ICC EVALUATION SERVICE

Most Widely Accepted and Trusted

ICC-ES Report

ESR-3716

ICC-ES | (800) 423-6587 | (562) 699-0543 | www.icc-es.org

Issued 04/2016
This report is subject to renewal 04/2017.

DIVISION: 03 00 00—CONCRETE
SECTION: 03 16 00—CONCRETE ANCHORS
DIVISION: 05 00 00—METALS
SECTION: 05 05 19—POST-INSTALLED CONCRETE ANCHORS

REPORT HOLDER:

BRIGHTON BEST INTERNATIONAL, INC.

12801 LEFFINGWELL AVENUE
SANTA FE SPRINGS, CALIFORNIA 90670

EVALUATION SUBJECT:

US ANCHOR ULTRAWEDGE ANCHORS FOR UNCRACKED CONCRETE

Look for the trusted marks of Conformity!

"2014 Recipient of Prestigious Western States Seismic Policy Council (WSSPC) Award in Excellence"

A Subsidiary of INTERNATIONAL CODE COUNCIL

ICC-ES Evaluation Report   ESR-3716

Reissued April 2016
This report is subject to renewal April 2017.

www.icc-es.org | (800) 423-6587 | (562) 699-0543   *A Subsidiary of the International Code Council®*

DIVISION: 03 00 00—CONCRETE
Section: 03 16 00—Concrete Anchors

DIVISION: 05 00 00—METALS
Section: 05 05 19—Post-Installed Concrete Anchors

REPORT HOLDER:

BRIGHTON BEST INTERNATIONAL, INC.
12801 LEFFINGWELL AVENUE
SANTE FE SPRINGS, CALIFORNIA 90670
(310) 835-0415
www.brightonbest.com

EVALUATION SUBJECT:

US ANCHOR ULTRAWEDGE ANCHORS FOR UNCRACKED CONCRETE

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2015, 2012, 2009 and 2006 *International Building Code®* (IBC)
- 2015, 2012, 2009 and 2006 *International Residential Code®* (IRC)

Property evaluated:

Structural

2.0 USES

US Anchor Ultrawedge Anchors are used to resist static, wind, and earthquake (Seismic Design Categories A and B only) tension and shear loads in uncracked normal-weight concrete and uncracked lightweight concrete having a specified compressive strength, f'_c, of 2,500 psi to 8,500 psi (17.2 MPa to 58.6 MPa).

The US Anchor Ultrawedge Anchors comply with Section 1901.3 of 2015 IBC, Section 1909 of the 2012 IBC, and Section 1912 of the 2009 and 2006 IBC. The anchors are alternatives to cast-in-place anchors described in Section 1908 of the 2012 IBC and Section 1911 of the 2009 and 2006 IBC. The anchors may also be used under the IRC where an engineered design is submitted in accordance with Section R301.1.3.

3.0 DESCRIPTION

3.1 US Anchor Ultrawedge Anchors:

The US Anchor Ultrawedge Anchors are torque-controlled expansion anchors. The anchors consist of a stud, nut, washer and expander collar (clip) as illustrated in Figure 1 of this report. The stud for all sizes is manufactured from cold-drawn carbon steel meeting the requirements of UNS G10350 with a minimum ultimate tensile strength of 550 MPa and is partially threaded with one end terminating in a flared mandrel. The expander collar (clip) is manufactured from cold-rolled carbon steel meeting the requirements of UNS G10050 with a minimum hardness of 45 HRB for the $^3/_8$" size and cold-rolled carbon steel meeting the requirements of GB/T 3522 Grade 50 with a minimum hardness of 75 HRB for the larger sizes and is formed around the stud mandrel so it is able to move freely. All components, including nuts and washers, are zinc-coated in accordance with ASTM B633 classification SC1, Type III. Installation information and dimensions are set forth in Section 4.3 and Table 1 and Table 2 of this report.

3.2 Concrete:

Normal-weight and lightweight concrete must comply with Sections 1903 and 1905 of the IBC, as applicable.

4.0 DESIGN AND INSTALLATION

4.1 Strength Design:

4.1.1 General: Design strength of anchors complying with 2015 IBC, as well as Section R301.1.3 of the 2015 IRC must be determined in accordance with ACI 318-14 and this report.

Design strength of anchors complying with the 2012 IBC, as well as Section R301.1.3 of the 2012 IRC, must be determined in accordance with ACI 318-11 Appendix D and this report.

Design strength of anchors complying with the 2009 IBC, as well as Section R301.1.3 of the 2009 IRC, must be determined in accordance with ACI 318-08 Appendix D and this report.

Design strength of anchors complying with the 2006 IBC and Section R301.1.3 of the 2006 IRC must be determined in accordance with ACI 318-05 Appendix D and this report.

The strength design of anchors must comply with ACI 318-14 17.3.1 or ACI 318 (-11, -08, -05) D.4.1, as applicable. Strength reduction factors, ϕ, as given in ACI 318-14 17.3.3 or ACI 318-11 D.4.3 or ACI 318 (-08, -05) D.4.4, as applicable, must be used for load combinations calculated in accordance with Section 1605.2 of the IBC, Section 5.3 of ACI 318-14 and Section 9.2 of ACI 318 (-11, -08, -05), as applicable. Strength reduction factors, ϕ, given in ACI 318-11 D.4.4 or ACI 318 (-08, -05) D.4.5 must be used for load combinations calculated in accordance with ACI 318 (-11, -08, -05), Appendix C. The value of f'_c used in calculations must be limited to a maximum of 8,000 psi (55.2 MPa), in accordance with ACI 318-14 17.2.7 or ACI 318-11 D.3.7, as applicable.

4.1.2 Requirements for Static Steel Strength in Tension, N_{sa}: The nominal steel strength of a single anchor in tension, N_{sa}, calculated in accordance with ACI 318-14 17.4.1.2 or ACI 318 (-11, -08, -05) D.5.1.2, as applicable, must be calculated based on the information given in Table 1 and must be used for design. The strength reduction factor, ϕ, corresponding to a ductile steel element may be used.

4.1.3 Requirements for Static Concrete Breakout Strength in Tension, N_{cb} or N_{cbg}: The nominal concrete breakout strength of a single anchor or a group of anchors in tension, N_{cb} and N_{cbg}, respectively, must be calculated in accordance with ACI 318-14 17.4.2 or ACI 318 (-11, -08, -05) D.5.2, as applicable, with modifications as described in this section. The basic concrete breakout strength in tension, N_b, must be calculated in accordance with ACI 318-14 17.4.2.2 or ACI 318 (-11, -08, -05) D.5.2.2, as applicable, using the values of h_{ef} and k_{uncr} as given in Table 1 of this report. The nominal concrete breakout strength in tension in regions of concrete where analysis indicates no cracking at service loads must be calculated in accordance with ACI 318-14 17.4.2.6 or ACI 318 (-11, -08, -05) D.5.2.6, as applicable, with $\Psi_{c,N} = 1.0$. The value of f'_c used in the calculations must be limited to 8,000 psi (55.2 MPa), in accordance with ACI 318-14 17.2.7 or ACI 318-11 D.3.7, as applicable.

4.1.4 Requirements for Pullout Strength in Tension, N_{pn}: The nominal pullout strength of a single anchor in tension in accordance with ACI 318-14 17.4.3 or ACI 318 (-11, -08, -05) D.5.3, as applicable, in uncracked concrete, $N_{p,uncr}$, is given in Table 1. In lieu of ACI 318-14 17.4.3.6 or ACI 318 (-11, -08, -05) D.5.3.6, as applicable, $\psi_{c.P} = 1.0$ for all design cases. In accordance with ACI 318-14 17.4.3 or ACI 318 (-11, -08, -05) D.5.3, as applicable the nominal pullout strength in uncracked concrete may be calculated in accordance with the following equation:

$$N_{p,f'_c} = N_{p,uncr}\sqrt{\frac{f'_c}{2,500}} \quad \text{(lb, psi)} \qquad \text{(Eq-1)}$$

$$N_{p,f'_c} = N_{p,uncr}\sqrt{\frac{f'_c}{17.2}} \quad \text{(N, MPa)}$$

$N_{p,uncr}$ are not provided in Table 1, the pullout strength in tension need not be evaluated.

4.1.5 Requirements for Static Steel Strength in shear, V_{sa}: The nominal steel strength in shear, V_{sa}, of a single anchor in accordance with ACI 318-14 17.5.1.2 or ACI 318 (-11, -08, -05) D.6.1.2, as applicable, is given in Table 1 of this report. The strength reduction factor, ϕ, corresponding to a ductile steel element may be used.

4.1.6 Requirements for Static Concrete Breakout Strength in Shear, V_{cb} or V_{cbg}: The nominal concrete breakout strength of a single anchor or group of anchors in shear, V_{cb} or V_{cbg}, respectively, must be calculated in accordance with ACI 318-14 17.5.2 or ACI 318 (-11, -08, -05) D.6.2, as applicable, with modifications as described in this section. The basic concrete breakout strength in shear, V_b, must be calculated in accordance with ACI 318-14 17.5.2.2 or ACI 318 (-11, -08, -05) D.6.2.2, as applicable, using the value of l_e according to Table 1 of this report.

4.1.7 Requirements for Static Concrete Pryout Strength of Anchor in Shear, V_{cp} or V_{cpg}: The nominal concrete pryout strength of a single anchor or group of anchors, V_{cp} or V_{cpg}, respectively, must be calculated in accordance with ACI 318-14 17.5.3 or ACI 318 (-11, -08, -05) D.6.3, as applicable, based on the value of k_{cp} provided in Table 1 and the value of N_{cb} or N_{cbg} as

calculated in Section 4.1.3 of this report.

4.1.8 Requirements for Interaction of Tensile and Shear Forces: For loadings that include combined tensile and shear forces, the design must be determined in accordance with ACI 318-14 17.6 or ACI 318 (-11, -08, -05) D.7, as applicable.

4.1.9 Requirements for Critical Edge Distance: In applications where the installed edge distance $c < c_{ac}$ and supplemental reinforcement to control splitting of the concrete is not present, the concrete breakout strength for the anchors loaded in tension for uncracked concrete, calculated in accordance with ACI 318-14 17.4.2 or ACI 318 (-11, -08, -05) D.5.2, as applicable, must be further multiplied by the factor $\Psi_{CP,N}$ as given by the following equation:

$$\Psi_{cp,N} = \frac{c}{c_{ac}}$$

where the factor $\Psi_{CP,N}$ need not be taken as less than $1.5h_{ef}/c_{ac}$.

For all other cases, $\Psi_{CP,N} = 1.0$. Values for the critical edge distance c_{ac} must be taken from Table 1. In all cases, c must not be less than c_{min} described in Table 1 of this report.

4.1.10 Requirements for Minimum Member Thickness, Minimum Anchor Spacing and Minimum Edge Distance: In lieu of using ACI 318-14 17.7.1 and 17.7.3 or ACI 318 (-11, -08, -05) D.8.1 and D.8.3, as applicable, values of s_{min} and c_{min} as given in Table 1 of this report must be used. In lieu of using ACI 318-14 17.7.5 or ACI 318 (-11 -08, -05) D.8.5, as applicable, minimum member thicknesses h_{min} as given in Table 1 of this report must be used.

4.1.11 Lightweight Concrete: For the use of anchors in lightweight concrete, the modification factor λ_a equal to 0.8λ is applied to all values of $\sqrt{f'_c}$ affecting N_n and V_n.

For ACI 318-14 (2015 IBC), ACI 318-11 (2012 IBC) and ACI 318-08 (2009 IBC), λ shall be determined in accordance with the corresponding version of ACI 318.

For ACI 318-05 (2006 IBC), λ shall be taken as 0.75 for all lightweight concrete and 0.85 for sand-lightweight concrete. Linear interpolation shall be permitted if partial sand replacement is used. In addition, the pullout strengths $N_{p,uncr}$ shall be multiplied by the modification factor, λ_a, as applicable.

4.2 Allowable Stress Design (ASD):

4.2.1 General: Design values for use with allowable stress design load combinations, calculated in accordance with Section 1605.3 of the IBC, must be established in accordance with the following equations:

$$T_{allowable,ASD} = \frac{\phi N_n}{\alpha}$$

$$V_{allowable,ASD} = \frac{\phi V_n}{\alpha}$$

where:

$T_{allowable,ASD}$ = Allowable tension load (lbf or kN)

$V_{allowable,ASD}$ = Allowable shear load (lbf or kN)

ϕN_n = Lowest design strength of an anchor or anchor group in tension as determined in accordance with ACI 318-14 Chapter 17 and 2015 IBC Section 1905.1.8, ACI 318-11 Appendix D, ACI 318-08 Appendix D and 2009 IBC Section 1908.1.9, ACI 318-05 Appendix D and 2006 IBC Section

1908.1.16, and Section 4.1 of this report as applicable. (lbf or kN).

ϕV_n = Lowest design strength of an anchor or anchor group in shear as determined in accordance with ACI 318-14 Chapter 17 and 2015 IBC Section 1905.1.8, ACI 318-11 Appendix D, ACI 318-08 Appendix D and 2009 IBC Section 1908.1.9, ACI 318-05 Appendix D and 2006 IBC Section 1908.1.16, and Section 4.1 of this report as applicable. (lbf or kN).

α = Conversion factor calculated as a weighted average of the load factors for the controlling load combination. In addition, α must include all applicable factors to account for nonductile failure modes and required over-strength.

The requirements for member thickness, edge distance and spacing, described in this report, must apply. An example of allowable stress design values for illustrative purposes is provided in Table 3 of this report.

4.2.2 Interaction of Tensile and Shear Forces: The interaction must be calculated and consistent with ACI 318-14 17.6 or ACI 318 (-11, -08, -05) D.7, as applicable, as follows:

For shear loads $V_{applied} \leq 0.2 V_{allowable,ASD}$, the full allowable load in tension must be permitted.

For tension loads $T_{applied} \leq 0.2 T_{allowable,ASD}$, the full allowable load in shear must be permitted.

For all other cases the following equation applies:

$$\frac{T_{applied}}{T_{allowable,ASD}} + \frac{V_{applied}}{V_{allowable,ASD}} \leq 1.2$$

4.3 Installation:

Embedment, spacing, edge distance, and concrete requirements must comply with Table 1 and Figure 2.

Anchor locations must comply with this report and the plans and specifications approved by the code official. US Anchor Ultrawedge Anchors must be installed in accordance with the manufacturer's published instructions and this report (see installation instructions at the end of this report). In case of conflict, this report governs.

4.4 Special Inspection:

Periodic special inspection is required in accordance with Section 1705.1.1 and Table 1705.3 of the 2015 IBC and 2012 IBC, Section 1704.15 and Table 1704.4 of the 2009 IBC, or Section 1704.13 of the 2006 IBC, as applicable. The special inspector must make periodic inspections during anchor installation to verify anchor type, anchor dimensions, concrete type, concrete compressive strength, drill bit type, hole dimensions, hole cleaning procedure, concrete member thickness, anchor embedment, anchor spacing, edge distances, tightening torque and adherence to the manufacturer's printed installation instructions. The special inspector must be present as often as required in accordance with the "statement of special inspection."

5.0 CONDITIONS OF USE

The US Anchor Ultrawedge Anchors described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

5.1 The anchors are installed in accordance with the manufacturer's published instructions and this report. In case of a conflict, this report governs.

5.2 The anchors are installed in uncracked normal-weight concrete and lightweight concrete having a specified compressive strength f'_c = 2,500 psi to 8,500 psi (17.2 MPa to 58.6 MPa).

5.3 Anchor sizes, dimensions, minimum embedment depths, and other installation parameters are as set forth in this report.

5.4 The values of f'_c used for calculation purposes must not exceed 8,000 psi (55.1 MPa).

5.5 Strength design values must be established in accordance with Section 4.1 of this report.

5.6 Allowable stress design values must be established in accordance with Section 4.2.

5.7 Anchor spacing(s) and edge distance(s) as well as minimum member thickness must comply with Table 1.

5.8 Prior to installation, calculations and details demonstrating compliance with this report must be submitted to the code official. The calculations and details must be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.

5.9 Since an ICC-ES acceptance criteria for evaluating data to determine the performance of anchors subjected to fatigue or shock loading is unavailable at this time, the use of these anchors under such conditions is beyond the scope of this report.

5.10 The use of the US Anchor Ultrawedge Anchors is limited to installation in uncracked normal-weight concrete. Anchors may not be installed in regions of a concrete member where cracking has occurred or where analysis indicates cracking may occur at service load levels, subject to the conditions of this report.

5.11 The anchors may be used to resist short-term loading due to wind or seismic forces limited to structures assigned to Seismic Design Categories A and B under the IBC, subject to the conditions of this report.

5.12 Where not otherwise prohibited in the code, US Anchor Ultrawedge Anchors are permitted for use with fire-resistance-rated construction provided that at least one of the following conditions is fulfilled:

- The anchors are used to resist wind forces only.
- Anchors that support a fire-resistance-rated envelope or a fire-resistance-rated membrane are protected by approved fire-resistance-rated materials, or have been evaluated for resistance to fire exposure in accordance with recognized standards.
- Anchors are used to support nonstructural elements.

5.13 Use of the anchors is limited to dry, interior locations.

5.14 Special inspection must be provided as set forth in Section 4.4 of this report.

5.15 US Anchor Ultrawedge Anchors are produced in Yuyao, China, under a quality control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Mechanical Anchors in Concrete Elements (AC193), dated October 2015; and quality control documentation.

7.0 IDENTIFICATION

Anchors are packaged in containers labeled with the company logo, product name, anchor size and length, catalog number and the evaluation report number (ESR-3716).

TABLE 1—DATA FOR US ANCHOR ULTRAWEDGE ANCHORS FOR USE IN UNCRACKED CONCRETE [1, 2]

CHARACTERISTIC	SYMBOL	UNITS	Nominal Anchor Diameter			
			$3/8$ inch	$1/2$ inch	$5/8$ inch	$3/4$ inch
Installation Information						
Anchor diameter	d_a (d_o)[3]	in.	$3/8$	$1/2$	$5/8$	$3/4$
Minimum diameter of hole clearance in fixture	d_h	in.	$7/16$	$9/16$	$11/16$	$13/16$
Nominal drill bit diameter	d_{bit}	in.	$3/8$	$1/2$	$5/8$	$3/4$
Minimum nominal embedment depth	h_{nom}	in.	$2^3/8$	$2^1/2$	$3^9/16$	$4^1/8$
Minimum effective embedment depth	h_{ef}	in.	2	2	3	$3^1/2$
Minimum hole depth	h_o	in.	$2^3/4$	3	4	$4^1/2$
Installation torque	T_{inst}	ft-lb	30	40	60	110
Minimum edge distance	c_{min}	in.	3	7	7	7
Minimum spacing	s_{min}	in.	4	7	7	7
Minimum concrete thickness	h_{min}	in.	4	6	6	8
Critical edge distance	c_{ac}	in.	7	9	9	12
Anchor Design Data						
Category number	1, 2 or 3	–	1	1	1	1
Yield strength of anchor steel	f_{ya}	lb/in^2	105,000	92,200	91,200	93,400
Ultimate strength of anchor steel	f_{uta}	lb/in^2	119,200	103,700	102,650	105,000
Tension						
Effective tensile stress area (neck)	$A_{se,N}$	in^2	0.056	0.110	0.173	0.262
Steel strength in tension	N_{sa}	lb.	6675	11,400	17,760	27,510
Reduction factor for steel failure modes [5]	ϕ	-	0.75			
Effectiveness factor for concrete breakout	k_{uncr}	–	24	24	24	24
Reduction factor for concrete breakout [6]	ϕ	-	0.65 (Condition B)			
Pull-out resistance [4]	$N_{p,uncr}$	lb.	3125	3225	N/A [8]	N/A [8]
Reduction factor for pull-out [6]	ϕ	-	0.65 (Condition B)			
Axial stiffness in service load range	β	lb/in	113,890	363,730	443,850	649,470
Shear						
Effective shear stress area (threads)	$A_{se,V}$	in^2	0.078	0.142	0.226	0.334
Load-bearing length of anchor	ℓ_e	in.	2	2	3	$3^1/2$
Reduction factor for concrete breakout or pryout [6]	ϕ	-	0.70 (Condition B)			
Coefficient for pryout strength	k_{cp}	-	1.0		2.0	
Steel strength in shear [7]	V_{sa}	lb.	3052	4954	9296	14,573
Reduction factor for steel failure [5]	ϕ	-	0.65			

For **SI:** 1 in = 25.4 mm, 1 in^2 = 6.451×10^{-4} m, 1 ft-lb = 1.356 Nm, 1 lb/in^2 = 6.895 Pa.

[1] The information presented in this table must be used in conjunction with the design criteria of ACI 318-14 Chapter 17 or ACI 318 Appendix D, as applicable.
[2] Installation must comply with the manufacturer's published installation instructions
[3] The notation in parentheses is for the 2006 IBC.
[4] See Section 4.1.4 of this report.
[5] Anchors are considered to be manufactured using ductile steel in accordance with ACI 318-14 2.3 or ACI 318 (-11, -08, -05) D.1. Strength reduction factors are for use with the load combinations of ACI 318-14 Section 5.3, ACI 318 (-11, -08, -05) Section 9.2 or IBC Section 1605.2, as applicable.
[6] Condition B applies where supplementary reinforcement in conformance with ACI 318-14 17.3.3.(c) or ACI 318-11 D.4.3(c) or ACI 318 (-08, -05) D.4.4(c) is not provided, or where pull-out or pry-out strength governs. For cases where supplementary reinforcement can be verified, the strength reduction factors associated with Condition A may be used. Strength reduction factors are for use with the load combinations of ACI 318-14 Section 5.3, ACI 318 (-11, -08, -05) Section 9.2 or IBC Section 1605.2.
[7] Tabulated values must be used for design since these values are lower than those calculated with ACI 318-14 Eq. (17.5.1.2b), ACI 318-11 Eq. (D-29) or ACI 318-08 and ACI 318-05 Eq. (D-20), as applicable.
[8] N/A denotes that pullout resistance is not applicable and does not need to be considered.

TABLE 2—US ANCHOR ULTRAWEDGE ANCHOR LENGTH CODE IDENTIFICATION SYSTEM

Length ID marking on threaded stud head		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
Overall anchor length, ℓ_{anch}, (inches)	From	$1^1/_2$	2	$2^1/_2$	3	$3^1/_2$	4	$4^1/_2$	5	$5^1/_2$	6	$6^1/_2$	7	$7^1/_2$	8	$8^1/_2$	9	$9^1/_2$	10	11
	Up to but not including	2	$2^1/_2$	3	$3^1/_2$	4	$4^1/_2$	5	$5^1/_2$	6	$6^1/_2$	7	$7^1/_2$	8	$8^1/_2$	9	$9^1/_2$	10	11	12

For **SI**: 1 inch = 25.4 mm.

INSTALLATION INSTRUCTIONS

1. Use a rotary hammer drill in the percussion mode with the correct size carbide drill bit meeting the requirements of ANSI Standard B212-15 to drill the hole perpendicular to the concrete surface and to the required depth.
2. Use a hand pump, compressed air or vacuum to remove debris and dust from the drilling operation.
3. If installation is through a fixture, position the fixture over the hole and install the anchor through the hole in the fixture. Using a hammer drive the anchor into the hole insuring that it is installed to the minimum required embedment depth, h_{nom}.
4. Install the washer and nut on the projecting thread and tighten the nut to the required installation torque value, T_{inst}, using a torque wrench.
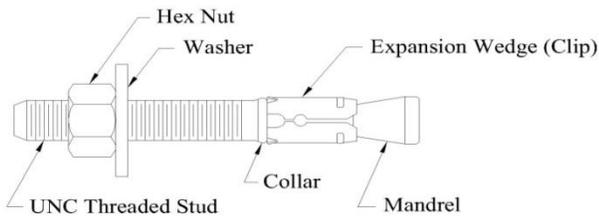

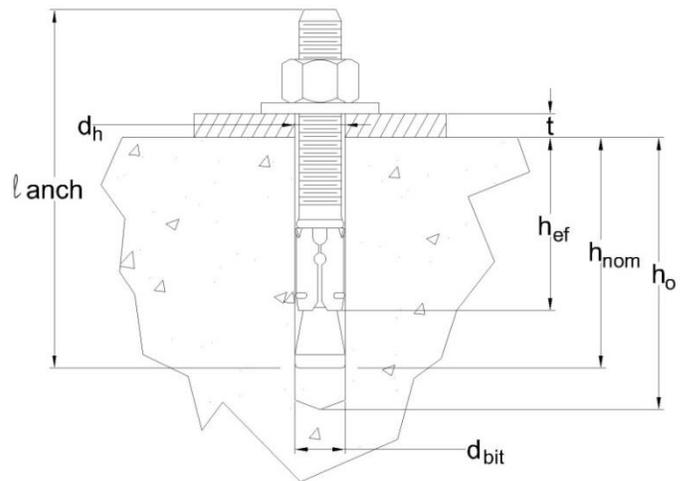**FIGURE 1—US ANCHOR ULTRAWEDGE ANCHOR COMPONENTS**

FIGURE 2—US ANCHOR ULTRAWEDGE ANCHOR INSTALLATION

TABLE 3—EXAMPLE OF ALLOWABLE STRESS DESIGN VALUES FOR ILLUSTRATIVE PURPOSES [1, 2, 3, 4, 5, 6, 7, 8]

Nominal Anchor Diameter, d_a (d_o) (in.)	Nominal Embedment Depth, h_{nom} (in.)	Effective Embedment Depth, h_{ef} (in.)	Allowable Tension Load, (lbs.)
$^3/_8$	$2^3/_8$	2	1372
$^1/_2$	$2^1/_2$	2	1416
$^5/_8$	$3^9/_{16}$	3	2739
$^3/_4$	$4^1/_8$	$3^1/_2$	3451

[1] Single anchor with static tension only
[2] Concrete determined to remain uncracked for the life of the anchorage
[3] Load combinations from ACI 318-14 Section 5.3 or ACI 318 (-11, -08, -05) Section. 9.2, as applicable and strength reduction factors from ACI 318 Condition B (supplementary reinforcement not provided)
[4] Controlling load combination 30% dead and 70% live loads, 1.2D+1.6L
[5] Calculation of weighted average $\alpha = 1.2(0.3) + 1.6(0.7) = 1.48$
[6] Normal weight concrete with $f'_c = 2,500$ psi
[7] $c_{a1} = c_{a2} \geq c_{ac}$
[8] $h \geq h_{min}$

DIVISION: 03 00 00—CONCRETE
Section: 03 16 00—Concrete Anchors

DIVISION: 05 00 00—METALS
Section: 05 05 19—Post-Installed Concrete Anchors

REPORT HOLDER:

BRIGHTON BEST INTERNATIONAL, INC.
12801 LEFFINGWELL AVENUE
SANTE FE SPRINGS, CALIFORNIA 90670
(310) 835-0415
www.brightonbest.com

EVALUATION SUBJECT:

US ANCHOR ULTRAWEDGE ANCHORS FOR UNCRACKED CONCRETE

1.0   REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that the Brighton Best International, Inc. US Anchor Ultrawedge Anchors for uncracked concrete only, recognized in ICC-ES master evaluation report ESR-3716, have also been evaluated for compliance with the codes noted below.

Applicable code editions:

■ 2014 *Florida Building Code—Building*

■ 2010 *Florida Building Code—Building*

■ 2014 *Florida Building Code—Residential*

■ 2010 *Florida Building Code—Residential*

2.0   CONCLUSIONS

The Brighton Best International, Inc. US Anchor Ultrawedge Anchors in uncracked concrete, described in master evaluation report ESR-3716, comply with the 2014 and 2010 *Florida Building Code—Building* and the 2014 and 2010 *Florida Building Code—Residential*, when designed and installed in accordance with the *International Building Code®* provisions noted in the master report, and under the following conditions:

- Design wind loads must be based on Section 1609 of the 2014 or 2010 *Florida Building Code—Building* or Section 301.2.1.1 of the 2014 or 2010 *Florida Building Code—Residential*, as applicable.

- Load combinations must be in accordance with Section 1605.2 or Section 1605.3 of the 2014 or 2010 *Florida Building Code—Building*, as applicable.

- The modifications to ACI 318 as shown in 2009 IBC Sections 1908.1.9 and 1908.1.10, as noted in 2009 IBC Section 1912.1, do not apply to the 2010 *Florida Building Code*.

Use of the Brighton Best International, Inc. US Anchor Ultrawedge Anchors in uncracked concrete only, for compliance with the High-Velocity Hurricane Zone Provisions of the 2010 *Florida Building Code—Building* and 2010 *Florida Building Code—Residential*, has not been evaluated and is outside the scope of this supplement.

For products falling under Florida Rule 9N-3, verification that the report holder's quality-assurance program is audited by a quality-assurance entity approved by the Florida Building Commission for the type of inspections being conducted is the responsibility of an approved validation entity (or the code official, when the report holder does not possess an approval by the Commission).

This supplement expires concurrently with the master report, reissued April 2016.

BRIGHTON BEST, INC.
ULTRAWEDGE ANCHOR - ENGINEERING DATA SHEET
Allowable Stress Values For Anchorages to Normal-Weight Concrete

ESR-3716 provides design information for load factor and resistance design (LRFD), however allowable stress design (ASD) is still in use by some users. Translation of LRFD to ASD values is possible, however it is dependent on the levels of dead load and live load. Dead load is defined in the ACI 318 Building Code Requirements for Structural Concrete as "the weights of members, supported structure and permanent attachments that are likely to be present on a structure in service". Live load is defined in ACI 318 as "load that is not permanently applied to a structure, but is likely to occur during the service life of the structure (excluding environmental loads)". Examples of live loads are traffic on a walkway and nonpermanent loads associated with usage of a structure. Live load values are stipulated in the building code for various loading conditions and parts of structures.

To facilitate the translation of LRFD design values to ASD design values, two scenarios of dead load and live load levels are used to conservatively address the most common applications as follows:

- 100% Dead Load   10% Dead Load and 90% Live Load

For 100% dead load, ACI 318 Equation (5.3.1a) provides a conversion factor of 1.4 which is divided into the LRFD design loads and multiplied by a ϕ factor of 0.65 to determine an equivalent ASD load.

For 10% dead and 90% live load, ACI 318 Equation (5.3.1ab provides a conversion factor of 1.56 which is divided into the LRFD design loads and multiplied by a ϕ factor of 0.65 to determine an equivalent ASD load.

It is the responsibility of the user to select the appropriate ASD values based on the example loadings shown in this document or alternative dead versus live loading that may be applicable to the specific design.

The ASD values are provided in the following tables for tension and shear for each load scenario. Other installation and design provisions in ESR-3716 must be followed.

ALLOWABLE TENSION LOADS FOR ULTRAWEDGE ANCHORS INSTALLED IN NORMAL-WEIGHT CONCRETE – 100% DEAD LOAD (Pounds)[1,2,3]

ANCHOR DIAMETER (inches)	MINIMUM NOMINAL EMBEDMENT (inches) [4]	MINIMUM CONCRETE COMPRESSIVE STRENGTH, f'_c, psi				
		2500	3000	4000	5000	6000
3/8	2-3/8	1450	1590	1835	2050	2250
1/2	2-1/2	1500	1640	1895	2120	2320
5/8	3-9/16	2895	3170	3660	4095	4485
3/4	4-1/8	3650	4000	4615	5160	5650

ALLOWABLE SHEAR LOADS FOR ULTRAWEDGE ANCHORS INSTALLED IN NORMAL-WEIGHT CONCRETE – 100% DEAD LOAD (Pounds)[1,2,3]

ANCHOR DIAMETER (inches)	MINIMUM NOMINAL EMBEDMENT (inches) [4]	MINIMUM CONCRETE COMPRESSIVE STRENGTH, f'_c, psi
		2500
3/8	2-3/8	1415
1/2	2-1/2	2300
5/8	3-9/16	4315
3/4	4-1/8	6765

BRIGHTON BEST, INC.
ULTRAWEDGE ANCHOR - ENGINEERING DATA SHEET
Allowable Stress Values For Attachments to Normal-Weight Concrete

ALLOWABLE TENSION LOADS FOR ULTRAWEDGE ANCHORS INSTALLED IN NORMAL-WEIGHT CONCRETE – 10% DEAD LOAD, 90% LIVE LOAD (Pounds)[1,2,3]

ANCHOR DIAMETER (inches)	MINIMUM NOMINAL EMBEDMENT (inches) [4]	MINIMUM CONCRETE COMPRESSIVE STRENGTH, f'_c, psi				
		2500	3000	4000	5000	6000
3/8	2-3/8	1300	1425	1645	1840	2015
1/2	2-1/2	1345	1470	1700	1900	2080
5/8	3-9/16	2600	2845	3285	3675	4025
3/4	4-1/8	3275	3585	4140	4630	5070

ALLOWABLE SHEAR LOADS FOR ULTRAWEDGE ANCHORS INSTALLED IN NORMAL-WEIGHT CONCRETE – 10% DEAD LOAD, 90% LIVE LOAD (Pounds)[1,2,3]

ANCHOR DIAMETER (inches)	MINIMUM NOMINAL EMBEDMENT (inches) [4]	MINIMUM CONCRETE COMPRESSIVE STRENGTH, f'_c, psi
		2500
3/8	2-3/8	1270
1/2	2-1/2	2065
5/8	3-9/16	3875
3/4	4-1/8	6070

Notes to all tables:

[1] Based on ESR-3716 LRFD values

[2] The tabulated values are for anchors installed in normal-weight concrete that has reached the minimum designated compressive strength at the time of installation.

[3] Other installation and other design provisions in ESR-3176 must be followed

[4] Measured from the concrete surface to the embedded end of the anchor (nominal embedment)