	0.97	64001.93	1.26
3SML3718	77813.15	1.08	82451.26	1.02	64001.93	1.31
3SML3719	77813.15	1.23	82451.26	1.16	64001.93	1.50
3SML3720	77813.15	1.16	82451.26	1.10	64001.93	1.41
5SMR5721	95694.50	1.12	101398.44	1.06	78709.48	1.36
5SMR5722	95694.50	1.04	101398.44	0.98	78709.48	1.26
5SMR5723	95694.50	1.05	101398.44	0.99	78709.48	1.28
5SMR5727	95694.50	1.16	101398.44	1.09	78709.48	1.41
5SMR5725	95694.50	1.16	101398.44	1.09	78709.48	1.40
5SSL5726	94305.86	1.03	99927.03	0.97	77567.31	1.25
5SSL5727	94305.86	1.08	99927.03	1.02	77567.31	1.31
5SSL5728	94305.86	1.25	99927.03	1.18	77567.31	1.52
5SSL5729	94305.86	1.14	99927.03	1.07	77567.31	1.38
5SSL5730	94305.86	1.16	99927.03	1.09	77567.31	1.41
9SKG5701	65160.79	0.88	68125.41	0.84	52840.97	1.08
9SKG5702	65160.79	0.96	68125.41	0.92	52840.97	1.19
9SKG5703	65160.79	1.05	68125.41	1.00	52840.97	1.29
9SKG5704	65160.79	1.09	68125.41	1.04	52840.97	1.34
9SKG5705	65160.79	0.94	68125.41	0.90	52840.97	1.16
0SKL5701	104941.80	0.84	115693.76	0.76	95090.09	0.92
0SKL5702	104941.80	0.80	115693.76	0.73	95090.09	0.89
0SKL5703	104941.80	0.81	115693.76	0.73	95090.09	0.89
0SKL5704	104941.80	0.81	115693.76	0.74	95090.09	0.90
0SKL5705	104941.80	0.88	115693.76	0.80	95090.09	0.97
0SKL5721	59392.71	0.70	61454.36	0.68	47317.56	0.88

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc fcc200 (MPa)	
27	0SKL5722	EAll	1	19.05	19.05	82.55	-	-	29.23	34.5
27	0SKL5723	EAll	1	19.05	19.05	82.55	-	-	29.23	34.5
27	0SKL5724	EAll	1	19.05	19.05	82.55	-	-	29.23	34.5
27	0SKL5725	EAll	1	19.05	19.05	82.55	-	-	29.23	34.5
27	0SOL5726	EA	1	19.05	19.05	82.55	-	-	29.23	34.5
27	0SOL5727	EA	1	19.05	19.05	82.55	-	-	29.23	34.5
27	0SOL5728	EA	1	19.05	19.05	82.55	-	-	29.23	34.5
27	0SOL5729	EA	1	19.05	19.05	82.55	-	-	29.23	34.5
27	0SOL5730	EA	1	19.05	19.05	82.55	-	-	29.23	34.5
27	1SKL5401	EAll	1	19.05	19.05	57.15	-	-	29.23	34.5
27	1SKL5402	EAll	1	19.05	19.05	57.15	-	-	29.23	34.5
27	1SKL5403	EAll	1	19.05	19.05	57.15	-	-	29.23	34.5
27	1SKL5404	EAll	1	19.05	19.05	57.15	-	-	29.23	34.5
27	1SKL5405	EAll	1	19.05	19.05	57.15	-	-	29.23	34.5
27	1SKL5706	EAll	1	19.05	19.05	101.6	-	-	30.89	36.4
27	1SKL5707	EAll	1	19.05	19.05	101.6	-	-	30.89	36.4
27	1SKL5708	EAll	1	19.05	19.05	101.6	-	-	30.89	36.4
27	1SKL5709	EAll	1	19.05	19.05	101.6	-	-	30.89	36.4
27	1SKL5710	EAll	1	19.05	19.05	101.6	-	-	31.96	37.7
27	1SKL3711	EAll	1	19.05	19.05	101.6	-	-	20.77	24.5
27	1SKL3712	EAll	1	19.05	19.05	101.6	-	-	20.77	24.5
27	1SKL3713	EAll	1	19.05	19.05	101.6	-	-	20.77	24.5
27	1SKL3714	EAll	1	19.05	19.05	101.6	-	-	20.77	24.5
27	1SKL3715	EAll	1	19.05	19.05	101.6	-	-	20.77	24.5
27	1SKR5716	EAll	1	19.05	19.05	101.6	-	-	31.45	37.1
27	1SKR5717	EAll	1	19.05	19.05	101.6	-	-	31.45	37.1
27	1SKR5718	EAll	1	19.05	19.05	101.6	-	-	31.45	37.1
27	1SKR5719	EAll	1	19.05	19.05	101.6	-	-	31.45	37.1
27	1SKR5720	EAll	1	19.05	19.05	101.6	-	-	31.45	37.1
27	1SKR5721	EAll	1	19.05	19.05	101.6	-	-	19.84	23.4
27	1SKR5722	EAll	1	19.05	19.05	101.6	-	-	19.84	23.4
27	1SKR5723	EAll	1	19.05	19.05	101.6	-	-	19.84	23.4
27	1SKR5724	EAll	1	19.05	19.05	101.6	-	-	19.84	23.4
27	1SKR5725	EAll	1	19.05	19.05	101.6	-	-	19.84	23.4
27	3SKL5701	EAll	1	19.05	19.05	101.6	-	-	30.82	36.4
27	3SKL5702	EAll	1	19.05	19.05	101.6	-	-	30.82	36.4
27	3SKL5703	EAll	1	19.05	19.05	101.6	-	-	30.82	36.4
27	3SKL5704	EAll	1	19.05	19.05	101.6	-	-	30.82	36.4
27	3SKL5705	EAll	1	19.05	19.05	101.6	-	-	30.82	36.4
27	5SHL5401	Sleeve	1	9.525	9.525	57.15	-	-	32.23	38.0
27	5SHL5402	Sleeve	1	9.525	9.525	57.15	-	-	32.23	38.0
27	5SHL5403	Sleeve	1	9.525	9.525	57.15	-	-	32.23	38.0
27	5SHL5404	Sleeve	1	9.525	9.525	57.15	-	-	32.23	38.0

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Geometry						Remarks	Test Results Ultimate Load Nu (kN)	Failure Mode
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
0SKL5722	999	999	999	999	61330.52	61330.52	Rodriguez	52.662	Cone
0SKL5723	999	999	999	999	61330.52	61330.52	Rodriguez	55.705	Cone
0SKL5724	999	999	999	999	61330.52	61330.52	Rodriguez	55.096	Cone
0SKL5725	999	999	999	999	61330.52	61330.52	Rodriguez	54.184	Cone
0SOL5726	999	999	999	999	61330.52	61330.52	Rodriguez	39.571	Cone
0SOL5727	999	999	999	999	61330.52	61330.52	Rodriguez	44.442	Cone
0SOL5728	999	999	999	999	61330.52	61330.52	Rodriguez	40.790	Cone
0SOL5729	999	999	999	999	61330.52	61330.52	Rodriguez	47.182	Cone
0SOL5730	999	999	999	999	61330.52	61330.52	Rodriguez	50.229	Cone
1SKL5401	999	999	999	999	29395.1	29395.1	Rodriguez	23.429	Cone
1SKL5402	999	999	999	999	29395.1	29395.1	Rodriguez	21.134	Cone
1SKL5403	999	999	999	999	29395.1	29395.1	Rodriguez	19.803	Cone
1SKL5404	999	999	999	999	29395.1	29395.1	Rodriguez	25.297	Cone
1SKL5405	999	999	999	999	29395.1	29395.1	Rodriguez	19.443	Cone
1SKL5706	999	999	999	999	92903.04	92903.04	Rodriguez	75.175	Cone
1SKL5707	999	999	999	999	92903.04	92903.04	Rodriguez	65.153	Cone
1SKL5708	999	999	999	999	92903.04	92903.04	Rodriguez	71.074	Cone
1SKL5709	999	999	999	999	92903.04	92903.04	Rodriguez	69.254	Cone
1SKL5710	999	999	999	999	92903.04	92903.04	Rodriguez	75.700	Cone
1SKL3711	999	999	999	999	92903.04	92903.04	Rodriguez	58.285	Cone
1SKL3712	999	999	999	999	92903.04	92903.04	Rodriguez	66.367	Cone
1SKL3713	999	999	999	999	92903.04	92903.04	Rodriguez	56.555	Cone
1SKL3714	999	999	999	999	92903.04	92903.04	Rodriguez	58.863	Cone
1SKL3715	999	999	999	999	92903.04	92903.04	Rodriguez	57.711	Cone
1SKR5716	999	999	999	999	92903.04	92903.04	Rodriguez	73.952	Cone
1SKR5717	999	999	999	999	92903.04	92903.04	Rodriguez	66.029	Cone
1SKR5718	999	999	999	999	92903.04	92903.04	Rodriguez	66.910	Cone
1SKR5719	999	999	999	999	92903.04	92903.04	Rodriguez	62.217	Cone
1SKR5720	999	999	999	999	92903.04	92903.04	Rodriguez	73.952	Cone
1SKR5721	999	999	999	999	92903.04	92903.04	Rodriguez	64.059	Cone
1SKR5722	999	999	999	999	92903.04	92903.04	Rodriguez	60.514	Cone
1SKR5723	999	999	999	999	92903.04	92903.04	Rodriguez	54.019	Cone
1SKR5724	999	999	999	999	92903.04	92903.04	Rodriguez	55.790	Cone
1SKR5725	999	999	999	999	92903.04	92903.04	Rodriguez	61.990	Cone
3SKL5701	999	999	999	999	92903.04	92903.04	Rodriguez	67.297	Cone
3SKL5702	999	999	999	999	92903.04	92903.04	Rodriguez	70.856	Cone
3SKL5703	999	999	999	999	92903.04	92903.04	Rodriguez	64.037	Cone
3SKL5704	999	999	999	999	92903.04	92903.04	Rodriguez	68.187	Cone
3SKL5705	999	999	999	999	92903.04	92903.04	Rodriguez	71.745	Cone
5SHL5401	999	999	999	999	29395.1	29395.1	Rodriguez	39.696	Cone
5SHL5402	999	999	999	999	29395.1	29395.1	Rodriguez	32.112	Cone
5SHL5403	999	999	999	999	29395.1	29395.1	Rodriguez	36.573	Cone
5SHL5404	999	999	999	999	29395.1	29395.1	Rodriguez	40.141	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
0SKL5722	59392.71	0.89	61454.36	0.86	47317.56	1.11
0SKL5723	59392.71	0.94	61454.36	0.91	47317.56	1.18
0SKL5724	59392.71	0.93	61454.36	0.90	47317.56	1.16
0SKL5725	59392.71	0.91	61454.36	0.88	47317.56	1.15
0SOL5726	59392.71	0.67	61454.36	0.64	47317.56	0.84
0SOL5727	59392.71	0.75	61454.36	0.72	47317.56	0.94
0SOL5728	59392.71	0.69	61454.36	0.66	47317.56	0.86
0SOL5729	59392.71	0.79	61454.36	0.77	47317.56	1.00
0SOL5730	59392.71	0.85	61454.36	0.82	47317.56	1.06
1SKL5401	34212.27	0.68	32760.07	0.72	24568.73	0.95
1SKL5402	34212.27	0.62	32760.07	0.65	24568.73	0.86
1SKL5403	34212.27	0.58	32760.07	0.60	24568.73	0.81
1SKL5404	34212.27	0.74	32760.07	0.77	24568.73	1.03
1SKL5405	34212.27	0.57	32760.07	0.59	24568.73	0.79
1SKL5706	83359.32	0.90	89475.13	0.84	71086.75	1.06
1SKL5707	83359.32	0.78	89475.13	0.73	71086.75	0.92
1SKL5708	83359.32	0.85	89475.13	0.79	71086.75	1.00
1SKL5709	83359.32	0.83	89475.13	0.77	71086.75	0.97
1SKL5710	84789.10	0.89	91009.81	0.83	72306.03	1.05
1SKL3711	68350.65	0.85	73365.32	0.79	58287.73	1.00
1SKL3712	68350.65	0.97	73365.32	0.90	58287.73	1.14
1SKL3713	68350.65	0.83	73365.32	0.77	58287.73	0.97
1SKL3714	68350.65	0.86	73365.32	0.80	58287.73	1.01
1SKL3715	68350.65	0.84	73365.32	0.79	58287.73	0.99
1SKR5716	84118.75	0.88	90290.27	0.82	71734.37	1.03
1SKR5717	84118.75	0.78	90290.27	0.73	71734.37	0.92
1SKR5718	84118.75	0.80	90290.27	0.74	71734.37	0.93
1SKR5719	84118.75	0.74	90290.27	0.69	71734.37	0.87
1SKR5720	84118.75	0.88	90290.27	0.82	71734.37	1.03
1SKR5721	66812.94	0.96	71714.79	0.89	56976.40	1.12
1SKR5722	66812.94	0.91	71714.79	0.84	56976.40	1.06
1SKR5723	66812.94	0.81	71714.79	0.75	56976.40	0.95
1SKR5724	66812.94	0.84	71714.79	0.78	56976.40	0.98
1SKR5725	66812.94	0.93	71714.79	0.86	56976.40	1.09
3SKL5701	83266.23	0.81	89375.21	0.75	71007.37	0.95
3SKL5702	83266.23	0.85	89375.21	0.79	71007.37	1.00
3SKL5703	83266.23	0.77	89375.21	0.72	71007.37	0.90
3SKL5704	83266.23	0.82	89375.21	0.76	71007.37	0.96
3SKL5705	83266.23	0.86	89375.21	0.80	71007.37	1.01
5SHL5401	35924.42	1.10	34399.54	1.15	22573.49	1.76
5SHL5402	35924.42	0.89	34399.54	0.93	22573.49	1.42
5SHL5403	35924.42	1.02	34399.54	1.06	22573.49	1.62
5SHL5404	35924.42	1.12	34399.54	1.17	22573.49	1.78

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number	Diameter	Outside Diameter	Embedment	Strength of Steel	Aggregate Diameter	Strength of Concrete	
			n	d (mm)	do/dh (mm)	hef (mm)	fy (MPa)	dagg (mm)	fc (MPa)	fcc200 (MPa)
27	5SHL5405	Sleeve	1	9.525	9.525	57.15	-	-	32.23	38.0
27	5SHL5706	Sleeve	1	19.05	19.05	101.6	-	-	32.23	38.0
27	5SHL5707	Sleeve	1	19.05	19.05	101.6	-	-	32.23	38.0
27	5SHL5708	Sleeve	1	19.05	19.05	101.6	-	-	32.23	38.0
27	5SHL5709	Sleeve	1	19.05	19.05	101.6	-	-	32.23	38.0
27	5SHL5710	Sleeve	1	19.05	19.05	101.6	-	-	32.23	38.0
26	1.1	Sleeve	1	8	8	60				37.8
26	1.2	Sleeve	1	8	8	60				37.8
26	1.3	Sleeve	1	8	8	60				37.8
26	1.4	Sleeve	1	8	8	60				37.8
26	1.5	Sleeve	1	8	8	60				37.8
26	21.1	Sleeve	1	8	8	60				29.6
26	21.2	Sleeve	1	8	8	60				29.6
26	21.3	Sleeve	1	8	8	60				29.6
26	21.4	Sleeve	1	8	8	60				29.6
26	21.5	Sleeve	1	8	8	60				29.6
26	2.1	Sleeve	1	10	10	69				37.8
26	2.2	Sleeve	1	10	10	69				37.8
26	2.3	Sleeve	1	10	10	69				37.8
26	2.4	Sleeve	1	10	10	69				37.8
26	2.5	Sleeve	1	10	10	69				37.8
26	2.6	Sleeve	1	10	10	69				37.8
26	22.1	Sleeve	1	10	10	69				29.6
26	22.2	Sleeve	1	10	10	69				29.6
26	22.3	Sleeve	1	10	10	69				29.6
26	22.4	Sleeve	1	10	10	69				29.6
26	22.5	Sleeve	1	10	10	69				29.6
26	3.1	Sleeve	1	12	12	77				37.8
26	3.2	Sleeve	1	12	12	77				37.8
26	3.3	Sleeve	1	12	12	77				37.8
26	3.4	Sleeve	1	12	12	77				37.8
26	3.5	Sleeve	1	12	12	77				37.8
26	3.6	Sleeve	1	12	12	77				37.8
26	8.6	Sleeve	1	12	12	77				65.1
26	8.8	Sleeve	1	12	12	77				65.1
26	8.1	Sleeve	1	12	12	77				65.1
26	23.1	Sleeve	1	12	12	77				29.6
26	23.2	Sleeve	1	12	12	77				29.6
26	23.3	Sleeve	1	12	12	77				29.6
26	23.4	Sleeve	1	12	12	77				29.6
26	23.5	Sleeve	1	12	12	77				29.6
26	28.1	Sleeve	1	12	12	77				51.4
26	28.2	Sleeve	1	12	12	77				51.4

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Geometry						Remarks	Test Results Ultimate Load Nu (kN)	Failure Mode
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
5SHL5405	999	999	999	999	29395.1	29395.1	Rodriguez	43.708	Cone
5SHL5706	999	999	999	999	92903.04	92903.04	Rodriguez	111.054	Cone
5SHL5707	999	999	999	999	92903.04	92903.04	Rodriguez	105.258	Cone
5SHL5708	999	999	999	999	92903.04	92903.04	Rodriguez	104.813	Cone
5SHL5709	999	999	999	999	92903.04	92903.04	Rodriguez	117.300	Cone
5SHL5710	999	999	999	999	92903.04	92903.04	Rodriguez	101.691	Cone
1.1	999	999	999	999	16200	32400	Hilti	26.94	Cone
1.2	999	999	999	999	16200	32400	Hilti	26.19	Cone
1.3	999	999	999	999	16200	32400	Hilti	26.67	Cone
1.4	999	999	999	999	16200	32400	Hilti	25.83	Cone
1.5	999	999	999	999	16200	32400	Hilti	23.58	Cone
21.1	999	999	999	999	16200	32400	Hilti	31.26	Cone
21.2	999	999	999	999	16200	32400	Hilti	29.84	Cone
21.3	999	999	999	999	16200	32400	Hilti	29.21	Cone
21.4	999	999	999	999	16200	32400	Hilti	30.2	Cone
21.5	999	999	999	999	16200	32400	Hilti	28.22	Cone
2.1	999	999	999	999	21424.5	42849	Hilti	39.95	Cone
2.2	999	999	999	999	21424.5	42849	Hilti	41.3	Cone
2.3	999	999	999	999	21424.5	42849	Hilti	36.55	Cone
2.4	999	999	999	999	21424.5	42849	Hilti	37.06	Cone
2.5	999	999	999	999	21424.5	42849	Hilti	42.73	Cone
2.6	999	999	999	999	21424.5	42849	Hilti	40.31	Cone
22.1	999	999	999	999	21424.5	42849	Hilti	36.5	Cone
22.2	999	999	999	999	21424.5	42849	Hilti	37.88	Cone
22.3	999	999	999	999	21424.5	42849	Hilti	37.53	Cone
22.4	999	999	999	999	21424.5	42849	Hilti	36.61	Cone
22.5	999	999	999	999	21424.5	42849	Hilti	38.27	Cone
3.1	999	999	999	999	26680.5	53361	Hilti	57.18	Cone
3.2	999	999	999	999	26680.5	53361	Hilti	54.03	Cone
3.3	999	999	999	999	26680.5	53361	Hilti	55.82	Cone
3.4	999	999	999	999	26680.5	53361	Hilti	54.66	Cone
3.5	999	999	999	999	26680.5	53361	Hilti	56.9	Cone
3.6	999	999	999	999	26680.5	53361	Hilti	45.92	Cone
8.6	999	999	999	999	26680.5	53361	Hilti	66.09	Cone
8.8	999	999	999	999	26680.5	53361	Hilti	71.24	Cone
8.1	999	999	999	999	26680.5	53361	Hilti	68.68	Cone
23.1	999	999	999	999	26680.5	53361	Hilti	59.79	Cone
23.2	999	999	999	999	26680.5	53361	Hilti	55.1	Cone
23.3	999	999	999	999	26680.5	53361	Hilti	53.04	Cone
23.4	999	999	999	999	26680.5	53361	Hilti	59	Cone
23.5	999	999	999	999	26680.5	53361	Hilti	55.11	Cone
28.1	999	999	999	999	26680.5	53361	Hilti	68.62	Cone
28.2	999	999	999	999	26680.5	53361	Hilti	74.6	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
5SHL5405	35924.42	1.22	34399.54	1.27	22573.49	1.94
5SHL5706	85154.18	1.30	91401.67	1.22	72617.36	1.53
5SHL5707	85154.18	1.24	91401.67	1.15	72617.36	1.45
5SHL5708	85154.18	1.23	91401.67	1.15	72617.36	1.44
5SHL5709	85154.18	1.38	91401.67	1.28	72617.36	1.62
5SHL5710	85154.18	1.19	91401.67	1.11	72617.36	1.40
1.1	38525.38	0.70	37305.86	0.72	25512.78	1.06
1.2	38525.38	0.68	37305.86	0.70	25512.78	1.03
1.3	38525.38	0.69	37305.86	0.71	25512.78	1.05
1.4	38525.38	0.67	37305.86	0.69	25512.78	1.01
1.5	38525.38	0.61	37305.86	0.63	25512.78	0.92
21.1	34091.56	0.92	33012.39	0.95	22576.56	1.38
21.2	34091.56	0.88	33012.39	0.90	22576.56	1.32
21.3	34091.56	0.86	33012.39	0.88	22576.56	1.29
21.4	34091.56	0.89	33012.39	0.91	22576.56	1.34
21.5	34091.56	0.83	33012.39	0.85	22576.56	1.25
2.1	47510.94	0.84	47434.64	0.84	34229.64	1.17
2.2	47510.94	0.87	47434.64	0.87	34229.64	1.21
2.3	47510.94	0.77	47434.64	0.77	34229.64	1.07
2.4	47510.94	0.78	47434.64	0.78	34229.64	1.08
2.5	47510.94	0.90	47434.64	0.90	34229.64	1.25
2.6	47510.94	0.85	47434.64	0.85	34229.64	1.18
22.1	42042.99	0.87	41975.47	0.87	30290.21	1.21
22.2	42042.99	0.90	41975.47	0.90	30290.21	1.25
22.3	42042.99	0.89	41975.47	0.89	30290.21	1.24
22.4	42042.99	0.87	41975.47	0.87	30290.21	1.21
22.5	42042.99	0.91	41975.47	0.91	30290.21	1.26
3.1	56008.78	1.02	57180.84	1.00	43200.46	1.32
3.2	56008.78	0.96	57180.84	0.94	43200.46	1.25
3.3	56008.78	1.00	57180.84	0.98	43200.46	1.29
3.4	56008.78	0.98	57180.84	0.96	43200.46	1.27
3.5	56008.78	1.02	57180.84	1.00	43200.46	1.32
3.6	56008.78	0.82	57180.84	0.80	43200.46	1.06
8.6	73502.26	0.90	75040.39	0.88	56693.46	1.17
8.8	73502.26	0.97	75040.39	0.95	56693.46	1.26
8.1	73502.26	0.93	75040.39	0.92	56693.46	1.21
23.1	49562.82	1.21	50599.99	1.18	38228.59	1.56
23.2	49562.82	1.11	50599.99	1.09	38228.59	1.44
23.3	49562.82	1.07	50599.99	1.05	38228.59	1.39
23.4	49562.82	1.19	50599.99	1.17	38228.59	1.54
23.5	49562.82	1.11	50599.99	1.09	38228.59	1.44
28.1	65311.81	1.05	66678.55	1.03	50376.04	1.36
28.2	65311.81	1.14	66678.55	1.12	50376.04	1.48

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
26	28.3	Sleeve	1	12	12	77			51.4	
26	28.4	Sleeve	1	12	12	77			51.4	
26	28.5	Sleeve	1	12	12	77			51.4	
26	4.1	Sleeve	1	16	16	101			30.2	
26	4.2	Sleeve	1	16	16	101			30.2	
26	4.3	Sleeve	1	16	16	101			30.2	
26	4.4	Sleeve	1	16	16	101			30.2	
26	4.5	Sleeve	1	16	16	101			30.2	
26	4.6	Sleeve	1	16	16	101			30.2	
26	9.3	Sleeve	1	16	16	101			67.0	
26	9.7	Sleeve	1	16	16	101			67.0	
26	9.8	Sleeve	1	16	16	101			67.0	
26	9.1	Sleeve	1	16	16	101			67.0	
26	24.1	Sleeve	1	16	16	101			29.6	
26	24.2	Sleeve	1	16	16	101			29.6	
26	24.3	Sleeve	1	16	16	101			29.6	
26	24.4	Sleeve	1	16	16	101			29.6	
26	24.5	Sleeve	1	16	16	101			29.6	
26	29.1	Sleeve	1	16	16	101			51.4	
26	29.2	Sleeve	1	16	16	101			51.4	
26	29.3	Sleeve	1	16	16	101			51.4	
26	29.4	Sleeve	1	16	16	101			51.4	
26	29.5	Sleeve	1	16	16	101			51.4	
26	5.1	Sleeve	1	20	20	126			34.0	
26	5.2	Sleeve	1	20	20	126			34.0	
26	5.3	Sleeve	1	20	20	126			34.0	
26	5.4	Sleeve	1	20	20	126			34.0	
26	5.5	Sleeve	1	20	20	126			34.0	
26	5.6	Sleeve	1	20	20	126			34.0	
26	10.1	Sleeve	1	20	20	126			67.0	
26	10.2	Sleeve	1	20	20	126			67.0	
26	10.3	Sleeve	1	20	20	126			67.0	
26	10.4	Sleeve	1	20	20	126			67.0	
26	10.5	Sleeve	1	20	20	126			67.0	
26	10.7	Sleeve	1	20	20	126			67.0	
26	10.8	Sleeve	1	20	20	126			67.0	
26	10.9	Sleeve	1	20	20	126			67.0	
26	10.1	Sleeve	1	20	20	126			67.0	
26	25.1	Sleeve	1	20	20	126			29.6	
26	25.2	Sleeve	1	20	20	126			29.6	
26	25.3	Sleeve	1	20	20	126			29.6	
26	25.4	Sleeve	1	20	20	126			29.6	
26	25.5	Sleeve	1	20	20	126			29.6	

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
28.3	999	999	999	999	26680.5	53361	Hilti	73.68	Cone
28.4	999	999	999	999	26680.5	53361	Hilti	61.98	Cone
28.5	999	999	999	999	26680.5	53361	Hilti	68.66	Cone
4.1	999	999	999	999	45904.5	91809	Hilti	86.69	Cone
4.2	999	999	999	999	45904.5	91809	Hilti	87.18	Cone
4.3	999	999	999	999	45904.5	91809	Hilti	79.14	Cone
4.4	999	999	999	999	45904.5	91809	Hilti	101.76	Cone
4.5	999	999	999	999	45904.5	91809	Hilti	104.43	Cone
4.6	999	999	999	999	45904.5	91809	Hilti	98.76	Cone
9.3	999	999	999	999	45904.5	91809	Hilti	134.14	Cone
9.7	999	999	999	999	45904.5	91809	Hilti	128.88	Cone
9.8	999	999	999	999	45904.5	91809	Hilti	121.85	Cone
9.1	999	999	999	999	45904.5	91809	Hilti	133.1	Cone
24.1	999	999	999	999	45904.5	91809	Hilti	97.05	Cone
24.2	999	999	999	999	45904.5	91809	Hilti	91.91	Cone
24.3	999	999	999	999	45904.5	91809	Hilti	94.67	Cone
24.4	999	999	999	999	45904.5	91809	Hilti	94.87	Cone
24.5	999	999	999	999	45904.5	91809	Hilti	89.41	Cone
29.1	999	999	999	999	45904.5	91809	Hilti	130.02	Cone
29.2	999	999	999	999	45904.5	91809	Hilti	128.12	Cone
29.3	999	999	999	999	45904.5	91809	Hilti	136.88	Cone
29.4	999	999	999	999	45904.5	91809	Hilti	131.27	Cone
29.5	999	999	999	999	45904.5	91809	Hilti	129.31	Cone
5.1	999	999	999	999	71442	142884	Hilti	117.16	Cone
5.2	999	999	999	999	71442	142884	Hilti	109.19	Cone
5.3	999	999	999	999	71442	142884	Hilti	122.31	Cone
5.4	999	999	999	999	71442	142884	Hilti	155.73	Cone
5.5	999	999	999	999	71442	142884	Hilti	145.94	Cone
5.6	999	999	999	999	71442	142884	Hilti	156.38	Cone
10.1	999	999	999	999	71442	142884	Hilti	186	Cone
10.2	999	999	999	999	71442	142884	Hilti	187.07	Cone
10.3	999	999	999	999	71442	142884	Hilti	186.99	Cone
10.4	999	999	999	999	71442	142884	Hilti	187.4	Cone
10.5	999	999	999	999	71442	142884	Hilti	171.1	Cone
10.7	999	999	999	999	71442	142884	Hilti	189.11	Cone
10.8	999	999	999	999	71442	142884	Hilti	191.37	Cone
10.9	999	999	999	999	71442	142884	Hilti	167.13	Cone
10.1	999	999	999	999	71442	142884	Hilti	182.56	Cone
25.1	999	999	999	999	71442	142884	Hilti	149.14	Cone
25.2	999	999	999	999	71442	142884	Hilti	142.08	Cone
25.3	999	999	999	999	71442	142884	Hilti	147.4	Cone
25.4	999	999	999	999	71442	142884	Hilti	142.25	Cone
25.5	999	999	999	999	71442	142884	Hilti	141.99	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
28.3	65311.81	1.13	66678.55	1.11	50376.04	1.46
28.4	65311.81	0.95	66678.55	0.93	50376.04	1.23
28.5	65311.81	1.05	66678.55	1.03	50376.04	1.36
4.1	75207.24	1.15	80645.99	1.07	66644.29	1.30
4.2	75207.24	1.16	80645.99	1.08	66644.29	1.31
4.3	75207.24	1.05	80645.99	0.98	66644.29	1.19
4.4	75207.24	1.35	80645.99	1.26	66644.29	1.53
4.5	75207.24	1.39	80645.99	1.29	66644.29	1.57
4.6	75207.24	1.31	80645.99	1.22	66644.29	1.48
9.3	112019.48	1.20	120120.38	1.12	99265.17	1.35
9.7	112019.48	1.15	120120.38	1.07	99265.17	1.30
9.8	112019.48	1.09	120120.38	1.01	99265.17	1.23
9.1	112019.48	1.19	120120.38	1.11	99265.17	1.34
24.1	74456.40	1.30	79840.85	1.22	65978.94	1.47
24.2	74456.40	1.23	79840.85	1.15	65978.94	1.39
24.3	74456.40	1.27	79840.85	1.19	65978.94	1.43
24.4	74456.40	1.27	79840.85	1.19	65978.94	1.44
24.5	74456.40	1.20	79840.85	1.12	65978.94	1.36
29.1	98115.52	1.33	105210.93	1.24	86944.29	1.50
29.2	98115.52	1.31	105210.93	1.22	86944.29	1.47
29.3	98115.52	1.40	105210.93	1.30	86944.29	1.57
29.4	98115.52	1.34	105210.93	1.25	86944.29	1.51
29.5	98115.52	1.32	105210.93	1.23	86944.29	1.49
5.1	111190.93	1.05	123352.86	0.95	108682.30	1.08
5.2	111190.93	0.98	123352.86	0.89	108682.30	1.00
5.3	111190.93	1.10	123352.86	0.99	108682.30	1.13
5.4	111190.93	1.40	123352.86	1.26	108682.30	1.43
5.5	111190.93	1.31	123352.86	1.18	108682.30	1.34
5.6	111190.93	1.41	123352.86	1.27	108682.30	1.44
10.1	156087.21	1.19	173159.84	1.07	152565.66	1.22
10.2	156087.21	1.20	173159.84	1.08	152565.66	1.23
10.3	156087.21	1.20	173159.84	1.08	152565.66	1.23
10.4	156087.21	1.20	173159.84	1.08	152565.66	1.23
10.5	156087.21	1.10	173159.84	0.99	152565.66	1.12
10.7	156087.21	1.21	173159.84	1.09	152565.66	1.24
10.8	156087.21	1.23	173159.84	1.11	152565.66	1.25
10.9	156087.21	1.07	173159.84	0.97	152565.66	1.10
10.1	156087.21	1.17	173159.84	1.05	152565.66	1.20
25.1	103747.05	1.44	115094.78	1.30	101406.37	1.47
25.2	103747.05	1.37	115094.78	1.23	101406.37	1.40
25.3	103747.05	1.42	115094.78	1.28	101406.37	1.45
25.4	103747.05	1.37	115094.78	1.24	101406.37	1.40
25.5	103747.05	1.37	115094.78	1.23	101406.37	1.40

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
26	30.1	Sleeve	1	20	20	126			51.4	
26	30.2	Sleeve	1	20	20	126			51.4	
26	30.3	Sleeve	1	20	20	126			51.4	
26	30.4	Sleeve	1	20	20	126			51.4	
26	30.5	Sleeve	1	20	20	126			51.4	
26	41.1	Sleeve	1	24	24	148			26.4	
26	41.2	Sleeve	1	24	24	148			26.4	
26	41.3	Sleeve	1	24	24	148			26.4	
26	41.4	Sleeve	1	24	24	148			26.4	
26	41.5	Sleeve	1	24	24	148			26.4	
26	41.6	Sleeve	1	24	24	148			26.4	
26	41.7	Sleeve	1	24	24	148			26.4	
26	42.1	Sleeve	1	24	24	148			62.1	
26	42.2	Sleeve	1	24	24	148			62.1	
26	42.3	Sleeve	1	24	24	148			62.1	
26	42.4	Sleeve	1	24	24	148			62.1	
26	42.5	Sleeve	1	24	24	148			62.1	
26	42.6	Sleeve	1	24	24	148			62.1	
26	42.7	Sleeve	1	24	24	148			62.1	
26	42.8	Sleeve	1	24	24	148			62.1	
26	42.9	Sleeve	1	24	24	148			62.1	
26	42.1	Sleeve	1	24	24	148			62.1	
26	45.2	Sleeve	1	24	24	148			28.2	
26	45.3	Sleeve	1	24	24	148			28.2	
26	45.4	Sleeve	1	24	24	148			28.2	
26	45.5	Sleeve	1	24	24	148			28.2	
26	46.1	Sleeve	1	24	24	148			76.0	
26	46.2	Sleeve	1	24	24	148			50.0	
26	46.3	Sleeve	1	24	24	148			50.0	
26	46.6	Sleeve	1	24	24	148	0	0	72.0	
26	1.1	Expansion	1	8	8	46			29.4	
26	1.2	Expansion	1	8	8	46			29.4	
26	1.3	Expansion	1	8	8	46			29.4	
26	1.5	Expansion	1	8	8	46			29.4	
26	3.3	Expansion	1	8	8	46			59.0	
26	3.4	Expansion	1	8	8	46			28.0	
26	3.5	Expansion	1	8	8	46			28.0	
26	5.1	Expansion	1	8	8	46			43.1	
26	6.1	Expansion	1	8	8	46			33.0	
26	6.2	Expansion	1	8	8	46			33.0	
26	6.3	Expansion	1	8	8	46			33.0	
26	6.4	Expansion	1	8	8	46			33.0	
26	6.5	Expansion	1	8	8	46			33.0	

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
30.1	999	999	999	999	71442	142884	Hilti	164.77	Cone
30.2	999	999	999	999	71442	142884	Hilti	169.58	Cone
30.3	999	999	999	999	71442	142884	Hilti	167.45	Cone
30.4	999	999	999	999	71442	142884	Hilti	166.93	Cone
30.5	999	999	999	999	71442	142884	Hilti	168.15	Cone
41.1	999	999	999	999	98568	197136	Hilti	111.86	Cone
41.2	999	999	999	999	98568	197136	Hilti	117.05	Cone
41.3	999	999	999	999	98568	197136	Hilti	102.81	Cone
41.4	999	999	999	999	98568	197136	Hilti	95.32	Cone
41.5	999	999	999	999	98568	197136	Hilti	102.26	Cone
41.6	999	999	999	999	98568	197136	Hilti	121.73	Cone
41.7	999	999	999	999	98568	197136	Hilti	108.87	Cone
42.1	999	999	999	999	98568	197136	Hilti	174.8	Cone
42.2	999	999	999	999	98568	197136	Hilti	184.1	Cone
42.3	999	999	999	999	98568	197136	Hilti	171	Cone
42.4	999	999	999	999	98568	197136	Hilti	165.9	Cone
42.5	999	999	999	999	98568	197136	Hilti	156.8	Cone
42.6	999	999	999	999	98568	197136	Hilti	159.9	Cone
42.7	999	999	999	999	98568	197136	Hilti	179.2	Cone
42.8	999	999	999	999	98568	197136	Hilti	166.3	Cone
42.9	999	999	999	999	98568	197136	Hilti	157.3	Cone
42.1	999	999	999	999	98568	197136	Hilti	185.5	Cone
45.2	999	999	999	999	98568	197136	Hilti	143.32	Cone
45.3	999	999	999	999	98568	197136	Hilti	120.48	Cone
45.4	999	999	999	999	98568	197136	Hilti	132.46	Cone
45.5	999	999	999	999	98568	197136	Hilti	123.67	Cone
46.1	999	999	999	999	98568	197136	Hilti	223.22	Cone
46.2	999	999	999	999	98568	197136	Hilti	217.46	Cone
46.3	999	999	999	999	98568	197136	Hilti	242.39	Cone
46.6	999	999	999	999	98568	197136	Hilti	244.63	Cone
1.1	999	999	999	999	9522	19044	Hilti	14.9	Cone
1.2	999	999	999	999	9522	19044	Hilti	15	Cone
1.3	999	999	999	999	9522	19044	Hilti	15.3	Cone
1.5	999	999	999	999	9522	19044	Hilti	15.8	Cone
3.3	999	999	999	999	9522	19044	Hilti	22.7	Cone
3.4	999	999	999	999	9522	19044	Hilti	18.5	Cone
3.5	999	999	999	999	9522	19044	Hilti	18.8	Cone
5.1	999	999	999	999	9522	19044	Hilti	23.3	Cone
6.1	999	999	999	999	9522	19044	Hilti	17.8	Cone
6.2	999	999	999	999	9522	19044	Hilti	18	Cone
6.3	999	999	999	999	9522	19044	Hilti	18.3	Cone
6.4	999	999	999	999	9522	19044	Hilti	18.3	Cone
6.5	999	999	999	999	9522	19044	Hilti	17.3	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
30.1	136713.52	1.21	151667.08	1.09	133629.07	1.23
30.2	136713.52	1.24	151667.08	1.12	133629.07	1.27
30.3	136713.52	1.22	151667.08	1.10	133629.07	1.25
30.4	136713.52	1.22	151667.08	1.10	133629.07	1.25
30.5	136713.52	1.23	151667.08	1.11	133629.07	1.26
41.1	124729.34	0.90	141389.71	0.79	131481.39	0.85
41.2	124729.34	0.94	141389.71	0.83	131481.39	0.89
41.3	124729.34	0.82	141389.71	0.73	131481.39	0.78
41.4	124729.34	0.76	141389.71	0.67	131481.39	0.72
41.5	124729.34	0.82	141389.71	0.72	131481.39	0.78
41.6	124729.34	0.98	141389.71	0.86	131481.39	0.93
41.7	124729.34	0.87	141389.71	0.77	131481.39	0.83
42.1	191298.90	0.91	216851.11	0.81	201654.60	0.87
42.2	191298.90	0.96	216851.11	0.85	201654.60	0.91
42.3	191298.90	0.89	216851.11	0.79	201654.60	0.85
42.4	191298.90	0.87	216851.11	0.77	201654.60	0.82
42.5	191298.90	0.82	216851.11	0.72	201654.60	0.78
42.6	191298.90	0.84	216851.11	0.74	201654.60	0.79
42.7	191298.90	0.94	216851.11	0.83	201654.60	0.89
42.8	191298.90	0.87	216851.11	0.77	201654.60	0.82
42.9	191298.90	0.82	216851.11	0.73	201654.60	0.78
42.1	191298.90	0.97	216851.11	0.86	201654.60	0.92
45.2	128911.37	1.11	146130.34	0.98	135889.81	1.05
45.3	128911.37	0.93	146130.34	0.82	135889.81	0.89
45.4	128911.37	1.03	146130.34	0.91	135889.81	0.97
45.5	128911.37	0.96	146130.34	0.85	135889.81	0.91
46.1	211628.17	1.05	239895.80	0.93	223084.36	1.00
46.2	171653.11	1.27	194581.19	1.12	180945.31	1.20
46.3	171653.11	1.41	194581.19	1.25	180945.31	1.34
46.6	205983.73	1.19	233497.42	1.05	217134.38	1.13
1.1	22807.86	0.65	20700.40	0.72	13895.93	1.07
1.2	22807.86	0.66	20700.40	0.72	13895.93	1.08
1.3	22807.86	0.67	20700.40	0.74	13895.93	1.10
1.5	22807.86	0.69	20700.40	0.76	13895.93	1.14
3.3	32309.99	0.70	29324.53	0.77	19685.21	1.15
3.4	22258.19	0.83	20201.52	0.92	13561.04	1.36
3.5	22258.19	0.84	20201.52	0.93	13561.04	1.39
5.1	27615.28	0.84	25063.61	0.93	16824.90	1.38
6.1	24163.94	0.74	21931.18	0.81	14722.14	1.21
6.2	24163.94	0.74	21931.18	0.82	14722.14	1.22
6.3	24163.94	0.76	21931.18	0.83	14722.14	1.24
6.4	24163.94	0.76	21931.18	0.83	14722.14	1.24
6.5	24163.94	0.72	21931.18	0.79	14722.14	1.18

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number	Diameter	Outside Diameter	Embedment	Strength of Steel	Aggregate Diameter	Strength of Concrete	
			n	d (mm)	do/dh (mm)	hef (mm)	fy (MPa)	dagg (mm)	fc (MPa)	fcc200 (MPa)
26	6.6	Expansion	1	8	8	46				33.0
26	6.7	Expansion	1	8	8	46				33.0
26	6.8	Expansion	1	8	8	46				33.0
26	6.9	Expansion	1	8	8	46				33.0
26	6.1	Expansion	1	8	8	46				33.0
26	7.6	Expansion	1	10	10	58				29.2
26	8.1	Expansion	1	10	10	58				60.0
26	10.1	Expansion	1	10	10	58				59.0
26	10.2	Expansion	1	10	10	58				59.0
26	11.11	Expansion	1	10	10	58				28.0
26	11.4	Expansion	1	10	10	58				28.0
26	14.3	Expansion	1	10	10	58				28.5
26	14.5	Expansion	1	10	10	58				28.5
26	14.6	Expansion	1	10	10	58				28.5
26	14.8	Expansion	1	10	10	58				28.5
26	14.9	Expansion	1	10	10	58				28.5
26	14.12	Expansion	1	10	10	58				28.5
26	14.13	Expansion	1	10	10	58				28.5
26	14.15	Expansion	1	10	10	58				28.5
26	14.16	Expansion	1	10	10	58				28.5
26	14.18	Expansion	1	10	10	58				28.5
26	15.4	Expansion	1	12	12	68				30.7
26	15.5	Expansion	1	12	12	68				30.7
26	15.6	Expansion	1	12	12	68				30.7
26	15.7	Expansion	1	12	12	68				30.7
26	16.1	Expansion	1	12	12	68				57.0
26	16.2	Expansion	1	12	12	68				57.0
26	17.2	Expansion	1	12	12	68				59.0
26	18.3	Expansion	1	12	12	68				28.0
26	18.5	Expansion	1	12	12	68				28.0
26	18.6	Expansion	1	12	12	68				28.0
26	18.7	Expansion	1	12	12	68				28.0
26	18.8	Expansion	1	12	12	68				28.0
26	18.9	Expansion	1	12	12	68				28.0
26	18.1	Expansion	1	12	12	68				28.0
26	19.3	Expansion	1	12	12	68				58.6
26	19.4	Expansion	1	12	12	68				58.6
26	19.5	Expansion	1	12	12	68				58.6
26	20.2	Expansion	1	12	12	68				43.1
26	20.3	Expansion	1	12	12	68				43.1
26	20.4	Expansion	1	12	12	68				43.1
26	20.5	Expansion	1	12	12	68				43.1
26	21.1	Expansion	1	12	12	68				21.2

**Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow
Embedment (<=188mm), (Continued)**

Test Number	Geometry						Remarks	Test Results Ultimate Load Nu (kN)	Failure Mode
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
6.6	999	999	999	999	9522	19044	Hilti	19.5	Cone
6.7	999	999	999	999	9522	19044	Hilti	18	Cone
6.8	999	999	999	999	9522	19044	Hilti	17.5	Cone
6.9	999	999	999	999	9522	19044	Hilti	19	Cone
6.1	999	999	999	999	9522	19044	Hilti	18	Cone
7.6	999	999	999	999	15138	30276	Hilti	20.6	Cone
8.1	999	999	999	999	15138	30276	Hilti	31.3	Cone
10.1	999	999	999	999	15138	30276	Hilti	28.3	Cone
10.2	999	999	999	999	15138	30276	Hilti	30.8	Cone
11.11	999	999	999	999	15138	30276	Hilti	18.3	Cone
11.4	999	999	999	999	15138	30276	Hilti	19.2	Cone
14.3	999	999	999	999	15138	30276	Hilti	25.4	Cone
14.5	999	999	999	999	15138	30276	Hilti	24.2	Cone
14.6	999	999	999	999	15138	30276	Hilti	31.4	Cone
14.8	999	999	999	999	15138	30276	Hilti	25.6	Cone
14.9	999	999	999	999	15138	30276	Hilti	24.1	Cone
14.12	999	999	999	999	15138	30276	Hilti	23.5	Cone
14.13	999	999	999	999	15138	30276	Hilti	26.5	Cone
14.15	999	999	999	999	15138	30276	Hilti	26.2	Cone
14.16	999	999	999	999	15138	30276	Hilti	26.3	Cone
14.18	999	999	999	999	15138	30276	Hilti	25.2	Cone
15.4	999	999	999	999	20808	41616	Hilti	28.8	Cone
15.5	999	999	999	999	20808	41616	Hilti	31.4	Cone
15.6	999	999	999	999	20808	41616	Hilti	29.9	Cone
15.7	999	999	999	999	20808	41616	Hilti	27.1	Cone
16.1	999	999	999	999	20808	41616	Hilti	41.5	Cone
16.2	999	999	999	999	20808	41616	Hilti	40	Cone
17.2	999	999	999	999	20808	41616	Hilti	47	Cone
18.3	999	999	999	999	20808	41616	Hilti	32.5	Cone
18.5	999	999	999	999	20808	41616	Hilti	33	Cone
18.6	999	999	999	999	20808	41616	Hilti	33.5	Cone
18.7	999	999	999	999	20808	41616	Hilti	34.5	Cone
18.8	999	999	999	999	20808	41616	Hilti	31	Cone
18.9	999	999	999	999	20808	41616	Hilti	36	Cone
18.1	999	999	999	999	20808	41616	Hilti	31.5	Cone
19.3	999	999	999	999	20808	41616	Hilti	47	Cone
19.4	999	999	999	999	20808	41616	Hilti	45.5	Cone
19.5	999	999	999	999	20808	41616	Hilti	46	Cone
20.2	999	999	999	999	20808	41616	Hilti	40	Cone
20.3	999	999	999	999	20808	41616	Hilti	42.5	Cone
20.4	999	999	999	999	20808	41616	Hilti	37.5	Cone
20.5	999	999	999	999	20808	41616	Hilti	34.5	Cone
21.1	999	999	999	999	20808	41616	Hilti	28	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
6.6	24163.94	0.81	21931.18	0.89	14722.14	1.32
6.7	24163.94	0.74	21931.18	0.82	14722.14	1.22
6.8	24163.94	0.72	21931.18	0.80	14722.14	1.19
6.9	24163.94	0.79	21931.18	0.87	14722.14	1.29
6.1	24163.94	0.74	21931.18	0.82	14722.14	1.22
7.6	32181.59	0.64	30921.50	0.67	21977.10	0.94
8.1	46130.88	0.68	44324.59	0.71	31503.19	0.99
10.1	45744.84	0.62	43953.67	0.64	31239.56	0.91
10.2	45744.84	0.67	43953.67	0.70	31239.56	0.99
11.11	31513.39	0.58	30279.46	0.60	21520.78	0.85
11.4	31513.39	0.61	30279.46	0.63	21520.78	0.89
14.3	31793.51	0.80	30548.62	0.83	21712.08	1.17
14.5	31793.51	0.76	30548.62	0.79	21712.08	1.11
14.6	31793.51	0.99	30548.62	1.03	21712.08	1.45
14.8	31793.51	0.81	30548.62	0.84	21712.08	1.18
14.9	31793.51	0.76	30548.62	0.79	21712.08	1.11
14.12	31793.51	0.74	30548.62	0.77	21712.08	1.08
14.13	31793.51	0.83	30548.62	0.87	21712.08	1.22
14.15	31793.51	0.82	30548.62	0.86	21712.08	1.21
14.16	31793.51	0.83	30548.62	0.86	21712.08	1.21
14.18	31793.51	0.79	30548.62	0.82	21712.08	1.16
15.4	41889.64	0.69	41693.76	0.69	31124.66	0.93
15.5	41889.64	0.75	41693.76	0.75	31124.66	1.01
15.6	41889.64	0.71	41693.76	0.72	31124.66	0.96
15.7	41889.64	0.65	41693.76	0.65	31124.66	0.87
16.1	57078.81	0.73	56811.89	0.73	42410.45	0.98
16.2	57078.81	0.70	56811.89	0.70	42410.45	0.94
17.2	58071.56	0.81	57800.00	0.81	43148.08	1.09
18.3	40005.20	0.81	39818.13	0.82	29724.50	1.09
18.5	40005.20	0.82	39818.13	0.83	29724.50	1.11
18.6	40005.20	0.84	39818.13	0.84	29724.50	1.13
18.7	40005.20	0.86	39818.13	0.87	29724.50	1.16
18.8	40005.20	0.77	39818.13	0.78	29724.50	1.04
18.9	40005.20	0.90	39818.13	0.90	29724.50	1.21
18.1	40005.20	0.79	39818.13	0.79	29724.50	1.06
19.3	57874.37	0.81	57603.73	0.82	43001.57	1.09
19.4	57874.37	0.79	57603.73	0.79	43001.57	1.06
19.5	57874.37	0.79	57603.73	0.80	43001.57	1.07
20.2	49633.64	0.81	49401.54	0.81	36878.57	1.08
20.3	49633.64	0.86	49401.54	0.86	36878.57	1.15
20.4	49633.64	0.76	49401.54	0.76	36878.57	1.02
20.5	49633.64	0.70	49401.54	0.70	36878.57	0.94
21.1	34810.11	0.80	34647.33	0.81	25864.46	1.08

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
26	21.2	Expansion	1	12	12	68			21.2	
26	21.3	Expansion	1	12	12	68			21.2	
26	21.5	Expansion	1	12	12	68			21.2	
26	21.8	Expansion	1	12	12	68			21.2	
26	21.1	Expansion	1	12	12	68			21.2	
26	22.1	Expansion	1	12	12	68			28.5	
26	22.2	Expansion	1	12	12	68			28.5	
26	22.3	Expansion	1	12	12	68			28.5	
26	22.4	Expansion	1	12	12	68			28.5	
26	22.5	Expansion	1	12	12	68			28.5	
26	23.1	Expansion	1	12	12	68			20.2	
26	23.2	Expansion	1	12	12	68			20.2	
26	23.3	Expansion	1	12	12	68			20.2	
26	23.4	Expansion	1	12	12	68			20.2	
26	23.5	Expansion	1	12	12	68			20.2	
26	26.1	Expansion	1	16	16	82			48.5	
26	26.2	Expansion	1	16	16	82			48.5	
26	26.4	Expansion	1	16	16	82			48.5	
26	27.3	Expansion	1	16	16	82			45.0	
26	28.1	Expansion	1	16	16	82			56.0	
26	30.1	Expansion	1	16	16	82			58.6	
26	31.1	Expansion	1	16	16	82			44.5	
26	31.2	Expansion	1	16	16	82			44.5	
26	32.1	Expansion	1	16	16	82			33.0	
26	32.3	Expansion	1	16	16	82			33.0	
26	32.5	Expansion	1	16	16	82			33.0	
26	33.2	Expansion	1	20	20	101			29.6	
26	33.5	Expansion	1	20	20	101			29.6	
26	33.6	Expansion	1	20	20	101			29.6	
26	33.7	Expansion	1	20	20	101			29.6	
26	35.1	Expansion	1	20	20	101			57.0	
26	35.2	Expansion	1	20	20	101			57.0	
26	35.3	Expansion	1	20	20	101			57.0	
26	35.4	Expansion	1	20	20	101			57.0	
26	35.5	Expansion	1	20	20	101			57.0	
26	38.1	Expansion	1	20	20	101			24.0	
26	38.2	Expansion	1	20	20	101			24.0	
26	38.3	Expansion	1	20	20	101			24.0	
26	38.4	Expansion	1	20	20	101			24.0	
26	38.5	Expansion	1	20	20	101			24.0	
26	39.4	Expansion	1	20	20	101			49.3	
26	39.6	Expansion	1	20	20	101			49.3	
26	39.7	Expansion	1	20	20	101			49.3	

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
21.2	999	999	999	999	20808	41616	Hilti	30	Cone
21.3	999	999	999	999	20808	41616	Hilti	28	Cone
21.5	999	999	999	999	20808	41616	Hilti	32.5	Cone
21.8	999	999	999	999	20808	41616	Hilti	30	Cone
21.1	999	999	999	999	20808	41616	Hilti	28	Cone
22.1	999	999	999	999	20808	41616	Hilti	36.2	Cone
22.2	999	999	999	999	20808	41616	Hilti	34.9	Cone
22.3	999	999	999	999	20808	41616	Hilti	36.2	Cone
22.4	999	999	999	999	20808	41616	Hilti	34	Cone
22.5	999	999	999	999	20808	41616	Hilti	39.9	Cone
23.1	999	999	999	999	20808	41616	Hilti	29.2	Cone
23.2	999	999	999	999	20808	41616	Hilti	30.6	Cone
23.3	999	999	999	999	20808	41616	Hilti	29.2	Cone
23.4	999	999	999	999	20808	41616	Hilti	30	Cone
23.5	999	999	999	999	20808	41616	Hilti	25.6	Cone
26.1	999	999	999	999	30258	60516	Hilti	72	Cone
26.2	999	999	999	999	30258	60516	Hilti	71.5	Cone
26.4	999	999	999	999	30258	60516	Hilti	64.5	Cone
27.3	999	999	999	999	30258	60516	Hilti	62.5	Cone
28.1	999	999	999	999	30258	60516	Hilti	73.5	Cone
30.1	999	999	999	999	30258	60516	Hilti	74	Cone
31.1	999	999	999	999	30258	60516	Hilti	71.5	Cone
31.2	999	999	999	999	30258	60516	Hilti	67.8	Cone
32.1	999	999	999	999	30258	60516	Hilti	48.8	Cone
32.3	999	999	999	999	30258	60516	Hilti	50	Cone
32.5	999	999	999	999	30258	60516	Hilti	55	Cone
33.2	999	999	999	999	45904.5	91809	Hilti	76.1	Cone
33.5	999	999	999	999	45904.5	91809	Hilti	69	Cone
33.6	999	999	999	999	45904.5	91809	Hilti	64.6	Cone
33.7	999	999	999	999	45904.5	91809	Hilti	67.5	Cone
35.1	999	999	999	999	45904.5	91809	Hilti	108	Cone
35.2	999	999	999	999	45904.5	91809	Hilti	103	Cone
35.3	999	999	999	999	45904.5	91809	Hilti	97	Cone
35.4	999	999	999	999	45904.5	91809	Hilti	95	Cone
35.5	999	999	999	999	45904.5	91809	Hilti	89.5	Cone
38.1	999	999	999	999	45904.5	91809	Hilti	67	Cone
38.2	999	999	999	999	45904.5	91809	Hilti	63	Cone
38.3	999	999	999	999	45904.5	91809	Hilti	58.5	Cone
38.4	999	999	999	999	45904.5	91809	Hilti	70	Cone
38.5	999	999	999	999	45904.5	91809	Hilti	60	Cone
39.4	999	999	999	999	45904.5	91809	Hilti	106	Cone
39.6	999	999	999	999	45904.5	91809	Hilti	94	Cone
39.7	999	999	999	999	45904.5	91809	Hilti	97	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
21.2	34810.11	0.86	34647.33	0.87	25864.46	1.16
21.3	34810.11	0.80	34647.33	0.81	25864.46	1.08
21.5	34810.11	0.93	34647.33	0.94	25864.46	1.26
21.8	34810.11	0.86	34647.33	0.87	25864.46	1.16
21.1	34810.11	0.80	34647.33	0.81	25864.46	1.08
22.1	40360.81	0.90	40172.07	0.90	29988.72	1.21
22.2	40360.81	0.86	40172.07	0.87	29988.72	1.16
22.3	40360.81	0.90	40172.07	0.90	29988.72	1.21
22.4	40360.81	0.84	40172.07	0.85	29988.72	1.13
22.5	40360.81	0.99	40172.07	0.99	29988.72	1.33
23.1	33979.20	0.86	33820.30	0.86	25247.08	1.16
23.2	33979.20	0.90	33820.30	0.90	25247.08	1.21
23.3	33979.20	0.86	33820.30	0.86	25247.08	1.16
23.4	33979.20	0.88	33820.30	0.89	25247.08	1.19
23.5	33979.20	0.75	33820.30	0.76	25247.08	1.01
26.1	69721.34	1.03	72050.44	1.00	58145.85	1.24
26.2	69721.34	1.03	72050.44	0.99	58145.85	1.23
26.4	69721.34	0.93	72050.44	0.90	58145.85	1.11
27.3	67158.52	0.93	69402.00	0.90	56008.52	1.12
28.1	74918.47	0.98	77421.18	0.95	62480.12	1.18
30.1	76637.92	0.97	79198.06	0.93	63914.09	1.16
31.1	66784.38	1.07	69015.36	1.04	55696.49	1.28
31.2	66784.38	1.02	69015.36	0.98	55696.49	1.22
32.1	57511.12	0.85	59432.32	0.82	47962.83	1.02
32.3	57511.12	0.87	59432.32	0.84	47962.83	1.04
32.5	57511.12	0.96	59432.32	0.93	47962.83	1.15
33.2	74456.40	1.02	79840.85	0.95	68090.27	1.12
33.5	74456.40	0.93	79840.85	0.86	68090.27	1.01
33.6	74456.40	0.87	79840.85	0.81	68090.27	0.95
33.7	74456.40	0.91	79840.85	0.85	68090.27	0.99
35.1	103322.19	1.05	110794.12	0.97	94487.99	1.14
35.2	103322.19	1.00	110794.12	0.93	94487.99	1.09
35.3	103322.19	0.94	110794.12	0.88	94487.99	1.03
35.4	103322.19	0.92	110794.12	0.86	94487.99	1.01
35.5	103322.19	0.87	110794.12	0.81	94487.99	0.95
38.1	67044.29	1.00	71892.72	0.93	61311.91	1.09
38.2	67044.29	0.94	71892.72	0.88	61311.91	1.03
38.3	67044.29	0.87	71892.72	0.81	61311.91	0.95
38.4	67044.29	1.04	71892.72	0.97	61311.91	1.14
38.5	67044.29	0.89	71892.72	0.83	61311.91	0.98
39.4	96090.32	1.10	103039.26	1.03	87874.46	1.21
39.6	96090.32	0.98	103039.26	0.91	87874.46	1.07
39.7	96090.32	1.01	103039.26	0.94	87874.46	1.10

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
26	40.3	Expansion	1	20	20	101			44.5	
26	40.4	Expansion	1	20	20	101			44.5	
26	40.5	Expansion	1	20	20	101			44.5	
26	42.1	Expansion	1	24	24	125			34.7	
26	42.2	Expansion	1	24	24	125			34.7	
26	42.3	Expansion	1	24	24	125			34.7	
26	42.4	Expansion	1	24	24	125			34.7	
26	42.5	Expansion	1	24	24	125			34.7	
26	43.1	Expansion	1	24	24	125			26.4	
26	46.4	Expansion	1	24	24	125			27.0	
26	73.1	Expansion	1	8	8	46			29.6	
26	73.2	Expansion	1	8	8	46			29.6	
26	73.3	Expansion	1	8	8	46			29.6	
26	73.4	Expansion	1	8	8	46			29.6	
26	75.1	Expansion	1	8	8	46			29.6	
26	75.2	Expansion	1	8	8	46			29.6	
26	76.1	Expansion	1	8	8	46			27.9	
26	77.4	Expansion	1	10	10	53			28.8	
26	77.5	Expansion	1	10	10	53			28.8	
26	79.1	Expansion	1	10	10	53			28.8	
26	79.2	Expansion	1	10	10	53			28.8	
26	80.1	Expansion	1	10	10	53			50.2	
26	80.2	Expansion	1	10	10	53			50.2	
26	80.3	Expansion	1	10	10	53			50.2	
26	81.1	Expansion	1	12	12	68			29.6	
26	81.2	Expansion	1	12	12	68			29.6	
26	81.3	Expansion	1	12	12	68			29.6	
26	81.4	Expansion	1	12	12	68			29.6	
26	81.5	Expansion	1	12	12	68			29.6	
26	81.6	Expansion	1	12	12	68			29.6	
26	81.7	Expansion	1	12	12	68			29.6	
26	81.8	Expansion	1	12	12	68			29.6	
26	81.9	Expansion	1	12	12	68			29.6	
26	81.1	Expansion	1	12	12	68			29.6	
26	83.1	Expansion	1	12	12	68			29.6	
26	83.2	Expansion	1	12	12	68			29.6	
26	84.1	Expansion	1	12	12	68			55.9	
26	85.4	Expansion	1	12	12	68			55.0	
26	85.5	Expansion	1	12	12	68			55.0	
26	87.1	Expansion	1	16	16	82			26.7	
26	87.2	Expansion	1	16	16	82			26.7	
26	87.3	Expansion	1	16	16	82			26.7	
26	87.4	Expansion	1	16	16	82			26.7	

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
40.3	999	999	999	999	45904.5	91809	Hilti	94	Cone
40.4	999	999	999	999	45904.5	91809	Hilti	94	Cone
40.5	999	999	999	999	45904.5	91809	Hilti	90.5	Cone
42.1	999	999	999	999	70312.5	140625	Hilti	91.3	Cone
42.2	999	999	999	999	70312.5	140625	Hilti	75	Cone
42.3	999	999	999	999	70312.5	140625	Hilti	93	Cone
42.4	999	999	999	999	70312.5	140625	Hilti	82.1	Cone
42.5	999	999	999	999	70312.5	140625	Hilti	89.1	Cone
43.1	999	999	999	999	70312.5	140625	Hilti	105.4	Cone
46.4	999	999	999	999	70312.5	140625	Hilti	89	Cone
73.1	999	999	999	999	9522	19044	Hilti	18.9	Cone
73.2	999	999	999	999	9522	19044	Hilti	20.2	Cone
73.3	999	999	999	999	9522	19044	Hilti	20.5	Cone
73.4	999	999	999	999	9522	19044	Hilti	20.4	Cone
75.1	999	999	999	999	9522	19044	Hilti	18.4	Cone
75.2	999	999	999	999	9522	19044	Hilti	18.9	Cone
76.1	999	999	999	999	9522	19044	Hilti	19.3	Cone
77.4	999	999	999	999	12640.5	25281	Hilti	27	Cone
77.5	999	999	999	999	12640.5	25281	Hilti	27.8	Cone
79.1	999	999	999	999	12640.5	25281	Hilti	24.2	Cone
79.2	999	999	999	999	12640.5	25281	Hilti	23.2	Cone
80.1	999	999	999	999	12640.5	25281	Hilti	34	Cone
80.2	999	999	999	999	12640.5	25281	Hilti	34.8	Cone
80.3	999	999	999	999	12640.5	25281	Hilti	34.3	Cone
81.1	999	999	999	999	20808	41616	Hilti	38.5	Cone
81.2	999	999	999	999	20808	41616	Hilti	39.5	Cone
81.3	999	999	999	999	20808	41616	Hilti	32.3	Cone
81.4	999	999	999	999	20808	41616	Hilti	34.7	Cone
81.5	999	999	999	999	20808	41616	Hilti	38.4	Cone
81.6	999	999	999	999	20808	41616	Hilti	37.1	Cone
81.7	999	999	999	999	20808	41616	Hilti	37.8	Cone
81.8	999	999	999	999	20808	41616	Hilti	37.9	Cone
81.9	999	999	999	999	20808	41616	Hilti	36.3	Cone
81.1	999	999	999	999	20808	41616	Hilti	34.5	Cone
83.1	999	999	999	999	20808	41616	Hilti	28.1	Cone
83.2	999	999	999	999	20808	41616	Hilti	33.1	Cone
84.1	999	999	999	999	20808	41616	Hilti	46	Cone
85.4	999	999	999	999	20808	41616	Hilti	42	Cone
85.5	999	999	999	999	20808	41616	Hilti	42	Cone
87.1	999	999	999	999	30258	60516	Hilti	47.3	Cone
87.2	999	999	999	999	30258	60516	Hilti	48	Cone
87.3	999	999	999	999	30258	60516	Hilti	49.2	Cone
87.4	999	999	999	999	30258	60516	Hilti	50.7	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
40.3	91292.72	1.03	97894.72	0.96	83487.07	1.13
40.4	91292.72	1.03	97894.72	0.96	83487.07	1.13
40.5	91292.72	0.99	97894.72	0.92	83487.07	1.08
42.1	110995.11	0.82	122995.93	0.74	111045.90	0.82
42.2	110995.11	0.68	122995.93	0.61	111045.90	0.68
42.3	110995.11	0.84	122995.93	0.76	111045.90	0.84
42.4	110995.11	0.74	122995.93	0.67	111045.90	0.74
42.5	110995.11	0.80	122995.93	0.72	111045.90	0.80
43.1	96814.65	1.09	107282.28	0.98	96858.95	1.09
46.4	97908.64	0.91	108494.54	0.82	97953.43	0.91
73.1	22885.30	0.83	20770.69	0.91	13943.11	1.36
73.2	22885.30	0.88	20770.69	0.97	13943.11	1.45
73.3	22885.30	0.90	20770.69	0.99	13943.11	1.47
73.4	22885.30	0.89	20770.69	0.98	13943.11	1.46
75.1	22885.30	0.80	20770.69	0.89	13943.11	1.32
75.2	22885.30	0.83	20770.69	0.91	13943.11	1.36
76.1	22218.41	0.87	20165.41	0.96	13536.80	1.43
77.4	27917.99	0.97	26257.56	1.03	18578.44	1.45
77.5	27917.99	1.00	26257.56	1.06	18578.44	1.50
79.1	27917.99	0.87	26257.56	0.92	18578.44	1.30
79.2	27917.99	0.83	26257.56	0.88	18578.44	1.25
80.1	36858.68	0.92	34666.50	0.98	24528.15	1.39
80.2	36858.68	0.94	34666.50	1.00	24528.15	1.42
80.3	36858.68	0.93	34666.50	0.99	24528.15	1.40
81.1	41132.33	0.94	40939.99	0.94	30561.97	1.26
81.2	41132.33	0.96	40939.99	0.96	30561.97	1.29
81.3	41132.33	0.79	40939.99	0.79	30561.97	1.06
81.4	41132.33	0.84	40939.99	0.85	30561.97	1.14
81.5	41132.33	0.93	40939.99	0.94	30561.97	1.26
81.6	41132.33	0.90	40939.99	0.91	30561.97	1.21
81.7	41132.33	0.92	40939.99	0.92	30561.97	1.24
81.8	41132.33	0.92	40939.99	0.93	30561.97	1.24
81.9	41132.33	0.88	40939.99	0.89	30561.97	1.19
81.1	41132.33	0.84	40939.99	0.84	30561.97	1.13
83.1	41132.33	0.68	40939.99	0.69	30561.97	0.92
83.2	41132.33	0.80	40939.99	0.81	30561.97	1.08
84.1	56525.36	0.81	56261.04	0.82	41999.24	1.10
85.4	56068.48	0.75	55806.29	0.75	41659.77	1.01
85.5	56068.48	0.75	55806.29	0.75	41659.77	1.01
87.1	51730.96	0.91	53459.07	0.88	43142.32	1.10
87.2	51730.96	0.93	53459.07	0.90	43142.32	1.11
87.3	51730.96	0.95	53459.07	0.92	43142.32	1.14
87.4	51730.96	0.98	53459.07	0.95	43142.32	1.18

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number	Diameter	Outside Diameter	Embedment	Strength of Steel	Aggregate Diameter dagg (mm)	Strength of Concrete	
			n	d (mm)	do/dh (mm)	hef (mm)	fy (MPa)		fc (MPa)	fcc200 (MPa)
26	89.2	Expansion	1	16	16	82			52.0	
26	89.4	Expansion	1	16	16	82			52.0	
26	89.5	Expansion	1	16	16	82			52.0	
26	90.1	Expansion	1	16	16	82			66.5	
26	91.1	Expansion	1	16	16	82			70.0	
26	92.1	Expansion	1	16	16	82			63.0	
26	93.1	Expansion	1	20	20	101			26.7	
26	93.4	Expansion	1	20	20	101			26.7	
26	93.5	Expansion	1	20	20	101			26.7	
26	93.6	Expansion	1	20	20	101			26.7	
26	93.7	Expansion	1	20	20	101			26.7	
26	95.3	Expansion	1	20	20	101			26.4	

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
89.2	999	999	999	999	30258	60516	Hilti	77.4	Cone
89.4	999	999	999	999	30258	60516	Hilti	75	Cone
89.5	999	999	999	999	30258	60516	Hilti	71.2	Cone
90.1	999	999	999	999	30258	60516	Hilti	66.5	Cone
91.1	999	999	999	999	30258	60516	Hilti	73	Cone
92.1	999	999	999	999	30258	60516	Hilti	75.5	Cone
93.1	999	999	999	999	45904.5	91809	Hilti	65.2	Cone
93.4	999	999	999	999	45904.5	91809	Hilti	67.1	Cone
93.5	999	999	999	999	45904.5	91809	Hilti	72.3	Cone
93.6	999	999	999	999	45904.5	91809	Hilti	67.1	Cone
93.7	999	999	999	999	45904.5	91809	Hilti	68.5	Cone
95.3	999	999	999	999	45904.5	91809	Hilti	68.5	Cone

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
89.2	72193.24	1.07	74604.91	1.04	60207.35	1.29
89.4	72193.24	1.04	74604.91	1.01	60207.35	1.25
89.5	72193.24	0.99	74604.91	0.95	60207.35	1.18
90.1	81640.51	0.81	84367.77	0.79	68086.13	0.98
91.1	83761.39	0.87	86559.51	0.84	69854.90	1.05
92.1	79463.04	0.95	82117.56	0.92	66270.17	1.14
93.1	70715.04	0.92	75828.93	0.86	64668.80	1.01
93.4	70715.04	0.95	75828.93	0.88	64668.80	1.04
93.5	70715.04	1.02	75828.93	0.95	64668.80	1.12
93.6	70715.04	0.95	75828.93	0.88	64668.80	1.04
93.7	70715.04	0.97	75828.93	0.90	64668.80	1.06
95.3	70316.64	0.97	75401.72	0.91	64304.47	1.07
	Mean =	0.981	Mean =	1.000	Mean =	1.356
	COV. =	0.197	COV. =	0.213	COV. =	0.266

**Single Anchors, Tension, Uncracked Concrete, Static Loading, Edge Effect,
Shallow Embedment ($\leq 188\text{mm}$)**

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc fcc200 (MPa)	
3	GER1-07	E-DI	1	10	10	30		16	21.2	25.0
22	USA01-01	E-TW	1	6	6	34.2	544	25	15.8	18.6
22	USA01-02	E-TW	1	6	6	34.2	544	25	28.9	34.1
22	USA04-11	E-TW	1	8.9	8.9	34.2	483	25	15.8	18.6
22	USA04-12	E-TW	1	8.9	8.9	34.2	483	25	28.9	34.1
1	ENG1-03	E-TC	1	6	6	37		20	21.6	25.5
3	GER1-12	E-DI	1	12	12	37		16	21.2	25.0
3	GER1-13	E-DI	1	12	12	37		16	21.2	25.0
3	GER1-05	E-TC	1	10	10	38		16	21.2	25.0
22	USA04-19	E-TW	1	9.5	9.5	40	745	25	14.6	17.2
22	USA04-20	E-TW	1	9.5	9.5	40	565	25	14.6	17.2
3	GER1-11	E-TC	1	12	12	47		16	21.2	25.0
6	USA01-03	E-SD	1	12.7	12.7	51.6			20.7	24.4
6	USA01-04	E-SD	1	12.7	12.7	51.6			22.0	26.0
6	USA01-05	E-SD	1	12.7	12.7	51.6			20.7	24.4
3	GER1-21	E-SD	1	17	17	53		16	21.2	25.0
3	GER1-22	E-SD	1	17	17	53		16	21.2	25.0
3	GER1-16	E-TC	1	14	14	55		16	21.2	25.0
3	GER1-17	E-TC	1	14	14	55		16	21.2	25.0
3	GER1-10	E-TC	1	12	12	62		16	21.2	25.0
4	FRA1-01	E-TC	1	8	8	63.5	640		15.6	18.4
4	FRA1-02	E-TC	1	8	8	63.5	640		15.6	18.4
1	ENG1-01	E-TW	1	8	8	65	850	20	19.5	23.0
3	GER1-18	E-TC	1	16	16	67		16	21.2	25.0
3	GER1-19	E-TC	1	16	16	67		16	21.2	25.0
3	GER1-20	E-TC	1	16	16	75		16	21.2	25.0
6	USA01-06	E-SD	1	19	19	82.6			20.7	24.4
6	USA01-07	E-TC	1	19	19	82.6			20.7	24.4
6	USA01-08	E-SD	1	19	19	82.6			20.7	24.4
6	USA01-09	E-SD	1	19	19	82.6			25.5	30.1
6	USA01-10	E-TC	1	19	19	82.6			20.7	24.4
3	GER1-26	E-SD	1	25	25	83		16	21.2	25.0
3	GER1-27	E-SD	1	25	25	83		16	21.2	25.0
3	GER1-28	E-SD	1	25	25	83		16	21.2	25.0
3	GER1-23	E-TC	1	22	22	87		16	21.2	25.0
1	ENG1-02	E-TW	1	12	12	100	850	20	19.5	23.0
3	GER1-24	E-TC	1	24	24	100		16	21.2	25.0
3	GER1-25	E-TC	1	24	24	100		16	21.2	25.0
14	SWE03-07	E-TC	1	30	30	112	736		43.6	51.5
3	GER1-29	E-TC	1	28	28	125		16	21.2	25.0
14	SWE03-04	E-TC	1	27	27	134	736		26.2	30.9
14	SWE03-01	E-TC	1	27	27	142	736		26.2	30.9
7	GER1-30	E-TC	1	32	32	148		16	21.2	25.0

**Single Anchors, Tension, Uncracked Concrete, Static Loading, Edge Effect,
Shallow Embedment (<=188mm), (Continued)**

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)		Ultimate Load Nu (kN)	Failure Mode
GER1-07	40	999	999	999	7650	8100	UNKNOWN	6.7	Cone
USA01-01	32	999	999	999	8546.58	10526.76	UNKNOWN	7.4	Cone
USA01-02	32	999	999	999	8546.58	10526.76	UNKNOWN	7.6	Cone
USA04-11	48	999	999	999	10188.18	10526.76	UNKNOWN	8.9	Cone
USA04-12	48	999	999	999	10188.18	10526.76	UNKNOWN	10	Cone
ENG1-03	50	999	999	999	11710.5	12321	UNKNOWN	13	Cone
GER1-12	50	999	999	999	11710.5	12321	UNKNOWN	5.6	Cone
GER1-13	40	999	999	999	10600.5	12321	UNKNOWN	9.7	Cone
GER1-05	50	999	999	999	12198	12996	UNKNOWN	11.1	Cone
USA04-19	57	999	999	999	14040	14400	UNKNOWN	13.8	Cone
USA04-20	57	999	999	999	14040	14400	UNKNOWN	15.2	Cone
GER1-11	60	999	999	999	18400.5	19881	UNKNOWN	16.4	Cone
USA01-03	38	999	999	999	17863.92	23963.04	UNKNOWN	20.2	Cone
USA01-04	51	999	999	999	19876.32	23963.04	UNKNOWN	25.8	Cone
USA01-05	51	999	999	999	19876.32	23963.04	UNKNOWN	26.1	Cone
GER1-21	50	999	999	999	20590.5	25281	UNKNOWN	26.7	Cone
GER1-22	30	999	999	999	17410.5	25281	UNKNOWN	12	Cone
GER1-16	70	999	999	999	25162.5	27225	UNKNOWN	20.1	Cone
GER1-17	80	999	999	999	26812.5	27225	UNKNOWN	28.3	Cone
GER1-10	60	999	999	999	28458	34596	UNKNOWN	18.1	Cone
FRA1-01	63	999	999	999	30146.63	36290.25	UNKNOWN	18	Cone
FRA1-02	63	999	999	999	30146.63	36290.25	UNKNOWN	17.3	Cone
ENG1-01	80	999	999	999	34612.5	38025	UNKNOWN	23	Cone
GER1-18	80	999	999	999	36280.5	40401	UNKNOWN	30.9	Cone
GER1-19	90	999	999	999	38290.5	40401	UNKNOWN	29.7	Cone
GER1-20	80	999	999	999	43312.5	50625	UNKNOWN	34.4	Cone
USA01-06	57	999	999	999	44827.02	61404.84	UNKNOWN	41.6	Cone
USA01-07	57	999	999	999	44827.02	61404.84	UNKNOWN	47.2	Cone
USA01-08	76	999	999	999	49535.22	61404.84	UNKNOWN	54.2	Cone
USA01-09	76	999	999	999	49535.22	61404.84	UNKNOWN	55	Cone
USA01-10	76	999	999	999	49535.22	61404.84	UNKNOWN	57.1	Cone
GER1-26	120	999	999	999	60880.5	62001	UNKNOWN	56.1	Cone
GER1-27	80	999	999	999	50920.5	62001	UNKNOWN	40.3	Cone
GER1-28	40	999	999	999	40960.5	62001	UNKNOWN	24.2	Cone
GER1-23	110	999	999	999	62770.5	68121	UNKNOWN	46.6	Cone
ENG1-02	120	999	999	999	81000	90000	UNKNOWN	50	Cone
GER1-24	110	999	999	999	78000	90000	UNKNOWN	58.2	Cone
GER1-25	105	999	999	999	76500	90000	UNKNOWN	55.3	Cone
SWE03-07	150	999	999	999	106848	112896	UNKNOWN	147	Cone
GER1-29	130	999	999	999	119062.5	140625	UNKNOWN	91.2	Cone
SWE03-04	150	999	999	999	141102	161604	UNKNOWN	185	Cone
SWE03-01	150	999	999	999	154638	181476	UNKNOWN	162	Cone
GER1-30	160	999	999	999	169608	197136	UNKNOWN	114.6	Cone

**Single Anchors, Tension, Uncracked Concrete, Static Loading, Edge Effect,
Shallow Embedment ($\leq 188\text{mm}$), (Continued)**

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
GER1-07	10025.8	0.67	8049.81	0.83	5763.41	1.16
USA01-01	8109.968	0.91	6776.84	1.09	5611.43	1.32
USA01-02	10980.95	0.69	9175.88	0.83	7597.91	1.00
USA04-11	10984.16	0.81	9178.56	0.97	6049.77	1.47
USA04-12	14872.62	0.67	12427.83	0.80	8191.42	1.22
ENG1-03	14022.63	0.93	11990.07	1.08	8794.19	1.48
GER1-12	13884.47	0.40	11871.93	0.47	8707.55	0.64
GER1-13	11686.41	0.83	9992.48	0.97	8610.36	1.13
GER1-05	14139.13	0.79	12182.16	0.91	8760.38	1.27
USA04-19	13533.58	1.02	11829.66	1.17	7887.83	1.75
USA04-20	13533.58	1.12	11829.66	1.28	7887.83	1.93
GER1-11	18981.16	0.86	17323.55	0.95	13318.28	1.23
USA01-03	14889.67	1.36	13912.79	1.45	13914.09	1.45
USA01-04	18432.84	1.40	17223.49	1.50	15848.25	1.63
USA01-05	17856.67	1.46	16685.12	1.56	15352.87	1.70
GER1-21	18237.17	1.46	17152.51	1.56	17059.93	1.57
GER1-22	13730.69	0.87	12914.06	0.93	14221.76	0.84
GER1-16	23970.08	0.84	22746.11	0.88	18226.78	1.10
GER1-17	26772.82	1.06	25405.73	1.11	18226.78	1.55
GER1-10	23469.13	0.77	22894.68	0.79	21507.14	0.84
FRA1-01	21223.76	0.85	20814.31	0.86	19417.29	0.93
FRA1-02	21223.76	0.82	20814.31	0.83	19417.29	0.89
ENG1-01	28768.03	0.80	28357.56	0.81	21858.90	1.05
GER1-18	30660.4	1.01	30420.98	1.02	26708.59	1.16
GER1-19	33666.48	0.88	33403.58	0.89	26708.59	1.11
GER1-20	33403.1	1.03	33924.49	1.01	32643.66	1.05
USA01-06	29108.31	1.43	30122.16	1.38	34472.94	1.21
USA01-07	29108.31	1.62	30122.16	1.57	34472.94	1.37
USA01-08	34484.9	1.57	35686.02	1.52	38101.02	1.42
USA01-09	38301.64	1.44	39635.70	1.39	42317.98	1.30
USA01-10	34484.9	1.66	35686.02	1.60	38101.02	1.50
GER1-26	49375.78	1.14	51142.05	1.10	43212.11	1.30
GER1-27	36253.92	1.11	37550.79	1.07	41501.62	0.97
GER1-28	25105.27	0.96	26003.34	0.93	32572.82	0.74
GER1-23	47438.35	0.98	49565.54	0.94	45545.33	1.02
ENG1-02	53829.74	0.93	57627.20	0.87	51595.29	0.97
GER1-24	52582.19	1.11	56291.65	1.03	59469.16	0.98
GER1-25	50854.73	1.09	54442.33	1.02	58995.53	0.94
SWE03-07	104179.7	1.41	113575.71	1.29	164645.55	0.89
GER1-29	70593.52	1.29	78226.11	1.17	90945.64	1.00
SWE03-04	91847.76	2.01	102769.19	1.80	127414.98	1.45
SWE03-01	96078.44	1.69	108335.40	1.50	139547.96	1.16
GER1-30	93491.31	1.23	105979.14	1.08	127653.41	0.90

**Single Anchors, Tension, Uncracked Concrete, Static Loading, Edge Effect,
Shallow Embedment ($\leq 188\text{mm}$), (Continued)**

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa) fcc200 (MPa)	
2	GER1-08	UE	1	10	10	36	640	16	20.3	24.0
2	GER1-09	UE	1	10	10	36	640	16	50.0	59.0
2	GER1-03	UE	1	8	8	36.5	640	16	47.5	56.0
2	GER1-04	UE	1	8	8	36.5	640	16	21.2	25.0
2	GER1-01	UE	1	6	6	37	640	16	20.3	24.0
2	GER1-02	UE	1	6	6	37	640	16	50.0	59.0
9	GER5-01	S	1	9.5	9.5	42.9	350	16	11.7	13.8
9	GER5-02	S	1	9.5	9.5	42.9	350	16	11.7	13.8
9	GER5-03	S	1	9.5	9.5	42.9	350	16	11.7	13.8
9	GER5-04	S	1	9.5	9.5	42.9	350	16	24.1	28.4
9	GER5-05	S	1	9.5	9.5	42.9	350	16	24.1	28.4
9	GER5-06	S	1	9.5	9.5	42.9	350	16	24.1	28.4
9	GER5-07	S	1	15.9	15.9	67.1	350	16	19.3	22.8
9	GER5-08	S	1	15.9	15.9	67.1	350	16	19.3	22.8
9	GER5-09	S	1	15.9	15.9	67.1	350	16	29.7	35.1
9	GER5-10	S	1	15.9	15.9	67.1	350	16	19.3	22.8
9	GER5-11	S	1	15.9	15.9	67.1	350	16	29.7	35.1
9	GER5-12	S	1	15.9	15.9	67.1	350	16	29.7	35.1
9	GER5-22	S	1	15.9	15.9	67.1	350	16	19.3	22.8
9	GER5-23	S	1	15.9	15.9	67.1	350	16	19.3	22.8
9	GER5-24	S	1	15.9	15.9	67.1	350	16	29.7	35.1
9	GER5-25	S	1	15.9	15.9	67.1	350	16	19.3	22.8
9	GER5-26	S	1	15.9	15.9	67.1	350	16	29.7	35.1
9	GER5-27	S	1	15.9	15.9	67.1	350	16	29.7	35.1
9	GER5-13	S	1	15.9	15.9	67.3	350	16	17.0	20.1
9	GER5-14	S	1	15.9	15.9	67.3	350	16	17.0	20.1
9	GER5-15	S	1	15.9	15.9	67.3	350	16	17.0	20.1
9	GER5-16	S	1	15.9	15.9	67.3	350	16	40.3	47.6
9	GER5-17	S	1	15.9	15.9	67.3	350	16	40.3	47.6
9	GER5-18	S	1	15.9	15.9	67.3	350	16	40.3	47.6
9	GER5-28	S	1	15.9	15.9	67.3	350	16	15.6	18.4
9	GER5-29	S	1	15.9	15.9	67.3	350	16	15.6	18.4
9	GER5-30	S	1	15.9	15.9	67.3	350	16	15.6	18.4
9	GER5-31	S	1	15.9	15.9	67.3	350	16	33.0	38.9
9	GER5-32	S	1	15.9	15.9	67.3	350	16	33.0	38.9
9	GER5-33	S	1	15.9	15.9	67.3	350	16	33.0	38.9
2	GER1-14	UE	1	12	12	80	640	16	20.3	24.0
2	GER1-15	UE	1	12	12	80	640	16	20.3	24.0
13	USA06-01	S	1	19.5	19.5	88.5	345		37.9	44.7
13	USA06-03	S	1	19.5	19.5	88.5	345		37.9	44.7
13	USA05-11	S	1	19.5	19.5	88.9	345		33.6	39.6
13	USA06-05	S	1	19.5	19.5	88.9	345		33.6	39.6
13	USA06-06	S	1	19.5	19.5	88.9	345		29.7	35.1

**Single Anchors, Tension, Uncracked Concrete, Static Loading, Edge Effect,
Shallow Embedment (<=188mm), (Continued)**

Test Number	Geometry						Remarks	Test Results Ultimate Load Nu (kN)	Failure Mode
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
GER1-08	50	999	999	999	11232	11664	UNKNOWN	11.9	Cone
GER1-09	50	999	999	999	11232	11664	UNKNOWN	19.9	Cone
GER1-03	50	999	999	999	11470.13	11990.25	UNKNOWN	21.3	Cone
GER1-04	50	999	999	999	11470.13	11990.25	UNKNOWN	13.9	Cone
GER1-01	50	999	999	999	11710.5	12321	UNKNOWN	13.1	Cone
GER1-02	50	999	999	999	11710.5	12321	UNKNOWN	17.9	Cone
GER5-01	50	999	999	999	14716.85	16563.69	UNKNOWN	9.6	Cone
GER5-02	50	999	999	999	14716.85	16563.69	UNKNOWN	10.6	Cone
GER5-03	50	999	999	999	14716.85	16563.69	UNKNOWN	11.3	Cone
GER5-04	50	999	999	999	14716.85	16563.69	UNKNOWN	17.8	Cone
GER5-05	50	999	999	999	14716.85	16563.69	UNKNOWN	20	Cone
GER5-06	50	999	999	999	14716.85	16563.69	UNKNOWN	20.4	Cone
GER5-07	50	999	999	999	30325.85	40521.69	UNKNOWN	22.4	Cone
GER5-08	50	999	999	999	30325.85	40521.69	UNKNOWN	24.8	Cone
GER5-09	50	999	999	999	30325.85	40521.69	UNKNOWN	26.8	Cone
GER5-10	50	999	999	999	30325.85	40521.69	UNKNOWN	27.4	Cone
GER5-11	50	999	999	999	30325.85	40521.69	UNKNOWN	28.8	Cone
GER5-12	50	999	999	999	30325.85	40521.69	UNKNOWN	29.6	Cone
GER5-22	80	999	999	999	36364.85	40521.69	UNKNOWN	33	Cone
GER5-23	80	999	999	999	36364.85	40521.69	UNKNOWN	33.4	Cone
GER5-24	80	999	999	999	36364.85	40521.69	UNKNOWN	33.6	Cone
GER5-25	80	999	999	999	36364.85	40521.69	UNKNOWN	34.8	Cone
GER5-26	80	999	999	999	36364.85	40521.69	UNKNOWN	35	Cone
GER5-27	80	999	999	999	36364.85	40521.69	UNKNOWN	38.4	Cone
GER5-13	50	999	999	999	30476.81	40763.61	UNKNOWN	16.8	Cone
GER5-14	50	999	999	999	30476.81	40763.61	UNKNOWN	17.6	Cone
GER5-15	50	999	999	999	30476.81	40763.61	UNKNOWN	19.6	Cone
GER5-16	50	999	999	999	30476.81	40763.61	UNKNOWN	26.4	Cone
GER5-17	50	999	999	999	30476.81	40763.61	UNKNOWN	26.4	Cone
GER5-18	50	999	999	999	30476.81	40763.61	UNKNOWN	29.2	Cone
GER5-28	80	999	999	999	36533.81	40763.61	UNKNOWN	18.2	Cone
GER5-29	80	999	999	999	36533.81	40763.61	UNKNOWN	18.6	Cone
GER5-30	80	999	999	999	36533.81	40763.61	UNKNOWN	25.4	Cone
GER5-31	80	999	999	999	36533.81	40763.61	UNKNOWN	30.8	Cone
GER5-32	80	999	999	999	36533.81	40763.61	UNKNOWN	36	Cone
GER5-33	80	999	999	999	36533.81	40763.61	UNKNOWN	40.8	Cone
GER1-14	80	999	999	999	48000	57600	UNKNOWN	39.7	Cone
GER1-15	80	999	999	999	48000	57600	UNKNOWN	39.8	Cone
USA06-01	57	999	999	999	50378.63	70490.25	UNKNOWN	64	Cone
USA06-03	57	999	999	999	50378.63	70490.25	UNKNOWN	73.8	Cone
USA05-11	102	999	999	999	62767.85	71128.89	CBF	88.5	Cone
USA06-05	51	999	999	999	49166.15	71128.89	CBF	44	Cone
USA06-06	51	999	999	999	49166.15	71128.89	CBF	73.8	Cone

**Single Anchors, Tension, Uncracked Concrete, Static Loading, Edge Effect,
Shallow Embedment ($\leq 188\text{mm}$), (Continued)**

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
GER1-08	14883.5	0.80	12463.91	0.95	8589.03	1.39
GER1-09	23335.95	0.85	19542.25	1.02	13466.81	1.48
GER1-03	22944.55	0.93	19291.45	1.10	12908.63	1.65
GER1-04	15330.47	0.91	12889.64	1.08	8624.94	1.61
GER1-01	15158.68	0.86	12795.28	1.02	8305.27	1.58
GER1-02	23767.41	0.75	20061.81	0.89	13021.90	1.37
GER5-01	12768.13	0.75	11230.39	0.85	9418.55	1.02
GER5-02	12768.13	0.83	11230.39	0.94	9418.55	1.13
GER5-03	12768.13	0.89	11230.39	1.01	9418.55	1.20
GER5-04	18316.68	0.97	16110.71	1.10	13511.50	1.32
GER5-05	18316.68	1.09	16110.71	1.24	13511.50	1.48
GER5-06	18316.68	1.11	16110.71	1.27	13511.50	1.51
GER5-07	23939.93	0.94	23455.93	0.95	25977.82	0.86
GER5-08	23939.93	1.04	23455.93	1.06	25977.82	0.95
GER5-09	29703.59	0.90	29103.07	0.92	32232.11	0.83
GER5-10	23939.93	1.14	23455.93	1.17	25977.82	1.05
GER5-11	29703.59	0.97	29103.07	0.99	32232.11	0.89
GER5-12	29703.59	1.00	29103.07	1.02	32232.11	0.92
GER5-22	32662.33	1.01	32002.00	1.03	30308.26	1.09
GER5-23	32662.33	1.02	32002.00	1.04	30308.26	1.10
GER5-24	40525.96	0.83	39706.64	0.85	37605.14	0.89
GER5-25	32662.33	1.07	32002.00	1.09	30308.26	1.15
GER5-26	40525.96	0.86	39706.64	0.88	37605.14	0.93
GER5-27	40525.96	0.95	39706.64	0.97	37605.14	1.02
GER5-13	22540.69	0.75	22099.01	0.76	24492.20	0.69
GER5-14	22540.69	0.78	22099.01	0.80	24492.20	0.72
GER5-15	22540.69	0.87	22099.01	0.89	24492.20	0.80
GER5-16	34687.48	0.76	34007.78	0.78	37690.61	0.70
GER5-17	34687.48	0.76	34007.78	0.78	37690.61	0.70
GER5-18	34687.48	0.84	34007.78	0.86	37690.61	0.77
GER5-28	29406.18	0.62	28829.97	0.63	27352.19	0.67
GER5-29	29406.18	0.63	28829.97	0.65	27352.19	0.68
GER5-30	29406.18	0.86	28829.97	0.88	27352.19	0.93
GER5-31	42756.73	0.72	41918.92	0.73	39770.22	0.77
GER5-32	42756.73	0.84	41918.92	0.86	39770.22	0.91
GER5-33	42756.73	0.95	41918.92	0.97	39770.22	1.03
GER1-14	38400.61	1.03	38990.47	1.02	36311.31	1.09
GER1-15	38400.61	1.04	38990.47	1.02	36311.31	1.10
USA06-01	46977.35	1.36	48605.15	1.32	55250.13	1.16
USA06-03	46977.35	1.57	48605.15	1.52	55250.13	1.34
USA05-11	63764.7	1.39	66027.84	1.34	63042.46	1.40
USA06-05	42091.02	1.05	43584.92	1.01	50316.09	0.87
USA06-06	39627.38	1.86	41033.84	1.80	47371.03	1.56

**Single Anchors, Tension, Uncracked Concrete, Static Loading, Edge Effect,
Shallow Embedment ($\leq 188\text{mm}$), (Continued)**

Data Source	Test Number	Anchor						Concrete		
		Type	Number	Diameter	Outside Diameter	Embedment	Strength of Steel	Aggregate Diameter d _{agg} (mm)	Strength of Concrete	
			n	d (mm)	do/dh (mm)	hef (mm)	f _y (MPa)		f _c (MPa)	f _{cc200} (MPa)
13	USA06-08	S	1	19.5	19.5	88.9	345		33.6	39.6
13	USA06-10	S	1	19.5	19.5	88.9	345		29.7	35.1
25	USA12-01	U	1	12.7	12.7	88.9		32	30.2	35.6
25	USA12-02	U	1	12.7	12.7	88.9		32	30.2	35.6
25	USA12-03	U	1	12.7	12.7	88.9		32	30.2	35.6
25	USA12-04	U	1	12.7	12.7	88.9		32	30.2	35.6
9	GER5-19	S	1	22.2	22.2	90.3	350	16	39.8	47.0
9	GER5-20	S	1	22.2	22.2	90.3	350	16	39.8	47.0
9	GER5-21	S	1	22.2	22.2	90.3	350	16	39.8	47.0
9	GER5-34	S	1	22.2	22.2	90.3	350	16	19.3	22.8
9	GER5-35	S	1	22.2	22.2	90.3	350	16	19.3	22.8
9	GER5-36	S	1	22.2	22.2	90.3	350	16	39.8	47.0
9	GER5-37	S	1	22.2	22.2	90.3	350	16	19.3	22.8
9	GER5-38	S	1	22.2	22.2	90.3	350	16	39.8	47.0
9	GER5-39	S	1	22.2	22.2	90.3	350	16	39.8	47.0
9	GER5-40	S	1	22.2	22.2	90.3	350	16	19.3	22.8
9	GER5-41	S	1	22.2	22.2	90.3	350	16	19.3	22.8
9	GER5-42	S	1	22.2	22.2	90.3	350	16	19.3	22.8
9	GER5-43	S	1	22.2	22.2	90.3	350	16	29.7	35.1
9	GER5-44	S	1	22.2	22.2	90.3	350	16	29.7	35.1
9	GER5-45	S	1	22.2	22.2	90.3	350	16	29.7	35.1
13	USA06-04	S	1	19.5	19.5	92.1	345		33.7	39.8
13	USA06-02	S	1	19.5	19.5	114.3	345		37.9	44.7
13	USA06-11	S	1	19.5	19.5	114.3	345		31.9	37.7
13	USA06-13	S	1	19.5	19.5	114.3	345		31.9	37.7
25	USA12-06	U	1	15.88	15.88	114.3		32	43.8	51.7
7	GER1-31	UE	1	16	16	125	902	16	31.9	37.7
13	USA06-12	S	1	19.5	19.5	139.7	345		29.7	35.1
25	USA12-07	U	1	19.05	19.05	139.7		32	30.2	35.6
25	USA12-08	U	1	19.05	19.05	139.7		32	43.8	51.7
25	USA12-09	U	1	19.05	19.05	139.7		32	30.2	35.6
6	USA01-13	UE	1	12.7	12.7	145			25.1	29.6
6	USA01-20	UE	1	12.7	12.7	145			25.1	29.6
6	USA01-22	UE	1	12.7	12.7	145			25.1	29.6
6	USA01-11	UE	1	12.7	12.7	151.4			27.9	32.9
6	USA01-12	UE	1	12.7	12.7	151.4			21.9	25.9
6	USA01-14	UE	1	12.7	12.7	151.4			27.9	32.9
6	USA01-15	UE	1	12.7	12.7	151.4			25.1	29.6
6	USA01-17	UE	1	12.7	12.7	151.4			27.9	32.9
6	USA01-19	UE	1	12.7	12.7	151.4			27.9	32.9
6	USA01-21	UE	1	12.7	12.7	151.4			21.9	25.9
6	USA01-23	UE	1	12.7	12.7	151.4			21.9	25.9
13	USA06-07	S	1	19.5	19.5	168.2	345		35.7	42.1
13	USA06-09	S	1	19.5	19.5	168.2	345		35.7	42.1
7	GER1-33	UE	1	20	20	170	1047	16	20.9	24.7
25	USA12-10	U	1	25.4	25.4	177.8		32	30.2	35.6
12	GER5-52	S	1	22	22	185	900	16	18.8	22.2
12	GER5-53	S	1	22	22	185	900	16	18.8	22.2
12	GER5-54	S	1	22	22	185	900	16	18.8	22.2
12	GER5-55	S	1	22	22	185	900	16	18.8	22.2
6	USA01-24	UE	1	15	15	187.5			21.2	25.0

**Single Anchors, Tension, Uncracked Concrete, Static Loading, Edge Effect,
Shallow Embedment (<=188mm), (Continued)**

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)		Ultimate Load Nu (kN)	Failure Mode
USA06-08	76	999	999	999	55833.65	71128.89	CBF	59.1	Cone
USA06-10	76	999	999	999	55833.65	71128.89	CBF	81.4	Cone
USA12-01	57.15	999	999	999	50806.35	71128.89	ARKANSAS	35.59	Cone
USA12-02	82.55	999	999	999	57580.53	71128.89	ARKANSAS	65.706	Cone
USA12-03	95.25	999	999	999	60967.62	71128.89	ARKANSAS	54.755	Cone
USA12-04	111	999	999	999	65168.15	71128.89	ARKANSAS	60.23	Cone
GER5-19	50	999	999	999	50238.41	73386.81	UNKNOWN	38.4	Cone
GER5-20	50	999	999	999	50238.41	73386.81	UNKNOWN	40.8	Cone
GER5-21	50	999	999	999	50238.41	73386.81	UNKNOWN	44.8	Cone
GER5-34	80	999	999	999	58365.41	73386.81	UNKNOWN	49	Cone
GER5-35	80	999	999	999	58365.41	73386.81	UNKNOWN	53.2	Cone
GER5-36	80	999	999	999	58365.41	73386.81	UNKNOWN	55.2	Cone
GER5-37	80	999	999	999	58365.41	73386.81	UNKNOWN	58.4	Cone
GER5-38	80	999	999	999	58365.41	73386.81	UNKNOWN	59.2	Cone
GER5-39	80	999	999	999	58365.41	73386.81	UNKNOWN	60.8	Cone
GER5-40	120	999	999	999	69201.41	73386.81	UNKNOWN	62.8	Cone
GER5-41	120	999	999	999	69201.41	73386.81	UNKNOWN	65.6	Cone
GER5-42	120	999	999	999	69201.41	73386.81	UNKNOWN	66.8	Cone
GER5-43	120	999	999	999	69201.41	73386.81	UNKNOWN	69.2	Cone
GER5-44	120	999	999	999	69201.41	73386.81	UNKNOWN	81.2	Cone
GER5-45	120	999	999	999	69201.41	73386.81	UNKNOWN	84.2	Cone
USA06-04	51	999	999	999	52262.15	76341.69	MSF B1-5	48.9	Cone
USA06-02	70	999	999	999	82793.21	117580.4	UNKNOWN	103.1	Cone
USA06-11	76	999	999	999	84850.61	117580.4	CBF	91.1	Cone
USA06-13	102	999	999	999	93766.01	117580.4	CBF	97.8	Cone
USA12-06	146.05	999	999	999	108870.8	117580.4	ARKANSAS	136.514	Cone
GER1-31	125	999	999	999	117187.5	140625	UNKNOWN	114.3	Cone
USA06-12	76	999	999	999	119674	175644.8	CBF	125.4	Cone
USA12-07	76.2	999	999	999	119757.8	175644.8	ARKANSAS	66.805	Cone
USA12-08	82.55	999	999	999	122419.1	175644.8	ARKANSAS	87.136	Cone
USA12-09	177.8	999	999	999	162338.4	175644.8	ARKANSAS	155.395	Cone
USA01-13	102	999	999	999	138982.5	189225	UNKNOWN	78.7	Cone
USA01-20	127	999	999	999	149857.5	189225	UNKNOWN	81	Cone
USA01-22	127	999	999	999	149857.5	189225	UNKNOWN	85.9	Cone
USA01-11	102	999	999	999	149477.2	206297.6	UNKNOWN	38.3	Cone
USA01-12	102	999	999	999	149477.2	206297.6	UNKNOWN	74.7	Cone
USA01-14	102	999	999	999	149477.2	206297.6	UNKNOWN	80.1	Cone
USA01-15	102	999	999	999	149477.2	206297.6	UNKNOWN	81	Cone
USA01-17	114	999	999	999	154927.6	206297.6	UNKNOWN	73.8	Cone
USA01-19	127	999	999	999	160832.2	206297.6	UNKNOWN	78.3	Cone
USA01-21	127	999	999	999	160832.2	206297.6	UNKNOWN	84.5	Cone
USA01-23	127	999	999	999	160832.2	206297.6	UNKNOWN	90.3	Cone
USA06-07	152	999	999	999	204009.8	254621.2	MSF C3-4	131.2	Cone
USA06-09	102	999	999	999	178779.8	254621.2	MSF C2-4	130.7	Cone
GER1-33	170	999	999	999	216750	260100	UNKNOWN	159.8	Cone
USA12-10	234.95	999	999	999	267580.1	284515.6	ARKANSAS	235.446	Cone
GER5-52	261	999	999	999	298867.5	308025	UNKNOWN	109.3	Cone
GER5-53	261	999	999	999	298867.5	308025	UNKNOWN	126.5	Cone
GER5-54	264	999	999	999	300532.5	308025	UNKNOWN	114.4	Cone
GER5-55	265	999	999	999	301087.5	308025	UNKNOWN	125.6	Cone
USA01-24	127	999	999	999	229640.6	316406.3	UNKNOWN	129.7	Cone

**Single Anchors, Tension, Uncracked Concrete, Static Loading, Edge Effect,
Shallow Embedment ($\leq 188\text{mm}$), (Continued)**

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
USA06-08	52172.25	1.13	54023.95	1.09	58085.96	1.02
USA06-10	49118.55	1.66	50861.87	1.60	54686.12	1.49
USA12-01	42161.55	0.84	43657.95	0.82	46180.84	0.77
USA12-02	52127.01	1.26	53977.11	1.22	52460.51	1.25
USA12-03	57493.03	0.95	59533.57	0.92	54312.11	1.01
USA12-04	64502.67	0.93	66792.01	0.90	54458.32	1.11
GER5-19	46188.82	0.83	47962.18	0.80	57970.00	0.66
GER5-20	46188.82	0.88	47962.18	0.85	57970.00	0.70
GER5-21	46188.82	0.97	47962.18	0.93	57970.00	0.77
GER5-34	41440.59	1.18	43031.65	1.14	47842.56	1.02
GER5-35	41440.59	1.28	43031.65	1.24	47842.56	1.11
GER5-36	59498.69	0.93	61783.07	0.89	68690.38	0.80
GER5-37	41440.59	1.41	43031.65	1.36	47842.56	1.22
GER5-38	59498.69	0.99	61783.07	0.96	68690.38	0.86
GER5-39	59498.69	1.02	61783.07	0.98	68690.38	0.89
GER5-40	55562.41	1.13	57695.66	1.09	51854.64	1.21
GER5-41	55562.41	1.18	57695.66	1.14	51854.64	1.27
GER5-42	55562.41	1.20	57695.66	1.16	51854.64	1.29
GER5-43	68939.35	1.00	71586.19	0.97	64338.92	1.08
GER5-44	68939.35	1.18	71586.19	1.13	64338.92	1.26
GER5-45	68939.35	1.22	71586.19	1.18	64338.92	1.31
USA06-04	43782.44	1.12	45622.58	1.07	54240.39	0.90
USA06-02	67249.98	1.53	72601.16	1.42	86640.53	1.19
USA06-11	64362.51	1.42	69483.92	1.31	81951.21	1.11
USA06-13	76237.16	1.28	82303.46	1.19	90948.64	1.08
USA12-06	115443.6	1.18	124629.61	1.10	108398.20	1.26
GER1-31	94001.15	1.22	102829.13	1.11	103035.43	1.11
USA06-12	76202.86	1.65	84641.40	1.48	106881.64	1.17
USA12-07	76821.48	0.87	85328.52	0.78	107468.31	0.62
USA12-08	96068.85	0.91	106707.31	0.82	133213.78	0.65
USA12-09	129004	1.20	143289.65	1.08	134249.99	1.16
USA01-13	83947.52	0.94	93696.11	0.84	106798.02	0.74
USA01-20	95387.88	0.85	106465.02	0.76	114978.35	0.70
USA01-22	95387.88	0.90	106465.02	0.81	114978.35	0.75
USA01-11	92288.1	0.42	103568.08	0.37	120544.63	0.32
USA01-12	81883.73	0.91	91892.04	0.81	106954.68	0.70
USA01-14	92288.1	0.87	103568.08	0.77	120544.63	0.66
USA01-15	87537.39	0.93	98236.72	0.82	114339.37	0.71
USA01-17	98042.05	0.75	110025.31	0.67	125380.21	0.59
USA01-19	104465.2	0.75	117233.51	0.67	130014.87	0.60
USA01-21	92687.99	0.91	104016.85	0.81	115357.27	0.73
USA01-23	92687.99	0.97	104016.85	0.87	115357.27	0.78
USA06-07	144976.2	0.90	164751.49	0.80	200678.76	0.65
USA06-09	115951.1	1.13	131767.28	0.99	174542.34	0.75
GER1-33	120675.6	1.32	137302.83	1.16	152992.64	1.04
USA12-10	190914.3	1.23	218310.48	1.08	223207.80	1.05
GER5-52	168967.9	0.65	194045.35	0.56	184203.98	0.59
GER5-53	168967.9	0.75	194045.35	0.65	184203.98	0.69
GER5-54	170613.8	0.67	195935.48	0.58	184203.98	0.62
GER5-55	171164.1	0.73	196567.51	0.64	184203.98	0.68
USA01-24	111185.7	1.17	127868.89	1.01	161005.4	0.81
	Mean =	1.033	Mean =	1.024	Mean =	1.054
	COV =	0.271	COV =	0.252	COV =	0.286

**Group Anchors, Tension, Uncracked Concrete, Static Loading, No Edge,
Shallow Embedment (<=188 mm)**

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc fcc200 (MPa)	
4	FRA2-01	E-TC	2	10	15	71	640		11.5	13.6
4	FRA2-02	E-TC	2	10	15	71	640		23.6	27.9
3	GER2-01	E-DI	2	12	15	46		16	16.9	20.0
3	GER2-02	E-DI	2	12	15	46		16	33.9	40.0
3	GER2-03	E-DI	2	12	15	46		16	16.9	20.0
3	GER2-04	E-DI	2	12	15	46		16	33.9	40.0
2	GER2-05	UE	2	12	18	80	640	16	21.2	25.0
3	GER2-06	E-TC	2	12	18	75		16	18.1	21.4
2	GER2-07	E-SD	2	12	18.4	80	640	29	21.2	25.0
3	GER2-08	E-TC	2	12	18	75		16	24.8	29.3
3	GER2-09	E-TC	2	12	18	75		16	48.3	57.0
2	GER2-10	E-SD	2	8	12.7	36.5	640	16	21.2	25.0
2	GER2-11	E-SD	2	10	14.7	36	640	16	23.7	28.0
2	GER2-12	E-SD	2	6	10.7	37	640	16	23.7	28.0
2	GER2-13	E-SD	2	10	14.7	36	640	16	47.5	56.0
2	GER2-14	E-SD	2	8	12.7	36.5	640	16	47.5	56.0
3	GER2-15	E-DI	2	12	15	46		16	16.9	20.0
3	GER2-16	E-DI	2	12	15	46		16	33.9	40.0
3	GER2-17	E-TC	2	16	24	100		16	16.9	19.9
3	GER2-18	E-TC	2	16	24	100		16	18.6	22.0
3	GER2-19	E-TC	2	16	24	100		16	52.3	61.7
3	GER2-20	E-DI	2	12	15	46		16	16.9	20.0
3	GER2-21	E-DI	2	12	15	46		16	33.9	40.0
7	GER2-22	UE	2	16	16	125	902	16	28.9	34.1
3	GER2-23	E-TC	2	20	28	125		16	20.5	24.2
3	GER2-24	E-TC	2	20	28	125		16	40.8	48.2
3	GER2-25	E-DI	2	12	15	46		16	16.9	20.0
3	GER2-26	E-DI	2	12	15	46		16	33.9	40.0
3	GER2-27	E-TC	2	16	24	100		16	18.9	22.3
3	GER2-28	E-TC	2	12	18	75		16	24.8	29.3
3	GER2-29	E-TC	2	12	18	75		16	48.3	57.0
3	GER2-30	E-DI	2	12	15	46		16	16.9	20.0
3	GER2-31	E-DI	2	12	15	46		16	33.9	40.0
2	GER2-32	E-SD	2	8	12.7	36.5	640	16	21.2	25.0
2	GER2-33	E-SD	2	10	14.7	36	640	16	23.7	28.0
2	GER2-34	E-SD	2	8	12.7	36.5	640	16	47.5	56.0
2	GER2-35	E-SD	2	10	14.7	36	640	16	47.5	56.0
3	GER2-36	E-TC	2	12	18	75		16	18.1	21.4
3	GER2-37	E-TC	2	12	18	75		16	24.8	29.3
3	GER2-38	E-TC	2	12	18	75		16	48.3	57.0
3	GER2-39	E-TC	2	12	18	75		16	18.1	21.4
3	GER2-40	E-TC	2	12	18	75		16	48.3	57.0
3	GER2-41	E-TC	2	20	28	125		16	20.5	24.2

**Group Anchors, Tension, Uncracked Concrete, Static Loading, No Edge,
Shallow Embedment (≤ 188 mm), (Continued)**

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)		Ultimate Load Nu (kN)	Failure Mode
FRA2-01	999	999	100	999	66669	90738	UNKNOWN	33.6	Cone
FRA2-02	999	999	100	999	66669	90738	UNKNOWN	38.7	Cone
GER2-01	999	999	50	999	25944	38088	UNKNOWN	39.2	Cone
GER2-02	999	999	50	999	25944	38088	UNKNOWN	40	Cone
GER2-03	999	999	75	999	29394	38088	UNKNOWN	39.7	Cone
GER2-04	999	999	75	999	29394	38088	UNKNOWN	45.6	Cone
GER2-05	999	999	80	999	76800	115200	UNKNOWN	60.9	Cone
GER2-06	999	999	80	999	68625	101250	UNKNOWN	59.4	Cone
GER2-07	999	999	80	999	76800	115200	UNKNOWN	60.9	Cone
GER2-08	999	999	80	999	68625	101250	UNKNOWN	69.6	Cone
GER2-09	999	999	80	999	68625	101250	UNKNOWN	126.2	Cone
GER2-10	999	999	100	999	22940.25	23980.5	UNKNOWN	26.6	Cone
GER2-11	999	999	100	999	22464	23328	UNKNOWN	28.2	Cone
GER2-12	999	999	100	999	23421	24642	UNKNOWN	28.4	Cone
GER2-13	999	999	100	999	22464	23328	UNKNOWN	39.9	Cone
GER2-14	999	999	100	999	22940.25	23980.5	UNKNOWN	40.4	Cone
GER2-15	999	999	100	999	32844	38088	UNKNOWN	44.6	Cone
GER2-16	999	999	100	999	32844	38088	UNKNOWN	49.4	Cone
GER2-17	999	999	105	999	121500	180000	UNKNOWN	101.2	Cone
GER2-18	999	999	105	999	121500	180000	UNKNOWN	102.6	Cone
GER2-19	999	999	105	999	121500	180000	UNKNOWN	175.2	Cone
GER2-20	999	999	125	999	36294	38088	UNKNOWN	48.7	Cone
GER2-21	999	999	125	999	36294	38088	UNKNOWN	54.6	Cone
GER2-22	999	999	125	999	187500	281250	UNKNOWN	175.7	Cone
GER2-23	999	999	130	999	189375	281250	UNKNOWN	163.2	Cone
GER2-24	999	999	130	999	189375	281250	UNKNOWN	242.4	Cone
GER2-25	999	999	150	999	39744	38088	UNKNOWN	48.8	Cone
GER2-26	999	999	150	999	39744	38088	UNKNOWN	59	Cone
GER2-27	999	999	158	999	137400	180000	UNKNOWN	108.6	Cone
GER2-28	999	999	160	999	86625	101250	UNKNOWN	87.6	Cone
GER2-29	999	999	160	999	86625	101250	UNKNOWN	138.8	Cone
GER2-30	999	999	175	999	43194	38088	UNKNOWN	50.4	Cone
GER2-31	999	999	175	999	43194	38088	UNKNOWN	62.5	Cone
GER2-32	999	999	200	999	33890.25	23980.5	UNKNOWN	28.3	Cone
GER2-33	999	999	200	999	33264	23328	UNKNOWN	31.5	Cone
GER2-34	999	999	200	999	33890.25	23980.5	UNKNOWN	41.5	Cone
GER2-35	999	999	200	999	33264	23328	UNKNOWN	42.2	Cone
GER2-36	999	999	200	999	95625	101250	UNKNOWN	66.4	Cone
GER2-37	999	999	200	999	95625	101250	UNKNOWN	94.4	Cone
GER2-38	999	999	200	999	95625	101250	UNKNOWN	150.4	Cone
GER2-39	999	999	240	999	104625	101250	UNKNOWN	67.6	Cone
GER2-40	999	999	240	999	104625	101250	UNKNOWN	149	Cone
GER2-41	999	999	260	999	238125	281250	UNKNOWN	204	Cone

**Group Anchors, Tension, Uncracked Concrete, Static Loading, No Edge,
Shallow Embedment (≤ 188 mm), (Continued)**

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
FRA2-01	43711.51	0.77	43901.89	0.77	37850.51	0.89
FRA2-02	62607.80	0.62	62880.48	0.62	54213.12	0.71
GER2-01	25627.40	1.53	23259.42	1.69	18852.18	2.08
GER2-02	36242.62	1.10	32893.78	1.22	26661.01	1.50
GER2-03	29035.30	1.37	26352.42	1.51	21805.36	1.82
GER2-04	41062.12	1.11	37267.96	1.22	30837.44	1.48
GER2-05	71666.20	0.85	72767.04	0.84	58278.34	1.04
GER2-06	54914.90	1.08	55772.07	1.07	48899.17	1.21
GER2-07	64315.82	0.95	66151.86	0.92	58465.28	1.04
GER2-08	64256.51	1.08	65259.49	1.07	57217.44	1.22
GER2-09	89623.26	1.41	91022.19	1.39	79805.35	1.58
GER2-10	28441.55	0.94	24223.82	1.10	17249.88	1.54
GER2-11	29678.81	0.95	25176.73	1.12	18554.43	1.52
GER2-12	30522.15	0.93	26098.01	1.09	17941.44	1.58
GER2-13	41972.17	0.95	35605.28	1.12	26239.92	1.52
GER2-14	42567.42	0.95	36254.89	1.11	25817.26	1.56
GER2-15	32443.20	1.37	29445.43	1.51	23863.44	1.87
GER2-16	45881.62	1.08	41642.13	1.19	33748.00	1.46
GER2-17	81195.96	1.25	86924.00	1.16	83381.04	1.21
GER2-18	85372.74	1.20	91395.43	1.12	87670.22	1.17
GER2-19	142971.82	1.23	153057.89	1.14	146819.36	1.19
GER2-20	35851.10	1.36	32538.44	1.50	24107.98	2.02
GER2-21	50701.11	1.08	46016.30	1.19	34093.83	1.60
GER2-22	163475.10	1.07	178827.63	0.98	155607.63	1.13
GER2-23	124826.53	1.31	138322.81	1.18	141754.01	1.15
GER2-24	176166.27	1.38	195213.41	1.24	200055.82	1.21
GER2-25	37623.21	1.30	34146.80	1.43	24107.98	2.02
GER2-26	53207.25	1.11	48290.87	1.22	34093.83	1.73
GER2-27	97201.01	1.12	104058.13	1.04	102066.73	1.06
GER2-28	81110.68	1.08	82376.73	1.06	72078.72	1.22
GER2-29	113131.00	1.23	114896.86	1.21	100533.48	1.38
GER2-30	37623.21	1.34	34146.80	1.48	24107.98	2.09
GER2-31	53207.25	1.17	48290.87	1.29	34093.83	1.83
GER2-32	29731.27	0.95	25322.27	1.12	17249.88	1.64
GER2-33	30820.30	1.02	26145.07	1.20	18554.43	1.70
GER2-34	44497.68	0.93	37898.91	1.10	25817.26	1.61
GER2-35	43586.49	0.97	36974.71	1.14	26239.92	1.61
GER2-36	76520.76	0.87	77715.18	0.85	61988.23	1.07
GER2-37	89537.76	1.05	90935.35	1.04	72533.08	1.30
GER2-38	124884.87	1.20	126834.20	1.19	101167.20	1.49
GER2-39	81021.98	0.83	82286.66	0.82	61988.23	1.09
GER2-40	132231.04	1.13	134295.03	1.11	101167.20	1.47
GER2-41	156960.10	1.30	173930.66	1.17	178957.35	1.14

**Group Anchors, Tension, Uncracked Concrete, Static Loading, No Edge,
Shallow Embedment (≤ 188 mm), (Continued)**

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc fcc200 (MPa)	
3	GER2-42	E-TC	2	16	24	100		16	18.9	22.3
3	GER2-43	E-TC	2	16	24	100		16	16.9	19.9
3	GER2-44	E-TC	2	16	24	100		16	18.6	22.0
3	GER2-45	E-TC	2	16	24	100		16	52.3	61.7
3	GER2-46	UE	2	12	18	80	640	29	22.0	26.0
3	GER2-47	E-SD	2	12	18.4	80	640	16	21.2	25.0
3	GER2-48	E-TC	2	12	18	75		16	48.3	57.0
3	GER2-49	E-TC	2	20	28	125		16	20.5	24.2
3	GER2-50	E-TC	2	20	28	125		16	40.8	48.2
7	GER2-51	UE	2	16	16	125	902	16	28.9	34.1
10	GER6-01	S	2	15.9	31.8	67.3	350		17.0	20.1
10	GER6-02	S	2	15.9	31.8	67.3	350		40.4	47.7
10	GER6-03	S	2	15.9	31.8	67.3	350		15.6	18.4
10	GER6-04	S	2	15.9	31.8	67.3	350		40.4	47.7
10	GER6-05	S	2	15.9	31.8	67.3	350		15.2	17.9
10	GER6-06	S	2	15.9	31.8	67.3	350		28.1	33.2
6	USA02-01	E-SD	2	12.7	12.7	51.6			33.1	39.1
6	USA02-02	E-SD	2	12.7	12.7	51.6			33.1	39.1
6	USA02-03	E-SD	2	12.7	12.7	51.6			20.7	24.4
6	USA02-04	E-SD	2	12.7	12.7	51.6			20.7	24.4
6	USA02-05	E-SD	2	12.7	12.7	51.6			33.1	39.1
6	USA02-06	E-SD	2	12.7	12.7	51.6			33.1	39.1
6	USA02-07	E-SD	2	12.7	12.7	51.6			20.7	24.4
6	USA02-08	E-TC	2	12.7	12.7	88.9			20.7	24.4
6	USA02-09	E-TC	2	12.7	12.7	88.9			33.1	39.1
6	USA02-10	E-TC	2	19	19	82.6			33.1	39.1
6	USA02-11	E-TC	2	19	19	82.6			33.1	39.1
6	USA02-12	E-TC	2	19	19	82.6			33.1	39.1
6	USA02-13	E-TC	2	19	19	82.6			20.7	24.4
6	USA02-14	E-TC	2	19	19	82.6			20.7	24.4
23	USA02-15	E-TW	2	9.5	10	41.3	345	25	28.6	33.8
23	USA02-16	E-TW	2	9.5	10	41.3	345	25	28.6	33.8
23	USA02-17	E-TW	2	9.5	10	63.5	345	25	28.6	33.8
38	USA02-18	E-TW	2	9.5	10	42.6	483	25	12.6	14.9
38	USA02-19	E-TW	2	9.5	10	77.4	483	25	12.6	14.9
38	USA02-20	E-TW	2	9.5	10	38.5	483	25	30.7	36.2
38	USA02-21	E-TW	2	12.7	13.4	57.8	483	25	30.7	36.2
38	USA02-22	E-TW	2	12.7	13.4	105.4	483	25	12.6	14.9
38	USA02-23	E-TW	2	12.7	13.4	61	483	25	12.6	14.9
38	USA02-24	E-TW	2	15.9	16.6	71.5	483	25	12.6	14.9
38	USA02-25	E-TW	2	15.9	16.6	131.9	483	25	12.9	15.2
38	USA02-26	E-TW	2	15.9	16.6	71.4	483	25	30.7	36.2
38	USA02-27	E-TW	2	15.9	16.6	129.5	483	25	30.0	35.4

**Group Anchors, Tension, Uncracked Concrete, Static Loading, No Edge,
Shallow Embedment (≤ 188 mm), (Continued)**

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)		Ultimate Load Nu (kN)	Failure Mode
GER2-42	999	999	263	999	168900	180000	UNKNOWN	132.3	Cone
GER2-43	999	999	263	999	168900	180000	UNKNOWN	132.4	Cone
GER2-44	999	999	263	999	168900	180000	UNKNOWN	133.3	Cone
GER2-45	999	999	263	999	168900	180000	UNKNOWN	268	Cone
GER2-46	999	999	280	999	124800	115200	UNKNOWN	103.6	Cone
GER2-47	999	999	280	999	124800	115200	UNKNOWN	76	Cone
GER2-48	999	999	320	999	122625	101250	UNKNOWN	150	Cone
GER2-49	999	999	325	999	262500	281250	UNKNOWN	202.4	Cone
GER2-50	999	999	325	999	262500	281250	UNKNOWN	347.2	Cone
GER2-51	999	999	375	999	281250	281250	UNKNOWN	228.3	Cone
GER6-01	40	40	80	999	56915.61	81527.22	REVISED	59.6	Cone
GER6-02	40	40	80	999	56915.61	81527.22	REVISED	85.2	Cone
GER6-03	60	60	120	999	64991.61	81527.22	REVISED	66	Cone
GER6-04	60	60	120	999	64991.61	81527.22	REVISED	87.2	Cone
GER6-05	80	80	160	999	73067.61	81527.22	REVISED	76.8	Cone
GER6-06	80	80	160	999	73067.61	81527.22	REVISED	120.8	Cone
USA02-01	999	999	76	999	35727.84	47926.08	UNKNOWN	64.9	Cone
USA02-02	999	999	76	999	35727.84	47926.08	UNKNOWN	69.5	Cone
USA02-03	999	999	127	999	43622.64	47926.08	UNKNOWN	49.1	Cone
USA02-04	999	999	127	999	43622.64	47926.08	UNKNOWN	58.4	Cone
USA02-05	999	999	127	999	43622.64	47926.08	UNKNOWN	86.3	Cone
USA02-06	999	999	127	999	43622.64	47926.08	UNKNOWN	99.3	Cone
USA02-07	999	999	178	999	51517.44	47926.08	UNKNOWN	66.8	Cone
USA02-08	999	999	152	999	111667.3	142257.8	UNKNOWN	77	Cone
USA02-09	999	999	102	999	98332.29	142257.8	UNKNOWN	107.6	Cone
USA02-10	999	999	102	999	86680.44	122809.7	UNKNOWN	133.7	Cone
USA02-11	999	999	102	999	86680.44	122809.7	UNKNOWN	125.3	Cone
USA02-12	999	999	165	999	102291.8	122809.7	UNKNOWN	178.3	Cone
USA02-13	999	999	165	999	102291.8	122809.7	UNKNOWN	112.3	Cone
USA02-14	999	999	165	999	102291.8	122809.7	UNKNOWN	115.1	Cone
USA02-15	999	999	41	999	20431.11	30702.42	UNKNOWN	22.9	Cone
USA02-16	999	999	83	999	25634.91	30702.42	UNKNOWN	28.4	Cone
USA02-17	999	999	64	999	48482.25	72580.5	UNKNOWN	42	Cone
USA02-18	999	999	38	999	21189.24	32665.68	UNKNOWN	19.8	Cone
USA02-19	999	999	38	999	62740.44	107833.7	UNKNOWN	31.8	Cone
USA02-20	999	999	38	999	17729.25	26680.5	UNKNOWN	22.5	Cone
USA02-21	999	999	57	999	39951.36	60135.12	UNKNOWN	45.5	Cone
USA02-22	999	999	51	999	116108.6	199964.9	UNKNOWN	41.8	Cone
USA02-23	999	999	57	999	43920	66978	UNKNOWN	33.8	Cone
USA02-24	999	999	70	999	61025.25	92020.5	UNKNOWN	46.6	Cone
USA02-25	999	999	64	999	181903.3	313157	UNKNOWN	73.8	Cone
USA02-26	999	999	70	999	60875.64	91763.28	UNKNOWN	64.1	Cone
USA02-27	999	999	64	999	175796.3	301864.5	UNKNOWN	119.6	Cone

**Group Anchors, Tension, Uncracked Concrete, Static Loading, No Edge,
Shallow Embedment (≤ 188 mm), (Continued)**

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
GER2-42	119485.08	1.11	127914.26	1.03	112494.74	1.18
GER2-43	112872.41	1.17	120835.09	1.10	106268.94	1.25
GER2-44	118678.65	1.12	127050.93	1.05	111735.49	1.19
GER2-45	198748.48	1.35	212769.37	1.26	187120.93	1.43
GER2-46	109628.21	0.95	111312.17	0.93	76799.93	1.35
GER2-47	96473.73	0.79	99227.79	0.77	75615.91	1.01
GER2-48	132231.04	1.13	134295.03	1.12	101167.20	1.48
GER2-49	173026.88	1.17	191734.59	1.06	180745.39	1.12
GER2-50	244190.86	1.42	270592.84	1.28	255083.91	1.36
GER2-51	245212.65	0.93	268241.45	0.85	197726.29	1.15
GER6-01	51921.84	1.15	50904.43	1.17	45151.84	1.32
GER6-02	79985.49	1.07	78418.18	1.09	69556.32	1.22
GER6-03	56726.61	1.17	55615.06	1.19	50136.02	1.32
GER6-04	91334.97	0.96	89545.27	0.97	80723.52	1.08
GER6-05	62903.10	1.22	61670.52	1.25	53955.99	1.42
GER6-06	85667.20	1.41	83988.56	1.44	73482.21	1.64
USA02-01	46590.98	1.39	43534.22	1.49	35227.20	1.84
USA02-02	46590.98	1.49	43534.22	1.60	35227.20	1.97
USA02-03	44937.99	1.09	41989.67	1.17	31485.73	1.56
USA02-04	44937.99	1.30	41989.67	1.39	31485.73	1.85
USA02-05	56886.22	1.52	53154.00	1.62	39857.23	2.17
USA02-06	56886.22	1.75	53154.00	1.87	39857.23	2.49
USA02-07	49371.19	1.35	46132.02	1.45	31485.73	2.12
USA02-08	87639.85	0.88	91928.94	0.84	81163.36	0.95
USA02-09	97693.40	1.10	102474.52	1.05	89299.03	1.20
USA02-10	89341.05	1.50	92452.83	1.45	83855.34	1.59
USA02-11	89341.05	1.40	92452.83	1.36	83855.34	1.49
USA02-12	105431.63	1.69	109103.86	1.63	98788.15	1.80
USA02-13	83287.05	1.35	86187.97	1.30	78038.94	1.44
USA02-14	83287.05	1.38	86187.97	1.34	78038.94	1.47
USA02-15	27688.97	0.83	24417.29	0.94	18213.65	1.26
USA02-16	34741.35	0.82	30636.37	0.93	23191.59	1.22
USA02-17	52989.01	0.79	51966.77	0.81	40923.79	1.03
USA02-18	18773.07	1.05	16694.97	1.19	12369.08	1.60
USA02-19	41238.40	0.77	42144.26	0.75	32315.09	0.98
USA02-20	25754.07	0.87	22271.81	1.01	16529.61	1.36
USA02-21	47364.56	0.96	45473.56	1.00	36597.67	1.24
USA02-22	65398.68	0.64	70617.88	0.59	59639.20	0.70
USA02-23	32517.87	1.04	31606.51	1.07	25493.41	1.33
USA02-24	41733.16	1.12	41975.61	1.11	35850.62	1.30
USA02-25	92506.35	0.80	103282.92	0.71	94300.67	0.78
USA02-26	64935.22	0.99	65293.66	0.98	55761.34	1.15
USA02-27	137691.76	0.87	153342.14	0.78	139534.12	0.86

**Group Anchors, Tension, Uncracked Concrete, Static Loading, No Edge,
Shallow Embedment (≤ 188 mm), (Continued)**

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc fcc200 (MPa)	
38	USA02-28	E-TW	2	19	19.8	87.6	483	25	12.6	14.9
38	USA02-29	E-TW	2	19	19.8	150.7	483	25	12.9	15.2
38	USA02-30	E-TW	2	19	19.9	85.7	483	25	30.7	36.2
25	USA10-01	U	2	12.7	18	88.9	0	32	31.4	37.0
25	USA10-02	U	2	12.7	18	114.3	0	32	31.4	37.0
25	USA10-03	U	2	15.875	23	139.7	0	32	31.4	37.0
25	USA10-04	U	2	15.875	23	114.3	0	32	31.4	37.0
25	USA10-05	U	2	19.05	28	139.7	0	32	31.4	37.0
99	CHI1-12	S	4	22.22	34.9	160			21.0	24.8
99	CHI1-13	S	4	22.22	34.9	160			21.0	24.8
99	CHI1-14	S	4	22.22	34.9	160			21.0	24.8
99	CHI1-15	S	4	22.22	34.9	160			21.0	24.8
99	CHI1-16	S	4	22.22	34.9	160			21.0	24.8
99	CHI1-17	S	4	22.22	34.9	160			21.0	24.8
99	CHI1-18	S	4	22.22	34.9	160			21.0	24.8
99	CHI1-19	S	4	22.22	34.9	160			21.0	24.8
99	CHI1-20	S	4	22	35	90			32.4	38.2
99	CHI1-21	S	4	22	35	90			32.4	38.2
99	CHI1-22	S	4	22	35	90			32.4	38.2
99	CHI1-23	S	4	22	35	90			32.4	38.2
99	CHI1-24	S	4	22	35	90			32.4	24.8
99	CHI1-25	S	4	22	35	90			21.0	24.8
99	CHI1-26	S	4	22	35	190			21.0	37.5
99	CHI1-27	S	4	22	35	190			21.0	37.5
10	GER7-01	S	4	15.9	31.8	67.3	350		15.6	18.4
10	GER7-02	S	4	15.9	31.8	67.3	350		27.3	33.2
10	GER7-03	S	4	22.2	34.9	185.3	350	16	18.8	22.2
10	GER7-04	S	4	22.2	34.9	185.3	350	16	19.2	22.6
10	GER7-05	S	4	22.2	34.9	185.3	350	16	21.2	25.0
10	GER7-06	S	4	22.2	34.9	185.3	350	16	20.3	24.0
12	GER7-07	S	4	22	35	185	350	16	24.2	28.6
10	GER7-08	S	4	22.2	34.9	185.3	350	16	23.4	27.6
10	GER7-09	S	4	22.2	34.9	185.3	350	16	23.4	27.6
12	GER7-10	S	4	22	35	185	350	16	24.2	28.6
12	GER7-11	S	4	22	35	185	350	16	21.8	25.7
10	GER7-15	S	4	15.9	31.8	67.3	350		15.9	18.8
10	GER7-16	S	4	15.9	31.8	67.3	350		33.0	38.9
12	GER7-17	S	4	22	35	185	350	16	25.4	30.0
12	GER7-18	S	4	22	35	185	350	16	23.9	28.2
12	GER7-19	S	4	22	35	185	350	16	23.9	28.2
12	GER7-20	S	4	22	35	185	350	16	23.9	28.2
12	GER7-21	S	4	22	35	185	350	16	23.6	27.8
12	GER7-22	S	4	22	35	185	350	16	25.4	30.0

**Group Anchors, Tension, Uncracked Concrete, Static Loading, No Edge,
Shallow Embedment (≤ 188 mm), (Continued)**

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)		Ultimate Load Nu (kN)	Failure Mode
USA02-28	999	999	95	999	94029.84	138127.7	UNKNOWN	56.7	Cone
USA02-29	999	999	76	999	238754	408788.8	UNKNOWN	73.7	Cone
USA02-30	999	999	95	999	90524.91	132200.8	UNKNOWN	77.3	Cone
USA10-01	999	999	88.9	999	94838.52	142257.8	ARKANSAS	105.675584	Cone
USA10-02	999	999	180.34	999	179419	235160.8	ARKANSAS	148.38528	Cone
USA10-03	999	999	233.68	999	273580.1	351289.6	ARKANSAS	275.415712	Cone
USA10-04	999	999	358.14	999	240386.6	235160.8	ARKANSAS	262.823424	Cone
USA10-05	999	999	358.14	999	325741.3	351289.6	ARKANSAS	292.38928	Cone
CHI1-12	999	999	100	100	336400	921600	ZHAO	209.1	Cone
CHI1-13	999	999	100	100	336400	921600	ZHAO	196	Cone
CHI1-14	999	999	200	200	462400	921600	ZHAO	302.9	Cone
CHI1-15	999	999	200	200	462400	921600	ZHAO	335.4	Cone
CHI1-16	999	999	300	300	608400	921600	ZHAO	467.6	Cone
CHI1-17	999	999	300	300	608400	921600	ZHAO	359.5	Cone
CHI1-18	999	999	400	400	774400	921600	ZHAO	476.6	Cone
CHI1-19	999	999	400	400	774400	921600	ZHAO	356.8	Cone
CHI1-20	999	999	100	100	136900	291600	ZHAO2	116.5	Cone
CHI1-21	999	999	100	100	136900	291600	ZHAO2	102.8	Cone
CHI1-22	999	999	100	100	136900	291600	ZHAO2	105.2	Cone
CHI1-23	999	999	100	100	136900	291600	ZHAO2	115.4	Cone
CHI1-24	999	999	100	100	136900	291600	ZHAO2	98.9	Cone
CHI1-25	999	999	100	100	136900	291600	ZHAO2	95.1	Cone
CHI1-26	999	999	175	175	555025	1299600	ZHAO2	395	Cone
CHI1-27	999	999	175	175	555025	1299600	ZHAO2	377.1	Cone
GER7-01	40	40	80	80	79467.61	163054.4	REVISED	72	Cone
GER7-02	40	40	80	80	79467.61	163054.4	REVISED	129.6	Cone
GER7-03	999	999	100	100	430204.8	1236099	UNKNOWN	240	Cone
GER7-04	999	999	100	100	430204.8	1236099	UNKNOWN	253	Cone
GER7-05	999	999	100	100	430204.8	1236099	UNKNOWN	253	Cone
GER7-06	999	999	100	100	430204.8	1236099	UNKNOWN	264	Cone
GER7-07	850	850	100	100	429025	1232100	UNKNOWN	275	Cone
GER7-08	999	999	100	100	430204.8	1236099	UNKNOWN	278	Cone
GER7-09	999	999	100	100	430204.8	1236099	UNKNOWN	280	Cone
GER7-10	850	850	100	100	429025	1232100	UNKNOWN	290	Cone
GER7-11	850	850	100	100	429025	1232100	UNKNOWN	303	Cone
GER7-15	60	60	120	120	103619.6	163054.4	REVISED	70.4	Cone
GER7-16	60	60	120	120	103619.6	163054.4	REVISED	157.6	Cone
GER7-17	375	375	150	150	497025	1232100	UNKNOWN	308	Cone
GER7-18	575	575	150	150	497025	1232100	UNKNOWN	311	Cone
GER7-19	575	575	150	150	497025	1232100	UNKNOWN	313	Cone
GER7-20	575	575	150	150	497025	1232100	UNKNOWN	318	Cone
GER7-21	375	375	150	150	497025	1232100	UNKNOWN	330	Cone
GER7-22	375	375	150	150	497025	1232100	UNKNOWN	335	Cone

**Group Anchors, Tension, Uncracked Concrete, Static Loading, No Edge,
Shallow Embedment (≤ 188 mm), (Continued)**

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
USA02-28	58094.95	0.98	60776.00	0.93	55486.23	1.02
USA02-29	113591.92	0.65	129056.92	0.57	124683.76	0.59
USA02-30	88138.08	0.88	91836.42	0.84	83733.47	0.92
USA10-01	102158.82	1.03	105784.65	1.00	86300.99	1.22
USA10-02	170446.19	0.87	184008.83	0.81	162515.91	0.91
USA10-03	235086.82	1.17	261119.83	1.05	248907.78	1.11
USA10-04	223400.34	1.18	241176.62	1.09	183437.75	1.43
USA10-05	279908.82	1.04	310905.33	0.94	273842.86	1.07
CHI1-12	221080.27	0.95	249774.08	0.84	266659.29	0.78
CHI1-13	221080.27	0.89	249774.08	0.78	266659.29	0.74
CHI1-14	303886.79	1.00	343327.99	0.88	409805.94	0.74
CHI1-15	303886.79	1.10	343327.99	0.98	409805.94	0.82
CHI1-16	399837.21	1.17	451731.72	1.04	553716.78	0.84
CHI1-17	399837.21	0.90	451731.72	0.80	553716.78	0.65
CHI1-18	508931.51	0.94	574985.28	0.83	596685.89	0.80
CHI1-19	508931.51	0.70	574985.28	0.62	596685.89	0.60
CHI1-20	148881.94	0.78	154506.34	0.75	158460.45	0.74
CHI1-21	148881.94	0.69	154506.34	0.67	158460.45	0.65
CHI1-22	148881.94	0.71	154506.34	0.68	158460.45	0.66
CHI1-23	148881.94	0.78	154506.34	0.75	158460.45	0.73
CHI1-24	119959.92	0.82	124491.72	0.79	127677.70	0.77
CHI1-25	119959.92	0.79	124491.72	0.76	127677.70	0.74
CHI1-26	411603.94	0.96	474021.18	0.83	567076.74	0.70
CHI1-27	411603.94	0.92	474021.18	0.80	567076.74	0.66
GER7-01	69361.69	1.04	68002.56	1.06	66272.23	1.09
GER7-02	93170.80	1.42	91345.12	1.42	89020.85	1.46
GER7-03	248566.27	0.97	285506.48	0.84	310582.77	0.77
GER7-04	250795.60	1.01	288067.13	0.88	313368.32	0.81
GER7-05	263776.26	0.96	302976.88	0.84	329587.61	0.77
GER7-06	258446.90	1.02	296855.50	0.89	322928.58	0.82
GER7-07	281583.95	0.98	323375.32	0.85	351798.52	0.78
GER7-08	277153.42	1.00	318342.06	0.87	346302.33	0.80
GER7-09	277153.42	1.01	318342.06	0.88	346302.33	0.81
GER7-10	281583.95	1.03	323375.32	0.90	351798.52	0.82
GER7-11	266926.35	1.14	306542.30	0.99	333485.96	0.91
GER7-15	91420.06	0.77	89628.69	0.79	91601.50	0.77
GER7-16	131503.52	1.20	128926.72	1.22	131764.52	1.20
GER7-17	334103.59	0.92	383689.68	0.80	445704.12	0.69
GER7-18	323925.45	0.96	372000.95	0.84	432126.18	0.72
GER7-19	323925.45	0.97	372000.95	0.84	432126.18	0.72
GER7-20	323925.45	0.98	372000.95	0.85	432126.18	0.74
GER7-21	321619.90	1.03	369353.22	0.89	429050.51	0.77
GER7-22	334103.59	1.00	383689.68	0.87	445704.12	0.75

**Group Anchors, Tension, Uncracked Concrete, Static Loading, No Edge,
Shallow Embedment (<=188 mm), (Continued)**

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc fcc200 (MPa)	
12	GER7-23	S	4	22	35	185	350	16	28.1	33.1
12	GER7-24	S	4	22	35	185	350	16	23.6	27.8
12	GER7-25	S	4	22	35	185	350	16	28.1	33.1
10	GER7-26	S	4	15.9	31.8	67.3	350		15.2	17.9
10	GER7-27	S	4	15.9	31.8	67.3	350		28.1	33.2
12	GER7-28	S	4	22	35	185	350	16	24.5	28.9
12	GER7-29	S	4	22	35	185	350	16	24.5	28.9
12	GER7-30	S	4	22	35	185	350	16	24.5	28.9
12	GER7-31	S	4	22	35	185	350	16	20.3	24.0
12	GER7-32	S	4	22	35	185	350	16	20.3	24.0
6	USA03-01	E-SD	4	12.7	12.7	51.6			34.5	40.7
6	USA03-02	E-SD	4	12.7	12.7	51.6			26.9	31.7
6	USA03-03	E-SD	4	12.7	12.7	51.6			28.0	33.0
6	USA03-04	E-SD	4	12.7	12.7	51.6			20.7	24.4
6	USA03-05	E-SD	4	12.7	12.7	51.6			33.1	39.1
6	USA03-06	E-SD	4	19	19	82.6			34.5	40.7
6	USA03-07	E-SD	4	19	19	82.6			28.0	33.0
6	USA03-08	E-SD	4	19	19	82.6			20.7	24.4
6	USA03-09	E-SD	4	19	19	82.6			33.1	39.1
6	USA03-10	E-TC	4	12.7	12.7	88.9			34.5	40.7
6	USA07-01	S	4	15.9	63.5	161.9	345		27.5	32.5
6	USA07-02	S	4	15.9	63.5	161.9	345		27.5	32.5
6	USA07-03	S	4	15.9	63.5	161.9	345		30.3	35.8
25	USA08-01	U	4	9.525	9.525	117.475	861.875		29.4	34.7
25	USA08-02	U	4	9.525	9.525	117.475	861.875		29.4	34.7
25	USA08-07	U	4	12.7	12.7	153.9875	861.875		29.4	34.7
25	USA08-08	U	4	12.7	12.7	153.9875	861.875		29.4	34.7
25	USA11-01	U	4	6.35	12.7	38.1		32	43.8	51.7
25	USA11-03	U	4	9.525	15.875	63.5		32	31.6	37.3
25	USA11-04	U	4	12.7	18	88.9		32	30.2	35.6
25	USA11-05	U	4	12.7	18	88.9		32	31.6	37.3
25	USA11-06	U	4	12.7	18	88.9		32	30.2	35.6
25	USA11-07	U	4	12.7	18	88.9		32	31.6	37.3
25	USA11-08	U	4	15.875	23	114.3		32	31.6	37.3
25	USA11-09	U	4	15.875	23	114.3		32	31.6	37.3
25	USA11-10	U	4	19.05	28	139.7		32	30.2	35.6
25	USA11-11	U	4	19.05	28	139.7		32	30.2	35.6
25	USA11-12	U	4	19.05	28	139.7		32	30.2	35.6
25	USA11-13	U	4	19.05	28	139.7		32	30.2	35.6
25	USA11-14	U	4	19.05	28	139.7		32	31.6	37.3
25	USA11-15	U	4	19.05	28	139.7		32	31.6	37.3

**Group Anchors, Tension, Uncracked Concrete, Static Loading, No Edge,
Shallow Embedment (≤ 188 mm), (Continued)**

Test Number	Geometry						Remarks	Test Results Ultimate Load Nu (kN)	Failure Mode
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
GER7-23	375	375	150	150	497025	1232100	UNKNOWN	335	Cone
GER7-24	375	375	150	150	497025	1232100	UNKNOWN	342	Cone
GER7-25	375	375	150	150	497025	1232100	UNKNOWN	351	Cone
GER7-26	80	80	160	160	130971.6	163054.4	REVISED	118	Cone
GER7-27	80	80	160	160	130971.6	163054.4	REVISED	183.2	Cone
GER7-28	640	640	270	270	680625	1232100	UNKNOWN	390	Cone
GER7-29	640	640	270	270	680625	1232100	UNKNOWN	433	Cone
GER7-30	640	640	270	270	680625	1232100	UNKNOWN	439	Cone
GER7-31	530	530	400	400	912025	1232100	UNKNOWN	627	Cone
GER7-32	530	530	400	400	912025	1232100	UNKNOWN	628	Cone
USA03-01	999	999	76	76	53268.64	95852.16	UNKNOWN	111.4	Cone
USA03-02	999	999	127	127	79411.24	95852.16	UNKNOWN	109.4	Cone
USA03-03	999	999	127	127	79411.24	95852.16	UNKNOWN	105	Cone
USA03-04	999	999	178	178	110755.8	95852.16	UNKNOWN	128.1	Cone
USA03-05	999	999	178	178	110755.8	95852.16	UNKNOWN	145.8	Cone
USA03-06	999	999	102	102	1223360	245619.4	UNKNOWN	209.8	Cone
USA03-07	999	999	165	165	170403.8	245619.4	UNKNOWN	178	Cone
USA03-08	999	999	229	229	227338.2	245619.4	UNKNOWN	223.4	Cone
USA03-09	999	999	229	229	227338.2	245619.4	UNKNOWN	280.4	Cone
USA03-10	999	999	102	102	135939.7	284515.6	UNKNOWN	175.6	Cone
USA07-01	406	406	51	51	288046.9	943618	UNKNOWN	265.5	Cone
USA07-02	381	381	76	76	315506.9	943618	UNKNOWN	280.2	Cone
USA07-03	356	356	102	102	345391.3	943618	UNKNOWN	281.6	Cone
USA08-01	999	999	101.6	101.6	206138.7	496813.5	PERRY TESTS	212.7	Cone
USA08-02	999	999	101.6	101.6	206138.7	496813.5	PERRY TESTS	203.4	Cone
USA08-07	999	999	101.6	101.6	317602.7	853637.4	PERRY TESTS	314.4	Cone
USA08-08	999	999	101.6	101.6	317602.7	853637.4	PERRY TESTS	296.8	Cone
USA11-01	999	999	76.2	76.2	36290.25	52257.96	ARKANSAS	59.8	Cone
USA11-03	999	999	127	127	100806.3	145161	ARKANSAS	145.6	Cone
USA11-04	999	999	88.9	88.9	126451.4	284515.6	ARKANSAS	127.3	Cone
USA11-05	999	999	165.1	165.1	186451.2	284515.6	ARKANSAS	248.0	Cone
USA11-06	999	999	177.8	177.8	197580.3	284515.6	ARKANSAS	238.2	Cone
USA11-07	999	999	254	254	271128.5	284515.6	ARKANSAS	271.6	Cone
USA11-08	999	999	190.5	190.5	284515.6	470321.6	ARKANSAS	276.5	Cone
USA11-09	999	999	254	254	356289.6	470321.6	ARKANSAS	405.2	Cone
USA11-10	999	999	203.2	203.2	387257.3	702579.2	ARKANSAS	348.5	Cone
USA11-11	999	999	241.3	241.3	436128.2	702579.2	ARKANSAS	424.1	Cone
USA11-12	999	999	304.8	304.8	524031.2	702579.2	ARKANSAS	464.7	Cone
USA11-13	999	999	355.6	355.6	600160.1	702579.2	ARKANSAS	522.8	Cone
USA11-14	999	999	254	254	453063.6	702579.2	ARKANSAS	424.4	Cone
USA11-15	999	999	254	254	453063.6	702579.2	ARKANSAS	427.1	Cone

**Group Anchors, Tension, Uncracked Concrete, Static Loading, No Edge,
Shallow Embedment (≤ 188 mm), (Continued)**

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
GER7-23	350941.33	0.95	403026.39	0.83	468166.16	0.72
GER7-24	321619.90	1.06	369353.22	0.93	429050.51	0.80
GER7-25	350941.33	1.00	403026.39	0.87	468166.16	0.75
GER7-26	112752.01	1.05	110542.65	1.07	107405.48	1.10
GER7-27	153556.01	1.20	150547.10	1.22	146274.61	1.25
GER7-28	449054.55	0.87	515701.12	0.76	655966.11	0.59
GER7-29	449054.55	0.96	515701.12	0.84	655966.11	0.66
GER7-30	449054.55	0.98	515701.12	0.85	655966.11	0.67
GER7-31	548345.96	1.14	629728.89	1.00	764836.06	0.82
GER7-32	548345.96	1.15	629728.89	1.00	764836.06	0.82
USA03-01	70872.14	1.57	66222.33	1.68	62568.95	1.78
USA03-02	93243.45	1.17	87125.90	1.26	71775.86	1.52
USA03-03	95136.18	1.10	88894.44	1.18	73232.82	1.43
USA03-04	98742.37	1.30	92264.04	1.39	62971.45	2.03
USA03-05	124996.26	1.17	116795.45	1.25	79714.47	1.83
USA03-06	128670.32	1.63	133151.96	1.58	139421.09	1.50
USA03-07	161353.32	1.10	166973.32	1.07	177789.20	1.00
USA03-08	185101.09	1.21	191548.23	1.17	159278.36	1.40
USA03-09	234316.27	1.20	242477.59	1.16	201627.72	1.39
USA03-10	137792.06	1.27	144535.61	1.21	146912.49	1.20
USA07-01	215431.69	1.23	243733.14	1.09	256468.19	1.04
USA07-02	235969.16	1.19	266968.63	1.05	295294.56	0.95
USA07-03	271117.54	1.04	306734.48	0.92	354241.55	0.79
USA08-01	187127.25	1.14	202853.17	1.05	189566.93	1.12
USA08-02	187127.25	1.09	202853.17	1.00	189566.93	1.07
USA08-07	251820.84	1.25	283191.14	1.11	278680.10	1.13
USA08-08	251820.84	1.18	283191.14	1.05	278680.10	1.06
USA11-01	70570.23	0.85	60067.99	1.00	50012.60	1.20
USA11-03	129045.61	1.13	124933.58	1.17	113109.93	1.29
USA11-04	133566.62	0.95	138307.18	0.92	128739.70	0.99
USA11-05	201723.75	1.23	208883.35	1.19	206770.33	1.20
USA11-06	208697.85	1.14	216104.97	1.10	210604.35	1.13
USA11-07	293337.04	0.93	303748.19	0.89	223142.38	1.22
USA11-08	271472.31	1.02	293073.74	0.94	317091.59	0.87
USA11-09	339955.97	1.19	367006.74	1.10	368484.61	1.10
USA11-10	326307.24	1.07	362441.81	0.96	416206.00	0.84
USA11-11	367486.38	1.15	408181.03	1.04	474362.06	0.89
USA11-12	441554.45	1.05	490451.25	0.95	536544.99	0.87
USA11-13	505701.48	1.03	561701.78	0.93	537050.03	0.97
USA11-14	391024.18	1.09	434325.36	0.98	503153.91	0.84
USA11-15	391024.18	1.09	434325.36	0.98	503153.91	0.85
	Mean	1.081	Mean	1.057	Mean	1.188
	COV	0.192	COV	0.225	COV	0.331

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Deep Embedment (>188mm)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc fcc200 (MPa)	
99	CHI1-10	S	1	22	35	190			21.0	24.8
99	CHI1-11	S	1	22	35	190			21.0	24.8
99	CHI1-9	S	1	22	35	190			21.0	24.8
13	USA05-12	S	1	22.2	34.9	193.6	345		33.7	39.8
7	GER3-357	UE	1	24	32	200	640	16	35.6	42.0
99	USA12-1	S	1	19.5	31.75	203.6			36.5	43.1
99	USA12-2	S	1	19.5	31.75	203.6			36.5	43.1
99	USA12-3	S-U	1	22.22	34.9	203.6			33.7	39.8
7	GER3-358	UE	1	24	24	220	1144	16	28.1	33.2
7	GER3-359	UE	1	24	32.3	220	900	16	35.6	42.0
7	GER3-360	UE	1	24	24	220	1144	16	23.4	27.6
25	USA09-54	U	1	31.75	50.8	241.3	0	32	31.3	36.9
25	USA09-55	U	1	31.75	50.8	241.3	0	32	31.3	36.9
10	GER4-149	S	1	30	45	250	953	16	37.3	44.0
10	GER4-150	S	1	30	45	250	953	16	28.8	34.0
10	GER4-151	S	1	30	45	250	953	16	37.3	44.0
10	GER4-152	S	1	30	45	250	953	16	37.3	44.0
10	GER4-153	S	1	30	45	250	953	16	28.8	34.0
10	GER4-154	S	1	30	45	250	953	16	60.1	70.9
10	GER4-155	S	1	30	45	250	953	16	59.7	70.4
10	GER4-156	S	1	30	45	250	953	16	60.1	70.9
10	GER4-157	S	1	30	45	250	953	16	60.9	71.9
10	GER4-158	S	1	30	45	250	953	16	60.9	71.9
10	GER4-159	S	1	30	45	250	953	16	60.9	71.9
13	USA05-13	S	1	25.4	41.2	251.4	827		29.7	35.1
11	GER4-160	S	1	30	45	260	900	16	18.8	22.2
11	GER4-161	S	1	30	45	260	900	16	18.8	22.2
11	GER4-162	S	1	30	45	260	900	16	18.8	22.2
11	GER4-163	S	1	30	45	260	900	16	18.8	22.2
11	GER4-164	S	1	30	45	260	900	16	18.8	22.2
11	GER4-165	S	1	30	45	260	900	16	18.8	22.2
11	GER4-166	S	1	30	45	260	900	16	18.8	22.2
11	GER4-167	S	1	30	45	260	900	16	18.8	22.2
11	GER4-168	S	1	30	45	260	900	16	23.5	27.7
25	USA09-53	U	1	31.75	50.8	279.4	0	32	36.0	42.5
25	USA09-57	U	1	31.75	50.8	279.4	0	32	36.0	42.5
25	USA09-59	U	1	31.75	50.8	279.4	0	32	36.0	42.5
25	USA09-60	U	1	31.75	50.8	279.4	0	32	36.0	42.5
25	USA09-58	U	1	31.75	50.8	304.8	0	32	29.5	34.8
11	GER4-169	S	1	40	60	355	900	16	18.8	22.2
11	GER4-170	S	1	40	60	355	900	16	18.8	22.2
11	GER4-171	S	1	40	60	355	900	16	18.8	22.2
11	GER4-172	S	1	40	60	355	900	16	18.8	22.2

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Deep Embedment (>188mm), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)		Ultimate Load Nu (kN)	Failure Mode
CHI1-10	900	999	999	999	324900	324900	ZHAO	180.2	Cone
CHI1-11	900	999	999	999	324900	324900	ZHAO	187.8	Cone
CHI1-9	900	999	999	999	324900	324900	ZHAO	201.6	Cone
USA05-12	305	999	999	999	337328.6	337328.6	MSF B1-1	191.2	Cone
GER3-357	999	999	999	999	360000	360000	UNKNOWN	258.8	Cone
USA12-1	999	999	999	999	373076.6	373076.6	KLINGNER	272	Cone
USA12-2	999	999	999	999	373076.6	373076.6	KLINGNER	280.6	Cone
USA12-3	999	999	999	999	373076.6	373076.6	KLINGNER	329.2	Cone
GER3-358	330	999	999	999	435600	435600	UNKNOWN	235.3	Cone
GER3-359	999	999	999	999	435600	435600	UNKNOWN	257.2	Cone
GER3-360	999	999	999	999	435600	435600	UNKNOWN	240.3	Cone
USA09-54	999	999	999	999	524031.2	524031.2	ARKANSAS	497.7	Cone
USA09-55	999	999	999	999	524031.2	524031.2	ARKANSAS	542.5	Cone
GER4-149	999	999	999	999	562500	562500	UNKNOWN	411.8	Cone
GER4-150	999	999	999	999	562500	562500	UNKNOWN	412.1	Cone
GER4-151	999	999	999	999	562500	562500	UNKNOWN	415.1	Cone
GER4-152	999	999	999	999	562500	562500	UNKNOWN	435.6	Cone
GER4-153	999	999	999	999	562500	562500	UNKNOWN	436.4	Cone
GER4-154	999	999	999	999	562500	562500	UNKNOWN	499	Cone
GER4-155	999	999	999	999	562500	562500	UNKNOWN	535	Cone
GER4-156	999	999	999	999	562500	562500	UNKNOWN	559.1	Cone
GER4-157	999	999	999	999	562500	562500	UNKNOWN	617.5	Cone
GER4-158	999	999	999	999	562500	562500	UNKNOWN	620.5	Cone
GER4-159	999	999	999	999	562500	562500	UNKNOWN	624.2	Cone
USA05-13	457	999	999	999	568817.6	568817.6	CBF	435.9	Cone
GER4-160	545	999	999	999	608400	608400	UNKNOWN	294.3	Cone
GER4-161	547	999	999	999	608400	608400	UNKNOWN	302.1	Cone
GER4-162	550	999	999	999	608400	608400	UNKNOWN	262.3	Cone
GER4-163	550	999	999	999	608400	608400	UNKNOWN	266.6	Cone
GER4-164	550	999	999	999	608400	608400	UNKNOWN	270.7	Cone
GER4-165	550	999	999	999	608400	608400	UNKNOWN	273.6	Cone
GER4-166	550	999	999	999	608400	608400	UNKNOWN	278	Cone
GER4-167	550	999	999	999	608400	608400	UNKNOWN	285.9	Cone
GER4-168	700	999	999	999	608400	608400	UNKNOWN	290	Cone
USA09-53	999	999	999	999	702579.2	702579.2	ARKANSAS	662.0	Cone
USA09-57	999	999	999	999	702579.2	702579.2	ARKANSAS	527.6	Cone
USA09-59	999	999	999	999	702579.2	702579.2	ARKANSAS	647.1	Cone
USA09-60	999	999	999	999	702579.2	702579.2	ARKANSAS	632.1	Cone
USA09-58	999	999	999	999	836127.4	836127.4	ARKANSAS	696.6	Cone
GER4-169	726	999	999	999	1134225	1134225	UNKNOWN	450.6	Cone
GER4-170	731	999	999	999	1134225	1134225	UNKNOWN	452	Cone
GER4-171	731	999	999	999	1134225	1134225	UNKNOWN	465.7	Cone
GER4-172	731	999	999	999	1134225	1134225	UNKNOWN	468	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Deep Embedment (>188mm), (Continued)

Test Number	Comparison of Actual Test Results with different Methods							
	CC		Theoretical		ACI		CC Variation	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
CHI1-10	195941.71	0.92	225655.08	0.80	204498.48	0.88	195941.71	0.92
CHI1-11	195941.71	0.96	225655.08	0.83	204498.48	0.92	195941.71	0.96
CHI1-9	195941.71	1.03	225655.08	0.89	204498.48	0.99	195941.71	1.03
USA05-12	255311.41	0.75	294599.02	0.65	268078.02	0.71	255311.41	0.75
GER3-357	275385.01	0.94	318810.29	0.81	288848.91	0.90	275385.01	0.94
USA12-1	286533.86	0.95	332305.29	0.82	302175.14	0.90	286533.86	0.95
USA12-2	286533.86	0.98	332305.29	0.84	302175.14	0.93	286533.86	0.98
USA12-3	275346.05	1.20	319330.32	1.03	294263.10	1.12	275346.05	1.20
GER3-358	282470.91	0.83	330027.57	0.71	297104.80	0.79	282470.91	0.83
GER3-359	317708.86	0.81	371198.17	0.69	345535.51	0.74	317708.86	0.81
GER3-360	257548.62	0.93	300909.37	0.80	270891.37	0.89	257548.62	0.93
USA09-54	342060.89	1.46	402957.16	1.24	411257.45	1.21	342060.89	1.46
USA09-55	342060.89	1.59	402957.16	1.35	411257.45	1.32	342060.89	1.59
GER4-149	393919.07	1.05	465439.70	0.88	469911.94	0.88	393919.07	1.05
GER4-150	346274.20	1.19	409144.34	1.01	413075.65	1.00	346274.20	1.19
GER4-151	393919.07	1.05	465439.70	0.89	469911.94	0.88	393919.07	1.05
GER4-152	393919.07	1.11	465439.70	0.94	469911.94	0.93	393919.07	1.11
GER4-153	346274.20	1.26	409144.34	1.07	413075.65	1.06	346274.20	1.26
GER4-154	500038.90	1.00	590826.82	0.84	596503.86	0.84	500038.90	1.00
GER4-155	498272.59	1.07	588739.83	0.91	594396.81	0.90	498272.59	1.07
GER4-156	500038.90	1.12	590826.82	0.95	596503.86	0.94	500038.90	1.12
GER4-157	503552.92	1.23	594978.85	1.04	600695.78	1.03	503552.92	1.23
GER4-158	503552.92	1.23	594978.85	1.04	600695.78	1.03	503552.92	1.23
GER4-159	503552.92	1.24	594978.85	1.05	600695.78	1.04	503552.92	1.24
USA05-13	354790.62	1.23	419401.69	1.04	418621.25	1.04	355127.62	1.23
GER4-160	296761.23	0.99	351771.00	0.84	358903.58	0.82	298746.52	0.99
GER4-161	296761.23	1.02	351771.00	0.86	358903.58	0.84	298746.52	1.01
GER4-162	296761.23	0.88	351771.00	0.75	358903.58	0.73	298746.52	0.88
GER4-163	296761.23	0.90	351771.00	0.76	358903.58	0.74	298746.52	0.89
GER4-164	296761.23	0.91	351771.00	0.77	358903.58	0.75	298746.52	0.91
GER4-165	296761.23	0.92	351771.00	0.78	358903.58	0.76	298746.52	0.92
GER4-166	296761.23	0.94	351771.00	0.79	358903.58	0.77	298746.52	0.93
GER4-167	296761.23	0.96	351771.00	0.81	358903.58	0.80	298746.52	0.96
GER4-168	331490.10	0.87	392937.46	0.74	400904.74	0.72	333707.72	0.87
USA09-53	457249.93	1.45	545069.77	1.21	577530.57	1.15	465974.73	1.42
USA09-57	457249.93	1.15	545069.77	0.97	577530.57	0.91	465974.73	1.13
USA09-59	457249.93	1.42	545069.77	1.19	577530.57	1.12	465974.73	1.39
USA09-60	457249.93	1.38	545069.77	1.16	577530.57	1.09	465974.73	1.36
USA09-58	471486.54	1.48	565629.45	1.23	614017.89	1.13	487643.08	1.43
GER4-169	473466.96	0.95	573750.90	0.79	666777.68	0.68	502549.36	0.90
GER4-170	473466.96	0.95	573750.90	0.79	666777.68	0.68	502549.36	0.90
GER4-171	473466.96	0.98	573750.90	0.81	666777.68	0.70	502549.36	0.93
GER4-172	473466.96	0.99	573750.90	0.82	666777.68	0.70	502549.36	0.93

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Deep Embedment (>188mm), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc fcc200 (MPa)	
11	GER4-173	S	1	40	60	355	900	16	18.8	22.2
11	GER4-174	S	1	40	60	355	900	16	18.8	22.2
11	GER4-175	S	1	40	60	355	900	16	18.8	22.2
11	GER4-176	S	1	40	60	355	900	16	18.8	22.2
11	GER4-177	S	1	40	60	355	900	16	18.8	22.2
11	GER4-178	S	1	40	60	355	900	16	18.8	22.2
99	CSFR1-47	S-U	1	72	72	450			27.6	32.6
99	CSFR1-48	S-U	1	72	72	450			25.2	29.7
99	CSFR1-49	S-U	1	72	72	450			28.1	33.2
99	CSFR1-50	S-U	1	72	72	450			24.8	29.3
99	CSFR1-51	S-U	1	72	72	450			24.0	28.3
99	CSFR1-52	S-U	1	72	72	450			29.2	34.4
11	GER4-180	S	1	50	80	525	900	16	16.2	19.1
11	GER4-181	S	1	50	80	525	900	16	16.2	19.1
11	GER4-182	S	1	50	80	525	900	16	16.2	19.1
11	GER4-183	S	1	50	80	525	900	16	20.1	23.7
11	GER4-184	S	1	50	80	525	900	16	20.1	23.7
11	GER4-185	S	1	50	80	525	900	16	16.2	19.1
11	GER4-186	S	1	50	80	525	900	16	20.1	23.7
11	GER4-187	S	1	50	80	525	900	16	20.1	23.7
11	GER4-188	S	1	50	80	525	900	16	23.5	27.7
11	GER4-189	S	1	50	80	525	900	16	16.2	19.1
11	GER4-190	S	1	50	80	525	900	16	20.1	23.7
11	GER4-191	S	1	50	80	525	900	16	20.1	23.7
11	GER4-192	S	1	50	80	525	900	16	16.2	19.1
30	BUCK1-14	U	1	31.75	31.75	203.2			22.9	27.0
30	BUCK-22	U	1	31.75	31.75	203.2			20.5	24.2
30	BUCK-26	U	1	31.75	31.75	203.2			18.2	21.5
30	BUCK-27	U	1	31.75	31.75	203.2			24.8	29.3
30	BUCK-24	U	1	31.75	31.75	304.8			20.7	24.4
30	BUCK-25	U	1	31.75	31.75	304.8			20.7	24.4
30	BUCK-29	U	1	31.75	31.75	304.8			21.2	25.1
30	BUCK-12	S	1	31.75	47.62	203.2			19.7	23.2
30	BUCK-13	S	1	31.75	47.62	304.8			20.3	23.9

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Deep Embedment (>188mm), (Continued)

Test Number	Geometry						Remarks	Test Results Ultimate Load Nu (kN)	Failure Mode
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
GER4-173	731	999	999	999	1134225	1134225	UNKNOWN	479.7	Cone
GER4-174	733	999	999	999	1134225	1134225	UNKNOWN	470.5	Cone
GER4-175	733	999	999	999	1134225	1134225	UNKNOWN	475.6	Cone
GER4-176	738	999	999	999	1134225	1134225	UNKNOWN	421.6	Cone
GER4-177	999	999	999	999	1134225	1134225	UNKNOWN	395	Cone
GER4-178	999	999	999	999	1134225	1134225	UNKNOWN	439.3	Cone
CSFR1-47	999	999	999	999	1822500	1822500	K	1087	Cone
CSFR1-48	999	999	999	999	1822500	1822500	K	1108	Cone
CSFR1-49	999	999	999	999	1822500	1822500	K	1162	Cone
CSFR1-50	999	999	999	999	1822500	1822500	K	937.2	Cone
CSFR1-51	999	999	999	999	1822500	1822500	K	989	Cone
CSFR1-52	999	999	999	999	1822500	1822500	K	1221	Cone
GER4-180	999	999	999	999	2480625	2480625	UNKNOWN	731.3	Cone
GER4-181	999	999	999	999	2480625	2480625	UNKNOWN	770.1	Cone
GER4-182	999	999	999	999	2480625	2480625	UNKNOWN	841.9	Cone
GER4-183	999	999	999	999	2480625	2480625	UNKNOWN	843.6	Cone
GER4-184	999	999	999	999	2480625	2480625	UNKNOWN	860.3	Cone
GER4-185	999	999	999	999	2480625	2480625	UNKNOWN	861.7	Cone
GER4-186	999	999	999	999	2480625	2480625	UNKNOWN	884	Cone
GER4-187	999	999	999	999	2480625	2480625	UNKNOWN	917.6	Cone
GER4-188	999	999	999	999	2480625	2480625	UNKNOWN	885.2	Cone
GER4-189	999	999	999	999	2480625	2480625	UNKNOWN	838.6	Cone
GER4-190	999	999	999	999	2480625	2480625	UNKNOWN	852.4	Cone
GER4-191	999	999	999	999	2480625	2480625	UNKNOWN	919.3	Cone
GER4-192	999	999	999	999	2480625	2480625	UNKNOWN	767.2	Cone
BUCK1-14	999	999	999	999	371612.2	371612.2	BUCKNELL	318.62	Cone
BUCK-22	999	999	999	999	371612.2	371612.2	BUCKNELL	347.1	Cone
BUCK-26	999	999	999	999	371612.2	371612.2	BUCKNELL	315.95	Cone
BUCK-27	999	999	999	999	371612.2	371612.2	BUCKNELL	302.6	Cone
BUCK-24	999	999	999	999	836127.4	836127.4	BUCKNELL	525.1	Cone
BUCK-25	999	999	999	999	836127.4	836127.4	BUCKNELL	577.17	Cone
BUCK-29	999	999	999	999	836127.4	836127.4	BUCKNELL	551.36	Cone
BUCK-12	999	999	999	999	371612.2	371612.2	BUCKNELL	239.41	Cone
BUCK-13	999	999	999	999	836127.4	836127.4	BUCKNELL	489.5	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Deep Embedment (>188mm), (Continued)

Test Number	Comparison of Actual Test Results with different Methods							
	CC		Theoretical		ACI		CC Variation	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
GER4-173	473466.96	1.01	573750.90	0.84	666777.68	0.72	502549.36	0.95
GER4-174	473466.96	0.99	573750.90	0.82	666777.68	0.71	502549.36	0.94
GER4-175	473466.96	1.00	573750.90	0.83	666777.68	0.71	502549.36	0.95
GER4-176	473466.96	0.89	573750.90	0.73	666777.68	0.63	502549.36	0.84
GER4-177	473466.96	0.83	573750.90	0.69	666777.68	0.59	502549.36	0.79
GER4-178	473466.96	0.93	573750.90	0.77	666777.68	0.66	502549.36	0.87
CSFR1-47	818838.45	1.33	1005463.99	1.08	1288308.68	0.84	904887.48	1.20
CSFR1-48	781569.59	1.42	959701.00	1.15	1229672.20	0.90	863702.16	1.28
CSFR1-49	826339.42	1.41	1014674.54	1.15	1300110.22	0.89	913176.70	1.27
CSFR1-50	776288.66	1.21	953216.46	0.98	1221363.51	0.77	857866.27	1.09
CSFR1-51	762926.41	1.30	936808.75	1.06	1200340.19	0.82	843099.83	1.17
CSFR1-52	841140.71	1.45	1032849.26	1.18	1323397.63	0.92	929533.41	1.31
GER4-180	789816.67	0.93	976830.17	0.75	1333397.01	0.55	895990.91	0.82
GER4-181	789816.67	0.98	976830.17	0.79	1333397.01	0.58	895990.91	0.86
GER4-182	789816.67	1.07	976830.17	0.86	1333397.01	0.63	895990.91	0.94
GER4-183	879799.65	0.96	1088119.40	0.78	1485309.52	0.57	998070.21	0.85
GER4-184	879799.65	0.98	1088119.40	0.79	1485309.52	0.58	998070.21	0.86
GER4-185	789816.67	1.09	976830.17	0.88	1333397.01	0.65	895990.91	0.96
GER4-186	879799.65	1.00	1088119.40	0.81	1485309.52	0.60	998070.21	0.89
GER4-187	879799.65	1.04	1088119.40	0.84	1485309.52	0.62	998070.21	0.92
GER4-188	951151.06	0.93	1176365.46	0.75	1605767.55	0.55	1079013.32	0.82
GER4-189	789816.67	1.06	976830.17	0.86	1333397.01	0.63	895990.91	0.94
GER4-190	879799.65	0.97	1088119.40	0.78	1485309.52	0.57	998070.21	0.85
GER4-191	879799.65	1.04	1088119.40	0.84	1485309.52	0.62	998070.21	0.92
GER4-192	789816.67	0.97	976830.17	0.79	1333397.01	0.58	895990.91	0.86
BUCK1-14	226161.41	1.41	262237.95	1.22	238335.95	1.34	226161.41	1.41
BUCK-22	214250.83	1.62	248427.44	1.40	225784.21	1.54	214250.83	1.62
BUCK-26	201684.89	1.57	233857.01	1.35	212541.83	1.49	201684.89	1.57
BUCK-27	235509.24	1.28	273076.92	1.11	248186.99	1.22	235509.24	1.28
BUCK-24	394981.72	1.33	473848.71	1.11	486829.14	1.08	408516.65	1.29
BUCK-25	394981.72	1.46	473848.71	1.22	486829.14	1.19	408516.65	1.41
BUCK-29	400206.04	1.38	480116.19	1.15	493268.30	1.12	413919.99	1.33
BUCK-12	209559.13	1.14	242987.33	0.99	235756.87	1.02	209559.13	1.14
BUCK-13	390997.24	1.25	469068.65	1.04	504642.95	0.97	404395.63	1.21
	Mean =	1.110	Mean =	0.929	Mean =	0.867	Mean =	1.068
	COV =	0.189	COV =	0.193	COV =	0.257	COV =	0.201

**Single Anchors, Tension, Uncracked Concrete, Static Loading, Edge Effect,
Deep Embedment (>188mm)**

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc fcc200 (MPa)	
14	SWE03-08	E-TC	1	30	105	315	736		48.1	56.7
14	SWE03-02	E-TC	1	27	45	322	736		26.2	30.9
14	SWE03-03	E-TC	1	27	45	329	736		26.2	30.9
14	SWE03-05	E-TC	1	30	52	344	736		26.2	30.9
14	SWE03-06	E-TC	1	30	52	344	736		26.2	30.9
6	USA01-16	UE	1	15	15	193.8			25.0	29.5
6	USA01-25	UE	1	15	15	193.8			21.4	25.2
6	USA01-27	UE	1	15	15	193.8			21.2	25.0
6	USA01-30	UE	1	15	15	193.8			21.4	25.2
7	GER1-35	UE	1	24	24	220	1144	16	23.4	27.6
6	USA01-18	UE	1	19	19	222.3			25.0	29.5
6	USA01-26	UE	1	19	19	222.3			25.0	29.5
6	USA01-28	UE	1	19	19	222.3			25.0	29.5
6	USA01-29	UE	1	19	19	222.3			25.0	29.5
25	USA12-11	U	1	31.75	50.8	241.3		32	31.3	36.9
11	GER5-46	S	1	30	45	260	900	16	20.1	23.7
11	GER5-47	S	1	30	45	260	900	16	20.1	23.7
11	GER5-48	S	1	30	45	260	900	16	20.1	23.7
11	GER5-49	S	1	30	45	260	900	16	20.1	23.7
11	GER5-56	S	1	30	45	260	900	16	16.2	19.1
11	GER5-57	S	1	30	45	260	900	16	16.2	19.1
25	USA12-12	U	1	31.75	50.8	279.4		32	36.0	42.5
25	USA12-13	U	1	31.75	50.8	279.4		32	36.0	42.5
25	USA12-14	U	1	31.75	50.8	279.4		32	36.0	42.5
25	USA12-15	U	1	31.75	50.8	279.4		32	36.0	42.5
25	USA12-16	U	1	31.75	50.8	279.4		32	36.0	42.5
11	GER5-50	S	1	40	60	355	900	16	20.1	23.7
11	GER5-51	S	1	40	60	355	900	16	20.1	23.7
11	GER5-58	S	1	40	60	355	900	16	16.2	19.1
11	GER5-59	S	1	40	60	355	900	16	16.2	19.1
11	GER5-60	S	1	40	60	355	900	16	16.2	19.1
11	GER5-61	S	1	40	60	355	900	16	16.2	19.1
99	GER4-179	S	1	50	80	525	900	16	23.5	27.7

**Single Anchors, Tension, Uncracked Concrete, Static Loading, Edge Effect,
Deep Embedment (>188mm), (Continued)**

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)		Ultimate Load Nu (kN)	Failure Mode
SWE03-08	150	999	999	999	588262.5	893025	UNKNOWN	344	Cone
SWE03-02	150	999	999	999	611478	933156	UNKNOWN	266	Cone
SWE03-03	300	999	999	999	783184.5	974169	UNKNOWN	374	Cone
SWE03-05	150	999	999	999	687312	1065024	UNKNOWN	322	Cone
SWE03-06	300	999	999	999	842112	1065024	UNKNOWN	408	Cone
USA01-16	111	999	999	999	233548.4	338026	UNKNOWN	131.4	Cone
USA01-25	127	999	999	999	242850.8	338026	UNKNOWN	130.6	Cone
USA01-27	143	999	999	999	252153.2	338026	UNKNOWN	129.9	Cone
USA01-30	159	999	999	999	261455.6	338026	UNKNOWN	131.4	Cone
GER1-35	220	999	999	999	363000	435600	UNKNOWN	223.4	Cone
USA01-18	114	999	999	999	298404.4	444755.6	UNKNOWN	164.6	Cone
USA01-26	133	999	999	999	311075.5	444755.6	UNKNOWN	164.6	Cone
USA01-28	152	999	999	999	323746.6	444755.6	UNKNOWN	169	Cone
USA01-29	152	999	999	999	323746.6	444755.6	UNKNOWN	197.9	Cone
USA12-11	146.05	999	999	999	367741.2	524031.2	ARKANSAS	278.729	Cone
GER5-46	220	999	999	999	475800	608400	UNKNOWN	199.6	Cone
GER5-47	220	999	999	999	475800	608400	UNKNOWN	208.5	Cone
GER5-48	220	999	999	999	475800	608400	UNKNOWN	208.7	Cone
GER5-49	220	999	999	999	475800	608400	UNKNOWN	225.6	Cone
GER5-56	270	999	999	999	514800	608400	UNKNOWN	212	Cone
GER5-57	270	999	999	999	514800	608400	UNKNOWN	218	Cone
USA12-12	146.05	999	999	999	473708.7	702579.2	ARKANSAS	283.707	Cone
USA12-13	146.05	999	999	999	473708.7	702579.2	ARKANSAS	288.684	Cone
USA12-14	228.6	999	999	999	542902.1	702579.2	ARKANSAS	477.822	Cone
USA12-15	304.8	999	999	999	606773	702579.2	ARKANSAS	597.277	Cone
USA12-16	304.8	999	999	999	606773	702579.2	ARKANSAS	627.141	Cone
GER5-50	220	999	999	999	801412.5	1134225	UNKNOWN	327.2	Cone
GER5-51	220	999	999	999	801412.5	1134225	UNKNOWN	370.5	Cone
GER5-58	361	999	999	999	951577.5	1134225	UNKNOWN	274.2	Cone
GER5-59	370	999	999	999	961162.5	1134225	UNKNOWN	330.7	Cone
GER5-60	370	999	999	999	961162.5	1134225	UNKNOWN	416.3	Cone
GER5-61	377	999	999	999	968617.5	1134225	UNKNOWN	350.9	Cone
GER4-179	700	999	999	999	2342813	2480625	UNKNOWN	868.3	Cone

**Single Anchors, Tension, Uncracked Concrete, Static Loading, Edge Effect,
Deep Embedment (>188mm), (Continued)**

Test Number	Comparison of Actual Test Results with different Methods							
	CC		Theoretical		ACI		CC Variation	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
SWE03-08	278188.86	1.24	338843.76	1.02	715093.88	0.48	289336.18	1.19
SWE03-02	210402.67	1.26	256660.25	1.04	484086.39	0.55	219652.91	1.21
SWE03-03	306695.52	1.22	374659.44	1.00	635302.23	0.59	321351.95	1.16
SWE03-05	226510.57	1.42	277504.80	1.16	545241.81	0.59	239140.77	1.35
SWE03-06	318743.27	1.28	390501.80	1.04	692317.62	0.59	336516.35	1.21
USA01-16	116844.19	1.12	138001.06	0.95	175671.42	0.75	116844.19	1.12
USA01-25	115311.80	1.13	147353.27	0.89	170333.83	0.77	115311.80	1.13
USA01-27	122373.02	1.06	153402.97	0.85	176955.16	0.73	122373.02	1.06
USA01-30	130642.43	1.01	150761.80	0.87	184190.89	0.71	130642.43	1.01
GER1-35	187795.87	1.19	208822.83	1.07	268988.52	0.83	187795.87	1.19
USA01-18	136674.64	1.20	147730.49	1.11	223782.19	0.74	136674.64	1.20
USA01-26	146520.16	1.12	165742.50	0.99	236154.40	0.70	146520.16	1.12
USA01-28	156694.98	1.08	183251.70	0.92	247683.46	0.68	156694.98	1.08
USA01-29	156694.98	1.26	183251.70	1.08	247683.46	0.80	156694.98	1.26
USA12-11	186352.46	1.50	196289.32	1.42	340842.05	0.82	186352.46	1.38
GER5-46	200597.72	1.00	265286.84	0.75	348310.42	0.57	201939.69	0.99
GER5-47	200597.72	1.04	296694.60	0.70	348310.42	0.60	201939.69	1.03
GER5-48	200597.72	1.04	237781.94	0.88	348310.42	0.60	201939.69	1.03
GER5-49	200597.72	1.12	237781.94	0.95	348310.42	0.65	201939.69	1.12
GER5-56	206039.83	1.03	272058.02	0.78	331044.04	0.64	207418.21	1.02
GER5-57	206039.83	1.06	272058.02	0.80	331044.04	0.66	207418.21	1.05
USA12-12	232973.46	1.22	186243.20	1.52	457105.30	0.62	237418.83	1.10
USA12-13	232973.46	1.24	186243.20	1.55	457105.30	0.63	237418.83	1.12
USA12-14	293101.35	1.63	349394.66	1.37	535569.42	0.89	298694.02	1.47
USA12-15	354508.56	1.68	422595.80	1.41	577527.56	1.03	361272.95	1.52
USA12-16	354508.56	1.77	422595.80	1.48	577527.56	1.09	361272.95	1.60
GER5-50	269587.44	1.21	437320.98	0.75	580028.96	0.56	286146.67	1.14
GER5-51	269587.44	1.37	437320.98	0.85	580028.96	0.64	286146.67	1.29
GER5-58	323947.79	0.85	437286.65	0.63	612715.44	0.45	343846.07	0.80
GER5-59	329569.58	1.00	444875.32	0.74	615618.35	0.54	349813.18	0.95
GER5-60	329569.58	1.26	399374.95	1.04	615618.35	0.68	349813.18	1.19
GER5-61	333974.61	1.05	404713.00	0.87	617358.51	0.57	354488.79	0.99
GER4-179	860879.78	1.01	884121.75	0.98	1605767.55	0.54	976606.96	0.89
	Mean =	1.203	Mean =	1.014	Mean =	0.675	Mean =	1.151
	COV =	0.173	COV =	0.245	COV =	0.210	COV =	0.151

**Group Anchors, Tension, Uncracked Concrete, Static Loading, No Edge Effect,
Deep Embedment (>188mm)**

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc fcc200 (MPa)	
99	CHI1-27	S	4	22	35	190.00			31.8	37.5
10	GER7-12	S	4	22.2	34.9	355.00	350.00	16	25.3	29.9
10	GER7-13	S	4	22.2	34.9	355.00	350.00	16	26.1	30.8
10	GER7-14	S	4	22.2	34.9	355.00	350.00	16	23.2	27.4
25	USA03-17	UE	4	15.9	24.8	193.70			33.5	39.5
25	USA08-03	U	4	15.875	23	227.01	861.88		29.4	34.7
25	USA08-04	U	4	15.875	23	227.01	861.88		29.4	34.7
25	USA08-05	U	4	19.05	28	287.34	861.88		29.4	34.7
25	USA08-06	U	4	19.05	28	285.75	861.88		29.4	34.7
25	USA08-09	U	4	15.875	23	188.91	861.88		29.4	34.7
25	USA08-10	U	4	15.875	23	188.91	861.88		29.4	34.7
25	USA08-11	U	4	19.05	28	225.43	861.88		29.4	34.7
25	USA08-12	U	4	19.05	28	227.01	861.88		29.4	34.7
25	USA11-16	U	4	31.75	50.8	241.30		32	31.3	36.9
25	USA11-17	U	4	31.75	50.8	241.30		32	31.3	36.9
25	USA11-18	U	4	31.75	50.8	279.40		32	36.0	42.5
25	USA11-19	U	4	31.75	50.8	279.40		32	36.0	42.5
25	USA11-20	U	4	31.75	50.8	279.40		32	36.0	42.5
25	USA11-25	U	4	25.4	41.275	203.20		32	31.6	37.3

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)		Ultimate Load Nu (kN)	Failure Mode
CHI1-27	999	999	175	175	555025	1299600	ZHAO2	377.1	Cone
GER7-12	999	999	100	100	1357225	4536900	UNKNOWN	500	Cone
GER7-13	999	999	100	100	1357225	4536900	UNKNOWN	518	Cone
GER7-14	999	999	100	100	1357225	4536900	UNKNOWN	585	Cone
USA03-17	999	999	76	76	431780.4	1350709	UNKNOWN	409	Cone
USA08-03	999	999	101.6	101.6	612521.5	1855248	PERRY	519.3	Cone
USA08-04	999	999	101.6	101.6	612521.5	1855248	PERRY	537.9	Cone
USA08-05	999	999	101.6	101.6	928549.1	2972262	PERRY	834.7	Cone
USA08-06	999	999	101.6	101.6	919393.3	2939510	PERRY	806.8	Cone
USA08-09	999	999	101.6	101.6	446675	1284766	PERRY	398.8	Cone
USA08-10	999	999	101.6	101.6	446675	1284766	PERRY	389.5	Cone
USA08-11	999	999	101.6	101.6	605089.5	1829392	PERRY	575.0	Cone
USA08-12	999	999	101.6	101.6	612521.5	1855248	PERRY	602.8	Cone
USA11-16	999	999	241.3	241.3	931611	2096125	ARKANSAS	915.8	Cone
USA11-17	999	999	482.6	482.6	1455642	2096125	ARKANSAS	1552.9	Cone
USA11-18	999	999	279.4	279.4	1249030	2810317	ARKANSAS	1194.6	Cone
USA11-19	999	999	558.8	558.8	1951609	2810317	ARKANSAS	2110.4	Cone
USA11-20	999	999	482.6	482.6	1744513	2810317	ARKANSAS	2448.8	Cone
USA11-25	999	999	254	254	745805	1486449	ARKANSAS	635.6	Cone

**Group Anchors, Tension, Uncracked Concrete, Static Loading, No Edge Effect,
Deep Embedment (>188mm), (Continued)**

Test Number	Comparison of Actual Test Results with different Methods							
	CC		Theoretical		ACI		CC Variation	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
CHI1-27	411603.94	0.92	474021.18	0.80	479593.47	0.79	411603.94	0.92
GER7-12	657508.57	0.76	796773.94	0.63	1011765.15	0.49	697895.60	0.72
GER7-13	667330.82	0.78	808676.61	0.64	1026879.49	0.50	708321.18	0.73
GER7-14	629420.82	0.93	762736.99	0.77	968544.11	0.60	668082.58	0.88
USA03-17	325480.39	1.26	375585.58	1.09	383560.42	1.07	325480.39	1.26
USA08-03	399987.71	1.30	468671.87	1.11	475215.40	1.09	399987.71	1.30
USA08-04	399987.71	1.34	468671.87	1.15	475215.40	1.13	399987.71	1.34
USA08-05	538962.96	1.55	643827.91	1.30	695353.53	1.20	551868.80	1.51
USA08-06	535128.96	1.51	638984.90	1.26	689034.16	1.17	547427.16	1.47
USA08-09	319750.72	1.25	368018.36	1.08	357310.47	1.12	319750.72	1.25
USA08-10	319750.72	1.22	368018.36	1.06	357310.47	1.09	319750.72	1.22
USA08-11	396523.39	1.45	464317.67	1.24	469976.53	1.22	396523.39	1.45
USA08-12	399987.71	1.51	468671.87	1.29	475215.40	1.27	399987.71	1.51
USA11-16	608108.26	1.51	716368.29	1.28	861612.62	1.06	608108.26	1.51
USA11-17	950169.15	1.63	1119325.46	1.39	1358846.78	1.14	950169.15	1.63
USA11-18	812888.77	1.47	969012.92	1.23	1239358.13	0.96	828399.52	1.44
USA11-19	1270138.71	1.66	1514082.68	1.39	1954588.12	1.08	1294374.25	1.63
USA11-20	1135357.05	2.16	1353414.73	1.81	1838884.20	1.33	1157020.82	2.12
USA11-25	533710.87	1.19	618846.71	1.03	721788.05	0.88	533710.87	1.19
	Mean =	1.336	Mean =	1.133	Mean =	1.011	Mean =	1.319
	COV =	0.254	COV =	0.252	COV =	0.245	COV =	0.259

Single Anchors, Tension, Cracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), CIP and UC

Data Source	Test Number	Anchor					Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Member Thickness h (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
28	11SC5706	CIP	1	19.05	19.05	101.6	254.0	30.20593	35.643
28	11SC5707	CIP	1	19.05	19.05	101.6	254.0	30.20593	35.643
28	11SC5708	CIP	1	19.05	19.05	101.6	254.0	30.20593	35.643
28	11SC5709	CIP	1	19.05	19.05	101.6	254.0	30.20593	35.643
28	11SC5710	CIP	1	19.05	19.05	101.6	254.0	30.20593	35.643
29	7SML5406	UC1	1	9.53	15.88	57.1	254.0	29.56472	34.88637
29	7SML5407	UC1	1	9.53	15.88	57.1	254.0	29.56472	34.88637
29	7SML5408	UC1	1	9.53	15.88	57.1	254.0	29.56472	34.88637
29	7SML5409	UC1	1	9.53	15.88	57.1	254.0	29.56472	34.88637
29	7SML5410	UC1	1	9.53	15.88	57.1	254.0	29.56472	34.88637
29	7SML5711	UC1	1	19.05	28.07	101.6	254.0	32.40536	38.23832
29	7SML5712	UC1	1	19.05	28.07	101.6	254.0	33.09484	39.05191
29	7SML5713	UC1	1	19.05	28.07	101.6	254.0	33.09484	39.05191
29	7SML5714	UC1	1	19.05	28.07	101.6	254.0	33.09484	39.05191
29	7SML5715	UC1	1	19.05	28.07	101.6	254.0	33.09484	39.05191
29	7SSL5716	UC2	1	19.05	28.07	101.6	254.0	33.09484	39.05191
29	7SSL5717	UC2	1	19.05	28.07	101.6	254.0	33.09484	39.05191
29	7SSL5718	UC2	1	19.05	28.07	101.6	254.0	33.09484	39.05191
29	7SSL5719	UC2	1	19.05	28.07	101.6	254.0	29.30272	34.57721
29	7SSL5720	UC2	1	19.05	28.07	101.6	254.0	29.30272	34.57721
29	7SHL5421	UC2	1	9.53	16.23	57.1	254.0	29.56472	34.88637
29	7SHL5422	UC2	1	9.53	16.23	57.1	254.0	29.56472	34.88637
29	7SHL5423	UC2	1	9.53	16.23	57.1	254.0	29.56472	34.88637
29	7SHL5424	UC2	1	9.53	16.23	57.1	254.0	29.56472	34.88637
29	7SHL5425	UC2	1	9.53	16.23	57.1	254.0	29.56472	34.88637

**Single Anchors, Tension, Cracked Concrete, Static Loading, No Edge, Shallow
Embedment (<=188mm), CIP and UC (Continued)**

Test Number	Crack		Geometry						Remarks
	Crack Type	Initial Width w (mm)	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)	
11SC5706	Parallel	0.300	999	999	999	999	92903.04	92903.04	Hallowell
11SC5707	Parallel	0.300	999	999	999	999	92903.04	92903.04	Hallowell
11SC5708	Parallel	0.333	999	999	999	999	92903.04	92903.04	Hallowell
11SC5709	Parallel	0.300	999	999	999	999	92903.04	92903.04	Hallowell
11SC5710	Parallel	0.300	999	999	999	999	92903.04	92903.04	Hallowell
7SML5406	Parallel	0.300	999	999	999	999	29343.69	29343.69	Zhang
7SML5407	Parallel	0.300	999	999	999	999	29343.69	29343.69	Zhang
7SML5408	Parallel	0.300	999	999	999	999	29343.69	29343.69	Zhang
7SML5409	Parallel	0.300	999	999	999	999	29343.69	29343.69	Zhang
7SML5410	Parallel	0.300	999	999	999	999	29343.69	29343.69	Zhang
7SML5711	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
7SML5712	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
7SML5713	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
7SML5714	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
7SML5715	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
7SSL5716	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
7SSL5717	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
7SSL5718	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
7SSL5719	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
7SSL5720	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
7SHL5421	Parallel	0.300	999	999	999	999	29343.69	29343.69	Zhang
7SHL5422	Parallel	0.300	999	999	999	999	29343.69	29343.69	Zhang
7SHL5423	Parallel	0.300	999	999	999	999	29343.69	29343.69	Zhang
7SHL5424	Parallel	0.300	999	999	999	999	29343.69	29343.69	Zhang
7SHL5425	Parallel	0.300	999	999	999	999	29343.69	29343.69	Zhang

**Single Anchors, Tension, Cracked Concrete, Static Loading, No Edge, Shallow
Embedment (<=188mm), CIP and UC (Continued)**

Test Number	Test Results			Failure Mode	Comparison of Actual Test Results with different Methods			
	Ultimate Load Nu (kN)	Displac. $\delta_{N,u}$ (mm)	Crack Width w _{N,u} (mm)		CC		Theoretical	
					Npre	Nobs/Npre	Npre	Nobs/Npre
11SC5706	80.31	1.09	0.390	cone	101.6	0.97	87.60	0.92
11SC5707	90.19	1.27	0.440	cone	101.6	1.09	87.60	1.03
11SC5708	84.60	1.42	0.380	cone	101.6	1.02	87.60	0.97
11SC5709	88.47	1.75	0.410	cone	101.6	1.07	87.60	1.01
11SC5710	82.89	0.99	0.450	cone	101.6	1.00	87.60	0.95
7SML5406	37.26	5.49	0.450	cone	57.1	1.08	32.57	1.14
7SML5407	38.19	3.73	0.350	cone	57.1	1.11	32.57	1.17
7SML5408	37.26	2.95	0.400	cone	57.1	1.08	32.57	1.14
7SML5409	35.39	2.59	0.375	cone	57.1	1.03	32.57	1.09
7SML5410	34.93	3.68	0.380	cone	57.1	1.01	32.57	1.07
7SML5711	103.20	2.72	0.450	cone	101.6	1.21	90.73	1.14
7SML5712	100.36	2.57	0.450	cone	101.6	1.16	91.69	1.09
7SML5713	97.28	4.47	0.450	cone	101.6	1.12	91.69	1.06
7SML5714	103.39	3.18	0.450	cone	101.6	1.19	91.69	1.13
7SML5715	103.88	2.97	0.450	cone	101.6	1.20	91.69	1.13
7SSL5716	70.86	0.38	0.470	cone	101.6	0.82	91.69	0.77
7SSL5717	75.27	1.60	0.500	cone	101.6	0.87	91.69	0.82
7SSL5718	62.50	1.37	0.370	cone	101.6	0.72	91.69	0.68
7SSL5719	71.57	0.91	0.370	cone	101.6	0.88	86.28	0.83
7SSL5720	66.89	0.69	0.400	cone	101.6	0.82	86.28	0.78
7SHL5421	30.27	2.26	0.330	cone	57.1	0.88	32.57	0.93
7SHL5422	31.20	2.67	0.330	cone	57.1	0.91	32.57	0.96
7SHL5423	30.74	3.35	0.370	cone	57.1	0.89	32.57	0.94
7SHL5424	33.06	3.20	0.400	cone	57.1	0.96	32.57	1.02
7SHL5425	28.41	2.57	0.350	cone	57.1	0.82	32.57	0.87
					Mean =	0.997	Mean =	0.986
					COV. =	0.136	COV. =	0.139

Single Anchors, Tension, Cracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), Expansion and Sleeve

Data Source	Test Number	Anchor					Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Member Thickness h (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
29	7SKL5701	EAll	1	19.05	19.05	87.3125	254.0	29.30	34.58
29	7SKL5702	EAll	1	19.05	19.05	87.3125	254.0	29.30	34.58
29	7SKL5703	EAll	1	19.05	19.05	87.3125	254.0	29.30	34.58
29	7SKL5704	EAll	1	19.05	19.05	87.3125	254.0	29.30	34.58
29	7SKL5705	EAll	1	19.05	19.05	87.3125	254.0	29.30	34.58
26	50.2	EAll	1	8	12	46			76
26	50.4	EAll	1	8	12	46			76
26	50.6	EAll	1	8	12	46			76
26	50.8	EAll	1	8	12	46			76
26	50.1	EAll	1	8	12	46			76
26	50.12	EAll	1	8	12	46			76
26	51.2	EAll	1	8	12	46			24.3
26	51.4	EAll	1	8	12	46			24.3
26	51.6	EAll	1	8	12	46			24.3
26	52.2	EAll	1	8	12	46			26.9
26	52.6	EAll	1	8	12	46			26.9
26	52.9	EAll	1	8	12	46			26.9
26	53.4	EAll	1	8	12	46			37.1
26	53.6	EAll	1	8	12	46			37.1
26	54.6	EAll	1	10	15	58			76
26	55.2	EAll	1	10	15	58			24.3
26	55.6	EAll	1	10	15	58			24.3
26	56.2	EAll	1	10	15	58			33.5
26	56.4	EAll	1	10	15	58			33.5
26	56.6	EAll	1	10	15	58			33.5
26	60.4	EAll	1	12	18	68			81.1
26	60.6	EAll	1	12	18	68			81.1
26	61.3	EAll	1	12	18	68			26.9
26	62.1	EAll	1	12	18	68			24.3
26	62.3	EAll	1	12	18	68			24.3
26	62.4	EAll	1	12	18	68			24.3
26	62.5	EAll	1	12	18	68			24.3
26	62.6	EAll	1	12	18	68			24.3
26	63.1	EAll	1	12	18	68			25.2
26	63.2	EAll	1	12	18	68			25.2
26	63.3	EAll	1	12	18	68			25.2
26	63.4	EAll	1	12	18	68			25.2
26	63.5	EAll	1	12	18	68			25.2
26	63.6	EAll	1	12	18	68			25.2
26	64.1	EAll	1	16	24	82			84.4
26	64.7	EAll	1	16	24	82			84.4
26	64.8	EAll	1	16	24	82			84.4
26	64.9	EAll	1	16	24	82			84.4
26	66.1	EAll	1	20	28	101			80.2
26	66.2	EAll	1	20	28	101			80.2
26	66.5	EAll	1	20	28	101			80.2
26	66.7	EAll	1	20	28	101			80.2
26	67.1	EAll	1	20	28	101			29.4

Single Anchors, Tension, Cracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), Expansion and Sleeve (Continued)

Test Number	Crack		Geometry						Remarks
	Crack Type	Initial Width w (mm)	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)	
7SKL5701	Parallel	0.300	999	999	999	999	68611.3	68611.3	Zhang
7SKL5702	Parallel	0.300	999	999	999	999	68611.3	68611.3	Zhang
7SKL5703	Parallel	0.300	999	999	999	999	68611.3	68611.3	Zhang
7SKL5704	Parallel	0.300	999	999	999	999	68611.3	68611.3	Zhang
7SKL5705	Parallel	0.300	999	999	999	999	68611.3	68611.3	Zhang
50.2	Parallel		999	999	999	999	19044.0	19044.0	Dr. Peter
50.4	Parallel		999	999	999	999	19044.0	19044.0	Dr. Peter
50.6	Parallel		999	999	999	999	19044.0	19044.0	Dr. Peter
50.8	Parallel		999	999	999	999	19044.0	19044.0	Dr. Peter
50.1	Parallel		999	999	999	999	19044.0	19044.0	Dr. Peter
50.12	Parallel		999	999	999	999	19044.0	19044.0	Dr. Peter
51.2	Parallel		999	999	999	999	19044.0	19044.0	Dr. Peter
51.4	Parallel		999	999	999	999	19044.0	19044.0	Dr. Peter
51.6	Parallel		999	999	999	999	19044.0	19044.0	Dr. Peter
52.2	Parallel		999	999	999	999	19044.0	19044.0	Dr. Peter
52.6	Parallel		999	999	999	999	19044.0	19044.0	Dr. Peter
52.9	Parallel		999	999	999	999	19044.0	19044.0	Dr. Peter
53.4	Parallel		999	999	999	999	19044.0	19044.0	Dr. Peter
53.6	Parallel		999	999	999	999	19044.0	19044.0	Dr. Peter
54.6	Parallel		999	999	999	999	30276.0	30276.0	Dr. Peter
55.2	Parallel		999	999	999	999	30276.0	30276.0	Dr. Peter
55.6	Parallel		999	999	999	999	30276.0	30276.0	Dr. Peter
56.2	Parallel		999	999	999	999	30276.0	30276.0	Dr. Peter
56.4	Parallel		999	999	999	999	30276.0	30276.0	Dr. Peter
56.6	Parallel		999	999	999	999	30276.0	30276.0	Dr. Peter
60.4	Parallel		999	999	999	999	41616.0	41616.0	Dr. Peter
60.6	Parallel		999	999	999	999	41616.0	41616.0	Dr. Peter
61.3	Parallel		999	999	999	999	41616.0	41616.0	Dr. Peter
62.1	Parallel		999	999	999	999	41616.0	41616.0	Dr. Peter
62.3	Parallel		999	999	999	999	41616.0	41616.0	Dr. Peter
62.4	Parallel		999	999	999	999	41616.0	41616.0	Dr. Peter
62.5	Parallel		999	999	999	999	41616.0	41616.0	Dr. Peter
62.6	Parallel		999	999	999	999	41616.0	41616.0	Dr. Peter
63.1	Parallel		999	999	999	999	41616.0	41616.0	Dr. Peter
63.2	Parallel		999	999	999	999	41616.0	41616.0	Dr. Peter
63.3	Parallel		999	999	999	999	41616.0	41616.0	Dr. Peter
63.4	Parallel		999	999	999	999	41616.0	41616.0	Dr. Peter
63.5	Parallel		999	999	999	999	41616.0	41616.0	Dr. Peter
63.6	Parallel		999	999	999	999	41616.0	41616.0	Dr. Peter
64.1	Parallel		999	999	999	999	60516.0	60516.0	Dr. Peter
64.7	Parallel		999	999	999	999	60516.0	60516.0	Dr. Peter
64.8	Parallel		999	999	999	999	60516.0	60516.0	Dr. Peter
64.9	Parallel		999	999	999	999	60516.0	60516.0	Dr. Peter
66.1	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
66.2	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
66.5	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
66.7	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
67.1	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter

Single Anchors, Tension, Cracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), Expansion and Sleeve (Continued)

Test Number	Test Results			Failure Mode	Comparison of Actual Test Results with different Methods			
	Ultimate Load Nu (kN)	Displac. $\delta_{N,u}$ (mm)	Crack Width w _{N,u} (mm)		CC		Theoretical	
					Npre	Nobs/Npre	Npre	Nobs/Npre
7SKL5701	59.88	3.78	0.445	cone	87.31	1.3	47.3	1.3
7SKL5702	59.41	1.55	0.400	cone	87.31	1.3	47.3	1.3
7SKL5703	60.80	5.13	0.420	cone	87.31	1.3	47.3	1.3
7SKL5704	53.03	5.72	0.410	cone	87.31	1.2	47.3	1.1
7SKL5705	55.31	3.94	0.380	cone	87.31	1.2	47.3	1.2
50.2	22.30			cone	46.00	0.9	23.3	1.0
50.4	22.00			cone	46.00	0.9	23.3	0.9
50.6	21.80			cone	46.00	0.8	23.3	0.9
50.8	21.80			cone	46.00	0.8	23.3	0.9
50.1	18.30			cone	46.00	0.7	23.3	0.8
50.12	21.80			cone	46.00	0.8	23.3	0.9
51.2	9.30			cone	46.00	0.6	13.2	0.7
51.4	9.80			cone	46.00	0.7	13.2	0.7
51.6	10.80			cone	46.00	0.7	13.2	0.8
52.2	8.80			cone	46.00	0.6	13.9	0.6
52.6	8.80			cone	46.00	0.6	13.9	0.6
52.9	7.80			cone	46.00	0.5	13.9	0.6
53.4	13.80			cone	46.00	0.8	16.3	0.8
53.6	17.30			cone	46.00	1.0	16.3	1.1
54.6	30.00			cone	58.00	0.8	34.9	0.9
55.2	13.80			cone	58.00	0.7	19.7	0.7
55.6	12.30			cone	58.00	0.6	19.7	0.6
56.2	16.30			cone	58.00	0.7	23.2	0.7
56.4	14.50			cone	58.00	0.6	23.2	0.6
56.6	14.80			cone	58.00	0.6	23.2	0.6
60.4	32.30			cone	68.00	0.7	47.4	0.7
60.6	33.10			cone	68.00	0.7	47.4	0.7
61.3	18.40			cone	68.00	0.7	27.3	0.7
62.1	17.50			cone	68.00	0.7	26.0	0.7
62.3	18.50			cone	68.00	0.7	26.0	0.7
62.4	18.50			cone	68.00	0.7	26.0	0.7
62.5	20.50			cone	68.00	0.8	26.0	0.8
62.6	20.00			cone	68.00	0.8	26.0	0.8
63.1	27.70			cone	68.00	1.0	26.4	1.0
63.2	26.20			cone	68.00	1.0	26.4	1.0
63.3	26.90			cone	68.00	1.0	26.4	1.0
63.4	26.50			cone	68.00	1.0	26.4	1.0
63.5	26.00			cone	68.00	1.0	26.4	1.0
63.6	26.40			cone	68.00	1.0	26.4	1.0
64.1	52.50			cone	82.00	0.8	66.5	0.8
64.7	66.50			cone	82.00	1.0	66.5	1.0
64.8	62.00			cone	82.00	1.0	66.5	0.9
64.9	59.50			cone	82.00	0.9	66.5	0.9
66.1	101.00			cone	101.00	1.2	92.0	1.1
66.2	104.00			cone	101.00	1.2	92.0	1.1
66.5	100.00			cone	101.00	1.2	92.0	1.1
66.7	85.00			cone	101.00	1.0	92.0	0.9
67.1	41.80			cone	101.00	0.8	55.7	0.8

Single Anchors, Tension, Cracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), Expansion and Sleeve (Continued)

Data Source	Test Number	Anchor					Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Member Thickness h (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
26	67.2	EAll	1	20	28	101			29.4
26	67.3	EAll	1	20	28	101			29.4
26	67.4	EAll	1	20	28	101			29.4
26	67.5	EAll	1	20	28	101			29.4
26	70.1	EAll	1	24	32	125			81.1
26	70.2	EAll	1	24	32	125			81.1
26	70.3	EAll	1	24	32	125			81.1
26	71.1	EAll	1	24	32	125			20
26	71.2	EAll	1	24	32	125			20
26	71.3	EAll	1	24	32	125			20
26	71.4	EAll	1	24	32	125			20
26	71.5	EAll	1	24	32	125			20
26	71.6	EAll	1	24	32	125			20
26	72.1	EAll	1	24	32	125			24
26	72.2	EAll	1	24	32	125			24
26	72.3	EAll	1	24	32	125			24
26	72.4	EAll	1	24	32	125			24
26	72.5	EAll	1	24	32	125			24
26	72.6	EAll	1	24	32	125			24
26	105.1	EAll	1	10	15	53			34.9
26	105.3	EAll	1	10	15	53			34.9
26	105.5	EAll	1	10	15	53			34.9
26	110.1	EAll	1	12	18	68			27.5
26	110.3	EAll	1	12	18	68			27.5
26	110.4	EAll	1	12	18	68			27.5
29	7SHL5426	Sleeve	1	20	27.3	101.6	254.0	30.68	36.20
29	7SHL5427	Sleeve	1	20	27.3	101.6	254.0	30.68	36.20
29	7SHL5428	Sleeve	1	20	27.3	101.6	254.0	30.68	36.20
29	7SHL5429	Sleeve	1	20	27.3	101.6	254.0	30.68	36.20
29	7SHL5430	Sleeve	1	20	27.3	101.6	254.0	30.68	36.20
26	11.1	Sleeve	1	8	12	60			37.8
26	11.2	Sleeve	1	8	12	60			37.8
26	11.3	Sleeve	1	8	12	60			37.8
26	11.4	Sleeve	1	8	12	60			37.8
26	11.5	Sleeve	1	8	12	60			37.8
26	11.6	Sleeve	1	8	12	60			37.8
26	11.7	Sleeve	1	8	12	60			37.8
26	11.8	Sleeve	1	8	12	60			37.8
26	11.9	Sleeve	1	8	12	60			37.8
26	11.1	Sleeve	1	8	12	60			37.8
26	31.1	Sleeve	1	8	12	60			29.6
26	31.2	Sleeve	1	8	12	60			29.6
26	31.3	Sleeve	1	8	12	60			29.6
26	31.4	Sleeve	1	8	12	60			29.6
26	31.5	Sleeve	1	8	12	60			29.6
26	36.1	Sleeve	1	8	12	60			51.4
26	36.2	Sleeve	1	8	12	60			51.4
26	36.4	Sleeve	1	8	12	60			51.4

Single Anchors, Tension, Cracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), Expansion and Sleeve (Continued)

Test Number	Crack		Geometry						Remarks
	Crack Type	Initial Width w (mm)	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)	
67.2	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
67.3	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
67.4	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
67.5	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
70.1	Parallel		999	999	999	999	140625.0	140625.0	Dr. Peter
70.2	Parallel		999	999	999	999	140625.0	140625.0	Dr. Peter
70.3	Parallel		999	999	999	999	140625.0	140625.0	Dr. Peter
71.1	Parallel		999	999	999	999	140625.0	140625.0	Dr. Peter
71.2	Parallel		999	999	999	999	140625.0	140625.0	Dr. Peter
71.3	Parallel		999	999	999	999	140625.0	140625.0	Dr. Peter
71.4	Parallel		999	999	999	999	140625.0	140625.0	Dr. Peter
71.5	Parallel		999	999	999	999	140625.0	140625.0	Dr. Peter
71.6	Parallel		999	999	999	999	140625.0	140625.0	Dr. Peter
72.1	Parallel		999	999	999	999	140625.0	140625.0	Dr. Peter
72.2	Parallel		999	999	999	999	140625.0	140625.0	Dr. Peter
72.3	Parallel		999	999	999	999	140625.0	140625.0	Dr. Peter
72.4	Parallel		999	999	999	999	140625.0	140625.0	Dr. Peter
72.5	Parallel		999	999	999	999	140625.0	140625.0	Dr. Peter
72.6	Parallel		999	999	999	999	140625.0	140625.0	Dr. Peter
105.1	Parallel		999	999	999	999	25281.0	25281.0	Dr. Peter
105.3	Parallel		999	999	999	999	25281.0	25281.0	Dr. Peter
105.5	Parallel		999	999	999	999	25281.0	25281.0	Dr. Peter
110.1	Parallel		999	999	999	999	41616.0	41616.0	Dr. Peter
110.3	Parallel		999	999	999	999	41616.0	41616.0	Dr. Peter
110.4	Parallel		999	999	999	999	41616.0	41616.0	Dr. Peter
7SHL5426	Parallel	0.300	999	999	999	999	92903.0	92903.0	Dr. Peter
7SHL5427	Parallel	0.300	999	999	999	999	92903.0	92903.0	Dr. Peter
7SHL5428	Parallel	0.300	999	999	999	999	92903.0	92903.0	Dr. Peter
7SHL5429	Parallel	0.300	999	999	999	999	92903.0	92903.0	Dr. Peter
7SHL5430	Parallel	0.300	999	999	999	999	92903.0	92903.0	Dr. Peter
11.1	Parallel		999	999	999	999	32400.0	32400.0	Dr. Peter
11.2	Parallel		999	999	999	999	32400.0	32400.0	Dr. Peter
11.3	Parallel		999	999	999	999	32400.0	32400.0	Dr. Peter
11.4	Parallel		999	999	999	999	32400.0	32400.0	Dr. Peter
11.5	Parallel		999	999	999	999	32400.0	32400.0	Dr. Peter
11.6	Parallel		999	999	999	999	32400.0	32400.0	Dr. Peter
11.7	Parallel		999	999	999	999	32400.0	32400.0	Dr. Peter
11.8	Parallel		999	999	999	999	32400.0	32400.0	Dr. Peter
11.9	Parallel		999	999	999	999	32400.0	32400.0	Dr. Peter
11.1	Parallel		999	999	999	999	32400.0	32400.0	Dr. Peter
31.1	Parallel		999	999	999	999	32400.0	32400.0	Dr. Peter
31.2	Parallel		999	999	999	999	32400.0	32400.0	Dr. Peter
31.3	Parallel		999	999	999	999	32400.0	32400.0	Dr. Peter
31.4	Parallel		999	999	999	999	32400.0	32400.0	Dr. Peter
31.5	Parallel		999	999	999	999	32400.0	32400.0	Dr. Peter
36.1	Parallel		999	999	999	999	32400.0	32400.0	Dr. Peter
36.2	Parallel		999	999	999	999	32400.0	32400.0	Dr. Peter
36.4	Parallel		999	999	999	999	32400.0	32400.0	Dr. Peter

Single Anchors, Tension, Cracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), Expansion and Sleeve (Continued)

Test Number	Test Results			Failure Mode	Comparison of Actual Test Results with different Methods			
	Ultimate Load Nu (kN)	Displac. $\delta N, v$ (mm)	Crack Width wN, u (mm)		CC		Theoretical	
					Npre	Nobs/Npre	Npre	Nobs/Npre
67.2	43.00			cone	101.00	0.8	55.7	0.8
67.3	49.30			cone	101.00	0.9	55.7	0.9
67.4	42.10			cone	101.00	0.8	55.7	0.8
67.5	48.80			cone	101.00	0.9	55.7	0.9
70.1	115.00			cone	125.00	1.0	131.6	0.9
70.2	120.00			cone	125.00	1.0	131.6	0.9
70.3	132.00			cone	125.00	1.1	131.6	1.0
71.1	54.00			cone	125.00	0.9	65.4	0.8
71.2	50.00			cone	125.00	0.8	65.4	0.8
71.3	56.00			cone	125.00	0.9	65.4	0.9
71.4	50.00			cone	125.00	0.8	65.4	0.8
71.5	55.00			cone	125.00	0.9	65.4	0.8
71.6	53.50			cone	125.00	0.9	65.4	0.8
72.1	70.00			cone	125.00	1.1	71.6	1.0
72.2	63.50			cone	125.00	1.0	71.6	0.9
72.3	67.50			cone	125.00	1.0	71.6	0.9
72.4	70.00			cone	125.00	1.1	71.6	1.0
72.5	74.00			cone	125.00	1.1	71.6	1.0
72.6	65.00			cone	125.00	1.0	71.6	0.9
105.1	18.10			cone	53.00	0.8	20.2	0.9
105.3	20.20			cone	53.00	0.9	20.2	1.0
105.5	18.60			cone	53.00	0.9	20.2	0.9
110.1	17.60			cone	68.00	0.6	27.6	0.6
110.3	22.20			cone	68.00	0.8	27.6	0.8
110.4	23.70			cone	68.00	0.9	27.6	0.9
7SHL5426	96.91	2.06	0.400	cone	101.60	1.7	62.4	1.6
7SHL5427	77.71	9.07	0.335	cone	101.60	1.3	62.4	1.2
7SHL5428	96.46	1.50	0.370	cone	101.60	1.7	62.4	1.5
7SHL5429	85.03	2.39	0.400	cone	101.60	1.5	62.4	1.4
7SHL5430	74.51	3.51	0.350	cone	101.60	1.3	62.4	1.2
11.1	29.06			cone	60.00	1.1	26.1	1.1
11.2	24.63			cone	60.00	0.9	26.1	0.9
11.3	25.18			cone	60.00	0.9	26.1	1.0
11.4	20.94			cone	60.00	0.8	26.1	0.8
11.5	24.76			cone	60.00	0.9	26.1	0.9
11.6	29.03			cone	60.00	1.1	26.1	1.1
11.7	23.69			cone	60.00	0.9	26.1	0.9
11.8	26.15			cone	60.00	1.0	26.1	1.0
11.9	26.45			cone	60.00	1.0	26.1	1.0
11.1	28.92			cone	60.00	1.1	26.1	1.1
31.1	21.07			cone	60.00	0.9	23.1	0.9
31.2	19.73			cone	60.00	0.8	23.1	0.9
31.3	21.06			cone	60.00	0.9	23.1	0.9
31.4	22.42			cone	60.00	0.9	23.1	1.0
31.5	22.96			cone	60.00	1.0	23.1	1.0
36.1	30.14			cone	60.00	1.0	30.5	1.0
36.2	29.21			cone	60.00	0.9	30.5	1.0
36.4	29.29			cone	60.00	0.9	30.5	1.0

Single Anchors, Tension, Cracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), Expansion and Sleeve (Continued)

Data Source	Test Number	Anchor					Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Member Thickness h (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
26	12.1	Sleeve	1	10	15	69			37.8
26	12.2	Sleeve	1	10	15	69			37.8
26	12.3	Sleeve	1	10	15	69			37.8
26	12.4	Sleeve	1	10	15	69			37.8
26	12.5	Sleeve	1	10	15	69			37.8
26	12.6	Sleeve	1	10	15	69			37.8
26	12.7	Sleeve	1	10	15	69			37.8
26	12.8	Sleeve	1	10	15	69			37.8
26	12.9	Sleeve	1	10	15	69			37.8
26	12.1	Sleeve	1	10	15	69			37.8
26	17.1	Sleeve	1	10	15	69			69.9
26	17.2	Sleeve	1	10	15	69			69.9
26	17.3	Sleeve	1	10	15	69			69.9
26	17.4	Sleeve	1	10	15	69			69.9
26	17.5	Sleeve	1	10	15	69			69.9
26	17.8	Sleeve	1	10	15	69			69.9
26	32.1	Sleeve	1	10	15	69			29.6
26	32.2	Sleeve	1	10	15	69			29.6
26	32.3	Sleeve	1	10	15	69			29.6
26	32.4	Sleeve	1	10	15	69			29.6
26	32.5	Sleeve	1	10	15	69			29.6
26	37.4	Sleeve	1	10	15	69			51.4
26	37.5	Sleeve	1	10	15	69			51.4
26	13.1	Sleeve	1	12	18	77			37.8
26	13.2	Sleeve	1	12	18	77			37.8
26	13.3	Sleeve	1	12	18	77			37.8
26	13.4	Sleeve	1	12	18	77			37.8
26	13.5	Sleeve	1	12	18	77			37.8
26	13.6	Sleeve	1	12	18	77			37.8
26	13.7	Sleeve	1	12	18	77			37.8
26	13.8	Sleeve	1	12	18	77			37.8
26	13.9	Sleeve	1	12	18	77			37.8
26	13.1	Sleeve	1	12	18	77			37.8
26	18.1	Sleeve	1	12	18	77			64.5
26	18.2	Sleeve	1	12	18	77			64.5
26	18.6	Sleeve	1	12	18	77			64.5
26	18.7	Sleeve	1	12	18	77			64.5
26	18.1	Sleeve	1	12	18	77			64.5
26	33.1	Sleeve	1	12	18	77			29.6
26	33.2	Sleeve	1	12	18	77			29.6
26	33.3	Sleeve	1	12	18	77			29.6
26	33.4	Sleeve	1	12	18	77			29.6
26	33.5	Sleeve	1	12	18	77			29.6
26	38.1	Sleeve	1	12	18	77			51.4
26	38.2	Sleeve	1	12	18	77			51.4
26	38.3	Sleeve	1	12	18	77			51.4
26	38.4	Sleeve	1	12	18	77			51.4
26	38.5	Sleeve	1	12	18	77			51.4

Single Anchors, Tension, Cracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), Expansion and Sleeve (Continued)

Test Number	Crack		Geometry						Remarks
	Crack Type	Initial Width w (mm)	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)	
12.1	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
12.2	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
12.3	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
12.4	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
12.5	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
12.6	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
12.7	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
12.8	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
12.9	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
12.1	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
17.1	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
17.2	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
17.3	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
17.4	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
17.5	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
17.8	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
32.1	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
32.2	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
32.3	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
32.4	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
32.5	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
37.4	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
37.5	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
13.1	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
13.2	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
13.3	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
13.4	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
13.5	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
13.6	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
13.7	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
13.8	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
13.9	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
13.1	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
18.1	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
18.2	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
18.6	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
18.7	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
18.1	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
33.1	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
33.2	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
33.3	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
33.4	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
33.5	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
38.1	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
38.2	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
38.3	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
38.4	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
38.5	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter

Single Anchors, Tension, Cracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), Expansion and Sleeve (Continued)

Test Number	Test Results			Failure Mode	Comparison of Actual Test Results with different Methods			
	Ultimate Load N_u (kN)	Displac. $\delta_{N,u}$ (mm)	Crack Width $w_{N,u}$ (mm)		CC		Theoretical	
					Npre	Nobs/Npre	Npre	Nobs/Npre
12.1	31.19			cone	69.00	0.9	33.2	0.9
12.2	42.58			cone	69.00	1.3	33.2	1.3
12.3	39.61			cone	69.00	1.2	33.2	1.2
12.4	42.70			cone	69.00	1.3	33.2	1.3
12.5	35.42			cone	69.00	1.1	33.2	1.1
12.6	29.72			cone	69.00	0.9	33.2	0.9
12.7	39.15			cone	69.00	1.2	33.2	1.2
12.8	32.06			cone	69.00	1.0	33.2	1.0
12.9	29.76			cone	69.00	0.9	33.2	0.9
12.1	30.55			cone	69.00	0.9	33.2	0.9
17.1	43.86			cone	69.00	1.0	45.2	1.0
17.2	40.35			cone	69.00	0.9	45.2	0.9
17.3	40.05			cone	69.00	0.9	45.2	0.9
17.4	45.59			cone	69.00	1.0	45.2	1.0
17.5	45.80			cone	69.00	1.0	45.2	1.0
17.8	43.93			cone	69.00	1.0	45.2	1.0
32.1	24.70			cone	69.00	0.8	29.4	0.8
32.2	27.07			cone	69.00	0.9	29.4	0.9
32.3	33.84			cone	69.00	1.1	29.4	1.2
32.4	33.71			cone	69.00	1.1	29.4	1.1
32.5	31.05			cone	69.00	1.1	29.4	1.1
37.4	49.10			cone	69.00	1.3	38.7	1.3
37.5	47.09			cone	69.00	1.2	38.7	1.2
13.1	46.18			cone	77.00	1.2	40.0	1.2
13.2	46.08			cone	77.00	1.2	40.0	1.2
13.3	55.85			cone	77.00	1.4	40.0	1.4
13.4	46.07			cone	77.00	1.2	40.0	1.2
13.5	46.60			cone	77.00	1.2	40.0	1.2
13.6	54.30			cone	77.00	1.4	40.0	1.4
13.7	55.49			cone	77.00	1.4	40.0	1.4
13.8	52.26			cone	77.00	1.3	40.0	1.3
13.9	53.78			cone	77.00	1.4	40.0	1.3
13.1	56.43			cone	77.00	1.4	40.0	1.4
18.1	70.19			cone	77.00	1.4	52.3	1.3
18.2	64.45			cone	77.00	1.3	52.3	1.2
18.6	71.69			cone	77.00	1.4	52.3	1.4
18.7	65.54			cone	77.00	1.3	52.3	1.3
18.1	60.97			cone	77.00	1.2	52.3	1.2
33.1	32.63			cone	77.00	0.9	35.4	0.9
33.2	45.88			cone	77.00	1.3	35.4	1.3
33.3	42.04			cone	77.00	1.2	35.4	1.2
33.4	44.72			cone	77.00	1.3	35.4	1.3
33.5	46.10			cone	77.00	1.3	35.4	1.3
38.1	74.47			cone	77.00	1.6	46.7	1.6
38.2	57.77			cone	77.00	1.3	46.7	1.2
38.3	63.62			cone	77.00	1.4	46.7	1.4
38.4	67.06			cone	77.00	1.5	46.7	1.4
38.5	69.12			cone	77.00	1.5	46.7	1.5

Single Anchors, Tension, Cracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), Expansion and Sleeve (Continued)

Data Source	Test Number	Anchor					Concrete		
		Type	Number	Diameter	Outside Diameter	Embedment	Member Thickness	Strength of Concrete	
			n	d (mm)	do/dh (mm)	hef (mm)	h (mm)	fc (MPa)	fcc200 (MPa)
26	14.1	Sleeve	1	16	24	101			32.1
26	14.2	Sleeve	1	16	24	101			32.1
26	14.3	Sleeve	1	16	24	101			32.1
26	14.4	Sleeve	1	16	24	101			32.1
26	14.5	Sleeve	1	16	24	101			32.1
26	14.6	Sleeve	1	16	24	101			32.1
26	14.7	Sleeve	1	16	24	101			32.1
26	14.8	Sleeve	1	16	24	101			32.1
26	14.9	Sleeve	1	16	24	101			32.1
26	14.1	Sleeve	1	16	24	101			32.1
26	19.1	Sleeve	1	16	24	101			64.5
26	19.2	Sleeve	1	16	24	101			64.5
26	19.3	Sleeve	1	16	24	101			64.5
26	19.4	Sleeve	1	16	24	101			64.5
26	19.5	Sleeve	1	16	24	101			64.5
26	19.6	Sleeve	1	16	24	101			64.5
26	19.7	Sleeve	1	16	24	101			64.5
26	19.8	Sleeve	1	16	24	101			64.5
26	19.9	Sleeve	1	16	24	101			64.5
26	19.1	Sleeve	1	16	24	101			64.5
26	34.1	Sleeve	1	16	24	101			29.6
26	34.2	Sleeve	1	16	24	101			29.6
26	34.3	Sleeve	1	16	24	101			29.6
26	34.4	Sleeve	1	16	24	101			29.6
26	34.5	Sleeve	1	16	24	101			29.6
26	39.1	Sleeve	1	16	24	101			51.4
26	39.2	Sleeve	1	16	24	101			51.4
26	39.3	Sleeve	1	16	24	101			51.4
26	39.4	Sleeve	1	16	24	101			51.4
26	39.5	Sleeve	1	16	24	101			51.4
26	15.1	Sleeve	1	20	28	126			32.1
26	15.2	Sleeve	1	20	28	126			32.1
26	15.3	Sleeve	1	20	28	126			32.1
26	15.4	Sleeve	1	20	28	126			32.1
26	15.5	Sleeve	1	20	28	126			32.1
26	15.6	Sleeve	1	20	28	126			32.1
26	15.7	Sleeve	1	20	28	126			32.1
26	15.8	Sleeve	1	20	28	126			32.1
26	15.9	Sleeve	1	20	28	126			32.1
26	15.1	Sleeve	1	20	28	126			32.1
26	20.1	Sleeve	1	20	28	126			56.3
26	20.2	Sleeve	1	20	28	126			56.3
26	20.3	Sleeve	1	20	28	126			56.3
26	20.5	Sleeve	1	20	28	126			56.3
26	20.6	Sleeve	1	20	28	126			56.3
26	20.7	Sleeve	1	20	28	126			56.3
26	20.8	Sleeve	1	20	28	126			56.3
26	20.9	Sleeve	1	20	28	126			56.3

Single Anchors, Tension, Cracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), Expansion and Sleeve (Continued)

Test Number	Crack		Geometry						Remarks
	Crack Type	Initial Width w (mm)	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)	
14.1	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
14.2	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
14.3	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
14.4	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
14.5	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
14.6	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
14.7	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
14.8	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
14.9	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
14.1	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
19.1	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
19.2	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
19.3	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
19.4	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
19.5	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
19.6	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
19.7	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
19.8	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
19.9	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
19.1	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
34.1	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
34.2	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
34.3	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
34.4	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
34.5	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
39.1	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
39.2	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
39.3	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
39.4	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
39.5	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
15.1	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
15.2	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
15.3	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
15.4	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
15.5	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
15.6	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
15.7	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
15.8	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
15.9	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
15.1	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
20.1	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
20.2	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
20.3	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
20.5	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
20.6	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
20.7	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
20.8	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
20.9	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter

Single Anchors, Tension, Cracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), Expansion and Sleeve (Continued)

Test Number	Test Results			Failure Mode	Comparison of Actual Test Results with different Methods			
	Ultimate Load Nu (kN)	Displac. $\delta N, v$ (mm)	Crack Width wN, u (mm)		CC		Theoretical	
					Npre	Nobs/Npre	Npre	Nobs/Npre
14.1	87.67			cone	101.00	1.6	58.2	1.5
14.2	88.82			cone	101.00	1.6	58.2	1.5
14.3	99.70			cone	101.00	1.8	58.2	1.7
14.4	83.12			cone	101.00	1.5	58.2	1.4
14.5	86.43			cone	101.00	1.6	58.2	1.5
14.6	90.24			cone	101.00	1.7	58.2	1.6
14.7	83.75			cone	101.00	1.5	58.2	1.4
14.8	88.60			cone	101.00	1.6	58.2	1.5
14.9	109.83			cone	101.00	2.0	58.2	1.9
14.1	95.88			cone	101.00	1.8	58.2	1.6
19.1	114.08			cone	101.00	1.5	82.5	1.4
19.2	90.11			cone	101.00	1.2	82.5	1.1
19.3	112.83			cone	101.00	1.5	82.5	1.4
19.4	91.87			cone	101.00	1.2	82.5	1.1
19.5	92.87			cone	101.00	1.2	82.5	1.1
19.6	96.38			cone	101.00	1.3	82.5	1.2
19.7	81.60			cone	101.00	1.1	82.5	1.0
19.8	98.27			cone	101.00	1.3	82.5	1.2
19.9	108.41			cone	101.00	1.4	82.5	1.3
19.1	111.76			cone	101.00	1.5	82.5	1.4
34.1	77.10			cone	101.00	1.5	55.9	1.4
34.2	76.27			cone	101.00	1.5	55.9	1.4
34.3	76.30			cone	101.00	1.5	55.9	1.4
34.4	78.27			cone	101.00	1.5	55.9	1.4
34.5	77.07			cone	101.00	1.5	55.9	1.4
39.1	116.98			cone	101.00	1.7	73.6	1.6
39.2	117.92			cone	101.00	1.7	73.6	1.6
39.3	110.82			cone	101.00	1.6	73.6	1.5
39.4	109.33			cone	101.00	1.6	73.6	1.5
39.5	116.60			cone	101.00	1.7	73.6	1.6
15.1	110.07			cone	126.00	1.5	83.9	1.3
15.2	126.96			cone	126.00	1.7	83.9	1.5
15.3	125.95			cone	126.00	1.7	83.9	1.5
15.4	117.12			cone	126.00	1.5	83.9	1.4
15.5	119.27			cone	126.00	1.6	83.9	1.4
15.6	128.84			cone	126.00	1.7	83.9	1.5
15.7	123.20			cone	126.00	1.6	83.9	1.5
15.8	130.87			cone	126.00	1.7	83.9	1.6
15.9	119.61			cone	126.00	1.6	83.9	1.4
15.1	107.93			cone	126.00	1.4	83.9	1.3
20.1	162.80			cone	126.00	1.6	111.1	1.5
20.2	166.04			cone	126.00	1.7	111.1	1.5
20.3	174.39			cone	126.00	1.7	111.1	1.6
20.5	157.08			cone	126.00	1.6	111.1	1.4
20.6	157.09			cone	126.00	1.6	111.1	1.4
20.7	157.40			cone	126.00	1.6	111.1	1.4
20.8	145.11			cone	126.00	1.4	111.1	1.3
20.9	158.95			cone	126.00	1.6	111.1	1.4

Single Anchors, Tension, Cracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), Expansion and Sleeve (Continued)

Data Source	Test Number	Anchor					Concrete		
		Type	Number	Diameter	Outside Diameter	Embedment	Member Thickness h (mm)	Strength of Concrete	
			n	d (mm)	do/dh (mm)	hef (mm)		fc (MPa)	fcc200 (MPa)
26	20.1	Sleeve	1	20	28	126			56.3
26	35.1	Sleeve	1	20	28	126			29.6
26	35.2	Sleeve	1	20	28	126			29.6
26	35.3	Sleeve	1	20	28	126			29.6
26	35.4	Sleeve	1	20	28	126			29.6
26	35.5	Sleeve	1	20	28	126			29.6
26	40.1	Sleeve	1	20	28	126			51.4
26	40.2	Sleeve	1	20	28	126			51.4
26	40.3	Sleeve	1	20	28	126			51.4
26	40.4	Sleeve	1	20	28	126			51.4
26	40.5	Sleeve	1	20	28	126			51.4
26	43.1	Sleeve	1	24	32	148			29
26	43.2	Sleeve	1	24	32	148			29
26	43.3	Sleeve	1	24	32	148			29
26	43.4	Sleeve	1	24	32	148			29
26	43.5	Sleeve	1	24	32	148			29
26	43.6	Sleeve	1	24	32	148			29
26	43.7	Sleeve	1	24	32	148			29
26	43.8	Sleeve	1	24	32	148			29
26	43.9	Sleeve	1	24	32	148			29
26	43.1	Sleeve	1	24	32	148			29
26	43.43	Sleeve	1	24	32	148			29
26	44.1	Sleeve	1	24	32	148			62.8
26	44.2	Sleeve	1	24	32	148			62.8
26	44.3	Sleeve	1	24	32	148			62.8
26	44.4	Sleeve	1	24	32	148			62.8
26	44.5	Sleeve	1	24	32	148			62.8
26	44.6	Sleeve	1	24	32	148			62.8
26	44.7	Sleeve	1	24	32	148			62.8
26	44.8	Sleeve	1	24	32	148			62.8
26	44.9	Sleeve	1	24	32	148			62.8
26	44.1	Sleeve	1	24	32	148			62.8
26	44.11	Sleeve	1	24	32	148			62.8

**Single Anchors, Tension, Cracked Concrete, Static Loading, No Edge, Shallow
Embedment (<=188mm), Expansion and Sleeve (Continued)**

Test Number	Crack		Geometry						Remarks
	Crack Type	Initial Width w (mm)	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)	
20.1	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
35.1	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
35.2	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
35.3	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
35.4	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
35.5	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
40.1	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
40.2	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
40.3	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
40.4	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
40.5	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
43.1	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter
43.2	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter
43.3	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter
43.4	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter
43.5	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter
43.6	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter
43.7	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter
43.8	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter
43.9	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter
43.1	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter
43.43	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter
44.1	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter
44.2	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter
44.3	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter
44.4	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter
44.5	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter
44.6	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter
44.7	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter
44.8	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter
44.9	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter
44.1	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter
44.11	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter

Single Anchors, Tension, Cracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), Expansion and Sleeve (Continued)

Test Number	Test Results			Failure Mode	Comparison of Actual Test Results with different Methods			
	Ultimate Load Nu (kN)	Displac. $\delta N, v$ (mm)	Crack Width wN,u (mm)		CC		Theoretical	
					Npre	Nobs/Npre	Npre	Nobs/Npre
20.1	123.62			cone	126.00	1.2	111.1	1.1
35.1	121.92			cone	126.00	1.7	80.6	1.5
35.2	129.28			cone	126.00	1.8	80.6	1.6
35.3	120.99			cone	126.00	1.7	80.6	1.5
35.4	130.70			cone	126.00	1.8	80.6	1.6
35.5	126.76			cone	126.00	1.7	80.6	1.6
40.1	166.94			cone	126.00	1.7	106.2	1.6
40.2	165.89			cone	126.00	1.7	106.2	1.6
40.3	164.42			cone	126.00	1.7	106.2	1.5
40.4	168.56			cone	126.00	1.8	106.2	1.6
40.5	167.43			cone	126.00	1.7	106.2	1.6
43.1	128.70			cone	148.00	1.4	103.7	1.2
43.2	126.30			cone	148.00	1.4	103.7	1.2
43.3	126.10			cone	148.00	1.4	103.7	1.2
43.4	112.70			cone	148.00	1.2	103.7	1.1
43.5	118.90			cone	148.00	1.3	103.7	1.1
43.6	114.60			cone	148.00	1.3	103.7	1.1
43.7	118.30			cone	148.00	1.3	103.7	1.1
43.8	110.50			cone	148.00	1.2	103.7	1.1
43.9	104.20			cone	148.00	1.1	103.7	1.0
43.1	118.60			cone	148.00	1.3	103.7	1.1
43.43	123.50			cone	148.00	1.3	103.7	1.2
44.1	193.38			cone	148.00	1.4	152.6	1.3
44.2	193.81			cone	148.00	1.4	152.6	1.3
44.3	190.14			cone	148.00	1.4	152.6	1.2
44.4	191.11			cone	148.00	1.4	152.6	1.3
44.5	211.08			cone	148.00	1.6	152.6	1.4
44.6	195.21			cone	148.00	1.4	152.6	1.3
44.7	174.82			cone	148.00	1.3	152.6	1.1
44.8	181.70			cone	148.00	1.3	152.6	1.2
44.9	163.61			cone	148.00	1.2	152.6	1.1
44.1	183.45			cone	148.00	1.4	152.6	1.2
44.11	197.33			cone	148.00	1.5	152.6	1.3
					Mean =	1.194	Mean =	1.137
					COV =	0.276	COV =	0.242

**Single Anchors, Tension, Uncracked Concrete, Dynamic Loading, No Edge,
Shallow Embedment ($\leq 188\text{mm}$), CIP and UC**

Data Source	Test Number	Anchor					Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Member Thickness h (mm)	Strength of Concrete fc (MPa) fcc200 (MPa)	
28	10DM5706	UC1	1	19.05	28.07	101.6	254.0	29.75	35.11
28	10DM5707	UC1	1	19.05	28.07	101.6	254.0	29.75	35.11
28	10DM5708	UC1	1	19.05	28.07	101.6	254.0	29.75	35.11
28	10DM5709	UC1	1	19.05	28.07	101.6	254.0	29.75	35.11
28	10DM5710	UC1	1	19.05	28.07	101.6	254.0	29.75	35.11
28	12DC5701	CIP	1	19.05	-	101.6	254.0	30.21	35.64
28	12DC5702	CIP	1	19.05	-	101.6	254.0	30.21	35.64
28	12DC5703	CIP	1	19.05	-	101.6	254.0	30.21	35.64
28	12DC5704	CIP	1	19.05	-	101.6	254.0	30.21	35.64
28	12DC5705	CIP	1	19.05	-	101.6	254.0	30.21	35.64
27	2DML5726	UC1	1	19.05	28.07	101.6	609.6	30.89	36.45
27	2DML5727	UC1	1	19.05	28.07	101.6	609.6	30.89	36.45
27	2DML5728	UC1	1	19.05	28.07	101.6	609.6	30.89	36.45
27	2DML5729	UC1	1	19.05	28.07	101.6	609.6	30.89	36.45
27	2DML5730	UC1	1	19.05	28.07	101.6	609.6	30.89	36.45
27	6DML5411	UC1	1	9.53	15.88	57.15	609.6	33.92	40.02
27	6DML5412	UC1	1	9.53	15.88	57.15	609.6	33.92	40.02
27	6DML5413	UC1	1	9.53	15.88	57.15	609.6	33.92	40.02
27	6DML5414	UC1	1	9.53	15.88	57.15	609.6	33.92	40.02
27	6DML5415	UC1	1	9.53	15.88	57.15	609.6	33.92	40.02
27	6DML3716	UC1	1	19.05	28.07	101.6	609.6	21.68	25.58
27	6DML3717	UC1	1	19.05	28.07	101.6	609.6	21.68	25.58
27	6DML3718	UC1	1	19.05	28.07	101.6	609.6	21.68	25.58
27	6DML3719	UC1	1	19.05	28.07	101.6	609.6	21.68	25.58
27	6DML3720	UC1	1	19.05	28.07	101.6	609.6	21.68	25.58
27	6DMR5721	UC1	1	19.05	28.07	101.6	609.6	34.04	40.17
27	6DMR5722	UC1	1	19.05	28.07	101.6	609.6	34.04	40.17
27	6DMR5723	UC1	1	19.05	28.07	101.6	609.6	34.04	40.17
27	6DMR5724	UC1	1	19.05	28.07	101.6	609.6	34.04	40.17
27	6DMR5725	UC1	1	19.05	28.07	101.6	609.6	34.04	40.17
27	6DSL5726	UC2	1	19.05	28.07	101.6	609.6	31.84	37.57
27	6DSL5727	UC2	1	19.05	28.07	101.6	609.6	31.84	37.57
27	6DSL5728	UC2	1	19.05	28.07	101.6	609.6	31.84	37.57
27	6DSL5729	UC2	1	19.05	28.07	101.6	609.6	31.84	37.57
27	6DSL5730	UC2	1	19.05	28.07	101.6	609.6	31.84	37.57

**Single Anchors, Tension, Uncracked Concrete, Dynamic Loading, No Edge,
Shallow Embedment ($\leq 188\text{mm}$), CIP and UC (Continued)**

Test Number	Geometry						Remarks
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)	
10DM5706	999	999	999	999	92903.04	92903.04	Hallowel
10DM5707	999	999	999	999	92903.04	92903.04	Hallowel
10DM5708	999	999	999	999	92903.04	92903.04	Hallowel
10DM5709	999	999	999	999	92903.04	92903.04	Hallowel
10DM5710	999	999	999	999	92903.04	92903.04	Hallowel
12DC5701	999	999	999	999	92903.04	92903.04	Hallowel
12DC5702	999	999	999	999	92903.04	92903.04	Hallowel
12DC5703	999	999	999	999	92903.04	92903.04	Hallowel
12DC5704	999	999	999	999	92903.04	92903.04	Hallowel
12DC5705	999	999	999	999	92903.04	92903.04	Hallowel
2DML5726	999	999	999	999	92903.04	92903.04	Rodriguez
2DML5727	999	999	999	999	92903.04	92903.04	Rodriguez
2DML5728	999	999	999	999	92903.04	92903.04	Rodriguez
2DML5729	999	999	999	999	92903.04	92903.04	Rodriguez
2DML5730	999	999	999	999	92903.04	92903.04	Rodriguez
6DML5411	999	999	999	999	29395.1	29395.1	Rodriguez
6DML5412	999	999	999	999	29395.1	29395.1	Rodriguez
6DML5413	999	999	999	999	29395.1	29395.1	Rodriguez
6DML5414	999	999	999	999	29395.1	29395.1	Rodriguez
6DML5415	999	999	999	999	29395.1	29395.1	Rodriguez
6DML3716	999	999	999	999	92903.04	92903.04	Rodriguez
6DML3717	999	999	999	999	92903.04	92903.04	Rodriguez
6DML3718	999	999	999	999	92903.04	92903.04	Rodriguez
6DML3719	999	999	999	999	92903.04	92903.04	Rodriguez
6DML3720	999	999	999	999	92903.04	92903.04	Rodriguez
6DMR5721	999	999	999	999	92903.04	92903.04	Rodriguez
6DMR5722	999	999	999	999	92903.04	92903.04	Rodriguez
6DMR5723	999	999	999	999	92903.04	92903.04	Rodriguez
6DMR5724	999	999	999	999	92903.04	92903.04	Rodriguez
6DMR5725	999	999	999	999	92903.04	92903.04	Rodriguez
6DSL5726	999	999	999	999	92903.04	92903.04	Rodriguez
6DSL5727	999	999	999	999	92903.04	92903.04	Rodriguez
6DSL5728	999	999	999	999	92903.04	92903.04	Rodriguez
6DSL5729	999	999	999	999	92903.04	92903.04	Rodriguez
6DSL5730	999	999	999	999	92903.04	92903.04	Rodriguez

**Single Anchors, Tension, Uncracked Concrete, Dynamic Loading, No Edge,
Shallow Embedment ($\leq 188\text{mm}$), CIP and UC (Continued)**

Test Number	Test Results		Failure Mode	Comparison of Actual Test Results with different Methods			
	Ultimate Load Nu (kN)	Displac. δN_u (mm)		CC		Theoretical	
				Npre	Nobs/Npre	Npre	Nobs/Npre
10DM5706	129.14	3.66	cone	101.6	1.13	120.74	1.07
10DM5707	122.75	5.61	cone	101.6	1.08	120.74	1.02
10DM5708	112.52	5.08	cone	101.6	0.99	120.74	0.93
10DM5709	104.85	2.51	cone	101.6	0.92	120.74	0.87
10DM5710	127.86	0.99	cone	101.6	1.12	120.74	1.06
12DC5701	137.00	1.73	cone	101.6	1.19	121.66	1.13
12DC5702	122.40	1.75	cone	101.6	1.07	121.66	1.01
12DC5703	125.83	2.18	cone	101.6	1.10	121.66	1.03
12DC5704	122.40	1.52	cone	101.6	1.07	121.66	1.01
12DC5705	127.55	1.57	cone	101.6	1.11	121.66	1.05
2DML5726	118.46	7.29	cone	101.6	1.02	123.03	0.96
2DML5727	127.12	4.67	cone	101.6	1.09	123.03	1.03
2DML5728	123.02	3.51	cone	101.6	1.06	123.03	1.00
2DML5729	114.36	4.70	cone	101.6	0.98	123.03	0.93
2DML5730	114.81	4.60	cone	101.6	0.99	123.03	0.93
6DML5411	40.00	1.78	cone	57.15	0.78	48.52	0.82
6DML5412	44.35	2.46	cone	57.15	0.86	48.52	0.91
6DML5413	41.31	2.01	cone	57.15	0.80	48.52	0.85
6DML5414	53.05	5.61	cone	57.15	1.03	48.52	1.09
6DML5415	50.00	5.36	cone	57.15	0.97	48.52	1.03
6DML3716	97.77	2.62	cone	101.6	1.01	103.06	0.95
6DML3717	89.51	2.31	cone	101.6	0.92	103.06	0.87
6DML3718	106.45	8.36	cone	101.6	1.09	103.06	1.03
6DML3719	79.52	3.76	cone	101.6	0.82	103.06	0.77
6DML3720	90.81	3.89	cone	101.6	0.93	103.06	0.88
6DMR5721	122.39	6.10	cone	101.6	1.00	129.15	0.95
6DMR5722	116.75	4.90	cone	101.6	0.96	129.15	0.90
6DMR5723	115.45	4.85	cone	101.6	0.95	129.15	0.89
6DMR5724	114.58	5.56	cone	101.6	0.94	129.15	0.89
6DMR5725	118.92	8.23	cone	101.6	0.98	129.15	0.92
6DSL5726	128.79	2.21	cone	101.6	1.09	124.91	1.03
6DSL5727	126.55	2.41	cone	101.6	1.07	124.91	1.01
6DSL5728	126.10	2.84	cone	101.6	1.07	124.91	1.01
6DSL5729	135.97	1.93	cone	101.6	1.15	124.91	1.09
6DSL5730	136.87	2.82	cone	101.6	1.16	124.91	1.10
				Mean =	1.015	Mean =	0.972
				COV. =	0.101	COV. =	0.089

**Single Anchors, Tension, Uncracked Concrete, Dynamic Loading, No Edge,
Shallow Embedment ($\leq 188\text{mm}$), Expansion and Sleeve**

Data Source	Test Number	Anchor					Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Member Thickness h (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
28	10DK5705	EAll	1	19.05	19.05	87.3	254.0	29.75	35.11
28	10DK5712	EAll	1	19.05	19.05	87.3	254.0	29.75	35.11
28	10DK5713	EAll	1	19.05	19.05	87.3	254.0	29.75	35.11
28	10DK5714	EAll	1	19.05	19.05	87.3	254.0	29.75	35.11
28	10DK5715	EAll	1	19.05	19.05	87.3	254.0	29.75	35.11
27	0DKL5712	EAll	1	19.05	19.05	106.4	609.6	31.14	36.75
27	0DKL5713	EAll	1	19.05	19.05	106.4	609.6	31.14	36.75
27	0DKL5714	EAll	1	19.05	19.05	106.4	609.6	31.14	36.75
27	0DKL5715	EAll	1	19.05	19.05	106.4	609.6	31.14	36.75
27	0DKL5731	EAll	1	19.05	19.05	68.3	609.6	30.82	36.37
27	0DKL5732	EAll	1	19.05	19.05	68.3	609.6	31.14	36.75
27	0DKL5733	EAll	1	19.05	19.05	68.3	609.6	30.91	36.47
27	0DKL5734	EAll	1	19.05	19.05	68.3	609.6	30.91	36.47
27	0DKL5735	EAll	1	19.05	19.05	68.3	609.6	30.82	36.37
27	0DOL5738	EA	1	19.05	19.05	61.9	609.6	31.14	36.75
27	0DOL5739	EA	1	19.05	19.05	61.9	609.6	31.14	36.75
27	0DOL5740	EA	1	19.05	19.05	61.9	609.6	30.91	36.47
27	2DKL5401	EAll	1	9.53	9.53	49.2	609.6	30.89	36.45
27	2DKL5402	EAll	1	9.53	9.53	49.2	609.6	30.89	36.45
27	2DKL5404	EAll	1	9.53	9.53	49.2	609.6	30.89	36.45
27	2DKL5706	EAll	1	19.05	19.05	87.3	609.6	31.39	37.04
27	2DKL5707	EAll	1	19.05	19.05	87.3	609.6	31.96	37.71
27	2DKL5708	EAll	1	19.05	19.05	87.3	609.6	31.96	37.71
27	2DKL5709	EAll	1	19.05	19.05	87.3	609.6	31.96	37.71
27	2DKL5710	EAll	1	19.05	19.05	87.3	609.6	33.92	40.02
27	2DKL3711	EAll	1	19.05	19.05	87.3	609.6	21.68	25.58
27	2DKL3712	EAll	1	19.05	19.05	87.3	609.6	21.68	25.58
27	2DKL3713	EAll	1	19.05	19.05	87.3	609.6	21.68	25.58
27	2DKL3714	EAll	1	19.05	19.05	87.3	609.6	21.68	25.58
27	2DKR5716	EAll	1	19.05	19.05	87.3	609.6	32.47	38.31
27	2DKR5717	EAll	1	19.05	19.05	87.3	609.6	32.47	38.31
27	2DKR5718	EAll	1	19.05	19.05	87.3	609.6	32.47	38.31
27	2DKR5719	EAll	1	19.05	19.05	87.3	609.6	32.84	38.75
27	2DKR5720	EAll	1	19.05	19.05	87.3	609.6	34.02	40.14
27	2DKR5721	EAll	1	19.05	19.05	87.3	609.6	21.85	25.78
27	2DKR5722	EAll	1	19.05	19.05	87.3	609.6	21.85	25.78
27	2DKR5723	EAll	1	19.05	19.05	87.3	609.6	21.85	25.78
27	2DKR5724	EAll	1	19.05	19.05	87.3	609.6	21.85	25.78
27	2DKR5725	EAll	1	19.05	19.05	87.3	609.6	21.85	25.78
27	4DKL5701	EAll	1	19.05	19.05	87.3	609.6	33.37	39.38
27	4DKL5704	EAll	1	19.05	19.05	87.3	609.6	33.37	39.38
27	4DKL5705	EAll	1	19.05	19.05	87.3	609.6	33.37	39.38
27	6DHL5401	Sleeve	1	9.53	14.3	57.15	609.6	32.23	38.03
27	6DHL5402	Sleeve	1	9.53	14.3	57.15	609.6	32.23	38.03
27	6DHL5403	Sleeve	1	9.53	14.3	57.15	609.6	32.23	38.03
27	6DHL5404	Sleeve	1	9.53	14.3	57.15	609.6	32.23	38.03
27	6DHL5405	Sleeve	1	9.53	14.3	57.15	609.6	32.23	38.03
27	6DHL5706	Sleeve	1	19.05	27.3	101.6	609.6	32.23	38.03
27	6DHL5707	Sleeve	1	19.05	27.3	101.6	609.6	32.23	38.03
27	6DHL5708	Sleeve	1	19.05	27.3	101.6	609.6	32.23	38.03
27	6DHL5709	Sleeve	1	19.05	27.3	101.6	609.6	32.23	38.03
27	6DHL5710	Sleeve		19.05	27.3	101.6	609.6	32.23	38.03

**Single Anchors, Tension, Uncracked Concrete, Dynamic Loading, No Edge,
Shallow Embedment ($\leq 188\text{mm}$), Expansion and Sleeve (Continued)**

Test Number	Geometry						Remarks
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)	
10DK5705	999	999	999	999	68591.61	68591.61	Hallowell
10DK5712	999	999	999	999	68591.61	68591.61	Hallowell
10DK5713	999	999	999	999	68591.61	68591.61	Hallowell
10DK5714	999	999	999	999	68591.61	68591.61	Hallowell
10DK5715	999	999	999	999	68591.61	68591.61	Hallowell
0DKL5712	999	999	999	999	101812	101812	Rodriguez
0DKL5713	999	999	999	999	101812	101812	Rodriguez
0DKL5714	999	999	999	999	101812	101812	Rodriguez
0DKL5715	999	999	999	999	101812	101812	Rodriguez
0DKL5731	999	999	999	999	41934.85	41934.85	Rodriguez
0DKL5732	999	999	999	999	41934.85	41934.85	Rodriguez
0DKL5733	999	999	999	999	41934.85	41934.85	Rodriguez
0DKL5734	999	999	999	999	41934.85	41934.85	Rodriguez
0DKL5735	999	999	999	999	41934.85	41934.85	Rodriguez
0DOL5738	999	999	999	999	34495.63	34495.63	Rodriguez
0DOL5739	999	999	999	999	34495.63	34495.63	Rodriguez
0DOL5740	999	999	999	999	34495.63	34495.63	Rodriguez
2DKL5401	999	999	999	999	21794.62	21794.62	Rodriguez
2DKL5402	999	999	999	999	21794.62	21794.62	Rodriguez
2DKL5404	999	999	999	999	21794.62	21794.62	Rodriguez
2DKL5706	999	999	999	999	68607.32	68607.32	Rodriguez
2DKL5707	999	999	999	999	68607.32	68607.32	Rodriguez
2DKL5708	999	999	999	999	68607.32	68607.32	Rodriguez
2DKL5709	999	999	999	999	68607.32	68607.32	Rodriguez
2DKL5710	999	999	999	999	68607.32	68607.32	Rodriguez
2DKL3711	999	999	999	999	68607.32	68607.32	Rodriguez
2DKL3712	999	999	999	999	68607.32	68607.32	Rodriguez
2DKL3713	999	999	999	999	68607.32	68607.32	Rodriguez
2DKL3714	999	999	999	999	68607.32	68607.32	Rodriguez
2DKR5716	999	999	999	999	68607.32	68607.32	Rodriguez
2DKR5717	999	999	999	999	68607.32	68607.32	Rodriguez
2DKR5718	999	999	999	999	68607.32	68607.32	Rodriguez
2DKR5719	999	999	999	999	68607.32	68607.32	Rodriguez
2DKR5720	999	999	999	999	68607.32	68607.32	Rodriguez
2DKR5721	999	999	999	999	68607.32	68607.32	Rodriguez
2DKR5722	999	999	999	999	68607.32	68607.32	Rodriguez
2DKR5723	999	999	999	999	68607.32	68607.32	Rodriguez
2DKR5724	999	999	999	999	68607.32	68607.32	Rodriguez
2DKR5725	999	999	999	999	68607.32	68607.32	Rodriguez
4DKL5701	999	999	999	999	68607.32	68607.32	Rodriguez
4DKL5704	999	999	999	999	68607.32	68607.32	Rodriguez
4DKL5705	999	999	999	999	68607.32	68607.32	Rodriguez
6DHL5401	999	999	999	999	29395.1	29395.1	Rodriguez
6DHL5402	999	999	999	999	29395.1	29395.1	Rodriguez
6DHL5403	999	999	999	999	29395.1	29395.1	Rodriguez
6DHL5404	999	999	999	999	29395.1	29395.1	Rodriguez
6DHL5405	999	999	999	999	29395.1	29395.1	Rodriguez
6DHL5706	999	999	999	999	92903.04	92903.04	Rodriguez
6DHL5707	999	999	999	999	92903.04	92903.04	Rodriguez
6DHL5708	999	999	999	999	92903.04	92903.04	Rodriguez
6DHL5709	999	999	999	999	92903.04	92903.04	Rodriguez
6DHL5710	999	999	999	999	92903.04	92903.04	Rodriguez

Single Anchors, Tension, Uncracked Concrete, Dynamic Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), Expansion and Sleeve (Continued)

Test Number	Test Results		Failure Mode	Comparison of Actual Test Results with different Methods			
	Ultimate Load Nu (kN)	Displac. δN_u (mm)		CC		Theoretical	
				Npre	Nobs/Npre	Npre	Nobs/Npre
10DK5705	69.90	2.95	cone	87.3	1.07	68.13	1.03
10DK5712	76.72	1.88	cone/pull-through	87.3	1.18	68.13	1.13
10DK5713	71.18	2.84	cone/pull-through	87.3	1.09	68.13	1.04
10DK5714	75.45	3.84	cone	87.3	1.16	68.13	1.11
10DK5715	78.86	1.65	cone/pull-through	87.3	1.21	68.13	1.16
0DKL5712	78.95	22.28	p.o.w/cone	106.4	0.88	96.95	0.81
0DKL5713	74.87	15.75	p.o.w/cone	106.4	0.84	96.95	0.77
0DKL5714	83.94	22.15	p.o.w/cone	106.4	0.94	96.95	0.87
0DKL5715	73.05	23.27	p.o.w/cone	106.4	0.81	96.95	0.75
0DKL5731	56.27	1.93	cone	68.3	1.23	45.68	1.23
0DKL5732	44.92	4.65	cone	68.3	0.97	45.92	0.98
0DKL5733	47.82	1.32	cone	68.3	1.04	45.74	1.05
0DKL5734	56.48	2.01	cone	68.3	1.23	45.74	1.23
0DKL5735	60.80	3.73	cone	68.3	1.33	45.68	1.33
0DOL5738	39.47	7.54	cone	61.9	0.99	38.83	1.02
0DOL5739	46.74	2.18	cone	61.9	1.17	38.83	1.20
0DOL5740	44.63	5.21	cone	61.9	1.13	38.68	1.15
2DKL5401	25.97	5.18	cone	49.2	0.92	25.95	1.00
2DKL5402	24.15	7.65	p.o.w/cone	49.2	0.86	25.95	0.93
2DKL5404	27.79	9.88	p.o.w/cone	49.2	0.99	25.95	1.07
2DKL5706	75.93	8.13	cone	87.3	1.13	69.99	1.08
2DKL5707	78.39	8.26	cone	87.3	1.16	70.62	1.11
2DKL5708	68.98	5.08	cone	87.3	1.02	70.62	0.98
2DKL5709	67.64	4.45	cone	87.3	1.00	70.62	0.96
2DKL5710	76.52	5.26	cone	87.3	1.10	72.75	1.05
2DKL3711	59.96	8.69	cone	87.3	1.08	58.16	1.03
2DKL3712	42.58	0.20	cone	87.3	0.77	58.16	0.73
2DKL3713	43.45	0.46	cone	87.3	0.78	58.16	0.75
2DKL3714	69.09	7.37	cone	87.3	1.24	58.16	1.19
2DKR5716	78.21	5.28	cone	87.3	1.15	71.18	1.10
2DKR5717	77.77	5.97	cone	87.3	1.14	71.18	1.09
2DKR5718	87.55	6.12	cone	87.3	1.29	71.18	1.23
2DKR5719	77.77	3.33	cone	87.3	1.14	71.59	1.09
2DKR5720	68.60	11.96	cone/pullout	87.3	0.98	72.86	0.94
2DKR5721	66.65	7.37	cone	87.3	1.19	58.39	1.14
2DKR5722	61.46	10.49	cone	87.3	1.10	58.39	1.05
2DKR5723	62.32	5.59	cone	87.3	1.12	58.39	1.07
2DKR5724	58.43	8.10	cone	87.3	1.05	58.39	1.00
2DKR5725	59.29	9.14	p.o.w/cone	87.3	1.06	58.39	1.02
4DKL5701	67.51	9.25	p.o./cone	87.3	0.98	72.16	0.94
4DKL5704	83.72	7.06	cone	87.3	1.21	72.16	1.16
4DKL5705	82.85	8.92	p.o.w/cone	87.3	1.20	72.16	1.15
6DHL5401	44.60	2.21	cone	57.15	0.89	43.00	1.04
6DHL5402	39.25	0.84	cone	57.15	0.78	43.00	0.91
6DHL5403	40.14	2.97	cone	57.15	0.80	43.00	0.93
6DHL5404	34.34	2.16	cone	57.15	0.69	43.00	0.80
6DHL5405	40.59	3.18	cone	57.15	0.81	43.00	0.94
6DHL5706	126.67	5.28	cone	101.6	1.07	114.25	1.11
6DHL5707	140.94	1.45	cone	101.6	1.19	114.25	1.23
6DHL5708	119.98	5.59	cone	101.6	1.01	114.25	1.05
6DHL5709	137.82	3.20	cone	101.6	1.16	114.25	1.21
6DHL5710	146.29	3.12	cone	101.6	1.23	114.25	1.28
				Mean =	1.049	Mean =	1.043
				COV. =	0.147	COV. =	0.136

**Single Anchors, Tension, Cracked Concrete, Dynamic Loading, No Edge,
Shallow Embedment ($\leq 188\text{mm}$), CIP and UC**

Data Source	Test Number	Anchor					Concrete			
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Member Thickness h (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)	
	28	12DC5707	CIP	1	19.05	19.05	101.6	254.0	29.26	34.53
	28	12DC5708	CIP	1	19.05	19.05	101.6	254.0	29.26	34.53
	28	12DC5709	CIP	1	19.05	19.05	101.6	254.0	29.26	34.53
	28	12DC5710	CIP	1	19.05	19.05	101.6	254.0	29.26	34.53
	28	12DC5712	CIP	1	19.05	19.05	101.6	254.0	29.26	34.53
	29	8DML5406	UC1	1	9.53	15.88	57.1	254.0	29.56	34.89
	29	8DML5407	UC1	1	9.53	15.88	57.1	254.0	29.56	34.89
	29	8DML5408	UC1	1	9.53	15.88	57.1	254.0	29.56	34.89
	29	8DML5409	UC1	1	9.53	15.88	57.1	254.0	29.56	34.89
	29	8DML5410	UC1	1	9.53	15.88	57.1	254.0	29.56	34.89
	29	8DML5711	UC1	1	19.05	28.07	101.6	254.0	33.09	39.05
	29	8DML5712	UC1	1	19.05	28.07	101.6	254.0	33.09	39.05
	29	8DML5713	UC1	1	19.05	28.07	101.6	254.0	33.09	39.05
	29	8DML5714	UC1	1	19.05	28.07	101.6	254.0	33.09	39.05
	29	8DML5715	UC1	1	19.05	28.07	101.6	254.0	33.09	39.05
	29	8DSL5716	UC2	1	19.05	28.07	101.6	254.0	33.09	39.05
	29	8DSL5717	UC2	1	19.05	28.07	101.6	254.0	33.09	39.05
	29	8DSL5718	UC2	1	19.05	28.07	101.6	254.0	33.09	39.05
	29	8DSL5719	UC2	1	19.05	28.07	101.6	254.0	33.09	39.05
	29	8DSL5720	UC2	1	19.05	28.07	101.6	254.0	29.30	34.58

Test Number	Crack		Geometry					Remarks	
	Crack Type	Initial Width w (mm)	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)		Ano (mm ²)
12DC5707	Parallel	0.300	999	999	999	999	92903.04	92903.04	Hallowell
12DC5708	Parallel	0.300	999	999	999	999	92903.04	92903.04	Hallowell
12DC5709	Parallel	0.300	999	999	999	999	92903.04	92903.04	Hallowell
12DC5710	Parallel	0.300	999	999	999	999	92903.04	92903.04	Hallowell
12DC5712	Parallel	0.300	999	999	999	999	92903.04	92903.04	Hallowell
8DML5406	Parallel	0.300	999	999	999	999	29343.69	29343.69	Zhang
8DML5407	Parallel	0.300	999	999	999	999	29343.69	29343.69	Zhang
8DML5408	Parallel	0.300	999	999	999	999	29343.69	29343.69	Zhang
8DML5409	Parallel	0.300	999	999	999	999	29343.69	29343.69	Zhang
8DML5410	Parallel	0.300	999	999	999	999	29343.69	29343.69	Zhang
8DML5711	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
8DML5712	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
8DML5713	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
8DML5714	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
8DML5715	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
8DSL5716	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
8DSL5717	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
8DSL5718	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
8DSL5719	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
8DSL5720	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang

**Single Anchors, Tension, Cracked Concrete, Dynamic Loading, No Edge,
Shallow Embedment ($\leq 188\text{mm}$), CIP and UC (Continued)**

Test Number	Test Results			Failure Mode	Comparison of Actual Test Results with different Methods			
	Ultimate Load Nu (kN)	Displac. $\delta_{N,u}$ (mm)	Crack Width wN,u (mm)		CC		Theoretical	
					Npre	Nobs/Npre	Npre	Nobs/Npre
12DC5707	133.99	2.72	0.450	cone	101.6	1.32	107.77	1.24
12DC5708	131.46	3.30	0.390	cone	101.6	1.29	107.77	1.22
12DC5709	133.99	2.90	0.450	cone	101.6	1.32	107.77	1.24
12DC5710	133.57	2.59	0.420	cone	101.6	1.31	107.77	1.24
12DC5712	123.43	1.80	0.460	cone	101.6	1.21	107.77	1.15
8DML5406	43.31	4.22	0.370	cone	57.1	1.01	40.71	1.06
8DML5407	42.38	3.00	0.370	cone	57.1	0.98	40.71	1.04
8DML5408	44.71	3.18	0.370	cone	57.1	1.04	40.71	1.10
8DML5409	34.93	3.45	0.370	cone	57.1	0.81	40.71	0.86
8DML5410	46.11	3.61	0.370	cone	57.1	1.07	40.71	1.13
8DML5711	117.08	3.25	0.630	cone	101.6	1.08	114.61	1.02
8DML5712	113.12	5.03	0.700	cone	101.6	1.05	114.61	0.99
8DML5713	125.45	4.52	0.440	cone	101.6	1.16	114.61	1.09
8DML5714	105.20	3.33	0.480	cone	101.6	0.97	114.61	0.92
8DML5715	102.56	5.54	0.630	cone	101.6	0.95	114.61	0.89
8DSL5716	127.21	2.29	0.430	cone	101.6	1.18	114.61	1.11
8DSL5717	102.56	0.61	0.360	cone	101.6	0.95	114.61	0.89
8DSL5718	93.76	1.68	0.390	cone	101.6	0.87	114.61	0.82
8DSL5719	123.69	1.24	0.350	cone	101.6	1.14	114.61	1.08
8DSL5720	103.62	1.96	0.420	cone	101.6	1.02	107.85	0.96
					Average =	1.086	Average =	1.053
					COV. =	0.139	COV. =	0.126

**Single Anchors, Tension, Cracked Concrete, Dynamic Loading, No Edge,
Shallow Embedment ($\leq 188\text{mm}$), Expansion and Sleeve**

Data Source	Test Number	Anchor					Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Member Thickness h (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
29	8DKL5701	EAll	1	19.05	19.05	87.31	254.0	29.30	34.58
29	8DKL5702	EAll	1	19.05	19.05	87.31	254.0	30.68	36.20
29	8DKL5703	EAll	1	19.05	19.05	87.31	254.0	30.68	36.20
29	8DKL5704	EAll	1	19.05	19.05	87.31	254.0	30.68	36.20
29	8DKL5705	EAll	1	19.05	19.05	87.31	254.0	30.68	36.20
29	8DHL5421	Sleeve	1	10	14.3	57.1	254.0	29.56	34.89
29	8DHL5422	Sleeve	1	10	14.3	57.1	254.0	29.56	34.89
29	8DHL5423	Sleeve	1	10	14.3	57.1	254.0	29.56	34.89
29	8DHL5424	Sleeve	1	10	14.3	57.1	254.0	29.56	34.89
29	8DHL5425	Sleeve	1	10	14.3	57.1	254.0	29.56	34.89
29	8DHL5726	Sleeve	1	20	27.3	101.6	254.0	30.68	36.20
29	8DHL5727	Sleeve	1	20	27.3	101.6	254.0	30.68	36.20
29	8DHL5728	Sleeve	1	20	27.3	101.6	254.0	30.68	36.20
29	8DHL5729	Sleeve	1	20	27.3	101.6	254.0	30.68	36.20
29	8DHL5730	Sleeve	1	20	27.3	101.6	254.0	30.68	36.20

Test Number	Crack		Geometry						Remarks
	Crack Type	Initial Width w (mm)	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)	
8DKL5701	Parallel	0.300	999	999	999	999	68611.25	68611.25	Zhang
8DKL5702	Parallel	0.300	999	999	999	999	68611.25	68611.25	Zhang
8DKL5703	Parallel	0.300	999	999	999	999	68611.25	68611.25	Zhang
8DKL5704	Parallel	0.300	999	999	999	999	68611.25	68611.25	Zhang
8DKL5705	Parallel	0.300	999	999	999	999	68611.25	68611.25	Zhang
8DHL5421	Parallel	0.300	999	999	999	999	29343.69	29343.69	Zhang
8DHL5422	Parallel	0.300	999	999	999	999	29343.69	29343.69	Zhang
8DHL5423	Parallel	0.300	999	999	999	999	29343.69	29343.69	Zhang
8DHL5424	Parallel	0.300	999	999	999	999	29343.69	29343.69	Zhang
8DHL5425	Parallel	0.300	999	999	999	999	29343.69	29343.69	Zhang
8DHL5726	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
8DHL5727	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
8DHL5728	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
8DHL5729	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
8DHL5730	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang

**Single Anchors, Tension, Cracked Concrete, Dynamic Loading, No Edge,
Shallow Embedment (<=188mm), Expansion and Sleeve (Continued)**

Test Number	Test Results			Failure Mode	Comparison of Actual Test Results with different Methods			
	Ultimate Load Nu (kN)	Displac. $\delta_{N,u}$ (mm)	Crack Width w _{N,u} (mm)		CC		Theoretical	
					Npre	Nobs/Npre	Npre	Nobs/Npre
8DKL5701	51.92	7.14	0.340	p.o.w/cone	87.31	1.15	56.03	0.93
8DKL5702	49.83	21.46	0.340	p.o.w/cone	87.31	1.08	57.33	0.87
8DKL5703	57.14	7.82	0.440	p.o.w/cone	87.31	1.23	57.33	1.00
8DKL5704	64.46	6.02	0.430	p.o.w/cone	87.31	1.39	57.33	1.12
8DKL5705	48.46	16.23	0.340	p.o.w/cone	87.31	1.05	57.33	0.85
8DHL5421	27.01	1.96	0.350	cone	57.1	0.90	34.07	0.79
8DHL5422	31.67	3.38	0.350	cone	57.1	1.05	34.07	0.93
8DHL5423	31.67	2.79	0.350	cone	57.1	1.05	34.07	0.93
8DHL5424	30.74	6.50	0.350	p.o.w/cone	57.1	1.02	34.07	0.90
8DHL5425	31.67	2.90	0.350	cone	57.1	1.05	34.07	0.93
8DHL5726	114.29	2.18	0.440	p.o.w/cone	101.6	1.57	92.35	1.24
8DHL5727	86.40	1.19	0.350	p.o.w/cone	101.6	1.19	92.35	0.94
8DHL5728	75.87	0.94	0.350	p.o.w/cone	101.6	1.04	92.35	0.82
8DHL5729	86.15	0.61	0.350	p.o.w/cone	101.6	1.19	92.35	0.93
8DHL5730	118.75	2.95	0.475	p.o.w/cone	101.6	1.63	92.35	1.29
					Mean =	1.173	Mean =	0.964
					COV. =	0.178	COV. =	0.149

This table should be used as a reference for other tables in this Appendix

Data Source	References
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6	Versuchsdaten aus den USA, entnommen aus dem Schriftwechsel zwischen Robert Cannon und Rolf Eligehausen, Stuttgart, unpublished
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Data Source	References
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30	Data from Bucknell University
99	Unrecognized source

Notes

- "d" is the diameter of the shank (mm)
- "do" is the outer diameter of the head for cast-in-place anchors, and the sleeve diameter for sleeve and undercut anchors (mm)
- "h_{ef}" is the Effective Embedment depth of the anchor (mm)
- "c1" is the perpendicular distance from the anchor axis to the nearest free edge
- "c2" is the perpendicular distance from the anchor axis to the other free edge, in the direction perpendicular to "c1" (in the case where anchor is located at the corner of the member)
- "s1" is the distance to nearest anchor measured center to center of anchors (in direction 1)
- "s2" is the distance to nearest anchor in a direction perpendicular to "s1" (in direction 2), this is used in the case of 4- anchor groups
- "f_y" is the tensile yield stress of the anchor (MPa)
- "f_c" is the actual tested cylinder strength of concrete (MPa). If "f_{c200}" is originally given, "f_c" is calculated as $f_{c200}/1.18$
- "f_{c200}" is the actual tested strength of a 200-mm concrete cube. If "f_c" is originally given, "f_{c200}" is calculated as $1.18 f_c$
- "A_n" is the actual projected area of the breakout volume associated with an anchor or an anchor group (mm²)
- "A_{no}" is the projected area of the breakout volume of the anchor(s), not limited by edge or spacing influence (mm²)
- "N_{obs}/N_{pre}" is the ratio of the observed to the predicted anchor capacities

- "Displac." is the axial displacement of the anchor at maximum load (mm)
- "Member Thickness" is the member thickness parallel to the axis of the anchor (mm).
- "Failure Mode" is the tested failure mode of the anchor. It represents the dominant failure mode at the maximum load, not necessarily the final appearance of the failure cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$)

Data Source	Test Number	Anchor						Concrete		
		Type	Number	Diameter	Outside Diameter	Embedment	Strength of Steel	Aggregate Diameter	Strength of Concrete	
			n	d (mm)	do/dh (mm)	hef (mm)	fy (MPa)	dagg (mm)	fc (MPa)	fcc200 (MPa)
8	GER3-001	E-TC	1	6	6	17.6	630	16	18.64	22
8	GER3-002	E-TC	1	6	6	17.6	630	16	41.53	49.0
1	ENG2-11	E-TW	1	6	6	22		20	22.37	26.4
1	ENG2-12	E-TW	1	8	8	24		20	22.37	26.4
1	ENG2-36	E-DI	1	6	6	25		20	22.37	26.4
1	ENG2-37	E-DI	1	6	6	25		20	23.81	28.1
3	GER3-003	E-DI	1	8	8	25		16	21.19	25.0
3	GER3-004	E-DI	1	8	8	25		16	21.19	25.0
3	GER3-005	E-DI	1	8	8	25		16	21.19	25.0
3	GER3-006	E-DI	1	6	6	25		16	18.64	22.0
3	GER3-007	E-DI	1	6	6	25		16	41.53	49.0
3	GER3-008	E-DI	1	8	8	25		16	9.49	11.2
3	GER3-009	E-DI	1	8	8	25		16	18.90	22.3
3	GER3-010	E-DI	1	8	8	25		16	10.59	12.5
3	GER3-011	E-DI	1	8	8	25		16	20.85	24.6
3	GER3-012	E-DI	1	8	8	25		16	25.08	29.6
3	GER3-013	E-DI	1	8	8	25		16	36.19	42.7
3	GER3-014	E-DI	1	8	8	25		16	42.97	50.7
19	USA04-001	E-TC	1	6	6	25.4		25	27.37	32.3
19	USA04-02	E-TC	1	6	6	25.4		25	27.37	32.3
19	USA04-03	E-TC	1	6	6	25.4		25	27.37	32.3
8	GER3-015	E-TC	1	9	9	26.6	684	16	18.64	22.0
8	GER3-016	E-TC	1	9	9	26.6	684	16	41.53	49.0
6	USA04-05	E-SD	1	6	6	27.7			24.15	28.5
3	GER3-017	E-SD	1	6	6	28		16	13.90	16.4
3	GER3-018	E-SD	1	6	6	28		16	17.37	20.5
3	GER3-019	E-SD	1	6	6	28		16	27.37	32.3
3	GER3-020	E-SD	1	10	10	28		16	38.81	45.8
3	GER3-021	E-SD	1	6	6	28		16	50.42	59.5
3	GER3-022	E-SD	1	10	10	28		16	48.14	56.8
18	USA04-06	E-SD	1	6	6	28	393		38.90	45.9
1	ENG2-13	E-TW	1	10	10	30		20	22.37	26.4
1	ENG2-38	E-DI	1	8	8	30		20	22.37	26.4
1	ENG2-39	E-DI	1	8	8	30		20	23.81	28.1
1	ENG2-40	E-DI	1	8	8	30		20	22.37	26.4
3	GER3-023	E-DI	1	10	10	30		16	21.19	25.0
3	GER3-024	E-DI	1	10	10	30		16	21.19	25.0
3	GER3-025	E-DI	1	10	10	30		16	21.19	25.0
3	GER3-026	E-DI	1	10	10	30		16	11.10	13.1
3	GER3-027	E-DI	1	10	10	30		16	18.98	22.4
3	GER3-028	E-DI	1	10	10	30		16	17.46	20.6
3	GER3-029	E-DI	1	10	10	30		16	15.68	18.5
3	GER3-030	E-DI	1	10	10	30		16	22.37	26.4

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)		Ultimate Load Nu (kN)	Failure Mode
GER3-001	999	999	999	999	2787.84	2787.84	UNKNOWN	5.9	Cone
GER3-002	999	999	999	999	2787.84	2787.84	UNKNOWN	8.2	Cone
ENG2-11	999	999	999	999	4356	4356	UNKNOWN	7	Cone
ENG2-12	999	999	999	999	5184	5184	UNKNOWN	11	Cone
ENG2-36	999	999	999	999	5625	5625	UNKNOWN	9	Cone
ENG2-37	999	999	999	999	5625	5625	UNKNOWN	10	Cone
GER3-003	50	999	999	999	5625	5625	UNKNOWN	6.6	Cone
GER3-004	63	999	999	999	5625	5625	UNKNOWN	8.2	Cone
GER3-005	75	999	999	999	5625	5625	UNKNOWN	7.5	Cone
GER3-006	999	999	999	999	5625	5625	UNKNOWN	10	Cone
GER3-007	999	999	999	999	5625	5625	UNKNOWN	15.4	Cone
GER3-008	999	999	999	999	5625	5625	UNKNOWN	3.3	Cone
GER3-009	999	999	999	999	5625	5625	UNKNOWN	5.6	Cone
GER3-010	999	999	999	999	5625	5625	UNKNOWN	6.1	Cone
GER3-011	999	999	999	999	5625	5625	UNKNOWN	7.2	Cone
GER3-012	999	999	999	999	5625	5625	UNKNOWN	10.2	Cone
GER3-013	999	999	999	999	5625	5625	UNKNOWN	10.6	Cone
GER3-014	999	999	999	999	5625	5625	UNKNOWN	13.5	Cone
USA04-001	999	999	999	999	5806.44	5806.44	UNKNOWN	7.8	Cone
USA04-02	999	999	999	999	5806.44	5806.44	UNKNOWN	8.7	Cone
USA04-03	999	999	999	999	5806.44	5806.44	UNKNOWN	9.3	Cone
GER3-015	999	999	999	999	6368.04	6368.04	UNKNOWN	10	Cone
GER3-016	999	999	999	999	6368.04	6368.04	UNKNOWN	13.8	Cone
USA04-05	49	999	999	999	6905.61	6905.61	UNKNOWN	10.7	Cone
GER3-017	999	999	999	999	7056	7056	UNKNOWN	6.3	Cone
GER3-018	999	999	999	999	7056	7056	UNKNOWN	8.1	Cone
GER3-019	999	999	999	999	7056	7056	UNKNOWN	9.1	Cone
GER3-020	999	999	999	999	7056	7056	UNKNOWN	11.3	Cone
GER3-021	999	999	999	999	7056	7056	UNKNOWN	12.4	Cone
GER3-022	999	999	999	999	7056	7056	UNKNOWN	15.3	Cone
USA04-06	999	999	999	999	7056	7056	UNKNOWN	12.7	Cone
ENG2-13	999	999	999	999	8100	8100	UNKNOWN	16	Cone
ENG2-38	999	999	999	999	8100	8100	UNKNOWN	11	Cone
ENG2-39	999	999	999	999	8100	8100	UNKNOWN	13	Cone
ENG2-40	999	999	999	999	8100	8100	UNKNOWN	13	Cone
GER3-023	60	999	999	999	8100	8100	UNKNOWN	9.6	Cone
GER3-024	75	999	999	999	8100	8100	UNKNOWN	11.3	Cone
GER3-025	90	999	999	999	8100	8100	UNKNOWN	11.4	Cone
GER3-026	999	999	999	999	8100	8100	UNKNOWN	5.6	Cone
GER3-027	999	999	999	999	8100	8100	UNKNOWN	9.8	Cone
GER3-028	999	999	999	999	8100	8100	UNKNOWN	10	Cone
GER3-029	999	999	999	999	8100	8100	UNKNOWN	11.8	Cone
GER3-030	999	999	999	999	8100	8100	UNKNOWN	13.7	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
GER3-001	4669.33	1.26	3123.84	1.89	1871.39	3.15
GER3-002	6968.53	1.18	4662.03	1.76	2792.87	2.94
ENG2-11	7148.42	0.98	5180.91	1.35	3040.26	2.30
ENG2-12	8145.03	1.35	6081.82	1.81	3790.45	2.90
ENG2-36	8659.37	1.04	6555.06	1.37	4071.78	2.21
ENG2-37	8933.82	1.12	6762.82	1.48	4200.83	2.38
GER3-003	8426.63	0.78	6378.88	1.03	3962.34	1.67
GER3-004	8426.63	0.97	6378.88	1.29	3962.34	2.07
GER3-005	8426.63	0.89	6378.88	1.18	3962.34	1.89
GER3-006	7904.88	1.27	5983.92	1.67	3885.96	2.57
GER3-007	11797.29	1.31	8930.43	1.72	5799.43	2.66
GER3-008	5640.18	0.59	4269.56	0.77	2652.11	1.24
GER3-009	7958.60	0.70	6024.58	0.93	3742.26	1.50
GER3-010	5958.53	1.02	4510.55	1.35	2801.80	2.18
GER3-011	8358.95	0.86	6327.64	1.14	3930.52	1.83
GER3-012	9169.17	1.11	6940.97	1.47	4311.50	2.37
GER3-013	11012.81	0.96	8336.59	1.27	5178.40	2.05
GER3-014	12000.19	1.12	9084.03	1.49	5642.69	2.39
USA04-001	9809.03	0.80	7464.63	1.04	4354.04	1.79
USA04-02	9809.03	0.89	7464.63	1.17	4354.04	2.00
USA04-03	9809.03	0.95	7464.63	1.25	4354.04	2.14
GER3-015	8675.77	1.15	6703.25	1.49	4266.49	2.34
GER3-016	12947.76	1.07	10003.96	1.38	6367.34	2.17
USA04-05	10493.40	1.02	8214.79	1.30	4786.96	2.24
GER3-017	8089.71	0.78	6355.00	0.99	3703.28	1.70
GER3-018	9044.57	0.90	7105.11	1.14	4140.40	1.96
GER3-019	11353.05	0.80	8918.57	1.02	5197.16	1.75
GER3-020	13518.98	0.84	10620.05	1.06	6916.76	1.63
GER3-021	15408.83	0.80	12104.65	1.02	7053.81	1.76
GER3-022	15055.16	1.02	11826.82	1.29	7702.72	1.99
USA04-06	13533.73	0.94	10631.64	1.19	6195.43	2.05
ENG2-13	11383.03	1.41	9139.54	1.75	5922.59	2.70
ENG2-38	11383.03	0.97	9139.54	1.20	5922.59	1.86
ENG2-39	11743.81	1.11	9429.22	1.38	6110.30	2.13
ENG2-40	11383.03	1.14	9139.54	1.42	5922.59	2.19
GER3-023	11077.10	0.87	8893.91	1.08	5763.41	1.67
GER3-024	11077.10	1.02	8893.91	1.27	5763.41	1.96
GER3-025	11077.10	1.03	8893.91	1.28	5763.41	1.98
GER3-026	8018.47	0.70	6438.11	0.87	4172.01	1.34
GER3-027	10485.28	0.93	8418.73	1.16	5455.49	1.80
GER3-028	10055.17	0.99	8073.39	1.24	5231.70	1.91
GER3-029	9528.88	1.24	7650.83	1.54	4957.87	2.38
GER3-030	11383.03	1.20	9139.54	1.50	5922.59	2.31

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
3	GER3-031	E-DI	1	10	10	30		16	33.14	39.1
3	GER3-032	E-SD	1	12	12	31		16	21.19	25.0
3	GER3-033	E-SD	1	12	12	31		16	9.24	10.9
3	GER3-034	E-SD	1	12	12	31		16	12.12	14.3
3	GER3-035	E-SD	1	12	12	31		16	16.02	18.9
3	GER3-036	E-SD	1	12	12	31		16	22.63	26.7
3	GER3-037	E-SD	1	12	12	31		16	25.34	29.9
3	GER3-038	E-SD	1	12	12	31		16	36.53	43.1
3	GER3-039	E-SD	1	12	12	31		16	54.07	63.8
19	USA04-08	E-TC	1	6	6	31.8		25	27.37	32.3
19	USA04-09	E-TC	1	6	6	31.8		25	27.37	32.3
2	GER3-040	E-TC	1	6	6	32		16	19.66	23.2
17	SWE1-01	E-TW	1	10	10	32	540		19.66	23.2
17	SWE1-02	E-TW	1	10	10	32	560		22.63	26.7
6	USA04-10	E-SD	1	8.9	8.9	33.3			24.15	28.5
17	SWE1-03	E-TW	1	8	8	35	550		34.32	40.5
22	USA04-13	E-TW	1	9.5	9.5	35.5	483	25	13.64	16.1
17	SWE1-04	E-TW	1	8	8	36	550		22.03	26.0
17	SWE1-05	E-TW	1	10	10	36	540		19.66	23.2
1	ENG2-17	E-TC	1	6	6	37		20	21.61	25.5
3	GER3-065	E-DI	1	12	12	37		16	21.19	25.0
3	GER3-070	E-DI	1	12	12	37		16	21.19	25.0
3	GER3-072	E-DI	1	12	12	37		16	21.19	25.0
3	GER3-074	E-DI	1	12	12	37		16	21.19	25.0
3	GER3-076	E-DI	1	12	12	37		16	10.59	12.5
3	GER3-077	E-TC	1	14	14	37		16	19.41	22.9
3	GER3-080	E-DI	1	12	12	37		16	22.37	26.4
3	GER3-081	E-TC	1	14	14	37		16	53.81	63.5
17	SWE1-06	E-TW	1	8	8	37	550		34.41	40.6
22	USA04-14	E-TW	1	9.5	9.5	37.8	565	25	29.24	34.5
3	GER3-082	E-TC	1	10	10	38		16	21.19	25.0
3	GER3-083	E-TC	1	10	10	38		16	21.69	25.6
3	GER3-084	E-SD	1	14	14	38		16	11.69	13.8
3	GER3-085	E-SD	1	14	14	38		16	17.37	20.5
3	GER3-086	E-SD	1	14	14	38		16	21.19	25.0
3	GER3-087	E-SD	1	14	14	38		16	23.05	27.2
3	GER3-088	E-SD	1	14	14	38		16	30.51	36.0
3	GER3-089	E-SD	1	14	14	38		16	37.37	44.1
3	GER3-090	E-SD	1	14	14	38		16	53.47	63.1
17	SWE1-07	E-TW	1	8	8	38	550		21.78	25.7
6	USA04-15	E-SD	1	10	10	38.9			24.15	28.5
22	USA04-16	E-TW	1	9.5	9.5	38.9	483	25	15.76	18.6
3	GER3-091	E-TC	1	13	13	39		16	17.54	20.7

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)		Ultimate Load Nu (kN)	Failure Mode
GER3-031	999	999	999	999	8100	8100	UNKNOWN	17.9	Cone
GER3-032	60	999	999	999	8649	8649	UNKNOWN	12.9	Cone
GER3-033	999	999	999	999	8649	8649	UNKNOWN	6.7	Cone
GER3-034	999	999	999	999	8649	8649	UNKNOWN	8.8	Cone
GER3-035	999	999	999	999	8649	8649	UNKNOWN	9	Cone
GER3-036	999	999	999	999	8649	8649	UNKNOWN	10.8	Cone
GER3-037	999	999	999	999	8649	8649	UNKNOWN	15.1	Cone
GER3-038	999	999	999	999	8649	8649	UNKNOWN	19.5	Cone
GER3-039	999	999	999	999	8649	8649	UNKNOWN	20.3	Cone
USA04-08	999	999	999	999	9101.16	9101.16	UNKNOWN	8.5	Cone
USA04-09	999	999	999	999	9101.16	9101.16	UNKNOWN	10.5	Cone
GER3-040	999	999	999	999	9216	9216	UNKNOWN	9.1	Cone
SWE1-01	100	999	999	999	9216	9216	UNKNOWN	14.2	Cone
SWE1-02	999	999	999	999	9216	9216	UNKNOWN	12.6	Cone
USA04-10	58	999	999	999	9980.01	9980.01	UNKNOWN	15.6	Cone
SWE1-03	80	999	999	999	11025	11025	UNKNOWN	16.9	Cone
USA04-13	999	999	999	999	11342.25	11342.25	UNKNOWN	10.9	Cone
SWE1-04	80	999	999	999	11664	11664	UNKNOWN	14.1	Cone
SWE1-05	100	999	999	999	11664	11664	UNKNOWN	16.1	Cone
ENG2-17	100	999	999	999	12321	12321	UNKNOWN	13	Cone
GER3-065	70	999	999	999	12321	12321	UNKNOWN	13.8	Cone
GER3-070	80	999	999	999	12321	12321	UNKNOWN	15.8	Cone
GER3-072	100	999	999	999	12321	12321	UNKNOWN	16.2	Cone
GER3-074	120	999	999	999	12321	12321	UNKNOWN	16.8	Cone
GER3-076	999	999	999	999	12321	12321	UNKNOWN	11.7	Cone
GER3-077	999	999	999	999	12321	12321	UNKNOWN	14.5	Cone
GER3-080	999	999	999	999	12321	12321	UNKNOWN	19.6	Cone
GER3-081	999	999	999	999	12321	12321	UNKNOWN	23	Cone
SWE1-06	80	999	999	999	12321	12321	UNKNOWN	16.6	Cone
USA04-14	999	999	999	999	12859.56	12859.56	UNKNOWN	13.6	Cone
GER3-082	100	999	999	999	12996	12996	UNKNOWN	13.6	Cone
GER3-083	999	999	999	999	12996	12996	UNKNOWN	11.4	Cone
GER3-084	999	999	999	999	12996	12996	UNKNOWN	11.9	Cone
GER3-085	999	999	999	999	12996	12996	UNKNOWN	13	Cone
GER3-086	999	999	999	999	12996	12996	UNKNOWN	15.7	Cone
GER3-087	999	999	999	999	12996	12996	UNKNOWN	19.2	Cone
GER3-088	999	999	999	999	12996	12996	UNKNOWN	19.9	Cone
GER3-089	999	999	999	999	12996	12996	UNKNOWN	23.1	Cone
GER3-090	999	999	999	999	12996	12996	UNKNOWN	25.9	Cone
SWE1-07	80	999	999	999	12996	12996	UNKNOWN	15.5	Cone
USA04-15	113	999	999	999	13618.89	13618.89	UNKNOWN	22.7	Cone
USA04-16	999	999	999	999	13618.89	13618.89	UNKNOWN	14.4	Cone
GER3-091	999	999	999	999	13689	13689	UNKNOWN	14.7	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
GER3-031	13853.02	1.29	11122.72	1.61	7207.72	2.48
GER3-032	11635.54	1.11	9437.91	1.37	6402.19	2.01
GER3-033	7682.98	0.87	6231.88	1.08	4227.38	1.58
GER3-034	8800.04	1.00	7137.96	1.23	4842.02	1.82
GER3-035	10116.90	0.89	8206.10	1.10	5566.59	1.62
GER3-036	12024.65	0.90	9753.52	1.11	6616.28	1.63
GER3-037	12724.84	1.19	10321.47	1.46	7001.54	2.16
GER3-038	15277.60	1.28	12392.09	1.57	8406.15	2.32
GER3-039	18587.76	1.09	15077.04	1.35	10227.48	1.98
USA04-08	13740.93	0.62	11233.21	0.76	6562.18	1.30
USA04-09	13740.93	0.76	11233.21	0.93	6562.18	1.60
GER3-040	11755.55	0.77	9628.58	0.95	6247.91	1.46
SWE1-01	11755.55	1.21	9628.58	1.47	6218.30	2.28
SWE1-02	12611.15	1.00	10329.37	1.22	6670.88	1.89
USA04-10	13831.30	1.13	11466.04	1.36	7206.22	2.16
SWE1-03	17766.57	0.95	14947.86	1.13	9200.09	1.84
USA04-13	11442.73	0.95	9667.44	1.13	6157.18	1.77
SWE1-04	14849.59	0.95	12597.01	1.12	7758.36	1.82
SWE1-05	14027.23	1.15	11899.39	1.35	7661.83	2.10
ENG2-17	15323.10	0.85	13102.04	0.99	8435.25	1.54
GER3-065	15172.13	0.91	12972.95	1.06	8707.55	1.58
GER3-070	15172.13	1.04	12972.95	1.22	8707.55	1.81
GER3-072	15172.13	1.07	12972.95	1.25	8707.55	1.86
GER3-074	15172.13	1.11	12972.95	1.30	8707.55	1.93
GER3-076	10728.32	1.09	9173.26	1.28	6157.17	1.90
GER3-077	14520.93	1.00	12416.14	1.17	8673.97	1.67
GER3-080	15591.17	1.26	13331.25	1.47	8948.04	2.19
GER3-081	24180.40	0.95	20675.48	1.11	14443.98	1.59
SWE1-06	19334.80	0.86	16532.25	1.00	10190.73	1.63
USA04-14	18404.39	0.74	15833.28	0.86	10087.66	1.35
GER3-082	15791.36	0.86	13605.70	1.00	8760.38	1.55
GER3-083	15979.73	0.71	13768.00	0.83	8864.88	1.29
GER3-084	11732.46	1.01	10108.59	1.18	7051.06	1.69
GER3-085	14299.68	0.91	12320.48	1.06	8593.93	1.51
GER3-086	15791.36	0.99	13605.70	1.15	9490.41	1.65
GER3-087	16471.53	1.17	14191.73	1.35	9899.19	1.94
GER3-088	18949.63	1.05	16326.84	1.22	11388.49	1.75
GER3-089	20973.40	1.10	18070.50	1.28	12604.75	1.83
GER3-090	25087.89	1.03	21615.51	1.20	15077.51	1.72
SWE1-07	16010.91	0.97	13794.86	1.12	8512.09	1.82
USA04-15	17463.08	1.30	15145.92	1.50	9754.59	2.33
USA04-16	14107.66	1.02	12235.73	1.18	7799.73	1.85
GER3-091	14940.19	0.98	12967.15	1.13	8863.01	1.66

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
3	GER3-092	E-TC	1	13	13	39		16	20.34	24.0
3	GER3-093	E-TC	1	13	13	39		16	41.53	49.0
17	SWE1-08	E-TW	1	10	10	39	540		34.41	40.6
18	USA04-17	E-SD	1	10	10	39	393		38.90	45.9
22	USA04-18	E-TW	1	9.5	9.5	39.3	745	25	29.24	34.5
1	ENG2-14	E-TW	1	12	12	40		20	22.37	26.4
1	ENG2-41	E-DI	1	10	10	40		20	22.37	26.4
1	ENG2-42	E-DI	1	10	10	40		20	23.81	28.1
1	ENG2-43	E-DI	1	10	10	40		20	25.25	29.8
3	GER1-06	E-TC	1	10	10	40		16	21.19	25.0
8	GER3-099	E-DI	1	9	9	40		16	18.64	22.0
8	GER3-100	E-DI	1	9	9	40		16	41.53	49.0
3	GER3-101	E-TC	1	10	10	40		16	13.31	15.7
3	GER3-102	E-TC	1	10	10	40		16	18.56	21.9
3	GER3-103	E-DI	1	12	12	40		16	11.10	13.1
3	GER3-104	E-DI	1	12	12	40		16	17.03	20.1
3	GER3-105	E-DI	1	12	12	40		16	17.46	20.6
3	GER3-106	E-TC	1	10	10	40		16	33.81	39.9
3	GER3-107	E-DI	1	12	12	40		16	17.46	20.6
3	GER3-108	E-TC	1	12	12	40		16	25.85	30.5
3	GER3-109	E-DI	1	12	12	40		16	22.20	26.2
3	GER3-110	E-DI	1	12	12	40		16	18.47	21.8
3	GER3-111	E-DI	1	12	12	40		16	22.20	26.2
3	GER3-112	E-DI	1	12	12	40		16	39.92	47.1
3	GER3-113	E-TC	1	12	12	40		16	61.02	72.0
2	GER3-119	E-TC	1	7	7	40	900	16	29.66	35.0
2	GER3-120	E-TC	1	7	7	40	900	16	29.66	35.0
18	USA04-21	E-TC	1	8.9	8.9	40	393		26.95	31.8
18	USA04-22	E-TC	1	8.9	8.9	40	393		26.95	31.8
18	USA04-23	E-TC	1	8.9	8.9	40	393		26.95	31.8
18	USA04-24	E-TC	1	8.9	8.9	40	393		26.95	31.8
18	USA04-25	E-TC	1	8.9	8.9	40	393		26.95	31.8
17	SWE1-09	E-TW	1	10	10	41	540		22.03	26.0
17	SWE1-10	E-TW	1	10	10	41	540		34.32	40.5
19	USA04-26	E-DI	1	6	6	41.3		25	25.76	30.4
2	GER3-125	E-TC	1	8	8	42		16	19.66	23.2
1	ENG2-18	E-TC	1	6	6	43	640	20	27.37	32.3
1	ENG2-19	E-TC	1	8	8	43		20	20.93	24.7
1	ENG2-20	E-TC	1	10	10	43		20	21.61	25.5
1	ENG2-44	E-DI	1	10	10	43		20	22.37	26.4
3	GER3-126	E-TC	1	10	10	44		16	18.56	21.9
3	GER3-127	E-TC	1	10	10	44		16	23.31	27.5
3	GER3-128	E-TC	1	16	16	45		16	18.22	21.5

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)		Ultimate Load Nu (kN)	Failure Mode
GER3-092	999	999	999	999	13689	13689	UNKNOWN	17.5	Cone
GER3-093	999	999	999	999	13689	13689	UNKNOWN	27.9	Cone
SWE1-08	100	999	999	999	13689	13689	UNKNOWN	19.5	Cone
USA04-17	999	999	999	999	13689	13689	UNKNOWN	16.7	Cone
USA04-18	999	999	999	999	13900.41	13900.41	UNKNOWN	14.1	Cone
ENG2-14	999	999	999	999	14400	14400	UNKNOWN	16	Cone
ENG2-41	999	999	999	999	14400	14400	UNKNOWN	16	Cone
ENG2-42	999	999	999	999	14400	14400	UNKNOWN	19	Cone
ENG2-43	999	999	999	999	14400	14400	UNKNOWN	19	Cone
GER1-06	60	999	999	999	14400	14400	UNKNOWN	10.9	Cone
GER3-099	999	999	999	999	14400	14400	UNKNOWN	19.8	Cone
GER3-100	999	999	999	999	14400	14400	UNKNOWN	34.1	Cone
GER3-101	999	999	999	999	14400	14400	UNKNOWN	10.6	Cone
GER3-102	999	999	999	999	14400	14400	UNKNOWN	10.8	Cone
GER3-103	999	999	999	999	14400	14400	UNKNOWN	11.5	Cone
GER3-104	999	999	999	999	14400	14400	UNKNOWN	13.2	Cone
GER3-105	999	999	999	999	14400	14400	UNKNOWN	14.9	Cone
GER3-106	999	999	999	999	14400	14400	UNKNOWN	15.5	Cone
GER3-107	999	999	999	999	14400	14400	UNKNOWN	16.3	Cone
GER3-108	999	999	999	999	14400	14400	UNKNOWN	16.8	Cone
GER3-109	999	999	999	999	14400	14400	UNKNOWN	18.4	Cone
GER3-110	999	999	999	999	14400	14400	UNKNOWN	18.6	Cone
GER3-111	999	999	999	999	14400	14400	UNKNOWN	19.8	Cone
GER3-112	999	999	999	999	14400	14400	UNKNOWN	21.4	Cone
GER3-113	999	999	999	999	14400	14400	UNKNOWN	24.6	Cone
GER3-119	999	999	999	999	14400	14400	UNKNOWN	25.3	Cone
GER3-120	999	999	999	999	14400	14400	UNKNOWN	25.3	Cone
USA04-21	999	999	999	999	14400	14400	UNKNOWN	6.9	Cone
USA04-22	999	999	999	999	14400	14400	UNKNOWN	7.9	Cone
USA04-23	999	999	999	999	14400	14400	UNKNOWN	8	Cone
USA04-24	999	999	999	999	14400	14400	UNKNOWN	8.5	Cone
USA04-25	999	999	999	999	14400	14400	UNKNOWN	9.8	Cone
SWE1-09	100	999	999	999	15129	15129	UNKNOWN	14.8	Cone
SWE1-10	100	999	999	999	15129	15129	UNKNOWN	21.3	Cone
USA04-26	999	999	999	999	15351.21	15351.21	UNKNOWN	15	Cone
GER3-125	999	999	999	999	15876	15876	UNKNOWN	12.6	Cone
ENG2-18	999	999	999	999	16641	16641	UNKNOWN	14	Cone
ENG2-19	999	999	999	999	16641	16641	UNKNOWN	13	Cone
ENG2-20	65	999	999	999	16641	16641	UNKNOWN	21	Cone
ENG2-44	999	999	999	999	16641	16641	UNKNOWN	23	Cone
GER3-126	999	999	999	999	17424	17424	UNKNOWN	12.9	Cone
GER3-127	999	999	999	999	17424	17424	UNKNOWN	14.8	Cone
GER3-128	999	999	999	999	18225	18225	UNKNOWN	18.2	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
GER3-092	16087.06	1.09	13962.55	1.25	9543.37	1.83
GER3-093	22986.30	1.21	19950.66	1.40	13636.22	2.05
SWE1-08	20923.49	0.93	18160.27	1.07	11696.39	1.67
USA04-17	22247.30	0.75	19309.26	0.86	12436.41	1.34
USA04-18	19510.68	0.72	16970.47	0.83	10820.57	1.30
ENG2-14	17525.32	0.91	15318.83	1.04	10265.81	1.56
ENG2-41	17525.32	0.91	15318.83	1.04	10265.81	1.56
ENG2-42	18080.78	1.05	15804.36	1.20	10591.19	1.79
ENG2-43	18619.68	1.02	16275.41	1.17	10906.86	1.74
GER1-06	17054.31	0.64	14907.12	0.73	9605.68	1.13
GER3-099	15998.36	1.24	13984.12	1.42	9497.52	2.08
GER3-100	23876.03	1.43	20869.97	1.63	14174.14	2.41
GER3-101	13514.93	0.78	11813.36	0.90	7612.16	1.39
GER3-102	15961.96	0.68	13952.30	0.77	8990.42	1.20
GER3-103	12345.25	0.93	10790.94	1.07	7231.48	1.59
GER3-104	15291.92	0.86	13366.63	0.99	8957.55	1.47
GER3-105	15480.95	0.96	13531.86	1.10	9068.28	1.64
GER3-106	21545.20	0.72	18832.60	0.82	12135.13	1.28
GER3-107	15480.95	1.05	13531.86	1.20	9068.28	1.80
GER3-108	18837.10	0.89	16465.45	1.02	11034.21	1.52
GER3-109	17458.81	1.05	15260.70	1.21	10226.85	1.80
GER3-110	15925.47	1.17	13920.41	1.34	9328.67	1.99
GER3-111	17458.81	1.13	15260.70	1.30	10226.85	1.94
GER3-112	23408.55	0.91	20461.35	1.05	13712.03	1.56
GER3-113	28942.12	0.85	25298.22	0.97	16953.43	1.45
GER3-119	20178.93	1.25	17638.34	1.43	11456.52	2.21
GER3-120	20178.93	1.25	17638.34	1.43	11456.52	2.21
USA04-21	19234.36	0.36	16812.69	0.41	10595.23	0.65
USA04-22	19234.36	0.41	16812.69	0.47	10595.23	0.75
USA04-23	19234.36	0.42	16812.69	0.48	10595.23	0.76
USA04-24	19234.36	0.44	16812.69	0.51	10595.23	0.80
USA04-25	19234.36	0.51	16812.69	0.58	10595.23	0.92
SWE1-09	18048.31	0.82	15883.96	0.93	10241.62	1.45
SWE1-10	22525.65	0.95	19824.38	1.07	12782.32	1.67
USA04-26	19730.40	0.76	17399.09	0.86	10346.09	1.45
GER3-125	17676.33	0.71	15659.35	0.80	10571.10	1.19
ENG2-18	21606.18	0.65	19262.90	0.73	12441.53	1.13
ENG2-19	18894.06	0.69	16844.92	0.77	11290.36	1.15
ENG2-20	19197.60	1.09	17115.54	1.23	11888.90	1.77
ENG2-44	19533.44	1.18	17414.96	1.32	11672.43	1.97
GER3-126	18415.15	0.70	16519.18	0.78	10680.62	1.21
GER3-127	20635.71	0.72	18511.12	0.80	11968.53	1.24
GER3-128	18871.75	0.96	17029.72	1.07	12226.15	1.49

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number	Diameter	Outside Diameter	Embedment	Strength of Steel	Aggregate Diameter	Strength of Concrete	
			n	d (mm)	do/dh (mm)	hef (mm)	fy (MPa)	dagg (mm)	fc (MPa)	fcc200 (MPa)
3	GER3-129	E-TC	1	17	17	45		16	17.54	20.7
3	GER3-130	E-TC	1	17	17	45		16	20.34	24.0
3	GER3-131	E-TC	1	17	17	45		16	41.53	49.0
3	GER3-132	E-DI	1	15	15	46		16	21.19	25.0
3	GER3-133	E-DI	1	15	15	46		16	21.19	25.0
3	GER3-134	E-DI	1	15	15	46		16	21.19	25.0
3	GER3-135	E-DI	1	15	15	46		16	21.19	25.0
3	GER3-136	E-DI	1	15	15	46		16	21.19	25.0
3	GER3-137	E-DI	1	15	15	46		16	10.51	12.4
3	GER3-138	E-DI	1	15	15	46		16	24.41	28.8
3	GER3-139	E-DI	1	15	15	46		16	30.76	36.3
3	GER3-140	E-DI	1	15	15	46		16	41.95	49.5
17	SWE1-13	E-TW	1	10	10	46	540		15.42	18.2
1	ENG2-21	E-TC	1	8	8	47	640	20	27.37	32.3
3	GER3-141	E-TC	1	6	6	47		16	12.46	14.7
3	GER3-142	E-TC	1	12	12	47		16	7.46	8.8
3	GER3-143	E-TC	1	12	12	47		16	19.24	22.7
3	GER3-144	E-TC	1	12	12	47		16	15.85	18.7
3	GER3-145	E-TC	1	12	12	47		16	19.24	22.7
3	GER3-146	E-TC	1	12	12	47		16	19.15	22.6
3	GER3-147	E-TC	1	12	12	47		16	21.69	25.6
3	GER3-148	E-TC	1	12	12	47		16	31.86	37.6
3	GER3-149	E-TC	1	12	12	47		16	33.81	39.9
17	SWE1-14	E-TW	1	16	16	48	425		21.10	24.9
1	ENG2-01	E-TW	1	8	8	50	850	20	19.49	23.0
1	ENG2-06	E-TW	1	8	8	50	850	20	19.49	23.0
1	ENG2-22	E-TC	1	10	10	50		20	20.93	24.7
1	ENG2-23	E-TC	1	10	10	50		20	20.93	24.7
1	ENG2-45	E-DI	1	12	12	50		20	22.37	26.4
1	ENG2-46	E-DI	1	12	12	50		20	23.81	28.1
1	ENG2-47	E-DI	1	12	12	50		20	25.25	29.8
3	GER3-151	E-DI	1	15	15	50		16	11.10	13.1
3	GER3-152	E-DI	1	15	15	50		16	18.98	22.4
3	GER3-153	E-DI	1	15	15	50		16	20.42	24.1
3	GER3-154	E-TC	1	13	13	50		16	20.34	24.0
3	GER3-155	E-DI	1	15	15	50		16	20.42	24.1
19	USA04-27	E-TW	1	12.7	12.7	50.8	483	25	15.25	18.0
19	USA04-28	E-TW	1	12.7	12.7	50.8	483	25	15.25	18.0
1	ENG2-10	E-TW	1	16	16	51		20	23.73	28.0
2	GER3-162	E-TC	1	10	10	51		16	19.66	23.2
17	SWE1-15	E-TW	1	16	16	51	430		21.78	25.7
6	USA04-29	E-SD	1	12.7	12.7	51.6			22.03	26.0
6	USA04-30	E-SD	1	12.7	12.7	51.6			21.36	25.2

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)		Ultimate Load Nu (kN)	Failure Mode
GER3-129	999	999	999	999	18225	18225	UNKNOWN	21.2	Cone
GER3-130	999	999	999	999	18225	18225	UNKNOWN	27.6	Cone
GER3-131	999	999	999	999	18225	18225	UNKNOWN	40.3	Cone
GER3-132	100	999	999	999	19044	19044	UNKNOWN	22.3	Cone
GER3-133	125	999	999	999	19044	19044	UNKNOWN	27.7	Cone
GER3-134	150	999	999	999	19044	19044	UNKNOWN	26.7	Cone
GER3-135	175	999	999	999	19044	19044	UNKNOWN	22	Cone
GER3-136	200	999	999	999	19044	19044	UNKNOWN	27.8	Cone
GER3-137	999	999	999	999	19044	19044	UNKNOWN	17.2	Cone
GER3-138	999	999	999	999	19044	19044	UNKNOWN	30.6	Cone
GER3-139	999	999	999	999	19044	19044	UNKNOWN	36	Cone
GER3-140	999	999	999	999	19044	19044	UNKNOWN	43.3	Cone
SWE1-13	100	999	999	999	19044	19044	UNKNOWN	17.6	Cone
ENG2-21	999	999	999	999	19881	19881	UNKNOWN	21	Cone
GER3-141	999	999	999	999	19881	19881	UNKNOWN	9.8	Cone
GER3-142	999	999	999	999	19881	19881	UNKNOWN	11	Cone
GER3-143	999	999	999	999	19881	19881	UNKNOWN	13.1	Cone
GER3-144	999	999	999	999	19881	19881	UNKNOWN	13.8	Cone
GER3-145	999	999	999	999	19881	19881	UNKNOWN	15.1	Cone
GER3-146	999	999	999	999	19881	19881	UNKNOWN	15.8	Cone
GER3-147	999	999	999	999	19881	19881	UNKNOWN	19.9	Cone
GER3-148	999	999	999	999	19881	19881	UNKNOWN	20.8	Cone
GER3-149	999	999	999	999	19881	19881	UNKNOWN	26.6	Cone
SWE1-14	999	999	999	999	20736	20736	UNKNOWN	26.8	Cone
ENG2-01	999	999	999	999	22500	22500	UNKNOWN	15	Cone
ENG2-06	80	999	999	999	22500	22500	UNKNOWN	16	Cone
ENG2-22	999	999	999	999	22500	22500	UNKNOWN	18	Cone
ENG2-23	999	999	999	999	22500	22500	UNKNOWN	23	Cone
ENG2-45	999	999	999	999	22500	22500	UNKNOWN	24	Cone
ENG2-46	999	999	999	999	22500	22500	UNKNOWN	28	Cone
ENG2-47	999	999	999	999	22500	22500	UNKNOWN	40	Cone
GER3-151	999	999	999	999	22500	22500	UNKNOWN	16.4	Cone
GER3-152	999	999	999	999	22500	22500	UNKNOWN	19.1	Cone
GER3-153	999	999	999	999	22500	22500	UNKNOWN	19.2	Cone
GER3-154	999	999	999	999	22500	22500	UNKNOWN	24.9	Cone
GER3-155	999	999	999	999	22500	22500	UNKNOWN	25.8	Cone
USA04-27	999	999	999	999	23225.76	23225.76	UNKNOWN	21	Cone
USA04-28	999	999	999	999	23225.76	23225.76	UNKNOWN	24	Cone
ENG2-10	999	999	999	999	23409	23409	UNKNOWN	41	Cone
GER3-162	999	999	999	999	23409	23409	UNKNOWN	22	Cone
SWE1-15	160	999	999	999	23409	23409	UNKNOWN	29.3	Cone
USA04-29	89	999	999	999	23963.04	23963.04	UNKNOWN	23.8	Cone
USA04-30	90	999	999	999	23963.04	23963.04	UNKNOWN	28	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
GER3-129	18517.32	1.14	16709.88	1.27	12193.19	1.74
GER3-130	19938.78	1.38	17992.60	1.53	13129.19	2.10
GER3-131	28489.90	1.41	25709.06	1.57	18759.89	2.15
GER3-132	21032.01	1.06	19088.64	1.17	13476.77	1.65
GER3-133	21032.01	1.32	19088.64	1.45	13476.77	2.06
GER3-134	21032.01	1.27	19088.64	1.40	13476.77	1.98
GER3-135	21032.01	1.05	19088.64	1.15	13476.77	1.63
GER3-136	21032.01	1.32	19088.64	1.46	13476.77	2.06
GER3-137	14812.27	1.16	13443.61	1.28	9491.32	1.81
GER3-138	22573.93	1.36	20488.08	1.49	14464.79	2.12
GER3-139	25343.36	1.42	23001.62	1.57	16239.37	2.22
GER3-140	29594.67	1.46	26860.10	1.61	18963.49	2.28
SWE1-13	17945.13	0.98	16286.99	1.08	10556.25	1.67
ENG2-21	24690.06	0.85	22533.89	0.93	15138.37	1.39
GER3-141	16656.34	0.59	15201.75	0.64	9174.04	1.07
GER3-142	12887.31	0.85	11761.87	0.94	7901.68	1.39
GER3-143	20698.26	0.63	18890.69	0.69	12690.86	1.03
GER3-144	18786.32	0.73	17145.72	0.80	11518.58	1.20
GER3-145	20698.26	0.73	18890.69	0.80	12690.86	1.19
GER3-146	20652.62	0.77	18849.03	0.84	12662.87	1.25
GER3-147	21980.67	0.91	20061.10	0.99	13477.15	1.48
GER3-148	26638.81	0.78	24312.45	0.86	16333.22	1.27
GER3-149	27441.47	0.97	25045.02	1.06	16825.36	1.58
SWE1-14	22373.59	1.20	20530.24	1.31	14724.79	1.82
ENG2-01	22860.88	0.66	21194.78	0.71	13359.49	1.12
ENG2-06	22860.88	0.70	21194.78	0.75	13359.49	1.20
ENG2-22	23690.68	0.76	21964.10	0.82	15276.60	1.18
ENG2-23	23690.68	0.97	21964.10	1.05	15276.60	1.51
ENG2-45	24492.38	0.98	22707.38	1.06	16040.34	1.50
ENG2-46	25268.66	1.11	23427.08	1.20	16548.73	1.69
ENG2-47	26021.79	1.54	24125.32	1.66	17041.96	2.35
GER3-151	17253.01	0.95	15995.60	1.03	11299.19	1.45
GER3-152	22560.73	0.85	20916.50	0.91	14775.27	1.29
GER3-153	23401.17	0.82	21695.69	0.88	15325.69	1.25
GER3-154	23352.57	1.07	21650.64	1.15	14823.28	1.68
GER3-155	23401.17	1.10	21695.69	1.19	15325.69	1.68
USA04-27	20711.23	1.01	19277.84	1.09	13146.25	1.60
USA04-28	20711.23	1.16	19277.84	1.24	13146.25	1.83
ENG2-10	25984.14	1.58	24209.38	1.69	17368.09	2.36
GER3-162	23652.30	0.93	22036.81	1.00	15903.85	1.38
SWE1-15	24894.07	1.18	23193.76	1.26	16639.48	1.76
USA04-29	25482.11	0.93	23810.27	1.00	16250.83	1.46
USA04-30	25087.01	1.12	23441.09	1.19	15998.86	1.75

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
6	USA04-31	E-SD	1	12.7	12.7	51.6			34.49	40.7
6	USA04-32	E-SD	1	12.7	12.7	51.6			21.36	25.2
6	USA04-33	E-SD	1	12.7	12.7	51.6			24.15	28.5
6	USA04-34	E-SD	1	12.7	12.7	51.6			21.36	25.2
6	USA04-35	E-SD	1	12.7	12.7	51.6			34.49	40.7
6	USA04-36	E-SD	1	12.7	12.7	51.6			42.71	50.4
6	USA04-37	E-SD	1	12.7	12.7	51.6			42.71	50.4
6	USA04-38	E-SD	1	12.7	12.7	51.6			34.49	40.7
6	USA04-39	E-SD	1	12.7	12.7	51.6			42.71	50.4
6	USA04-40	E-SD	1	12.7	12.7	51.6			22.03	26.0
6	USA04-41	E-SD	1	12.7	12.7	51.6			22.03	26.0
6	USA04-42	E-SD	1	12.7	12.7	51.6			22.03	26.0
6	USA04-43	E-SD	1	12.7	12.7	51.6			22.03	26.0
6	USA04-44	E-SD	1	12.7	12.7	51.6			22.03	26.0
18	USA04-45	E-SD	1	12.7	12.7	52	393		38.90	45.9
1	ENG2-07	E-TW	1	16	16	53		20	28.81	34.0
1	ENG2-15	E-TW	1	16	16	53		20	22.37	26.4
1	ENG2-48	E-DI	1	12	12	53		20	22.37	26.4
3	GER3-163	E-SD	1	17	17	53		16	21.19	25.0
3	GER3-164	E-TC	1	12	12	53		16	21.19	25.0
3	GER3-165	E-TC	1	12	12	53		16	14.66	17.3
3	GER3-166	E-SD	1	17	17	53		16	9.58	11.3
3	GER3-167	E-SD	1	17	17	53		16	12.20	14.4
3	GER3-168	E-SD	1	17	17	53		16	18.64	22.0
3	GER3-169	E-SD	1	17	17	53		16	24.66	29.1
3	GER3-170	E-SD	1	17	17	53		16	38.56	45.5
3	GER3-171	E-DI	1	20	20	55		16	21.19	25.0
3	GER3-172	E-DI	1	20	20	55		16	21.19	25.0
3	GER3-173	E-DI	1	20	20	55		16	21.19	25.0
3	GER3-174	E-TC	1	10	10	55		16	17.37	20.5
3	GER3-175	E-TC	1	10	10	55		16	17.71	20.9
3	GER3-176	E-TC	1	12	12	55		16	22.12	26.1
3	GER3-177	E-TC	1	14	14	55		16	19.07	22.5
3	GER3-178	E-DI	1	20	20	55		16	20.68	24.4
3	GER3-179	E-TC	1	14	14	55		16	22.20	26.2
3	GER3-180	E-DI	1	20	20	55		16	22.37	26.4
3	GER3-181	E-TC	1	14	14	55		16	46.95	55.4
3	GER3-182	E-TC	1	14	14	55		16	59.58	70.3
3	GER3-183	E-DI	1	20	20	55		16	42.97	50.7
3	GER3-184	E-TC	1	8	8	55		16	19.66	23.2
17	SWE1-16	E-TW	1	10	10	55	560		19.83	23.4
1	ENG2-24	E-TC	1	10	10	57	640	20	27.37	32.3
3	GER3-185	E-TC	1	14	14	57		16	19.24	22.7

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)		Ultimate Load Nu (kN)	Failure Mode
USA04-31	90	999	999	999	23963.04	23963.04	UNKNOWN	32.7	Cone
USA04-32	90	999	999	999	23963.04	23963.04	UNKNOWN	32.9	Cone
USA04-33	90	999	999	999	23963.04	23963.04	UNKNOWN	34.7	Cone
USA04-34	90	999	999	999	23963.04	23963.04	UNKNOWN	36.6	Cone
USA04-35	90	999	999	999	23963.04	23963.04	UNKNOWN	40.9	Cone
USA04-36	90	999	999	999	23963.04	23963.04	UNKNOWN	44.9	Cone
USA04-37	90	999	999	999	23963.04	23963.04	UNKNOWN	46.3	Cone
USA04-38	90	999	999	999	23963.04	23963.04	UNKNOWN	48.4	Cone
USA04-39	90	999	999	999	23963.04	23963.04	UNKNOWN	49.8	Cone
USA04-40	102	999	999	999	23963.04	23963.04	UNKNOWN	30.2	Cone
USA04-41	114	999	999	999	23963.04	23963.04	UNKNOWN	31.7	Cone
USA04-42	127	999	999	999	23963.04	23963.04	UNKNOWN	29.1	Cone
USA04-43	140	999	999	999	23963.04	23963.04	UNKNOWN	27.9	Cone
USA04-44	152	999	999	999	23963.04	23963.04	UNKNOWN	32.5	Cone
USA04-45	999	999	999	999	24336	24336	UNKNOWN	35	Cone
ENG2-07	999	999	999	999	25281	25281	UNKNOWN	43	Cone
ENG2-15	999	999	999	999	25281	25281	UNKNOWN	28	Cone
ENG2-48	999	999	999	999	25281	25281	UNKNOWN	32	Cone
GER3-163	100	999	999	999	25281	25281	UNKNOWN	31.2	Cone
GER3-164	130	999	999	999	25281	25281	UNKNOWN	19.1	Cone
GER3-165	999	999	999	999	25281	25281	UNKNOWN	14.8	Cone
GER3-166	999	999	999	999	25281	25281	UNKNOWN	19.1	Cone
GER3-167	999	999	999	999	25281	25281	UNKNOWN	22.7	Cone
GER3-168	999	999	999	999	25281	25281	UNKNOWN	26.6	Cone
GER3-169	999	999	999	999	25281	25281	UNKNOWN	30.8	Cone
GER3-170	999	999	999	999	25281	25281	UNKNOWN	44.6	Cone
GER3-171	120	999	999	999	27225	27225	UNKNOWN	26.5	Cone
GER3-172	150	999	999	999	27225	27225	UNKNOWN	30.5	Cone
GER3-173	180	999	999	999	27225	27225	UNKNOWN	29.4	Cone
GER3-174	999	999	999	999	27225	27225	UNKNOWN	12.6	Cone
GER3-175	999	999	999	999	27225	27225	UNKNOWN	18	Cone
GER3-176	999	999	999	999	27225	27225	UNKNOWN	20.5	Cone
GER3-177	999	999	999	999	27225	27225	UNKNOWN	22.2	Cone
GER3-178	999	999	999	999	27225	27225	UNKNOWN	29.5	Cone
GER3-179	999	999	999	999	27225	27225	UNKNOWN	29.8	Cone
GER3-180	999	999	999	999	27225	27225	UNKNOWN	42.2	Cone
GER3-181	999	999	999	999	27225	27225	UNKNOWN	42.4	Cone
GER3-182	999	999	999	999	27225	27225	UNKNOWN	48.5	Cone
GER3-183	999	999	999	999	27225	27225	UNKNOWN	57.3	Cone
GER3-184	999	999	999	999	27225	27225	UNKNOWN	19.2	Cone
SWE1-16	999	999	999	999	27225	27225	UNKNOWN	17.9	Cone
ENG2-24	999	999	999	999	29241	29241	UNKNOWN	31	Cone
GER3-185	999	999	999	999	29241	29241	UNKNOWN	17.4	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
USA04-31	31882.02	1.03	29790.29	1.10	20332.28	1.61
USA04-32	25087.01	1.31	23441.09	1.40	15998.86	2.06
USA04-33	26679.09	1.30	24928.72	1.39	17014.19	2.04
USA04-34	25087.01	1.46	23441.09	1.56	15998.86	2.29
USA04-35	31882.02	1.28	29790.29	1.37	20332.28	2.01
USA04-36	35478.39	1.27	33150.71	1.35	22625.81	1.98
USA04-37	35478.39	1.31	33150.71	1.40	22625.81	2.05
USA04-38	31882.02	1.52	29790.29	1.62	20332.28	2.38
USA04-39	35478.39	1.40	33150.71	1.50	22625.81	2.20
USA04-40	25482.11	1.19	23810.27	1.27	16250.83	1.86
USA04-41	25482.11	1.24	23810.27	1.33	16250.83	1.95
USA04-42	25482.11	1.14	23810.27	1.22	16250.83	1.79
USA04-43	25482.11	1.09	23810.27	1.17	16250.83	1.72
USA04-44	25482.11	1.28	23810.27	1.36	16250.83	2.00
USA04-45	34251.96	1.02	32065.50	1.09	21894.86	1.60
ENG2-07	30333.84	1.42	28529.73	1.51	20482.95	2.10
ENG2-15	26729.44	1.05	25139.70	1.11	18049.08	1.55
ENG2-48	26729.44	1.20	25139.70	1.27	17787.50	1.80
GER3-163	26011.05	1.20	24464.04	1.28	17818.54	1.75
GER3-164	26011.05	0.73	24464.04	0.78	16545.78	1.15
GER3-165	21637.69	0.68	20350.79	0.73	13763.86	1.08
GER3-166	17487.48	1.09	16447.40	1.16	11979.57	1.59
GER3-167	19741.00	1.15	18566.90	1.22	13523.32	1.68
GER3-168	24400.53	1.09	22949.30	1.16	16715.27	1.59
GER3-169	28063.02	1.10	26393.96	1.17	19224.21	1.60
GER3-170	35090.83	1.27	33003.79	1.35	24038.52	1.86
GER3-171	27497.18	0.96	26093.10	1.02	19811.72	1.34
GER3-172	27497.18	1.11	26093.10	1.17	19811.72	1.54
GER3-173	27497.18	1.07	26093.10	1.13	19811.72	1.48
GER3-174	24899.75	0.51	23628.31	0.53	15548.23	0.81
GER3-175	25141.51	0.72	23857.72	0.75	15699.19	1.15
GER3-176	28095.61	0.73	26660.97	0.77	18083.64	1.13
GER3-177	26086.11	0.85	24754.09	0.90	17291.44	1.28
GER3-178	27165.21	1.09	25778.09	1.14	19572.53	1.51
GER3-179	28149.38	1.06	26712.00	1.12	18659.09	1.60
GER3-180	28256.61	1.49	26813.76	1.57	20358.89	2.07
GER3-181	40932.95	1.04	38842.81	1.09	27132.81	1.56
GER3-182	46110.07	1.05	43755.58	1.11	30564.52	1.59
GER3-183	39158.15	1.46	37158.63	1.54	28213.44	2.03
GER3-184	26488.79	0.72	25136.21	0.76	17151.21	1.12
SWE1-16	26602.72	0.67	25244.32	0.71	16611.62	1.08
ENG2-24	32975.22	0.94	31556.16	0.98	22093.40	1.40
GER3-185	27643.90	0.63	26454.27	0.66	18521.42	0.94

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
3	GER3-186	E-TC	1	20	20	57		16	16.27	19.2
3	GER3-187	E-TC	1	20	20	57		16	41.36	48.8
3	GER3-188	E-TC	1	20	20	57		16	53.81	63.5
17	SWE1-17	E-TW	1	12	12	57	560		36.10	42.6
19	USA04-46	E-TC	1	8.9	8.9	57		25	28.81	34.0
19	USA04-47	E-TC	1	15.9	15.9	57		25	26.78	31.6
21	USA04-48	E-TW	1	12.7	12.7	57.5	483	25	27.63	32.6
1	ENG2-25	E-TC	1	12	12	58	640	20	27.37	32.3
17	SWE1-18	E-TW	1	16	16	58	430		21.78	25.7
22	USA04-49	E-TW	1	12	12	58.2	745	25	14.49	17.1
22	USA04-50	E-TW	1	12	12	58.9	565	25	25.00	29.5
3	GER3-189	E-TC	1	16	16	59		16	13.31	15.7
3	GER3-190	E-TC	1	16	16	59		16	53.39	63.0
1	ENG2-49	E-DI	1	16	16	60		20	22.37	26.4
1	ENG2-50	E-DI	1	16	16	60		20	25.25	29.8
3	GER3-194	E-TC	1	14	14	60		16	21.19	25.0
3	GER3-195	E-TC	1	19	19	60		16	58.05	68.5
0	GER3-200	E-TC	1	10	10	60		16	47.46	56.0
3	GER3-201	E-TC	1	10	10	60	900	16	26.27	31.0
22	USA04-51	E-TW	1	12	12	60.2	565	25	12.97	15.3
22	USA04-52	E-TW	1	12	12	60.7	745	25	27.63	32.6
22	USA04-53	E-TW	1	12	12	60.8	483	25	13.64	16.1
3	GER3-213	E-TC	1	15	15	61		16	17.20	20.3
3	GER3-214	E-TC	1	15	15	61		16	53.39	63.0
1	ENG2-26	E-TC	1	8	8	62	640	20	27.37	32.3
8	GER3-215	E-DI	1	15	15	62		16	18.64	22.0
8	GER3-216	E-DI	1	15	15	62		16	41.53	49.0
6	USA04-54	E-SD	1	15.9	15.9	62.7			24.15	28.5
3	GER3-217	E-SD	1	21	21	63		16	21.19	25.0
3	GER3-218	E-SD	1	21	21	63		16	9.15	10.8
3	GER3-219	E-SD	1	21	21	63		16	11.69	13.8
3	GER3-220	E-SD	1	21	21	63		16	15.08	17.8
3	GER3-221	E-SD	1	21	21	63		16	18.56	21.9
3	GER3-222	E-SD	1	21	21	63		16	26.10	30.8
3	GER3-223	E-SD	1	21	21	63		16	36.27	42.8
34	USA04-55	E-TC	1	15.9	15.9	63.5		9	30.25	35.7
34	USA04-56	E-TC	1	15.9	15.9	63.5		9	30.25	35.7
34	USA04-57	E-TC	1	15.9	15.9	63.5		9	30.25	35.7
34	USA04-58	E-TC	1	15.9	15.9	63.5		9	30.25	35.7
34	USA04-59	E-TC	1	15.9	15.9	63.5		9	43.98	51.9
34	USA04-60	E-TC	1	15.9	15.9	63.5		9	43.98	51.9
34	USA04-61	E-TC	1	15.9	15.9	63.5		9	43.98	51.9
15	USA04-62	E-TC	1	12.7	12.7	63.5			24.07	28.4

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)		Ultimate Load Nu (kN)	Failure Mode
GER3-186	999	999	999	999	29241	29241	UNKNOWN	27.7	Cone
GER3-187	999	999	999	999	29241	29241	UNKNOWN	40.4	Cone
GER3-188	999	999	999	999	29241	29241	UNKNOWN	48.9	Cone
SWE1-17	999	999	999	999	29241	29241	UNKNOWN	31	Cone
USA04-46	999	999	999	999	29241	29241	UNKNOWN	30.7	Cone
USA04-47	999	999	999	999	29241	29241	UNKNOWN	33.4	Cone
USA04-48	999	999	999	999	29756.25	29756.25	UNKNOWN	32.6	Cone
ENG2-25	999	999	999	999	30276	30276	UNKNOWN	35	Cone
SWE1-18	160	999	999	999	30276	30276	UNKNOWN	33.4	Cone
USA04-49	999	999	999	999	30485.16	30485.16	UNKNOWN	21.3	Cone
USA04-50	999	999	999	999	31222.89	31222.89	UNKNOWN	23.2	Cone
GER3-189	999	999	999	999	31329	31329	UNKNOWN	24.6	Cone
GER3-190	999	999	999	999	31329	31329	UNKNOWN	37.8	Cone
ENG2-49	999	999	999	999	32400	32400	UNKNOWN	29	Cone
ENG2-50	999	999	999	999	32400	32400	UNKNOWN	47	Cone
GER3-194	140	999	999	999	32400	32400	UNKNOWN	27.7	Cone
GER3-195	999	999	999	999	32400	32400	UNKNOWN	50.5	Cone
GER3-200	999	999	999	999	32400	32400	UNKNOWN	48.3	Cone
GER3-201	999	999	999	999	32400	32400	UNKNOWN	33.7	Cone
USA04-51	999	999	999	999	32616.36	32616.36	UNKNOWN	19	Cone
USA04-52	999	999	999	999	33160.41	33160.41	UNKNOWN	23.4	Cone
USA04-53	999	999	999	999	33269.76	33269.76	UNKNOWN	19	Cone
GER3-213	999	999	999	999	33489	33489	UNKNOWN	29.4	Cone
GER3-214	999	999	999	999	33489	33489	UNKNOWN	45.8	Cone
ENG2-26	999	999	999	999	34596	34596	UNKNOWN	29	Cone
GER3-215	999	999	999	999	34596	34596	UNKNOWN	30.2	Cone
GER3-216	999	999	999	999	34596	34596	UNKNOWN	61	Cone
USA04-54	110	999	999	999	35381.61	35381.61	UNKNOWN	46.7	Cone
GER3-217	120	999	999	999	35721	35721	UNKNOWN	38.2	Cone
GER3-218	999	999	999	999	35721	35721	UNKNOWN	19.4	Cone
GER3-219	999	999	999	999	35721	35721	UNKNOWN	23.8	Cone
GER3-220	999	999	999	999	35721	35721	UNKNOWN	33.5	Cone
GER3-221	999	999	999	999	35721	35721	UNKNOWN	37.8	Cone
GER3-222	999	999	999	999	35721	35721	UNKNOWN	44	Cone
GER3-223	999	999	999	999	35721	35721	UNKNOWN	61	Cone
USA04-55	999	999	999	999	36290.25	36290.25	UNKNOWN	33.9	Cone
USA04-56	999	999	999	999	36290.25	36290.25	UNKNOWN	36.4	Cone
USA04-57	999	999	999	999	36290.25	36290.25	UNKNOWN	36.4	Cone
USA04-58	999	999	999	999	36290.25	36290.25	UNKNOWN	36.4	Cone
USA04-59	999	999	999	999	36290.25	36290.25	UNKNOWN	49.6	Cone
USA04-60	999	999	999	999	36290.25	36290.25	UNKNOWN	53.9	Cone
USA04-61	999	999	999	999	36290.25	36290.25	UNKNOWN	56.4	Cone
USA04-62	999	999	999	999	36290.25	36290.25	UNKNOWN	29.8	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
GER3-186	25423.60	1.09	24329.51	1.14	18473.29	1.50
GER3-187	40531.84	1.00	38787.59	1.04	29451.24	1.37
GER3-188	46235.25	1.06	44245.56	1.11	33595.46	1.46
SWE1-17	37869.64	0.82	36239.95	0.86	24657.94	1.26
USA04-46	33831.86	0.91	32375.93	0.95	21039.13	1.46
USA04-47	32615.94	1.02	31212.34	1.07	22437.48	1.49
USA04-48	33564.85	0.97	32185.87	1.01	24377.22	1.34
ENG2-25	33846.78	1.03	32521.49	1.08	24064.17	1.45
SWE1-18	30191.36	1.11	29009.20	1.15	20900.39	1.60
USA04-49	24754.64	0.86	23804.30	0.89	16228.79	1.31
USA04-50	33102.29	0.70	31919.25	0.73	21787.16	1.06
GER3-189	24210.40	1.02	23354.23	1.05	16841.91	1.46
GER3-190	48497.84	0.78	46782.78	0.81	33737.40	1.12
ENG2-49	32196.08	0.90	31176.91	0.93	23690.34	1.22
ENG2-50	34206.54	1.37	33123.73	1.42	25169.67	1.87
GER3-194	31330.76	0.88	30338.99	0.91	21324.61	1.30
GER3-195	51861.64	0.97	50219.97	1.01	37683.54	1.34
GER3-200	46891.59	1.03	45407.25	1.06	32907.73	1.47
GER3-201	34888.46	0.97	33784.07	1.00	23842.35	1.41
USA04-51	24632.84	0.77	23871.13	0.80	16330.80	1.16
USA04-52	36405.41	0.64	35345.76	0.66	24202.49	0.97
USA04-53	25647.34	0.74	24910.09	0.76	17059.88	1.11
GER3-213	28941.22	1.02	28130.10	1.05	20064.09	1.47
GER3-214	50984.61	0.90	49555.68	0.92	35346.13	1.30
ENG2-26	37407.86	0.78	36492.25	0.79	25046.83	1.16
GER3-215	30872.58	0.98	30116.93	1.00	23520.32	1.28
GER3-216	46074.40	1.32	44946.66	1.36	35101.84	1.74
USA04-54	35735.33	1.31	34947.86	1.34	25272.06	1.85
GER3-217	33709.70	1.13	33001.74	1.16	25416.63	1.50
GER3-218	22156.28	0.88	21690.96	0.89	16705.51	1.16
GER3-219	25045.20	0.95	24519.21	0.97	18883.72	1.26
GER3-220	28444.28	1.18	27846.90	1.20	21446.58	1.56
GER3-221	31550.55	1.20	30887.94	1.22	23788.66	1.59
GER3-222	37416.25	1.18	36630.45	1.20	28211.31	1.56
GER3-223	44106.93	1.38	43180.61	1.41	33255.99	1.83
USA04-55	40763.25	0.83	39976.86	0.85	28937.20	1.17
USA04-56	40763.25	0.89	39976.86	0.91	28937.20	1.26
USA04-57	40763.25	0.89	39976.86	0.91	28937.20	1.26
USA04-58	40763.25	0.89	39976.86	0.91	28937.20	1.26
USA04-59	49149.42	1.01	48201.24	1.03	34890.41	1.42
USA04-60	49149.42	1.10	48201.24	1.12	34890.41	1.54
USA04-61	49149.42	1.15	48201.24	1.17	34890.41	1.62
USA04-62	36357.49	0.82	35656.09	0.84	24769.43	1.20

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
15	USA04-63	E-TC	1	12.7	12.7	63.5			24.07	28.4
15	USA04-64	E-TC	1	12.7	12.7	63.5			24.07	28.4
15	USA04-65	E-TC	1	12.7	12.7	63.5			24.07	28.4
15	USA04-66	E-TC	1	12.7	12.7	63.5			31.36	37.0
15	USA04-67	E-TC	1	12.7	12.7	63.5			32.71	38.6
15	USA04-68	E-TC	1	12.7	12.7	63.5			32.71	38.6
15	USA04-69	E-TC	1	12.7	12.7	63.5			32.71	38.6
1	ENG2-51	E-DI	1	16	16	64		20	23.81	28.1
1	ENG2-02	E-TW	1	8	8	65	850	20	19.49	23.0
1	ENG2-27	E-TC	1	12	12	65		20	19.49	23.0
1	ENG2-52	E-DI	1	16	16	65		20	22.37	26.4
3	GER3-224	E-TC	1	10	10	65		16	12.46	14.7
3	GER3-225	E-TC	1	10	10	65		16	25.85	30.5
3	GER3-226	E-DI	1	20	20	65		16	16.53	19.5
3	GER3-227	E-DI	1	20	20	65		16	17.37	20.5
3	GER3-228	E-DI	1	20	20	65		16	16.53	19.5
3	GER3-229	E-DI	1	20	20	65		16	22.97	27.1
3	GER3-230	E-DI	1	20	20	65		16	42.37	50.0
8	GER3-231	E-TC	1	10	10	65	640	16	24.41	28.8
8	GER3-232	E-TC	1	10	10	65	640	16	47.20	55.7
8	GER3-233	E-TC	1	10	10	65	640	16	24.41	28.8
8	GER3-234	E-TC	1	10	10	65	640	16	24.41	28.8
8	GER3-235	E-TC	1	10	10	65	640	16	47.20	55.7
17	SWE1-22	E-TW	1	16	16	65	430		17.54	20.7
3	GER3-236	E-TC	1	15	15	66		16	19.66	23.2
3	GER3-237	E-TC	1	16	16	67		16	21.19	25.0
3	GER3-238	E-TC	1	16	16	67		16	7.46	8.8
3	GER3-239	E-TC	1	16	16	67		16	18.81	22.2
3	GER3-240	E-TC	1	16	16	67		16	27.20	32.1
3	GER3-241	E-TC	1	16	16	67		16	61.44	72.5
3	GER3-242	E-TC	1	12	12	67		16	18.64	22.0
17	SWE1-23	E-TW	1	16	16	67	430		34.32	40.5
1	ENG2-16	E-TW	1	20	20	68		20	22.37	26.4
1	ENG2-08	E-TW	1	20	20	69		20	28.81	34.0
3	GER3-243	E-TC	1	18	18	70		16	19.15	22.6
3	GER3-244	E-TC	1	18	18	70		16	21.69	25.6
3	GER3-245	E-TC	1	18	18	70		16	31.86	37.6
7	GER3-246	E-TC	1	10	10	70	640	16	40.68	48.0
7	GER3-247	E-TC	1	10	10	70	640	16	30.51	36.0
7	GER3-248	E-TC	1	10	10	70	640	16	40.68	48.0
3	GER3-249	E-TC	1	19	19	71		16	21.19	25.0
3	GER3-250	E-TC	1	19	19	71		16	14.92	17.6
3	GER3-251	E-TC	1	19	19	71		16	20.34	24.0

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)		Ultimate Load Nu (kN)	Failure Mode
USA04-63	999	999	999	999	36290.25	36290.25	UNKNOWN	30.3	Cone
USA04-64	999	999	999	999	36290.25	36290.25	UNKNOWN	22.3	Cone
USA04-65	999	999	999	999	36290.25	36290.25	UNKNOWN	29.6	Cone
USA04-66	999	999	999	999	36290.25	36290.25	UNKNOWN	32.7	Cone
USA04-67	999	999	999	999	36290.25	36290.25	UNKNOWN	35.9	Cone
USA04-68	999	999	999	999	36290.25	36290.25	UNKNOWN	37	Cone
USA04-69	999	999	999	999	36290.25	36290.25	UNKNOWN	37	Cone
ENG2-51	999	999	999	999	36864	36864	UNKNOWN	35	Cone
ENG2-02	999	999	999	999	38025	38025	UNKNOWN	25	Cone
ENG2-27	999	999	999	999	38025	38025	UNKNOWN	42	Cone
ENG2-52	999	999	999	999	38025	38025	UNKNOWN	40	Cone
GER3-224	999	999	999	999	38025	38025	UNKNOWN	14.8	Cone
GER3-225	999	999	999	999	38025	38025	UNKNOWN	23.3	Cone
GER3-226	999	999	999	999	38025	38025	UNKNOWN	29.6	Cone
GER3-227	999	999	999	999	38025	38025	UNKNOWN	29.7	Cone
GER3-228	999	999	999	999	38025	38025	UNKNOWN	36.5	Cone
GER3-229	999	999	999	999	38025	38025	UNKNOWN	40	Cone
GER3-230	999	999	999	999	38025	38025	UNKNOWN	52	Cone
GER3-231	999	999	999	999	38025	38025	UNKNOWN	36.4	Cone
GER3-232	999	999	999	999	38025	38025	UNKNOWN	37.1	Cone
GER3-233	999	999	999	999	38025	38025	UNKNOWN	38.1	Cone
GER3-234	999	999	999	999	38025	38025	UNKNOWN	38.1	Cone
GER3-235	999	999	999	999	38025	38025	UNKNOWN	39.7	Cone
SWE1-22	160	999	999	999	38025	38025	UNKNOWN	27.9	Cone
GER3-236	999	999	999	999	39204	39204	UNKNOWN	30.5	Cone
GER3-237	150	999	999	999	40401	40401	UNKNOWN	29	Cone
GER3-238	999	999	999	999	40401	40401	UNKNOWN	19.2	Cone
GER3-239	999	999	999	999	40401	40401	UNKNOWN	33.1	Cone
GER3-240	999	999	999	999	40401	40401	UNKNOWN	45.5	Cone
GER3-241	999	999	999	999	40401	40401	UNKNOWN	59.9	Cone
GER3-242	999	999	999	999	40401	40401	UNKNOWN	32.2	Cone
SWE1-23	150	999	999	999	40401	40401	UNKNOWN	47.1	Cone
ENG2-16	999	999	999	999	41616	41616	UNKNOWN	40	Cone
ENG2-08	999	999	999	999	42849	42849	UNKNOWN	54	Cone
GER3-243	999	999	999	999	44100	44100	UNKNOWN	29.9	Cone
GER3-244	999	999	999	999	44100	44100	UNKNOWN	31.6	Cone
GER3-245	999	999	999	999	44100	44100	UNKNOWN	40.7	Cone
GER3-246	999	999	999	999	44100	44100	UNKNOWN	35.3	Cone
GER3-247	999	999	999	999	44100	44100	UNKNOWN	34.8	Cone
GER3-248	999	999	999	999	44100	44100	UNKNOWN	35.6	Cone
GER3-249	160	999	999	999	45369	45369	UNKNOWN	38.4	Cone
GER3-250	999	999	999	999	45369	45369	UNKNOWN	34.3	Cone
GER3-251	999	999	999	999	45369	45369	UNKNOWN	40.5	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
USA04-63	36357.49	0.83	35656.09	0.85	24769.43	1.22
USA04-64	36357.49	0.61	35656.09	0.63	24769.43	0.90
USA04-65	36357.49	0.81	35656.09	0.83	24769.43	1.20
USA04-66	41498.80	0.79	40698.22	0.80	28272.07	1.16
USA04-67	42386.58	0.85	41568.87	0.86	28876.89	1.24
USA04-68	42386.58	0.87	41568.87	0.89	28876.89	1.28
USA04-69	42386.58	0.87	41568.87	0.89	28876.89	1.28
ENG2-51	36592.93	0.96	35948.91	0.97	27374.14	1.28
ENG2-02	33885.04	0.74	33401.56	0.75	21858.90	1.14
ENG2-27	33885.04	1.24	33401.56	1.26	24853.27	1.69
ENG2-52	36303.30	1.10	35785.31	1.12	27268.57	1.47
GER3-224	27089.61	0.55	26703.09	0.55	17954.01	0.82
GER3-225	39020.61	0.60	38463.85	0.61	25861.44	0.90
GER3-226	31200.49	0.95	30755.31	0.96	23435.69	1.26
GER3-227	31990.50	0.93	31534.05	0.94	24029.09	1.24
GER3-228	31200.49	1.17	30755.31	1.19	23435.69	1.56
GER3-229	36781.44	1.09	36256.63	1.10	27627.72	1.45
GER3-230	49960.77	1.04	49247.91	1.06	37527.13	1.39
GER3-231	37917.56	0.96	37376.54	0.97	26604.69	1.37
GER3-232	52731.70	0.70	51979.30	0.71	36998.96	1.00
GER3-233	37917.56	1.00	37376.54	1.02	26604.69	1.43
GER3-234	37917.56	1.00	37376.54	1.02	26604.69	1.43
GER3-235	52731.70	0.75	51979.30	0.76	36998.96	1.07
SWE1-22	32146.18	0.87	31687.50	0.88	23009.74	1.21
GER3-236	34820.42	0.88	34437.20	0.89	24734.38	1.23
GER3-237	36970.58	0.78	36681.89	0.79	26708.59	1.09
GER3-238	21934.50	0.88	21763.21	0.88	15846.10	1.21
GER3-239	34838.77	0.95	34566.72	0.96	25168.51	1.32
GER3-240	41892.75	1.09	41565.61	1.09	30264.50	1.50
GER3-241	62958.64	0.95	62467.01	0.96	45483.10	1.32
GER3-242	34681.48	0.93	34410.66	0.94	25779.36	1.25
SWE1-23	47055.87	1.00	46688.42	1.01	33994.49	1.39
ENG2-16	38845.39	1.03	38663.73	1.03	29533.96	1.35
ENG2-08	45059.59	1.20	44987.22	1.20	34395.90	1.57
GER3-243	37538.37	0.80	37591.07	0.80	28129.57	1.06
GER3-244	39952.24	0.79	40008.33	0.79	29938.42	1.06
GER3-245	48418.92	0.84	48486.90	0.84	36282.96	1.12
GER3-246	54706.86	0.65	54783.67	0.64	39783.65	0.89
GER3-247	47377.53	0.73	47444.05	0.73	34453.65	1.01
GER3-248	54706.86	0.65	54783.67	0.65	39783.65	0.89
GER3-249	40330.32	0.95	40505.97	0.95	30690.15	1.25
GER3-250	33839.03	1.01	33986.42	1.01	25750.48	1.33
GER3-251	39515.48	1.02	39687.58	1.02	30070.08	1.35

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
3	GER3-252	E-TC	1	19	19	71		16	20.34	24.0
22	USA04-70	E-TW	1	15.9	15.9	71.6	483	25	13.56	16.0
1	ENG2-28	E-TC	1	10	10	72	640	20	27.37	32.3
3	GER3-253	E-TC	1	14	14	73		16	17.37	20.5
3	GER3-254	E-TC	1	14	14	73		16	19.49	23.0
3	GER3-255	E-DI	1	25	25	74		16	21.19	25.0
3	GER3-256	E-DI	1	25	25	74		16	21.19	25.0
3	GER3-257	E-DI	1	25	25	74		16	21.19	25.0
3	GER3-258	E-DI	1	25	25	74		16	10.34	12.2
3	GER3-259	E-DI	1	25	25	74		16	15.68	18.5
3	GER3-260	E-DI	1	25	25	74		16	24.92	29.4
3	GER3-261	E-DI	1	25	25	74		16	47.97	56.6
1	ENG2-03	E-TW	1	12	12	75	850	20	19.49	23.0
1	ENG2-05	E-TW	1	12	12	75	850	20	19.49	23.0
3	GER3-262	E-TC	1	16	16	75		16	21.19	25.0
3	GER3-263	E-TC	1	16	16	75		16	21.19	25.0
3	GER3-264	E-TC	1	16	16	75		16	21.19	25.0
3	GER3-265	E-TC	1	18	18	75		16	17.54	20.7
3	GER3-266	E-TC	1	18	18	75		16	24.83	29.3
3	GER3-267	E-TC	1	18	18	75		16	34.15	40.3
3	GER3-268	E-TC	1	18	18	75		16	33.14	39.1
3	GER3-269	E-TC	1	18	18	75		16	48.31	57.0
1	ENG2-09	E-TW	1	25	25	76		20	28.81	34.0
1	ENG2-29	E-TC	1	12	12	78	640	20	27.37	32.3
3	GER3-270	E-TC	1	20	20	78		16	19.75	23.3
3	GER3-271	E-TC	1	20	20	78		16	21.95	25.9
3	GER3-272	E-TC	1	20	20	78		16	59.15	69.8
1	ENG2-53	E-DI	1	20	20	80		20	22.37	26.4
2	GER3-273	E-SD	1	12	12	80	640	16	20.34	24.0
2	GER3-274	E-SD	1	12	12	80	640	16	20.34	24.0
2	GER3-275	E-SD	1	12	12	80	640	16	20.34	24.0
3	GER3-276	E-DI	1	25	25	80		16	16.53	19.5
2	GER3-277	E-SD	1	12	12	80	640	16	41.53	49.0
2	GER3-278	E-SD	1	12	12	80	640	16	41.53	49.0
2	GER3-279	E-TC	1	10	10	80		16	25.85	30.5
2	GER3-280	E-TC	1	10	10	80		16	25.85	30.5
8	GER3-281	E-TC	1	12	12	80	640	16	34.58	40.8
7	GER3-282	E-TC	1	12	12	80	640	16	22.80	26.9
7	GER3-283	E-TC	1	12	12	80	640	16	24.83	29.3
8	GER3-284	E-TC	1	12	12	80	640	16	25.42	30.0
8	GER3-285	E-TC	1	12	12	80	640	16	25.42	30.0
8	GER3-286	E-TC	1	12	12	80	640	16	34.58	40.8
8	GER3-287	E-TC	1	12	12	80	640	16	34.58	40.8

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)		Ultimate Load Nu (kN)	Failure Mode
GER3-252	999	999	999	999	45369	45369	UNKNOWN	43.8	Cone
USA04-70	999	999	999	999	46139.04	46139.04	UNKNOWN	31.6	Cone
ENG2-28	999	999	999	999	46656	46656	UNKNOWN	42	Cone
GER3-253	999	999	999	999	47961	47961	UNKNOWN	25.5	Cone
GER3-254	999	999	999	999	47961	47961	UNKNOWN	32.8	Cone
GER3-255	160	999	999	999	49284	49284	UNKNOWN	41.9	Cone
GER3-256	200	999	999	999	49284	49284	UNKNOWN	49.9	Cone
GER3-257	240	999	999	999	49284	49284	UNKNOWN	65	Cone
GER3-258	999	999	999	999	49284	49284	UNKNOWN	31.3	Cone
GER3-259	999	999	999	999	49284	49284	UNKNOWN	39.3	Cone
GER3-260	999	999	999	999	49284	49284	UNKNOWN	60.5	Cone
GER3-261	999	999	999	999	49284	49284	UNKNOWN	105	Cone
ENG2-03	999	999	999	999	50625	50625	UNKNOWN	29	Cone
ENG2-05	120	999	999	999	50625	50625	UNKNOWN	33	Cone
GER3-262	160	999	999	999	50625	50625	UNKNOWN	43.7	Cone
GER3-263	200	999	999	999	50625	50625	UNKNOWN	46.4	Cone
GER3-264	240	999	999	999	50625	50625	UNKNOWN	48.3	Cone
GER3-265	999	999	999	999	50625	50625	UNKNOWN	40.1	Cone
GER3-266	999	999	999	999	50625	50625	UNKNOWN	54.2	Cone
GER3-267	999	999	999	999	50625	50625	UNKNOWN	62.6	Cone
GER3-268	999	999	999	999	50625	50625	UNKNOWN	67.6	Cone
GER3-269	999	999	999	999	50625	50625	UNKNOWN	79.3	Cone
ENG2-09	999	999	999	999	51984	51984	UNKNOWN	68	Cone
ENG2-29	999	999	999	999	54756	54756	UNKNOWN	53	Cone
GER3-270	999	999	999	999	54756	54756	UNKNOWN	39.1	Cone
GER3-271	999	999	999	999	54756	54756	UNKNOWN	46.6	Cone
GER3-272	999	999	999	999	54756	54756	UNKNOWN	68.9	Cone
ENG2-53	999	999	999	999	57600	57600	UNKNOWN	58	Cone
GER3-273	140	999	999	999	57600	57600	UNKNOWN	42.4	Cone
GER3-274	140	999	999	999	57600	57600	UNKNOWN	45.5	Cone
GER3-275	160	999	999	999	57600	57600	UNKNOWN	45.1	Cone
GER3-276	999	999	999	999	57600	57600	UNKNOWN	48.8	Cone
GER3-277	999	999	999	999	57600	57600	UNKNOWN	75.8	Cone
GER3-278	999	999	999	999	57600	57600	UNKNOWN	76	Cone
GER3-279	999	999	999	999	57600	57600	UNKNOWN	46.4	Cone
GER3-280	999	999	999	999	57600	57600	UNKNOWN	46.4	Cone
GER3-281	999	999	999	999	57600	57600	UNKNOWN	52.8	Cone
GER3-282	999	999	999	999	57600	57600	UNKNOWN	45.6	Cone
GER3-283	999	999	999	999	57600	57600	UNKNOWN	53.2	Cone
GER3-284	999	999	999	999	57600	57600	UNKNOWN	38.4	Cone
GER3-285	999	999	999	999	57600	57600	UNKNOWN	40.8	Cone
GER3-286	999	999	999	999	57600	57600	UNKNOWN	49.3	Cone
GER3-287	999	999	999	999	57600	57600	UNKNOWN	51.6	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
GER3-252	39515.48	1.11	39687.58	1.10	30070.08	1.46
USA04-70	32674.10	0.97	32873.37	0.96	24071.83	1.31
ENG2-28	46813.82	0.90	47153.22	0.89	33803.40	1.24
GER3-253	38074.60	0.67	38458.74	0.66	27621.49	0.92
GER3-254	40329.45	0.81	40736.35	0.81	29257.29	1.12
GER3-255	42913.28	0.98	43465.79	0.96	35185.61	1.19
GER3-256	42913.28	1.16	43465.79	1.15	35185.61	1.42
GER3-257	42913.28	1.51	43465.79	1.50	35185.61	1.85
GER3-258	29977.93	1.04	30363.90	1.03	24579.61	1.27
GER3-259	36915.40	1.06	37390.69	1.05	30267.80	1.30
GER3-260	46536.67	1.30	47135.84	1.28	38156.51	1.59
GER3-261	64569.87	1.63	65401.22	1.61	52942.35	1.98
ENG2-03	41998.13	0.69	42653.67	0.68	30058.86	0.96
ENG2-05	41998.13	0.79	42653.67	0.77	30058.86	1.10
GER3-262	43786.07	1.00	44469.53	0.98	32779.38	1.33
GER3-263	43786.07	1.06	44469.53	1.04	32779.38	1.42
GER3-264	43786.07	1.10	44469.53	1.09	32779.38	1.47
GER3-265	39842.92	1.01	40464.83	0.99	30482.99	1.32
GER3-266	47402.34	1.14	48142.25	1.13	36266.54	1.49
GER3-267	55592.80	1.13	56460.54	1.11	42532.89	1.47
GER3-268	54758.86	1.23	55613.59	1.22	41894.86	1.61
GER3-269	66115.52	1.20	67147.52	1.18	50583.60	1.57
ENG2-09	52087.55	1.31	53040.35	1.28	42993.47	1.58
ENG2-29	52785.82	1.00	54026.96	0.98	40878.52	1.30
GER3-270	44832.60	0.87	45886.74	0.85	35442.70	1.10
GER3-271	47267.85	0.99	48379.25	0.96	37367.90	1.25
GER3-272	77596.78	0.89	79421.29	0.87	61344.62	1.12
ENG2-53	49569.10	1.17	50984.16	1.14	41458.10	1.40
GER3-273	47262.28	0.90	48611.49	0.87	37044.08	1.14
GER3-274	47262.28	0.96	48611.49	0.94	37044.08	1.23
GER3-275	47262.28	0.95	48611.49	0.93	37044.08	1.22
GER3-276	42601.65	1.15	43817.80	1.11	35630.73	1.37
GER3-277	67531.61	1.12	69459.45	1.09	52931.14	1.43
GER3-278	67531.61	1.13	69459.45	1.09	52931.14	1.44
GER3-279	53279.36	0.87	54800.34	0.85	40869.03	1.14
GER3-280	53279.36	0.87	54800.34	0.85	40869.03	1.14
GER3-281	61622.48	0.86	63381.63	0.83	48299.57	1.09
GER3-282	50036.30	0.91	51464.70	0.89	39178.50	1.16
GER3-283	52220.72	1.02	53711.48	0.99	40888.90	1.30
GER3-284	52840.84	0.73	54349.30	0.71	41416.54	0.93
GER3-285	52840.84	0.77	54349.30	0.75	41416.54	0.99
GER3-286	61622.48	0.80	63381.63	0.78	48299.57	1.02
GER3-287	61622.48	0.84	63381.63	0.81	48299.57	1.07

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
18	USA04-71	E-TC	1	12	12	80	393		39.92	47.1
18	USA04-72	E-TC	1	12	12	80	393		29.92	35.3
18	USA04-73	E-TC	1	12	12	80	393		39.92	47.1
1	ENG2-54	E-DI	1	19	19	81		20	23.81	28.1
3	GER3-289	E-TC	1	18	18	81		16	17.37	20.5
3	GER3-290	E-TC	1	20	20	82		16	19.24	22.7
2	GER3-291	E-TC	1	16	16	82		16	19.66	23.2
6	USA04-74	E-SD	1	19.5	19.5	82.6			24.15	28.5
6	USA04-75	E-SD	1	19.5	19.5	82.6			25.51	30.1
6	USA04-76	E-SD	1	19.5	19.5	82.6			25.51	30.1
1	ENG2-55	E-DI	1	20	20	83		20	22.37	26.4
3	GER3-292	E-SD	1	25	25	83		16	21.19	25.0
3	GER3-293	E-SD	1	25	25	83		16	15.17	17.9
3	GER3-294	E-SD	1	25	25	83		16	12.12	14.3
3	GER3-295	E-SD	1	25	25	83		16	16.53	19.5
3	GER3-296	E-SD	1	25	25	83		16	24.32	28.7
3	GER3-297	E-SD	1	25	25	83		16	43.14	50.9
3	GER3-298	E-SD	1	25	25	83		16	58.31	68.8
18	USA04-77	E-SD	1	19.5	19.5	83	248		38.90	45.9
3	GER3-299	E-TC	1	22	22	87		16	21.19	25.0
3	GER3-300	E-TC	1	22	22	87		16	19.07	22.5
3	GER3-301	E-TC	1	22	22	87		16	23.05	27.2
3	GER3-302	E-TC	1	22	22	87		16	47.12	55.6
22	USA04-78	E-TW	1	19.5	19.5	87.4	483	25	13.56	16.0
3	GER3-303	E-TC	1	24	24	89		16	21.19	25.0
3	GER3-304	E-TC	1	24	24	89		16	19.15	22.6
3	GER3-305	E-TC	1	24	24	89		16	19.24	22.7
3	GER3-306	E-TC	1	24	24	89		16	31.86	37.6
1	ENG2-30	E-TC	1	16	16	90		20	19.49	23.0
1	ENG2-31	E-TC	1	16	16	90		20	19.49	23.0
3	GER3-307	E-TC	1	22	22	90		16	17.37	20.5
3	GER3-308	E-TC	1	22	22	90		16	57.63	68.0
6	USA04-79	E-SD	1	22.2	22.2	93.7			24.15	28.5
3	GER3-309	E-TC	1	25	25	94		16	21.19	25.0
3	GER3-310	E-TC	1	24	24	97		16	21.19	25.0
3	GER3-311	E-TC	1	24	24	97		16	16.44	19.4
3	GER3-312	E-TC	1	24	24	97		16	17.20	20.3
3	GER3-313	E-TC	1	24	24	97		16	38.14	45.0
1	ENG2-04	E-TW	1	12	12	100	850	20	19.49	23.0
3	GER3-315	E-TC	1	24	24	100		16	21.19	25.0
3	GER3-316	E-TC	1	24	24	100		16	21.19	25.0
3	GER3-317	E-TC	1	24	24	100		16	21.19	25.0
3	GER3-318	E-TC	1	25	25	100		16	20.76	24.5

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)		Ultimate Load Nu (kN)	Failure Mode
USA04-71	999	999	999	999	57600	57600	UNKNOWN	59	Cone
USA04-72	999	999	999	999	57600	57600	UNKNOWN	62	Cone
USA04-73	999	999	999	999	57600	57600	UNKNOWN	54.7	Cone
ENG2-54	999	999	999	999	59049	59049	UNKNOWN	66	Cone
GER3-289	999	999	999	999	59049	59049	UNKNOWN	40.7	Cone
GER3-290	999	999	999	999	60516	60516	UNKNOWN	32.8	Cone
GER3-291	999	999	999	999	60516	60516	UNKNOWN	49	Cone
USA04-74	144	999	999	999	61404.84	61404.84	UNKNOWN	66.3	Cone
USA04-75	210	999	999	999	61404.84	61404.84	UNKNOWN	57.4	Cone
USA04-76	229	999	999	999	61404.84	61404.84	UNKNOWN	69.4	Cone
ENG2-55	999	999	999	999	62001	62001	UNKNOWN	54	Cone
GER3-292	160	999	999	999	62001	62001	UNKNOWN	60.5	Cone
GER3-293	999	999	999	999	62001	62001	UNKNOWN	41.1	Cone
GER3-294	999	999	999	999	62001	62001	UNKNOWN	41.4	Cone
GER3-295	999	999	999	999	62001	62001	UNKNOWN	55.3	Cone
GER3-296	999	999	999	999	62001	62001	UNKNOWN	67.7	Cone
GER3-297	999	999	999	999	62001	62001	UNKNOWN	76	Cone
GER3-298	999	999	999	999	62001	62001	UNKNOWN	92.4	Cone
USA04-77	999	999	999	999	62001	62001	UNKNOWN	63	Cone
GER3-299	200	999	999	999	68121	68121	UNKNOWN	48.2	Cone
GER3-300	999	999	999	999	68121	68121	UNKNOWN	47.4	Cone
GER3-301	999	999	999	999	68121	68121	UNKNOWN	53.3	Cone
GER3-302	999	999	999	999	68121	68121	UNKNOWN	102.2	Cone
USA04-78	999	999	999	999	68748.84	68748.84	UNKNOWN	37.3	Cone
GER3-303	250	999	999	999	71289	71289	UNKNOWN	58.7	Cone
GER3-304	999	999	999	999	71289	71289	UNKNOWN	46.5	Cone
GER3-305	999	999	999	999	71289	71289	UNKNOWN	50.5	Cone
GER3-306	999	999	999	999	71289	71289	UNKNOWN	62.9	Cone
ENG2-30	999	999	999	999	72900	72900	UNKNOWN	57	Cone
ENG2-31	999	999	999	999	72900	72900	UNKNOWN	67	Cone
GER3-307	999	999	999	999	72900	72900	UNKNOWN	51	Cone
GER3-308	999	999	999	999	72900	72900	UNKNOWN	90.9	Cone
USA04-79	164	999	999	999	79017.21	79017.21	UNKNOWN	79.2	Cone
GER3-309	250	999	999	999	79524	79524	UNKNOWN	53.5	Cone
GER3-310	200	999	999	999	84681	84681	UNKNOWN	58.5	Cone
GER3-311	999	999	999	999	84681	84681	UNKNOWN	53.9	Cone
GER3-312	999	999	999	999	84681	84681	UNKNOWN	70.6	Cone
GER3-313	999	999	999	999	84681	84681	UNKNOWN	87.6	Cone
ENG2-04	999	999	999	999	90000	90000	UNKNOWN	57	Cone
GER3-315	210	999	999	999	90000	90000	UNKNOWN	77.7	Cone
GER3-316	260	999	999	999	90000	90000	UNKNOWN	80.3	Cone
GER3-317	263	999	999	999	90000	90000	UNKNOWN	79	Cone
GER3-318	999	999	999	999	90000	90000	UNKNOWN	60.7	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
USA04-71	66209.38	0.89	68099.47	0.87	48519.51	1.22
USA04-72	57318.71	1.08	58955.00	1.05	42004.25	1.48
USA04-73	66209.38	0.83	68099.47	0.80	48519.51	1.13
ENG2-54	52102.05	1.27	53717.10	1.23	43719.20	1.51
GER3-289	44501.90	0.91	45881.37	0.89	34875.89	1.17
GER3-290	47698.84	0.69	49292.25	0.67	38278.51	0.86
GER3-291	48221.30	1.02	49832.16	0.98	40367.10	1.21
USA04-74	54033.94	1.23	55915.96	1.19	43247.03	1.53
USA04-75	55529.97	1.03	57464.10	1.00	44444.41	1.29
USA04-76	55529.97	1.25	57464.10	1.21	44444.41	1.56
ENG2-55	52383.34	1.03	54257.20	1.00	44241.71	1.22
GER3-292	50975.47	1.19	52798.96	1.15	43052.66	1.41
GER3-293	43133.80	0.95	44676.78	0.92	36429.77	1.13
GER3-294	38553.10	1.07	39932.21	1.04	32561.02	1.27
GER3-295	45020.32	1.23	46630.78	1.19	38023.08	1.45
GER3-296	54617.55	1.24	56571.32	1.20	46128.67	1.47
GER3-297	72736.12	1.04	75338.03	1.01	61431.18	1.24
GER3-298	84563.99	1.09	87589.01	1.05	71420.71	1.29
USA04-77	69071.29	0.91	71542.11	0.88	55365.14	1.14
GER3-299	54704.49	0.88	57157.50	0.84	45545.33	1.06
GER3-300	51897.24	0.91	54224.37	0.87	43208.10	1.10
GER3-301	57060.74	0.93	59619.41	0.89	47507.08	1.12
GER3-302	81581.25	1.25	85239.45	1.20	67922.12	1.50
USA04-78	44065.76	0.85	46080.22	0.81	35898.58	1.04
GER3-303	56601.65	1.04	59383.75	0.99	48302.16	1.22
GER3-304	53816.24	0.86	56461.43	0.82	45925.17	1.01
GER3-305	53935.17	0.94	56586.20	0.89	46026.66	1.10
GER3-306	69414.95	0.91	72826.85	0.86	59236.65	1.06
ENG2-30	55207.97	1.03	58037.66	0.98	47264.97	1.21
ENG2-31	55207.97	1.21	58037.66	1.15	47264.97	1.42
GER3-307	52121.25	0.98	54792.73	0.93	43839.50	1.16
GER3-308	94927.56	0.96	99793.09	0.91	79844.15	1.14
USA04-79	65283.87	1.21	69119.13	1.15	55689.53	1.42
GER3-309	61437.83	0.87	65083.29	0.82	53724.57	1.00
GER3-310	64402.35	0.91	68593.00	0.85	56370.93	1.04
GER3-311	56732.58	0.95	60424.17	0.89	49657.64	1.09
GER3-312	58033.63	1.22	61809.87	1.14	50796.44	1.39
GER3-313	86404.82	1.01	92027.17	0.95	75629.54	1.16
ENG2-04	64660.35	0.88	69221.87	0.82	51595.29	1.10
GER3-315	67413.07	1.15	72168.78	1.08	59555.22	1.30
GER3-316	67413.07	1.19	72168.78	1.11	59555.22	1.35
GER3-317	67413.07	1.17	72168.78	1.09	59555.22	1.33
GER3-318	66735.53	0.91	71443.45	0.85	59432.11	1.02

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
3	GER3-319	E-TC	1	24	24	100		16	15.51	18.3
3	GER3-320	E-TC	1	25	25	100		16	20.85	24.6
3	GER3-321	E-TC	1	24	24	100		16	16.86	19.9
3	GER3-322	E-TC	1	24	24	100		16	34.15	40.3
3	GER3-323	E-TC	1	25	25	100		16	47.63	56.2
3	GER3-324	E-TC	1	24	24	100		16	33.14	39.1
3	GER3-325	E-TC	1	24	24	100		16	52.29	61.7
3	GER3-327	E-TC	1	28	28	105		16	7.46	8.8
3	GER3-328	E-TC	1	28	28	105		16	19.24	22.7
3	GER3-329	E-TC	1	25	25	105		16	19.24	22.7
3	GER3-330	E-TC	1	28	28	105		16	21.19	25.0
3	GER3-331	E-TC	1	28	28	105		16	27.37	32.3
3	GER3-332	E-TC	1	28	28	105		16	52.71	62.2
3	GER3-333	E-TC	1	28	28	105		16	63.90	75.4
1	ENG2-32	E-TC	1	20	20	110		20	21.61	25.5
1	ENG2-33	E-TC	1	20	20	110		20	21.61	25.5
3	GER3-334	E-TC	1	28	28	114		16	19.24	22.7
1	ENG2-34	E-TC	1	16	16	117	640	20	27.37	32.3
3	GER3-340	E-TC	1	28	28	125		16	15.51	18.3
3	GER3-341	E-TC	1	28	28	125		16	20.51	24.2
3	GER3-342	E-TC	1	28	28	125		16	33.14	39.1
3	GER3-343	E-TC	1	28	28	125		16	47.03	55.5
8	GER3-344	E-TC	1	16	16	125	640	16	24.92	29.4
8	GER3-346	E-TC	1	16	16	125	640	16	21.02	24.8
8	GER3-347	E-TC	1	16	16	125	640	16	21.02	24.8
8	GER3-348	E-TC	1	16	16	125	640	16	46.53	54.9
8	GER3-349	E-TC	1	16	16	125	640	16	49.49	58.4
14	SWE2-03	E-TC	1	30	30	130	736		48.05	56.7
1	ENG2-35	E-TC	1	20	20	136	640	20	27.37	32.3
14	SWE2-01	E-TC	1	27	27	140	736		26.19	30.9
14	SWE2-02	E-TC	1	27	27	142	736		26.19	30.9
3	GER3-350	E-TC	1	32	32	148		16	15.51	18.3
3	GER3-351	E-TC	1	32	32	148		16	22.12	26.1
3	GER3-352	E-TC	1	32	32	148		16	36.36	42.9
3	GER3-353	E-TC	1	32	32	148		16	39.49	46.6
18	USA04-80	E-TC	1	20	20	170	248		22.97	27.1
2	GER3-041	UE	1	10	10	36	640	16	20.34	24.0
2	GER3-042	UE	1	10	10	36	640	16	50.00	59.0
2	GER3-043	UE	1	10	10	36	640	16	20.34	24.0
2	GER3-044	UE	1	10	10	36	640	16	50.00	59.0
2	GER3-045	UE	1	10	10	36	640	16	20.34	24.0
2	GER3-046	UE	1	10	10	36	640	16	50.00	59.0
2	GER3-047	UE	1	10	10	36	640	16	20.34	24.0

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)		Ultimate Load Nu (kN)	Failure Mode
GER3-319	999	999	999	999	90000	90000	UNKNOWN	62.1	Cone
GER3-320	999	999	999	999	90000	90000	UNKNOWN	65.5	Cone
GER3-321	999	999	999	999	90000	90000	UNKNOWN	72.2	Cone
GER3-322	999	999	999	999	90000	90000	UNKNOWN	96.6	Cone
GER3-323	999	999	999	999	90000	90000	UNKNOWN	102.9	Cone
GER3-324	999	999	999	999	90000	90000	UNKNOWN	117.2	Cone
GER3-325	999	999	999	999	90000	90000	UNKNOWN	147.3	Cone
GER3-327	999	999	999	999	99225	99225	UNKNOWN	45.1	Cone
GER3-328	999	999	999	999	99225	99225	UNKNOWN	54.5	Cone
GER3-329	999	999	999	999	99225	99225	UNKNOWN	57.4	Cone
GER3-330	999	999	999	999	99225	99225	UNKNOWN	86.2	Cone
GER3-331	999	999	999	999	99225	99225	UNKNOWN	95.7	Cone
GER3-332	999	999	999	999	99225	99225	UNKNOWN	133	Cone
GER3-333	999	999	999	999	99225	99225	UNKNOWN	157	Cone
ENG2-32	999	999	999	999	108900	108900	UNKNOWN	86	Cone
ENG2-33	999	999	999	999	108900	108900	UNKNOWN	87	Cone
GER3-334	999	999	999	999	116964	116964	UNKNOWN	68.8	Cone
ENG2-34	999	999	999	999	123201	123201	UNKNOWN	93	Cone
GER3-340	999	999	999	999	140625	140625	UNKNOWN	84.5	Cone
GER3-341	999	999	999	999	140625	140625	UNKNOWN	114.6	Cone
GER3-342	999	999	999	999	140625	140625	UNKNOWN	171.6	Cone
GER3-343	999	999	999	999	140625	140625	UNKNOWN	201.8	Cone
GER3-344	999	999	999	999	140625	140625	UNKNOWN	81.8	Cone
GER3-346	999	999	999	999	140625	140625	UNKNOWN	72.3	Cone
GER3-347	999	999	999	999	140625	140625	UNKNOWN	76.5	Cone
GER3-348	999	999	999	999	140625	140625	UNKNOWN	93.5	Cone
GER3-349	999	999	999	999	140625	140625	UNKNOWN	100.5	Cone
SWE2-03	300	999	999	999	152100	152100	UNKNOWN	206	Cone
ENG2-35	999	999	999	999	166464	166464	UNKNOWN	113	Cone
SWE2-01	300	999	999	999	176400	176400	UNKNOWN	180	Cone
SWE2-02	300	999	999	999	181476	181476	UNKNOWN	190	Cone
GER3-350	999	999	999	999	197136	197136	UNKNOWN	90.4	Cone
GER3-351	999	999	999	999	197136	197136	UNKNOWN	142	Cone
GER3-352	999	999	999	999	197136	197136	UNKNOWN	204.6	Cone
GER3-353	999	999	999	999	197136	197136	UNKNOWN	222.6	Cone
USA04-80	999	999	999	999	260100	260100	UNKNOWN	157.3	Cone
GER3-041	75	999	999	999	11664	11664	UNKNOWN	12.9	Cone
GER3-042	75	999	999	999	11664	11664	UNKNOWN	21.9	Cone
GER3-043	75	999	999	999	11664	11664	UNKNOWN	16.1	Cone
GER3-044	75	999	999	999	11664	11664	UNKNOWN	22.2	Cone
GER3-045	100	999	999	999	11664	11664	UNKNOWN	16.9	Cone
GER3-046	100	999	999	999	11664	11664	UNKNOWN	24.6	Cone
GER3-047	100	999	999	999	11664	11664	UNKNOWN	18.4	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
GER3-319	57676.60	1.08	61745.45	1.01	50953.66	1.22
GER3-320	66871.59	0.98	71589.11	0.91	59553.28	1.10
GER3-321	60145.15	1.20	64388.15	1.12	53134.47	1.36
GER3-322	85590.71	1.13	91628.78	1.05	75614.02	1.28
GER3-323	101074.65	1.02	108205.05	0.95	90013.22	1.14
GER3-324	84306.78	1.39	90254.27	1.30	74479.74	1.57
GER3-325	105905.05	1.39	113376.22	1.30	93560.47	1.57
GER3-327	43032.78	1.05	46438.60	0.97	39793.34	1.13
GER3-328	69114.79	0.79	74584.86	0.73	63911.94	0.85
GER3-329	69114.79	0.83	74584.86	0.77	62470.31	0.92
GER3-330	72531.73	1.19	78272.24	1.10	67071.66	1.29
GER3-331	82444.05	1.16	88969.06	1.08	76237.79	1.26
GER3-332	114407.17	1.16	123461.90	1.08	105794.78	1.26
GER3-333	125963.21	1.25	135932.54	1.15	116480.90	1.35
ENG2-32	78547.65	1.09	85392.65	1.01	73632.57	1.17
ENG2-33	78547.65	1.11	85392.65	1.02	73632.57	1.18
GER3-334	78188.76	0.88	85472.36	0.80	74085.67	0.93
ENG2-34	96973.74	0.96	106424.04	0.87	90060.50	1.03
GER3-340	80605.50	1.05	89320.58	0.95	78587.79	1.08
GER3-341	92692.97	1.24	102714.96	1.12	90372.70	1.27
GER3-342	117822.30	1.46	130561.28	1.31	114872.99	1.49
GER3-343	140373.66	1.44	155550.89	1.30	136859.85	1.47
GER3-344	102167.50	0.80	113213.88	0.72	97266.30	0.84
GER3-346	93835.02	0.77	103980.49	0.70	89333.54	0.81
GER3-347	93835.02	0.82	103980.49	0.74	89333.54	0.86
GER3-348	139612.82	0.67	154707.79	0.60	132915.28	0.70
GER3-349	143994.38	0.70	159563.09	0.63	137086.65	0.73
SWE2-03	150480.65	1.37	167674.49	1.23	220968.75	0.93
ENG2-35	121530.06	0.93	136253.48	0.83	121762.10	0.93
SWE2-01	124149.62	1.45	139728.03	1.29	138295.20	1.30
SWE2-02	126819.45	1.50	142998.12	1.33	141787.29	1.34
GER3-350	103846.58	0.87	117717.60	0.77	109468.18	0.83
GER3-351	124018.63	1.14	140584.07	1.01	130732.21	1.09
GER3-352	158999.34	1.29	180237.23	1.14	167606.55	1.22
GER3-353	165714.16	1.34	187848.96	1.18	174684.87	1.27
USA04-80	155572.25	1.01	179306.55	0.88	161515.90	0.97
GER3-041	15897.54	0.81	13313.10	0.97	8589.03	1.50
GER3-042	24925.88	0.88	20873.70	1.05	13466.81	1.63
GER3-043	15897.54	1.01	13313.10	1.21	8589.03	1.87
GER3-044	24925.88	0.89	20873.70	1.06	13466.81	1.65
GER3-045	15897.54	1.06	13313.10	1.27	8589.03	1.97
GER3-046	24925.88	0.99	20873.70	1.18	13466.81	1.83
GER3-047	15897.54	1.16	13313.10	1.38	8589.03	2.14

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
2	GER3-048	UE	1	10	10	36	640	16	50.00	59.0
2	GER3-049	UE	1	10	10	36	640	16	11.02	13.0
2	GER3-050	UE	1	10	10	36	640	16	32.20	38.0
2	GER3-051	UE	1	10	10	36	640	16	23.73	28.0
2	GER3-052	UE	1	10	10	36	640	16	46.61	55.0
2	GER3-053	UE	1	8	8	36.5	640	16	21.19	25.0
2	GER3-054	UE	1	8	8	36.5	640	16	47.46	56.0
2	GER3-055	UE	1	8	8	36.5	640	16	21.19	25.0
2	GER3-056	UE	1	8	8	36.5	640	16	47.46	56.0
2	GER3-057	UE	1	8	8	36.5	640	16	21.19	25.0
2	GER3-058	UE	1	8	8	36.5	640	16	47.46	56.0
2	GER3-059	UE	1	8	8	36.5	640	16	21.19	25.0
2	GER3-060	UE	1	8	8	36.5	640	16	47.46	56.0
2	GER3-061	UE	1	8	8	36.5	640	16	11.02	13.0
2	GER3-062	UE	1	8	8	36.5	640	16	23.73	28.0
2	GER3-063	UE	1	8	8	36.5	640	16	32.20	38.0
2	GER3-064	UE	1	8	8	36.5	640	16	47.46	56.0
2	GER3-066	UE	1	6	6	37	640	16	20.34	24.0
2	GER3-067	UE	1	6	6	37	640	16	20.34	24.0
2	GER3-068	UE	1	6	6	37	640	16	20.34	24.0
2	GER3-069	UE	1	6	6	37	640	16	20.34	24.0
2	GER3-071	UE	1	6	6	37	640	16	20.34	24.0
2	GER3-073	UE	1	6	6	37	640	16	20.34	24.0
2	GER3-075	UE	1	6	6	37	640	16	11.02	13.0
2	GER3-078	UE	1	6	6	37	640	16	23.73	28.0
2	GER3-079	UE	1	6	6	37	640	16	32.20	38.0
25	USA09-02	U	1	6.35	6.35	38.1	0	32	33.10	39.1
25	USA09-03	U	1	6.35	6.35	38.1	0	32	33.10	39.1
25	USA09-04	U	1	6.35	6.35	38.1	0	32	33.10	39.1
25	USA09-05	U	1	6.35	6.35	38.1	0	32	33.10	39.1
25	USA09-15	U	1	9.525	9.525	38.1	0	32	47.68	56.3
7	GER3-094	UE	1	8	8	40	640	16	19.49	23.0
7	GER3-095	UE	1	8	8	40	640	16	50.00	59.0
5	GER3-096	UE	1	8	8	40	640	16	22.03	26.0
5	GER3-097	UE	1	8	8	40	640	16	25.25	29.8
5	GER3-098	UE	1	8	8	40	640	16	38.73	45.7
7	GER3-114	UE	1	8	8	40	640	16	25.51	30.1
7	GER3-115	UE	1	8	8	40	640	16	25.51	30.1
7	GER3-116	UE	1	8	8	40	640	16	54.32	64.1
7	GER3-117	UE	1	8	8	40	640	16	54.32	64.1
8	GER3-118	UE	1	6	6	40		16	26.27	31.0
2	GER3-121	UE	1	8	8	40	640	16	22.46	26.5
2	GER3-122	UE	1	8	8	40	640	16	22.46	26.5

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
GER3-048	100	999	999	999	11664	11664	UNKNOWN	22	Cone
GER3-049	999	999	999	999	11664	11664	UNKNOWN	10.4	Cone
GER3-050	999	999	999	999	11664	11664	UNKNOWN	16.9	Cone
GER3-051	999	999	999	999	11664	11664	UNKNOWN	17	Cone
GER3-052	999	999	999	999	11664	11664	UNKNOWN	23.5	Cone
GER3-053	75	999	999	999	11990.25	11990.25	UNKNOWN	15	Cone
GER3-054	75	999	999	999	11990.25	11990.25	UNKNOWN	22.3	Cone
GER3-055	75	999	999	999	11990.25	11990.25	UNKNOWN	15.5	Cone
GER3-056	75	999	999	999	11990.25	11990.25	UNKNOWN	24.2	Cone
GER3-057	100	999	999	999	11990.25	11990.25	UNKNOWN	17.6	Cone
GER3-058	100	999	999	999	11990.25	11990.25	UNKNOWN	25.5	Cone
GER3-059	100	999	999	999	11990.25	11990.25	UNKNOWN	17.5	Cone
GER3-060	100	999	999	999	11990.25	11990.25	UNKNOWN	25.7	Cone
GER3-061	999	999	999	999	11990.25	11990.25	UNKNOWN	13.1	Cone
GER3-062	999	999	999	999	11990.25	11990.25	UNKNOWN	16.2	Cone
GER3-063	999	999	999	999	11990.25	11990.25	UNKNOWN	16.3	Cone
GER3-064	999	999	999	999	11990.25	11990.25	UNKNOWN	20.3	Cone
GER3-066	70	999	999	999	12321	12321	UNKNOWN	14.3	Cone
GER3-067	75	999	999	999	12321	12321	UNKNOWN	13.9	Cone
GER3-068	75	999	999	999	12321	12321	UNKNOWN	16.1	Cone
GER3-069	80	999	999	999	12321	12321	UNKNOWN	15.1	Cone
GER3-071	100	999	999	999	12321	12321	UNKNOWN	16.9	Cone
GER3-073	100	999	999	999	12321	12321	UNKNOWN	17.1	Cone
GER3-075	999	999	999	999	12321	12321	UNKNOWN	9.5	Cone
GER3-078	999	999	999	999	12321	12321	UNKNOWN	15.7	Cone
GER3-079	999	999	999	999	12321	12321	UNKNOWN	16.1	Cone
USA09-02	999	999	999	999	13064.49	13064.49	ARKANSAS	17.796448	Cone
USA09-03	999	999	999	999	13064.49	13064.49	ARKANSAS	21.354848	Cone
USA09-04	999	999	999	999	13064.49	13064.49	ARKANSAS	21.901952	Cone
USA09-05	999	999	999	999	13064.49	13064.49	ARKANSAS	23.271936	Cone
USA09-15	999	999	999	999	13064.49	13064.49	ARKANSAS	35.143648	Cone
GER3-094	999	999	999	999	14400	14400	UNKNOWN	15	Cone
GER3-095	999	999	999	999	14400	14400	UNKNOWN	26.2	Cone
GER3-096	999	999	999	999	14400	14400	UNKNOWN	16	Cone
GER3-097	999	999	999	999	14400	14400	UNKNOWN	18.1	Cone
GER3-098	999	999	999	999	14400	14400	UNKNOWN	23	Cone
GER3-114	999	999	999	999	14400	14400	UNKNOWN	22.9	Cone
GER3-115	999	999	999	999	14400	14400	UNKNOWN	23.6	Cone
GER3-116	999	999	999	999	14400	14400	UNKNOWN	24	Cone
GER3-117	999	999	999	999	14400	14400	UNKNOWN	27.4	Cone
GER3-118	999	999	999	999	14400	14400	UNKNOWN	14.5	Cone
GER3-121	999	999	999	999	14400	14400	UNKNOWN	16.9	Cone
GER3-122	999	999	999	999	14400	14400	UNKNOWN	16.9	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
GER3-048	24925.88	0.88	20873.70	1.05	13466.81	1.63
GER3-049	11700.28	0.89	9798.17	1.06	6321.36	1.65
GER3-050	20003.97	0.84	16751.95	1.01	10807.63	1.56
GER3-051	17171.31	0.99	14379.79	1.18	9277.21	1.83
GER3-052	24066.10	0.98	20153.70	1.17	13002.29	1.81
GER3-053	16564.56	0.91	13927.25	1.08	8624.94	1.74
GER3-054	24791.57	0.90	20844.40	1.07	12908.63	1.73
GER3-055	16564.56	0.94	13927.25	1.11	8624.94	1.80
GER3-056	24791.57	0.98	20844.40	1.16	12908.63	1.87
GER3-057	16564.56	1.06	13927.25	1.26	8624.94	2.04
GER3-058	24791.57	1.03	20844.40	1.22	12908.63	1.98
GER3-059	16564.56	1.06	13927.25	1.26	8624.94	2.03
GER3-060	24791.57	1.04	20844.40	1.23	12908.63	1.99
GER3-061	11944.88	1.10	10043.08	1.30	6219.53	2.11
GER3-062	17530.28	0.92	14739.22	1.10	9127.78	1.77
GER3-063	20422.16	0.80	17170.67	0.95	10633.54	1.53
GER3-064	24791.57	0.82	20844.40	0.97	12908.63	1.57
GER3-066	16564.52	0.86	13981.93	1.02	8305.27	1.72
GER3-067	16564.52	0.84	13981.93	0.99	8305.27	1.67
GER3-068	16564.52	0.97	13981.93	1.15	8305.27	1.94
GER3-069	16564.52	0.91	13981.93	1.08	8305.27	1.82
GER3-071	16564.52	1.02	13981.93	1.21	8305.27	2.03
GER3-073	16564.52	1.03	13981.93	1.22	8305.27	2.06
GER3-075	12191.16	0.78	10290.42	0.92	6112.51	1.55
GER3-078	17891.73	0.88	15102.21	1.04	8970.72	1.75
GER3-079	20843.23	0.77	17593.54	0.92	10450.57	1.54
USA09-02	22079.38	0.81	18793.53	0.95	11618.38	1.53
USA09-03	22079.38	0.97	18793.53	1.14	11618.38	1.84
USA09-04	22079.38	0.99	18793.53	1.17	11618.38	1.89
USA09-05	22079.38	1.05	18793.53	1.24	11618.38	2.00
USA09-15	26501.01	1.33	22557.13	1.56	14816.65	2.37
GER3-094	18227.39	0.82	15728.25	0.95	9581.98	1.57
GER3-095	29193.53	0.90	25190.83	1.04	15346.79	1.71
GER3-096	19379.71	0.83	16722.57	0.96	10187.75	1.57
GER3-097	20747.64	0.87	17902.95	1.01	10906.86	1.66
GER3-098	25693.23	0.90	22170.45	1.04	13506.71	1.70
GER3-114	20851.82	1.10	17992.84	1.27	11425.38	2.00
GER3-115	20851.82	1.13	17992.84	1.31	11425.38	2.07
GER3-116	30429.14	0.79	26257.02	0.91	16673.10	1.44
GER3-117	30429.14	0.90	26257.02	1.04	16673.10	1.64
GER3-118	21161.26	0.69	18259.85	0.79	10888.97	1.33
GER3-121	19565.17	0.86	16882.60	1.00	10423.69	1.62
GER3-122	19565.17	0.86	16882.60	1.00	10423.69	1.62

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
2	GER3-123	UE	1	8	8	40	640	16	24.92	29.4
2	GER3-124	UE	1	8	8	40	640	16	24.92	29.4
9	GER4-001	S	1	9.5	9.5	42.9	350	16	11.69	13.8
9	GER4-002	S	1	9.5	9.5	42.9	350	16	11.69	13.8
9	GER4-003	S	1	9.5	9.5	42.9	350	16	11.69	13.8
9	GER4-004	S	1	9.5	9.5	42.9	350	16	24.07	28.4
9	GER4-005	S	1	9.5	9.5	42.9	350	16	24.07	28.4
9	GER4-006	S	1	9.5	9.5	42.9	350	16	24.07	28.4
9	GER4-007	S	1	9.5	9.5	42.9	350	16	23.64	27.9
9	GER4-008	S	1	9.5	9.5	42.9	350	16	24.07	28.4
9	GER4-009	S	1	9.5	9.5	42.9	350	16	21.27	25.1
9	GER4-010	S	1	9.5	9.5	42.9	350	16	21.27	25.1
9	GER4-011	S	1	9.5	9.5	42.9	350	16	23.64	27.9
9	GER4-012	S	1	9.5	9.5	42.9	350	16	23.64	27.9
9	GER4-013	S	1	9.5	9.5	42.9	350	16	21.27	25.1
9	GER4-014	S	1	9.5	9.5	42.9	350	16	21.27	25.1
9	GER4-015	S	1	9.5	9.5	42.9	350	16	23.64	27.9
9	GER4-016	S	1	9.5	9.5	42.9	350	16	23.64	27.9
9	GER4-017	S	1	9.5	9.5	42.9	350	16	21.27	25.1
9	GER4-018	S	1	9.5	9.5	42.9	350	16	23.64	27.9
9	GER4-019	S	1	9.5	9.5	42.9	350	16	29.83	35.2
9	GER4-020	S	1	9.5	9.5	42.9	350	16	24.07	28.4
9	GER4-021	S	1	9.5	9.5	42.9	350	16	21.27	25.1
9	GER4-022	S	1	9.5	9.5	42.9	350	16	30.93	36.5
9	GER4-023	S	1	9.5	9.5	42.9	350	16	30.93	36.5
9	GER4-024	S	1	9.5	9.5	42.9	350	16	29.83	35.2
9	GER4-025	S	1	9.5	9.5	42.9	350	16	30.93	36.5
9	GER4-026	S	1	9.5	9.5	42.9	350	16	29.83	35.2
9	GER4-027	S	1	9.5	9.5	42.9	350	16	29.83	35.2
9	GER4-028	S	1	9.5	9.5	42.9	350	16	29.83	35.2
9	GER4-029	S	1	9.5	9.5	42.9	350	16	29.83	35.2
17	SWE1-11	UE	1	6	6	43	855		19.58	23.1
17	SWE1-12	UE	1	6	6	44	855		21.86	25.8
99	CSFR1-27	S	1	8	8	50			27.63	32.6
99	CSFR1-28	S	1	8	8	50			25.17	29.7
99	CSFR1-29	S	1	8	8	50			28.14	33.2
99	CSFR1-30	S	1	8	8	50			24.83	29.3
99	CSFR1-31	S	1	8	8	50			24.83	29.3
99	CSFR1-32	S	1	8	8	50			23.98	28.3
99	CSFR1-33	S	1	8	8	50			23.98	28.3
99	CSFR1-34	S	1	8	8	50			29.15	34.4
99	CSFR1-35	S	1	8	8	50			29.15	34.4
99	CSFR1-36	S	1	8	8	50			29.15	34.4

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
GER3-123	999	999	999	999	14400	14400	UNKNOWN	18.2	Cone
GER3-124	999	999	999	999	14400	14400	UNKNOWN	18.2	Cone
GER4-001	80	999	999	999	16563.69	16563.69	UNKNOWN	13.2	Cone
GER4-002	80	999	999	999	16563.69	16563.69	UNKNOWN	14	Cone
GER4-003	80	999	999	999	16563.69	16563.69	UNKNOWN	14.8	Cone
GER4-004	80	999	999	999	16563.69	16563.69	UNKNOWN	20.2	Cone
GER4-005	80	999	999	999	16563.69	16563.69	UNKNOWN	21.2	Cone
GER4-006	80	999	999	999	16563.69	16563.69	UNKNOWN	21.2	Cone
GER4-007	200	999	999	999	16563.69	16563.69	UNKNOWN	15.2	Cone
GER4-008	200	999	999	999	16563.69	16563.69	UNKNOWN	16	Cone
GER4-009	200	999	999	999	16563.69	16563.69	UNKNOWN	18.2	Cone
GER4-010	200	999	999	999	16563.69	16563.69	UNKNOWN	19.2	Cone
GER4-011	200	999	999	999	16563.69	16563.69	UNKNOWN	20.6	Cone
GER4-012	200	999	999	999	16563.69	16563.69	UNKNOWN	20.6	Cone
GER4-013	200	999	999	999	16563.69	16563.69	UNKNOWN	20.8	Cone
GER4-014	200	999	999	999	16563.69	16563.69	UNKNOWN	20.8	Cone
GER4-015	200	999	999	999	16563.69	16563.69	UNKNOWN	21	Cone
GER4-016	200	999	999	999	16563.69	16563.69	UNKNOWN	21.2	Cone
GER4-017	200	999	999	999	16563.69	16563.69	UNKNOWN	22	Cone
GER4-018	200	999	999	999	16563.69	16563.69	UNKNOWN	22.6	Cone
GER4-019	200	999	999	999	16563.69	16563.69	UNKNOWN	23	Cone
GER4-020	200	999	999	999	16563.69	16563.69	UNKNOWN	24	Cone
GER4-021	200	999	999	999	16563.69	16563.69	UNKNOWN	24.8	Cone
GER4-022	200	999	999	999	16563.69	16563.69	UNKNOWN	25	Cone
GER4-023	200	999	999	999	16563.69	16563.69	UNKNOWN	25	Cone
GER4-024	200	999	999	999	16563.69	16563.69	UNKNOWN	25.5	Cone
GER4-025	200	999	999	999	16563.69	16563.69	UNKNOWN	27	Cone
GER4-026	200	999	999	999	16563.69	16563.69	UNKNOWN	27	Cone
GER4-027	200	999	999	999	16563.69	16563.69	UNKNOWN	27	Cone
GER4-028	200	999	999	999	16563.69	16563.69	UNKNOWN	27.5	Cone
GER4-029	200	999	999	999	16563.69	16563.69	UNKNOWN	29.5	Cone
SWE1-11	999	999	999	999	16641	16641	UNKNOWN	13.7	Cone
SWE1-12	999	999	999	999	17424	17424	UNKNOWN	15	Cone
CSFR1-27	999	999	999	999	22500	22500	K	25.8	Cone
CSFR1-28	999	999	999	999	22500	22500	K	40.2	Cone
CSFR1-29	999	999	999	999	22500	22500	K	35.6	Cone
CSFR1-30	999	999	999	999	22500	22500	K	27.2	Cone
CSFR1-31	999	999	999	999	22500	22500	K	26.1	Cone
CSFR1-32	999	999	999	999	22500	22500	K	21.5	Cone
CSFR1-33	999	999	999	999	22500	22500	K	30.2	Cone
CSFR1-34	999	999	999	999	22500	22500	K	29.3	Cone
CSFR1-35	999	999	999	999	22500	22500	K	33.2	Cone
CSFR1-36	999	999	999	999	22500	22500	K	29.6	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
GER3-123	20607.93	0.88	17782.39	1.02	10979.24	1.66
GER3-124	20607.93	0.88	17782.39	1.02	10979.24	1.66
GER4-001	15681.81	0.84	13793.17	0.96	9475.79	1.39
GER4-002	15681.81	0.89	13793.17	1.01	9475.79	1.48
GER4-003	15681.81	0.94	13793.17	1.07	9475.79	1.56
GER4-004	22496.54	0.90	19787.17	1.02	13593.62	1.49
GER4-005	22496.54	0.94	19787.17	1.07	13593.62	1.56
GER4-006	22496.54	0.94	19787.17	1.07	13593.62	1.56
GER4-007	22297.63	0.68	19612.21	0.78	13582.26	1.12
GER4-008	22496.54	0.71	19787.17	0.81	13703.43	1.17
GER4-009	21149.18	0.86	18602.07	0.98	12882.70	1.41
GER4-010	21149.18	0.91	18602.07	1.03	12882.70	1.49
GER4-011	22297.63	0.92	19612.21	1.05	13582.26	1.52
GER4-012	22297.63	0.92	19612.21	1.05	13582.26	1.52
GER4-013	21149.18	0.98	18602.07	1.12	12882.70	1.61
GER4-014	21149.18	0.98	18602.07	1.12	12882.70	1.61
GER4-015	22297.63	0.94	19612.21	1.07	13582.26	1.55
GER4-016	22297.63	0.95	19612.21	1.08	13582.26	1.56
GER4-017	21149.18	1.04	18602.07	1.18	12882.70	1.71
GER4-018	22297.63	1.01	19612.21	1.15	13582.26	1.66
GER4-019	25045.40	0.92	22029.05	1.04	15256.02	1.51
GER4-020	22496.54	1.07	19787.17	1.21	13703.43	1.75
GER4-021	21149.18	1.17	18602.07	1.33	12882.70	1.93
GER4-022	25503.69	0.98	22432.15	1.11	15535.18	1.61
GER4-023	25503.69	0.98	22432.15	1.11	15535.18	1.61
GER4-024	25045.40	1.02	22029.05	1.16	15256.02	1.67
GER4-025	25503.69	1.06	22432.15	1.20	15535.18	1.74
GER4-026	25045.40	1.08	22029.05	1.23	15256.02	1.77
GER4-027	25045.40	1.08	22029.05	1.23	15133.78	1.78
GER4-028	25045.40	1.10	22029.05	1.25	15256.02	1.80
GER4-029	25045.40	1.18	22029.05	1.34	15133.78	1.95
SWE1-11	20360.07	0.67	17919.22	0.76	10660.48	1.29
SWE1-12	22272.02	0.67	19722.82	0.76	11742.97	1.28
CSFR1-27	30327.35	0.85	27756.62	0.93	17193.90	1.50
CSFR1-28	28947.02	1.39	26493.29	1.52	16411.33	2.45
CSFR1-29	30605.16	1.16	28010.88	1.27	17351.41	2.05
CSFR1-30	28751.43	0.95	26314.28	1.03	16300.45	1.67
CSFR1-31	28751.43	0.91	26314.28	0.99	16300.45	1.60
CSFR1-32	28256.53	0.76	25861.33	0.83	16019.87	1.34
CSFR1-33	28256.53	1.07	25861.33	1.17	16019.87	1.89
CSFR1-34	31153.36	0.94	28512.61	1.03	17662.20	1.66
CSFR1-35	31153.36	1.07	28512.61	1.16	17662.20	1.88
CSFR1-36	31153.36	0.95	28512.61	1.04	17662.20	1.68

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
99	CSFR1-37	S	1	8	8	50			29.15	34.4
99	EUR1-1	S	1	22	22	50			26.55	31.3
99	EUR1-2	S	1	22	22	50			26.55	31.3
99	EUR1-3	S	1	22	22	50			26.55	31.3
5	GER3-150	UE	1	8	8	50	640	16	22.03	26.0
7	GER3-156	UE	1	8	8	50	640	16	23.90	28.2
7	GER3-157	UE	1	8	8	50	640	16	23.90	28.2
7	GER3-158	UE	1	8	8	50	640	16	51.44	60.7
7	GER3-159	UE	1	8	8	50	640	16	51.44	60.7
8	GER3-160	UE	1	8	8	50		16	26.27	31.0
7	GER3-161	UE	1	8	8	50	640	16	29.66	35.0
8	GER3-191	UE	1	10	10	60	640	16	24.15	28.5
8	GER3-192	UE	1	10	10	60	640	16	57.03	67.3
8	GER3-193	UE	1	8	8	60	640	16	21.61	25.5
2	GER3-196	UE	1	10	10	60	640	16	23.73	28.0
2	GER3-197	UE	1	10	10	60	640	16	23.73	28.0
2	GER3-198	UE	1	10	10	60	640	16	43.22	51.0
2	GER3-199	UE	1	10	10	60	640	16	43.22	51.0
8	GER3-202	UE	1	8	8	60	640	16	19.49	23.0
8	GER3-203	UE	1	8	8	60	640	16	21.61	25.5
8	GER3-204	UE	1	8	8	60	640	16	21.61	25.5
7	GER3-205	UE	1	10	10	60	833	16	46.78	55.2
2	GER3-206	UE	1	10	10	60	886	16	16.36	19.3
2	GER3-207	UE	1	10	10	60	886	16	16.36	19.3
8	GER3-208	UE	1	10	10	60		16	28.81	34.0
8	GER3-209	UE	1	10	10	60	640	16	24.15	28.5
8	GER3-210	UE	1	10	10	60	640	16	24.15	28.5
8	GER3-211	UE	1	10	10	60	640	16	24.15	28.5
8	GER3-212	UE	1	10	10	60	640	16	25.08	29.6
17	SWE1-19	UE	1	8	8	60	795		22.80	26.9
17	SWE1-20	UE	1	10	10	63	855		36.10	42.6
99	EUR1-4	S-U	1	19.5	19.5	63.5			21.44	25.3
13	USA05-05	S-U	1	19.5	19.5	63.5	345		21.44	25.3
25	USA09-16	U	1	9.525	9.525	63.5	0	32	33.10	39.1
25	USA09-17	U	1	9.525	9.525	63.5	0	32	33.10	39.1
25	USA09-18	U	1	9.525	9.525	63.5	0	32	33.10	39.1
25	USA09-19	U	1	9.525	9.525	63.5	0	32	33.10	39.1
25	USA09-20	U	1	9.525	9.525	63.5	0	32	33.10	39.1
25	USA09-24	U	1	12.7	12.7	63.5	0	32	47.68	56.3
17	SWE1-21	UE	1	10	10	64	855		19.58	23.1
9	GER4-030	S	1	22.2	22.2	65.3	350	16	25.85	30.5
9	GER4-031	S	1	22.2	22.2	65.3	350	16	25.85	30.5
9	GER4-032	S	1	22.2	22.2	65.3	350	16	25.85	30.5

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)		Ultimate Load Nu (kN)	Failure Mode
CSFR1-37	999	999	999	999	22500	22500	K	35.6	Cone
EUR1-1	999	999	999	999	22500	22500	KEUSER	19.1	Cone
EUR1-2	999	999	999	999	22500	22500	KEUSER	28.3	Cone
EUR1-3	999	999	999	999	22500	22500	KEUSER	27.2	Cone
GER3-150	999	999	999	999	22500	22500	UNKNOWN	21.2	Cone
GER3-156	999	999	999	999	22500	22500	UNKNOWN	24.6	Cone
GER3-157	999	999	999	999	22500	22500	UNKNOWN	27.2	Cone
GER3-158	999	999	999	999	22500	22500	UNKNOWN	30.5	Cone
GER3-159	999	999	999	999	22500	22500	UNKNOWN	30.8	Cone
GER3-160	999	999	999	999	22500	22500	UNKNOWN	20.7	Cone
GER3-161	999	999	999	999	22500	22500	UNKNOWN	26.6	Cone
GER3-191	999	999	999	999	32400	32400	UNKNOWN	37.3	Cone
GER3-192	999	999	999	999	32400	32400	UNKNOWN	54.7	Cone
GER3-193	999	999	999	999	32400	32400	UNKNOWN	30	Cone
GER3-196	999	999	999	999	32400	32400	UNKNOWN	35.6	Cone
GER3-197	999	999	999	999	32400	32400	UNKNOWN	35.6	Cone
GER3-198	999	999	999	999	32400	32400	UNKNOWN	43.8	Cone
GER3-199	999	999	999	999	32400	32400	UNKNOWN	43.8	Cone
GER3-202	999	999	999	999	32400	32400	UNKNOWN	27.7	Cone
GER3-203	999	999	999	999	32400	32400	UNKNOWN	29.6	Cone
GER3-204	999	999	999	999	32400	32400	UNKNOWN	30.5	Cone
GER3-205	999	999	999	999	32400	32400	UNKNOWN	50.7	Cone
GER3-206	999	999	999	999	32400	32400	UNKNOWN	22.5	Cone
GER3-207	999	999	999	999	32400	32400	UNKNOWN	22.5	Cone
GER3-208	999	999	999	999	32400	32400	UNKNOWN	29.7	Cone
GER3-209	999	999	999	999	32400	32400	UNKNOWN	37.1	Cone
GER3-210	999	999	999	999	32400	32400	UNKNOWN	37.4	Cone
GER3-211	999	999	999	999	32400	32400	UNKNOWN	38.1	Cone
GER3-212	999	999	999	999	32400	32400	UNKNOWN	49.1	Cone
SWE1-19	999	999	999	999	32400	32400	UNKNOWN	26.7	Cone
SWE1-20	999	999	999	999	35721	35721	UNKNOWN	35	Cone
EUR1-4	381	999	999	999	36290.25	36290.25	KLINGNER	71.1	Cone
USA05-05	381	999	999	999	36290.25	36290.25	CBF	71.1	Cone
USA09-16	999	999	999	999	36290.25	36290.25	ARKANSAS	52.01936	Cone
USA09-17	999	999	999	999	36290.25	36290.25	ARKANSAS	54.75488	Cone
USA09-18	999	999	999	999	36290.25	36290.25	ARKANSAS	52.01936	Cone
USA09-19	999	999	999	999	36290.25	36290.25	ARKANSAS	49.279392	Cone
USA09-20	999	999	999	999	36290.25	36290.25	ARKANSAS	57.494848	Cone
USA09-24	999	999	999	999	36290.25	36290.25	ARKANSAS	59.251808	Cone
SWE1-21	999	999	999	999	36864	36864	UNKNOWN	23.7	Cone
GER4-030	200	999	999	999	38376.81	38376.81	UNKNOWN	30.5	Cone
GER4-031	200	999	999	999	38376.81	38376.81	UNKNOWN	41.4	Cone
GER4-032	200	999	999	999	38376.81	38376.81	UNKNOWN	42.4	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
CSFR1-37	31153.36	1.14	28512.61	1.25	17662.20	2.02
EUR1-1	29730.75	0.64	27210.59	0.70	22850.58	0.84
EUR1-2	29730.75	0.95	27210.59	1.04	22850.58	1.24
EUR1-3	29730.75	0.91	27210.59	1.00	22850.58	1.19
GER3-150	27083.97	0.78	24788.17	0.86	15183.66	1.40
GER3-156	28206.57	0.87	25815.60	0.95	16399.61	1.50
GER3-157	28206.57	0.96	25815.60	1.05	16399.61	1.66
GER3-158	41382.81	0.74	37874.95	0.81	24060.43	1.27
GER3-159	41382.81	0.74	37874.95	0.81	24060.43	1.28
GER3-160	29573.76	0.70	27066.90	0.76	16793.40	1.23
GER3-161	31423.87	0.85	28760.19	0.92	18298.61	1.45
GER3-191	37275.20	1.00	35632.50	1.05	22768.45	1.64
GER3-192	57280.27	0.95	54755.96	1.00	34987.96	1.56
GER3-193	35258.81	0.85	33704.97	0.89	20954.72	1.43
GER3-196	36946.78	0.96	35318.55	1.01	22781.33	1.56
GER3-197	36946.78	0.96	35318.55	1.01	22781.33	1.56
GER3-198	49863.48	0.88	47666.03	0.92	30745.75	1.42
GER3-199	49863.48	0.88	47666.03	0.92	30745.75	1.42
GER3-202	33485.86	0.83	32010.15	0.87	20564.41	1.35
GER3-203	35258.81	0.84	33704.97	0.88	21653.22	1.37
GER3-204	35258.81	0.87	33704.97	0.90	21682.32	1.41
GER3-205	51876.07	0.98	49589.92	1.02	32671.83	1.55
GER3-206	30674.41	0.73	29322.60	0.77	18913.79	1.19
GER3-207	30674.41	0.73	29322.60	0.77	18913.79	1.19
GER3-208	40713.36	0.73	38919.15	0.76	25103.80	1.18
GER3-209	37275.20	1.00	35632.50	1.04	23383.82	1.59
GER3-210	37275.20	1.00	35632.50	1.05	23383.82	1.60
GER3-211	37275.20	1.02	35632.50	1.07	23383.82	1.63
GER3-212	37987.73	1.29	36313.63	1.35	23830.81	2.06
SWE1-19	36213.76	0.74	34617.84	0.77	22120.11	1.21
SWE1-20	49032.75	0.71	47387.56	0.74	30689.83	1.14
EUR1-4	38237.68	1.86	37019.24	1.92	28226.04	2.52
USA05-05	38237.68	1.86	37019.24	1.92	28226.04	2.52
USA09-16	47507.26	1.09	45993.45	1.13	30256.20	1.72
USA09-17	47507.26	1.15	45993.45	1.19	30256.20	1.81
USA09-18	47507.26	1.09	45993.45	1.13	30256.20	1.72
USA09-19	47507.26	1.04	45993.45	1.07	30256.20	1.63
USA09-20	47507.26	1.21	45993.45	1.25	30256.20	1.90
USA09-24	57021.09	1.04	55204.11	1.07	37287.54	1.59
SWE1-21	36969.76	0.64	35853.47	0.66	23253.53	1.02
GER4-030	43781.47	0.70	42646.10	0.72	34710.35	0.88
GER4-031	43781.47	0.95	42646.10	0.97	34710.35	1.19
GER4-032	43781.47	0.97	42646.10	0.99	34710.35	1.22

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
9	GER4-033	S	1	15.9	15.9	67.1	350	16	11.69	13.8
9	GER4-034	S	1	15.9	15.9	67.1	350	16	11.69	13.8
9	GER4-035	S	1	15.9	15.9	67.1	350	16	11.69	13.8
9	GER4-036	S	1	15.9	15.9	67.1	350	16	24.07	28.4
9	GER4-037	S	1	15.9	15.9	67.1	350	16	24.07	28.4
9	GER4-038	S	1	15.9	15.9	67.1	350	16	24.07	28.4
9	GER4-039	S	1	15.9	15.9	67.1	350	16	19.24	22.7
9	GER4-040	S	1	15.9	15.9	67.1	350	16	19.24	22.7
9	GER4-041	S	1	15.9	15.9	67.1	350	16	19.24	22.7
9	GER4-042	S	1	15.9	15.9	67.1	350	16	19.24	22.7
9	GER4-043	S	1	15.9	15.9	67.1	350	16	19.24	22.7
9	GER4-044	S	1	15.9	15.9	67.1	350	16	19.24	22.7
9	GER4-045	S	1	15.9	15.9	67.1	350	16	9.66	11.4
9	GER4-046	S	1	15.9	15.9	67.1	350	16	9.66	11.4
9	GER4-047	S	1	15.9	15.9	67.1	350	16	9.66	11.4
9	GER4-048	S	1	15.9	15.9	67.1	350	16	19.24	22.7
9	GER4-049	S	1	15.9	15.9	67.1	350	16	19.24	22.7
9	GER4-050	S	1	15.9	15.9	67.1	350	16	19.24	22.7
9	GER4-051	S	1	15.9	15.9	67.1	350	16	19.24	22.7
9	GER4-052	S	1	15.9	15.9	67.1	350	16	19.24	22.7
9	GER4-053	S	1	15.9	15.9	67.1	350	16	19.24	22.7
9	GER4-054	S	1	15.9	15.9	67.1	350	16	39.32	46.4
9	GER4-055	S	1	15.9	15.9	67.1	350	16	39.32	46.4
9	GER4-056	S	1	15.9	15.9	67.1	350	16	39.32	46.4
9	GER4-057	S	1	15.9	15.9	67.1	350	16	31.61	37.3
9	GER4-058	S	1	15.9	15.9	67.1	350	16	31.61	37.3
9	GER4-059	S	1	15.9	15.9	67.1	350	16	31.61	37.3
9	GER4-060	S	1	15.9	15.9	67.1	350	16	39.32	46.4
9	GER4-061	S	1	15.9	15.9	67.1	350	16	39.32	46.4
9	GER4-062	S	1	15.9	15.9	67.1	350	16	39.32	46.4
?	EUR1-5	S	1	19.05	19.05	68			17.46	20.6
?	EUR1-6	S	1	19.05	19.05	68			17.46	20.6
?	EUR1-7	S	1	19.05	19.05	68			38.05	44.9
?	EUR1-8	S	1	19.05	19.05	68			40.08	47.3
17	SWE1-24	UE	1	12	12	72	795		22.80	26.9
17	SWE1-25	UE	1	12	12	72	795		37.03	43.7
30	USA05-14	S	1	25.4	25.4	76	248		22.97	27.1
25	USA09-74	U	1	19.05	19.05	76.2	0	32	31.65	37.3
7	GER3-288	UE	1	12	12	80	978	16	46.78	55.2
24	USA05-18	S	1	15.9	15.9	87.3	345		20.59	24.3
24	USA05-19	S	1	15.9	15.9	87.3	345		20.59	24.3
24	USA05-20	S	1	15.9	15.9	87.3	345		20.59	24.3
24	USA05-21	S	1	19	19	87.3	345		20.59	24.3

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)		Ultimate Load Nu (kN)	Failure Mode
GER4-033	120	999	999	999	40521.69	40521.69	UNKNOWN	32	Cone
GER4-034	120	999	999	999	40521.69	40521.69	UNKNOWN	32.8	Cone
GER4-035	120	999	999	999	40521.69	40521.69	UNKNOWN	33.2	Cone
GER4-036	120	999	999	999	40521.69	40521.69	UNKNOWN	47.6	Cone
GER4-037	120	999	999	999	40521.69	40521.69	UNKNOWN	49.6	Cone
GER4-038	120	999	999	999	40521.69	40521.69	UNKNOWN	52.8	Cone
GER4-039	200	999	999	999	40521.69	40521.69	UNKNOWN	37	Cone
GER4-040	200	999	999	999	40521.69	40521.69	UNKNOWN	40.5	Cone
GER4-041	200	999	999	999	40521.69	40521.69	UNKNOWN	42	Cone
GER4-042	200	999	999	999	40521.69	40521.69	UNKNOWN	43.5	Cone
GER4-043	200	999	999	999	40521.69	40521.69	UNKNOWN	44	Cone
GER4-044	200	999	999	999	40521.69	40521.69	UNKNOWN	49.5	Cone
GER4-045	300	999	999	999	40521.69	40521.69	UNKNOWN	29	Cone
GER4-046	300	999	999	999	40521.69	40521.69	UNKNOWN	32	Cone
GER4-047	300	999	999	999	40521.69	40521.69	UNKNOWN	37	Cone
GER4-048	300	999	999	999	40521.69	40521.69	UNKNOWN	37.5	Cone
GER4-049	300	999	999	999	40521.69	40521.69	UNKNOWN	39	Cone
GER4-050	300	999	999	999	40521.69	40521.69	UNKNOWN	40	Cone
GER4-051	300	999	999	999	40521.69	40521.69	UNKNOWN	40	Cone
GER4-052	300	999	999	999	40521.69	40521.69	UNKNOWN	42	Cone
GER4-053	300	999	999	999	40521.69	40521.69	UNKNOWN	45	Cone
GER4-054	300	999	999	999	40521.69	40521.69	UNKNOWN	54	Cone
GER4-055	300	999	999	999	40521.69	40521.69	UNKNOWN	56	Cone
GER4-056	300	999	999	999	40521.69	40521.69	UNKNOWN	57	Cone
GER4-057	300	999	999	999	40521.69	40521.69	UNKNOWN	57.5	Cone
GER4-058	300	999	999	999	40521.69	40521.69	UNKNOWN	58	Cone
GER4-059	300	999	999	999	40521.69	40521.69	UNKNOWN	59	Cone
GER4-060	300	999	999	999	40521.69	40521.69	UNKNOWN	59	Cone
GER4-061	300	999	999	999	40521.69	40521.69	UNKNOWN	60	Cone
GER4-062	300	999	999	999	40521.69	40521.69	UNKNOWN	61	Cone
EUR1-5	200	999	999	999	41616	41616	SATTLER	43.4	Cone
EUR1-6	200	999	999	999	41616	41616	SATTLER	45.1	Cone
EUR1-7	200	999	999	999	41616	41616	SATTLER	55	Cone
EUR1-8	200	999	999	999	41616	41616	SATTLER	55.6	Cone
SWE1-24	999	999	999	999	46656	46656	UNKNOWN	40	Cone
SWE1-25	999	999	999	999	46656	46656	UNKNOWN	46.3	Cone
USA05-14	229	999	999	999	51984	51984	UNKNOWN	62.3	Cone
USA09-74	999	999	999	999	52257.96	52257.96	ARKANSAS	84.320736	Cone
GER3-288	999	999	999	999	57600	57600	UNKNOWN	75.8	Cone
USA05-18	305	999	999	999	68591.61	68591.61	UNKNOWN	62.3	Cone
USA05-19	305	999	999	999	68591.61	68591.61	UNKNOWN	55.2	Cone
USA05-20	305	999	999	999	68591.61	68591.61	UNKNOWN	41.8	Cone
USA05-21	305	999	999	999	68591.61	68591.61	UNKNOWN	62.3	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
GER4-033	30675.66	1.04	30055.49	1.06	23680.26	1.35
GER4-034	30675.66	1.07	30055.49	1.09	23680.26	1.39
GER4-035	30675.66	1.08	30055.49	1.10	23680.26	1.40
GER4-036	44006.17	1.08	43116.50	1.10	33970.83	1.40
GER4-037	44006.17	1.13	43116.50	1.15	33970.83	1.46
GER4-038	44006.17	1.20	43116.50	1.22	33970.83	1.55
GER4-039	39342.99	0.94	38547.59	0.96	30371.05	1.22
GER4-040	39342.99	1.03	38547.59	1.05	30371.05	1.33
GER4-041	39342.99	1.07	38547.59	1.09	30371.05	1.38
GER4-042	39342.99	1.11	38547.59	1.13	30371.05	1.43
GER4-043	39342.99	1.12	38547.59	1.14	30371.05	1.45
GER4-044	39342.99	1.26	38547.59	1.28	30371.05	1.63
GER4-045	27880.90	1.04	27317.23	1.06	21522.83	1.35
GER4-046	27880.90	1.15	27317.23	1.17	21522.83	1.49
GER4-047	27880.90	1.33	27317.23	1.35	21522.83	1.72
GER4-048	39342.99	0.95	38547.59	0.97	30371.05	1.23
GER4-049	39342.99	0.99	38547.59	1.01	30371.05	1.28
GER4-050	39342.99	1.02	38547.59	1.04	30371.05	1.32
GER4-051	39342.99	1.02	38547.59	1.04	30371.05	1.32
GER4-052	39342.99	1.07	38547.59	1.09	30371.05	1.38
GER4-053	39342.99	1.14	38547.59	1.17	30371.05	1.48
GER4-054	56248.82	0.96	55111.63	0.98	43421.61	1.24
GER4-055	56248.82	1.00	55111.63	1.02	43421.61	1.29
GER4-056	56248.82	1.01	55111.63	1.03	43421.61	1.31
GER4-057	50432.31	1.14	49412.71	1.16	38931.52	1.48
GER4-058	50432.31	1.15	49412.71	1.17	38931.52	1.49
GER4-059	50432.31	1.17	49412.71	1.19	38931.52	1.52
GER4-060	56248.82	1.05	55111.63	1.07	43421.61	1.36
GER4-061	56248.82	1.07	55111.63	1.09	43421.61	1.38
GER4-062	56248.82	1.08	55111.63	1.11	43421.61	1.40
EUR1-5	38235.58	1.14	37568.87	1.16	29646.31	1.46
EUR1-6	38235.58	1.18	37568.87	1.20	29646.31	1.52
EUR1-7	56449.12	0.97	55464.83	0.99	43768.35	1.26
EUR1-8	57938.15	0.96	56927.89	0.98	44922.88	1.24
SWE1-24	47604.23	0.84	47334.62	0.85	32283.40	1.24
SWE1-25	60675.05	0.76	60331.41	0.77	41147.54	1.13
USA05-14	51817.41	1.20	52088.79	1.20	48264.75	1.29
USA09-74	61068.55	1.38	61420.37	1.37	46608.52	1.81
GER3-288	79868.44	0.95	81095.27	0.93	56123.04	1.35
USA05-18	60408.10	1.03	62346.78	1.00	49233.11	1.27
USA05-19	60408.10	0.91	62346.78	0.89	49233.11	1.12
USA05-20	60408.10	0.69	62346.78	0.67	49233.11	0.85
USA05-21	60408.10	1.03	62346.78	1.00	51837.38	1.20

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
13	USA05-08	S-U	1	19.5	19.5	88.9	345		21.44	25.3
24	USA05-22	S	1	19	19	88.9	345		20.59	24.3
24	USA05-23	S	1	19	19	88.9	345		20.59	24.3
24	USA05-24	S	1	19	19	88.9	345		20.59	24.3
24	USA05-25	S	1	19	19	88.9	345		20.59	24.3
24	USA05-26	S	1	22.2	22.2	88.9	345		20.59	24.3
24	USA05-27	S	1	22.2	22.2	88.9	345		20.59	24.3
24	USA05-28	S	1	22.2	22.2	88.9	345		20.59	24.3
25	USA09-25	U	1	12.7	12.7	88.9	0	32	30.17	35.6
25	USA09-26	U	1	12.7	12.7	88.9	0	32	30.17	35.6
25	USA09-27	U	1	12.7	12.7	88.9	0	32	30.17	35.6
25	USA09-28	U	1	12.7	12.7	88.9	0	32	30.17	35.6
25	USA09-29	U	1	12.7	12.7	88.9	0	32	30.17	35.6
25	USA09-30	U	1	12.7	12.7	88.9	0	32	30.17	35.6
25	USA09-31	U	1	12.7	12.7	88.9	0	32	30.17	35.6
25	USA09-38	U	1	15.875	15.875	88.9	0	32	30.17	35.6
25	USA09-61	U	1	19.05	19.05	88.9	0	32	31.65	37.3
25	USA09-75	U	1	19.05	19.05	88.9	0	32	31.65	37.3
25	USA09-76	U	1	19.05	19.05	88.9	0	32	31.65	37.3
99	CHI1-1	S	1	22	22	90			29.49	34.8
99	CHI1-2	S	1	22	22	90			29.49	34.8
99	CHI1-3	S	1	22	22	90			29.49	34.8
99	CHI1-4	S	1	22	22	90			21.02	24.8
99	CHI1-5	S	1	22	22	90			21.02	24.8
9	GER4-063	S	1	22.2	22.2	90.3	350	16	11.69	13.8
9	GER4-064	S	1	22.2	22.2	90.3	350	16	11.69	13.8
9	GER4-065	S	1	22.2	22.2	90.3	350	16	11.69	13.8
9	GER4-066	S	1	22.2	22.2	90.3	350	16	24.07	28.4
9	GER4-067	S	1	22.2	22.2	90.3	350	16	24.07	28.4
9	GER4-068	S	1	22.2	22.2	90.3	350	16	24.07	28.4
9	GER4-069	S	1	22.2	22.2	90.3	350	16	25.85	30.5
9	GER4-070	S	1	22.2	22.2	90.3	350	16	25.85	30.5
9	GER4-071	S	1	22.2	22.2	90.3	350	16	25.85	30.5
9	GER4-072	S	1	22.2	22.2	90.3	350	16	39.32	46.4
9	GER4-073	S	1	22.2	22.2	90.3	350	16	39.32	46.4
9	GER4-074	S	1	22.2	22.2	90.3	350	16	39.32	46.4
9	GER4-075	S	1	22.2	22.2	90.3	350	16	39.32	46.4
9	GER4-076	S	1	22.2	22.2	90.3	350	16	39.32	46.4
9	GER4-077	S	1	22.2	22.2	90.3	350	16	39.32	46.4
9	GER4-078	S	1	22.2	22.2	90.3	350	16	23.64	27.9
9	GER4-079	S	1	22.2	22.2	90.3	350	16	23.64	27.9
9	GER4-080	S	1	22.2	22.2	90.3	350	16	23.64	27.9
9	GER4-081	S	1	22.2	22.2	90.3	350	16	23.64	27.9

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
USA05-08	381	999	999	999	71128.89	71128.89	CBF	112.9	Cone
USA05-22	305	999	999	999	71128.89	71128.89	UNKNOWN	48	Cone
USA05-23	305	999	999	999	71128.89	71128.89	UNKNOWN	48	Cone
USA05-24	305	999	999	999	71128.89	71128.89	UNKNOWN	55.2	Cone
USA05-25	305	999	999	999	71128.89	71128.89	UNKNOWN	52	Cone
USA05-26	305	999	999	999	71128.89	71128.89	UNKNOWN	48	Cone
USA05-27	305	999	999	999	71128.89	71128.89	UNKNOWN	55.2	Cone
USA05-28	305	999	999	999	71128.89	71128.89	UNKNOWN	62.3	Cone
USA09-25	999	999	999	999	71128.89	71128.89	ARKANSAS	84.231776	Cone
USA09-26	999	999	999	999	71128.89	71128.89	ARKANSAS	78.422688	Cone
USA09-27	999	999	999	999	71128.89	71128.89	ARKANSAS	84.231776	Cone
USA09-28	999	999	999	999	71128.89	71128.89	ARKANSAS	65.705856	Cone
USA09-29	999	999	999	999	71128.89	71128.89	ARKANSAS	62.970336	Cone
USA09-30	999	999	999	999	71128.89	71128.89	ARKANSAS	60.230368	Cone
USA09-31	999	999	999	999	71128.89	71128.89	ARKANSAS	62.970336	Cone
USA09-38	999	999	999	999	71128.89	71128.89	ARKANSAS	89.796224	Cone
USA09-61	999	999	999	999	71128.89	71128.89	ARKANSAS	89.24912	Cone
USA09-75	999	999	999	999	71128.89	71128.89	ARKANSAS	99.105888	Cone
USA09-76	999	999	999	999	71128.89	71128.89	ARKANSAS	99.105888	Cone
CHI1-1	900	999	999	999	72900	72900	ZHAO	74	Cone
CHI1-2	900	999	999	999	72900	72900	ZHAO	52.1	Cone
CHI1-3	900	999	999	999	72900	72900	ZHAO	77.4	Cone
CHI1-4	900	999	999	999	72900	72900	ZHAO	61.9	Cone
CHI1-5	900	999	999	999	72900	72900	ZHAO	70.1	Cone
GER4-063	160	999	999	999	73386.81	73386.81	UNKNOWN	46.2	Cone
GER4-064	160	999	999	999	73386.81	73386.81	UNKNOWN	46.4	Cone
GER4-065	160	999	999	999	73386.81	73386.81	UNKNOWN	47.8	Cone
GER4-066	160	999	999	999	73386.81	73386.81	UNKNOWN	66.8	Cone
GER4-067	160	999	999	999	73386.81	73386.81	UNKNOWN	70.4	Cone
GER4-068	160	999	999	999	73386.81	73386.81	UNKNOWN	71.2	Cone
GER4-069	200	999	999	999	73386.81	73386.81	UNKNOWN	69.2	Cone
GER4-070	200	999	999	999	73386.81	73386.81	UNKNOWN	71.2	Cone
GER4-071	200	999	999	999	73386.81	73386.81	UNKNOWN	76	Cone
GER4-072	200	999	999	999	73386.81	73386.81	UNKNOWN	78.5	Cone
GER4-073	200	999	999	999	73386.81	73386.81	UNKNOWN	80	Cone
GER4-074	200	999	999	999	73386.81	73386.81	UNKNOWN	81.5	Cone
GER4-075	200	999	999	999	73386.81	73386.81	UNKNOWN	82	Cone
GER4-076	200	999	999	999	73386.81	73386.81	UNKNOWN	83.5	Cone
GER4-077	200	999	999	999	73386.81	73386.81	UNKNOWN	92	Cone
GER4-078	300	999	999	999	73386.81	73386.81	UNKNOWN	62	Cone
GER4-079	300	999	999	999	73386.81	73386.81	UNKNOWN	64	Cone
GER4-080	300	999	999	999	73386.81	73386.81	UNKNOWN	64.8	Cone
GER4-081	300	999	999	999	73386.81	73386.81	UNKNOWN	65.6	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
USA05-08	63340.80	1.78	65588.90	1.72	50426.43	2.24
USA05-22	62076.39	0.77	64279.61	0.75	50808.96	0.94
USA05-23	62076.39	0.77	64279.61	0.75	50808.96	0.94
USA05-24	62076.39	0.89	64279.61	0.86	50808.96	1.09
USA05-25	62076.39	0.84	64279.61	0.81	50808.96	1.02
USA05-26	62076.39	0.77	64279.61	0.75	52113.91	0.92
USA05-27	62076.39	0.89	64279.61	0.86	52113.91	1.06
USA05-28	62076.39	1.00	64279.61	0.97	56155.05	1.11
USA09-25	75131.22	1.12	77797.79	1.08	54463.40	1.55
USA09-26	75131.22	1.04	77797.79	1.01	54463.40	1.44
USA09-27	75131.22	1.12	77797.79	1.08	54463.40	1.55
USA09-28	75131.22	0.87	77797.79	0.84	54463.40	1.21
USA09-29	75131.22	0.84	77797.79	0.81	54463.40	1.16
USA09-30	75131.22	0.80	77797.79	0.77	54463.40	1.11
USA09-31	75131.22	0.84	77797.79	0.81	54463.40	1.16
USA09-38	75131.22	1.20	77797.79	1.15	57010.80	1.58
USA09-61	76955.17	1.16	79686.47	1.12	61004.08	1.46
USA09-75	76955.17	1.29	79686.47	1.24	61004.08	1.62
USA09-76	76955.17	1.29	79686.47	1.24	61004.08	1.62
CHI1-1	75670.05	0.98	78528.68	0.94	63748.54	1.16
CHI1-2	75670.05	0.69	78528.68	0.66	63748.54	0.82
CHI1-3	75670.05	1.02	78528.68	0.99	63748.54	1.21
CHI1-4	63879.32	0.97	66292.52	0.93	53815.39	1.15
CHI1-5	63879.32	1.10	66292.52	1.06	53815.39	1.30
GER4-063	47889.67	0.96	49728.33	0.93	40342.21	1.15
GER4-064	47889.67	0.97	49728.33	0.93	40342.21	1.15
GER4-065	47889.67	1.00	49728.33	0.96	40342.21	1.18
GER4-066	68700.75	0.97	71338.43	0.94	57873.45	1.15
GER4-067	68700.75	1.02	71338.43	0.99	57873.45	1.22
GER4-068	68700.75	1.04	71338.43	1.00	57873.45	1.23
GER4-069	71195.44	0.97	73928.91	0.94	59974.98	1.15
GER4-070	71195.44	1.00	73928.91	0.96	59974.98	1.19
GER4-071	71195.44	1.07	73928.91	1.03	59974.98	1.27
GER4-072	87813.50	0.89	91184.99	0.86	73974.01	1.06
GER4-073	87813.50	0.91	91184.99	0.88	73974.01	1.08
GER4-074	87813.50	0.93	91184.99	0.89	73974.01	1.10
GER4-075	87813.50	0.93	91184.99	0.90	73974.01	1.11
GER4-076	87813.50	0.95	91184.99	0.92	73974.01	1.13
GER4-077	87813.50	1.05	91184.99	1.01	73974.01	1.24
GER4-078	68093.30	0.91	70707.66	0.88	57361.74	1.08
GER4-079	68093.30	0.94	70707.66	0.91	57361.74	1.12
GER4-080	68093.30	0.95	70707.66	0.92	57361.74	1.13
GER4-081	68093.30	0.96	70707.66	0.93	57361.74	1.14

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
9	GER4-082	S	1	22.2	22.2	90.3	350	16	21.27	25.1
9	GER4-083	S	1	22.2	22.2	90.3	350	16	23.64	27.9
9	GER4-084	S	1	22.2	22.2	90.3	350	16	23.64	27.9
9	GER4-085	S	1	22.2	22.2	90.3	350	16	24.07	28.4
9	GER4-086	S	1	22.2	22.2	90.3	350	16	29.83	35.2
9	GER4-087	S	1	22.2	22.2	90.3	350	16	21.27	25.1
9	GER4-088	S	1	22.2	22.2	90.3	350	16	24.07	28.4
9	GER4-089	S	1	22.2	22.2	90.3	350	16	29.83	35.2
9	GER4-090	S	1	22.2	22.2	90.3	350	16	29.83	35.2
9	GER4-091	S	1	22.2	22.2	90.3	350	16	21.27	25.1
9	GER4-092	S	1	22.2	22.2	90.3	350	16	30.93	36.5
9	GER4-093	S	1	22.2	22.2	90.3	350	16	24.07	28.4
9	GER4-094	S	1	22.2	22.2	90.3	350	16	21.27	25.1
9	GER4-095	S	1	22.2	22.2	90.3	350	16	25.85	30.5
9	GER4-096	S	1	22.2	22.2	90.3	350	16	25.85	30.5
9	GER4-097	S	1	22.2	22.2	90.3	350	16	29.83	35.2
9	GER4-098	S	1	22.2	22.2	90.3	350	16	21.27	25.1
9	GER4-099	S	1	22.2	22.2	90.3	350	16	21.27	25.1
9	GER4-100	S	1	22.2	22.2	90.3	350	16	29.83	35.2
9	GER4-101	S	1	22.2	22.2	90.3	350	16	25.85	30.5
9	GER4-102	S	1	22.2	22.2	90.3	350	16	30.93	36.5
9	GER4-103	S	1	22.2	22.2	90.3	350	16	30.93	36.5
9	GER4-104	S	1	22.2	22.2	90.3	350	16	29.83	35.2
9	GER4-105	S	1	15.9	15.9	92.1	350	16	13.14	15.5
9	GER4-106	S	1	15.9	15.9	92.1	350	16	13.14	15.5
9	GER4-107	S	1	15.9	15.9	92.1	350	16	13.14	15.5
9	GER4-108	S	1	15.9	15.9	92.1	350	16	9.66	11.4
9	GER4-109	S	1	15.9	15.9	92.1	350	16	9.66	11.4
9	GER4-110	S	1	15.9	15.9	92.1	350	16	9.66	11.4
9	GER4-111	S	1	15.9	15.9	92.1	350	16	31.61	37.3
9	GER4-112	S	1	15.9	15.9	92.1	350	16	31.61	37.3
9	GER4-113	S	1	15.9	15.9	92.1	350	16	31.61	37.3
13	USA05-02	S	1	19.5	19.5	92.1	345		20.68	24.4
13	USA05-04	S	1	19.5	19.5	92.1	345		35.68	42.1
13	USA05-06	S	1	19.5	19.5	92.1	345		20.68	24.4
13	USA05-07	S	1	19.5	19.5	92.1	345		35.68	42.1
13	USA05-09	S	1	19.5	19.5	92.1	345		20.68	24.4
13	USA05-10	S	1	19.5	19.5	92.1	345		35.68	42.1
24	USA05-17	S	1	12.7	12.7	93.7	345		20.59	24.3
99	EUR1-10	S	1	22	22	100			26.55	31.3
99	EUR1-11	S	1	22	22	100			26.55	31.3
99	EUR1-9	S	1	22	22	100			26.55	31.3
2	GER3-314	UE	1	16	16	100	640	16	29.66	35.0

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
GER4-082	300	999	999	999	73386.81	73386.81	UNKNOWN	67.6	Cone
GER4-083	300	999	999	999	73386.81	73386.81	UNKNOWN	68.4	Cone
GER4-084	300	999	999	999	73386.81	73386.81	UNKNOWN	68.4	Cone
GER4-085	300	999	999	999	73386.81	73386.81	UNKNOWN	69	Cone
GER4-086	300	999	999	999	73386.81	73386.81	UNKNOWN	73	Cone
GER4-087	300	999	999	999	73386.81	73386.81	UNKNOWN	73.2	Cone
GER4-088	300	999	999	999	73386.81	73386.81	UNKNOWN	74	Cone
GER4-089	300	999	999	999	73386.81	73386.81	UNKNOWN	74	Cone
GER4-090	300	999	999	999	73386.81	73386.81	UNKNOWN	74	Cone
GER4-091	300	999	999	999	73386.81	73386.81	UNKNOWN	75.6	Cone
GER4-092	300	999	999	999	73386.81	73386.81	UNKNOWN	76	Cone
GER4-093	300	999	999	999	73386.81	73386.81	UNKNOWN	76	Cone
GER4-094	300	999	999	999	73386.81	73386.81	UNKNOWN	76	Cone
GER4-095	300	999	999	999	73386.81	73386.81	UNKNOWN	76.8	Cone
GER4-096	300	999	999	999	73386.81	73386.81	UNKNOWN	77.6	Cone
GER4-097	300	999	999	999	73386.81	73386.81	UNKNOWN	78	Cone
GER4-098	300	999	999	999	73386.81	73386.81	UNKNOWN	78.8	Cone
GER4-099	300	999	999	999	73386.81	73386.81	UNKNOWN	79.2	Cone
GER4-100	300	999	999	999	73386.81	73386.81	UNKNOWN	80	Cone
GER4-101	300	999	999	999	73386.81	73386.81	UNKNOWN	80	Cone
GER4-102	300	999	999	999	73386.81	73386.81	UNKNOWN	82	Cone
GER4-103	300	999	999	999	73386.81	73386.81	UNKNOWN	82.5	Cone
GER4-104	300	999	999	999	73386.81	73386.81	UNKNOWN	85	Cone
GER4-105	200	999	999	999	76341.69	76341.69	UNKNOWN	43.2	Cone
GER4-106	200	999	999	999	76341.69	76341.69	UNKNOWN	47.6	Cone
GER4-107	200	999	999	999	76341.69	76341.69	UNKNOWN	50	Cone
GER4-108	300	999	999	999	76341.69	76341.69	UNKNOWN	42	Cone
GER4-109	300	999	999	999	76341.69	76341.69	UNKNOWN	46	Cone
GER4-110	300	999	999	999	76341.69	76341.69	UNKNOWN	51	Cone
GER4-111	300	999	999	999	76341.69	76341.69	UNKNOWN	88	Cone
GER4-112	300	999	999	999	76341.69	76341.69	UNKNOWN	91	Cone
GER4-113	300	999	999	999	76341.69	76341.69	UNKNOWN	98	Cone
USA05-02	305	999	999	999	76341.69	76341.69	UNKNOWN	53.3	Cone
USA05-04	305	999	999	999	76341.69	76341.69	MSF C1-1	82.2	Cone
USA05-06	305	999	999	999	76341.69	76341.69	NS	48.9	Cone
USA05-07	305	999	999	999	76341.69	76341.69	MSF C1-2	82.2	Cone
USA05-09	305	999	999	999	76341.69	76341.69	NS	62.2	Cone
USA05-10	305	999	999	999	76341.69	76341.69	MSF C1-3	76.9	Cone
USA05-17	305	999	999	999	79017.21	79017.21	UNKNOWN	34.7	Cone
EUR1-10	999	999	999	999	90000	90000	KEUSER	81.1	Cone
EUR1-11	999	999	999	999	90000	90000	KEUSER	74.6	Cone
EUR1-9	999	999	999	999	90000	90000	KEUSER	90	Cone
GER3-314	999	999	999	999	90000	90000	UNKNOWN	82.2	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
GER4-082	64586.11	1.05	67065.82	1.01	54407.29	1.24
GER4-083	68093.30	1.00	70707.66	0.97	57361.74	1.19
GER4-084	68093.30	1.00	70707.66	0.97	57361.74	1.19
GER4-085	68700.75	1.00	71338.43	0.97	57873.45	1.19
GER4-086	76484.53	0.95	79421.06	0.92	64430.50	1.13
GER4-087	64586.11	1.13	67065.82	1.09	54407.29	1.35
GER4-088	68700.75	1.08	71338.43	1.04	57873.45	1.28
GER4-089	76484.53	0.97	79421.06	0.93	64430.50	1.15
GER4-090	76484.53	0.97	79421.06	0.93	64430.50	1.15
GER4-091	64586.11	1.17	67065.82	1.13	54407.29	1.39
GER4-092	77884.08	0.98	80874.35	0.94	65609.48	1.16
GER4-093	68700.75	1.11	71338.43	1.07	57873.45	1.31
GER4-094	64586.11	1.18	67065.82	1.13	54407.29	1.40
GER4-095	71195.44	1.08	73928.91	1.04	59974.98	1.28
GER4-096	71195.44	1.09	73928.91	1.05	59974.98	1.29
GER4-097	76484.53	1.02	79421.06	0.98	64430.50	1.21
GER4-098	64586.11	1.22	67065.82	1.17	54407.29	1.45
GER4-099	64586.11	1.23	67065.82	1.18	54407.29	1.46
GER4-100	76484.53	1.05	79421.06	1.01	64430.50	1.24
GER4-101	71195.44	1.12	73928.91	1.08	59974.98	1.33
GER4-102	77884.08	1.05	80874.35	1.01	65609.48	1.25
GER4-103	77884.08	1.06	80874.35	1.02	65609.48	1.26
GER4-104	76484.53	1.11	79421.06	1.07	64430.50	1.32
GER4-105	52278.84	0.83	54476.07	0.79	43154.38	1.00
GER4-106	52278.84	0.91	54476.07	0.87	43154.38	1.10
GER4-107	52278.84	0.96	54476.07	0.92	43154.38	1.16
GER4-108	44834.52	0.94	46718.87	0.90	37009.35	1.13
GER4-109	44834.52	1.03	46718.87	0.98	37009.35	1.24
GER4-110	44834.52	1.14	46718.87	1.09	37009.35	1.38
GER4-111	81098.82	1.09	84507.32	1.04	66944.28	1.31
GER4-112	81098.82	1.12	84507.32	1.08	66944.28	1.36
GER4-113	81098.82	1.21	84507.32	1.16	66944.28	1.46
USA05-02	65592.63	0.81	68349.42	0.78	54144.45	0.98
USA05-04	86159.10	0.95	89780.28	0.92	71121.37	1.16
USA05-06	65592.63	0.75	68349.42	0.72	54144.45	0.90
USA05-07	86159.10	0.95	89780.28	0.92	71121.37	1.16
USA05-09	65592.63	0.95	68349.42	0.91	54144.45	1.15
USA05-10	86159.10	0.89	89780.28	0.86	71121.37	1.08
USA05-17	67171.21	0.52	70205.58	0.49	52842.41	0.66
EUR1-10	84091.26	0.96	88869.40	0.91	72584.20	1.12
EUR1-11	84091.26	0.89	88869.40	0.84	72584.20	1.03
EUR1-9	84091.26	1.07	88869.40	1.01	72584.20	1.24
GER3-314	88880.13	0.92	93930.38	0.88	65920.44	1.25

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
17	SWE1-26	UE	1	16	16	103	815		24.49	28.9
17	SWE1-27	UE	1	16	16	104	815		36.27	42.8
7	GER3-326	UE	1	12	12	105	640	16	34.75	41.0
25	USA09-35	U	1	15.875	15.875	114.3	0	32	30.17	35.6
25	USA09-36	U	1	15.875	15.875	114.3	0	32	30.17	35.6
25	USA09-37	U	1	15.875	15.875	114.3	0	32	30.17	35.6
25	USA09-43	U	1	19.05	19.05	114.3	0	32	47.68	56.3
9	GER4-114	S	1	19	19	115.3	350	16	17.20	20.3
9	GER4-115	S	1	19	19	115.3	350	16	17.20	20.3
9	GER4-116	S	1	19	19	115.3	350	16	17.20	20.3
9	GER4-117	S	1	22.2	22.2	115.3	350	16	25.85	30.5
9	GER4-118	S	1	22.2	22.2	115.3	350	16	25.85	30.5
9	GER4-119	S	1	22.2	22.2	115.3	350	16	25.85	30.5
8	GER3-335	UE	1	16	16	123.9	640	16	53.39	63.0
8	GER3-336	UE	1	16	16	124	640	16	29.66	35.0
8	GER3-337	UE	1	16	16	124.5	640	16	29.66	35.0
7	GER1-32	UE	1	16	16	125	902	16	31.95	37.7
7	GER3-338	UE	1	16	16	125	902	16	31.95	37.7
7	GER3-339	UE	1	16	16	125	902	16	31.95	37.7
7	GER3-345	UE	1	16	16	125	902	16	31.95	37.7
17	SWE1-28	UE	1	16	16	125	660		13.81	16.3
30	USA05-15	S	1	25.4	25.4	127	248		21.44	25.3
30	USA05-16	S	1	25.4	25.4	127	248		21.36	25.2
11	GER4-120	S	1	22	22	130	350	16	23.47	27.7
25	USA09-39	U	1	19.05	19.05	139.7	0	32	43.82	51.7
25	USA09-40	U	1	19.05	19.05	139.7	0	32	43.82	51.7
25	USA09-41	U	1	19.05	19.05	139.7	0	32	43.82	51.7
25	USA09-44	U	1	19.05	19.05	139.7	0	32	30.17	35.6
25	USA09-45	U	1	19.05	19.05	139.7	0	32	30.17	35.6
25	USA09-46	U	1	19.05	19.05	139.7	0	32	30.17	35.6
25	USA09-78	U	1	25.4	25.4	139.7	0	32	31.65	37.3
25	USA09-79	U	1	25.4	25.4	139.7	0	32	31.65	37.3
25	USA09-80	U	1	25.4	25.4	139.7	0	32	31.65	37.3
9	GER4-121	S	1	22.2	22.2	140.3	350	16	15.93	18.8
99	CSFR1-38	S-U	1	24	24	150			27.63	32.6
99	CSFR1-39	S-U	1	24	24	150			25.17	29.7
99	CSFR1-40	S-U	1	24	24	150			28.14	33.2
99	CSFR1-41	S-U	1	24	24	150			24.83	29.3
99	CSFR1-42	S-U	1	24	24	150			24.83	29.3
99	CSFR1-43	S-U	1	24	24	150			23.98	28.3
99	CSFR1-44	S-U	1	24	24	150			23.98	28.3
99	CSFR1-45	S-U	1	24	24	150			29.15	34.4
99	CSFR1-46	S-U	1	24	24	150			29.15	34.4

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
SWE1-26	999	999	999	999	95481	95481	UNKNOWN	49.6	Cone
SWE1-27	999	999	999	999	97344	97344	UNKNOWN	69	Cone
GER3-326	999	999	999	999	99225	99225	UNKNOWN	83.5	Cone
USA09-35	999	999	999	999	117580.4	117580.4	ARKANSAS	128.676192	Cone
USA09-36	999	999	999	999	117580.4	117580.4	ARKANSAS	120.460736	Cone
USA09-37	999	999	999	999	117580.4	117580.4	ARKANSAS	120.460736	Cone
USA09-43	999	999	999	999	117580.4	117580.4	ARKANSAS	210.288096	Cone
GER4-114	300	999	999	999	119646.8	119646.8	UNKNOWN	72	Cone
GER4-115	300	999	999	999	119646.8	119646.8	UNKNOWN	72	Cone
GER4-116	300	999	999	999	119646.8	119646.8	UNKNOWN	87.2	Cone
GER4-117	300	999	999	999	119646.8	119646.8	UNKNOWN	94.4	Cone
GER4-118	300	999	999	999	119646.8	119646.8	UNKNOWN	97.6	Cone
GER4-119	300	999	999	999	119646.8	119646.8	UNKNOWN	100.8	Cone
GER3-335	999	999	999	999	138160.9	138160.9	UNKNOWN	128.2	Cone
GER3-336	999	999	999	999	138384	138384	UNKNOWN	101.3	Cone
GER3-337	999	999	999	999	139502.3	139502.3	UNKNOWN	101.8	Cone
GER1-32	188	999	999	999	140625	140625	UNKNOWN	120.9	Cone
GER3-338	188	999	999	999	140625	140625	UNKNOWN	120.9	Cone
GER3-339	250	999	999	999	140625	140625	UNKNOWN	120.6	Cone
GER3-345	999	999	999	999	140625	140625	UNKNOWN	121.2	Cone
SWE1-28	999	999	999	999	140625	140625	UNKNOWN	76.2	Cone
USA05-15	584	999	999	999	145161	145161	UNKNOWN	100.1	Cone
USA05-16	584	999	999	999	145161	145161	UNKNOWN	117.4	Cone
GER4-120	550	999	999	999	152100	152100	UNKNOWN	97.2	Cone
USA09-39	999	999	999	999	175644.8	175644.8	ARKANSAS	219.01952	Cone
USA09-40	999	999	999	999	175644.8	175644.8	ARKANSAS	210.808512	Cone
USA09-41	999	999	999	999	175644.8	175644.8	ARKANSAS	191.64208	Cone
USA09-44	999	999	999	999	175644.8	175644.8	ARKANSAS	169.740128	Cone
USA09-45	999	999	999	999	175644.8	175644.8	ARKANSAS	153.313664	Cone
USA09-46	999	999	999	999	175644.8	175644.8	ARKANSAS	167.004608	Cone
USA09-78	999	999	999	999	175644.8	175644.8	ARKANSAS	208.615648	Cone
USA09-79	999	999	999	999	175644.8	175644.8	ARKANSAS	206.974336	Cone
USA09-80	999	999	999	999	175644.8	175644.8	ARKANSAS	184.52528	Cone
GER4-121	300	999	999	999	177156.8	177156.8	UNKNOWN	85.6	Cone
CSFR1-38	999	999	999	999	202500	202500	K	150	Cone
CSFR1-39	999	999	999	999	202500	202500	K	161.7	Cone
CSFR1-40	999	999	999	999	202500	202500	K	131.4	Cone
CSFR1-41	999	999	999	999	202500	202500	K	133.3	Cone
CSFR1-42	999	999	999	999	202500	202500	K	181.7	Cone
CSFR1-43	999	999	999	999	202500	202500	K	160.7	Cone
CSFR1-44	999	999	999	999	202500	202500	K	165.7	Cone
CSFR1-45	999	999	999	999	202500	202500	K	151.5	Cone
CSFR1-46	999	999	999	999	202500	202500	K	167.7	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
SWE1-26	84425.85	0.59	89659.30	0.55	63293.81	0.78
SWE1-27	104241.96	0.66	110878.13	0.62	78426.82	0.88
GER3-326	103501.47	0.81	110261.11	0.76	79435.47	1.05
USA09-35	109531.03	1.17	118246.57	1.09	89937.76	1.43
USA09-36	109531.03	1.10	118246.57	1.02	89937.76	1.34
USA09-37	109531.03	1.10	118246.57	1.02	89937.76	1.34
USA09-43	137703.26	1.53	148660.51	1.41	117188.09	1.79
GER4-114	83803.59	0.86	90591.59	0.79	73403.73	0.98
GER4-115	83803.59	0.86	90591.59	0.79	73403.73	0.98
GER4-116	83803.59	1.04	90591.59	0.96	73403.73	1.19
GER4-117	102722.25	0.92	111042.65	0.85	91870.75	1.03
GER4-118	102722.25	0.95	111042.65	0.88	91870.75	1.06
GER4-119	102722.25	0.98	111042.65	0.91	91870.75	1.10
GER3-335	164455.31	0.78	179672.16	0.71	140091.20	0.92
GER3-336	122726.18	0.83	134097.43	0.76	104290.69	0.97
GER3-337	123469.22	0.82	134987.24	0.75	105347.97	0.97
GER1-32	128915.86	0.94	141022.81	0.86	103950.82	1.16
GER3-338	128915.86	0.94	141022.81	0.86	103950.82	1.16
GER3-339	128915.86	0.94	141022.81	0.86	103950.82	1.16
GER3-345	128915.86	0.94	141022.81	0.86	103950.82	1.17
SWE1-28	84767.52	0.90	92728.34	0.82	72230.10	1.05
USA05-15	108152.48	0.93	118576.54	0.84	109222.50	0.92
USA05-16	107938.53	1.09	118341.96	0.99	140238.61	0.84
GER4-120	117199.45	0.83	128916.36	0.75	108441.44	0.90
USA09-39	178373.85	1.23	198126.59	1.11	161816.76	1.35
USA09-40	178373.85	1.18	198126.59	1.06	161816.76	1.30
USA09-41	178373.85	1.07	198126.59	0.97	161816.76	1.18
USA09-44	148000.25	1.15	164389.48	1.03	134262.51	1.26
USA09-45	148000.25	1.04	164389.48	0.93	134262.51	1.14
USA09-46	148000.25	1.13	164389.48	1.02	134262.51	1.24
USA09-78	151593.21	1.38	168380.32	1.24	148408.09	1.41
USA09-79	151593.21	1.37	168380.32	1.23	148408.09	1.39
USA09-80	151593.21	1.22	168380.32	1.10	148408.09	1.24
GER4-121	108252.04	0.79	120307.46	0.71	102376.15	0.84
CSFR1-38	157585.53	0.95	176642.02	0.85	143145.41	1.05
CSFR1-39	150413.14	1.08	168602.28	0.96	136630.24	1.18
CSFR1-40	159029.10	0.83	178260.15	0.74	144456.69	0.91
CSFR1-41	149396.82	0.89	167463.06	0.80	135707.06	0.98
CSFR1-42	149396.82	1.22	167463.06	1.09	135707.06	1.34
CSFR1-43	146825.26	1.09	164580.52	0.98	133371.13	1.20
CSFR1-44	146825.26	1.13	164580.52	1.01	133371.13	1.24
CSFR1-45	161877.60	0.94	181453.12	0.83	147044.18	1.03
CSFR1-46	161877.60	1.04	181453.12	0.92	147044.18	1.14

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
99	EUR1-12	S	1	22	22	150			26.55	31.3
99	EUR1-13	S	1	22	22	150			26.55	31.3
99	EUR1-14	S	1	22	22	150			26.55	31.3
99	CHI1-6	S	1	22	22	160			21.02	24.8
99	CHI1-7	S	1	22	22	160			21.02	24.8
99	CHI1-8	S	1	22	22	160			21.02	24.8
7	GER1-34	UE	1	20	20	170	1047	16	23.98	28.3
7	GER3-354	UE	1	20	20	170	1047	16	23.98	28.3
7	GER3-355	UE	1	20	20	170	1047	16	23.98	28.3
7	GER3-356	UE	1	20	20	170	1047	16	23.98	28.3
25	USA09-50	U	1	25.4	25.4	177.8	0	32	30.17	35.6
25	USA09-51	U	1	25.4	25.4	177.8	0	32	30.17	35.6
25	USA09-52	U	1	25.4	25.4	177.8	0	32	30.17	35.6
12	GER4-122	S	1	22	22	185	350	16	21.02	24.8
11	GER4-123	S	1	22	22	185	900	16	18.81	22.2
11	GER4-124	S	1	22	22	185	900	16	18.81	22.2
11	GER4-125	S	1	22	22	185	900	16	18.81	22.2
12	GER4-126	S	1	22	22	185	350	16	22.97	27.1
12	GER4-127	S	1	22	22	185	350	16	22.97	27.1
12	GER4-128	S	1	22	22	185	350	16	23.90	28.2
12	GER4-129	S	1	22	22	185	350	16	25.17	29.7
12	GER4-130	S	1	22	22	185	350	16	25.08	29.6
12	GER4-131	S	1	22	22	185	350	16	28.05	33.1
12	GER4-132	S	1	22	22	185	350	16	22.97	27.1
12	GER4-133	S	1	22	22	185	350	16	25.08	29.6
12	GER4-134	S	1	22	22	185	350	16	23.56	27.8
12	GER4-135	S	1	22	22	185	350	16	22.97	27.1
12	GER4-136	S	1	22	22	185	350	16	25.17	29.7
12	GER4-137	S	1	22	22	185	350	16	25.42	30.0
12	GER4-138	S	1	22	22	185	350	16	25.08	29.6
11	GER4-139	S	1	22	22	185	900	16	18.81	22.2
12	GER4-140	S	1	22	22	185	350	16	13.22	15.6
12	GER4-141	S	1	22	22	185	350	16	13.90	16.4
12	GER4-142	S	1	22	22	185	350	16	13.90	16.4
12	GER4-143	S	1	22	22	185	350	16	13.22	15.6
12	GER4-144	S	1	22	22	185	350	16	17.12	20.2
12	GER4-145	S	1	22	22	185	350	16	17.12	20.2
12	GER4-146	S	1	22	22	185	350	16	16.86	19.9
12	GER4-147	S	1	22	22	185	350	16	16.86	19.9
11	GER4-148	S	1	22	22	185	900	16	18.81	22.2
28	9SMG5706	UC1	1	19.1	19.05	101.6	-	-	29.75	35.1
28	9SMG5707	UC1	1	19.1	19.05	101.6	-	-	29.75	35.1
28	9SMG5708	UC1	1	19.1	19.05	101.6	-	-	29.75	35.1

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)		Ultimate Load Nu (kN)	Failure Mode
EUR1-12	999	999	999	999	202500	202500	KEUSER	147.4	Cone
EUR1-13	999	999	999	999	202500	202500	KEUSER	150.9	Cone
EUR1-14	999	999	999	999	202500	202500	KEUSER	138.6	Cone
CHI1-6	900	999	999	999	230400	230400	ZHAO	148.8	Cone
CHI1-7	900	999	999	999	230400	230400	ZHAO	155.8	Cone
CHI1-8	900	999	999	999	230400	230400	ZHAO	161.9	Cone
GER1-34	255	999	999	999	260100	260100	UNKNOWN	183.2	Cone
GER3-354	255	999	999	999	260100	260100	UNKNOWN	183.2	Cone
GER3-355	340	999	999	999	260100	260100	UNKNOWN	190.7	Cone
GER3-356	999	999	999	999	260100	260100	UNKNOWN	199.6	Cone
USA09-50	999	999	999	999	284515.6	284515.6	ARKANSAS	273.7744	Cone
USA09-51	999	999	999	999	284515.6	284515.6	ARKANSAS	271.03888	Cone
USA09-52	999	999	999	999	284515.6	284515.6	ARKANSAS	271.03888	Cone
GER4-122	400	999	999	999	308025	308025	UNKNOWN	173.5	Cone
GER4-123	447	999	999	999	308025	308025	UNKNOWN	150.6	Cone
GER4-124	449	999	999	999	308025	308025	UNKNOWN	151.7	Cone
GER4-125	450	999	999	999	308025	308025	UNKNOWN	145.6	Cone
GER4-126	450	999	999	999	308025	308025	UNKNOWN	187	Cone
GER4-127	450	999	999	999	308025	308025	UNKNOWN	200	Cone
GER4-128	450	999	999	999	308025	308025	UNKNOWN	207	Cone
GER4-129	450	999	999	999	308025	308025	UNKNOWN	223	Cone
GER4-130	450	999	999	999	308025	308025	UNKNOWN	223	Cone
GER4-131	450	999	999	999	308025	308025	UNKNOWN	223	Cone
GER4-132	450	999	999	999	308025	308025	UNKNOWN	226	Cone
GER4-133	450	999	999	999	308025	308025	UNKNOWN	228	Cone
GER4-134	450	999	999	999	308025	308025	UNKNOWN	230	Cone
GER4-135	450	999	999	999	308025	308025	UNKNOWN	236	Cone
GER4-136	450	999	999	999	308025	308025	UNKNOWN	239	Cone
GER4-137	450	999	999	999	308025	308025	UNKNOWN	241	Cone
GER4-138	450	999	999	999	308025	308025	UNKNOWN	259	Cone
GER4-139	550	999	999	999	308025	308025	UNKNOWN	148.4	Cone
GER4-140	650	999	999	999	308025	308025	UNKNOWN	128	Cone
GER4-141	650	999	999	999	308025	308025	UNKNOWN	128.4	Cone
GER4-142	650	999	999	999	308025	308025	UNKNOWN	135	Cone
GER4-143	650	999	999	999	308025	308025	UNKNOWN	138.6	Cone
GER4-144	650	999	999	999	308025	308025	UNKNOWN	181.5	Cone
GER4-145	650	999	999	999	308025	308025	UNKNOWN	182.3	Cone
GER4-146	650	999	999	999	308025	308025	UNKNOWN	182.7	Cone
GER4-147	650	999	999	999	308025	308025	UNKNOWN	201	Cone
GER4-148	875	999	999	999	308025	308025	UNKNOWN	141.3	Cone
9SMG5706	999	999	999	999	92903.04	92903.04	Hallowell	116.36	Cone
9SMG5707	999	999	999	999	92903.04	92903.04	Hallowell	98.46	Cone
9SMG5708	999	999	999	999	92903.04	92903.04	Hallowell	113.80	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
EUR1-12	154485.51	0.95	173167.11	0.85	149200.85	0.99
EUR1-13	154485.51	0.98	173167.11	0.87	149200.85	1.01
EUR1-14	154485.51	0.90	173167.11	0.80	149200.85	0.93
CHI1-6	151417.64	0.98	171070.00	0.87	149248.01	1.00
CHI1-7	151417.64	1.03	171070.00	0.91	149248.01	1.04
CHI1-8	151417.64	1.07	171070.00	0.95	149248.01	1.08
GER1-34	177148.41	1.03	201556.78	0.91	165053.16	1.11
GER3-354	177148.41	1.03	201556.78	0.91	165053.16	1.11
GER3-355	177148.41	1.08	201556.78	0.95	165053.16	1.16
GER3-356	177148.41	1.13	201556.78	0.99	165053.16	1.21
USA09-50	212503.19	1.29	242997.34	1.13	223228.61	1.23
USA09-51	212503.19	1.28	242997.34	1.12	223228.61	1.21
USA09-52	212503.19	1.28	242997.34	1.12	223228.61	1.21
GER4-122	188258.28	0.92	216198.69	0.80	194692.12	0.89
GER4-123	178116.74	0.85	204551.99	0.74	184203.98	0.82
GER4-124	178116.74	0.85	204551.99	0.74	184203.98	0.82
GER4-125	178116.74	0.82	204551.99	0.71	184203.98	0.79
GER4-126	196794.47	0.95	226001.78	0.83	203520.04	0.92
GER4-127	196794.47	1.02	226001.78	0.88	203520.04	0.98
GER4-128	200748.73	1.03	230542.91	0.90	207609.43	1.00
GER4-129	206018.62	1.08	236594.94	0.94	213059.42	1.05
GER4-130	205671.50	1.08	236196.29	0.94	212700.44	1.05
GER4-131	217491.48	1.03	249770.54	0.89	224924.37	0.99
GER4-132	196794.47	1.15	226001.78	1.00	203520.04	1.11
GER4-133	205671.50	1.11	236196.29	0.97	212700.44	1.07
GER4-134	199319.89	1.15	228902.02	1.00	206131.76	1.12
GER4-135	196794.47	1.20	226001.78	1.04	203520.04	1.16
GER4-136	206018.62	1.16	236594.94	1.01	213059.42	1.12
GER4-137	207056.50	1.16	237786.86	1.01	214132.78	1.13
GER4-138	205671.50	1.26	236196.29	1.10	212700.44	1.22
GER4-139	178116.74	0.83	204551.99	0.73	184203.98	0.81
GER4-140	149310.57	0.86	171470.54	0.75	154413.34	0.83
GER4-141	153091.18	0.84	175812.26	0.73	158323.16	0.81
GER4-142	153091.18	0.88	175812.26	0.77	158323.16	0.85
GER4-143	149310.57	0.93	171470.54	0.81	154413.34	0.90
GER4-144	169904.13	1.07	195120.50	0.93	175710.70	1.03
GER4-145	169904.13	1.07	195120.50	0.93	175710.70	1.04
GER4-146	168637.75	1.08	193666.17	0.94	174401.04	1.05
GER4-147	168637.75	1.19	193666.17	1.04	174401.04	1.15
GER4-148	178116.74	0.79	204551.99	0.69	184203.98	0.77
9SMG5706	91159.54	1.28	96593.17	1.20	74979.44	1.55
9SMG5707	91159.54	1.08	96593.17	1.02	74979.44	1.31
9SMG5708	91159.54	1.25	96593.17	1.18	74979.44	1.52

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
28	9SMG5709	UC1	1	19.1	19.05	101.6	-	-	29.75	35.1
28	9SMG5710	UC1	1	19.1	19.05	101.6	-	-	29.75	35.1
28	11SC5701	CIP	1	19.1	19.05	101.6	-	-	30.21	35.6
28	11SC5702	CIP	1	19.1	19.05	101.6	-	-	30.21	35.6
28	11SC5703	CIP	1	19.1	19.05	101.6	-	-	30.21	35.6
28	11SC5704	CIP	1	19.1	19.05	101.6	-	-	30.21	35.6
28	11SC5705	CIP	1	19.1	19.05	101.6	-	-	30.21	35.6
27	1SML5726	UC1	1	19.1	19.05	101.6	-	-	29.23	34.5
27	1SML5727	UC1	1	19.1	19.05	101.6	-	-	29.23	34.5
27	1SML5728	UC1	1	19.1	19.05	101.6	-	-	29.23	34.5
27	1SML5729	UC1	1	19.1	19.05	101.6	-	-	29.23	34.5
27	1SML5730	UC1	1	19.1	19.05	101.6	-	-	29.23	34.5
27	5SML5411	UC1	1	19.1	19.05	57.15	-	-	33.62	39.7
27	5SML5412	UC1	1	19.1	19.05	57.15	-	-	33.62	39.7
27	5SML5413	UC1	1	19.1	19.05	57.15	-	-	33.62	39.7
27	5SML5414	UC1	1	19.1	19.05	57.15	-	-	33.62	39.7
27	5SML5415	UC1	1	19.1	19.05	57.15	-	-	33.62	39.7
27	3SML3716	UC1	1	19.1	19.05	101.6	-	-	21.68	25.6
27	3SML3717	UC1	1	19.1	19.05	101.6	-	-	21.68	25.6
27	3SML3718	UC1	1	19.1	19.05	101.6	-	-	21.68	25.6
27	3SML3719	UC1	1	19.1	19.05	101.6	-	-	21.68	25.6
27	3SML3720	UC1	1	19.1	19.05	101.6	-	-	21.68	25.6
27	5SMR5721	UC1	1	19.1	19.05	101.6	-	-	32.78	38.7
27	5SMR5722	UC1	1	19.1	19.05	101.6	-	-	32.78	38.7
27	5SMR5723	UC1	1	19.1	19.05	101.6	-	-	32.78	38.7
27	5SMR5727	UC1	1	19.1	19.05	101.6	-	-	32.78	38.7
27	5SMR5725	UC1	1	19.1	19.05	101.6	-	-	32.78	38.7
27	5SSL5726	UC2	1	19.1	19.05	101.6	-	-	31.84	37.6
27	5SSL5727	UC2	1	19.1	19.05	101.6	-	-	31.84	37.6
27	5SSL5728	UC2	1	19.1	19.05	101.6	-	-	31.84	37.6
27	5SSL5729	UC2	1	19.1	19.05	101.6	-	-	31.84	37.6
27	5SSL5730	UC2	1	19.1	19.05	101.6	-	-	31.84	37.6
28	9SKG5701	EAI	1	19.05	19.05	87.3	-	-	29.75	35.1
28	9SKG5702	EAI	1	19.05	19.05	87.3	-	-	29.75	35.1
28	9SKG5703	EAI	1	19.05	19.05	87.3	-	-	29.75	35.1
28	9SKG5704	EAI	1	19.05	19.05	87.3	-	-	29.75	35.1
28	9SKG5705	EAI	1	19.05	19.05	87.3	-	-	29.75	35.1
27	0SKL5701	EAI	1	19.05	19.05	120.65	-	-	29.23	34.5
27	0SKL5702	EAI	1	19.05	19.05	120.65	-	-	29.23	34.5
27	0SKL5703	EAI	1	19.05	19.05	120.65	-	-	29.23	34.5
27	0SKL5704	EAI	1	19.05	19.05	120.65	-	-	29.23	34.5
27	0SKL5705	EAI	1	19.05	19.05	120.65	-	-	29.23	34.5
27	0SKL5721	EAI	1	19.05	19.05	82.55	-	-	29.23	34.5

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure Mode
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
9SMG5709	999	999	999	999	92903.04	92903.04	Hallowell	122.32	Cone
9SMG5710	999	999	999	999	92903.04	92903.04	Hallowell	116.36	Cone
11SC5701	999	999	999	999	92903.04	92903.04	Hallowell	104.36	Cone
11SC5702	999	999	999	999	92903.04	92903.04	Hallowell	95.34	Cone
11SC5703	999	999	999	999	92903.04	92903.04	Hallowell	102.21	Cone
11SC5704	999	999	999	999	92903.04	92903.04	Hallowell	94.05	Cone
11SC5705	999	999	999	999	92903.04	92903.04	Hallowell	94.48	Cone
1SML5726	999	999	999	999	92903.04	92903.04	Rodriguez	97.11	Cone
1SML5727	999	999	999	999	92903.04	92903.04	Rodriguez	93.45	Cone
1SML5728	999	999	999	999	92903.04	92903.04	Rodriguez	86.15	Cone
1SML5729	999	999	999	999	92903.04	92903.04	Rodriguez	106.24	Cone
1SML5730	999	999	999	999	92903.04	92903.04	Rodriguez	97.71	Cone
5SML5411	999	999	999	999	29395.1	29395.1	Rodriguez	35.81	Cone
5SML5412	999	999	999	999	29395.1	29395.1	Rodriguez	35.81	Cone
5SML5413	999	999	999	999	29395.1	29395.1	Rodriguez	34.50	Cone
5SML5414	999	999	999	999	29395.1	29395.1	Rodriguez	43.67	Cone
5SML5415	999	999	999	999	29395.1	29395.1	Rodriguez	41.49	Cone
3SML3716	999	999	999	999	92903.04	92903.04	Rodriguez	82.56	Cone
3SML3717	999	999	999	999	92903.04	92903.04	Rodriguez	80.38	Cone
3SML3718	999	999	999	999	92903.04	92903.04	Rodriguez	83.86	Cone
3SML3719	999	999	999	999	92903.04	92903.04	Rodriguez	96.03	Cone
3SML3720	999	999	999	999	92903.04	92903.04	Rodriguez	90.38	Cone
5SMR5721	999	999	999	999	92903.04	92903.04	Rodriguez	107.02	Cone
5SMR5722	999	999	999	999	92903.04	92903.04	Rodriguez	99.50	Cone
5SMR5723	999	999	999	999	92903.04	92903.04	Rodriguez	100.83	Cone
5SMR5727	999	999	999	999	92903.04	92903.04	Rodriguez	111.00	Cone
5SMR5725	999	999	999	999	92903.04	92903.04	Rodriguez	110.56	Cone
5SSL5726	999	999	999	999	92903.04	92903.04	Rodriguez	96.93	Cone
5SSL5727	999	999	999	999	92903.04	92903.04	Rodriguez	101.87	Cone
5SSL5728	999	999	999	999	92903.04	92903.04	Rodriguez	117.58	Cone
5SSL5729	999	999	999	999	92903.04	92903.04	Rodriguez	107.25	Cone
5SSL5730	999	999	999	999	92903.04	92903.04	Rodriguez	109.05	Cone
9SKG5701	999	999	999	999	68591.61	68591.61	Hallowell	57.117	Cone
9SKG5702	999	999	999	999	68591.61	68591.61	Hallowell	62.659	Cone
9SKG5703	999	999	999	999	68591.61	68591.61	Hallowell	68.200	Cone
9SKG5704	999	999	999	999	68591.61	68591.61	Hallowell	70.757	Cone
9SKG5705	999	999	999	999	68591.61	68591.61	Hallowell	61.380	Cone
0SKL5701	999	999	999	999	131007.8	131007.8	Rodriguez	87.670	Cone
0SKL5702	999	999	999	999	131007.8	131007.8	Rodriguez	84.320	Cone
0SKL5703	999	999	999	999	131007.8	131007.8	Rodriguez	84.627	Cone
0SKL5704	999	999	999	999	131007.8	131007.8	Rodriguez	85.232	Cone
0SKL5705	999	999	999	999	131007.8	131007.8	Rodriguez	92.234	Cone
0SKL5721	999	999	999	999	61330.52	61330.52	Rodriguez	41.702	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
9SMG5709	91159.54	1.34	96593.17	1.27	74979.44	1.63
9SMG5710	91159.54	1.28	96593.17	1.20	74979.44	1.55
11SC5701	91854.06	1.14	97329.08	1.07	70296.92	1.48
11SC5702	91854.06	1.04	97329.08	0.98	70296.92	1.36
11SC5703	91854.06	1.11	97329.08	1.05	70296.92	1.45
11SC5704	91854.06	1.02	97329.08	0.97	70296.92	1.34
11SC5705	91854.06	1.03	97329.08	0.97	70296.92	1.34
1SML5726	90363.83	1.07	95750.03	1.01	74324.96	1.31
1SML5727	90363.83	1.03	95750.03	0.98	74324.96	1.26
1SML5728	90363.83	0.95	95750.03	0.90	74324.96	1.16
1SML5729	90363.83	1.18	95750.03	1.11	74324.96	1.43
1SML5730	90363.83	1.08	95750.03	1.02	74324.96	1.31
5SML5411	40881.55	0.88	38644.39	0.93	29464.76	1.22
5SML5412	40881.55	0.88	38644.39	0.93	29464.76	1.22
5SML5413	40881.55	0.84	38644.39	0.89	29464.76	1.17
5SML5414	40881.55	1.07	38644.39	1.13	29464.76	1.48
5SML5415	40881.55	1.01	38644.39	1.07	29464.76	1.41
3SML3716	77813.15	1.06	82451.26	1.00	64001.93	1.29
3SML3717	77813.15	1.03	82451.26	0.97	64001.93	1.26
3SML3718	77813.15	1.08	82451.26	1.02	64001.93	1.31
3SML3719	77813.15	1.23	82451.26	1.16	64001.93	1.50
3SML3720	77813.15	1.16	82451.26	1.10	64001.93	1.41
5SMR5721	95694.50	1.12	101398.44	1.06	78709.48	1.36
5SMR5722	95694.50	1.04	101398.44	0.98	78709.48	1.26
5SMR5723	95694.50	1.05	101398.44	0.99	78709.48	1.28
5SMR5727	95694.50	1.16	101398.44	1.09	78709.48	1.41
5SMR5725	95694.50	1.16	101398.44	1.09	78709.48	1.40
5SSL5726	94305.86	1.03	99927.03	0.97	77567.31	1.25
5SSL5727	94305.86	1.08	99927.03	1.02	77567.31	1.31
5SSL5728	94305.86	1.25	99927.03	1.18	77567.31	1.52
5SSL5729	94305.86	1.14	99927.03	1.07	77567.31	1.38
5SSL5730	94305.86	1.16	99927.03	1.09	77567.31	1.41
9SKG5701	65160.79	0.88	68125.41	0.84	52840.97	1.08
9SKG5702	65160.79	0.96	68125.41	0.92	52840.97	1.19
9SKG5703	65160.79	1.05	68125.41	1.00	52840.97	1.29
9SKG5704	65160.79	1.09	68125.41	1.04	52840.97	1.34
9SKG5705	65160.79	0.94	68125.41	0.90	52840.97	1.16
0SKL5701	104941.80	0.84	115693.76	0.76	95090.09	0.92
0SKL5702	104941.80	0.80	115693.76	0.73	95090.09	0.89
0SKL5703	104941.80	0.81	115693.76	0.73	95090.09	0.89
0SKL5704	104941.80	0.81	115693.76	0.74	95090.09	0.90
0SKL5705	104941.80	0.88	115693.76	0.80	95090.09	0.97
0SKL5721	59392.71	0.70	61454.36	0.68	47317.56	0.88

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number	Diameter	Outside Diameter	Embedment	Strength of Steel	Aggregate Diameter d _{agg} (mm)	Strength of Concrete	
			n	d (mm)	do/dh (mm)	hef (mm)	f _y (MPa)		f _c (MPa)	f _{cc200} (MPa)
27	0SKL5722	EAll	1	19.05	19.05	82.55	-	-	29.23	34.5
27	0SKL5723	EAll	1	19.05	19.05	82.55	-	-	29.23	34.5
27	0SKL5724	EAll	1	19.05	19.05	82.55	-	-	29.23	34.5
27	0SKL5725	EAll	1	19.05	19.05	82.55	-	-	29.23	34.5
27	0SOL5726	EA	1	19.05	19.05	82.55	-	-	29.23	34.5
27	0SOL5727	EA	1	19.05	19.05	82.55	-	-	29.23	34.5
27	0SOL5728	EA	1	19.05	19.05	82.55	-	-	29.23	34.5
27	0SOL5729	EA	1	19.05	19.05	82.55	-	-	29.23	34.5
27	0SOL5730	EA	1	19.05	19.05	82.55	-	-	29.23	34.5
27	1SKL5401	EAll	1	19.05	19.05	57.15	-	-	29.23	34.5
27	1SKL5402	EAll	1	19.05	19.05	57.15	-	-	29.23	34.5
27	1SKL5403	EAll	1	19.05	19.05	57.15	-	-	29.23	34.5
27	1SKL5404	EAll	1	19.05	19.05	57.15	-	-	29.23	34.5
27	1SKL5405	EAll	1	19.05	19.05	57.15	-	-	29.23	34.5
27	1SKL5706	EAll	1	19.05	19.05	101.6	-	-	30.89	36.4
27	1SKL5707	EAll	1	19.05	19.05	101.6	-	-	30.89	36.4
27	1SKL5708	EAll	1	19.05	19.05	101.6	-	-	30.89	36.4
27	1SKL5709	EAll	1	19.05	19.05	101.6	-	-	30.89	36.4
27	1SKL5710	EAll	1	19.05	19.05	101.6	-	-	31.96	37.7
27	1SKL3711	EAll	1	19.05	19.05	101.6	-	-	20.77	24.5
27	1SKL3712	EAll	1	19.05	19.05	101.6	-	-	20.77	24.5
27	1SKL3713	EAll	1	19.05	19.05	101.6	-	-	20.77	24.5
27	1SKL3714	EAll	1	19.05	19.05	101.6	-	-	20.77	24.5
27	1SKL3715	EAll	1	19.05	19.05	101.6	-	-	20.77	24.5
27	1SKR5716	EAll	1	19.05	19.05	101.6	-	-	31.45	37.1
27	1SKR5717	EAll	1	19.05	19.05	101.6	-	-	31.45	37.1
27	1SKR5718	EAll	1	19.05	19.05	101.6	-	-	31.45	37.1
27	1SKR5719	EAll	1	19.05	19.05	101.6	-	-	31.45	37.1
27	1SKR5720	EAll	1	19.05	19.05	101.6	-	-	31.45	37.1
27	1SKR5721	EAll	1	19.05	19.05	101.6	-	-	19.84	23.4
27	1SKR5722	EAll	1	19.05	19.05	101.6	-	-	19.84	23.4
27	1SKR5723	EAll	1	19.05	19.05	101.6	-	-	19.84	23.4
27	1SKR5724	EAll	1	19.05	19.05	101.6	-	-	19.84	23.4
27	1SKR5725	EAll	1	19.05	19.05	101.6	-	-	19.84	23.4
27	3SKL5701	EAll	1	19.05	19.05	101.6	-	-	30.82	36.4
27	3SKL5702	EAll	1	19.05	19.05	101.6	-	-	30.82	36.4
27	3SKL5703	EAll	1	19.05	19.05	101.6	-	-	30.82	36.4
27	3SKL5704	EAll	1	19.05	19.05	101.6	-	-	30.82	36.4
27	3SKL5705	EAll	1	19.05	19.05	101.6	-	-	30.82	36.4
27	5SHL5401	Sleeve	1	9.525	9.525	57.15	-	-	32.23	38.0
27	5SHL5402	Sleeve	1	9.525	9.525	57.15	-	-	32.23	38.0
27	5SHL5403	Sleeve	1	9.525	9.525	57.15	-	-	32.23	38.0
27	5SHL5404	Sleeve	1	9.525	9.525	57.15	-	-	32.23	38.0

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
0SKL5722	999	999	999	999	61330.52	61330.52	Rodriguez	52.662	Cone
0SKL5723	999	999	999	999	61330.52	61330.52	Rodriguez	55.705	Cone
0SKL5724	999	999	999	999	61330.52	61330.52	Rodriguez	55.096	Cone
0SKL5725	999	999	999	999	61330.52	61330.52	Rodriguez	54.184	Cone
0SOL5726	999	999	999	999	61330.52	61330.52	Rodriguez	39.571	Cone
0SOL5727	999	999	999	999	61330.52	61330.52	Rodriguez	44.442	Cone
0SOL5728	999	999	999	999	61330.52	61330.52	Rodriguez	40.790	Cone
0SOL5729	999	999	999	999	61330.52	61330.52	Rodriguez	47.182	Cone
0SOL5730	999	999	999	999	61330.52	61330.52	Rodriguez	50.229	Cone
1SKL5401	999	999	999	999	29395.1	29395.1	Rodriguez	23.429	Cone
1SKL5402	999	999	999	999	29395.1	29395.1	Rodriguez	21.134	Cone
1SKL5403	999	999	999	999	29395.1	29395.1	Rodriguez	19.803	Cone
1SKL5404	999	999	999	999	29395.1	29395.1	Rodriguez	25.297	Cone
1SKL5405	999	999	999	999	29395.1	29395.1	Rodriguez	19.443	Cone
1SKL5706	999	999	999	999	92903.04	92903.04	Rodriguez	75.175	Cone
1SKL5707	999	999	999	999	92903.04	92903.04	Rodriguez	65.153	Cone
1SKL5708	999	999	999	999	92903.04	92903.04	Rodriguez	71.074	Cone
1SKL5709	999	999	999	999	92903.04	92903.04	Rodriguez	69.254	Cone
1SKL5710	999	999	999	999	92903.04	92903.04	Rodriguez	75.700	Cone
1SKL3711	999	999	999	999	92903.04	92903.04	Rodriguez	58.285	Cone
1SKL3712	999	999	999	999	92903.04	92903.04	Rodriguez	66.367	Cone
1SKL3713	999	999	999	999	92903.04	92903.04	Rodriguez	56.555	Cone
1SKL3714	999	999	999	999	92903.04	92903.04	Rodriguez	58.863	Cone
1SKL3715	999	999	999	999	92903.04	92903.04	Rodriguez	57.711	Cone
1SKR5716	999	999	999	999	92903.04	92903.04	Rodriguez	73.952	Cone
1SKR5717	999	999	999	999	92903.04	92903.04	Rodriguez	66.029	Cone
1SKR5718	999	999	999	999	92903.04	92903.04	Rodriguez	66.910	Cone
1SKR5719	999	999	999	999	92903.04	92903.04	Rodriguez	62.217	Cone
1SKR5720	999	999	999	999	92903.04	92903.04	Rodriguez	73.952	Cone
1SKR5721	999	999	999	999	92903.04	92903.04	Rodriguez	64.059	Cone
1SKR5722	999	999	999	999	92903.04	92903.04	Rodriguez	60.514	Cone
1SKR5723	999	999	999	999	92903.04	92903.04	Rodriguez	54.019	Cone
1SKR5724	999	999	999	999	92903.04	92903.04	Rodriguez	55.790	Cone
1SKR5725	999	999	999	999	92903.04	92903.04	Rodriguez	61.990	Cone
3SKL5701	999	999	999	999	92903.04	92903.04	Rodriguez	67.297	Cone
3SKL5702	999	999	999	999	92903.04	92903.04	Rodriguez	70.856	Cone
3SKL5703	999	999	999	999	92903.04	92903.04	Rodriguez	64.037	Cone
3SKL5704	999	999	999	999	92903.04	92903.04	Rodriguez	68.187	Cone
3SKL5705	999	999	999	999	92903.04	92903.04	Rodriguez	71.745	Cone
5SHL5401	999	999	999	999	29395.1	29395.1	Rodriguez	39.696	Cone
5SHL5402	999	999	999	999	29395.1	29395.1	Rodriguez	32.112	Cone
5SHL5403	999	999	999	999	29395.1	29395.1	Rodriguez	36.573	Cone
5SHL5404	999	999	999	999	29395.1	29395.1	Rodriguez	40.141	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
OSKL5722	59392.71	0.89	61454.36	0.86	47317.56	1.11
OSKL5723	59392.71	0.94	61454.36	0.91	47317.56	1.18
OSKL5724	59392.71	0.93	61454.36	0.90	47317.56	1.16
OSKL5725	59392.71	0.91	61454.36	0.88	47317.56	1.15
OSOL5726	59392.71	0.67	61454.36	0.64	47317.56	0.84
OSOL5727	59392.71	0.75	61454.36	0.72	47317.56	0.94
OSOL5728	59392.71	0.69	61454.36	0.66	47317.56	0.86
OSOL5729	59392.71	0.79	61454.36	0.77	47317.56	1.00
OSOL5730	59392.71	0.85	61454.36	0.82	47317.56	1.06
1SKL5401	34212.27	0.68	32760.07	0.72	24568.73	0.95
1SKL5402	34212.27	0.62	32760.07	0.65	24568.73	0.86
1SKL5403	34212.27	0.58	32760.07	0.60	24568.73	0.81
1SKL5404	34212.27	0.74	32760.07	0.77	24568.73	1.03
1SKL5405	34212.27	0.57	32760.07	0.59	24568.73	0.79
1SKL5706	83359.32	0.90	89475.13	0.84	71086.75	1.06
1SKL5707	83359.32	0.78	89475.13	0.73	71086.75	0.92
1SKL5708	83359.32	0.85	89475.13	0.79	71086.75	1.00
1SKL5709	83359.32	0.83	89475.13	0.77	71086.75	0.97
1SKL5710	84789.10	0.89	91009.81	0.83	72306.03	1.05
1SKL3711	68350.65	0.85	73365.32	0.79	58287.73	1.00
1SKL3712	68350.65	0.97	73365.32	0.90	58287.73	1.14
1SKL3713	68350.65	0.83	73365.32	0.77	58287.73	0.97
1SKL3714	68350.65	0.86	73365.32	0.80	58287.73	1.01
1SKL3715	68350.65	0.84	73365.32	0.79	58287.73	0.99
1SKR5716	84118.75	0.88	90290.27	0.82	71734.37	1.03
1SKR5717	84118.75	0.78	90290.27	0.73	71734.37	0.92
1SKR5718	84118.75	0.80	90290.27	0.74	71734.37	0.93
1SKR5719	84118.75	0.74	90290.27	0.69	71734.37	0.87
1SKR5720	84118.75	0.88	90290.27	0.82	71734.37	1.03
1SKR5721	66812.94	0.96	71714.79	0.89	56976.40	1.12
1SKR5722	66812.94	0.91	71714.79	0.84	56976.40	1.06
1SKR5723	66812.94	0.81	71714.79	0.75	56976.40	0.95
1SKR5724	66812.94	0.84	71714.79	0.78	56976.40	0.98
1SKR5725	66812.94	0.93	71714.79	0.86	56976.40	1.09
3SKL5701	83266.23	0.81	89375.21	0.75	71007.37	0.95
3SKL5702	83266.23	0.85	89375.21	0.79	71007.37	1.00
3SKL5703	83266.23	0.77	89375.21	0.72	71007.37	0.90
3SKL5704	83266.23	0.82	89375.21	0.76	71007.37	0.96
3SKL5705	83266.23	0.86	89375.21	0.80	71007.37	1.01
5SHL5401	35924.42	1.10	34399.54	1.15	22573.49	1.76
5SHL5402	35924.42	0.89	34399.54	0.93	22573.49	1.42
5SHL5403	35924.42	1.02	34399.54	1.06	22573.49	1.62
5SHL5404	35924.42	1.12	34399.54	1.17	22573.49	1.78

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter	Outside	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete	
				d (mm)	diameter do/dh (mm)				fc (MPa)	fcc200 (MPa)
27	5SHL5405	Sleeve	1	9.525	9.525	57.15	-	-	32.23	38.0
27	5SHL5706	Sleeve	1	19.05	19.05	101.6	-	-	32.23	38.0
27	5SHL5707	Sleeve	1	19.05	19.05	101.6	-	-	32.23	38.0
27	5SHL5708	Sleeve	1	19.05	19.05	101.6	-	-	32.23	38.0
27	5SHL5709	Sleeve	1	19.05	19.05	101.6	-	-	32.23	38.0
27	5SHL5710	Sleeve	1	19.05	19.05	101.6	-	-	32.23	38.0
26	1.1	Sleeve	1	8	8	60				37.8
26	1.2	Sleeve	1	8	8	60				37.8
26	1.3	Sleeve	1	8	8	60				37.8
26	1.4	Sleeve	1	8	8	60				37.8
26	1.5	Sleeve	1	8	8	60				37.8
26	21.1	Sleeve	1	8	8	60				29.6
26	21.2	Sleeve	1	8	8	60				29.6
26	21.3	Sleeve	1	8	8	60				29.6
26	21.4	Sleeve	1	8	8	60				29.6
26	21.5	Sleeve	1	8	8	60				29.6
26	2.1	Sleeve	1	10	10	69				37.8
26	2.2	Sleeve	1	10	10	69				37.8
26	2.3	Sleeve	1	10	10	69				37.8
26	2.4	Sleeve	1	10	10	69				37.8
26	2.5	Sleeve	1	10	10	69				37.8
26	2.6	Sleeve	1	10	10	69				37.8
26	22.1	Sleeve	1	10	10	69				29.6
26	22.2	Sleeve	1	10	10	69				29.6
26	22.3	Sleeve	1	10	10	69				29.6
26	22.4	Sleeve	1	10	10	69				29.6
26	22.5	Sleeve	1	10	10	69				29.6
26	3.1	Sleeve	1	12	12	77				37.8
26	3.2	Sleeve	1	12	12	77				37.8
26	3.3	Sleeve	1	12	12	77				37.8
26	3.4	Sleeve	1	12	12	77				37.8
26	3.5	Sleeve	1	12	12	77				37.8
26	3.6	Sleeve	1	12	12	77				37.8
26	8.6	Sleeve	1	12	12	77				65.1
26	8.8	Sleeve	1	12	12	77				65.1
26	8.1	Sleeve	1	12	12	77				65.1
26	23.1	Sleeve	1	12	12	77				29.6
26	23.2	Sleeve	1	12	12	77				29.6
26	23.3	Sleeve	1	12	12	77				29.6
26	23.4	Sleeve	1	12	12	77				29.6
26	23.5	Sleeve	1	12	12	77				29.6
26	28.1	Sleeve	1	12	12	77				51.4
26	28.2	Sleeve	1	12	12	77				51.4

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
5SHL5405	999	999	999	999	29395.1	29395.1	Rodriguez	43.708	Cone
5SHL5706	999	999	999	999	92903.04	92903.04	Rodriguez	111.054	Cone
5SHL5707	999	999	999	999	92903.04	92903.04	Rodriguez	105.258	Cone
5SHL5708	999	999	999	999	92903.04	92903.04	Rodriguez	104.813	Cone
5SHL5709	999	999	999	999	92903.04	92903.04	Rodriguez	117.300	Cone
5SHL5710	999	999	999	999	92903.04	92903.04	Rodriguez	101.691	Cone
1.1	999	999	999	999	16200	32400	Hilti	26.94	Cone
1.2	999	999	999	999	16200	32400	Hilti	26.19	Cone
1.3	999	999	999	999	16200	32400	Hilti	26.67	Cone
1.4	999	999	999	999	16200	32400	Hilti	25.83	Cone
1.5	999	999	999	999	16200	32400	Hilti	23.58	Cone
21.1	999	999	999	999	16200	32400	Hilti	31.26	Cone
21.2	999	999	999	999	16200	32400	Hilti	29.84	Cone
21.3	999	999	999	999	16200	32400	Hilti	29.21	Cone
21.4	999	999	999	999	16200	32400	Hilti	30.2	Cone
21.5	999	999	999	999	16200	32400	Hilti	28.22	Cone
2.1	999	999	999	999	21424.5	42849	Hilti	39.95	Cone
2.2	999	999	999	999	21424.5	42849	Hilti	41.3	Cone
2.3	999	999	999	999	21424.5	42849	Hilti	36.55	Cone
2.4	999	999	999	999	21424.5	42849	Hilti	37.06	Cone
2.5	999	999	999	999	21424.5	42849	Hilti	42.73	Cone
2.6	999	999	999	999	21424.5	42849	Hilti	40.31	Cone
22.1	999	999	999	999	21424.5	42849	Hilti	36.5	Cone
22.2	999	999	999	999	21424.5	42849	Hilti	37.88	Cone
22.3	999	999	999	999	21424.5	42849	Hilti	37.53	Cone
22.4	999	999	999	999	21424.5	42849	Hilti	36.61	Cone
22.5	999	999	999	999	21424.5	42849	Hilti	38.27	Cone
3.1	999	999	999	999	26680.5	53361	Hilti	57.18	Cone
3.2	999	999	999	999	26680.5	53361	Hilti	54.03	Cone
3.3	999	999	999	999	26680.5	53361	Hilti	55.82	Cone
3.4	999	999	999	999	26680.5	53361	Hilti	54.66	Cone
3.5	999	999	999	999	26680.5	53361	Hilti	56.9	Cone
3.6	999	999	999	999	26680.5	53361	Hilti	45.92	Cone
8.6	999	999	999	999	26680.5	53361	Hilti	66.09	Cone
8.8	999	999	999	999	26680.5	53361	Hilti	71.24	Cone
8.1	999	999	999	999	26680.5	53361	Hilti	68.68	Cone
23.1	999	999	999	999	26680.5	53361	Hilti	59.79	Cone
23.2	999	999	999	999	26680.5	53361	Hilti	55.1	Cone
23.3	999	999	999	999	26680.5	53361	Hilti	53.04	Cone
23.4	999	999	999	999	26680.5	53361	Hilti	59	Cone
23.5	999	999	999	999	26680.5	53361	Hilti	55.11	Cone
28.1	999	999	999	999	26680.5	53361	Hilti	68.62	Cone
28.2	999	999	999	999	26680.5	53361	Hilti	74.6	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
5SHL5405	35924.42	1.22	34399.54	1.27	22573.49	1.94
5SHL5706	85154.18	1.30	91401.67	1.22	72617.36	1.53
5SHL5707	85154.18	1.24	91401.67	1.15	72617.36	1.45
5SHL5708	85154.18	1.23	91401.67	1.15	72617.36	1.44
5SHL5709	85154.18	1.38	91401.67	1.28	72617.36	1.62
5SHL5710	85154.18	1.19	91401.67	1.11	72617.36	1.40
1.1	38525.38	0.70	37305.86	0.72	25512.78	1.06
1.2	38525.38	0.68	37305.86	0.70	25512.78	1.03
1.3	38525.38	0.69	37305.86	0.71	25512.78	1.05
1.4	38525.38	0.67	37305.86	0.69	25512.78	1.01
1.5	38525.38	0.61	37305.86	0.63	25512.78	0.92
21.1	34091.56	0.92	33012.39	0.95	22576.56	1.38
21.2	34091.56	0.88	33012.39	0.90	22576.56	1.32
21.3	34091.56	0.86	33012.39	0.88	22576.56	1.29
21.4	34091.56	0.89	33012.39	0.91	22576.56	1.34
21.5	34091.56	0.83	33012.39	0.85	22576.56	1.25
2.1	47510.94	0.84	47434.64	0.84	34229.64	1.17
2.2	47510.94	0.87	47434.64	0.87	34229.64	1.21
2.3	47510.94	0.77	47434.64	0.77	34229.64	1.07
2.4	47510.94	0.78	47434.64	0.78	34229.64	1.08
2.5	47510.94	0.90	47434.64	0.90	34229.64	1.25
2.6	47510.94	0.85	47434.64	0.85	34229.64	1.18
22.1	42042.99	0.87	41975.47	0.87	30290.21	1.21
22.2	42042.99	0.90	41975.47	0.90	30290.21	1.25
22.3	42042.99	0.89	41975.47	0.89	30290.21	1.24
22.4	42042.99	0.87	41975.47	0.87	30290.21	1.21
22.5	42042.99	0.91	41975.47	0.91	30290.21	1.26
3.1	56008.78	1.02	57180.84	1.00	43200.46	1.32
3.2	56008.78	0.96	57180.84	0.94	43200.46	1.25
3.3	56008.78	1.00	57180.84	0.98	43200.46	1.29
3.4	56008.78	0.98	57180.84	0.96	43200.46	1.27
3.5	56008.78	1.02	57180.84	1.00	43200.46	1.32
3.6	56008.78	0.82	57180.84	0.80	43200.46	1.06
8.6	73502.26	0.90	75040.39	0.88	56693.46	1.17
8.8	73502.26	0.97	75040.39	0.95	56693.46	1.26
8.1	73502.26	0.93	75040.39	0.92	56693.46	1.21
23.1	49562.82	1.21	50599.99	1.18	38228.59	1.56
23.2	49562.82	1.11	50599.99	1.09	38228.59	1.44
23.3	49562.82	1.07	50599.99	1.05	38228.59	1.39
23.4	49562.82	1.19	50599.99	1.17	38228.59	1.54
23.5	49562.82	1.11	50599.99	1.09	38228.59	1.44
28.1	65311.81	1.05	66678.55	1.03	50376.04	1.36
28.2	65311.81	1.14	66678.55	1.12	50376.04	1.48

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number	Diameter	Outside Diameter	Embedment	Strength of Steel	Aggregate Diameter	Strength of Concrete	
			n	d (mm)	do/dh (mm)	hef (mm)	fy (MPa)	dagg (mm)	fc (MPa)	fcc200 (MPa)
26	28.3	Sleeve	1	12	12	77			51.4	
26	28.4	Sleeve	1	12	12	77			51.4	
26	28.5	Sleeve	1	12	12	77			51.4	
26	4.1	Sleeve	1	16	16	101			30.2	
26	4.2	Sleeve	1	16	16	101			30.2	
26	4.3	Sleeve	1	16	16	101			30.2	
26	4.4	Sleeve	1	16	16	101			30.2	
26	4.5	Sleeve	1	16	16	101			30.2	
26	4.6	Sleeve	1	16	16	101			30.2	
26	9.3	Sleeve	1	16	16	101			67.0	
26	9.7	Sleeve	1	16	16	101			67.0	
26	9.8	Sleeve	1	16	16	101			67.0	
26	9.1	Sleeve	1	16	16	101			67.0	
26	24.1	Sleeve	1	16	16	101			29.6	
26	24.2	Sleeve	1	16	16	101			29.6	
26	24.3	Sleeve	1	16	16	101			29.6	
26	24.4	Sleeve	1	16	16	101			29.6	
26	24.5	Sleeve	1	16	16	101			29.6	
26	29.1	Sleeve	1	16	16	101			51.4	
26	29.2	Sleeve	1	16	16	101			51.4	
26	29.3	Sleeve	1	16	16	101			51.4	
26	29.4	Sleeve	1	16	16	101			51.4	
26	29.5	Sleeve	1	16	16	101			51.4	
26	5.1	Sleeve	1	20	20	126			34.0	
26	5.2	Sleeve	1	20	20	126			34.0	
26	5.3	Sleeve	1	20	20	126			34.0	
26	5.4	Sleeve	1	20	20	126			34.0	
26	5.5	Sleeve	1	20	20	126			34.0	
26	5.6	Sleeve	1	20	20	126			34.0	
26	10.1	Sleeve	1	20	20	126			67.0	
26	10.2	Sleeve	1	20	20	126			67.0	
26	10.3	Sleeve	1	20	20	126			67.0	
26	10.4	Sleeve	1	20	20	126			67.0	
26	10.5	Sleeve	1	20	20	126			67.0	
26	10.7	Sleeve	1	20	20	126			67.0	
26	10.8	Sleeve	1	20	20	126			67.0	
26	10.9	Sleeve	1	20	20	126			67.0	
26	10.1	Sleeve	1	20	20	126			67.0	
26	25.1	Sleeve	1	20	20	126			29.6	
26	25.2	Sleeve	1	20	20	126			29.6	
26	25.3	Sleeve	1	20	20	126			29.6	
26	25.4	Sleeve	1	20	20	126			29.6	
26	25.5	Sleeve	1	20	20	126			29.6	

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
28.3	999	999	999	999	26680.5	53361	Hilti	73.68	Cone
28.4	999	999	999	999	26680.5	53361	Hilti	61.98	Cone
28.5	999	999	999	999	26680.5	53361	Hilti	68.66	Cone
4.1	999	999	999	999	45904.5	91809	Hilti	86.69	Cone
4.2	999	999	999	999	45904.5	91809	Hilti	87.18	Cone
4.3	999	999	999	999	45904.5	91809	Hilti	79.14	Cone
4.4	999	999	999	999	45904.5	91809	Hilti	101.76	Cone
4.5	999	999	999	999	45904.5	91809	Hilti	104.43	Cone
4.6	999	999	999	999	45904.5	91809	Hilti	98.76	Cone
9.3	999	999	999	999	45904.5	91809	Hilti	134.14	Cone
9.7	999	999	999	999	45904.5	91809	Hilti	128.88	Cone
9.8	999	999	999	999	45904.5	91809	Hilti	121.85	Cone
9.1	999	999	999	999	45904.5	91809	Hilti	133.1	Cone
24.1	999	999	999	999	45904.5	91809	Hilti	97.05	Cone
24.2	999	999	999	999	45904.5	91809	Hilti	91.91	Cone
24.3	999	999	999	999	45904.5	91809	Hilti	94.67	Cone
24.4	999	999	999	999	45904.5	91809	Hilti	94.87	Cone
24.5	999	999	999	999	45904.5	91809	Hilti	89.41	Cone
29.1	999	999	999	999	45904.5	91809	Hilti	130.02	Cone
29.2	999	999	999	999	45904.5	91809	Hilti	128.12	Cone
29.3	999	999	999	999	45904.5	91809	Hilti	136.88	Cone
29.4	999	999	999	999	45904.5	91809	Hilti	131.27	Cone
29.5	999	999	999	999	45904.5	91809	Hilti	129.31	Cone
5.1	999	999	999	999	71442	142884	Hilti	117.16	Cone
5.2	999	999	999	999	71442	142884	Hilti	109.19	Cone
5.3	999	999	999	999	71442	142884	Hilti	122.31	Cone
5.4	999	999	999	999	71442	142884	Hilti	155.73	Cone
5.5	999	999	999	999	71442	142884	Hilti	145.94	Cone
5.6	999	999	999	999	71442	142884	Hilti	156.38	Cone
10.1	999	999	999	999	71442	142884	Hilti	186	Cone
10.2	999	999	999	999	71442	142884	Hilti	187.07	Cone
10.3	999	999	999	999	71442	142884	Hilti	186.99	Cone
10.4	999	999	999	999	71442	142884	Hilti	187.4	Cone
10.5	999	999	999	999	71442	142884	Hilti	171.1	Cone
10.7	999	999	999	999	71442	142884	Hilti	189.11	Cone
10.8	999	999	999	999	71442	142884	Hilti	191.37	Cone
10.9	999	999	999	999	71442	142884	Hilti	167.13	Cone
10.1	999	999	999	999	71442	142884	Hilti	182.56	Cone
25.1	999	999	999	999	71442	142884	Hilti	149.14	Cone
25.2	999	999	999	999	71442	142884	Hilti	142.08	Cone
25.3	999	999	999	999	71442	142884	Hilti	147.4	Cone
25.4	999	999	999	999	71442	142884	Hilti	142.25	Cone
25.5	999	999	999	999	71442	142884	Hilti	141.99	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
28.3	65311.81	1.13	66678.55	1.11	50376.04	1.46
28.4	65311.81	0.95	66678.55	0.93	50376.04	1.23
28.5	65311.81	1.05	66678.55	1.03	50376.04	1.36
4.1	75207.24	1.15	80645.99	1.07	66644.29	1.30
4.2	75207.24	1.16	80645.99	1.08	66644.29	1.31
4.3	75207.24	1.05	80645.99	0.98	66644.29	1.19
4.4	75207.24	1.35	80645.99	1.26	66644.29	1.53
4.5	75207.24	1.39	80645.99	1.29	66644.29	1.57
4.6	75207.24	1.31	80645.99	1.22	66644.29	1.48
9.3	112019.48	1.20	120120.38	1.12	99265.17	1.35
9.7	112019.48	1.15	120120.38	1.07	99265.17	1.30
9.8	112019.48	1.09	120120.38	1.01	99265.17	1.23
9.1	112019.48	1.19	120120.38	1.11	99265.17	1.34
24.1	74456.40	1.30	79840.85	1.22	65978.94	1.47
24.2	74456.40	1.23	79840.85	1.15	65978.94	1.39
24.3	74456.40	1.27	79840.85	1.19	65978.94	1.43
24.4	74456.40	1.27	79840.85	1.19	65978.94	1.44
24.5	74456.40	1.20	79840.85	1.12	65978.94	1.36
29.1	98115.52	1.33	105210.93	1.24	86944.29	1.50
29.2	98115.52	1.31	105210.93	1.22	86944.29	1.47
29.3	98115.52	1.40	105210.93	1.30	86944.29	1.57
29.4	98115.52	1.34	105210.93	1.25	86944.29	1.51
29.5	98115.52	1.32	105210.93	1.23	86944.29	1.49
5.1	111190.93	1.05	123352.86	0.95	108682.30	1.08
5.2	111190.93	0.98	123352.86	0.89	108682.30	1.00
5.3	111190.93	1.10	123352.86	0.99	108682.30	1.13
5.4	111190.93	1.40	123352.86	1.26	108682.30	1.43
5.5	111190.93	1.31	123352.86	1.18	108682.30	1.34
5.6	111190.93	1.41	123352.86	1.27	108682.30	1.44
10.1	156087.21	1.19	173159.84	1.07	152565.66	1.22
10.2	156087.21	1.20	173159.84	1.08	152565.66	1.23
10.3	156087.21	1.20	173159.84	1.08	152565.66	1.23
10.4	156087.21	1.20	173159.84	1.08	152565.66	1.23
10.5	156087.21	1.10	173159.84	0.99	152565.66	1.12
10.7	156087.21	1.21	173159.84	1.09	152565.66	1.24
10.8	156087.21	1.23	173159.84	1.11	152565.66	1.25
10.9	156087.21	1.07	173159.84	0.97	152565.66	1.10
10.1	156087.21	1.17	173159.84	1.05	152565.66	1.20
25.1	103747.05	1.44	115094.78	1.30	101406.37	1.47
25.2	103747.05	1.37	115094.78	1.23	101406.37	1.40
25.3	103747.05	1.42	115094.78	1.28	101406.37	1.45
25.4	103747.05	1.37	115094.78	1.24	101406.37	1.40
25.5	103747.05	1.37	115094.78	1.23	101406.37	1.40

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number	Diameter	Outside Diameter	Embedment	Strength of Steel	Aggregate Diameter	Strength of Concrete	
			n	d (mm)	do/dh (mm)	hef (mm)	fy (MPa)	dagg (mm)	fc (MPa)	fcc200 (MPa)
26	30.1	Sleeve	1	20	20	126				51.4
26	30.2	Sleeve	1	20	20	126				51.4
26	30.3	Sleeve	1	20	20	126				51.4
26	30.4	Sleeve	1	20	20	126				51.4
26	30.5	Sleeve	1	20	20	126				51.4
26	41.1	Sleeve	1	24	24	148				26.4
26	41.2	Sleeve	1	24	24	148				26.4
26	41.3	Sleeve	1	24	24	148				26.4
26	41.4	Sleeve	1	24	24	148				26.4
26	41.5	Sleeve	1	24	24	148				26.4
26	41.6	Sleeve	1	24	24	148				26.4
26	41.7	Sleeve	1	24	24	148				26.4
26	42.1	Sleeve	1	24	24	148				62.1
26	42.2	Sleeve	1	24	24	148				62.1
26	42.3	Sleeve	1	24	24	148				62.1
26	42.4	Sleeve	1	24	24	148				62.1
26	42.5	Sleeve	1	24	24	148				62.1
26	42.6	Sleeve	1	24	24	148				62.1
26	42.7	Sleeve	1	24	24	148				62.1
26	42.8	Sleeve	1	24	24	148				62.1
26	42.9	Sleeve	1	24	24	148				62.1
26	42.1	Sleeve	1	24	24	148				62.1
26	45.2	Sleeve	1	24	24	148				28.2
26	45.3	Sleeve	1	24	24	148				28.2
26	45.4	Sleeve	1	24	24	148				28.2
26	45.5	Sleeve	1	24	24	148				28.2
26	46.1	Sleeve	1	24	24	148				76.0
26	46.2	Sleeve	1	24	24	148				50.0
26	46.3	Sleeve	1	24	24	148				50.0
26	46.6	Sleeve	1	24	24	148	0	0		72.0
26	1.1	Expansion	1	8	8	46				29.4
26	1.2	Expansion	1	8	8	46				29.4
26	1.3	Expansion	1	8	8	46				29.4
26	1.5	Expansion	1	8	8	46				29.4
26	3.3	Expansion	1	8	8	46				59.0
26	3.4	Expansion	1	8	8	46				28.0
26	3.5	Expansion	1	8	8	46				28.0
26	5.1	Expansion	1	8	8	46				43.1
26	6.1	Expansion	1	8	8	46				33.0
26	6.2	Expansion	1	8	8	46				33.0
26	6.3	Expansion	1	8	8	46				33.0
26	6.4	Expansion	1	8	8	46				33.0
26	6.5	Expansion	1	8	8	46				33.0

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
30.1	999	999	999	999	71442	142884	Hilti	164.77	Cone
30.2	999	999	999	999	71442	142884	Hilti	169.58	Cone
30.3	999	999	999	999	71442	142884	Hilti	167.45	Cone
30.4	999	999	999	999	71442	142884	Hilti	166.93	Cone
30.5	999	999	999	999	71442	142884	Hilti	168.15	Cone
41.1	999	999	999	999	98568	197136	Hilti	111.86	Cone
41.2	999	999	999	999	98568	197136	Hilti	117.05	Cone
41.3	999	999	999	999	98568	197136	Hilti	102.81	Cone
41.4	999	999	999	999	98568	197136	Hilti	95.32	Cone
41.5	999	999	999	999	98568	197136	Hilti	102.26	Cone
41.6	999	999	999	999	98568	197136	Hilti	121.73	Cone
41.7	999	999	999	999	98568	197136	Hilti	108.87	Cone
42.1	999	999	999	999	98568	197136	Hilti	174.8	Cone
42.2	999	999	999	999	98568	197136	Hilti	184.1	Cone
42.3	999	999	999	999	98568	197136	Hilti	171	Cone
42.4	999	999	999	999	98568	197136	Hilti	165.9	Cone
42.5	999	999	999	999	98568	197136	Hilti	156.8	Cone
42.6	999	999	999	999	98568	197136	Hilti	159.9	Cone
42.7	999	999	999	999	98568	197136	Hilti	179.2	Cone
42.8	999	999	999	999	98568	197136	Hilti	166.3	Cone
42.9	999	999	999	999	98568	197136	Hilti	157.3	Cone
42.1	999	999	999	999	98568	197136	Hilti	185.5	Cone
45.2	999	999	999	999	98568	197136	Hilti	143.32	Cone
45.3	999	999	999	999	98568	197136	Hilti	120.48	Cone
45.4	999	999	999	999	98568	197136	Hilti	132.46	Cone
45.5	999	999	999	999	98568	197136	Hilti	123.67	Cone
46.1	999	999	999	999	98568	197136	Hilti	223.22	Cone
46.2	999	999	999	999	98568	197136	Hilti	217.46	Cone
46.3	999	999	999	999	98568	197136	Hilti	242.39	Cone
46.6	999	999	999	999	98568	197136	Hilti	244.63	Cone
1.1	999	999	999	999	9522	19044	Hilti	14.9	Cone
1.2	999	999	999	999	9522	19044	Hilti	15	Cone
1.3	999	999	999	999	9522	19044	Hilti	15.3	Cone
1.5	999	999	999	999	9522	19044	Hilti	15.8	Cone
3.3	999	999	999	999	9522	19044	Hilti	22.7	Cone
3.4	999	999	999	999	9522	19044	Hilti	18.5	Cone
3.5	999	999	999	999	9522	19044	Hilti	18.8	Cone
5.1	999	999	999	999	9522	19044	Hilti	23.3	Cone
6.1	999	999	999	999	9522	19044	Hilti	17.8	Cone
6.2	999	999	999	999	9522	19044	Hilti	18	Cone
6.3	999	999	999	999	9522	19044	Hilti	18.3	Cone
6.4	999	999	999	999	9522	19044	Hilti	18.3	Cone
6.5	999	999	999	999	9522	19044	Hilti	17.3	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
30.1	136713.52	1.21	151667.08	1.09	133629.07	1.23
30.2	136713.52	1.24	151667.08	1.12	133629.07	1.27
30.3	136713.52	1.22	151667.08	1.10	133629.07	1.25
30.4	136713.52	1.22	151667.08	1.10	133629.07	1.25
30.5	136713.52	1.23	151667.08	1.11	133629.07	1.26
41.1	124729.34	0.90	141389.71	0.79	131481.39	0.85
41.2	124729.34	0.94	141389.71	0.83	131481.39	0.89
41.3	124729.34	0.82	141389.71	0.73	131481.39	0.78
41.4	124729.34	0.76	141389.71	0.67	131481.39	0.72
41.5	124729.34	0.82	141389.71	0.72	131481.39	0.78
41.6	124729.34	0.98	141389.71	0.86	131481.39	0.93
41.7	124729.34	0.87	141389.71	0.77	131481.39	0.83
42.1	191298.90	0.91	216851.11	0.81	201654.60	0.87
42.2	191298.90	0.96	216851.11	0.85	201654.60	0.91
42.3	191298.90	0.89	216851.11	0.79	201654.60	0.85
42.4	191298.90	0.87	216851.11	0.77	201654.60	0.82
42.5	191298.90	0.82	216851.11	0.72	201654.60	0.78
42.6	191298.90	0.84	216851.11	0.74	201654.60	0.79
42.7	191298.90	0.94	216851.11	0.83	201654.60	0.89
42.8	191298.90	0.87	216851.11	0.77	201654.60	0.82
42.9	191298.90	0.82	216851.11	0.73	201654.60	0.78
42.1	191298.90	0.97	216851.11	0.86	201654.60	0.92
45.2	128911.37	1.11	146130.34	0.98	135889.81	1.05
45.3	128911.37	0.93	146130.34	0.82	135889.81	0.89
45.4	128911.37	1.03	146130.34	0.91	135889.81	0.97
45.5	128911.37	0.96	146130.34	0.85	135889.81	0.91
46.1	211628.17	1.05	239895.80	0.93	223084.36	1.00
46.2	171653.11	1.27	194581.19	1.12	180945.31	1.20
46.3	171653.11	1.41	194581.19	1.25	180945.31	1.34
46.6	205983.73	1.19	233497.42	1.05	217134.38	1.13
1.1	22807.86	0.65	20700.40	0.72	13895.93	1.07
1.2	22807.86	0.66	20700.40	0.72	13895.93	1.08
1.3	22807.86	0.67	20700.40	0.74	13895.93	1.10
1.5	22807.86	0.69	20700.40	0.76	13895.93	1.14
3.3	32309.99	0.70	29324.53	0.77	19685.21	1.15
3.4	22258.19	0.83	20201.52	0.92	13561.04	1.36
3.5	22258.19	0.84	20201.52	0.93	13561.04	1.39
5.1	27615.28	0.84	25063.61	0.93	16824.90	1.38
6.1	24163.94	0.74	21931.18	0.81	14722.14	1.21
6.2	24163.94	0.74	21931.18	0.82	14722.14	1.22
6.3	24163.94	0.76	21931.18	0.83	14722.14	1.24
6.4	24163.94	0.76	21931.18	0.83	14722.14	1.24
6.5	24163.94	0.72	21931.18	0.79	14722.14	1.18

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number	Diameter	Outside Diameter	Embedment	Strength of Steel	Aggregate Diameter	Strength of Concrete	
			n	d (mm)	do/dh (mm)	hef (mm)	fy (MPa)	dagg (mm)	fc (MPa)	fcc200 (MPa)
26	6.6	Expansion	1	8	8	46			33.0	
26	6.7	Expansion	1	8	8	46			33.0	
26	6.8	Expansion	1	8	8	46			33.0	
26	6.9	Expansion	1	8	8	46			33.0	
26	6.1	Expansion	1	8	8	46			33.0	
26	7.6	Expansion	1	10	10	58			29.2	
26	8.1	Expansion	1	10	10	58			60.0	
26	10.1	Expansion	1	10	10	58			59.0	
26	10.2	Expansion	1	10	10	58			59.0	
26	11.11	Expansion	1	10	10	58			28.0	
26	11.4	Expansion	1	10	10	58			28.0	
26	14.3	Expansion	1	10	10	58			28.5	
26	14.5	Expansion	1	10	10	58			28.5	
26	14.6	Expansion	1	10	10	58			28.5	
26	14.8	Expansion	1	10	10	58			28.5	
26	14.9	Expansion	1	10	10	58			28.5	
26	14.12	Expansion	1	10	10	58			28.5	
26	14.13	Expansion	1	10	10	58			28.5	
26	14.15	Expansion	1	10	10	58			28.5	
26	14.16	Expansion	1	10	10	58			28.5	
26	14.18	Expansion	1	10	10	58			28.5	
26	15.4	Expansion	1	12	12	68			30.7	
26	15.5	Expansion	1	12	12	68			30.7	
26	15.6	Expansion	1	12	12	68			30.7	
26	15.7	Expansion	1	12	12	68			30.7	
26	16.1	Expansion	1	12	12	68			57.0	
26	16.2	Expansion	1	12	12	68			57.0	
26	17.2	Expansion	1	12	12	68			59.0	
26	18.3	Expansion	1	12	12	68			28.0	
26	18.5	Expansion	1	12	12	68			28.0	
26	18.6	Expansion	1	12	12	68			28.0	
26	18.7	Expansion	1	12	12	68			28.0	
26	18.8	Expansion	1	12	12	68			28.0	
26	18.9	Expansion	1	12	12	68			28.0	
26	18.1	Expansion	1	12	12	68			28.0	
26	19.3	Expansion	1	12	12	68			58.6	
26	19.4	Expansion	1	12	12	68			58.6	
26	19.5	Expansion	1	12	12	68			58.6	
26	20.2	Expansion	1	12	12	68			43.1	
26	20.3	Expansion	1	12	12	68			43.1	
26	20.4	Expansion	1	12	12	68			43.1	
26	20.5	Expansion	1	12	12	68			43.1	
26	21.1	Expansion	1	12	12	68			21.2	

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
6.6	999	999	999	999	9522	19044	Hilti	19.5	Cone
6.7	999	999	999	999	9522	19044	Hilti	18	Cone
6.8	999	999	999	999	9522	19044	Hilti	17.5	Cone
6.9	999	999	999	999	9522	19044	Hilti	19	Cone
6.1	999	999	999	999	9522	19044	Hilti	18	Cone
7.6	999	999	999	999	15138	30276	Hilti	20.6	Cone
8.1	999	999	999	999	15138	30276	Hilti	31.3	Cone
10.1	999	999	999	999	15138	30276	Hilti	28.3	Cone
10.2	999	999	999	999	15138	30276	Hilti	30.8	Cone
11.11	999	999	999	999	15138	30276	Hilti	18.3	Cone
11.4	999	999	999	999	15138	30276	Hilti	19.2	Cone
14.3	999	999	999	999	15138	30276	Hilti	25.4	Cone
14.5	999	999	999	999	15138	30276	Hilti	24.2	Cone
14.6	999	999	999	999	15138	30276	Hilti	31.4	Cone
14.8	999	999	999	999	15138	30276	Hilti	25.6	Cone
14.9	999	999	999	999	15138	30276	Hilti	24.1	Cone
14.12	999	999	999	999	15138	30276	Hilti	23.5	Cone
14.13	999	999	999	999	15138	30276	Hilti	26.5	Cone
14.15	999	999	999	999	15138	30276	Hilti	26.2	Cone
14.16	999	999	999	999	15138	30276	Hilti	26.3	Cone
14.18	999	999	999	999	15138	30276	Hilti	25.2	Cone
15.4	999	999	999	999	20808	41616	Hilti	28.8	Cone
15.5	999	999	999	999	20808	41616	Hilti	31.4	Cone
15.6	999	999	999	999	20808	41616	Hilti	29.9	Cone
15.7	999	999	999	999	20808	41616	Hilti	27.1	Cone
16.1	999	999	999	999	20808	41616	Hilti	41.5	Cone
16.2	999	999	999	999	20808	41616	Hilti	40	Cone
17.2	999	999	999	999	20808	41616	Hilti	47	Cone
18.3	999	999	999	999	20808	41616	Hilti	32.5	Cone
18.5	999	999	999	999	20808	41616	Hilti	33	Cone
18.6	999	999	999	999	20808	41616	Hilti	33.5	Cone
18.7	999	999	999	999	20808	41616	Hilti	34.5	Cone
18.8	999	999	999	999	20808	41616	Hilti	31	Cone
18.9	999	999	999	999	20808	41616	Hilti	36	Cone
18.1	999	999	999	999	20808	41616	Hilti	31.5	Cone
19.3	999	999	999	999	20808	41616	Hilti	47	Cone
19.4	999	999	999	999	20808	41616	Hilti	45.5	Cone
19.5	999	999	999	999	20808	41616	Hilti	46	Cone
20.2	999	999	999	999	20808	41616	Hilti	40	Cone
20.3	999	999	999	999	20808	41616	Hilti	42.5	Cone
20.4	999	999	999	999	20808	41616	Hilti	37.5	Cone
20.5	999	999	999	999	20808	41616	Hilti	34.5	Cone
21.1	999	999	999	999	20808	41616	Hilti	28	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
6.6	24163.94	0.81	21931.18	0.89	14722.14	1.32
6.7	24163.94	0.74	21931.18	0.82	14722.14	1.22
6.8	24163.94	0.72	21931.18	0.80	14722.14	1.19
6.9	24163.94	0.79	21931.18	0.87	14722.14	1.29
6.1	24163.94	0.74	21931.18	0.82	14722.14	1.22
7.6	32181.59	0.64	30921.50	0.67	21977.10	0.94
8.1	46130.88	0.68	44324.59	0.71	31503.19	0.99
10.1	45744.84	0.62	43953.67	0.64	31239.56	0.91
10.2	45744.84	0.67	43953.67	0.70	31239.56	0.99
11.11	31513.39	0.58	30279.46	0.60	21520.78	0.85
11.4	31513.39	0.61	30279.46	0.63	21520.78	0.89
14.3	31793.51	0.80	30548.62	0.83	21712.08	1.17
14.5	31793.51	0.76	30548.62	0.79	21712.08	1.11
14.6	31793.51	0.99	30548.62	1.03	21712.08	1.45
14.8	31793.51	0.81	30548.62	0.84	21712.08	1.18
14.9	31793.51	0.76	30548.62	0.79	21712.08	1.11
14.12	31793.51	0.74	30548.62	0.77	21712.08	1.08
14.13	31793.51	0.83	30548.62	0.87	21712.08	1.22
14.15	31793.51	0.82	30548.62	0.86	21712.08	1.21
14.16	31793.51	0.83	30548.62	0.86	21712.08	1.21
14.18	31793.51	0.79	30548.62	0.82	21712.08	1.16
15.4	41889.64	0.69	41693.76	0.69	31124.66	0.93
15.5	41889.64	0.75	41693.76	0.75	31124.66	1.01
15.6	41889.64	0.71	41693.76	0.72	31124.66	0.96
15.7	41889.64	0.65	41693.76	0.65	31124.66	0.87
16.1	57078.81	0.73	56811.89	0.73	42410.45	0.98
16.2	57078.81	0.70	56811.89	0.70	42410.45	0.94
17.2	58071.56	0.81	57800.00	0.81	43148.08	1.09
18.3	40005.20	0.81	39818.13	0.82	29724.50	1.09
18.5	40005.20	0.82	39818.13	0.83	29724.50	1.11
18.6	40005.20	0.84	39818.13	0.84	29724.50	1.13
18.7	40005.20	0.86	39818.13	0.87	29724.50	1.16
18.8	40005.20	0.77	39818.13	0.78	29724.50	1.04
18.9	40005.20	0.90	39818.13	0.90	29724.50	1.21
18.1	40005.20	0.79	39818.13	0.79	29724.50	1.06
19.3	57874.37	0.81	57603.73	0.82	43001.57	1.09
19.4	57874.37	0.79	57603.73	0.79	43001.57	1.06
19.5	57874.37	0.79	57603.73	0.80	43001.57	1.07
20.2	49633.64	0.81	49401.54	0.81	36878.57	1.08
20.3	49633.64	0.86	49401.54	0.86	36878.57	1.15
20.4	49633.64	0.76	49401.54	0.76	36878.57	1.02
20.5	49633.64	0.70	49401.54	0.70	36878.57	0.94
21.1	34810.11	0.80	34647.33	0.81	25864.46	1.08

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Data Source	Test Number	Anchor					Concrete		
		Type	Number	Diameter	Outside Diameter	Embedment	Strength of Steel	Aggregate Diameter	Strength of Concrete
			n	d (mm)	do/dh (mm)	hef (mm)	fy (MPa)	dagg (mm)	fc (MPa) fcc200 (MPa)
26	21.2	Expansion	1	12	12	68		21.2	
26	21.3	Expansion	1	12	12	68		21.2	
26	21.5	Expansion	1	12	12	68		21.2	
26	21.8	Expansion	1	12	12	68		21.2	
26	21.1	Expansion	1	12	12	68		21.2	
26	22.1	Expansion	1	12	12	68		28.5	
26	22.2	Expansion	1	12	12	68		28.5	
26	22.3	Expansion	1	12	12	68		28.5	
26	22.4	Expansion	1	12	12	68		28.5	
26	22.5	Expansion	1	12	12	68		28.5	
26	23.1	Expansion	1	12	12	68		20.2	
26	23.2	Expansion	1	12	12	68		20.2	
26	23.3	Expansion	1	12	12	68		20.2	
26	23.4	Expansion	1	12	12	68		20.2	
26	23.5	Expansion	1	12	12	68		20.2	
26	26.1	Expansion	1	16	16	82		48.5	
26	26.2	Expansion	1	16	16	82		48.5	
26	26.4	Expansion	1	16	16	82		48.5	
26	27.3	Expansion	1	16	16	82		45.0	
26	28.1	Expansion	1	16	16	82		56.0	
26	30.1	Expansion	1	16	16	82		58.6	
26	31.1	Expansion	1	16	16	82		44.5	
26	31.2	Expansion	1	16	16	82		44.5	
26	32.1	Expansion	1	16	16	82		33.0	
26	32.3	Expansion	1	16	16	82		33.0	
26	32.5	Expansion	1	16	16	82		33.0	
26	33.2	Expansion	1	20	20	101		29.6	
26	33.5	Expansion	1	20	20	101		29.6	
26	33.6	Expansion	1	20	20	101		29.6	
26	33.7	Expansion	1	20	20	101		29.6	
26	35.1	Expansion	1	20	20	101		57.0	
26	35.2	Expansion	1	20	20	101		57.0	
26	35.3	Expansion	1	20	20	101		57.0	
26	35.4	Expansion	1	20	20	101		57.0	
26	35.5	Expansion	1	20	20	101		57.0	
26	38.1	Expansion	1	20	20	101		24.0	
26	38.2	Expansion	1	20	20	101		24.0	
26	38.3	Expansion	1	20	20	101		24.0	
26	38.4	Expansion	1	20	20	101		24.0	
26	38.5	Expansion	1	20	20	101		24.0	
26	39.4	Expansion	1	20	20	101		49.3	
26	39.6	Expansion	1	20	20	101		49.3	
26	39.7	Expansion	1	20	20	101		49.3	

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
21.2	999	999	999	999	20808	41616	Hilti	30	Cone
21.3	999	999	999	999	20808	41616	Hilti	28	Cone
21.5	999	999	999	999	20808	41616	Hilti	32.5	Cone
21.8	999	999	999	999	20808	41616	Hilti	30	Cone
21.1	999	999	999	999	20808	41616	Hilti	28	Cone
22.1	999	999	999	999	20808	41616	Hilti	36.2	Cone
22.2	999	999	999	999	20808	41616	Hilti	34.9	Cone
22.3	999	999	999	999	20808	41616	Hilti	36.2	Cone
22.4	999	999	999	999	20808	41616	Hilti	34	Cone
22.5	999	999	999	999	20808	41616	Hilti	39.9	Cone
23.1	999	999	999	999	20808	41616	Hilti	29.2	Cone
23.2	999	999	999	999	20808	41616	Hilti	30.6	Cone
23.3	999	999	999	999	20808	41616	Hilti	29.2	Cone
23.4	999	999	999	999	20808	41616	Hilti	30	Cone
23.5	999	999	999	999	20808	41616	Hilti	25.6	Cone
26.1	999	999	999	999	30258	60516	Hilti	72	Cone
26.2	999	999	999	999	30258	60516	Hilti	71.5	Cone
26.4	999	999	999	999	30258	60516	Hilti	64.5	Cone
27.3	999	999	999	999	30258	60516	Hilti	62.5	Cone
28.1	999	999	999	999	30258	60516	Hilti	73.5	Cone
30.1	999	999	999	999	30258	60516	Hilti	74	Cone
31.1	999	999	999	999	30258	60516	Hilti	71.5	Cone
31.2	999	999	999	999	30258	60516	Hilti	67.8	Cone
32.1	999	999	999	999	30258	60516	Hilti	48.8	Cone
32.3	999	999	999	999	30258	60516	Hilti	50	Cone
32.5	999	999	999	999	30258	60516	Hilti	55	Cone
33.2	999	999	999	999	45904.5	91809	Hilti	76.1	Cone
33.5	999	999	999	999	45904.5	91809	Hilti	69	Cone
33.6	999	999	999	999	45904.5	91809	Hilti	64.6	Cone
33.7	999	999	999	999	45904.5	91809	Hilti	67.5	Cone
35.1	999	999	999	999	45904.5	91809	Hilti	108	Cone
35.2	999	999	999	999	45904.5	91809	Hilti	103	Cone
35.3	999	999	999	999	45904.5	91809	Hilti	97	Cone
35.4	999	999	999	999	45904.5	91809	Hilti	95	Cone
35.5	999	999	999	999	45904.5	91809	Hilti	89.5	Cone
38.1	999	999	999	999	45904.5	91809	Hilti	67	Cone
38.2	999	999	999	999	45904.5	91809	Hilti	63	Cone
38.3	999	999	999	999	45904.5	91809	Hilti	58.5	Cone
38.4	999	999	999	999	45904.5	91809	Hilti	70	Cone
38.5	999	999	999	999	45904.5	91809	Hilti	60	Cone
39.4	999	999	999	999	45904.5	91809	Hilti	106	Cone
39.6	999	999	999	999	45904.5	91809	Hilti	94	Cone
39.7	999	999	999	999	45904.5	91809	Hilti	97	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
21.2	34810.11	0.86	34647.33	0.87	25864.46	1.16
21.3	34810.11	0.80	34647.33	0.81	25864.46	1.08
21.5	34810.11	0.93	34647.33	0.94	25864.46	1.26
21.8	34810.11	0.86	34647.33	0.87	25864.46	1.16
21.1	34810.11	0.80	34647.33	0.81	25864.46	1.08
22.1	40360.81	0.90	40172.07	0.90	29988.72	1.21
22.2	40360.81	0.86	40172.07	0.87	29988.72	1.16
22.3	40360.81	0.90	40172.07	0.90	29988.72	1.21
22.4	40360.81	0.84	40172.07	0.85	29988.72	1.13
22.5	40360.81	0.99	40172.07	0.99	29988.72	1.33
23.1	33979.20	0.86	33820.30	0.86	25247.08	1.16
23.2	33979.20	0.90	33820.30	0.90	25247.08	1.21
23.3	33979.20	0.86	33820.30	0.86	25247.08	1.16
23.4	33979.20	0.88	33820.30	0.89	25247.08	1.19
23.5	33979.20	0.75	33820.30	0.76	25247.08	1.01
26.1	69721.34	1.03	72050.44	1.00	58145.85	1.24
26.2	69721.34	1.03	72050.44	0.99	58145.85	1.23
26.4	69721.34	0.93	72050.44	0.90	58145.85	1.11
27.3	67158.52	0.93	69402.00	0.90	56008.52	1.12
28.1	74918.47	0.98	77421.18	0.95	62480.12	1.18
30.1	76637.92	0.97	79198.06	0.93	63914.09	1.16
31.1	66784.38	1.07	69015.36	1.04	55696.49	1.28
31.2	66784.38	1.02	69015.36	0.98	55696.49	1.22
32.1	57511.12	0.85	59432.32	0.82	47962.83	1.02
32.3	57511.12	0.87	59432.32	0.84	47962.83	1.04
32.5	57511.12	0.96	59432.32	0.93	47962.83	1.15
33.2	74456.40	1.02	79840.85	0.95	68090.27	1.12
33.5	74456.40	0.93	79840.85	0.86	68090.27	1.01
33.6	74456.40	0.87	79840.85	0.81	68090.27	0.95
33.7	74456.40	0.91	79840.85	0.85	68090.27	0.99
35.1	103322.19	1.05	110794.12	0.97	94487.99	1.14
35.2	103322.19	1.00	110794.12	0.93	94487.99	1.09
35.3	103322.19	0.94	110794.12	0.88	94487.99	1.03
35.4	103322.19	0.92	110794.12	0.86	94487.99	1.01
35.5	103322.19	0.87	110794.12	0.81	94487.99	0.95
38.1	67044.29	1.00	71892.72	0.93	61311.91	1.09
38.2	67044.29	0.94	71892.72	0.88	61311.91	1.03
38.3	67044.29	0.87	71892.72	0.81	61311.91	0.95
38.4	67044.29	1.04	71892.72	0.97	61311.91	1.14
38.5	67044.29	0.89	71892.72	0.83	61311.91	0.98
39.4	96090.32	1.10	103039.26	1.03	87874.46	1.21
39.6	96090.32	0.98	103039.26	0.91	87874.46	1.07
39.7	96090.32	1.01	103039.26	0.94	87874.46	1.10

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa) fcc200 (MPa)	
26	40.3	Expansion	1	20	20	101				44.5
26	40.4	Expansion	1	20	20	101				44.5
26	40.5	Expansion	1	20	20	101				44.5
26	42.1	Expansion	1	24	24	125				34.7
26	42.2	Expansion	1	24	24	125				34.7
26	42.3	Expansion	1	24	24	125				34.7
26	42.4	Expansion	1	24	24	125				34.7
26	42.5	Expansion	1	24	24	125				34.7
26	43.1	Expansion	1	24	24	125				26.4
26	46.4	Expansion	1	24	24	125				27.0
26	73.1	Expansion	1	8	8	46				29.6
26	73.2	Expansion	1	8	8	46				29.6
26	73.3	Expansion	1	8	8	46				29.6
26	73.4	Expansion	1	8	8	46				29.6
26	75.1	Expansion	1	8	8	46				29.6
26	75.2	Expansion	1	8	8	46				29.6
26	76.1	Expansion	1	8	8	46				27.9
26	77.4	Expansion	1	10	10	53				28.8
26	77.5	Expansion	1	10	10	53				28.8
26	79.1	Expansion	1	10	10	53				28.8
26	79.2	Expansion	1	10	10	53				28.8
26	80.1	Expansion	1	10	10	53				50.2
26	80.2	Expansion	1	10	10	53				50.2
26	80.3	Expansion	1	10	10	53				50.2
26	81.1	Expansion	1	12	12	68				29.6
26	81.2	Expansion	1	12	12	68				29.6
26	81.3	Expansion	1	12	12	68				29.6
26	81.4	Expansion	1	12	12	68				29.6
26	81.5	Expansion	1	12	12	68				29.6
26	81.6	Expansion	1	12	12	68				29.6
26	81.7	Expansion	1	12	12	68				29.6
26	81.8	Expansion	1	12	12	68				29.6
26	81.9	Expansion	1	12	12	68				29.6
26	81.1	Expansion	1	12	12	68				29.6
26	83.1	Expansion	1	12	12	68				29.6
26	83.2	Expansion	1	12	12	68				29.6
26	84.1	Expansion	1	12	12	68				55.9
26	85.4	Expansion	1	12	12	68				55.0
26	85.5	Expansion	1	12	12	68				55.0
26	87.1	Expansion	1	16	16	82				26.7
26	87.2	Expansion	1	16	16	82				26.7
26	87.3	Expansion	1	16	16	82				26.7
26	87.4	Expansion	1	16	16	82				26.7

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (≤ 188 mm), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)		Ultimate Load Nu (kN)	Failure Mode
40.3	999	999	999	999	45904.5	91809	Hilti	94	Cone
40.4	999	999	999	999	45904.5	91809	Hilti	94	Cone
40.5	999	999	999	999	45904.5	91809	Hilti	90.5	Cone
42.1	999	999	999	999	70312.5	140625	Hilti	91.3	Cone
42.2	999	999	999	999	70312.5	140625	Hilti	75	Cone
42.3	999	999	999	999	70312.5	140625	Hilti	93	Cone
42.4	999	999	999	999	70312.5	140625	Hilti	82.1	Cone
42.5	999	999	999	999	70312.5	140625	Hilti	89.1	Cone
43.1	999	999	999	999	70312.5	140625	Hilti	105.4	Cone
46.4	999	999	999	999	70312.5	140625	Hilti	89	Cone
73.1	999	999	999	999	9522	19044	Hilti	18.9	Cone
73.2	999	999	999	999	9522	19044	Hilti	20.2	Cone
73.3	999	999	999	999	9522	19044	Hilti	20.5	Cone
73.4	999	999	999	999	9522	19044	Hilti	20.4	Cone
75.1	999	999	999	999	9522	19044	Hilti	18.4	Cone
75.2	999	999	999	999	9522	19044	Hilti	18.9	Cone
76.1	999	999	999	999	9522	19044	Hilti	19.3	Cone
77.4	999	999	999	999	12640.5	25281	Hilti	27	Cone
77.5	999	999	999	999	12640.5	25281	Hilti	27.8	Cone
79.1	999	999	999	999	12640.5	25281	Hilti	24.2	Cone
79.2	999	999	999	999	12640.5	25281	Hilti	23.2	Cone
80.1	999	999	999	999	12640.5	25281	Hilti	34	Cone
80.2	999	999	999	999	12640.5	25281	Hilti	34.8	Cone
80.3	999	999	999	999	12640.5	25281	Hilti	34.3	Cone
81.1	999	999	999	999	20808	41616	Hilti	38.5	Cone
81.2	999	999	999	999	20808	41616	Hilti	39.5	Cone
81.3	999	999	999	999	20808	41616	Hilti	32.3	Cone
81.4	999	999	999	999	20808	41616	Hilti	34.7	Cone
81.5	999	999	999	999	20808	41616	Hilti	38.4	Cone
81.6	999	999	999	999	20808	41616	Hilti	37.1	Cone
81.7	999	999	999	999	20808	41616	Hilti	37.8	Cone
81.8	999	999	999	999	20808	41616	Hilti	37.9	Cone
81.9	999	999	999	999	20808	41616	Hilti	36.3	Cone
81.1	999	999	999	999	20808	41616	Hilti	34.5	Cone
83.1	999	999	999	999	20808	41616	Hilti	28.1	Cone
83.2	999	999	999	999	20808	41616	Hilti	33.1	Cone
84.1	999	999	999	999	20808	41616	Hilti	46	Cone
85.4	999	999	999	999	20808	41616	Hilti	42	Cone
85.5	999	999	999	999	20808	41616	Hilti	42	Cone
87.1	999	999	999	999	30258	60516	Hilti	47.3	Cone
87.2	999	999	999	999	30258	60516	Hilti	48	Cone
87.3	999	999	999	999	30258	60516	Hilti	49.2	Cone
87.4	999	999	999	999	30258	60516	Hilti	50.7	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
40.3	91292.72	1.03	97894.72	0.96	83487.07	1.13
40.4	91292.72	1.03	97894.72	0.96	83487.07	1.13
40.5	91292.72	0.99	97894.72	0.92	83487.07	1.08
42.1	110995.11	0.82	122995.93	0.74	111045.90	0.82
42.2	110995.11	0.68	122995.93	0.61	111045.90	0.68
42.3	110995.11	0.84	122995.93	0.76	111045.90	0.84
42.4	110995.11	0.74	122995.93	0.67	111045.90	0.74
42.5	110995.11	0.80	122995.93	0.72	111045.90	0.80
43.1	96814.65	1.09	107282.28	0.98	96858.95	1.09
46.4	97908.64	0.91	108494.54	0.82	97953.43	0.91
73.1	22885.30	0.83	20770.69	0.91	13943.11	1.36
73.2	22885.30	0.88	20770.69	0.97	13943.11	1.45
73.3	22885.30	0.90	20770.69	0.99	13943.11	1.47
73.4	22885.30	0.89	20770.69	0.98	13943.11	1.46
75.1	22885.30	0.80	20770.69	0.89	13943.11	1.32
75.2	22885.30	0.83	20770.69	0.91	13943.11	1.36
76.1	22218.41	0.87	20165.41	0.96	13536.80	1.43
77.4	27917.99	0.97	26257.56	1.03	18578.44	1.45
77.5	27917.99	1.00	26257.56	1.06	18578.44	1.50
79.1	27917.99	0.87	26257.56	0.92	18578.44	1.30
79.2	27917.99	0.83	26257.56	0.88	18578.44	1.25
80.1	36858.68	0.92	34666.50	0.98	24528.15	1.39
80.2	36858.68	0.94	34666.50	1.00	24528.15	1.42
80.3	36858.68	0.93	34666.50	0.99	24528.15	1.40
81.1	41132.33	0.94	40939.99	0.94	30561.97	1.26
81.2	41132.33	0.96	40939.99	0.96	30561.97	1.29
81.3	41132.33	0.79	40939.99	0.79	30561.97	1.06
81.4	41132.33	0.84	40939.99	0.85	30561.97	1.14
81.5	41132.33	0.93	40939.99	0.94	30561.97	1.26
81.6	41132.33	0.90	40939.99	0.91	30561.97	1.21
81.7	41132.33	0.92	40939.99	0.92	30561.97	1.24
81.8	41132.33	0.92	40939.99	0.93	30561.97	1.24
81.9	41132.33	0.88	40939.99	0.89	30561.97	1.19
81.1	41132.33	0.84	40939.99	0.84	30561.97	1.13
83.1	41132.33	0.68	40939.99	0.69	30561.97	0.92
83.2	41132.33	0.80	40939.99	0.81	30561.97	1.08
84.1	56525.36	0.81	56261.04	0.82	41999.24	1.10
85.4	56068.48	0.75	55806.29	0.75	41659.77	1.01
85.5	56068.48	0.75	55806.29	0.75	41659.77	1.01
87.1	51730.96	0.91	53459.07	0.88	43142.32	1.10
87.2	51730.96	0.93	53459.07	0.90	43142.32	1.11
87.3	51730.96	0.95	53459.07	0.92	43142.32	1.14
87.4	51730.96	0.98	53459.07	0.95	43142.32	1.18

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
26	89.2	Expansion	1	16	16	82			52.0	
26	89.4	Expansion	1	16	16	82			52.0	
26	89.5	Expansion	1	16	16	82			52.0	
26	90.1	Expansion	1	16	16	82			66.5	
26	91.1	Expansion	1	16	16	82			70.0	
26	92.1	Expansion	1	16	16	82			63.0	
26	93.1	Expansion	1	20	20	101			26.7	
26	93.4	Expansion	1	20	20	101			26.7	
26	93.5	Expansion	1	20	20	101			26.7	
26	93.6	Expansion	1	20	20	101			26.7	
26	93.7	Expansion	1	20	20	101			26.7	
26	95.3	Expansion	1	20	20	101			26.4	

Test Number	Geometry						Remarks	Test Results Ultimate Load Nu (kN)	Failure Failure Mode
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
89.2	999	999	999	999	30258	60516	Hilti	77.4	Cone
89.4	999	999	999	999	30258	60516	Hilti	75	Cone
89.5	999	999	999	999	30258	60516	Hilti	71.2	Cone
90.1	999	999	999	999	30258	60516	Hilti	66.5	Cone
91.1	999	999	999	999	30258	60516	Hilti	73	Cone
92.1	999	999	999	999	30258	60516	Hilti	75.5	Cone
93.1	999	999	999	999	45904.5	91809	Hilti	65.2	Cone
93.4	999	999	999	999	45904.5	91809	Hilti	67.1	Cone
93.5	999	999	999	999	45904.5	91809	Hilti	72.3	Cone
93.6	999	999	999	999	45904.5	91809	Hilti	67.1	Cone
93.7	999	999	999	999	45904.5	91809	Hilti	68.5	Cone
95.3	999	999	999	999	45904.5	91809	Hilti	68.5	Cone

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
89.2	72193.24	1.07	74604.91	1.04	60207.35	1.29
89.4	72193.24	1.04	74604.91	1.01	60207.35	1.25
89.5	72193.24	0.99	74604.91	0.95	60207.35	1.18
90.1	81640.51	0.81	84367.77	0.79	68086.13	0.98
91.1	83761.39	0.87	86559.51	0.84	69854.90	1.05
92.1	79463.04	0.95	82117.56	0.92	66270.17	1.14
93.1	70715.04	0.92	75828.93	0.86	64668.80	1.01
93.4	70715.04	0.95	75828.93	0.88	64668.80	1.04
93.5	70715.04	1.02	75828.93	0.95	64668.80	1.12
93.6	70715.04	0.95	75828.93	0.88	64668.80	1.04
93.7	70715.04	0.97	75828.93	0.90	64668.80	1.06
95.3	70316.64	0.97	75401.72	0.91	64304.47	1.07
	Mean =	0.981	Mean =	1.000	Mean =	1.356
	COV. =	0.197	COV. =	0.213	COV. =	0.266

**Single Anchors, Tension, Uncracked Concrete, Static Loading, Edge Effect,
Shallow Embedment (<=188mm)**

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa) fcc200 (MPa)	
3	GER1-07	E-DI	1	10	10	30		16	21.2	25.0
22	USA01-01	E-TW	1	6	6	34.2	544	25	15.8	18.6
22	USA01-02	E-TW	1	6	6	34.2	544	25	28.9	34.1
22	USA04-11	E-TW	1	8.9	8.9	34.2	483	25	15.8	18.6
22	USA04-12	E-TW	1	8.9	8.9	34.2	483	25	28.9	34.1
1	ENG1-03	E-TC	1	6	6	37		20	21.6	25.5
3	GER1-12	E-DI	1	12	12	37		16	21.2	25.0
3	GER1-13	E-DI	1	12	12	37		16	21.2	25.0
3	GER1-05	E-TC	1	10	10	38		16	21.2	25.0
22	USA04-19	E-TW	1	9.5	9.5	40	745	25	14.6	17.2
22	USA04-20	E-TW	1	9.5	9.5	40	565	25	14.6	17.2
3	GER1-11	E-TC	1	12	12	47		16	21.2	25.0
6	USA01-03	E-SD	1	12.7	12.7	51.6			20.7	24.4
6	USA01-04	E-SD	1	12.7	12.7	51.6			22.0	26.0
6	USA01-05	E-SD	1	12.7	12.7	51.6			20.7	24.4
3	GER1-21	E-SD	1	17	17	53		16	21.2	25.0
3	GER1-22	E-SD	1	17	17	53		16	21.2	25.0
3	GER1-16	E-TC	1	14	14	55		16	21.2	25.0
3	GER1-17	E-TC	1	14	14	55		16	21.2	25.0
3	GER1-10	E-TC	1	12	12	62		16	21.2	25.0
4	FRA1-01	E-TC	1	8	8	63.5	640		15.6	18.4
4	FRA1-02	E-TC	1	8	8	63.5	640		15.6	18.4
1	ENG1-01	E-TW	1	8	8	65	850	20	19.5	23.0
3	GER1-18	E-TC	1	16	16	67		16	21.2	25.0
3	GER1-19	E-TC	1	16	16	67		16	21.2	25.0
3	GER1-20	E-TC	1	16	16	75		16	21.2	25.0
6	USA01-06	E-SD	1	19	19	82.6			20.7	24.4
6	USA01-07	E-TC	1	19	19	82.6			20.7	24.4
6	USA01-08	E-SD	1	19	19	82.6			20.7	24.4
6	USA01-09	E-SD	1	19	19	82.6			25.5	30.1
6	USA01-10	E-TC	1	19	19	82.6			20.7	24.4
3	GER1-26	E-SD	1	25	25	83		16	21.2	25.0
3	GER1-27	E-SD	1	25	25	83		16	21.2	25.0
3	GER1-28	E-SD	1	25	25	83		16	21.2	25.0
3	GER1-23	E-TC	1	22	22	87		16	21.2	25.0
1	ENG1-02	E-TW	1	12	12	100	850	20	19.5	23.0
3	GER1-24	E-TC	1	24	24	100		16	21.2	25.0
3	GER1-25	E-TC	1	24	24	100		16	21.2	25.0
14	SWE03-07	E-TC	1	30	30	112	736		43.6	51.5
3	GER1-29	E-TC	1	28	28	125		16	21.2	25.0
14	SWE03-04	E-TC	1	27	27	134	736		26.2	30.9
14	SWE03-01	E-TC	1	27	27	142	736		26.2	30.9
7	GER1-30	E-TC	1	32	32	148		16	21.2	25.0

**Single Anchors, Tension, Uncracked Concrete, Static Loading, Edge Effect,
Shallow Embedment ($\leq 188\text{mm}$), (Continued)**

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)		Ultimate Load Nu (kN)	Failure Mode
GER1-07	40	999	999	999	7650	8100	UNKNOWN	6.7	Cone
USA01-01	32	999	999	999	8546.58	10526.76	UNKNOWN	7.4	Cone
USA01-02	32	999	999	999	8546.58	10526.76	UNKNOWN	7.6	Cone
USA04-11	48	999	999	999	10188.18	10526.76	UNKNOWN	8.9	Cone
USA04-12	48	999	999	999	10188.18	10526.76	UNKNOWN	10	Cone
ENG1-03	50	999	999	999	11710.5	12321	UNKNOWN	13	Cone
GER1-12	50	999	999	999	11710.5	12321	UNKNOWN	5.6	Cone
GER1-13	40	999	999	999	10600.5	12321	UNKNOWN	9.7	Cone
GER1-05	50	999	999	999	12198	12996	UNKNOWN	11.1	Cone
USA04-19	57	999	999	999	14040	14400	UNKNOWN	13.8	Cone
USA04-20	57	999	999	999	14040	14400	UNKNOWN	15.2	Cone
GER1-11	60	999	999	999	18400.5	19881	UNKNOWN	16.4	Cone
USA01-03	38	999	999	999	17863.92	23963.04	UNKNOWN	20.2	Cone
USA01-04	51	999	999	999	19876.32	23963.04	UNKNOWN	25.8	Cone
USA01-05	51	999	999	999	19876.32	23963.04	UNKNOWN	26.1	Cone
GER1-21	50	999	999	999	20590.5	25281	UNKNOWN	26.7	Cone
GER1-22	30	999	999	999	17410.5	25281	UNKNOWN	12	Cone
GER1-16	70	999	999	999	25162.5	27225	UNKNOWN	20.1	Cone
GER1-17	80	999	999	999	26812.5	27225	UNKNOWN	28.3	Cone
GER1-10	60	999	999	999	28458	34596	UNKNOWN	18.1	Cone
FRA1-01	63	999	999	999	30146.63	36290.25	UNKNOWN	18	Cone
FRA1-02	63	999	999	999	30146.63	36290.25	UNKNOWN	17.3	Cone
ENG1-01	80	999	999	999	34612.5	38025	UNKNOWN	23	Cone
GER1-18	80	999	999	999	36280.5	40401	UNKNOWN	30.9	Cone
GER1-19	90	999	999	999	38290.5	40401	UNKNOWN	29.7	Cone
GER1-20	80	999	999	999	43312.5	50625	UNKNOWN	34.4	Cone
USA01-06	57	999	999	999	44827.02	61404.84	UNKNOWN	41.6	Cone
USA01-07	57	999	999	999	44827.02	61404.84	UNKNOWN	47.2	Cone
USA01-08	76	999	999	999	49535.22	61404.84	UNKNOWN	54.2	Cone
USA01-09	76	999	999	999	49535.22	61404.84	UNKNOWN	55	Cone
USA01-10	76	999	999	999	49535.22	61404.84	UNKNOWN	57.1	Cone
GER1-26	120	999	999	999	60880.5	62001	UNKNOWN	56.1	Cone
GER1-27	80	999	999	999	50920.5	62001	UNKNOWN	40.3	Cone
GER1-28	40	999	999	999	40960.5	62001	UNKNOWN	24.2	Cone
GER1-23	110	999	999	999	62770.5	68121	UNKNOWN	46.6	Cone
ENG1-02	120	999	999	999	81000	90000	UNKNOWN	50	Cone
GER1-24	110	999	999	999	78000	90000	UNKNOWN	58.2	Cone
GER1-25	105	999	999	999	76500	90000	UNKNOWN	55.3	Cone
SWE03-07	150	999	999	999	106848	112896	UNKNOWN	147	Cone
GER1-29	130	999	999	999	119062.5	140625	UNKNOWN	91.2	Cone
SWE03-04	150	999	999	999	141102	161604	UNKNOWN	185	Cone
SWE03-01	150	999	999	999	154638	181476	UNKNOWN	162	Cone
GER1-30	160	999	999	999	169608	197136	UNKNOWN	114.6	Cone

**Single Anchors, Tension, Uncracked Concrete, Static Loading, Edge Effect,
Shallow Embedment (<=188mm), (Continued)**

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
GER1-07	10025.8	0.67	8049.81	0.83	5763.41	1.16
USA01-01	8109.968	0.91	6776.84	1.09	5611.43	1.32
USA01-02	10980.95	0.69	9175.88	0.83	7597.91	1.00
USA04-11	10984.16	0.81	9178.56	0.97	6049.77	1.47
USA04-12	14872.62	0.67	12427.83	0.80	8191.42	1.22
ENG1-03	14022.63	0.93	11990.07	1.08	8794.19	1.48
GER1-12	13884.47	0.40	11871.93	0.47	8707.55	0.64
GER1-13	11686.41	0.83	9992.48	0.97	8610.36	1.13
GER1-05	14139.13	0.79	12182.16	0.91	8760.38	1.27
USA04-19	13533.58	1.02	11829.66	1.17	7887.83	1.75
USA04-20	13533.58	1.12	11829.66	1.28	7887.83	1.93
GER1-11	18981.16	0.86	17323.55	0.95	13318.28	1.23
USA01-03	14889.67	1.36	13912.79	1.45	13914.09	1.45
USA01-04	18432.84	1.40	17223.49	1.50	15848.25	1.63
USA01-05	17856.67	1.46	16685.12	1.56	15352.87	1.70
GER1-21	18237.17	1.46	17152.51	1.56	17059.93	1.57
GER1-22	13730.69	0.87	12914.06	0.93	14221.76	0.84
GER1-16	23970.08	0.84	22746.11	0.88	18226.78	1.10
GER1-17	26772.82	1.06	25405.73	1.11	18226.78	1.55
GER1-10	23469.13	0.77	22894.68	0.79	21507.14	0.84
FRA1-01	21223.76	0.85	20814.31	0.86	19417.29	0.93
FRA1-02	21223.76	0.82	20814.31	0.83	19417.29	0.89
ENG1-01	28768.03	0.80	28357.56	0.81	21858.90	1.05
GER1-18	30660.4	1.01	30420.98	1.02	26708.59	1.16
GER1-19	33666.48	0.88	33403.58	0.89	26708.59	1.11
GER1-20	33403.1	1.03	33924.49	1.01	32643.66	1.05
USA01-06	29108.31	1.43	30122.16	1.38	34472.94	1.21
USA01-07	29108.31	1.62	30122.16	1.57	34472.94	1.37
USA01-08	34484.9	1.57	35686.02	1.52	38101.02	1.42
USA01-09	38301.64	1.44	39635.70	1.39	42317.98	1.30
USA01-10	34484.9	1.66	35686.02	1.60	38101.02	1.50
GER1-26	49375.78	1.14	51142.05	1.10	43212.11	1.30
GER1-27	36253.92	1.11	37550.79	1.07	41501.62	0.97
GER1-28	25105.27	0.96	26003.34	0.93	32572.82	0.74
GER1-23	47438.35	0.98	49565.54	0.94	45545.33	1.02
ENG1-02	53829.74	0.93	57627.20	0.87	51595.29	0.97
GER1-24	52582.19	1.11	56291.65	1.03	59469.16	0.98
GER1-25	50854.73	1.09	54442.33	1.02	58995.53	0.94
SWE03-07	104179.7	1.41	113575.71	1.29	164645.55	0.89
GER1-29	70593.52	1.29	78226.11	1.17	90945.64	1.00
SWE03-04	91847.76	2.01	102769.19	1.80	127414.98	1.45
SWE03-01	96078.44	1.69	108335.40	1.50	139547.96	1.16
GER1-30	93491.31	1.23	105979.14	1.08	127653.41	0.90

Single Anchors, Tension, Uncracked Concrete, Static Loading, Edge Effect, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa) fcc200 (MPa)	
2	GER1-08	UE	1	10	10	36	640	16	20.3	24.0
2	GER1-09	UE	1	10	10	36	640	16	50.0	59.0
2	GER1-03	UE	1	8	8	36.5	640	16	47.5	56.0
2	GER1-04	UE	1	8	8	36.5	640	16	21.2	25.0
2	GER1-01	UE	1	6	6	37	640	16	20.3	24.0
2	GER1-02	UE	1	6	6	37	640	16	50.0	59.0
9	GER5-01	S	1	9.5	9.5	42.9	350	16	11.7	13.8
9	GER5-02	S	1	9.5	9.5	42.9	350	16	11.7	13.8
9	GER5-03	S	1	9.5	9.5	42.9	350	16	11.7	13.8
9	GER5-04	S	1	9.5	9.5	42.9	350	16	24.1	28.4
9	GER5-05	S	1	9.5	9.5	42.9	350	16	24.1	28.4
9	GER5-06	S	1	9.5	9.5	42.9	350	16	24.1	28.4
9	GER5-07	S	1	15.9	15.9	67.1	350	16	19.3	22.8
9	GER5-08	S	1	15.9	15.9	67.1	350	16	19.3	22.8
9	GER5-09	S	1	15.9	15.9	67.1	350	16	29.7	35.1
9	GER5-10	S	1	15.9	15.9	67.1	350	16	19.3	22.8
9	GER5-11	S	1	15.9	15.9	67.1	350	16	29.7	35.1
9	GER5-12	S	1	15.9	15.9	67.1	350	16	29.7	35.1
9	GER5-22	S	1	15.9	15.9	67.1	350	16	19.3	22.8
9	GER5-23	S	1	15.9	15.9	67.1	350	16	19.3	22.8
9	GER5-24	S	1	15.9	15.9	67.1	350	16	29.7	35.1
9	GER5-25	S	1	15.9	15.9	67.1	350	16	19.3	22.8
9	GER5-26	S	1	15.9	15.9	67.1	350	16	29.7	35.1
9	GER5-27	S	1	15.9	15.9	67.1	350	16	29.7	35.1
9	GER5-13	S	1	15.9	15.9	67.3	350	16	17.0	20.1
9	GER5-14	S	1	15.9	15.9	67.3	350	16	17.0	20.1
9	GER5-15	S	1	15.9	15.9	67.3	350	16	17.0	20.1
9	GER5-16	S	1	15.9	15.9	67.3	350	16	40.3	47.6
9	GER5-17	S	1	15.9	15.9	67.3	350	16	40.3	47.6
9	GER5-18	S	1	15.9	15.9	67.3	350	16	40.3	47.6
9	GER5-28	S	1	15.9	15.9	67.3	350	16	15.6	18.4
9	GER5-29	S	1	15.9	15.9	67.3	350	16	15.6	18.4
9	GER5-30	S	1	15.9	15.9	67.3	350	16	15.6	18.4
9	GER5-31	S	1	15.9	15.9	67.3	350	16	33.0	38.9
9	GER5-32	S	1	15.9	15.9	67.3	350	16	33.0	38.9
9	GER5-33	S	1	15.9	15.9	67.3	350	16	33.0	38.9
2	GER1-14	UE	1	12	12	80	640	16	20.3	24.0
2	GER1-15	UE	1	12	12	80	640	16	20.3	24.0
13	USA06-01	S	1	19.5	19.5	88.5	345		37.9	44.7
13	USA06-03	S	1	19.5	19.5	88.5	345		37.9	44.7
13	USA05-11	S	1	19.5	19.5	88.9	345		33.6	39.6
13	USA06-05	S	1	19.5	19.5	88.9	345		33.6	39.6
13	USA06-06	S	1	19.5	19.5	88.9	345		29.7	35.1

**Single Anchors, Tension, Uncracked Concrete, Static Loading, Edge Effect,
Shallow Embedment ($\leq 188\text{mm}$), (Continued)**

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)		Ultimate Load Nu (kN)	Failure Mode
GER1-08	50	999	999	999	11232	11664	UNKNOWN	11.9	Cone
GER1-09	50	999	999	999	11232	11664	UNKNOWN	19.9	Cone
GER1-03	50	999	999	999	11470.13	11990.25	UNKNOWN	21.3	Cone
GER1-04	50	999	999	999	11470.13	11990.25	UNKNOWN	13.9	Cone
GER1-01	50	999	999	999	11710.5	12321	UNKNOWN	13.1	Cone
GER1-02	50	999	999	999	11710.5	12321	UNKNOWN	17.9	Cone
GER5-01	50	999	999	999	14716.85	16563.69	UNKNOWN	9.6	Cone
GER5-02	50	999	999	999	14716.85	16563.69	UNKNOWN	10.6	Cone
GER5-03	50	999	999	999	14716.85	16563.69	UNKNOWN	11.3	Cone
GER5-04	50	999	999	999	14716.85	16563.69	UNKNOWN	17.8	Cone
GER5-05	50	999	999	999	14716.85	16563.69	UNKNOWN	20	Cone
GER5-06	50	999	999	999	14716.85	16563.69	UNKNOWN	20.4	Cone
GER5-07	50	999	999	999	30325.85	40521.69	UNKNOWN	22.4	Cone
GER5-08	50	999	999	999	30325.85	40521.69	UNKNOWN	24.8	Cone
GER5-09	50	999	999	999	30325.85	40521.69	UNKNOWN	26.8	Cone
GER5-10	50	999	999	999	30325.85	40521.69	UNKNOWN	27.4	Cone
GER5-11	50	999	999	999	30325.85	40521.69	UNKNOWN	28.8	Cone
GER5-12	50	999	999	999	30325.85	40521.69	UNKNOWN	29.6	Cone
GER5-22	80	999	999	999	36364.85	40521.69	UNKNOWN	33	Cone
GER5-23	80	999	999	999	36364.85	40521.69	UNKNOWN	33.4	Cone
GER5-24	80	999	999	999	36364.85	40521.69	UNKNOWN	33.6	Cone
GER5-25	80	999	999	999	36364.85	40521.69	UNKNOWN	34.8	Cone
GER5-26	80	999	999	999	36364.85	40521.69	UNKNOWN	35	Cone
GER5-27	80	999	999	999	36364.85	40521.69	UNKNOWN	38.4	Cone
GER5-13	50	999	999	999	30476.81	40763.61	UNKNOWN	16.8	Cone
GER5-14	50	999	999	999	30476.81	40763.61	UNKNOWN	17.6	Cone
GER5-15	50	999	999	999	30476.81	40763.61	UNKNOWN	19.6	Cone
GER5-16	50	999	999	999	30476.81	40763.61	UNKNOWN	26.4	Cone
GER5-17	50	999	999	999	30476.81	40763.61	UNKNOWN	26.4	Cone
GER5-18	50	999	999	999	30476.81	40763.61	UNKNOWN	29.2	Cone
GER5-28	80	999	999	999	36533.81	40763.61	UNKNOWN	18.2	Cone
GER5-29	80	999	999	999	36533.81	40763.61	UNKNOWN	18.6	Cone
GER5-30	80	999	999	999	36533.81	40763.61	UNKNOWN	25.4	Cone
GER5-31	80	999	999	999	36533.81	40763.61	UNKNOWN	30.8	Cone
GER5-32	80	999	999	999	36533.81	40763.61	UNKNOWN	36	Cone
GER5-33	80	999	999	999	36533.81	40763.61	UNKNOWN	40.8	Cone
GER1-14	80	999	999	999	48000	57600	UNKNOWN	39.7	Cone
GER1-15	80	999	999	999	48000	57600	UNKNOWN	39.8	Cone
USA06-01	57	999	999	999	50378.63	70490.25	UNKNOWN	64	Cone
USA06-03	57	999	999	999	50378.63	70490.25	UNKNOWN	73.8	Cone
USA05-11	102	999	999	999	62767.85	71128.89	CBF	88.5	Cone
USA06-05	51	999	999	999	49166.15	71128.89	CBF	44	Cone
USA06-06	51	999	999	999	49166.15	71128.89	CBF	73.8	Cone

**Single Anchors, Tension, Uncracked Concrete, Static Loading, Edge Effect,
Shallow Embedment (<=188mm), (Continued)**

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
GER1-08	14883.5	0.80	12463.91	0.95	8589.03	1.39
GER1-09	23335.95	0.85	19542.25	1.02	13466.81	1.48
GER1-03	22944.55	0.93	19291.45	1.10	12908.63	1.65
GER1-04	15330.47	0.91	12889.64	1.08	8624.94	1.61
GER1-01	15158.68	0.86	12795.28	1.02	8305.27	1.58
GER1-02	23767.41	0.75	20061.81	0.89	13021.90	1.37
GER5-01	12768.13	0.75	11230.39	0.85	9418.55	1.02
GER5-02	12768.13	0.83	11230.39	0.94	9418.55	1.13
GER5-03	12768.13	0.89	11230.39	1.01	9418.55	1.20
GER5-04	18316.68	0.97	16110.71	1.10	13511.50	1.32
GER5-05	18316.68	1.09	16110.71	1.24	13511.50	1.48
GER5-06	18316.68	1.11	16110.71	1.27	13511.50	1.51
GER5-07	23939.93	0.94	23455.93	0.95	25977.82	0.86
GER5-08	23939.93	1.04	23455.93	1.06	25977.82	0.95
GER5-09	29703.59	0.90	29103.07	0.92	32232.11	0.83
GER5-10	23939.93	1.14	23455.93	1.17	25977.82	1.05
GER5-11	29703.59	0.97	29103.07	0.99	32232.11	0.89
GER5-12	29703.59	1.00	29103.07	1.02	32232.11	0.92
GER5-22	32662.33	1.01	32002.00	1.03	30308.26	1.09
GER5-23	32662.33	1.02	32002.00	1.04	30308.26	1.10
GER5-24	40525.96	0.83	39706.64	0.85	37605.14	0.89
GER5-25	32662.33	1.07	32002.00	1.09	30308.26	1.15
GER5-26	40525.96	0.86	39706.64	0.88	37605.14	0.93
GER5-27	40525.96	0.95	39706.64	0.97	37605.14	1.02
GER5-13	22540.69	0.75	22099.01	0.76	24492.20	0.69
GER5-14	22540.69	0.78	22099.01	0.80	24492.20	0.72
GER5-15	22540.69	0.87	22099.01	0.89	24492.20	0.80
GER5-16	34687.48	0.76	34007.78	0.78	37690.61	0.70
GER5-17	34687.48	0.76	34007.78	0.78	37690.61	0.70
GER5-18	34687.48	0.84	34007.78	0.86	37690.61	0.77
GER5-28	29406.18	0.62	28829.97	0.63	27352.19	0.67
GER5-29	29406.18	0.63	28829.97	0.65	27352.19	0.68
GER5-30	29406.18	0.86	28829.97	0.88	27352.19	0.93
GER5-31	42756.73	0.72	41918.92	0.73	39770.22	0.77
GER5-32	42756.73	0.84	41918.92	0.86	39770.22	0.91
GER5-33	42756.73	0.95	41918.92	0.97	39770.22	1.03
GER1-14	38400.61	1.03	38990.47	1.02	36311.31	1.09
GER1-15	38400.61	1.04	38990.47	1.02	36311.31	1.10
USA06-01	46977.35	1.36	48605.15	1.32	55250.13	1.16
USA06-03	46977.35	1.57	48605.15	1.52	55250.13	1.34
USA05-11	63764.7	1.39	66027.84	1.34	63042.46	1.40
USA06-05	42091.02	1.05	43584.92	1.01	50316.09	0.87
USA06-06	39627.38	1.86	41033.84	1.80	47371.03	1.56

Single Anchors, Tension, Uncracked Concrete, Static Loading, Edge Effect, Shallow Embedment ($\leq 188\text{mm}$), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
13	USA06-08	S	1	19.5	19.5	88.9	345		33.6	39.6
13	USA06-10	S	1	19.5	19.5	88.9	345		29.7	35.1
25	USA12-01	U	1	12.7	12.7	88.9		32	30.2	35.6
25	USA12-02	U	1	12.7	12.7	88.9		32	30.2	35.6
25	USA12-03	U	1	12.7	12.7	88.9		32	30.2	35.6
25	USA12-04	U	1	12.7	12.7	88.9		32	30.2	35.6
9	GER5-19	S	1	22.2	22.2	90.3	350	16	39.8	47.0
9	GER5-20	S	1	22.2	22.2	90.3	350	16	39.8	47.0
9	GER5-21	S	1	22.2	22.2	90.3	350	16	39.8	47.0
9	GER5-34	S	1	22.2	22.2	90.3	350	16	19.3	22.8
9	GER5-35	S	1	22.2	22.2	90.3	350	16	19.3	22.8
9	GER5-36	S	1	22.2	22.2	90.3	350	16	39.8	47.0
9	GER5-37	S	1	22.2	22.2	90.3	350	16	19.3	22.8
9	GER5-38	S	1	22.2	22.2	90.3	350	16	39.8	47.0
9	GER5-39	S	1	22.2	22.2	90.3	350	16	39.8	47.0
9	GER5-40	S	1	22.2	22.2	90.3	350	16	19.3	22.8
9	GER5-41	S	1	22.2	22.2	90.3	350	16	19.3	22.8
9	GER5-42	S	1	22.2	22.2	90.3	350	16	19.3	22.8
9	GER5-43	S	1	22.2	22.2	90.3	350	16	29.7	35.1
9	GER5-44	S	1	22.2	22.2	90.3	350	16	29.7	35.1
9	GER5-45	S	1	22.2	22.2	90.3	350	16	29.7	35.1
13	USA06-04	S	1	19.5	19.5	92.1	345		33.7	39.8
13	USA06-02	S	1	19.5	19.5	114.3	345		37.9	44.7
13	USA06-11	S	1	19.5	19.5	114.3	345		31.9	37.7
13	USA06-13	S	1	19.5	19.5	114.3	345		31.9	37.7
25	USA12-06	U	1	15.88	15.88	114.3		32	43.8	51.7
7	GER1-31	UE	1	16	16	125	902	16	31.9	37.7
13	USA06-12	S	1	19.5	19.5	139.7	345		29.7	35.1
25	USA12-07	U	1	19.05	19.05	139.7		32	30.2	35.6
25	USA12-08	U	1	19.05	19.05	139.7		32	43.8	51.7
25	USA12-09	U	1	19.05	19.05	139.7		32	30.2	35.6
6	USA01-13	UE	1	12.7	12.7	145			25.1	29.6
6	USA01-20	UE	1	12.7	12.7	145			25.1	29.6
6	USA01-22	UE	1	12.7	12.7	145			25.1	29.6
6	USA01-11	UE	1	12.7	12.7	151.4			27.9	32.9
6	USA01-12	UE	1	12.7	12.7	151.4			21.9	25.9
6	USA01-14	UE	1	12.7	12.7	151.4			27.9	32.9
6	USA01-15	UE	1	12.7	12.7	151.4			25.1	29.6
6	USA01-17	UE	1	12.7	12.7	151.4			27.9	32.9
6	USA01-19	UE	1	12.7	12.7	151.4			27.9	32.9
6	USA01-21	UE	1	12.7	12.7	151.4			21.9	25.9
6	USA01-23	UE	1	12.7	12.7	151.4			21.9	25.9
13	USA06-07	S	1	19.5	19.5	168.2	345		35.7	42.1
13	USA06-09	S	1	19.5	19.5	168.2	345		35.7	42.1
7	GER1-33	UE	1	20	20	170	1047	16	20.9	24.7
25	USA12-10	U	1	25.4	25.4	177.8		32	30.2	35.6
12	GER5-52	S	1	22	22	185	900	16	18.8	22.2
12	GER5-53	S	1	22	22	185	900	16	18.8	22.2
12	GER5-54	S	1	22	22	185	900	16	18.8	22.2
12	GER5-55	S	1	22	22	185	900	16	18.8	22.2
6	USA01-24	UE	1	15	15	187.5			21.2	25.0

**Single Anchors, Tension, Uncracked Concrete, Static Loading, Edge Effect,
Shallow Embedment ($\leq 188\text{mm}$), (Continued)**

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)		Ultimate Load Nu (kN)	Failure Mode
USA06-08	76	999	999	999	55833.65	71128.89	CBF	59.1	Cone
USA06-10	76	999	999	999	55833.65	71128.89	CBF	81.4	Cone
USA12-01	57.15	999	999	999	50806.35	71128.89	ARKANSAS	35.59	Cone
USA12-02	82.55	999	999	999	57580.53	71128.89	ARKANSAS	65.706	Cone
USA12-03	95.25	999	999	999	60967.62	71128.89	ARKANSAS	54.755	Cone
USA12-04	111	999	999	999	65168.15	71128.89	ARKANSAS	60.23	Cone
GER5-19	50	999	999	999	50238.41	73386.81	UNKNOWN	38.4	Cone
GER5-20	50	999	999	999	50238.41	73386.81	UNKNOWN	40.8	Cone
GER5-21	50	999	999	999	50238.41	73386.81	UNKNOWN	44.8	Cone
GER5-34	80	999	999	999	58365.41	73386.81	UNKNOWN	49	Cone
GER5-35	80	999	999	999	58365.41	73386.81	UNKNOWN	53.2	Cone
GER5-36	80	999	999	999	58365.41	73386.81	UNKNOWN	55.2	Cone
GER5-37	80	999	999	999	58365.41	73386.81	UNKNOWN	58.4	Cone
GER5-38	80	999	999	999	58365.41	73386.81	UNKNOWN	59.2	Cone
GER5-39	80	999	999	999	58365.41	73386.81	UNKNOWN	60.8	Cone
GER5-40	120	999	999	999	69201.41	73386.81	UNKNOWN	62.8	Cone
GER5-41	120	999	999	999	69201.41	73386.81	UNKNOWN	65.6	Cone
GER5-42	120	999	999	999	69201.41	73386.81	UNKNOWN	66.8	Cone
GER5-43	120	999	999	999	69201.41	73386.81	UNKNOWN	69.2	Cone
GER5-44	120	999	999	999	69201.41	73386.81	UNKNOWN	81.2	Cone
GER5-45	120	999	999	999	69201.41	73386.81	UNKNOWN	84.2	Cone
USA06-04	51	999	999	999	52262.15	76341.69	MSF B1-5	48.9	Cone
USA06-02	70	999	999	999	82793.21	117580.4	UNKNOWN	103.1	Cone
USA06-11	76	999	999	999	84850.61	117580.4	CBF	91.1	Cone
USA06-13	102	999	999	999	93766.01	117580.4	CBF	97.8	Cone
USA12-06	146.05	999	999	999	108870.8	117580.4	ARKANSAS	136.514	Cone
GER1-31	125	999	999	999	117187.5	140625	UNKNOWN	114.3	Cone
USA06-12	76	999	999	999	119674	175644.8	CBF	125.4	Cone
USA12-07	76.2	999	999	999	119757.8	175644.8	ARKANSAS	66.805	Cone
USA12-08	82.55	999	999	999	122419.1	175644.8	ARKANSAS	87.136	Cone
USA12-09	177.8	999	999	999	162338.4	175644.8	ARKANSAS	155.395	Cone
USA01-13	102	999	999	999	138982.5	189225	UNKNOWN	78.7	Cone
USA01-20	127	999	999	999	149857.5	189225	UNKNOWN	81	Cone
USA01-22	127	999	999	999	149857.5	189225	UNKNOWN	85.9	Cone
USA01-11	102	999	999	999	149477.2	206297.6	UNKNOWN	38.3	Cone
USA01-12	102	999	999	999	149477.2	206297.6	UNKNOWN	74.7	Cone
USA01-14	102	999	999	999	149477.2	206297.6	UNKNOWN	80.1	Cone
USA01-15	102	999	999	999	149477.2	206297.6	UNKNOWN	81	Cone
USA01-17	114	999	999	999	154927.6	206297.6	UNKNOWN	73.8	Cone
USA01-19	127	999	999	999	160832.2	206297.6	UNKNOWN	78.3	Cone
USA01-21	127	999	999	999	160832.2	206297.6	UNKNOWN	84.5	Cone
USA01-23	127	999	999	999	160832.2	206297.6	UNKNOWN	90.3	Cone
USA06-07	152	999	999	999	204009.8	254621.2	MSF C3-4	131.2	Cone
USA06-09	102	999	999	999	178779.8	254621.2	MSF C2-4	130.7	Cone
GER1-33	170	999	999	999	216750	260100	UNKNOWN	159.8	Cone
USA12-10	234.95	999	999	999	267580.1	284515.6	ARKANSAS	235.446	Cone
GER5-52	261	999	999	999	298867.5	308025	UNKNOWN	109.3	Cone
GER5-53	261	999	999	999	298867.5	308025	UNKNOWN	126.5	Cone
GER5-54	264	999	999	999	300532.5	308025	UNKNOWN	114.4	Cone
GER5-55	265	999	999	999	301087.5	308025	UNKNOWN	125.6	Cone
USA01-24	127	999	999	999	229640.6	316406.3	UNKNOWN	129.7	Cone

**Single Anchors, Tension, Uncracked Concrete, Static Loading, Edge Effect,
Shallow Embedment ($\leq 188\text{mm}$), (Continued)**

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
USA06-08	52172.25	1.13	54023.95	1.09	58085.96	1.02
USA06-10	49118.55	1.66	50861.87	1.60	54686.12	1.49
USA12-01	42161.55	0.84	43657.95	0.82	46180.84	0.77
USA12-02	52127.01	1.26	53977.11	1.22	52460.51	1.25
USA12-03	57493.03	0.95	59533.57	0.92	54312.11	1.01
USA12-04	64502.67	0.93	66792.01	0.90	54458.32	1.11
GER5-19	46188.82	0.83	47962.18	0.80	57970.00	0.66
GER5-20	46188.82	0.88	47962.18	0.85	57970.00	0.70
GER5-21	46188.82	0.97	47962.18	0.93	57970.00	0.77
GER5-34	41440.59	1.18	43031.65	1.14	47842.56	1.02
GER5-35	41440.59	1.28	43031.65	1.24	47842.56	1.11
GER5-36	59498.69	0.93	61783.07	0.89	68690.38	0.80
GER5-37	41440.59	1.41	43031.65	1.36	47842.56	1.22
GER5-38	59498.69	0.99	61783.07	0.96	68690.38	0.86
GER5-39	59498.69	1.02	61783.07	0.98	68690.38	0.89
GER5-40	55562.41	1.13	57695.66	1.09	51854.64	1.21
GER5-41	55562.41	1.18	57695.66	1.14	51854.64	1.27
GER5-42	55562.41	1.20	57695.66	1.16	51854.64	1.29
GER5-43	68939.35	1.00	71586.19	0.97	64338.92	1.08
GER5-44	68939.35	1.18	71586.19	1.13	64338.92	1.26
GER5-45	68939.35	1.22	71586.19	1.18	64338.92	1.31
USA06-04	43782.44	1.12	45622.58	1.07	54240.39	0.90
USA06-02	67249.98	1.53	72601.16	1.42	86640.53	1.19
USA06-11	64362.51	1.42	69483.92	1.31	81951.21	1.11
USA06-13	76237.16	1.28	82303.46	1.19	90948.64	1.08
USA12-06	115443.6	1.18	124629.61	1.10	108398.20	1.26
GER1-31	94001.15	1.22	102829.13	1.11	103035.43	1.11
USA06-12	76202.86	1.65	84641.40	1.48	106881.64	1.17
USA12-07	76821.48	0.87	85328.52	0.78	107468.31	0.62
USA12-08	96068.85	0.91	106707.31	0.82	133213.78	0.65
USA12-09	129004	1.20	143289.65	1.08	134249.99	1.16
USA01-13	83947.52	0.94	93696.11	0.84	106798.02	0.74
USA01-20	95387.88	0.85	106465.02	0.76	114978.35	0.70
USA01-22	95387.88	0.90	106465.02	0.81	114978.35	0.75
USA01-11	92288.1	0.42	103568.08	0.37	120544.63	0.32
USA01-12	81883.73	0.91	91892.04	0.81	106954.68	0.70
USA01-14	92288.1	0.87	103568.08	0.77	120544.63	0.66
USA01-15	87537.39	0.93	98236.72	0.82	114339.37	0.71
USA01-17	98042.05	0.75	110025.31	0.67	125380.21	0.59
USA01-19	104465.2	0.75	117233.51	0.67	130014.87	0.60
USA01-21	92687.99	0.91	104016.85	0.81	115357.27	0.73
USA01-23	92687.99	0.97	104016.85	0.87	115357.27	0.78
USA06-07	144976.2	0.90	164751.49	0.80	200678.76	0.65
USA06-09	115951.1	1.13	131767.28	0.99	174542.34	0.75
GER1-33	120675.6	1.32	137302.83	1.16	152992.64	1.04
USA12-10	190914.3	1.23	218310.48	1.08	223207.80	1.05
GER5-52	168967.9	0.65	194045.35	0.56	184203.98	0.59
GER5-53	168967.9	0.75	194045.35	0.65	184203.98	0.69
GER5-54	170613.8	0.67	195935.48	0.58	184203.98	0.62
GER5-55	171164.1	0.73	196567.51	0.64	184203.98	0.68
USA01-24	111185.7	1.17	127868.89	1.01	161005.4	0.81
	Mean =	1.033	Mean =	1.024	Mean =	1.054
	COV =	0.271	COV =	0.252	COV =	0.286

Group Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188 mm)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa) fcc200 (MPa)	
4	FRA2-01	E-TC	2	10	15	71	640		11.5	13.6
4	FRA2-02	E-TC	2	10	15	71	640		23.6	27.9
3	GER2-01	E-DI	2	12	15	46		16	16.9	20.0
3	GER2-02	E-DI	2	12	15	46		16	33.9	40.0
3	GER2-03	E-DI	2	12	15	46		16	16.9	20.0
3	GER2-04	E-DI	2	12	15	46		16	33.9	40.0
2	GER2-05	UE	2	12	18	80	640	16	21.2	25.0
3	GER2-06	E-TC	2	12	18	75		16	18.1	21.4
2	GER2-07	E-SD	2	12	18.4	80	640	29	21.2	25.0
3	GER2-08	E-TC	2	12	18	75		16	24.8	29.3
3	GER2-09	E-TC	2	12	18	75		16	48.3	57.0
2	GER2-10	E-SD	2	8	12.7	36.5	640	16	21.2	25.0
2	GER2-11	E-SD	2	10	14.7	36	640	16	23.7	28.0
2	GER2-12	E-SD	2	6	10.7	37	640	16	23.7	28.0
2	GER2-13	E-SD	2	10	14.7	36	640	16	47.5	56.0
2	GER2-14	E-SD	2	8	12.7	36.5	640	16	47.5	56.0
3	GER2-15	E-DI	2	12	15	46		16	16.9	20.0
3	GER2-16	E-DI	2	12	15	46		16	33.9	40.0
3	GER2-17	E-TC	2	16	24	100		16	16.9	19.9
3	GER2-18	E-TC	2	16	24	100		16	18.6	22.0
3	GER2-19	E-TC	2	16	24	100		16	52.3	61.7
3	GER2-20	E-DI	2	12	15	46		16	16.9	20.0
3	GER2-21	E-DI	2	12	15	46		16	33.9	40.0
7	GER2-22	UE	2	16	16	125	902	16	28.9	34.1
3	GER2-23	E-TC	2	20	28	125		16	20.5	24.2
3	GER2-24	E-TC	2	20	28	125		16	40.8	48.2
3	GER2-25	E-DI	2	12	15	46		16	16.9	20.0
3	GER2-26	E-DI	2	12	15	46		16	33.9	40.0
3	GER2-27	E-TC	2	16	24	100		16	18.9	22.3
3	GER2-28	E-TC	2	12	18	75		16	24.8	29.3
3	GER2-29	E-TC	2	12	18	75		16	48.3	57.0
3	GER2-30	E-DI	2	12	15	46		16	16.9	20.0
3	GER2-31	E-DI	2	12	15	46		16	33.9	40.0
2	GER2-32	E-SD	2	8	12.7	36.5	640	16	21.2	25.0
2	GER2-33	E-SD	2	10	14.7	36	640	16	23.7	28.0
2	GER2-34	E-SD	2	8	12.7	36.5	640	16	47.5	56.0
2	GER2-35	E-SD	2	10	14.7	36	640	16	47.5	56.0
3	GER2-36	E-TC	2	12	18	75		16	18.1	21.4
3	GER2-37	E-TC	2	12	18	75		16	24.8	29.3
3	GER2-38	E-TC	2	12	18	75		16	48.3	57.0
3	GER2-39	E-TC	2	12	18	75		16	18.1	21.4
3	GER2-40	E-TC	2	12	18	75		16	48.3	57.0
3	GER2-41	E-TC	2	20	28	125		16	20.5	24.2

**Group Anchors, Tension, Uncracked Concrete, Static Loading, No Edge,
Shallow Embedment (≤ 188 mm), (Continued)**

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)		Ultimate Load Nu (kN)	Failure Mode
FRA2-01	999	999	100	999	66669	90738	UNKNOWN	33.6	Cone
FRA2-02	999	999	100	999	66669	90738	UNKNOWN	38.7	Cone
GER2-01	999	999	50	999	25944	38088	UNKNOWN	39.2	Cone
GER2-02	999	999	50	999	25944	38088	UNKNOWN	40	Cone
GER2-03	999	999	75	999	29394	38088	UNKNOWN	39.7	Cone
GER2-04	999	999	75	999	29394	38088	UNKNOWN	45.6	Cone
GER2-05	999	999	80	999	76800	115200	UNKNOWN	60.9	Cone
GER2-06	999	999	80	999	68625	101250	UNKNOWN	59.4	Cone
GER2-07	999	999	80	999	76800	115200	UNKNOWN	60.9	Cone
GER2-08	999	999	80	999	68625	101250	UNKNOWN	69.6	Cone
GER2-09	999	999	80	999	68625	101250	UNKNOWN	126.2	Cone
GER2-10	999	999	100	999	22940.25	23980.5	UNKNOWN	26.6	Cone
GER2-11	999	999	100	999	22464	23328	UNKNOWN	28.2	Cone
GER2-12	999	999	100	999	23421	24642	UNKNOWN	28.4	Cone
GER2-13	999	999	100	999	22464	23328	UNKNOWN	39.9	Cone
GER2-14	999	999	100	999	22940.25	23980.5	UNKNOWN	40.4	Cone
GER2-15	999	999	100	999	32844	38088	UNKNOWN	44.6	Cone
GER2-16	999	999	100	999	32844	38088	UNKNOWN	49.4	Cone
GER2-17	999	999	105	999	121500	180000	UNKNOWN	101.2	Cone
GER2-18	999	999	105	999	121500	180000	UNKNOWN	102.6	Cone
GER2-19	999	999	105	999	121500	180000	UNKNOWN	175.2	Cone
GER2-20	999	999	125	999	36294	38088	UNKNOWN	48.7	Cone
GER2-21	999	999	125	999	36294	38088	UNKNOWN	54.6	Cone
GER2-22	999	999	125	999	187500	281250	UNKNOWN	175.7	Cone
GER2-23	999	999	130	999	189375	281250	UNKNOWN	163.2	Cone
GER2-24	999	999	130	999	189375	281250	UNKNOWN	242.4	Cone
GER2-25	999	999	150	999	39744	38088	UNKNOWN	48.8	Cone
GER2-26	999	999	150	999	39744	38088	UNKNOWN	59	Cone
GER2-27	999	999	158	999	137400	180000	UNKNOWN	108.6	Cone
GER2-28	999	999	160	999	86625	101250	UNKNOWN	87.6	Cone
GER2-29	999	999	160	999	86625	101250	UNKNOWN	138.8	Cone
GER2-30	999	999	175	999	43194	38088	UNKNOWN	50.4	Cone
GER2-31	999	999	175	999	43194	38088	UNKNOWN	62.5	Cone
GER2-32	999	999	200	999	33890.25	23980.5	UNKNOWN	28.3	Cone
GER2-33	999	999	200	999	33264	23328	UNKNOWN	31.5	Cone
GER2-34	999	999	200	999	33890.25	23980.5	UNKNOWN	41.5	Cone
GER2-35	999	999	200	999	33264	23328	UNKNOWN	42.2	Cone
GER2-36	999	999	200	999	95625	101250	UNKNOWN	66.4	Cone
GER2-37	999	999	200	999	95625	101250	UNKNOWN	94.4	Cone
GER2-38	999	999	200	999	95625	101250	UNKNOWN	150.4	Cone
GER2-39	999	999	240	999	104625	101250	UNKNOWN	67.6	Cone
GER2-40	999	999	240	999	104625	101250	UNKNOWN	149	Cone
GER2-41	999	999	260	999	238125	281250	UNKNOWN	204	Cone

**Group Anchors, Tension, Uncracked Concrete, Static Loading, No Edge,
Shallow Embedment (≤ 188 mm), (Continued)**

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
FRA2-01	43711.51	0.77	43901.89	0.77	37850.51	0.89
FRA2-02	62607.80	0.62	62880.48	0.62	54213.12	0.71
GER2-01	25627.40	1.53	23259.42	1.69	18852.18	2.08
GER2-02	36242.62	1.10	32893.78	1.22	26661.01	1.50
GER2-03	29035.30	1.37	26352.42	1.51	21805.36	1.82
GER2-04	41062.12	1.11	37267.96	1.22	30837.44	1.48
GER2-05	71666.20	0.85	72767.04	0.84	58278.34	1.04
GER2-06	54914.90	1.08	55772.07	1.07	48899.17	1.21
GER2-07	64315.82	0.95	66151.86	0.92	58465.28	1.04
GER2-08	64256.51	1.08	65259.49	1.07	57217.44	1.22
GER2-09	89623.26	1.41	91022.19	1.39	79805.35	1.58
GER2-10	28441.55	0.94	24223.82	1.10	17249.88	1.54
GER2-11	29678.81	0.95	25176.73	1.12	18554.43	1.52
GER2-12	30522.15	0.93	26098.01	1.09	17941.44	1.58
GER2-13	41972.17	0.95	35605.28	1.12	26239.92	1.52
GER2-14	42567.42	0.95	36254.89	1.11	25817.26	1.56
GER2-15	32443.20	1.37	29445.43	1.51	23863.44	1.87
GER2-16	45881.62	1.08	41642.13	1.19	33748.00	1.46
GER2-17	81195.96	1.25	86924.00	1.16	83381.04	1.21
GER2-18	85372.74	1.20	91395.43	1.12	87670.22	1.17
GER2-19	142971.82	1.23	153057.89	1.14	146819.36	1.19
GER2-20	35851.10	1.36	32538.44	1.50	24107.98	2.02
GER2-21	50701.11	1.08	46016.30	1.19	34093.83	1.60
GER2-22	163475.10	1.07	178827.63	0.98	155607.63	1.13
GER2-23	124826.53	1.31	138322.81	1.18	141754.01	1.15
GER2-24	176166.27	1.38	195213.41	1.24	200055.82	1.21
GER2-25	37623.21	1.30	34146.80	1.43	24107.98	2.02
GER2-26	53207.25	1.11	48290.87	1.22	34093.83	1.73
GER2-27	97201.01	1.12	104058.13	1.04	102066.73	1.06
GER2-28	81110.68	1.08	82376.73	1.06	72078.72	1.22
GER2-29	113131.00	1.23	114896.86	1.21	100533.48	1.38
GER2-30	37623.21	1.34	34146.80	1.48	24107.98	2.09
GER2-31	53207.25	1.17	48290.87	1.29	34093.83	1.83
GER2-32	29731.27	0.95	25322.27	1.12	17249.88	1.64
GER2-33	30820.30	1.02	26145.07	1.20	18554.43	1.70
GER2-34	44497.68	0.93	37898.91	1.10	25817.26	1.61
GER2-35	43586.49	0.97	36974.71	1.14	26239.92	1.61
GER2-36	76520.76	0.87	77715.18	0.85	61988.23	1.07
GER2-37	89537.76	1.05	90935.35	1.04	72533.08	1.30
GER2-38	124884.87	1.20	126834.20	1.19	101167.20	1.49
GER2-39	81021.98	0.83	82286.66	0.82	61988.23	1.09
GER2-40	132231.04	1.13	134295.03	1.11	101167.20	1.47
GER2-41	156960.10	1.30	173930.66	1.17	178957.35	1.14

Group Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (≤ 188 mm), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa) fcc200 (MPa)	
3	GER2-42	E-TC	2	16	24	100		16	18.9	22.3
3	GER2-43	E-TC	2	16	24	100		16	16.9	19.9
3	GER2-44	E-TC	2	16	24	100		16	18.6	22.0
3	GER2-45	E-TC	2	16	24	100		16	52.3	61.7
3	GER2-46	UE	2	12	18	80	640	29	22.0	26.0
3	GER2-47	E-SD	2	12	18.4	80	640	16	21.2	25.0
3	GER2-48	E-TC	2	12	18	75		16	48.3	57.0
3	GER2-49	E-TC	2	20	28	125		16	20.5	24.2
3	GER2-50	E-TC	2	20	28	125		16	40.8	48.2
7	GER2-51	UE	2	16	16	125	902	16	28.9	34.1
10	GER6-01	S	2	15.9	31.8	67.3	350		17.0	20.1
10	GER6-02	S	2	15.9	31.8	67.3	350		40.4	47.7
10	GER6-03	S	2	15.9	31.8	67.3	350		15.6	18.4
10	GER6-04	S	2	15.9	31.8	67.3	350		40.4	47.7
10	GER6-05	S	2	15.9	31.8	67.3	350		15.2	17.9
10	GER6-06	S	2	15.9	31.8	67.3	350		28.1	33.2
6	USA02-01	E-SD	2	12.7	12.7	51.6			33.1	39.1
6	USA02-02	E-SD	2	12.7	12.7	51.6			33.1	39.1
6	USA02-03	E-SD	2	12.7	12.7	51.6			20.7	24.4
6	USA02-04	E-SD	2	12.7	12.7	51.6			20.7	24.4
6	USA02-05	E-SD	2	12.7	12.7	51.6			33.1	39.1
6	USA02-06	E-SD	2	12.7	12.7	51.6			33.1	39.1
6	USA02-07	E-SD	2	12.7	12.7	51.6			20.7	24.4
6	USA02-08	E-TC	2	12.7	12.7	88.9			20.7	24.4
6	USA02-09	E-TC	2	12.7	12.7	88.9			33.1	39.1
6	USA02-10	E-TC	2	19	19	82.6			33.1	39.1
6	USA02-11	E-TC	2	19	19	82.6			33.1	39.1
6	USA02-12	E-TC	2	19	19	82.6			33.1	39.1
6	USA02-13	E-TC	2	19	19	82.6			20.7	24.4
6	USA02-14	E-TC	2	19	19	82.6			20.7	24.4
23	USA02-15	E-TW	2	9.5	10	41.3	345	25	28.6	33.8
23	USA02-16	E-TW	2	9.5	10	41.3	345	25	28.6	33.8
23	USA02-17	E-TW	2	9.5	10	63.5	345	25	28.6	33.8
38	USA02-18	E-TW	2	9.5	10	42.6	483	25	12.6	14.9
38	USA02-19	E-TW	2	9.5	10	77.4	483	25	12.6	14.9
38	USA02-20	E-TW	2	9.5	10	38.5	483	25	30.7	36.2
38	USA02-21	E-TW	2	12.7	13.4	57.8	483	25	30.7	36.2
38	USA02-22	E-TW	2	12.7	13.4	105.4	483	25	12.6	14.9
38	USA02-23	E-TW	2	12.7	13.4	61	483	25	12.6	14.9
38	USA02-24	E-TW	2	15.9	16.6	71.5	483	25	12.6	14.9
38	USA02-25	E-TW	2	15.9	16.6	131.9	483	25	12.9	15.2
38	USA02-26	E-TW	2	15.9	16.6	71.4	483	25	30.7	36.2
38	USA02-27	E-TW	2	15.9	16.6	129.5	483	25	30.0	35.4

**Group Anchors, Tension, Uncracked Concrete, Static Loading, No Edge,
Shallow Embedment (≤ 188 mm), (Continued)**

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)		Ultimate Load Nu (kN)	Failure Mode
GER2-42	999	999	263	999	168900	180000	UNKNOWN	132.3	Cone
GER2-43	999	999	263	999	168900	180000	UNKNOWN	132.4	Cone
GER2-44	999	999	263	999	168900	180000	UNKNOWN	133.3	Cone
GER2-45	999	999	263	999	168900	180000	UNKNOWN	268	Cone
GER2-46	999	999	280	999	124800	115200	UNKNOWN	103.6	Cone
GER2-47	999	999	280	999	124800	115200	UNKNOWN	76	Cone
GER2-48	999	999	320	999	122625	101250	UNKNOWN	150	Cone
GER2-49	999	999	325	999	262500	281250	UNKNOWN	202.4	Cone
GER2-50	999	999	325	999	262500	281250	UNKNOWN	347.2	Cone
GER2-51	999	999	375	999	281250	281250	UNKNOWN	228.3	Cone
GER6-01	40	40	80	999	56915.61	81527.22	REVISED	59.6	Cone
GER6-02	40	40	80	999	56915.61	81527.22	REVISED	85.2	Cone
GER6-03	60	60	120	999	64991.61	81527.22	REVISED	66	Cone
GER6-04	60	60	120	999	64991.61	81527.22	REVISED	87.2	Cone
GER6-05	80	80	160	999	73067.61	81527.22	REVISED	76.8	Cone
GER6-06	80	80	160	999	73067.61	81527.22	REVISED	120.8	Cone
USA02-01	999	999	76	999	35727.84	47926.08	UNKNOWN	64.9	Cone
USA02-02	999	999	76	999	35727.84	47926.08	UNKNOWN	69.5	Cone
USA02-03	999	999	127	999	43622.64	47926.08	UNKNOWN	49.1	Cone
USA02-04	999	999	127	999	43622.64	47926.08	UNKNOWN	58.4	Cone
USA02-05	999	999	127	999	43622.64	47926.08	UNKNOWN	86.3	Cone
USA02-06	999	999	127	999	43622.64	47926.08	UNKNOWN	99.3	Cone
USA02-07	999	999	178	999	51517.44	47926.08	UNKNOWN	66.8	Cone
USA02-08	999	999	152	999	111667.3	142257.8	UNKNOWN	77	Cone
USA02-09	999	999	102	999	98332.29	142257.8	UNKNOWN	107.6	Cone
USA02-10	999	999	102	999	86680.44	122809.7	UNKNOWN	133.7	Cone
USA02-11	999	999	102	999	86680.44	122809.7	UNKNOWN	125.3	Cone
USA02-12	999	999	165	999	102291.8	122809.7	UNKNOWN	178.3	Cone
USA02-13	999	999	165	999	102291.8	122809.7	UNKNOWN	112.3	Cone
USA02-14	999	999	165	999	102291.8	122809.7	UNKNOWN	115.1	Cone
USA02-15	999	999	41	999	20431.11	30702.42	UNKNOWN	22.9	Cone
USA02-16	999	999	83	999	25634.91	30702.42	UNKNOWN	28.4	Cone
USA02-17	999	999	64	999	48482.25	72580.5	UNKNOWN	42	Cone
USA02-18	999	999	38	999	21189.24	32665.68	UNKNOWN	19.8	Cone
USA02-19	999	999	38	999	62740.44	107833.7	UNKNOWN	31.8	Cone
USA02-20	999	999	38	999	17729.25	26680.5	UNKNOWN	22.5	Cone
USA02-21	999	999	57	999	39951.36	60135.12	UNKNOWN	45.5	Cone
USA02-22	999	999	51	999	116108.6	199964.9	UNKNOWN	41.8	Cone
USA02-23	999	999	57	999	43920	66978	UNKNOWN	33.8	Cone
USA02-24	999	999	70	999	61025.25	92020.5	UNKNOWN	46.6	Cone
USA02-25	999	999	64	999	181903.3	313157	UNKNOWN	73.8	Cone
USA02-26	999	999	70	999	60875.64	91763.28	UNKNOWN	64.1	Cone
USA02-27	999	999	64	999	175796.3	301864.5	UNKNOWN	119.6	Cone

**Group Anchors, Tension, Uncracked Concrete, Static Loading, No Edge,
Shallow Embedment (≤ 188 mm), (Continued)**

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
GER2-42	119485.08	1.11	127914.26	1.03	112494.74	1.18
GER2-43	112872.41	1.17	120835.09	1.10	106268.94	1.25
GER2-44	118678.65	1.12	127050.93	1.05	111735.49	1.19
GER2-45	198748.48	1.35	212769.37	1.26	187120.93	1.43
GER2-46	109628.21	0.95	111312.17	0.93	76799.93	1.35
GER2-47	96473.73	0.79	99227.79	0.77	75615.91	1.01
GER2-48	132231.04	1.13	134295.03	1.12	101167.20	1.48
GER2-49	173026.88	1.17	191734.59	1.06	180745.39	1.12
GER2-50	244190.86	1.42	270592.84	1.28	255083.91	1.36
GER2-51	245212.65	0.93	268241.45	0.85	197726.29	1.15
GER6-01	51921.84	1.15	50904.43	1.17	45151.84	1.32
GER6-02	79985.49	1.07	78418.18	1.09	69556.32	1.22
GER6-03	56726.61	1.17	55615.06	1.19	50136.02	1.32
GER6-04	91334.97	0.96	89545.27	0.97	80723.52	1.08
GER6-05	62903.10	1.22	61670.52	1.25	53955.99	1.42
GER6-06	85667.20	1.41	83988.56	1.44	73482.21	1.64
USA02-01	46590.98	1.39	43534.22	1.49	35227.20	1.84
USA02-02	46590.98	1.49	43534.22	1.60	35227.20	1.97
USA02-03	44937.99	1.09	41989.67	1.17	31485.73	1.56
USA02-04	44937.99	1.30	41989.67	1.39	31485.73	1.85
USA02-05	56886.22	1.52	53154.00	1.62	39857.23	2.17
USA02-06	56886.22	1.75	53154.00	1.87	39857.23	2.49
USA02-07	49371.19	1.35	46132.02	1.45	31485.73	2.12
USA02-08	87639.85	0.88	91928.94	0.84	81163.36	0.95
USA02-09	97693.40	1.10	102474.52	1.05	89299.03	1.20
USA02-10	89341.05	1.50	92452.83	1.45	83855.34	1.59
USA02-11	89341.05	1.40	92452.83	1.36	83855.34	1.49
USA02-12	105431.63	1.69	109103.86	1.63	98788.15	1.80
USA02-13	83287.05	1.35	86187.97	1.30	78038.94	1.44
USA02-14	83287.05	1.38	86187.97	1.34	78038.94	1.47
USA02-15	27688.97	0.83	24417.29	0.94	18213.65	1.26
USA02-16	34741.35	0.82	30636.37	0.93	23191.59	1.22
USA02-17	52989.01	0.79	51966.77	0.81	40923.79	1.03
USA02-18	18773.07	1.05	16694.97	1.19	12369.08	1.60
USA02-19	41238.40	0.77	42144.26	0.75	32315.09	0.98
USA02-20	25754.07	0.87	22271.81	1.01	16529.61	1.36
USA02-21	47364.56	0.96	45473.56	1.00	36597.67	1.24
USA02-22	65398.68	0.64	70617.88	0.59	59639.20	0.70
USA02-23	32517.87	1.04	31606.51	1.07	25493.41	1.33
USA02-24	41733.16	1.12	41975.61	1.11	35850.62	1.30
USA02-25	92506.35	0.80	103282.92	0.71	94300.67	0.78
USA02-26	64935.22	0.99	65293.66	0.98	55761.34	1.15
USA02-27	137691.76	0.87	153342.14	0.78	139534.12	0.86

Group Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (≤ 188 mm), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa) fcc200 (MPa)	
38	USA02-28	E-TW	2	19	19.8	87.6	483	25	12.6	14.9
38	USA02-29	E-TW	2	19	19.8	150.7	483	25	12.9	15.2
38	USA02-30	E-TW	2	19	19.9	85.7	483	25	30.7	36.2
25	USA10-01	U	2	12.7	18	88.9	0	32	31.4	37.0
25	USA10-02	U	2	12.7	18	114.3	0	32	31.4	37.0
25	USA10-03	U	2	15.875	23	139.7	0	32	31.4	37.0
25	USA10-04	U	2	15.875	23	114.3	0	32	31.4	37.0
25	USA10-05	U	2	19.05	28	139.7	0	32	31.4	37.0
99	CHI1-12	S	4	22.22	34.9	160			21.0	24.8
99	CHI1-13	S	4	22.22	34.9	160			21.0	24.8
99	CHI1-14	S	4	22.22	34.9	160			21.0	24.8
99	CHI1-15	S	4	22.22	34.9	160			21.0	24.8
99	CHI1-16	S	4	22.22	34.9	160			21.0	24.8
99	CHI1-17	S	4	22.22	34.9	160			21.0	24.8
99	CHI1-18	S	4	22.22	34.9	160			21.0	24.8
99	CHI1-19	S	4	22.22	34.9	160			21.0	24.8
99	CHI1-20	S	4	22	35	90			32.4	38.2
99	CHI1-21	S	4	22	35	90			32.4	38.2
99	CHI1-22	S	4	22	35	90			32.4	38.2
99	CHI1-23	S	4	22	35	90			32.4	38.2
99	CHI1-24	S	4	22	35	90			32.4	24.8
99	CHI1-25	S	4	22	35	90			21.0	24.8
99	CHI1-26	S	4	22	35	190			21.0	37.5
99	CHI1-27	S	4	22	35	190			21.0	37.5
10	GER7-01	S	4	15.9	31.8	67.3	350		15.6	18.4
10	GER7-02	S	4	15.9	31.8	67.3	350		27.3	33.2
10	GER7-03	S	4	22.2	34.9	185.3	350	16	18.8	22.2
10	GER7-04	S	4	22.2	34.9	185.3	350	16	19.2	22.6
10	GER7-05	S	4	22.2	34.9	185.3	350	16	21.2	25.0
10	GER7-06	S	4	22.2	34.9	185.3	350	16	20.3	24.0
12	GER7-07	S	4	22	35	185	350	16	24.2	28.6
10	GER7-08	S	4	22.2	34.9	185.3	350	16	23.4	27.6
10	GER7-09	S	4	22.2	34.9	185.3	350	16	23.4	27.6
12	GER7-10	S	4	22	35	185	350	16	24.2	28.6
12	GER7-11	S	4	22	35	185	350	16	21.8	25.7
10	GER7-15	S	4	15.9	31.8	67.3	350		15.9	18.8
10	GER7-16	S	4	15.9	31.8	67.3	350		33.0	38.9
12	GER7-17	S	4	22	35	185	350	16	25.4	30.0
12	GER7-18	S	4	22	35	185	350	16	23.9	28.2
12	GER7-19	S	4	22	35	185	350	16	23.9	28.2
12	GER7-20	S	4	22	35	185	350	16	23.9	28.2
12	GER7-21	S	4	22	35	185	350	16	23.6	27.8
12	GER7-22	S	4	22	35	185	350	16	25.4	30.0

**Group Anchors, Tension, Uncracked Concrete, Static Loading, No Edge,
Shallow Embedment (<=188 mm), (Continued)**

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)		Ultimate Load Nu (kN)	Failure Mode
USA02-28	999	999	95	999	94029.84	138127.7	UNKNOWN	56.7	Cone
USA02-29	999	999	76	999	238754	408788.8	UNKNOWN	73.7	Cone
USA02-30	999	999	95	999	90524.91	132200.8	UNKNOWN	77.3	Cone
USA10-01	999	999	88.9	999	94838.52	142257.8	ARKANSAS	105.675584	Cone
USA10-02	999	999	180.34	999	179419	235160.8	ARKANSAS	148.38528	Cone
USA10-03	999	999	233.68	999	273580.1	351289.6	ARKANSAS	275.415712	Cone
USA10-04	999	999	358.14	999	240386.6	235160.8	ARKANSAS	262.823424	Cone
USA10-05	999	999	358.14	999	325741.3	351289.6	ARKANSAS	292.38928	Cone
CHI1-12	999	999	100	100	336400	921600	ZHAO	209.1	Cone
CHI1-13	999	999	100	100	336400	921600	ZHAO	196	Cone
CHI1-14	999	999	200	200	462400	921600	ZHAO	302.9	Cone
CHI1-15	999	999	200	200	462400	921600	ZHAO	335.4	Cone
CHI1-16	999	999	300	300	608400	921600	ZHAO	467.6	Cone
CHI1-17	999	999	300	300	608400	921600	ZHAO	359.5	Cone
CHI1-18	999	999	400	400	774400	921600	ZHAO	476.6	Cone
CHI1-19	999	999	400	400	774400	921600	ZHAO	356.8	Cone
CHI1-20	999	999	100	100	136900	291600	ZHAO2	116.5	Cone
CHI1-21	999	999	100	100	136900	291600	ZHAO2	102.8	Cone
CHI1-22	999	999	100	100	136900	291600	ZHAO2	105.2	Cone
CHI1-23	999	999	100	100	136900	291600	ZHAO2	115.4	Cone
CHI1-24	999	999	100	100	136900	291600	ZHAO2	98.9	Cone
CHI1-25	999	999	100	100	136900	291600	ZHAO2	95.1	Cone
CHI1-26	999	999	175	175	555025	1299600	ZHAO2	395	Cone
CHI1-27	999	999	175	175	555025	1299600	ZHAO2	377.1	Cone
GER7-01	40	40	80	80	79467.61	163054.4	REVISED	72	Cone
GER7-02	40	40	80	80	79467.61	163054.4	REVISED	129.6	Cone
GER7-03	999	999	100	100	430204.8	1236099	UNKNOWN	240	Cone
GER7-04	999	999	100	100	430204.8	1236099	UNKNOWN	253	Cone
GER7-05	999	999	100	100	430204.8	1236099	UNKNOWN	253	Cone
GER7-06	999	999	100	100	430204.8	1236099	UNKNOWN	264	Cone
GER7-07	850	850	100	100	429025	1232100	UNKNOWN	275	Cone
GER7-08	999	999	100	100	430204.8	1236099	UNKNOWN	278	Cone
GER7-09	999	999	100	100	430204.8	1236099	UNKNOWN	280	Cone
GER7-10	850	850	100	100	429025	1232100	UNKNOWN	290	Cone
GER7-11	850	850	100	100	429025	1232100	UNKNOWN	303	Cone
GER7-15	60	60	120	120	103619.6	163054.4	REVISED	70.4	Cone
GER7-16	60	60	120	120	103619.6	163054.4	REVISED	157.6	Cone
GER7-17	375	375	150	150	497025	1232100	UNKNOWN	308	Cone
GER7-18	575	575	150	150	497025	1232100	UNKNOWN	311	Cone
GER7-19	575	575	150	150	497025	1232100	UNKNOWN	313	Cone
GER7-20	575	575	150	150	497025	1232100	UNKNOWN	318	Cone
GER7-21	375	375	150	150	497025	1232100	UNKNOWN	330	Cone
GER7-22	375	375	150	150	497025	1232100	UNKNOWN	335	Cone

**Group Anchors, Tension, Uncracked Concrete, Static Loading, No Edge,
Shallow Embedment (≤ 188 mm), (Continued)**

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
USA02-28	58094.95	0.98	60776.00	0.93	55486.23	1.02
USA02-29	113591.92	0.65	129056.92	0.57	124683.76	0.59
USA02-30	88138.08	0.88	91836.42	0.84	83733.47	0.92
USA10-01	102158.82	1.03	105784.65	1.00	86300.99	1.22
USA10-02	170446.19	0.87	184008.83	0.81	162515.91	0.91
USA10-03	235086.82	1.17	261119.83	1.05	248907.78	1.11
USA10-04	223400.34	1.18	241176.62	1.09	183437.75	1.43
USA10-05	279908.82	1.04	310905.33	0.94	273842.86	1.07
CHI1-12	221080.27	0.95	249774.08	0.84	266659.29	0.78
CHI1-13	221080.27	0.89	249774.08	0.78	266659.29	0.74
CHI1-14	303886.79	1.00	343327.99	0.88	409805.94	0.74
CHI1-15	303886.79	1.10	343327.99	0.98	409805.94	0.82
CHI1-16	399837.21	1.17	451731.72	1.04	553716.78	0.84
CHI1-17	399837.21	0.90	451731.72	0.80	553716.78	0.65
CHI1-18	508931.51	0.94	574985.28	0.83	596685.89	0.80
CHI1-19	508931.51	0.70	574985.28	0.62	596685.89	0.60
CHI1-20	148881.94	0.78	154506.34	0.75	158460.45	0.74
CHI1-21	148881.94	0.69	154506.34	0.67	158460.45	0.65
CHI1-22	148881.94	0.71	154506.34	0.68	158460.45	0.66
CHI1-23	148881.94	0.78	154506.34	0.75	158460.45	0.73
CHI1-24	119959.92	0.82	124491.72	0.79	127677.70	0.77
CHI1-25	119959.92	0.79	124491.72	0.76	127677.70	0.74
CHI1-26	411603.94	0.96	474021.18	0.83	567076.74	0.70
CHI1-27	411603.94	0.92	474021.18	0.80	567076.74	0.66
GER7-01	69361.69	1.04	68002.56	1.06	66272.23	1.09
GER7-02	93170.80	1.42	91345.12	1.42	89020.85	1.46
GER7-03	248566.27	0.97	285506.48	0.84	310582.77	0.77
GER7-04	250795.60	1.01	288067.13	0.88	313368.32	0.81
GER7-05	263776.26	0.96	302976.88	0.84	329587.61	0.77
GER7-06	258446.90	1.02	296855.50	0.89	322928.58	0.82
GER7-07	281583.95	0.98	323375.32	0.85	351798.52	0.78
GER7-08	277153.42	1.00	318342.06	0.87	346302.33	0.80
GER7-09	277153.42	1.01	318342.06	0.88	346302.33	0.81
GER7-10	281583.95	1.03	323375.32	0.90	351798.52	0.82
GER7-11	266926.35	1.14	306542.30	0.99	333485.96	0.91
GER7-15	91420.06	0.77	89628.69	0.79	91601.50	0.77
GER7-16	131503.52	1.20	128926.72	1.22	131764.52	1.20
GER7-17	334103.59	0.92	383689.68	0.80	445704.12	0.69
GER7-18	323925.45	0.96	372000.95	0.84	432126.18	0.72
GER7-19	323925.45	0.97	372000.95	0.84	432126.18	0.72
GER7-20	323925.45	0.98	372000.95	0.85	432126.18	0.74
GER7-21	321619.90	1.03	369353.22	0.89	429050.51	0.77
GER7-22	334103.59	1.00	383689.68	0.87	445704.12	0.75

Group Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Shallow Embedment (≤ 188 mm), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa) fcc200 (MPa)	
12	GER7-23	S	4	22	35	185	350	16	28.1	33.1
12	GER7-24	S	4	22	35	185	350	16	23.6	27.8
12	GER7-25	S	4	22	35	185	350	16	28.1	33.1
10	GER7-26	S	4	15.9	31.8	67.3	350		15.2	17.9
10	GER7-27	S	4	15.9	31.8	67.3	350		28.1	33.2
12	GER7-28	S	4	22	35	185	350	16	24.5	28.9
12	GER7-29	S	4	22	35	185	350	16	24.5	28.9
12	GER7-30	S	4	22	35	185	350	16	24.5	28.9
12	GER7-31	S	4	22	35	185	350	16	20.3	24.0
12	GER7-32	S	4	22	35	185	350	16	20.3	24.0
6	USA03-01	E-SD	4	12.7	12.7	51.6			34.5	40.7
6	USA03-02	E-SD	4	12.7	12.7	51.6			26.9	31.7
6	USA03-03	E-SD	4	12.7	12.7	51.6			28.0	33.0
6	USA03-04	E-SD	4	12.7	12.7	51.6			20.7	24.4
6	USA03-05	E-SD	4	12.7	12.7	51.6			33.1	39.1
6	USA03-06	E-SD	4	19	19	82.6			34.5	40.7
6	USA03-07	E-SD	4	19	19	82.6			28.0	33.0
6	USA03-08	E-SD	4	19	19	82.6			20.7	24.4
6	USA03-09	E-SD	4	19	19	82.6			33.1	39.1
6	USA03-10	E-TC	4	12.7	12.7	88.9			34.5	40.7
6	USA07-01	S	4	15.9	63.5	161.9	345		27.5	32.5
6	USA07-02	S	4	15.9	63.5	161.9	345		27.5	32.5
6	USA07-03	S	4	15.9	63.5	161.9	345		30.3	35.8
25	USA08-01	U	4	9.525	9.525	117.475	861.875		29.4	34.7
25	USA08-02	U	4	9.525	9.525	117.475	861.875		29.4	34.7
25	USA08-07	U	4	12.7	12.7	153.9875	861.875		29.4	34.7
25	USA08-08	U	4	12.7	12.7	153.9875	861.875		29.4	34.7
25	USA11-01	U	4	6.35	12.7	38.1		32	43.8	51.7
25	USA11-03	U	4	9.525	15.875	63.5		32	31.6	37.3
25	USA11-04	U	4	12.7	18	88.9		32	30.2	35.6
25	USA11-05	U	4	12.7	18	88.9		32	31.6	37.3
25	USA11-06	U	4	12.7	18	88.9		32	30.2	35.6
25	USA11-07	U	4	12.7	18	88.9		32	31.6	37.3
25	USA11-08	U	4	15.875	23	114.3		32	31.6	37.3
25	USA11-09	U	4	15.875	23	114.3		32	31.6	37.3
25	USA11-10	U	4	19.05	28	139.7		32	30.2	35.6
25	USA11-11	U	4	19.05	28	139.7		32	30.2	35.6
25	USA11-12	U	4	19.05	28	139.7		32	30.2	35.6
25	USA11-13	U	4	19.05	28	139.7		32	30.2	35.6
25	USA11-14	U	4	19.05	28	139.7		32	31.6	37.3
25	USA11-15	U	4	19.05	28	139.7		32	31.6	37.3

**Group Anchors, Tension, Uncracked Concrete, Static Loading, No Edge,
Shallow Embedment (≤ 188 mm), (Continued)**

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)		Ultimate Load Nu (kN)	Failure Mode
GER7-23	375	375	150	150	497025	1232100	UNKNOWN	335	Cone
GER7-24	375	375	150	150	497025	1232100	UNKNOWN	342	Cone
GER7-25	375	375	150	150	497025	1232100	UNKNOWN	351	Cone
GER7-26	80	80	160	160	130971.6	163054.4	REVISED	118	Cone
GER7-27	80	80	160	160	130971.6	163054.4	REVISED	183.2	Cone
GER7-28	640	640	270	270	680625	1232100	UNKNOWN	390	Cone
GER7-29	640	640	270	270	680625	1232100	UNKNOWN	433	Cone
GER7-30	640	640	270	270	680625	1232100	UNKNOWN	439	Cone
GER7-31	530	530	400	400	912025	1232100	UNKNOWN	627	Cone
GER7-32	530	530	400	400	912025	1232100	UNKNOWN	628	Cone
USA03-01	999	999	76	76	53268.64	95852.16	UNKNOWN	111.4	Cone
USA03-02	999	999	127	127	79411.24	95852.16	UNKNOWN	109.4	Cone
USA03-03	999	999	127	127	79411.24	95852.16	UNKNOWN	105	Cone
USA03-04	999	999	178	178	110755.8	95852.16	UNKNOWN	128.1	Cone
USA03-05	999	999	178	178	110755.8	95852.16	UNKNOWN	145.8	Cone
USA03-06	999	999	102	102	122360	245619.4	UNKNOWN	209.8	Cone
USA03-07	999	999	165	165	170403.8	245619.4	UNKNOWN	178	Cone
USA03-08	999	999	229	229	227338.2	245619.4	UNKNOWN	223.4	Cone
USA03-09	999	999	229	229	227338.2	245619.4	UNKNOWN	280.4	Cone
USA03-10	999	999	102	102	135939.7	284515.6	UNKNOWN	175.6	Cone
USA07-01	406	406	51	51	288046.9	943618	UNKNOWN	265.5	Cone
USA07-02	381	381	76	76	315506.9	943618	UNKNOWN	280.2	Cone
USA07-03	356	356	102	102	345391.3	943618	UNKNOWN	281.6	Cone
USA08-01	999	999	101.6	101.6	206138.7	496813.5	PERRY TESTS	212.7	Cone
USA08-02	999	999	101.6	101.6	206138.7	496813.5	PERRY TESTS	203.4	Cone
USA08-07	999	999	101.6	101.6	317602.7	853637.4	PERRY TESTS	314.4	Cone
USA08-08	999	999	101.6	101.6	317602.7	853637.4	PERRY TESTS	296.8	Cone
USA11-01	999	999	76.2	76.2	36290.25	52257.96	ARKANSAS	59.8	Cone
USA11-03	999	999	127	127	100806.3	145161	ARKANSAS	145.6	Cone
USA11-04	999	999	88.9	88.9	126451.4	284515.6	ARKANSAS	127.3	Cone
USA11-05	999	999	165.1	165.1	186451.2	284515.6	ARKANSAS	248.0	Cone
USA11-06	999	999	177.8	177.8	197580.3	284515.6	ARKANSAS	238.2	Cone
USA11-07	999	999	254	254	271128.5	284515.6	ARKANSAS	271.6	Cone
USA11-08	999	999	190.5	190.5	284515.6	470321.6	ARKANSAS	276.5	Cone
USA11-09	999	999	254	254	356289.6	470321.6	ARKANSAS	405.2	Cone
USA11-10	999	999	203.2	203.2	387257.3	702579.2	ARKANSAS	348.5	Cone
USA11-11	999	999	241.3	241.3	436128.2	702579.2	ARKANSAS	424.1	Cone
USA11-12	999	999	304.8	304.8	524031.2	702579.2	ARKANSAS	464.7	Cone
USA11-13	999	999	355.6	355.6	600160.1	702579.2	ARKANSAS	522.8	Cone
USA11-14	999	999	254	254	453063.6	702579.2	ARKANSAS	424.4	Cone
USA11-15	999	999	254	254	453063.6	702579.2	ARKANSAS	427.1	Cone

**Group Anchors, Tension, Uncracked Concrete, Static Loading, No Edge,
Shallow Embedment (≤ 188 mm), (Continued)**

Test Number	Comparison of Actual Test Results with different Methods					
	CC		Theoretical		ACI	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
GER7-23	350941.33	0.95	403026.39	0.83	468166.16	0.72
GER7-24	321619.90	1.06	369353.22	0.93	429050.51	0.80
GER7-25	350941.33	1.00	403026.39	0.87	468166.16	0.75
GER7-26	112752.01	1.05	110542.65	1.07	107405.48	1.10
GER7-27	153556.01	1.20	150547.10	1.22	146274.61	1.25
GER7-28	449054.55	0.87	515701.12	0.76	655966.11	0.59
GER7-29	449054.55	0.96	515701.12	0.84	655966.11	0.66
GER7-30	449054.55	0.98	515701.12	0.85	655966.11	0.67
GER7-31	548345.96	1.14	629728.89	1.00	764836.06	0.82
GER7-32	548345.96	1.15	629728.89	1.00	764836.06	0.82
USA03-01	70872.14	1.57	66222.33	1.68	62568.95	1.78
USA03-02	93243.45	1.17	87125.90	1.26	71775.86	1.52
USA03-03	95136.18	1.10	88894.44	1.18	73232.82	1.43
USA03-04	98742.37	1.30	92264.04	1.39	62971.45	2.03
USA03-05	124996.26	1.17	116795.45	1.25	79714.47	1.83
USA03-06	128670.32	1.63	133151.96	1.58	139421.09	1.50
USA03-07	161353.32	1.10	166973.32	1.07	177789.20	1.00
USA03-08	185101.09	1.21	191548.23	1.17	159278.36	1.40
USA03-09	234316.27	1.20	242477.59	1.16	201627.72	1.39
USA03-10	137792.06	1.27	144535.61	1.21	146912.49	1.20
USA07-01	215431.69	1.23	243733.14	1.09	256468.19	1.04
USA07-02	235969.16	1.19	266968.63	1.05	295294.56	0.95
USA07-03	271117.54	1.04	306734.48	0.92	354241.55	0.79
USA08-01	187127.25	1.14	202853.17	1.05	189566.93	1.12
USA08-02	187127.25	1.09	202853.17	1.00	189566.93	1.07
USA08-07	251820.84	1.25	283191.14	1.11	278680.10	1.13
USA08-08	251820.84	1.18	283191.14	1.05	278680.10	1.06
USA11-01	70570.23	0.85	60067.99	1.00	50012.60	1.20
USA11-03	129045.61	1.13	124933.58	1.17	113109.93	1.29
USA11-04	133566.62	0.95	138307.18	0.92	128739.70	0.99
USA11-05	201723.75	1.23	208883.35	1.19	206770.33	1.20
USA11-06	208697.85	1.14	216104.97	1.10	210604.35	1.13
USA11-07	293337.04	0.93	303748.19	0.89	223142.38	1.22
USA11-08	271472.31	1.02	293073.74	0.94	317091.59	0.87
USA11-09	339955.97	1.19	367006.74	1.10	368484.61	1.10
USA11-10	326307.24	1.07	362441.81	0.96	416206.00	0.84
USA11-11	367486.38	1.15	408181.03	1.04	474362.06	0.89
USA11-12	441554.45	1.05	490451.25	0.95	536544.99	0.87
USA11-13	505701.48	1.03	561701.78	0.93	537050.03	0.97
USA11-14	391024.18	1.09	434325.36	0.98	503153.91	0.84
USA11-15	391024.18	1.09	434325.36	0.98	503153.91	0.85
	Mean	1.081	Mean	1.057	Mean	1.188
	COV	0.192	COV	0.225	COV	0.331

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Deep Embedment (>188mm)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc fcc200 (MPa)	
99	CHI1-10	S	1	22	35	190			21.0	24.8
99	CHI1-11	S	1	22	35	190			21.0	24.8
99	CHI1-9	S	1	22	35	190			21.0	24.8
13	USA05-12	S	1	22.2	34.9	193.6	345		33.7	39.8
7	GER3-357	UE	1	24	32	200	640	16	35.6	42.0
99	USA12-1	S	1	19.5	31.75	203.6			36.5	43.1
99	USA12-2	S	1	19.5	31.75	203.6			36.5	43.1
99	USA12-3	S-U	1	22.22	34.9	203.6			33.7	39.8
7	GER3-358	UE	1	24	24	220	1144	16	28.1	33.2
7	GER3-359	UE	1	24	32.3	220	900	16	35.6	42.0
7	GER3-360	UE	1	24	24	220	1144	16	23.4	27.6
25	USA09-54	U	1	31.75	50.8	241.3	0	32	31.3	36.9
25	USA09-55	U	1	31.75	50.8	241.3	0	32	31.3	36.9
10	GER4-149	S	1	30	45	250	953	16	37.3	44.0
10	GER4-150	S	1	30	45	250	953	16	28.8	34.0
10	GER4-151	S	1	30	45	250	953	16	37.3	44.0
10	GER4-152	S	1	30	45	250	953	16	37.3	44.0
10	GER4-153	S	1	30	45	250	953	16	28.8	34.0
10	GER4-154	S	1	30	45	250	953	16	60.1	70.9
10	GER4-155	S	1	30	45	250	953	16	59.7	70.4
10	GER4-156	S	1	30	45	250	953	16	60.1	70.9
10	GER4-157	S	1	30	45	250	953	16	60.9	71.9
10	GER4-158	S	1	30	45	250	953	16	60.9	71.9
10	GER4-159	S	1	30	45	250	953	16	60.9	71.9
13	USA05-13	S	1	25.4	41.2	251.4	827		29.7	35.1
11	GER4-160	S	1	30	45	260	900	16	18.8	22.2
11	GER4-161	S	1	30	45	260	900	16	18.8	22.2
11	GER4-162	S	1	30	45	260	900	16	18.8	22.2
11	GER4-163	S	1	30	45	260	900	16	18.8	22.2
11	GER4-164	S	1	30	45	260	900	16	18.8	22.2
11	GER4-165	S	1	30	45	260	900	16	18.8	22.2
11	GER4-166	S	1	30	45	260	900	16	18.8	22.2
11	GER4-167	S	1	30	45	260	900	16	18.8	22.2
11	GER4-168	S	1	30	45	260	900	16	23.5	27.7
25	USA09-53	U	1	31.75	50.8	279.4	0	32	36.0	42.5
25	USA09-57	U	1	31.75	50.8	279.4	0	32	36.0	42.5
25	USA09-59	U	1	31.75	50.8	279.4	0	32	36.0	42.5
25	USA09-60	U	1	31.75	50.8	279.4	0	32	36.0	42.5
25	USA09-58	U	1	31.75	50.8	304.8	0	32	29.5	34.8
11	GER4-169	S	1	40	60	355	900	16	18.8	22.2
11	GER4-170	S	1	40	60	355	900	16	18.8	22.2
11	GER4-171	S	1	40	60	355	900	16	18.8	22.2
11	GER4-172	S	1	40	60	355	900	16	18.8	22.2

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Deep Embedment (>188mm), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
CHI1-10	900	999	999	999	324900	324900	ZHAO	180.2	Cone
CHI1-11	900	999	999	999	324900	324900	ZHAO	187.8	Cone
CHI1-9	900	999	999	999	324900	324900	ZHAO	201.6	Cone
USA05-12	305	999	999	999	337328.6	337328.6	MSF B1-1	191.2	Cone
GER3-357	999	999	999	999	360000	360000	UNKNOWN	258.8	Cone
USA12-1	999	999	999	999	373076.6	373076.6	KLINGNER	272	Cone
USA12-2	999	999	999	999	373076.6	373076.6	KLINGNER	280.6	Cone
USA12-3	999	999	999	999	373076.6	373076.6	KLINGNER	329.2	Cone
GER3-358	330	999	999	999	435600	435600	UNKNOWN	235.3	Cone
GER3-359	999	999	999	999	435600	435600	UNKNOWN	257.2	Cone
GER3-360	999	999	999	999	435600	435600	UNKNOWN	240.3	Cone
USA09-54	999	999	999	999	524031.2	524031.2	ARKANSAS	497.7	Cone
USA09-55	999	999	999	999	524031.2	524031.2	ARKANSAS	542.5	Cone
GER4-149	999	999	999	999	562500	562500	UNKNOWN	411.8	Cone
GER4-150	999	999	999	999	562500	562500	UNKNOWN	412.1	Cone
GER4-151	999	999	999	999	562500	562500	UNKNOWN	415.1	Cone
GER4-152	999	999	999	999	562500	562500	UNKNOWN	435.6	Cone
GER4-153	999	999	999	999	562500	562500	UNKNOWN	436.4	Cone
GER4-154	999	999	999	999	562500	562500	UNKNOWN	499	Cone
GER4-155	999	999	999	999	562500	562500	UNKNOWN	535	Cone
GER4-156	999	999	999	999	562500	562500	UNKNOWN	559.1	Cone
GER4-157	999	999	999	999	562500	562500	UNKNOWN	617.5	Cone
GER4-158	999	999	999	999	562500	562500	UNKNOWN	620.5	Cone
GER4-159	999	999	999	999	562500	562500	UNKNOWN	624.2	Cone
USA05-13	457	999	999	999	568817.6	568817.6	CBF	435.9	Cone
GER4-160	545	999	999	999	608400	608400	UNKNOWN	294.3	Cone
GER4-161	547	999	999	999	608400	608400	UNKNOWN	302.1	Cone
GER4-162	550	999	999	999	608400	608400	UNKNOWN	262.3	Cone
GER4-163	550	999	999	999	608400	608400	UNKNOWN	266.6	Cone
GER4-164	550	999	999	999	608400	608400	UNKNOWN	270.7	Cone
GER4-165	550	999	999	999	608400	608400	UNKNOWN	273.6	Cone
GER4-166	550	999	999	999	608400	608400	UNKNOWN	278	Cone
GER4-167	550	999	999	999	608400	608400	UNKNOWN	285.9	Cone
GER4-168	700	999	999	999	608400	608400	UNKNOWN	290	Cone
USA09-53	999	999	999	999	702579.2	702579.2	ARKANSAS	662.0	Cone
USA09-57	999	999	999	999	702579.2	702579.2	ARKANSAS	527.6	Cone
USA09-59	999	999	999	999	702579.2	702579.2	ARKANSAS	647.1	Cone
USA09-60	999	999	999	999	702579.2	702579.2	ARKANSAS	632.1	Cone
USA09-58	999	999	999	999	836127.4	836127.4	ARKANSAS	696.6	Cone
GER4-169	726	999	999	999	1134225	1134225	UNKNOWN	450.6	Cone
GER4-170	731	999	999	999	1134225	1134225	UNKNOWN	452	Cone
GER4-171	731	999	999	999	1134225	1134225	UNKNOWN	465.7	Cone
GER4-172	731	999	999	999	1134225	1134225	UNKNOWN	468	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Deep Embedment (>188mm), (Continued)

Test Number	Comparison of Actual Test Results with different Methods							
	CC		Theoretical		ACI		CC Variation	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
CHI1-10	195941.71	0.92	225655.08	0.80	204498.48	0.88	195941.71	0.92
CHI1-11	195941.71	0.96	225655.08	0.83	204498.48	0.92	195941.71	0.96
CHI1-9	195941.71	1.03	225655.08	0.89	204498.48	0.99	195941.71	1.03
USA05-12	255311.41	0.75	294599.02	0.65	268078.02	0.71	255311.41	0.75
GER3-357	275385.01	0.94	318810.29	0.81	288848.91	0.90	275385.01	0.94
USA12-1	286533.86	0.95	332305.29	0.82	302175.14	0.90	286533.86	0.95
USA12-2	286533.86	0.98	332305.29	0.84	302175.14	0.93	286533.86	0.98
USA12-3	275346.05	1.20	319330.32	1.03	294263.10	1.12	275346.05	1.20
GER3-358	282470.91	0.83	330027.57	0.71	297104.80	0.79	282470.91	0.83
GER3-359	317708.86	0.81	371198.17	0.69	345535.51	0.74	317708.86	0.81
GER3-360	257548.62	0.93	300909.37	0.80	270891.37	0.89	257548.62	0.93
USA09-54	342060.89	1.46	402957.16	1.24	411257.45	1.21	342060.89	1.46
USA09-55	342060.89	1.59	402957.16	1.35	411257.45	1.32	342060.89	1.59
GER4-149	393919.07	1.05	465439.70	0.88	469911.94	0.88	393919.07	1.05
GER4-150	346274.20	1.19	409144.34	1.01	413075.65	1.00	346274.20	1.19
GER4-151	393919.07	1.05	465439.70	0.89	469911.94	0.88	393919.07	1.05
GER4-152	393919.07	1.11	465439.70	0.94	469911.94	0.93	393919.07	1.11
GER4-153	346274.20	1.26	409144.34	1.07	413075.65	1.06	346274.20	1.26
GER4-154	500038.90	1.00	590826.82	0.84	596503.86	0.84	500038.90	1.00
GER4-155	498272.59	1.07	588739.83	0.91	594396.81	0.90	498272.59	1.07
GER4-156	500038.90	1.12	590826.82	0.95	596503.86	0.94	500038.90	1.12
GER4-157	503552.92	1.23	594978.85	1.04	600695.78	1.03	503552.92	1.23
GER4-158	503552.92	1.23	594978.85	1.04	600695.78	1.03	503552.92	1.23
GER4-159	503552.92	1.24	594978.85	1.05	600695.78	1.04	503552.92	1.24
USA05-13	354790.62	1.23	419401.69	1.04	418621.25	1.04	355127.62	1.23
GER4-160	296761.23	0.99	351771.00	0.84	358903.58	0.82	298746.52	0.99
GER4-161	296761.23	1.02	351771.00	0.86	358903.58	0.84	298746.52	1.01
GER4-162	296761.23	0.88	351771.00	0.75	358903.58	0.73	298746.52	0.88
GER4-163	296761.23	0.90	351771.00	0.76	358903.58	0.74	298746.52	0.89
GER4-164	296761.23	0.91	351771.00	0.77	358903.58	0.75	298746.52	0.91
GER4-165	296761.23	0.92	351771.00	0.78	358903.58	0.76	298746.52	0.92
GER4-166	296761.23	0.94	351771.00	0.79	358903.58	0.77	298746.52	0.93
GER4-167	296761.23	0.96	351771.00	0.81	358903.58	0.80	298746.52	0.96
GER4-168	331490.10	0.87	392937.46	0.74	400904.74	0.72	333707.72	0.87
USA09-53	457249.93	1.45	545069.77	1.21	577530.57	1.15	465974.73	1.42
USA09-57	457249.93	1.15	545069.77	0.97	577530.57	0.91	465974.73	1.13
USA09-59	457249.93	1.42	545069.77	1.19	577530.57	1.12	465974.73	1.39
USA09-60	457249.93	1.38	545069.77	1.16	577530.57	1.09	465974.73	1.36
USA09-58	471486.54	1.48	565629.45	1.23	614017.89	1.13	487643.08	1.43
GER4-169	473466.96	0.95	573750.90	0.79	666777.68	0.68	502549.36	0.90
GER4-170	473466.96	0.95	573750.90	0.79	666777.68	0.68	502549.36	0.90
GER4-171	473466.96	0.98	573750.90	0.81	666777.68	0.70	502549.36	0.93
GER4-172	473466.96	0.99	573750.90	0.82	666777.68	0.70	502549.36	0.93

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Deep Embedment (>188mm), (Continued)

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
11	GER4-173	S	1	40	60	355	900	16	18.8	22.2
11	GER4-174	S	1	40	60	355	900	16	18.8	22.2
11	GER4-175	S	1	40	60	355	900	16	18.8	22.2
11	GER4-176	S	1	40	60	355	900	16	18.8	22.2
11	GER4-177	S	1	40	60	355	900	16	18.8	22.2
11	GER4-178	S	1	40	60	355	900	16	18.8	22.2
99	CSFR1-47	S-U	1	72	72	450			27.6	32.6
99	CSFR1-48	S-U	1	72	72	450			25.2	29.7
99	CSFR1-49	S-U	1	72	72	450			28.1	33.2
99	CSFR1-50	S-U	1	72	72	450			24.8	29.3
99	CSFR1-51	S-U	1	72	72	450			24.0	28.3
99	CSFR1-52	S-U	1	72	72	450			29.2	34.4
11	GER4-180	S	1	50	80	525	900	16	16.2	19.1
11	GER4-181	S	1	50	80	525	900	16	16.2	19.1
11	GER4-182	S	1	50	80	525	900	16	16.2	19.1
11	GER4-183	S	1	50	80	525	900	16	20.1	23.7
11	GER4-184	S	1	50	80	525	900	16	20.1	23.7
11	GER4-185	S	1	50	80	525	900	16	16.2	19.1
11	GER4-186	S	1	50	80	525	900	16	20.1	23.7
11	GER4-187	S	1	50	80	525	900	16	20.1	23.7
11	GER4-188	S	1	50	80	525	900	16	23.5	27.7
11	GER4-189	S	1	50	80	525	900	16	16.2	19.1
11	GER4-190	S	1	50	80	525	900	16	20.1	23.7
11	GER4-191	S	1	50	80	525	900	16	20.1	23.7
11	GER4-192	S	1	50	80	525	900	16	16.2	19.1
30	BUCK1-14	U	1	31.75	31.75	203.2			22.9	27.0
30	BUCK-22	U	1	31.75	31.75	203.2			20.5	24.2
30	BUCK-26	U	1	31.75	31.75	203.2			18.2	21.5
30	BUCK-27	U	1	31.75	31.75	203.2			24.8	29.3
30	BUCK-24	U	1	31.75	31.75	304.8			20.7	24.4
30	BUCK-25	U	1	31.75	31.75	304.8			20.7	24.4
30	BUCK-29	U	1	31.75	31.75	304.8			21.2	25.1
30	BUCK-12	S	1	31.75	47.62	203.2			19.7	23.2
30	BUCK-13	S	1	31.75	47.62	304.8			20.3	23.9

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Deep Embedment (>188mm), (Continued)

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
GER4-173	731	999	999	999	1134225	1134225	UNKNOWN	479.7	Cone
GER4-174	733	999	999	999	1134225	1134225	UNKNOWN	470.5	Cone
GER4-175	733	999	999	999	1134225	1134225	UNKNOWN	475.6	Cone
GER4-176	738	999	999	999	1134225	1134225	UNKNOWN	421.6	Cone
GER4-177	999	999	999	999	1134225	1134225	UNKNOWN	395	Cone
GER4-178	999	999	999	999	1134225	1134225	UNKNOWN	439.3	Cone
CSFR1-47	999	999	999	999	1822500	1822500	K	1087	Cone
CSFR1-48	999	999	999	999	1822500	1822500	K	1108	Cone
CSFR1-49	999	999	999	999	1822500	1822500	K	1162	Cone
CSFR1-50	999	999	999	999	1822500	1822500	K	937.2	Cone
CSFR1-51	999	999	999	999	1822500	1822500	K	989	Cone
CSFR1-52	999	999	999	999	1822500	1822500	K	1221	Cone
GER4-180	999	999	999	999	2480625	2480625	UNKNOWN	731.3	Cone
GER4-181	999	999	999	999	2480625	2480625	UNKNOWN	770.1	Cone
GER4-182	999	999	999	999	2480625	2480625	UNKNOWN	841.9	Cone
GER4-183	999	999	999	999	2480625	2480625	UNKNOWN	843.6	Cone
GER4-184	999	999	999	999	2480625	2480625	UNKNOWN	860.3	Cone
GER4-185	999	999	999	999	2480625	2480625	UNKNOWN	861.7	Cone
GER4-186	999	999	999	999	2480625	2480625	UNKNOWN	884	Cone
GER4-187	999	999	999	999	2480625	2480625	UNKNOWN	917.6	Cone
GER4-188	999	999	999	999	2480625	2480625	UNKNOWN	885.2	Cone
GER4-189	999	999	999	999	2480625	2480625	UNKNOWN	838.6	Cone
GER4-190	999	999	999	999	2480625	2480625	UNKNOWN	852.4	Cone
GER4-191	999	999	999	999	2480625	2480625	UNKNOWN	919.3	Cone
GER4-192	999	999	999	999	2480625	2480625	UNKNOWN	767.2	Cone
BUCK1-14	999	999	999	999	371612.2	371612.2	BUCKNELL	318.62	Cone
BUCK-22	999	999	999	999	371612.2	371612.2	BUCKNELL	347.1	Cone
BUCK-26	999	999	999	999	371612.2	371612.2	BUCKNELL	315.95	Cone
BUCK-27	999	999	999	999	371612.2	371612.2	BUCKNELL	302.6	Cone
BUCK-24	999	999	999	999	836127.4	836127.4	BUCKNELL	525.1	Cone
BUCK-25	999	999	999	999	836127.4	836127.4	BUCKNELL	577.17	Cone
BUCK-29	999	999	999	999	836127.4	836127.4	BUCKNELL	551.36	Cone
BUCK-12	999	999	999	999	371612.2	371612.2	BUCKNELL	239.41	Cone
BUCK-13	999	999	999	999	836127.4	836127.4	BUCKNELL	489.5	Cone

Single Anchors, Tension, Uncracked Concrete, Static Loading, No Edge, Deep Embedment (>188mm), (Continued)

Test Number	Comparison of Actual Test Results with different Methods							
	CC		Theoretical		ACI		CC Variation	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
GER4-173	473466.96	1.01	573750.90	0.84	666777.68	0.72	502549.36	0.95
GER4-174	473466.96	0.99	573750.90	0.82	666777.68	0.71	502549.36	0.94
GER4-175	473466.96	1.00	573750.90	0.83	666777.68	0.71	502549.36	0.95
GER4-176	473466.96	0.89	573750.90	0.73	666777.68	0.63	502549.36	0.84
GER4-177	473466.96	0.83	573750.90	0.69	666777.68	0.59	502549.36	0.79
GER4-178	473466.96	0.93	573750.90	0.77	666777.68	0.66	502549.36	0.87
CSFR1-47	818838.45	1.33	1005463.99	1.08	1288308.68	0.84	904887.48	1.20
CSFR1-48	781569.59	1.42	959701.00	1.15	1229672.20	0.90	863702.16	1.28
CSFR1-49	826339.42	1.41	1014674.54	1.15	1300110.22	0.89	913176.70	1.27
CSFR1-50	776288.66	1.21	953216.46	0.98	1221363.51	0.77	857866.27	1.09
CSFR1-51	762926.41	1.30	936808.75	1.06	1200340.19	0.82	843099.83	1.17
CSFR1-52	841140.71	1.45	1032849.26	1.18	1323397.63	0.92	929533.41	1.31
GER4-180	789816.67	0.93	976830.17	0.75	1333397.01	0.55	895990.91	0.82
GER4-181	789816.67	0.98	976830.17	0.79	1333397.01	0.58	895990.91	0.86
GER4-182	789816.67	1.07	976830.17	0.86	1333397.01	0.63	895990.91	0.94
GER4-183	879799.65	0.96	1088119.40	0.78	1485309.52	0.57	998070.21	0.85
GER4-184	879799.65	0.98	1088119.40	0.79	1485309.52	0.58	998070.21	0.86
GER4-185	789816.67	1.09	976830.17	0.88	1333397.01	0.65	895990.91	0.96
GER4-186	879799.65	1.00	1088119.40	0.81	1485309.52	0.60	998070.21	0.89
GER4-187	879799.65	1.04	1088119.40	0.84	1485309.52	0.62	998070.21	0.92
GER4-188	951151.06	0.93	1176365.46	0.75	1605767.55	0.55	1079013.32	0.82
GER4-189	789816.67	1.06	976830.17	0.86	1333397.01	0.63	895990.91	0.94
GER4-190	879799.65	0.97	1088119.40	0.78	1485309.52	0.57	998070.21	0.85
GER4-191	879799.65	1.04	1088119.40	0.84	1485309.52	0.62	998070.21	0.92
GER4-192	789816.67	0.97	976830.17	0.79	1333397.01	0.58	895990.91	0.86
BUCK1-14	226161.41	1.41	262237.95	1.22	238335.95	1.34	226161.41	1.41
BUCK-22	214250.83	1.62	248427.44	1.40	225784.21	1.54	214250.83	1.62
BUCK-26	201684.89	1.57	233857.01	1.35	212541.83	1.49	201684.89	1.57
BUCK-27	235509.24	1.28	273076.92	1.11	248186.99	1.22	235509.24	1.28
BUCK-24	394981.72	1.33	473848.71	1.11	486829.14	1.08	408516.65	1.29
BUCK-25	394981.72	1.46	473848.71	1.22	486829.14	1.19	408516.65	1.41
BUCK-29	400206.04	1.38	480116.19	1.15	493268.30	1.12	413919.99	1.33
BUCK-12	209559.13	1.14	242987.33	0.99	235756.87	1.02	209559.13	1.14
BUCK-13	390997.24	1.25	469068.65	1.04	504642.95	0.97	404395.63	1.21
	Mean =	1.110	Mean =	0.929	Mean =	0.867	Mean =	1.068
	COV =	0.189	COV =	0.193	COV =	0.257	COV =	0.201

**Single Anchors, Tension, Uncracked Concrete, Static Loading, Edge Effect,
Deep Embedment (>188mm)**

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
14	SWE03-08	E-TC	1	30	105	315	736		48.1	56.7
14	SWE03-02	E-TC	1	27	45	322	736		26.2	30.9
14	SWE03-03	E-TC	1	27	45	329	736		26.2	30.9
14	SWE03-05	E-TC	1	30	52	344	736		26.2	30.9
14	SWE03-06	E-TC	1	30	52	344	736		26.2	30.9
6	USA01-16	UE	1	15	15	193.8			25.0	29.5
6	USA01-25	UE	1	15	15	193.8			21.4	25.2
6	USA01-27	UE	1	15	15	193.8			21.2	25.0
6	USA01-30	UE	1	15	15	193.8			21.4	25.2
7	GER1-35	UE	1	24	24	220	1144	16	23.4	27.6
6	USA01-18	UE	1	19	19	222.3			25.0	29.5
6	USA01-26	UE	1	19	19	222.3			25.0	29.5
6	USA01-28	UE	1	19	19	222.3			25.0	29.5
6	USA01-29	UE	1	19	19	222.3			25.0	29.5
25	USA12-11	U	1	31.75	50.8	241.3		32	31.3	36.9
11	GER5-46	S	1	30	45	260	900	16	20.1	23.7
11	GER5-47	S	1	30	45	260	900	16	20.1	23.7
11	GER5-48	S	1	30	45	260	900	16	20.1	23.7
11	GER5-49	S	1	30	45	260	900	16	20.1	23.7
11	GER5-56	S	1	30	45	260	900	16	16.2	19.1
11	GER5-57	S	1	30	45	260	900	16	16.2	19.1
25	USA12-12	U	1	31.75	50.8	279.4		32	36.0	42.5
25	USA12-13	U	1	31.75	50.8	279.4		32	36.0	42.5
25	USA12-14	U	1	31.75	50.8	279.4		32	36.0	42.5
25	USA12-15	U	1	31.75	50.8	279.4		32	36.0	42.5
25	USA12-16	U	1	31.75	50.8	279.4		32	36.0	42.5
11	GER5-50	S	1	40	60	355	900	16	20.1	23.7
11	GER5-51	S	1	40	60	355	900	16	20.1	23.7
11	GER5-58	S	1	40	60	355	900	16	16.2	19.1
11	GER5-59	S	1	40	60	355	900	16	16.2	19.1
11	GER5-60	S	1	40	60	355	900	16	16.2	19.1
11	GER5-61	S	1	40	60	355	900	16	16.2	19.1
99	GER4-179	S	1	50	80	525	900	16	23.5	27.7

**Single Anchors, Tension, Uncracked Concrete, Static Loading, Edge Effect,
Deep Embedment (>188mm), (Continued)**

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)			
SWE03-08	150	999	999	999	588262.5	893025	UNKNOWN	344	Cone
SWE03-02	150	999	999	999	611478	933156	UNKNOWN	266	Cone
SWE03-03	300	999	999	999	783184.5	974169	UNKNOWN	374	Cone
SWE03-05	150	999	999	999	687312	1065024	UNKNOWN	322	Cone
SWE03-06	300	999	999	999	842112	1065024	UNKNOWN	408	Cone
USA01-16	111	999	999	999	233548.4	338026	UNKNOWN	131.4	Cone
USA01-25	127	999	999	999	242850.8	338026	UNKNOWN	130.6	Cone
USA01-27	143	999	999	999	252153.2	338026	UNKNOWN	129.9	Cone
USA01-30	159	999	999	999	261455.6	338026	UNKNOWN	131.4	Cone
GER1-35	220	999	999	999	363000	435600	UNKNOWN	223.4	Cone
USA01-18	114	999	999	999	298404.4	444755.6	UNKNOWN	164.6	Cone
USA01-26	133	999	999	999	311075.5	444755.6	UNKNOWN	164.6	Cone
USA01-28	152	999	999	999	323746.6	444755.6	UNKNOWN	169	Cone
USA01-29	152	999	999	999	323746.6	444755.6	UNKNOWN	197.9	Cone
USA12-11	146.05	999	999	999	367741.2	524031.2	ARKANSAS	278.729	Cone
GER5-46	220	999	999	999	475800	608400	UNKNOWN	199.6	Cone
GER5-47	220	999	999	999	475800	608400	UNKNOWN	208.5	Cone
GER5-48	220	999	999	999	475800	608400	UNKNOWN	208.7	Cone
GER5-49	220	999	999	999	475800	608400	UNKNOWN	225.6	Cone
GER5-56	270	999	999	999	514800	608400	UNKNOWN	212	Cone
GER5-57	270	999	999	999	514800	608400	UNKNOWN	218	Cone
USA12-12	146.05	999	999	999	473708.7	702579.2	ARKANSAS	283.707	Cone
USA12-13	146.05	999	999	999	473708.7	702579.2	ARKANSAS	288.684	Cone
USA12-14	228.6	999	999	999	542902.1	702579.2	ARKANSAS	477.822	Cone
USA12-15	304.8	999	999	999	606773	702579.2	ARKANSAS	597.277	Cone
USA12-16	304.8	999	999	999	606773	702579.2	ARKANSAS	627.141	Cone
GER5-50	220	999	999	999	801412.5	1134225	UNKNOWN	327.2	Cone
GER5-51	220	999	999	999	801412.5	1134225	UNKNOWN	370.5	Cone
GER5-58	361	999	999	999	951577.5	1134225	UNKNOWN	274.2	Cone
GER5-59	370	999	999	999	961162.5	1134225	UNKNOWN	330.7	Cone
GER5-60	370	999	999	999	961162.5	1134225	UNKNOWN	416.3	Cone
GER5-61	377	999	999	999	968617.5	1134225	UNKNOWN	350.9	Cone
GER4-179	700	999	999	999	2342813	2480625	UNKNOWN	868.3	Cone

**Single Anchors, Tension, Uncracked Concrete, Static Loading, Edge Effect,
Deep Embedment (>188mm), (Continued)**

Test Number	Comparison of Actual Test Results with different Methods							
	CC		Theoretical		ACI		CC Variation	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
SWE03-08	278188.86	1.24	338843.76	1.02	715093.88	0.48	289336.18	1.19
SWE03-02	210402.67	1.26	256660.25	1.04	484086.39	0.55	219652.91	1.21
SWE03-03	306695.52	1.22	374659.44	1.00	635302.23	0.59	321351.95	1.16
SWE03-05	226510.57	1.42	277504.80	1.16	545241.81	0.59	239140.77	1.35
SWE03-06	318743.27	1.28	390501.80	1.04	692317.62	0.59	336516.35	1.21
USA01-16	116844.19	1.12	138001.06	0.95	175671.42	0.75	116844.19	1.12
USA01-25	115311.80	1.13	147353.27	0.89	170333.83	0.77	115311.80	1.13
USA01-27	122373.02	1.06	153402.97	0.85	176955.16	0.73	122373.02	1.06
USA01-30	130642.43	1.01	150761.80	0.87	184190.89	0.71	130642.43	1.01
GER1-35	187795.87	1.19	208822.83	1.07	268988.52	0.83	187795.87	1.19
USA01-18	136674.64	1.20	147730.49	1.11	223782.19	0.74	136674.64	1.20
USA01-26	146520.16	1.12	165742.50	0.99	236154.40	0.70	146520.16	1.12
USA01-28	156694.98	1.08	183251.70	0.92	247683.46	0.68	156694.98	1.08
USA01-29	156694.98	1.26	183251.70	1.08	247683.46	0.80	156694.98	1.26
USA12-11	186352.46	1.50	196289.32	1.42	340842.05	0.82	186352.46	1.38
GER5-46	200597.72	1.00	265286.84	0.75	348310.42	0.57	201939.69	0.99
GER5-47	200597.72	1.04	296694.60	0.70	348310.42	0.60	201939.69	1.03
GER5-48	200597.72	1.04	237781.94	0.88	348310.42	0.60	201939.69	1.03
GER5-49	200597.72	1.12	237781.94	0.95	348310.42	0.65	201939.69	1.12
GER5-56	206039.83	1.03	272058.02	0.78	331044.04	0.64	207418.21	1.02
GER5-57	206039.83	1.06	272058.02	0.80	331044.04	0.66	207418.21	1.05
USA12-12	232973.46	1.22	186243.20	1.52	457105.30	0.62	237418.83	1.10
USA12-13	232973.46	1.24	186243.20	1.55	457105.30	0.63	237418.83	1.12
USA12-14	293101.35	1.63	349394.66	1.37	535569.42	0.89	298694.02	1.47
USA12-15	354508.56	1.68	422595.80	1.41	577527.56	1.03	361272.95	1.52
USA12-16	354508.56	1.77	422595.80	1.48	577527.56	1.09	361272.95	1.60
GER5-50	269587.44	1.21	437320.98	0.75	580028.96	0.56	286146.67	1.14
GER5-51	269587.44	1.37	437320.98	0.85	580028.96	0.64	286146.67	1.29
GER5-58	323947.79	0.85	437286.65	0.63	612715.44	0.45	343846.07	0.80
GER5-59	329569.58	1.00	444875.32	0.74	615618.35	0.54	349813.18	0.95
GER5-60	329569.58	1.26	399374.95	1.04	615618.35	0.68	349813.18	1.19
GER5-61	333974.61	1.05	404713.00	0.87	617358.51	0.57	354488.79	0.99
GER4-179	860879.78	1.01	884121.75	0.98	1605767.55	0.54	976606.96	0.89
	Mean =	1.203	Mean =	1.014	Mean =	0.675	Mean =	1.151
	COV =	0.173	COV =	0.245	COV =	0.210	COV =	0.151

**Group Anchors, Tension, Uncracked Concrete, Static Loading, No Edge Effect,
Deep Embedment (>188mm)**

Data Source	Test Number	Anchor						Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Strength of Steel fy (MPa)	Aggregate Diameter dagg (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
99	CHI1-27	S	4	22	35	190.00			31.8	37.5
10	GER7-12	S	4	22.2	34.9	355.00	350.00	16	25.3	29.9
10	GER7-13	S	4	22.2	34.9	355.00	350.00	16	26.1	30.8
10	GER7-14	S	4	22.2	34.9	355.00	350.00	16	23.2	27.4
25	USA03-17	UE	4	15.9	24.8	193.70			33.5	39.5
25	USA08-03	U	4	15.875	23	227.01	861.88		29.4	34.7
25	USA08-04	U	4	15.875	23	227.01	861.88		29.4	34.7
25	USA08-05	U	4	19.05	28	287.34	861.88		29.4	34.7
25	USA08-06	U	4	19.05	28	285.75	861.88		29.4	34.7
25	USA08-09	U	4	15.875	23	188.91	861.88		29.4	34.7
25	USA08-10	U	4	15.875	23	188.91	861.88		29.4	34.7
25	USA08-11	U	4	19.05	28	225.43	861.88		29.4	34.7
25	USA08-12	U	4	19.05	28	227.01	861.88		29.4	34.7
25	USA11-16	U	4	31.75	50.8	241.30		32	31.3	36.9
25	USA11-17	U	4	31.75	50.8	241.30		32	31.3	36.9
25	USA11-18	U	4	31.75	50.8	279.40		32	36.0	42.5
25	USA11-19	U	4	31.75	50.8	279.40		32	36.0	42.5
25	USA11-20	U	4	31.75	50.8	279.40		32	36.0	42.5
25	USA11-25	U	4	25.4	41.275	203.20		32	31.6	37.3

Test Number	Geometry						Remarks	Test Results	Failure
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)		Ultimate Load Nu (kN)	Failure Mode
CHI1-27	999	999	175	175	555025	1299600	ZHAO2	377.1	Cone
GER7-12	999	999	100	100	1357225	4536900	UNKNOWN	500	Cone
GER7-13	999	999	100	100	1357225	4536900	UNKNOWN	518	Cone
GER7-14	999	999	100	100	1357225	4536900	UNKNOWN	585	Cone
USA03-17	999	999	76	76	431780.4	1350709	UNKNOWN	409	Cone
USA08-03	999	999	101.6	101.6	612521.5	1855248	PERRY	519.3	Cone
USA08-04	999	999	101.6	101.6	612521.5	1855248	PERRY	537.9	Cone
USA08-05	999	999	101.6	101.6	928549.1	2972262	PERRY	834.7	Cone
USA08-06	999	999	101.6	101.6	919393.3	2939510	PERRY	806.8	Cone
USA08-09	999	999	101.6	101.6	446675	1284766	PERRY	398.8	Cone
USA08-10	999	999	101.6	101.6	446675	1284766	PERRY	389.5	Cone
USA08-11	999	999	101.6	101.6	605089.5	1829392	PERRY	575.0	Cone
USA08-12	999	999	101.6	101.6	612521.5	1855248	PERRY	602.8	Cone
USA11-16	999	999	241.3	241.3	931611	2096125	ARKANSAS	915.8	Cone
USA11-17	999	999	482.6	482.6	1455642	2096125	ARKANSAS	1552.9	Cone
USA11-18	999	999	279.4	279.4	1249030	2810317	ARKANSAS	1194.6	Cone
USA11-19	999	999	558.8	558.8	1951609	2810317	ARKANSAS	2110.4	Cone
USA11-20	999	999	482.6	482.6	1744513	2810317	ARKANSAS	2448.8	Cone
USA11-25	999	999	254	254	745805	1486449	ARKANSAS	635.6	Cone

**Group Anchors, Tension, Uncracked Concrete, Static Loading, No Edge Effect,
Deep Embedment (>188mm), (Continued)**

Test Number	Comparison of Actual Test Results with different Methods							
	CC		Theoretical		ACI		CC Variation	
	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre	Npre	Nobs/Npre
CHI1-27	411603.94	0.92	474021.18	0.80	479593.47	0.79	411603.94	0.92
GER7-12	657508.57	0.76	796773.94	0.63	1011765.15	0.49	697895.60	0.72
GER7-13	667330.82	0.78	808676.61	0.64	1026879.49	0.50	708321.18	0.73
GER7-14	629420.82	0.93	762736.99	0.77	968544.11	0.60	668082.58	0.88
USA03-17	325480.39	1.26	375585.58	1.09	383560.42	1.07	325480.39	1.26
USA08-03	399987.71	1.30	468671.87	1.11	475215.40	1.09	399987.71	1.30
USA08-04	399987.71	1.34	468671.87	1.15	475215.40	1.13	399987.71	1.34
USA08-05	538962.96	1.55	643827.91	1.30	695353.53	1.20	551868.80	1.51
USA08-06	535128.96	1.51	638984.90	1.26	689034.16	1.17	547427.16	1.47
USA08-09	319750.72	1.25	368018.36	1.08	357310.47	1.12	319750.72	1.25
USA08-10	319750.72	1.22	368018.36	1.06	357310.47	1.09	319750.72	1.22
USA08-11	396523.39	1.45	464317.67	1.24	469976.53	1.22	396523.39	1.45
USA08-12	399987.71	1.51	468671.87	1.29	475215.40	1.27	399987.71	1.51
USA11-16	608108.26	1.51	716368.29	1.28	861612.62	1.06	608108.26	1.51
USA11-17	950169.15	1.63	1119325.46	1.39	1358846.78	1.14	950169.15	1.63
USA11-18	812888.77	1.47	969012.92	1.23	1239358.13	0.96	828399.52	1.44
USA11-19	1270138.71	1.66	1514082.68	1.39	1954588.12	1.08	1294374.25	1.63
USA11-20	1135357.05	2.16	1353414.73	1.81	1838884.20	1.33	1157020.82	2.12
USA11-25	533710.87	1.19	618846.71	1.03	721788.05	0.88	533710.87	1.19
	Mean =	1.336	Mean =	1.133	Mean =	1.011	Mean =	1.319
	COV =	0.254	COV =	0.252	COV =	0.245	COV =	0.259

Single Anchors, Tension, Cracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), CIP and UC

Data Source	Test Number	Anchor					Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Member Thickness h (mm)	Strength of Concrete fc (MPa)	Strength fcc200 (MPa)
28	11SC5706	CIP	1	19.05	19.05	101.6	254.0	30.20593	35.643
28	11SC5707	CIP	1	19.05	19.05	101.6	254.0	30.20593	35.643
28	11SC5708	CIP	1	19.05	19.05	101.6	254.0	30.20593	35.643
28	11SC5709	CIP	1	19.05	19.05	101.6	254.0	30.20593	35.643
28	11SC5710	CIP	1	19.05	19.05	101.6	254.0	30.20593	35.643
29	7SML5406	UC1	1	9.53	15.88	57.1	254.0	29.56472	34.88637
29	7SML5407	UC1	1	9.53	15.88	57.1	254.0	29.56472	34.88637
29	7SML5408	UC1	1	9.53	15.88	57.1	254.0	29.56472	34.88637
29	7SML5409	UC1	1	9.53	15.88	57.1	254.0	29.56472	34.88637
29	7SML5410	UC1	1	9.53	15.88	57.1	254.0	29.56472	34.88637
29	7SML5711	UC1	1	19.05	28.07	101.6	254.0	32.40536	38.23832
29	7SML5712	UC1	1	19.05	28.07	101.6	254.0	33.09484	39.05191
29	7SML5713	UC1	1	19.05	28.07	101.6	254.0	33.09484	39.05191
29	7SML5714	UC1	1	19.05	28.07	101.6	254.0	33.09484	39.05191
29	7SML5715	UC1	1	19.05	28.07	101.6	254.0	33.09484	39.05191
29	7SSL5716	UC2	1	19.05	28.07	101.6	254.0	33.09484	39.05191
29	7SSL5717	UC2	1	19.05	28.07	101.6	254.0	33.09484	39.05191
29	7SSL5718	UC2	1	19.05	28.07	101.6	254.0	33.09484	39.05191
29	7SSL5719	UC2	1	19.05	28.07	101.6	254.0	29.30272	34.57721
29	7SSL5720	UC2	1	19.05	28.07	101.6	254.0	29.30272	34.57721
29	7SHL5421	UC2	1	9.53	16.23	57.1	254.0	29.56472	34.88637
29	7SHL5422	UC2	1	9.53	16.23	57.1	254.0	29.56472	34.88637
29	7SHL5423	UC2	1	9.53	16.23	57.1	254.0	29.56472	34.88637
29	7SHL5424	UC2	1	9.53	16.23	57.1	254.0	29.56472	34.88637
29	7SHL5425	UC2	1	9.53	16.23	57.1	254.0	29.56472	34.88637

**Single Anchors, Tension, Cracked Concrete, Static Loading, No Edge, Shallow
Embedment (<=188mm), CIP and UC (Continued)**

Test Number	Crack		Geometry						Remarks
	Crack Type	Initial Width w (mm)	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)	
11SC5706	Parallel	0.300	999	999	999	999	92903.04	92903.04	Hallowell
11SC5707	Parallel	0.300	999	999	999	999	92903.04	92903.04	Hallowell
11SC5708	Parallel	0.333	999	999	999	999	92903.04	92903.04	Hallowell
11SC5709	Parallel	0.300	999	999	999	999	92903.04	92903.04	Hallowell
11SC5710	Parallel	0.300	999	999	999	999	92903.04	92903.04	Hallowell
7SML5406	Parallel	0.300	999	999	999	999	29343.69	29343.69	Zhang
7SML5407	Parallel	0.300	999	999	999	999	29343.69	29343.69	Zhang
7SML5408	Parallel	0.300	999	999	999	999	29343.69	29343.69	Zhang
7SML5409	Parallel	0.300	999	999	999	999	29343.69	29343.69	Zhang
7SML5410	Parallel	0.300	999	999	999	999	29343.69	29343.69	Zhang
7SML5711	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
7SML5712	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
7SML5713	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
7SML5714	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
7SML5715	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
7SSL5716	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
7SSL5717	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
7SSL5718	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
7SSL5719	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
7SSL5720	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
7SHL5421	Parallel	0.300	999	999	999	999	29343.69	29343.69	Zhang
7SHL5422	Parallel	0.300	999	999	999	999	29343.69	29343.69	Zhang
7SHL5423	Parallel	0.300	999	999	999	999	29343.69	29343.69	Zhang
7SHL5424	Parallel	0.300	999	999	999	999	29343.69	29343.69	Zhang
7SHL5425	Parallel	0.300	999	999	999	999	29343.69	29343.69	Zhang

Single Anchors, Tension, Cracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), CIP and UC (Continued)

Test Number	Test Results			Failure Mode	Comparison of Actual Test Results with different Methods			
	Ultimate Load Nu (kN)	Displac. δN_{ν} (mm)	Crack Width wN,u (mm)		CC		Theoretical	
					Npre	Nobs/Npre	Npre	Nobs/Npre
11SC5706	80.31	1.09	0.390	cone	101.6	0.97	87.60	0.92
11SC5707	90.19	1.27	0.440	cone	101.6	1.09	87.60	1.03
11SC5708	84.60	1.42	0.380	cone	101.6	1.02	87.60	0.97
11SC5709	88.47	1.75	0.410	cone	101.6	1.07	87.60	1.01
11SC5710	82.89	0.99	0.450	cone	101.6	1.00	87.60	0.95
7SML5406	37.26	5.49	0.450	cone	57.1	1.08	32.57	1.14
7SML5407	38.19	3.73	0.350	cone	57.1	1.11	32.57	1.17
7SML5408	37.26	2.95	0.400	cone	57.1	1.08	32.57	1.14
7SML5409	35.39	2.59	0.375	cone	57.1	1.03	32.57	1.09
7SML5410	34.93	3.68	0.380	cone	57.1	1.01	32.57	1.07
7SML5711	103.20	2.72	0.450	cone	101.6	1.21	90.73	1.14
7SML5712	100.36	2.57	0.450	cone	101.6	1.16	91.69	1.09
7SML5713	97.28	4.47	0.450	cone	101.6	1.12	91.69	1.06
7SML5714	103.39	3.18	0.450	cone	101.6	1.19	91.69	1.13
7SML5715	103.88	2.97	0.450	cone	101.6	1.20	91.69	1.13
7SSL5716	70.86	0.38	0.470	cone	101.6	0.82	91.69	0.77
7SSL5717	75.27	1.60	0.500	cone	101.6	0.87	91.69	0.82
7SSL5718	62.50	1.37	0.370	cone	101.6	0.72	91.69	0.68
7SSL5719	71.57	0.91	0.370	cone	101.6	0.88	86.28	0.83
7SSL5720	66.89	0.69	0.400	cone	101.6	0.82	86.28	0.78
7SHL5421	30.27	2.26	0.330	cone	57.1	0.88	32.57	0.93
7SHL5422	31.20	2.67	0.330	cone	57.1	0.91	32.57	0.96
7SHL5423	30.74	3.35	0.370	cone	57.1	0.89	32.57	0.94
7SHL5424	33.06	3.20	0.400	cone	57.1	0.96	32.57	1.02
7SHL5425	28.41	2.57	0.350	cone	57.1	0.82	32.57	0.87
					Mean =	0.997	Mean =	0.986
					COV. =	0.136	COV. =	0.139

Single Anchors, Tension, Cracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), Expansion and Sleeve

Data Source	Test Number	Anchor					Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Member Thickness h (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
29	7SKL5701	EAll	1	19.05	19.05	87.3125	254.0	29.30	34.58
29	7SKL5702	EAll	1	19.05	19.05	87.3125	254.0	29.30	34.58
29	7SKL5703	EAll	1	19.05	19.05	87.3125	254.0	29.30	34.58
29	7SKL5704	EAll	1	19.05	19.05	87.3125	254.0	29.30	34.58
29	7SKL5705	EAll	1	19.05	19.05	87.3125	254.0	29.30	34.58
26	50.2	EAll	1	8	12	46			76
26	50.4	EAll	1	8	12	46			76
26	50.6	EAll	1	8	12	46			76
26	50.8	EAll	1	8	12	46			76
26	50.1	EAll	1	8	12	46			76
26	50.12	EAll	1	8	12	46			76
26	51.2	EAll	1	8	12	46			24.3
26	51.4	EAll	1	8	12	46			24.3
26	51.6	EAll	1	8	12	46			24.3
26	52.2	EAll	1	8	12	46			26.9
26	52.6	EAll	1	8	12	46			26.9
26	52.9	EAll	1	8	12	46			26.9
26	53.4	EAll	1	8	12	46			37.1
26	53.6	EAll	1	8	12	46			37.1
26	54.6	EAll	1	10	15	58			76
26	55.2	EAll	1	10	15	58			24.3
26	55.6	EAll	1	10	15	58			24.3
26	56.2	EAll	1	10	15	58			33.5
26	56.4	EAll	1	10	15	58			33.5
26	56.6	EAll	1	10	15	58			33.5
26	60.4	EAll	1	12	18	68			81.1
26	60.6	EAll	1	12	18	68			81.1
26	61.3	EAll	1	12	18	68			26.9
26	62.1	EAll	1	12	18	68			24.3
26	62.3	EAll	1	12	18	68			24.3
26	62.4	EAll	1	12	18	68			24.3
26	62.5	EAll	1	12	18	68			24.3
26	62.6	EAll	1	12	18	68			24.3
26	63.1	EAll	1	12	18	68			25.2
26	63.2	EAll	1	12	18	68			25.2
26	63.3	EAll	1	12	18	68			25.2
26	63.4	EAll	1	12	18	68			25.2
26	63.5	EAll	1	12	18	68			25.2
26	63.6	EAll	1	12	18	68			25.2
26	64.1	EAll	1	16	24	82			84.4
26	64.7	EAll	1	16	24	82			84.4
26	64.8	EAll	1	16	24	82			84.4
26	64.9	EAll	1	16	24	82			84.4
26	66.1	EAll	1	20	28	101			80.2
26	66.2	EAll	1	20	28	101			80.2
26	66.5	EAll	1	20	28	101			80.2
26	66.7	EAll	1	20	28	101			80.2
26	67.1	EAll	1	20	28	101			29.4

Single Anchors, Tension, Cracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), Expansion and Sleeve (Continued)

Test Number	Crack		Geometry						Remarks
	Crack Type	Initial Width w (mm)	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)	
7SKL5701	Parallel	0.300	999	999	999	999	68611.3	68611.3	Zhang
7SKL5702	Parallel	0.300	999	999	999	999	68611.3	68611.3	Zhang
7SKL5703	Parallel	0.300	999	999	999	999	68611.3	68611.3	Zhang
7SKL5704	Parallel	0.300	999	999	999	999	68611.3	68611.3	Zhang
7SKL5705	Parallel	0.300	999	999	999	999	68611.3	68611.3	Zhang
50.2	Parallel		999	999	999	999	19044.0	19044.0	Dr. Peter
50.4	Parallel		999	999	999	999	19044.0	19044.0	Dr. Peter
50.6	Parallel		999	999	999	999	19044.0	19044.0	Dr. Peter
50.8	Parallel		999	999	999	999	19044.0	19044.0	Dr. Peter
50.1	Parallel		999	999	999	999	19044.0	19044.0	Dr. Peter
50.12	Parallel		999	999	999	999	19044.0	19044.0	Dr. Peter
51.2	Parallel		999	999	999	999	19044.0	19044.0	Dr. Peter
51.4	Parallel		999	999	999	999	19044.0	19044.0	Dr. Peter
51.6	Parallel		999	999	999	999	19044.0	19044.0	Dr. Peter
52.2	Parallel		999	999	999	999	19044.0	19044.0	Dr. Peter
52.6	Parallel		999	999	999	999	19044.0	19044.0	Dr. Peter
52.9	Parallel		999	999	999	999	19044.0	19044.0	Dr. Peter
53.4	Parallel		999	999	999	999	19044.0	19044.0	Dr. Peter
53.6	Parallel		999	999	999	999	19044.0	19044.0	Dr. Peter
54.6	Parallel		999	999	999	999	30276.0	30276.0	Dr. Peter
55.2	Parallel		999	999	999	999	30276.0	30276.0	Dr. Peter
55.6	Parallel		999	999	999	999	30276.0	30276.0	Dr. Peter
56.2	Parallel		999	999	999	999	30276.0	30276.0	Dr. Peter
56.4	Parallel		999	999	999	999	30276.0	30276.0	Dr. Peter
56.6	Parallel		999	999	999	999	30276.0	30276.0	Dr. Peter
60.4	Parallel		999	999	999	999	41616.0	41616.0	Dr. Peter
60.6	Parallel		999	999	999	999	41616.0	41616.0	Dr. Peter
61.3	Parallel		999	999	999	999	41616.0	41616.0	Dr. Peter
62.1	Parallel		999	999	999	999	41616.0	41616.0	Dr. Peter
62.3	Parallel		999	999	999	999	41616.0	41616.0	Dr. Peter
62.4	Parallel		999	999	999	999	41616.0	41616.0	Dr. Peter
62.5	Parallel		999	999	999	999	41616.0	41616.0	Dr. Peter
62.6	Parallel		999	999	999	999	41616.0	41616.0	Dr. Peter
63.1	Parallel		999	999	999	999	41616.0	41616.0	Dr. Peter
63.2	Parallel		999	999	999	999	41616.0	41616.0	Dr. Peter
63.3	Parallel		999	999	999	999	41616.0	41616.0	Dr. Peter
63.4	Parallel		999	999	999	999	41616.0	41616.0	Dr. Peter
63.5	Parallel		999	999	999	999	41616.0	41616.0	Dr. Peter
63.6	Parallel		999	999	999	999	41616.0	41616.0	Dr. Peter
64.1	Parallel		999	999	999	999	60516.0	60516.0	Dr. Peter
64.7	Parallel		999	999	999	999	60516.0	60516.0	Dr. Peter
64.8	Parallel		999	999	999	999	60516.0	60516.0	Dr. Peter
64.9	Parallel		999	999	999	999	60516.0	60516.0	Dr. Peter
66.1	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
66.2	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
66.5	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
66.7	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
67.1	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter

Single Anchors, Tension, Cracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), Expansion and Sleeve (Continued)

Test Number	Test Results			Failure Mode	Comparison of Actual Test Results with different Methods			
	Ultimate Load Nu (kN)	Displac. $\delta_{N,u}$ (mm)	Crack Width w _{N,u} (mm)		CC		Theoretical	
					Npre	Nobs/Npre	Npre	Nobs/Npre
7SKL5701	59.88	3.78	0.445	cone	87.31	1.3	47.3	1.3
7SKL5702	59.41	1.55	0.400	cone	87.31	1.3	47.3	1.3
7SKL5703	60.80	5.13	0.420	cone	87.31	1.3	47.3	1.3
7SKL5704	53.03	5.72	0.410	cone	87.31	1.2	47.3	1.1
7SKL5705	55.31	3.94	0.380	cone	87.31	1.2	47.3	1.2
50.2	22.30			cone	46.00	0.9	23.3	1.0
50.4	22.00			cone	46.00	0.9	23.3	0.9
50.6	21.80			cone	46.00	0.8	23.3	0.9
50.8	21.80			cone	46.00	0.8	23.3	0.9
50.1	18.30			cone	46.00	0.7	23.3	0.8
50.12	21.80			cone	46.00	0.8	23.3	0.9
51.2	9.30			cone	46.00	0.6	13.2	0.7
51.4	9.80			cone	46.00	0.7	13.2	0.7
51.6	10.80			cone	46.00	0.7	13.2	0.8
52.2	8.80			cone	46.00	0.6	13.9	0.6
52.6	8.80			cone	46.00	0.6	13.9	0.6
52.9	7.80			cone	46.00	0.5	13.9	0.6
53.4	13.80			cone	46.00	0.8	16.3	0.8
53.6	17.30			cone	46.00	1.0	16.3	1.1
54.6	30.00			cone	58.00	0.8	34.9	0.9
55.2	13.80			cone	58.00	0.7	19.7	0.7
55.6	12.30			cone	58.00	0.6	19.7	0.6
56.2	16.30			cone	58.00	0.7	23.2	0.7
56.4	14.50			cone	58.00	0.6	23.2	0.6
56.6	14.80			cone	58.00	0.6	23.2	0.6
60.4	32.30			cone	68.00	0.7	47.4	0.7
60.6	33.10			cone	68.00	0.7	47.4	0.7
61.3	18.40			cone	68.00	0.7	27.3	0.7
62.1	17.50			cone	68.00	0.7	26.0	0.7
62.3	18.50			cone	68.00	0.7	26.0	0.7
62.4	18.50			cone	68.00	0.7	26.0	0.7
62.5	20.50			cone	68.00	0.8	26.0	0.8
62.6	20.00			cone	68.00	0.8	26.0	0.8
63.1	27.70			cone	68.00	1.0	26.4	1.0
63.2	26.20			cone	68.00	1.0	26.4	1.0
63.3	26.90			cone	68.00	1.0	26.4	1.0
63.4	26.50			cone	68.00	1.0	26.4	1.0
63.5	26.00			cone	68.00	1.0	26.4	1.0
63.6	26.40			cone	68.00	1.0	26.4	1.0
64.1	52.50			cone	82.00	0.8	66.5	0.8
64.7	66.50			cone	82.00	1.0	66.5	1.0
64.8	62.00			cone	82.00	1.0	66.5	0.9
64.9	59.50			cone	82.00	0.9	66.5	0.9
66.1	101.00			cone	101.00	1.2	92.0	1.1
66.2	104.00			cone	101.00	1.2	92.0	1.1
66.5	100.00			cone	101.00	1.2	92.0	1.1
66.7	85.00			cone	101.00	1.0	92.0	0.9
67.1	41.80			cone	101.00	0.8	55.7	0.8

Single Anchors, Tension, Cracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), Expansion and Sleeve (Continued)

Data Source	Test Number	Anchor					Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Member Thickness h (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
26	67.2	EAll	1	20	28	101			29.4
26	67.3	EAll	1	20	28	101			29.4
26	67.4	EAll	1	20	28	101			29.4
26	67.5	EAll	1	20	28	101			29.4
26	70.1	EAll	1	24	32	125			81.1
26	70.2	EAll	1	24	32	125			81.1
26	70.3	EAll	1	24	32	125			81.1
26	71.1	EAll	1	24	32	125			20
26	71.2	EAll	1	24	32	125			20
26	71.3	EAll	1	24	32	125			20
26	71.4	EAll	1	24	32	125			20
26	71.5	EAll	1	24	32	125			20
26	71.6	EAll	1	24	32	125			20
26	72.1	EAll	1	24	32	125			24
26	72.2	EAll	1	24	32	125			24
26	72.3	EAll	1	24	32	125			24
26	72.4	EAll	1	24	32	125			24
26	72.5	EAll	1	24	32	125			24
26	72.6	EAll	1	24	32	125			24
26	105.1	EAll	1	10	15	53			34.9
26	105.3	EAll	1	10	15	53			34.9
26	105.5	EAll	1	10	15	53			34.9
26	110.1	EAll	1	12	18	68			27.5
26	110.3	EAll	1	12	18	68			27.5
26	110.4	EAll	1	12	18	68			27.5
29	7SHL5426	Sleeve	1	20	27.3	101.6	254.0	30.68	36.20
29	7SHL5427	Sleeve	1	20	27.3	101.6	254.0	30.68	36.20
29	7SHL5428	Sleeve	1	20	27.3	101.6	254.0	30.68	36.20
29	7SHL5429	Sleeve	1	20	27.3	101.6	254.0	30.68	36.20
29	7SHL5430	Sleeve	1	20	27.3	101.6	254.0	30.68	36.20
26	11.1	Sleeve	1	8	12	60			37.8
26	11.2	Sleeve	1	8	12	60			37.8
26	11.3	Sleeve	1	8	12	60			37.8
26	11.4	Sleeve	1	8	12	60			37.8
26	11.5	Sleeve	1	8	12	60			37.8
26	11.6	Sleeve	1	8	12	60			37.8
26	11.7	Sleeve	1	8	12	60			37.8
26	11.8	Sleeve	1	8	12	60			37.8
26	11.9	Sleeve	1	8	12	60			37.8
26	11.1	Sleeve	1	8	12	60			37.8
26	31.1	Sleeve	1	8	12	60			29.6
26	31.2	Sleeve	1	8	12	60			29.6
26	31.3	Sleeve	1	8	12	60			29.6
26	31.4	Sleeve	1	8	12	60			29.6
26	31.5	Sleeve	1	8	12	60			29.6
26	36.1	Sleeve	1	8	12	60			51.4
26	36.2	Sleeve	1	8	12	60			51.4
26	36.4	Sleeve	1	8	12	60			51.4

Single Anchors, Tension, Cracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), Expansion and Sleeve (Continued)

Test Number	Crack		Geometry						Remarks
	Crack Type	Initial Width w (mm)	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)	
67.2	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
67.3	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
67.4	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
67.5	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
70.1	Parallel		999	999	999	999	140625.0	140625.0	Dr. Peter
70.2	Parallel		999	999	999	999	140625.0	140625.0	Dr. Peter
70.3	Parallel		999	999	999	999	140625.0	140625.0	Dr. Peter
71.1	Parallel		999	999	999	999	140625.0	140625.0	Dr. Peter
71.2	Parallel		999	999	999	999	140625.0	140625.0	Dr. Peter
71.3	Parallel		999	999	999	999	140625.0	140625.0	Dr. Peter
71.4	Parallel		999	999	999	999	140625.0	140625.0	Dr. Peter
71.5	Parallel		999	999	999	999	140625.0	140625.0	Dr. Peter
71.6	Parallel		999	999	999	999	140625.0	140625.0	Dr. Peter
72.1	Parallel		999	999	999	999	140625.0	140625.0	Dr. Peter
72.2	Parallel		999	999	999	999	140625.0	140625.0	Dr. Peter
72.3	Parallel		999	999	999	999	140625.0	140625.0	Dr. Peter
72.4	Parallel		999	999	999	999	140625.0	140625.0	Dr. Peter
72.5	Parallel		999	999	999	999	140625.0	140625.0	Dr. Peter
72.6	Parallel		999	999	999	999	140625.0	140625.0	Dr. Peter
105.1	Parallel		999	999	999	999	25281.0	25281.0	Dr. Peter
105.3	Parallel		999	999	999	999	25281.0	25281.0	Dr. Peter
105.5	Parallel		999	999	999	999	25281.0	25281.0	Dr. Peter
110.1	Parallel		999	999	999	999	41616.0	41616.0	Dr. Peter
110.3	Parallel		999	999	999	999	41616.0	41616.0	Dr. Peter
110.4	Parallel		999	999	999	999	41616.0	41616.0	Dr. Peter
7SHL5426	Parallel	0.300	999	999	999	999	92903.0	92903.0	Dr. Peter
7SHL5427	Parallel	0.300	999	999	999	999	92903.0	92903.0	Dr. Peter
7SHL5428	Parallel	0.300	999	999	999	999	92903.0	92903.0	Dr. Peter
7SHL5429	Parallel	0.300	999	999	999	999	92903.0	92903.0	Dr. Peter
7SHL5430	Parallel	0.300	999	999	999	999	92903.0	92903.0	Dr. Peter
11.1	Parallel		999	999	999	999	32400.0	32400.0	Dr. Peter
11.2	Parallel		999	999	999	999	32400.0	32400.0	Dr. Peter
11.3	Parallel		999	999	999	999	32400.0	32400.0	Dr. Peter
11.4	Parallel		999	999	999	999	32400.0	32400.0	Dr. Peter
11.5	Parallel		999	999	999	999	32400.0	32400.0	Dr. Peter
11.6	Parallel		999	999	999	999	32400.0	32400.0	Dr. Peter
11.7	Parallel		999	999	999	999	32400.0	32400.0	Dr. Peter
11.8	Parallel		999	999	999	999	32400.0	32400.0	Dr. Peter
11.9	Parallel		999	999	999	999	32400.0	32400.0	Dr. Peter
11.1	Parallel		999	999	999	999	32400.0	32400.0	Dr. Peter
31.1	Parallel		999	999	999	999	32400.0	32400.0	Dr. Peter
31.2	Parallel		999	999	999	999	32400.0	32400.0	Dr. Peter
31.3	Parallel		999	999	999	999	32400.0	32400.0	Dr. Peter
31.4	Parallel		999	999	999	999	32400.0	32400.0	Dr. Peter
31.5	Parallel		999	999	999	999	32400.0	32400.0	Dr. Peter
36.1	Parallel		999	999	999	999	32400.0	32400.0	Dr. Peter
36.2	Parallel		999	999	999	999	32400.0	32400.0	Dr. Peter
36.4	Parallel		999	999	999	999	32400.0	32400.0	Dr. Peter

Single Anchors, Tension, Cracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), Expansion and Sleeve (Continued)

Test Number	Test Results			Failure Mode	Comparison of Actual Test Results with different Methods			
	Ultimate Load N_u (kN)	Displac. $\delta_{N,u}$ (mm)	Crack Width $w_{N,u}$ (mm)		CC		Theoretical	
					N_{pre}	N_{obs}/N_{pre}	N_{pre}	N_{obs}/N_{pre}
67.2	43.00			cone	101.00	0.8	55.7	0.8
67.3	49.30			cone	101.00	0.9	55.7	0.9
67.4	42.10			cone	101.00	0.8	55.7	0.8
67.5	48.80			cone	101.00	0.9	55.7	0.9
70.1	115.00			cone	125.00	1.0	131.6	0.9
70.2	120.00			cone	125.00	1.0	131.6	0.9
70.3	132.00			cone	125.00	1.1	131.6	1.0
71.1	54.00			cone	125.00	0.9	65.4	0.8
71.2	50.00			cone	125.00	0.8	65.4	0.8
71.3	56.00			cone	125.00	0.9	65.4	0.9
71.4	50.00			cone	125.00	0.8	65.4	0.8
71.5	55.00			cone	125.00	0.9	65.4	0.8
71.6	53.50			cone	125.00	0.9	65.4	0.8
72.1	70.00			cone	125.00	1.1	71.6	1.0
72.2	63.50			cone	125.00	1.0	71.6	0.9
72.3	67.50			cone	125.00	1.0	71.6	0.9
72.4	70.00			cone	125.00	1.1	71.6	1.0
72.5	74.00			cone	125.00	1.1	71.6	1.0
72.6	65.00			cone	125.00	1.0	71.6	0.9
105.1	18.10			cone	53.00	0.8	20.2	0.9
105.3	20.20			cone	53.00	0.9	20.2	1.0
105.5	18.60			cone	53.00	0.9	20.2	0.9
110.1	17.60			cone	68.00	0.6	27.6	0.6
110.3	22.20			cone	68.00	0.8	27.6	0.8
110.4	23.70			cone	68.00	0.9	27.6	0.9
7SHL5426	96.91	2.06	0.400	cone	101.60	1.7	62.4	1.6
7SHL5427	77.71	9.07	0.335	cone	101.60	1.3	62.4	1.2
7SHL5428	96.46	1.50	0.370	cone	101.60	1.7	62.4	1.5
7SHL5429	85.03	2.39	0.400	cone	101.60	1.5	62.4	1.4
7SHL5430	74.51	3.51	0.350	cone	101.60	1.3	62.4	1.2
11.1	29.06			cone	60.00	1.1	26.1	1.1
11.2	24.63			cone	60.00	0.9	26.1	0.9
11.3	25.18			cone	60.00	0.9	26.1	1.0
11.4	20.94			cone	60.00	0.8	26.1	0.8
11.5	24.76			cone	60.00	0.9	26.1	0.9
11.6	29.03			cone	60.00	1.1	26.1	1.1
11.7	23.69			cone	60.00	0.9	26.1	0.9
11.8	26.15			cone	60.00	1.0	26.1	1.0
11.9	26.45			cone	60.00	1.0	26.1	1.0
11.1	28.92			cone	60.00	1.1	26.1	1.1
31.1	21.07			cone	60.00	0.9	23.1	0.9
31.2	19.73			cone	60.00	0.8	23.1	0.9
31.3	21.06			cone	60.00	0.9	23.1	0.9
31.4	22.42			cone	60.00	0.9	23.1	1.0
31.5	22.96			cone	60.00	1.0	23.1	1.0
36.1	30.14			cone	60.00	1.0	30.5	1.0
36.2	29.21			cone	60.00	0.9	30.5	1.0
36.4	29.29			cone	60.00	0.9	30.5	1.0

Single Anchors, Tension, Cracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), Expansion and Sleeve (Continued)

Data Source	Test Number	Anchor					Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Member Thickness h (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
26	12.1	Sleeve	1	10	15	69			37.8
26	12.2	Sleeve	1	10	15	69			37.8
26	12.3	Sleeve	1	10	15	69			37.8
26	12.4	Sleeve	1	10	15	69			37.8
26	12.5	Sleeve	1	10	15	69			37.8
26	12.6	Sleeve	1	10	15	69			37.8
26	12.7	Sleeve	1	10	15	69			37.8
26	12.8	Sleeve	1	10	15	69			37.8
26	12.9	Sleeve	1	10	15	69			37.8
26	12.1	Sleeve	1	10	15	69			37.8
26	17.1	Sleeve	1	10	15	69			69.9
26	17.2	Sleeve	1	10	15	69			69.9
26	17.3	Sleeve	1	10	15	69			69.9
26	17.4	Sleeve	1	10	15	69			69.9
26	17.5	Sleeve	1	10	15	69			69.9
26	17.8	Sleeve	1	10	15	69			69.9
26	32.1	Sleeve	1	10	15	69			29.6
26	32.2	Sleeve	1	10	15	69			29.6
26	32.3	Sleeve	1	10	15	69			29.6
26	32.4	Sleeve	1	10	15	69			29.6
26	32.5	Sleeve	1	10	15	69			29.6
26	37.4	Sleeve	1	10	15	69			51.4
26	37.5	Sleeve	1	10	15	69			51.4
26	13.1	Sleeve	1	12	18	77			37.8
26	13.2	Sleeve	1	12	18	77			37.8
26	13.3	Sleeve	1	12	18	77			37.8
26	13.4	Sleeve	1	12	18	77			37.8
26	13.5	Sleeve	1	12	18	77			37.8
26	13.6	Sleeve	1	12	18	77			37.8
26	13.7	Sleeve	1	12	18	77			37.8
26	13.8	Sleeve	1	12	18	77			37.8
26	13.9	Sleeve	1	12	18	77			37.8
26	13.1	Sleeve	1	12	18	77			37.8
26	18.1	Sleeve	1	12	18	77			64.5
26	18.2	Sleeve	1	12	18	77			64.5
26	18.6	Sleeve	1	12	18	77			64.5
26	18.7	Sleeve	1	12	18	77			64.5
26	18.1	Sleeve	1	12	18	77			64.5
26	33.1	Sleeve	1	12	18	77			29.6
26	33.2	Sleeve	1	12	18	77			29.6
26	33.3	Sleeve	1	12	18	77			29.6
26	33.4	Sleeve	1	12	18	77			29.6
26	33.5	Sleeve	1	12	18	77			29.6
26	38.1	Sleeve	1	12	18	77			51.4
26	38.2	Sleeve	1	12	18	77			51.4
26	38.3	Sleeve	1	12	18	77			51.4
26	38.4	Sleeve	1	12	18	77			51.4
26	38.5	Sleeve	1	12	18	77			51.4

Single Anchors, Tension, Cracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), Expansion and Sleeve (Continued)

Test Number	Crack		Geometry						Remarks
	Crack Type	Initial Width w (mm)	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)	
12.1	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
12.2	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
12.3	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
12.4	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
12.5	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
12.6	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
12.7	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
12.8	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
12.9	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
12.1	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
17.1	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
17.2	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
17.3	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
17.4	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
17.5	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
17.8	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
32.1	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
32.2	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
32.3	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
32.4	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
32.5	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
37.4	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
37.5	Parallel		999	999	999	999	42849.0	42849.0	Dr. Peter
13.1	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
13.2	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
13.3	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
13.4	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
13.5	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
13.6	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
13.7	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
13.8	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
13.9	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
13.1	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
18.1	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
18.2	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
18.6	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
18.7	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
18.1	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
33.1	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
33.2	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
33.3	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
33.4	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
33.5	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
38.1	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
38.2	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
38.3	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
38.4	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter
38.5	Parallel		999	999	999	999	53361.0	53361.0	Dr. Peter

Single Anchors, Tension, Cracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), Expansion and Sleeve (Continued)

Test Number	Test Results			Failure Mode	Comparison of Actual Test Results with different Methods			
	Ultimate Load N_u (kN)	Displac. $\delta_{N,u}$ (mm)	Crack Width $w_{N,u}$ (mm)		CC		Theoretical	
					N_{pre}	Nobs/ N_{pre}	N_{pre}	Nobs/ N_{pre}
12.1	31.19			cone	69.00	0.9	33.2	0.9
12.2	42.58			cone	69.00	1.3	33.2	1.3
12.3	39.61			cone	69.00	1.2	33.2	1.2
12.4	42.70			cone	69.00	1.3	33.2	1.3
12.5	35.42			cone	69.00	1.1	33.2	1.1
12.6	29.72			cone	69.00	0.9	33.2	0.9
12.7	39.15			cone	69.00	1.2	33.2	1.2
12.8	32.06			cone	69.00	1.0	33.2	1.0
12.9	29.76			cone	69.00	0.9	33.2	0.9
12.1	30.55			cone	69.00	0.9	33.2	0.9
17.1	43.86			cone	69.00	1.0	45.2	1.0
17.2	40.35			cone	69.00	0.9	45.2	0.9
17.3	40.05			cone	69.00	0.9	45.2	0.9
17.4	45.59			cone	69.00	1.0	45.2	1.0
17.5	45.80			cone	69.00	1.0	45.2	1.0
17.8	43.93			cone	69.00	1.0	45.2	1.0
32.1	24.70			cone	69.00	0.8	29.4	0.8
32.2	27.07			cone	69.00	0.9	29.4	0.9
32.3	33.84			cone	69.00	1.1	29.4	1.2
32.4	33.71			cone	69.00	1.1	29.4	1.1
32.5	31.05			cone	69.00	1.1	29.4	1.1
37.4	49.10			cone	69.00	1.3	38.7	1.3
37.5	47.09			cone	69.00	1.2	38.7	1.2
13.1	46.18			cone	77.00	1.2	40.0	1.2
13.2	46.08			cone	77.00	1.2	40.0	1.2
13.3	55.85			cone	77.00	1.4	40.0	1.4
13.4	46.07			cone	77.00	1.2	40.0	1.2
13.5	46.60			cone	77.00	1.2	40.0	1.2
13.6	54.30			cone	77.00	1.4	40.0	1.4
13.7	55.49			cone	77.00	1.4	40.0	1.4
13.8	52.26			cone	77.00	1.3	40.0	1.3
13.9	53.78			cone	77.00	1.4	40.0	1.3
13.1	56.43			cone	77.00	1.4	40.0	1.4
18.1	70.19			cone	77.00	1.4	52.3	1.3
18.2	64.45			cone	77.00	1.3	52.3	1.2
18.6	71.69			cone	77.00	1.4	52.3	1.4
18.7	65.54			cone	77.00	1.3	52.3	1.3
18.1	60.97			cone	77.00	1.2	52.3	1.2
33.1	32.63			cone	77.00	0.9	35.4	0.9
33.2	45.88			cone	77.00	1.3	35.4	1.3
33.3	42.04			cone	77.00	1.2	35.4	1.2
33.4	44.72			cone	77.00	1.3	35.4	1.3
33.5	46.10			cone	77.00	1.3	35.4	1.3
38.1	74.47			cone	77.00	1.6	46.7	1.6
38.2	57.77			cone	77.00	1.3	46.7	1.2
38.3	63.62			cone	77.00	1.4	46.7	1.4
38.4	67.06			cone	77.00	1.5	46.7	1.4
38.5	69.12			cone	77.00	1.5	46.7	1.5

Single Anchors, Tension, Cracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), Expansion and Sleeve (Continued)

Data Source	Test Number	Anchor					Concrete		
		Type	Number	Diameter	Outside Diameter	Embedment	Member Thickness h (mm)	Strength of Concrete	
			n	d (mm)	do/dh (mm)	hef (mm)		fc (MPa)	fcc200 (MPa)
26	14.1	Sleeve	1	16	24	101			32.1
26	14.2	Sleeve	1	16	24	101			32.1
26	14.3	Sleeve	1	16	24	101			32.1
26	14.4	Sleeve	1	16	24	101			32.1
26	14.5	Sleeve	1	16	24	101			32.1
26	14.6	Sleeve	1	16	24	101			32.1
26	14.7	Sleeve	1	16	24	101			32.1
26	14.8	Sleeve	1	16	24	101			32.1
26	14.9	Sleeve	1	16	24	101			32.1
26	14.1	Sleeve	1	16	24	101			32.1
26	19.1	Sleeve	1	16	24	101			64.5
26	19.2	Sleeve	1	16	24	101			64.5
26	19.3	Sleeve	1	16	24	101			64.5
26	19.4	Sleeve	1	16	24	101			64.5
26	19.5	Sleeve	1	16	24	101			64.5
26	19.6	Sleeve	1	16	24	101			64.5
26	19.7	Sleeve	1	16	24	101			64.5
26	19.8	Sleeve	1	16	24	101			64.5
26	19.9	Sleeve	1	16	24	101			64.5
26	19.1	Sleeve	1	16	24	101			64.5
26	34.1	Sleeve	1	16	24	101			29.6
26	34.2	Sleeve	1	16	24	101			29.6
26	34.3	Sleeve	1	16	24	101			29.6
26	34.4	Sleeve	1	16	24	101			29.6
26	34.5	Sleeve	1	16	24	101			29.6
26	39.1	Sleeve	1	16	24	101			51.4
26	39.2	Sleeve	1	16	24	101			51.4
26	39.3	Sleeve	1	16	24	101			51.4
26	39.4	Sleeve	1	16	24	101			51.4
26	39.5	Sleeve	1	16	24	101			51.4
26	15.1	Sleeve	1	20	28	126			32.1
26	15.2	Sleeve	1	20	28	126			32.1
26	15.3	Sleeve	1	20	28	126			32.1
26	15.4	Sleeve	1	20	28	126			32.1
26	15.5	Sleeve	1	20	28	126			32.1
26	15.6	Sleeve	1	20	28	126			32.1
26	15.7	Sleeve	1	20	28	126			32.1
26	15.8	Sleeve	1	20	28	126			32.1
26	15.9	Sleeve	1	20	28	126			32.1
26	15.1	Sleeve	1	20	28	126			32.1
26	20.1	Sleeve	1	20	28	126			56.3
26	20.2	Sleeve	1	20	28	126			56.3
26	20.3	Sleeve	1	20	28	126			56.3
26	20.5	Sleeve	1	20	28	126			56.3
26	20.6	Sleeve	1	20	28	126			56.3
26	20.7	Sleeve	1	20	28	126			56.3
26	20.8	Sleeve	1	20	28	126			56.3
26	20.9	Sleeve	1	20	28	126			56.3

Single Anchors, Tension, Cracked Concrete, Static Loading, No Edge, Shallow Embedment (<=188mm), Expansion and Sleeve (Continued)

Test Number	Crack		Geometry						Remarks
	Crack Type	Initial Width w (mm)	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)	
14.1	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
14.2	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
14.3	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
14.4	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
14.5	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
14.6	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
14.7	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
14.8	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
14.9	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
14.1	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
19.1	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
19.2	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
19.3	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
19.4	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
19.5	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
19.6	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
19.7	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
19.8	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
19.9	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
19.1	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
34.1	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
34.2	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
34.3	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
34.4	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
34.5	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
39.1	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
39.2	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
39.3	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
39.4	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
39.5	Parallel		999	999	999	999	91809.0	91809.0	Dr. Peter
15.1	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
15.2	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
15.3	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
15.4	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
15.5	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
15.6	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
15.7	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
15.8	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
15.9	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
15.1	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
20.1	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
20.2	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
20.3	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
20.5	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
20.6	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
20.7	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
20.8	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
20.9	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter

Single Anchors, Tension, Cracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), Expansion and Sleeve (Continued)

Test Number	Test Results			Failure Mode	Comparison of Actual Test Results with different Methods			
	Ultimate Load N_u (kN)	Displac. $\delta_{N,u}$ (mm)	Crack Width $w_{N,u}$ (mm)		CC		Theoretical	
					Npre	Nobs/Npre	Npre	Nobs/Npre
14.1	87.67			cone	101.00	1.6	58.2	1.5
14.2	88.82			cone	101.00	1.6	58.2	1.5
14.3	99.70			cone	101.00	1.8	58.2	1.7
14.4	83.12			cone	101.00	1.5	58.2	1.4
14.5	86.43			cone	101.00	1.6	58.2	1.5
14.6	90.24			cone	101.00	1.7	58.2	1.6
14.7	83.75			cone	101.00	1.5	58.2	1.4
14.8	88.60			cone	101.00	1.6	58.2	1.5
14.9	109.83			cone	101.00	2.0	58.2	1.9
14.1	95.88			cone	101.00	1.8	58.2	1.6
19.1	114.08			cone	101.00	1.5	82.5	1.4
19.2	90.11			cone	101.00	1.2	82.5	1.1
19.3	112.83			cone	101.00	1.5	82.5	1.4
19.4	91.87			cone	101.00	1.2	82.5	1.1
19.5	92.87			cone	101.00	1.2	82.5	1.1
19.6	96.38			cone	101.00	1.3	82.5	1.2
19.7	81.60			cone	101.00	1.1	82.5	1.0
19.8	98.27			cone	101.00	1.3	82.5	1.2
19.9	108.41			cone	101.00	1.4	82.5	1.3
19.1	111.76			cone	101.00	1.5	82.5	1.4
34.1	77.10			cone	101.00	1.5	55.9	1.4
34.2	76.27			cone	101.00	1.5	55.9	1.4
34.3	76.30			cone	101.00	1.5	55.9	1.4
34.4	78.27			cone	101.00	1.5	55.9	1.4
34.5	77.07			cone	101.00	1.5	55.9	1.4
39.1	116.98			cone	101.00	1.7	73.6	1.6
39.2	117.92			cone	101.00	1.7	73.6	1.6
39.3	110.82			cone	101.00	1.6	73.6	1.5
39.4	109.33			cone	101.00	1.6	73.6	1.5
39.5	116.60			cone	101.00	1.7	73.6	1.6
15.1	110.07			cone	126.00	1.5	83.9	1.3
15.2	126.96			cone	126.00	1.7	83.9	1.5
15.3	125.95			cone	126.00	1.7	83.9	1.5
15.4	117.12			cone	126.00	1.5	83.9	1.4
15.5	119.27			cone	126.00	1.6	83.9	1.4
15.6	128.84			cone	126.00	1.7	83.9	1.5
15.7	123.20			cone	126.00	1.6	83.9	1.5
15.8	130.87			cone	126.00	1.7	83.9	1.6
15.9	119.61			cone	126.00	1.6	83.9	1.4
15.1	107.93			cone	126.00	1.4	83.9	1.3
20.1	162.80			cone	126.00	1.6	111.1	1.5
20.2	166.04			cone	126.00	1.7	111.1	1.5
20.3	174.39			cone	126.00	1.7	111.1	1.6
20.5	157.08			cone	126.00	1.6	111.1	1.4
20.6	157.09			cone	126.00	1.6	111.1	1.4
20.7	157.40			cone	126.00	1.6	111.1	1.4
20.8	145.11			cone	126.00	1.4	111.1	1.3
20.9	158.95			cone	126.00	1.6	111.1	1.4

Single Anchors, Tension, Cracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), Expansion and Sleeve (Continued)

Data Source	Test Number	Anchor					Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Member Thickness h (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
26	20.1	Sleeve	1	20	28	126			56.3
26	35.1	Sleeve	1	20	28	126			29.6
26	35.2	Sleeve	1	20	28	126			29.6
26	35.3	Sleeve	1	20	28	126			29.6
26	35.4	Sleeve	1	20	28	126			29.6
26	35.5	Sleeve	1	20	28	126			29.6
26	40.1	Sleeve	1	20	28	126			51.4
26	40.2	Sleeve	1	20	28	126			51.4
26	40.3	Sleeve	1	20	28	126			51.4
26	40.4	Sleeve	1	20	28	126			51.4
26	40.5	Sleeve	1	20	28	126			51.4
26	43.1	Sleeve	1	24	32	148			29
26	43.2	Sleeve	1	24	32	148			29
26	43.3	Sleeve	1	24	32	148			29
26	43.4	Sleeve	1	24	32	148			29
26	43.5	Sleeve	1	24	32	148			29
26	43.6	Sleeve	1	24	32	148			29
26	43.7	Sleeve	1	24	32	148			29
26	43.8	Sleeve	1	24	32	148			29
26	43.9	Sleeve	1	24	32	148			29
26	43.1	Sleeve	1	24	32	148			29
26	43.43	Sleeve	1	24	32	148			29
26	44.1	Sleeve	1	24	32	148			62.8
26	44.2	Sleeve	1	24	32	148			62.8
26	44.3	Sleeve	1	24	32	148			62.8
26	44.4	Sleeve	1	24	32	148			62.8
26	44.5	Sleeve	1	24	32	148			62.8
26	44.6	Sleeve	1	24	32	148			62.8
26	44.7	Sleeve	1	24	32	148			62.8
26	44.8	Sleeve	1	24	32	148			62.8
26	44.9	Sleeve	1	24	32	148			62.8
26	44.1	Sleeve	1	24	32	148			62.8
26	44.11	Sleeve	1	24	32	148			62.8

**Single Anchors, Tension, Cracked Concrete, Static Loading, No Edge, Shallow
Embedment (<=188mm), Expansion and Sleeve (Continued)**

Test Number	Crack		Geometry						Remarks
	Crack Type	Initial Width w (mm)	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)	
20.1	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
35.1	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
35.2	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
35.3	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
35.4	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
35.5	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
40.1	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
40.2	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
40.3	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
40.4	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
40.5	Parallel		999	999	999	999	142884.0	142884.0	Dr. Peter
43.1	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter
43.2	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter
43.3	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter
43.4	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter
43.5	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter
43.6	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter
43.7	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter
43.8	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter
43.9	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter
43.1	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter
43.43	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter
44.1	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter
44.2	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter
44.3	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter
44.4	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter
44.5	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter
44.6	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter
44.7	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter
44.8	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter
44.9	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter
44.1	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter
44.11	Parallel		999	999	999	999	197136.0	197136.0	Dr. Peter

Single Anchors, Tension, Cracked Concrete, Static Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), Expansion and Sleeve (Continued)

Test Number	Test Results			Failure Mode	Comparison of Actual Test Results with different Methods			
	Ultimate Load Nu (kN)	Displac. $\delta_{N,u}$ (mm)	Crack Width wN,u (mm)		CC		Theoretical	
					Npre	Nobs/Npre	Npre	Nobs/Npre
20.1	123.62			cone	126.00	1.2	111.1	1.1
35.1	121.92			cone	126.00	1.7	80.6	1.5
35.2	129.28			cone	126.00	1.8	80.6	1.6
35.3	120.99			cone	126.00	1.7	80.6	1.5
35.4	130.70			cone	126.00	1.8	80.6	1.6
35.5	126.76			cone	126.00	1.7	80.6	1.6
40.1	166.94			cone	126.00	1.7	106.2	1.6
40.2	165.89			cone	126.00	1.7	106.2	1.6
40.3	164.42			cone	126.00	1.7	106.2	1.5
40.4	168.56			cone	126.00	1.8	106.2	1.6
40.5	167.43			cone	126.00	1.7	106.2	1.6
43.1	128.70			cone	148.00	1.4	103.7	1.2
43.2	126.30			cone	148.00	1.4	103.7	1.2
43.3	126.10			cone	148.00	1.4	103.7	1.2
43.4	112.70			cone	148.00	1.2	103.7	1.1
43.5	118.90			cone	148.00	1.3	103.7	1.1
43.6	114.60			cone	148.00	1.3	103.7	1.1
43.7	118.30			cone	148.00	1.3	103.7	1.1
43.8	110.50			cone	148.00	1.2	103.7	1.1
43.9	104.20			cone	148.00	1.1	103.7	1.0
43.1	118.60			cone	148.00	1.3	103.7	1.1
43.43	123.50			cone	148.00	1.3	103.7	1.2
44.1	193.38			cone	148.00	1.4	152.6	1.3
44.2	193.81			cone	148.00	1.4	152.6	1.3
44.3	190.14			cone	148.00	1.4	152.6	1.2
44.4	191.11			cone	148.00	1.4	152.6	1.3
44.5	211.08			cone	148.00	1.6	152.6	1.4
44.6	195.21			cone	148.00	1.4	152.6	1.3
44.7	174.82			cone	148.00	1.3	152.6	1.1
44.8	181.70			cone	148.00	1.3	152.6	1.2
44.9	163.61			cone	148.00	1.2	152.6	1.1
44.1	183.45			cone	148.00	1.4	152.6	1.2
44.11	197.33			cone	148.00	1.5	152.6	1.3
					Mean =	1.194	Mean =	1.137
					COV =	0.276	COV =	0.242

**Single Anchors, Tension, Uncracked Concrete, Dynamic Loading, No Edge,
Shallow Embedment ($\leq 188\text{mm}$), CIP and UC**

Data Source	Test Number	Anchor					Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Member Thickness h (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
28	10DM5706	UC1	1	19.05	28.07	101.6	254.0	29.75	35.11
28	10DM5707	UC1	1	19.05	28.07	101.6	254.0	29.75	35.11
28	10DM5708	UC1	1	19.05	28.07	101.6	254.0	29.75	35.11
28	10DM5709	UC1	1	19.05	28.07	101.6	254.0	29.75	35.11
28	10DM5710	UC1	1	19.05	28.07	101.6	254.0	29.75	35.11
28	12DC5701	CIP	1	19.05	-	101.6	254.0	30.21	35.64
28	12DC5702	CIP	1	19.05	-	101.6	254.0	30.21	35.64
28	12DC5703	CIP	1	19.05	-	101.6	254.0	30.21	35.64
28	12DC5704	CIP	1	19.05	-	101.6	254.0	30.21	35.64
28	12DC5705	CIP	1	19.05	-	101.6	254.0	30.21	35.64
27	2DML5726	UC1	1	19.05	28.07	101.6	609.6	30.89	36.45
27	2DML5727	UC1	1	19.05	28.07	101.6	609.6	30.89	36.45
27	2DML5728	UC1	1	19.05	28.07	101.6	609.6	30.89	36.45
27	2DML5729	UC1	1	19.05	28.07	101.6	609.6	30.89	36.45
27	2DML5730	UC1	1	19.05	28.07	101.6	609.6	30.89	36.45
27	6DML5411	UC1	1	9.53	15.88	57.15	609.6	33.92	40.02
27	6DML5412	UC1	1	9.53	15.88	57.15	609.6	33.92	40.02
27	6DML5413	UC1	1	9.53	15.88	57.15	609.6	33.92	40.02
27	6DML5414	UC1	1	9.53	15.88	57.15	609.6	33.92	40.02
27	6DML5415	UC1	1	9.53	15.88	57.15	609.6	33.92	40.02
27	6DML3716	UC1	1	19.05	28.07	101.6	609.6	21.68	25.58
27	6DML3717	UC1	1	19.05	28.07	101.6	609.6	21.68	25.58
27	6DML3718	UC1	1	19.05	28.07	101.6	609.6	21.68	25.58
27	6DML3719	UC1	1	19.05	28.07	101.6	609.6	21.68	25.58
27	6DML3720	UC1	1	19.05	28.07	101.6	609.6	21.68	25.58
27	6DMR5721	UC1	1	19.05	28.07	101.6	609.6	34.04	40.17
27	6DMR5722	UC1	1	19.05	28.07	101.6	609.6	34.04	40.17
27	6DMR5723	UC1	1	19.05	28.07	101.6	609.6	34.04	40.17
27	6DMR5724	UC1	1	19.05	28.07	101.6	609.6	34.04	40.17
27	6DMR5725	UC1	1	19.05	28.07	101.6	609.6	34.04	40.17
27	6DSL5726	UC2	1	19.05	28.07	101.6	609.6	31.84	37.57
27	6DSL5727	UC2	1	19.05	28.07	101.6	609.6	31.84	37.57
27	6DSL5728	UC2	1	19.05	28.07	101.6	609.6	31.84	37.57
27	6DSL5729	UC2	1	19.05	28.07	101.6	609.6	31.84	37.57
27	6DSL5730	UC2	1	19.05	28.07	101.6	609.6	31.84	37.57

**Single Anchors, Tension, Uncracked Concrete, Dynamic Loading, No Edge,
Shallow Embedment ($\leq 188\text{mm}$), CIP and UC (Continued)**

Test Number	Geometry						Remarks
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)	
10DM5706	999	999	999	999	92903.04	92903.04	Hallowel
10DM5707	999	999	999	999	92903.04	92903.04	Hallowel
10DM5708	999	999	999	999	92903.04	92903.04	Hallowel
10DM5709	999	999	999	999	92903.04	92903.04	Hallowel
10DM5710	999	999	999	999	92903.04	92903.04	Hallowel
12DC5701	999	999	999	999	92903.04	92903.04	Hallowel
12DC5702	999	999	999	999	92903.04	92903.04	Hallowel
12DC5703	999	999	999	999	92903.04	92903.04	Hallowel
12DC5704	999	999	999	999	92903.04	92903.04	Hallowel
12DC5705	999	999	999	999	92903.04	92903.04	Hallowel
2DML5726	999	999	999	999	92903.04	92903.04	Rodriguez
2DML5727	999	999	999	999	92903.04	92903.04	Rodriguez
2DML5728	999	999	999	999	92903.04	92903.04	Rodriguez
2DML5729	999	999	999	999	92903.04	92903.04	Rodriguez
2DML5730	999	999	999	999	92903.04	92903.04	Rodriguez
6DML5411	999	999	999	999	29395.1	29395.1	Rodriguez
6DML5412	999	999	999	999	29395.1	29395.1	Rodriguez
6DML5413	999	999	999	999	29395.1	29395.1	Rodriguez
6DML5414	999	999	999	999	29395.1	29395.1	Rodriguez
6DML5415	999	999	999	999	29395.1	29395.1	Rodriguez
6DML3716	999	999	999	999	92903.04	92903.04	Rodriguez
6DML3717	999	999	999	999	92903.04	92903.04	Rodriguez
6DML3718	999	999	999	999	92903.04	92903.04	Rodriguez
6DML3719	999	999	999	999	92903.04	92903.04	Rodriguez
6DML3720	999	999	999	999	92903.04	92903.04	Rodriguez
6DMR5721	999	999	999	999	92903.04	92903.04	Rodriguez
6DMR5722	999	999	999	999	92903.04	92903.04	Rodriguez
6DMR5723	999	999	999	999	92903.04	92903.04	Rodriguez
6DMR5724	999	999	999	999	92903.04	92903.04	Rodriguez
6DMR5725	999	999	999	999	92903.04	92903.04	Rodriguez
6DSL5726	999	999	999	999	92903.04	92903.04	Rodriguez
6DSL5727	999	999	999	999	92903.04	92903.04	Rodriguez
6DSL5728	999	999	999	999	92903.04	92903.04	Rodriguez
6DSL5729	999	999	999	999	92903.04	92903.04	Rodriguez
6DSL5730	999	999	999	999	92903.04	92903.04	Rodriguez

**Single Anchors, Tension, Uncracked Concrete, Dynamic Loading, No Edge,
Shallow Embedment ($\leq 188\text{mm}$), CIP and UC (Continued)**

Test Number	Test Results		Failure Mode	Comparison of Actual Test Results with different Methods			
	Ultimate Load Nu (kN)	Displac. δN_u (mm)		CC		Theoretical	
				Npre	Nobs/Npre	Npre	Nobs/Npre
10DM5706	129.14	3.66	cone	101.6	1.13	120.74	1.07
10DM5707	122.75	5.61	cone	101.6	1.08	120.74	1.02
10DM5708	112.52	5.08	cone	101.6	0.99	120.74	0.93
10DM5709	104.85	2.51	cone	101.6	0.92	120.74	0.87
10DM5710	127.86	0.99	cone	101.6	1.12	120.74	1.06
12DC5701	137.00	1.73	cone	101.6	1.19	121.66	1.13
12DC5702	122.40	1.75	cone	101.6	1.07	121.66	1.01
12DC5703	125.83	2.18	cone	101.6	1.10	121.66	1.03
12DC5704	122.40	1.52	cone	101.6	1.07	121.66	1.01
12DC5705	127.55	1.57	cone	101.6	1.11	121.66	1.05
2DML5726	118.46	7.29	cone	101.6	1.02	123.03	0.96
2DML5727	127.12	4.67	cone	101.6	1.09	123.03	1.03
2DML5728	123.02	3.51	cone	101.6	1.06	123.03	1.00
2DML5729	114.36	4.70	cone	101.6	0.98	123.03	0.93
2DML5730	114.81	4.60	cone	101.6	0.99	123.03	0.93
6DML5411	40.00	1.78	cone	57.15	0.78	48.52	0.82
6DML5412	44.35	2.46	cone	57.15	0.86	48.52	0.91
6DML5413	41.31	2.01	cone	57.15	0.80	48.52	0.85
6DML5414	53.05	5.61	cone	57.15	1.03	48.52	1.09
6DML5415	50.00	5.36	cone	57.15	0.97	48.52	1.03
6DML3716	97.77	2.62	cone	101.6	1.01	103.06	0.95
6DML3717	89.51	2.31	cone	101.6	0.92	103.06	0.87
6DML3718	106.45	8.36	cone	101.6	1.09	103.06	1.03
6DML3719	79.52	3.76	cone	101.6	0.82	103.06	0.77
6DML3720	90.81	3.89	cone	101.6	0.93	103.06	0.88
6DMR5721	122.39	6.10	cone	101.6	1.00	129.15	0.95
6DMR5722	116.75	4.90	cone	101.6	0.96	129.15	0.90
6DMR5723	115.45	4.85	cone	101.6	0.95	129.15	0.89
6DMR5724	114.58	5.56	cone	101.6	0.94	129.15	0.89
6DMR5725	118.92	8.23	cone	101.6	0.98	129.15	0.92
6DSL5726	128.79	2.21	cone	101.6	1.09	124.91	1.03
6DSL5727	126.55	2.41	cone	101.6	1.07	124.91	1.01
6DSL5728	126.10	2.84	cone	101.6	1.07	124.91	1.01
6DSL5729	135.97	1.93	cone	101.6	1.15	124.91	1.09
6DSL5730	136.87	2.82	cone	101.6	1.16	124.91	1.10
				Mean =	1.015	Mean =	0.972
				COV. =	0.101	COV. =	0.089

**Single Anchors, Tension, Uncracked Concrete, Dynamic Loading, No Edge,
Shallow Embedment ($\leq 188\text{mm}$), Expansion and Sleeve**

Data Source	Test Number	Anchor					Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Member Thickness h (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)
28	10DK5705	EAll	1	19.05	19.05	87.3	254.0	29.75	35.11
28	10DK5712	EAll	1	19.05	19.05	87.3	254.0	29.75	35.11
28	10DK5713	EAll	1	19.05	19.05	87.3	254.0	29.75	35.11
28	10DK5714	EAll	1	19.05	19.05	87.3	254.0	29.75	35.11
28	10DK5715	EAll	1	19.05	19.05	87.3	254.0	29.75	35.11
27	0DKL5712	EAll	1	19.05	19.05	106.4	609.6	31.14	36.75
27	0DKL5713	EAll	1	19.05	19.05	106.4	609.6	31.14	36.75
27	0DKL5714	EAll	1	19.05	19.05	106.4	609.6	31.14	36.75
27	0DKL5715	EAll	1	19.05	19.05	106.4	609.6	31.14	36.75
27	0DKL5731	EAll	1	19.05	19.05	68.3	609.6	30.82	36.37
27	0DKL5732	EAll	1	19.05	19.05	68.3	609.6	31.14	36.75
27	0DKL5733	EAll	1	19.05	19.05	68.3	609.6	30.91	36.47
27	0DKL5734	EAll	1	19.05	19.05	68.3	609.6	30.91	36.47
27	0DKL5735	EAll	1	19.05	19.05	68.3	609.6	30.82	36.37
27	0DOL5738	EA	1	19.05	19.05	61.9	609.6	31.14	36.75
27	0DOL5739	EA	1	19.05	19.05	61.9	609.6	31.14	36.75
27	0DOL5740	EA	1	19.05	19.05	61.9	609.6	30.91	36.47
27	2DKL5401	EAll	1	9.53	9.53	49.2	609.6	30.89	36.45
27	2DKL5402	EAll	1	9.53	9.53	49.2	609.6	30.89	36.45
27	2DKL5404	EAll	1	9.53	9.53	49.2	609.6	30.89	36.45
27	2DKL5706	EAll	1	19.05	19.05	87.3	609.6	31.39	37.04
27	2DKL5707	EAll	1	19.05	19.05	87.3	609.6	31.96	37.71
27	2DKL5708	EAll	1	19.05	19.05	87.3	609.6	31.96	37.71
27	2DKL5709	EAll	1	19.05	19.05	87.3	609.6	31.96	37.71
27	2DKL5710	EAll	1	19.05	19.05	87.3	609.6	33.92	40.02
27	2DKL3711	EAll	1	19.05	19.05	87.3	609.6	21.68	25.58
27	2DKL3712	EAll	1	19.05	19.05	87.3	609.6	21.68	25.58
27	2DKL3713	EAll	1	19.05	19.05	87.3	609.6	21.68	25.58
27	2DKL3714	EAll	1	19.05	19.05	87.3	609.6	21.68	25.58
27	2DKR5716	EAll	1	19.05	19.05	87.3	609.6	32.47	38.31
27	2DKR5717	EAll	1	19.05	19.05	87.3	609.6	32.47	38.31
27	2DKR5718	EAll	1	19.05	19.05	87.3	609.6	32.47	38.31
27	2DKR5719	EAll	1	19.05	19.05	87.3	609.6	32.84	38.75
27	2DKR5720	EAll	1	19.05	19.05	87.3	609.6	34.02	40.14
27	2DKR5721	EAll	1	19.05	19.05	87.3	609.6	21.85	25.78
27	2DKR5722	EAll	1	19.05	19.05	87.3	609.6	21.85	25.78
27	2DKR5723	EAll	1	19.05	19.05	87.3	609.6	21.85	25.78
27	2DKR5724	EAll	1	19.05	19.05	87.3	609.6	21.85	25.78
27	2DKR5725	EAll	1	19.05	19.05	87.3	609.6	21.85	25.78
27	4DKL5701	EAll	1	19.05	19.05	87.3	609.6	33.37	39.38
27	4DKL5704	EAll	1	19.05	19.05	87.3	609.6	33.37	39.38
27	4DKL5705	EAll	1	19.05	19.05	87.3	609.6	33.37	39.38
27	6DHL5401	Sleeve	1	9.53	14.3	57.15	609.6	32.23	38.03
27	6DHL5402	Sleeve	1	9.53	14.3	57.15	609.6	32.23	38.03
27	6DHL5403	Sleeve	1	9.53	14.3	57.15	609.6	32.23	38.03
27	6DHL5404	Sleeve	1	9.53	14.3	57.15	609.6	32.23	38.03
27	6DHL5405	Sleeve	1	9.53	14.3	57.15	609.6	32.23	38.03
27	6DHL5706	Sleeve	1	19.05	27.3	101.6	609.6	32.23	38.03
27	6DHL5707	Sleeve	1	19.05	27.3	101.6	609.6	32.23	38.03
27	6DHL5708	Sleeve	1	19.05	27.3	101.6	609.6	32.23	38.03
27	6DHL5709	Sleeve	1	19.05	27.3	101.6	609.6	32.23	38.03
27	6DHL5710	Sleeve		19.05	27.3	101.6	609.6	32.23	38.03

**Single Anchors, Tension, Uncracked Concrete, Dynamic Loading, No Edge,
Shallow Embedment ($\leq 188\text{mm}$), Expansion and Sleeve (Continued)**

Test Number	Geometry						Remarks
	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)	
10DK5705	999	999	999	999	68591.61	68591.61	Hallowell
10DK5712	999	999	999	999	68591.61	68591.61	Hallowell
10DK5713	999	999	999	999	68591.61	68591.61	Hallowell
10DK5714	999	999	999	999	68591.61	68591.61	Hallowell
10DK5715	999	999	999	999	68591.61	68591.61	Hallowell
0DKL5712	999	999	999	999	101812	101812	Rodriguez
0DKL5713	999	999	999	999	101812	101812	Rodriguez
0DKL5714	999	999	999	999	101812	101812	Rodriguez
0DKL5715	999	999	999	999	101812	101812	Rodriguez
0DKL5731	999	999	999	999	41934.85	41934.85	Rodriguez
0DKL5732	999	999	999	999	41934.85	41934.85	Rodriguez
0DKL5733	999	999	999	999	41934.85	41934.85	Rodriguez
0DKL5734	999	999	999	999	41934.85	41934.85	Rodriguez
0DKL5735	999	999	999	999	41934.85	41934.85	Rodriguez
0DOL5738	999	999	999	999	34495.63	34495.63	Rodriguez
0DOL5739	999	999	999	999	34495.63	34495.63	Rodriguez
0DOL5740	999	999	999	999	34495.63	34495.63	Rodriguez
2DKL5401	999	999	999	999	21794.62	21794.62	Rodriguez
2DKL5402	999	999	999	999	21794.62	21794.62	Rodriguez
2DKL5404	999	999	999	999	21794.62	21794.62	Rodriguez
2DKL5706	999	999	999	999	68607.32	68607.32	Rodriguez
2DKL5707	999	999	999	999	68607.32	68607.32	Rodriguez
2DKL5708	999	999	999	999	68607.32	68607.32	Rodriguez
2DKL5709	999	999	999	999	68607.32	68607.32	Rodriguez
2DKL5710	999	999	999	999	68607.32	68607.32	Rodriguez
2DKL3711	999	999	999	999	68607.32	68607.32	Rodriguez
2DKL3712	999	999	999	999	68607.32	68607.32	Rodriguez
2DKL3713	999	999	999	999	68607.32	68607.32	Rodriguez
2DKL3714	999	999	999	999	68607.32	68607.32	Rodriguez
2DKR5716	999	999	999	999	68607.32	68607.32	Rodriguez
2DKR5717	999	999	999	999	68607.32	68607.32	Rodriguez
2DKR5718	999	999	999	999	68607.32	68607.32	Rodriguez
2DKR5719	999	999	999	999	68607.32	68607.32	Rodriguez
2DKR5720	999	999	999	999	68607.32	68607.32	Rodriguez
2DKR5721	999	999	999	999	68607.32	68607.32	Rodriguez
2DKR5722	999	999	999	999	68607.32	68607.32	Rodriguez
2DKR5723	999	999	999	999	68607.32	68607.32	Rodriguez
2DKR5724	999	999	999	999	68607.32	68607.32	Rodriguez
2DKR5725	999	999	999	999	68607.32	68607.32	Rodriguez
4DKL5701	999	999	999	999	68607.32	68607.32	Rodriguez
4DKL5704	999	999	999	999	68607.32	68607.32	Rodriguez
4DKL5705	999	999	999	999	68607.32	68607.32	Rodriguez
6DHL5401	999	999	999	999	29395.1	29395.1	Rodriguez
6DHL5402	999	999	999	999	29395.1	29395.1	Rodriguez
6DHL5403	999	999	999	999	29395.1	29395.1	Rodriguez
6DHL5404	999	999	999	999	29395.1	29395.1	Rodriguez
6DHL5405	999	999	999	999	29395.1	29395.1	Rodriguez
6DHL5706	999	999	999	999	92903.04	92903.04	Rodriguez
6DHL5707	999	999	999	999	92903.04	92903.04	Rodriguez
6DHL5708	999	999	999	999	92903.04	92903.04	Rodriguez
6DHL5709	999	999	999	999	92903.04	92903.04	Rodriguez
6DHL5710	999	999	999	999	92903.04	92903.04	Rodriguez

Single Anchors, Tension, Uncracked Concrete, Dynamic Loading, No Edge, Shallow Embedment ($\leq 188\text{mm}$), Expansion and Sleeve (Continued)

Test Number	Test Results		Failure Mode	Comparison of Actual Test Results with different Methods			
	Ultimate Load Nu (kN)	Displac. $\delta N_{u,D}$ (mm)		CC		Theoretical	
				Npre	Nobs/Npre	Npre	Nobs/Npre
10DK5705	69.90	2.95	cone	87.3	1.07	68.13	1.03
10DK5712	76.72	1.88	cone/pull-through	87.3	1.18	68.13	1.13
10DK5713	71.18	2.84	cone/pull-through	87.3	1.09	68.13	1.04
10DK5714	75.45	3.84	cone	87.3	1.16	68.13	1.11
10DK5715	78.86	1.65	cone/pull-through	87.3	1.21	68.13	1.16
0DKL5712	78.95	22.28	p.o.w/cone	106.4	0.88	96.95	0.81
0DKL5713	74.87	15.75	p.o.w/cone	106.4	0.84	96.95	0.77
0DKL5714	83.94	22.15	p.o.w/cone	106.4	0.94	96.95	0.87
0DKL5715	73.05	23.27	p.o.w/cone	106.4	0.81	96.95	0.75
0DKL5731	56.27	1.93	cone	68.3	1.23	45.68	1.23
0DKL5732	44.92	4.65	cone	68.3	0.97	45.92	0.98
0DKL5733	47.82	1.32	cone	68.3	1.04	45.74	1.05
0DKL5734	56.48	2.01	cone	68.3	1.23	45.74	1.23
0DKL5735	60.80	3.73	cone	68.3	1.33	45.68	1.33
0DOL5738	39.47	7.54	cone	61.9	0.99	38.83	1.02
0DOL5739	46.74	2.18	cone	61.9	1.17	38.83	1.20
0DOL5740	44.63	5.21	cone	61.9	1.13	38.68	1.15
2DKL5401	25.97	5.18	cone	49.2	0.92	25.95	1.00
2DKL5402	24.15	7.65	p.o.w/cone	49.2	0.86	25.95	0.93
2DKL5404	27.79	9.88	p.o.w/cone	49.2	0.99	25.95	1.07
2DKL5706	75.93	8.13	cone	87.3	1.13	69.99	1.08
2DKL5707	78.39	8.26	cone	87.3	1.16	70.62	1.11
2DKL5708	68.98	5.08	cone	87.3	1.02	70.62	0.98
2DKL5709	67.64	4.45	cone	87.3	1.00	70.62	0.96
2DKL5710	76.52	5.26	cone	87.3	1.10	72.75	1.05
2DKL3711	59.96	8.69	cone	87.3	1.08	58.16	1.03
2DKL3712	42.58	0.20	cone	87.3	0.77	58.16	0.73
2DKL3713	43.45	0.46	cone	87.3	0.78	58.16	0.75
2DKL3714	69.09	7.37	cone	87.3	1.24	58.16	1.19
2DKR5716	78.21	5.28	cone	87.3	1.15	71.18	1.10
2DKR5717	77.77	5.97	cone	87.3	1.14	71.18	1.09
2DKR5718	87.55	6.12	cone	87.3	1.29	71.18	1.23
2DKR5719	77.77	3.33	cone	87.3	1.14	71.59	1.09
2DKR5720	68.60	11.96	cone/pullout	87.3	0.98	72.86	0.94
2DKR5721	66.65	7.37	cone	87.3	1.19	58.39	1.14
2DKR5722	61.46	10.49	cone	87.3	1.10	58.39	1.05
2DKR5723	62.32	5.59	cone	87.3	1.12	58.39	1.07
2DKR5724	58.43	8.10	cone	87.3	1.05	58.39	1.00
2DKR5725	59.29	9.14	p.o.w/cone	87.3	1.06	58.39	1.02
4DKL5701	67.51	9.25	p.o./cone	87.3	0.98	72.16	0.94
4DKL5704	83.72	7.06	cone	87.3	1.21	72.16	1.16
4DKL5705	82.85	8.92	p.o.w/cone	87.3	1.20	72.16	1.15
6DHL5401	44.60	2.21	cone	57.15	0.89	43.00	1.04
6DHL5402	39.25	0.84	cone	57.15	0.78	43.00	0.91
6DHL5403	40.14	2.97	cone	57.15	0.80	43.00	0.93
6DHL5404	34.34	2.16	cone	57.15	0.69	43.00	0.80
6DHL5405	40.59	3.18	cone	57.15	0.81	43.00	0.94
6DHL5706	126.67	5.28	cone	101.6	1.07	114.25	1.11
6DHL5707	140.94	1.45	cone	101.6	1.19	114.25	1.23
6DHL5708	119.98	5.59	cone	101.6	1.01	114.25	1.05
6DHL5709	137.82	3.20	cone	101.6	1.16	114.25	1.21
6DHL5710	146.29	3.12	cone	101.6	1.23	114.25	1.28
				Mean =	1.049	Mean =	1.043
				COV. =	0.147	COV. =	0.136

**Single Anchors, Tension, Cracked Concrete, Dynamic Loading, No Edge,
Shallow Embedment ($\leq 188\text{mm}$), CIP and UC**

Data Source	Test Number	Anchor					Concrete			
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Member Thickness h (mm)	Strength of Concrete fc (MPa)	fcc200 (MPa)	
	28	12DC5707	CIP	1	19.05	19.05	101.6	254.0	29.26	34.53
	28	12DC5708	CIP	1	19.05	19.05	101.6	254.0	29.26	34.53
	28	12DC5709	CIP	1	19.05	19.05	101.6	254.0	29.26	34.53
	28	12DC5710	CIP	1	19.05	19.05	101.6	254.0	29.26	34.53
	28	12DC5712	CIP	1	19.05	19.05	101.6	254.0	29.26	34.53
	29	8DML5406	UC1	1	9.53	15.88	57.1	254.0	29.56	34.89
	29	8DML5407	UC1	1	9.53	15.88	57.1	254.0	29.56	34.89
	29	8DML5408	UC1	1	9.53	15.88	57.1	254.0	29.56	34.89
	29	8DML5409	UC1	1	9.53	15.88	57.1	254.0	29.56	34.89
	29	8DML5410	UC1	1	9.53	15.88	57.1	254.0	29.56	34.89
	29	8DML5711	UC1	1	19.05	28.07	101.6	254.0	33.09	39.05
	29	8DML5712	UC1	1	19.05	28.07	101.6	254.0	33.09	39.05
	29	8DML5713	UC1	1	19.05	28.07	101.6	254.0	33.09	39.05
	29	8DML5714	UC1	1	19.05	28.07	101.6	254.0	33.09	39.05
	29	8DML5715	UC1	1	19.05	28.07	101.6	254.0	33.09	39.05
	29	8DSL5716	UC2	1	19.05	28.07	101.6	254.0	33.09	39.05
	29	8DSL5717	UC2	1	19.05	28.07	101.6	254.0	33.09	39.05
	29	8DSL5718	UC2	1	19.05	28.07	101.6	254.0	33.09	39.05
	29	8DSL5719	UC2	1	19.05	28.07	101.6	254.0	33.09	39.05
	29	8DSL5720	UC2	1	19.05	28.07	101.6	254.0	29.30	34.58

Test Number	Crack		Geometry						Remarks
	Crack Type	Initial Width w (mm)	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)	
12DC5707	Parallel	0.300	999	999	999	999	92903.04	92903.04	Hallowell
12DC5708	Parallel	0.300	999	999	999	999	92903.04	92903.04	Hallowell
12DC5709	Parallel	0.300	999	999	999	999	92903.04	92903.04	Hallowell
12DC5710	Parallel	0.300	999	999	999	999	92903.04	92903.04	Hallowell
12DC5712	Parallel	0.300	999	999	999	999	92903.04	92903.04	Hallowell
8DML5406	Parallel	0.300	999	999	999	999	29343.69	29343.69	Zhang
8DML5407	Parallel	0.300	999	999	999	999	29343.69	29343.69	Zhang
8DML5408	Parallel	0.300	999	999	999	999	29343.69	29343.69	Zhang
8DML5409	Parallel	0.300	999	999	999	999	29343.69	29343.69	Zhang
8DML5410	Parallel	0.300	999	999	999	999	29343.69	29343.69	Zhang
8DML5711	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
8DML5712	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
8DML5713	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
8DML5714	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
8DML5715	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
8DSL5716	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
8DSL5717	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
8DSL5718	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
8DSL5719	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
8DSL5720	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang

**Single Anchors, Tension, Cracked Concrete, Dynamic Loading, No Edge,
Shallow Embedment ($\leq 188\text{mm}$), CIP and UC (Continued)**

Test Number	Test Results			Failure Mode	Comparison of Actual Test Results with different Methods			
	Ultimate Load Nu (kN)	Displac. $\delta_{N,u}$ (mm)	Crack Width wN,u (mm)		CC		Theoretical	
					Npre	Nobs/Npre	Npre	Nobs/Npre
12DC5707	133.99	2.72	0.450	cone	101.6	1.32	107.77	1.24
12DC5708	131.46	3.30	0.390	cone	101.6	1.29	107.77	1.22
12DC5709	133.99	2.90	0.450	cone	101.6	1.32	107.77	1.24
12DC5710	133.57	2.59	0.420	cone	101.6	1.31	107.77	1.24
12DC5712	123.43	1.80	0.460	cone	101.6	1.21	107.77	1.15
8DML5406	43.31	4.22	0.370	cone	57.1	1.01	40.71	1.06
8DML5407	42.38	3.00	0.370	cone	57.1	0.98	40.71	1.04
8DML5408	44.71	3.18	0.370	cone	57.1	1.04	40.71	1.10
8DML5409	34.93	3.45	0.370	cone	57.1	0.81	40.71	0.86
8DML5410	46.11	3.61	0.370	cone	57.1	1.07	40.71	1.13
8DML5711	117.08	3.25	0.630	cone	101.6	1.08	114.61	1.02
8DML5712	113.12	5.03	0.700	cone	101.6	1.05	114.61	0.99
8DML5713	125.45	4.52	0.440	cone	101.6	1.16	114.61	1.09
8DML5714	105.20	3.33	0.480	cone	101.6	0.97	114.61	0.92
8DML5715	102.56	5.54	0.630	cone	101.6	0.95	114.61	0.89
8DSL5716	127.21	2.29	0.430	cone	101.6	1.18	114.61	1.11
8DSL5717	102.56	0.61	0.360	cone	101.6	0.95	114.61	0.89
8DSL5718	93.76	1.68	0.390	cone	101.6	0.87	114.61	0.82
8DSL5719	123.69	1.24	0.350	cone	101.6	1.14	114.61	1.08
8DSL5720	103.62	1.96	0.420	cone	101.6	1.02	107.85	0.96
					Average =	1.086	Average =	1.053
					COV. =	0.139	COV. =	0.126

**Single Anchors, Tension, Cracked Concrete, Dynamic Loading, No Edge,
Shallow Embedment ($\leq 188\text{mm}$), Expansion and Sleeve**

Data Source	Test Number	Anchor					Concrete		
		Type	Number n	Diameter d (mm)	Outside Diameter do/dh (mm)	Embedment hef (mm)	Member Thickness h (mm)	Strength of Concrete fc (MPa)	Strength fcc200 (MPa)
29	8DKL5701	EAll	1	19.05	19.05	87.31	254.0	29.30	34.58
29	8DKL5702	EAll	1	19.05	19.05	87.31	254.0	30.68	36.20
29	8DKL5703	EAll	1	19.05	19.05	87.31	254.0	30.68	36.20
29	8DKL5704	EAll	1	19.05	19.05	87.31	254.0	30.68	36.20
29	8DKL5705	EAll	1	19.05	19.05	87.31	254.0	30.68	36.20
29	8DHL5421	Sleeve	1	10	14.3	57.1	254.0	29.56	34.89
29	8DHL5422	Sleeve	1	10	14.3	57.1	254.0	29.56	34.89
29	8DHL5423	Sleeve	1	10	14.3	57.1	254.0	29.56	34.89
29	8DHL5424	Sleeve	1	10	14.3	57.1	254.0	29.56	34.89
29	8DHL5425	Sleeve	1	10	14.3	57.1	254.0	29.56	34.89
29	8DHL5726	Sleeve	1	20	27.3	101.6	254.0	30.68	36.20
29	8DHL5727	Sleeve	1	20	27.3	101.6	254.0	30.68	36.20
29	8DHL5728	Sleeve	1	20	27.3	101.6	254.0	30.68	36.20
29	8DHL5729	Sleeve	1	20	27.3	101.6	254.0	30.68	36.20
29	8DHL5730	Sleeve	1	20	27.3	101.6	254.0	30.68	36.20

Test Number	Crack		Geometry						Remarks
	Crack Type	Initial Width w (mm)	c1 (mm)	c2 (mm)	s1 (mm)	s2 (mm)	An (mm ²)	Ano (mm ²)	
8DKL5701	Parallel	0.300	999	999	999	999	68611.25	68611.25	Zhang
8DKL5702	Parallel	0.300	999	999	999	999	68611.25	68611.25	Zhang
8DKL5703	Parallel	0.300	999	999	999	999	68611.25	68611.25	Zhang
8DKL5704	Parallel	0.300	999	999	999	999	68611.25	68611.25	Zhang
8DKL5705	Parallel	0.300	999	999	999	999	68611.25	68611.25	Zhang
8DHL5421	Parallel	0.300	999	999	999	999	29343.69	29343.69	Zhang
8DHL5422	Parallel	0.300	999	999	999	999	29343.69	29343.69	Zhang
8DHL5423	Parallel	0.300	999	999	999	999	29343.69	29343.69	Zhang
8DHL5424	Parallel	0.300	999	999	999	999	29343.69	29343.69	Zhang
8DHL5425	Parallel	0.300	999	999	999	999	29343.69	29343.69	Zhang
8DHL5726	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
8DHL5727	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
8DHL5728	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
8DHL5729	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang
8DHL5730	Parallel	0.300	999	999	999	999	92903.04	92903.04	Zhang

**Single Anchors, Tension, Cracked Concrete, Dynamic Loading, No Edge,
Shallow Embedment (<=188mm), Expansion and Sleeve (Continued)**

Test Number	Test Results			Failure Mode	Comparison of Actual Test Results with different Methods			
	Ultimate Load Nu (kN)	Displac. $\delta_{N,u}$ (mm)	Crack Width wN,u (mm)		CC		Theoretical	
					Npre	Nobs/Npre	Npre	Nobs/Npre
8DKL5701	51.92	7.14	0.340	p.o.w/cone	87.31	1.15	56.03	0.93
8DKL5702	49.83	21.46	0.340	p.o.w/cone	87.31	1.08	57.33	0.87
8DKL5703	57.14	7.82	0.440	p.o.w/cone	87.31	1.23	57.33	1.00
8DKL5704	64.46	6.02	0.430	p.o.w/cone	87.31	1.39	57.33	1.12
8DKL5705	48.46	16.23	0.340	p.o.w/cone	87.31	1.05	57.33	0.85
8DHL5421	27.01	1.96	0.350	cone	57.1	0.90	34.07	0.79
8DHL5422	31.67	3.38	0.350	cone	57.1	1.05	34.07	0.93
8DHL5423	31.67	2.79	0.350	cone	57.1	1.05	34.07	0.93
8DHL5424	30.74	6.50	0.350	p.o.w/cone	57.1	1.02	34.07	0.90
8DHL5425	31.67	2.90	0.350	cone	57.1	1.05	34.07	0.93
8DHL5726	114.29	2.18	0.440	p.o.w/cone	101.6	1.57	92.35	1.24
8DHL5727	86.40	1.19	0.350	p.o.w/cone	101.6	1.19	92.35	0.94
8DHL5728	75.87	0.94	0.350	p.o.w/cone	101.6	1.04	92.35	0.82
8DHL5729	86.15	0.61	0.350	p.o.w/cone	101.6	1.19	92.35	0.93
8DHL5730	118.75	2.95	0.475	p.o.w/cone	101.6	1.63	92.35	1.29
					Mean =	1.173	Mean =	0.964
					COV. =	0.178	COV. =	0.149