ICC-ES Evaluation Report

ESR-3981

Reissued October 2024

Subject to renewal October 2026

This report also contains:

- **CA Supplement**
- **FL Supplement**
- **City of LA Supplement**

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: RIGHTON BEST INTERNATIONAL, INC.	EVALUATION SUBJECT: US ANCHOR ULTRAWEDGE+ WEDGE ANCHORS IN CRACKED AND UNCRACKED CONCRETE	

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2018, 2015, 2012, and 2009 *International Building Code®* (IBC)
- 2018, 2015, 2012, and 2009 *International Residential Code®* (IRC)

†The ADIBC is based on the 2009 IBC. 2009 IBC code sections referenced in this report are the same sections in the ADIBC.

Property evaluated:

- Structural

2.0 USES

US Anchor Ultrawedge+ Wedge Anchors are used as anchorage in cracked and uncracked normalweight concrete and lightweight concrete having a specified compressive strength, f'_c, of 2,500 psi to 8,500 psi (17.2 MPa to 58.6 MPa) to resist static, wind, seismic tension, and shear loads.

The US Anchor Ultrawedge+ Wedge Anchors comply with anchors as described in Section 1901.3 of 2018 and 2015 IBC, Section 1909 of the 2012 IBC, and Section 1912 of the 2009 IBC. The anchors are alternatives to cast-in-place anchors described in Section 1901.3 of the 2018 and 2015 IBC, Section 1908 of the 2012 IBC and Section 1911 of the 2009 IBC. The anchors may also be used where an engineered design is submitted in accordance with Section R301.1.3 of the IRC.

3.0 DESCRIPTION

3.1 US Anchor Ultrawedge+ Wedge Anchors:

The US Anchor Ultrawedge+ Wedge Anchors are torque-controlled, mechanical expansion anchors. The anchors consist of a stud (anchor body), nut, washer, and expander wedge (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 and is partially threaded with one end terminating in a flared mandrel. The expander wedge (clip) is manufactured from Chinese steel standard GB/T3522 Grade 50 steel subsequently through hardened to Rockwell HRC 28-32 and is formed around the stud mandrel so it is able to move freely. The clip movement is restrained by the mandrel taper and by a collar. The anchor is installed in a predrilled hole with a hammer. When torque is applied to the nut of the installed anchor, the mandrel is drawn into the expansion element, which is in turn expanded against the wall of the drilled hole. The stud and clip are zinc-coated in accordance with ASTM B633, classification SC1, Type III. The nuts and washers have a proprietary friction-reducing and corrosion-resisting coating. Installation information and dimensions are set forth in Section 4.3 and Table 1 and Table 2 of this report.

3.2 Concrete:

Normalweight 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 the 2018 and 2015 IBC, as well as Section R301.1.3 of the 2018 and 2015 IRC must be determined in accordance with ACI 318-14 Chapter 17 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.

The strength design of anchors must comply with ACI 318-14 17.3.1 or ACI 318 (-11, -08) 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) D.4.4, as applicable, and noted in Table 1 of this report, must be used for load combinations calculated in accordance with Section 1605.2 of the IBC, ACI 318-14 5.3 and ACI 318 (-11, -08) 9.2, as applicable. Strength reduction factors, ϕ, given in ACI 318-11 D.4.4 or ACI 318-08 D.4.5, as applicable, must be used for load combinations calculated in accordance with ACI 318 (-11, -08) 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, ACI 318-11 D.3.7 or ACI 318-08 D.3.5, 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) 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) 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) D.5.2.2, as applicable, using the values of h_{ef}, k_{cr} 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) D.5.2.6, as applicable, with $\Psi_{c,N}$ = 1.0 and k_{uncr} as given in Table 1.

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, ACI 318-11 D.3.7 or ACI 318-08 D.3.5, as applicable.

4.1.4 Requirements for Pullout Strength in Tension, Npn: The nominal pullout strength of a single anchor in tension in accordance with ACI 318-14 17.4.3 or ACI 318 (-11, -08) D.5.3, as applicable, in cracked and uncracked concrete, $N_{p,cr}$ *and* $N_{p,uncr}$, respectively, is given in Table 1. In lieu of ACI 318-14 17.4.3.6 or ACI 318 (-11,-08) 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) D.5.3, as applicable the nominal pullout strength in cracked concrete may be calculated in accordance with the following equation:

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

$$N_{p,f_c'} = N_{p,cr}\sqrt{\frac{f_c'}{17.2}} \quad \text{(N, MPa)}$$

In regions where analysis indicates no cracking in accordance with ACI 318-14 17.4.3.6 or ACI 318 (-11, -08) D5.3.6, as applicable, the nominal pullout strength in tension may be calculated in accordance with the following equation:

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

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

Where values for $N_{p,cr}$ or $N_{p,uncr}$ are not provided in Table 1 of this report, 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) D.6.1.2, as applicable, is given in Table 1 of this report and must be used in lieu of the values derived by calculation from ACI 318-14 Eq. 17.5.1.2b or ACI 318 (-11, -08) Eq. D-29, as applicable. 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) 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) D.6.2.2, as applicable, based on the values provided in Table 1 of this report and 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) D.6.3, as applicable, modified by using 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 Seismic Design:

4.1.8.1 General: For load combinations including seismic, the design must be performed in accordance with ACI 318-14 17.2.3 or ACI 318 (-11, -08) D.3.3, as applicable. Modifications to ACI 318-14 17.2.3 shall be applied under Section 1905.1.8 of the 2018 and 2015 IBC. For the 2012 IBC, Section 1905.1.9 shall be omitted. Modifications to ACI 318-08 D.3.3 shall be applied under Section 1908.1.9 of the 2009 IBC.

The anchors must comply with ACI 318-14 2.3 or ACI 318-11 D.1, as applicable, as ductile steel elements and must be designed in accordance with ACI 318-14 17.2.3.4, 17.2.3.5, 17.2.3.6 or 17.2.3.7; or ACI 318-11 D.3.3.4, D.3.3.5, D.3.3.6 or D.3.3.7; ACI 318-08 D.3.3.4, D.3.3.5 or D.3.3.6, as applicable. Strength reduction factors, ϕ, are given in Table 1 of this report. The anchors may be installed in Seismic Design Categories A through F of the IBC.

4.1.8.2 Seismic Tension: The nominal steel strength and nominal concrete breakout strength for anchors in tension must be calculated in accordance with ACI 318-14 17.4.1 and 17.4.2 or ACI 318 (-11, -08) D.5.1 and D.5.2, respectively, as applicable, as described in Sections 4.1.2 and 4.1.3 of this report. In accordance with ACI 318-14 17.4.3.2 or ACI 318 (-11, -08) D.5.3.2, as applicable, the appropriate pullout strength in tension for seismic loads, $_{p,eq}$, described in Table 1 must be used in lieu of N_p, as applicable. The value of $N_{p,eq}$ may be adjusted by calculation for concrete strength in accordance with Eq-1 and Section 4.1.4 of this report. If no values for $N_{p,eq}$ are given in Table 1, the static design strength values govern.

4.1.8.3 Seismic Shear: The nominal concrete breakout strength and pryout strength in shear must be calculated in accordance with ACI 318-14 17.5.2 and 17.5.3 or ACI 318 (-11, -08) D.6.2 and D.6.3, respectively, as applicable, as described in Sections 4.1.6 and 4.1.7 of this report. In accordance with ACI 318-14 17.5.1.2 or ACI 318 (-11, -08) D.6.1.2, as applicable, the appropriate value for nominal steel strength for seismic loads, $V_{sa,eq}$ described in Table 1 must be used in lieu of V_{sa}, as applicable.

4.1.9 Requirements for Interaction of Tensile and Shear Forces: For anchors or groups of anchors that are subjected to the effects of combined tensile and shear forces, the design must be determined in accordance with ACI 318-14 17.6 or ACI 318 (-11, -08) D.7, as applicable.

4.1.10 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) D.5.2, as applicable, must be further multiplied by the factor $\Psi_{cp,N}$ as given by Eq-3:

$\psi_{cp,N}=\frac{c}{c_{ac}}$ (Eq-3) where the factor $\Psi_{cp,N}$ need not be taken as less than $\frac{1.5h_{ef}}{c_{ac}}$.

For all other cases, $\Psi_{cp,N}$ = 1.0. In lieu of using ACI 318-14 17.7.6 or ACI 318 (-11, -08) D.8.6, as applicable, values of 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.

4.1.11 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) D.8.1 and D.8.3, respectively, 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) D.8.5, as applicable, minimum member thicknesses h_{min} as given in Table 1 of this report must be used.

4.1.12 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 (2018 and 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.

4.2 Allowable Stress Design (ASD):

4.2.1 General: Design values for use with allowable stress design (working 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, 2018 and 2015 IBC Section 1905.1.8, ACI 318-11 Appendix D, ACI 318-08 Appendix D and 2009 IBC Section 1908.1.9, and Section 4.1 of this report as applicable. For the 2012 IBC, Section 1905.1.9 shall be omitted (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, and Section 4.1 of this report as applicable. For the 2012 IBC, Section 1905.1.9 shall be omitted (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) D.7, as applicable, as follows:

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

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

For all other cases:

$$\frac{T_{applied}}{T_{allowable,ASD}} + \frac{V_{applied}}{V_{allowable,ASD}} \le 1.2 \qquad (Eq\text{-}4)$$

4.3 Installation:

Installation parameters such as embedment, spacing, edge distance, and concrete requirements, are provided in Table 1 and Figure 2.

Anchor locations must comply with this report, and plans and specifications approved by the code official. US Anchor Ultrawedge+ Wedge Anchors must be installed in accordance with the manufacturer's published installation 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 2018, 2015 and 2012 IBC, or Section 1704.15 and Table 1704.4 of the 2009 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." Under the IBC, additional requirements as set forth in Sections 1705, 1706 and 1707 must be observed, when applicable.

5.0 CONDITIONS OF USE:

The US Anchor Ultrawedge+ Wedge 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 must be installed in accordance with the manufacturer's published installation instructions and this report. In case of a conflict, this report governs.

5.2 The anchors must be limited to use in cracked and uncracked normal-weight concrete and lightweight concrete having a specified compressive strength, f'c, of 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 The concrete shall have attained its minimum design strength prior to the installation of the anchors.

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

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

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

5.9 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.

5.10 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.

5.11 Anchors may be installed in regions of concrete where cracking has occurred or where analysis indicates cracking may occur ($f_t > f_r$), subject to the conditions of this report.

5.12 The anchors may be used to resist short-term loading due to wind or seismic forces in locations designated as Seismic Design Categories A through F of the IBC, subject to the conditions of this report.

5.13 Where not otherwise prohibited in the code, US Anchor Ultrawedge+ Wedge 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.

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

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

5.16 Anchors are manufactured for Brighton Best International, Inc. under an approved 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 2017 (Editorially revised April 2018); which incorporates requirements in ACI 355.2-07, for use in cracked and uncracked concrete; including tests 18 and 19 of Table 4.2 of Annex A of AC193 for seismic tension and shear, and quality control documentation.

7.0 IDENTIFICATION

7.1 The anchors are identified by packaging labeled with the company name (Brighton Best), product name, anchor diameter and length, part number, production lot number and the evaluation report number (ESR-3981).

7.2 The report holder's contact information is the following:

BRIGHTON BEST INTERNATIONAL, INC.
12801 LEFFINGWELL AVENUE
SANTE FE SPRINGS, CALIFORNIA 90670
(562) 483-2740
www.brightonbest.com

TABLE 1—DATA FOR US ANCHOR ULTRAWEDGE+ WEDGE ANCHORS FOR USE IN CRACKED AND 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	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.	$2^{3}/_{8}$		3	$3^{9}/_{16}$	$4^{1}/_{8}$
Minimum effective embedment depth	h_{ef}	in.	2		$2^{1}/_{2}$	3	$3^{1}/_{2}$
Minimum hole depth	h_o	in.	$2^{3}/_{4}$		$3^{1}/_{4}$	$3^{3}/_{4}$	$4^{1}/_{2}$
Installation torque	T_{inst}	ft-lb	29		40	80	110
Minimum edge distance	c_{min}	in.	4	$2^{1}/_{2}$	$2^{3}/_{4}$	4	5
	for $s \geq$		6	5	6	6	9
Minimum spacing	s_{min}	in.	6	$2^{1}/_{2}$	3	$3^{3}/_{4}$	5
	for $c \geq$		4	4	4	6	9
Minimum concrete thickness	h_{min}	in.	$4^{1}/_{2}$	6	6	$6^{1}/_{2}$	
Critical edge distance	c_{ac}	in.	8	5	8	13	11
Anchor Design Data							
Category number	1, 2 or 3	–	1		1	1	1
Yield strength of anchor steel	f_{ya}	lb/in^2	87,200		84,000	81,600	81,600
Ultimate strength of anchor steel	f_{uta}	lb/in^2	109,000		105,000	102,000	102,000
Tension							
Effective tensile stress area (neck)	$A_{se,N}$	in^2	0.056		0.103	0.164	0.238
Steel strength in tension	N_{sa}	lb.	6,104		10,815	16,728	24,276
Reduction factor for steel failure modes [4]	ϕ	-	0.75				
Effectiveness factor for concrete breakout, cracked	k_{cr}	-	17		21	21	24
Effectiveness factor for concrete breakout, uncracked	k_{uncr}	-	24		24	27	27
Reduction factor for concrete breakout [5]	ϕ	-	0.65 (Condition B)				
Pull-out resistance, cracked concrete [3]	$N_{p,cr}$	lb.	N/A		2,970	4,037	N/A
Pull-out resistance, uncracked concrete [3]	$N_{p,uncr}$	lb.	3,013		3,394	N/A	N/A
Pull-out resistance, seismic loads [3]	$N_{p,eq}$	lb.	N/A		2,970	4,037	N/A
Reduction factor for pull-out [5]	ϕ	-	0.65 (Condition B)				
Axial stiffness in service load range (cracked)	β_{cr}	lb/in	37,300		44,600	40,300	55,800
Axial stiffness in service load range (uncracked)	β_{uncr}	lb/in	277,400		230,400	105,700	401,200
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, non-seismic [6]	V_{sa}	lb.	2,508		5,500	9,923	18,317
Steel strength in shear, seismic	$V_{sa,eq}$	lb.	2,006		4,400	7,938	16,485
Reduction factor for steel failure [6]	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]See Section 4.1.4 of this report. N/A (not applicable) denotes that this value does not control for design.
[4]Anchors are considered to be manufactured using ductile steel in accordance with ACI 318-14 2.3 or ACI 318 (-11, -08) D.1. Strength reduction factors are for use with the load combinations of ACI 318-14 5.3, ACI 318 (-11, -08) 9.2 or IBC Section 1605.2, as applicable.
[5]Condition B applies where supplementary reinforcement in conformance with ACI 318-14 17.3.3(c), ACI 318-11 D.4.3(c) or ACI 318-08 D.4.4(c), as applicable, 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 5.3, ACI 318 (-11, -08) 9.2 or IBC Section 1605.2.
[6]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 Eq. (D-20), as applicable.

TABLE 2—US ANCHOR ULTRAWEDGE+ WEDGE 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, ensuring 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.

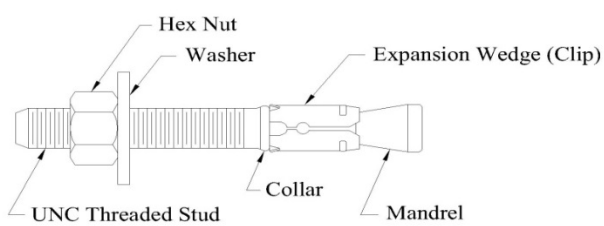

FIGURE 1—US ANCHOR ULTRAWEDGE+ WEDGE ANCHOR COMPONENTS

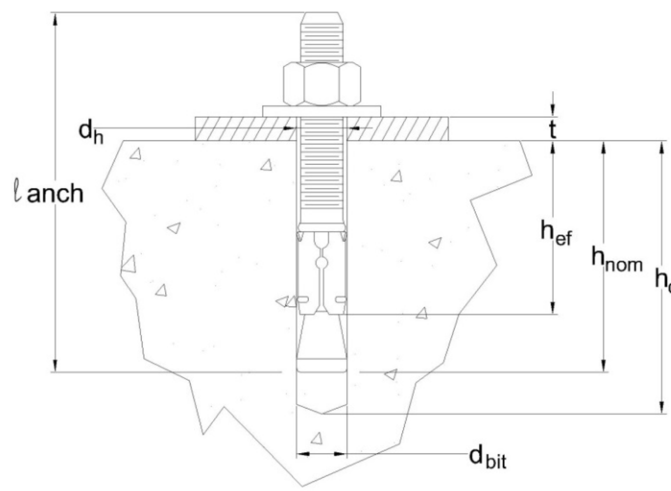

FIGURE 2—US ANCHOR ULTRAWEDGE+ WEDGE ANCHOR INSTALLATION

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, uncracked (lbs.)
$^3/_8$	$2^3/_8$	2	1323
$^1/_2$	$2^1/_2$	2	1491
$^5/_8$	$3^9/_{16}$	3	3081
$^3/_4$	$4^1/_8$	$3^1/_2$	3882

[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 5.3 or ACI 318 (-11, -08) 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 α =1.2(0.3) + 1.6(0.7) = 1.48
[6]Normalweight concrete with f'_c = 2,500 psi
[7]$c_{a1} = c_{a2} \geq c_{ac}$
[8]$h \geq h_{min}$

ICC-ES Evaluation Report

ESR-3981 City of LA Supplement

Reissued October 2024

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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.

EVALUATION SUBJECT:

US ANCHOR ULTRAWEDGE+ WEDGE ANCHORS IN CRACKED AND UNCRACKED CONCRETE

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that US Anchor Ultrawedge+ Wedge Anchors in cracked and uncracked concrete, described in ICC-ES evaluation report ESR-3981, have also been evaluated for compliance with the codes noted below as adopted by the Los Angeles Department of Building and Safety (LADBS).

Applicable code editions:

- 2020 *City of Los Angeles Building Code (LABC)*
- 2020 *City of Los Angeles Residential Code (LARC)*

2.0 CONCLUSIONS

The US Anchor Ultrawedge+ Wedge Anchors in cracked and uncracked concrete, described in Sections 2.0 through 7.0 of the evaluation report ESR-3981, comply with the LABC Chapter 19*,* and the LARC, and are subject to the conditions of use described in this supplement.

3.0 CONDITIONS OF USE

The US Anchor Ultrawedge+ Wedge Anchors in cracked and uncracked concrete described in this evaluation report must comply with all of the following conditions:

- All applicable sections in the evaluation report ESR-3981.
- The design, installation, conditions of use and identification of the anchors are in accordance with the 2018 *International Building Code®* (2018 IBC) provisions noted in the evaluation report ESR-3981.
- The design, installation and inspection are in accordance with additional requirements of LABC Chapters 16 and 17, as applicable.
- Under the LARC, an engineered design in accordance with LARC Section R301.1.3 must be submitted.
- The allowable and strength design values listed in the evaluation report and tables are for the connection of the anchors to the concrete. The connection between the anchors and the connected members shall be checked for capacity (which may govern).
- For use in wall anchorage assemblies to flexible diaphragm applications, anchors shall be designed per the requirements of City of Los Angeles Information Bulletin P/BC 2020-071.

This supplement expires concurrently with the evaluation report, reissued October 2024.

ICC-ES Evaluation Report

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REPORT HOLDER:

BRIGHTON BEST INTERNATIONAL, INC.

EVALUATION SUBJECT:

US ANCHOR ULTRAWEDGE+ WEDGE ANCHORS IN CRACKED AND UNCRACKED CONCRETE

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that the US Anchor Ultrawedge+ Wedge Anchors in cracked and uncracked concrete, described in ICC-ES evaluation report ESR-3981, have also been evaluated for compliance with the codes noted below.

Applicable code editions:

- 2019 *California Building Code* (CBC)

  For evaluation of applicable chapters adopted by the California Office of Statewide Health Planning and Development (OSHPD) AKA: California Department of Health Care Access and Information (HCAI) and the Division of the State Architect (DSA), see Section 2.1 and 2.2 below.

- 2019 *California Residential Code* (CRC)

2.0 CONCLUSIONS

The US Anchor Ultrawedge+ Wedge Anchors in cracked and uncracked concrete, described in Sections 2.0 through 7.0 of the evaluation report ESR-3981, comply with CBC Chapters 19 and CRC Section R301.1.3, provided the design and installation are in accordance with the 2018 *International Building Code®* provisions noted in the evaluation report, and the additional requirements of CBC Chapters 16 and 17, as applicable.

2.1 OSHPD:

The US Anchor Ultrawedge+ Wedge Anchors in cracked and uncracked concrete, described in Sections 2.0 through 7.0 of the evaluation report ESR-3981, comply with the CBC amended Sections in Chapters 16, 17 and 19, and Chapters 16A, 17A and 19A, provided the design and installation are in accordance with the 2018 *International Building Code®* provisions noted in the evaluation report, and the additional requirements in Sections 2.1.1 to 2.1.3 of this supplement:

2.1.1 Verification Test Requirements: The installation verification test loads, frequency, and acceptance criteria shall be in accordance with Section 1901.3.4 [OSHPD 1R, 2 and 5], and Section 1910A.5 [OSHPD 1 & 4] of the CBC, as applicable.

2.1.2 Special Inspection Requirements: Periodic special inspection is required, in accordance with Section 1705.1.1 and Table 1705.3 [OSHPD 1R, 2 and 5], or Section 1705A.1.1, and Table 1705A.3 [OSHPD 1 & 4] of the CBC, as applicable. In addition, special inspection is required for special seismic certification for designated seismic system in accordance with amended Section 1705.13.3.1 [OSHPD 1R, 2 and 5] and Section 1705A.12.4 [OSHPD 1 & 4] of the CBC, as applicable.

2.1.3 Conditions of Use:

1. Where moment resistance is assumed at the base of the superstructure elements, deformation of the superstructure to foundation connection shall be considered in accordance with Section 1617A.1.16 [OSHPD 1 & 4] of the CBC.

2.2 DSA:

The US Anchor Ultrawedge+ Wedge Anchors in cracked and uncracked concrete, described in Sections 2.0 through 7.0 of the evaluation report ESR-3981, comply with the CBC amended Sections in Chapters 16, 17 and 19, and Chapters 16A, 17A and 19A, provided the design and installation are in accordance with the 2018 *International Building Code*® provisions noted in the evaluation report, and the additional requirements in Sections 2.2.1 to 2.2.3 of this supplement:

2.2.1 Verification Test Requirements: The installation verification test loads, frequency, and acceptance criteria shall be in accordance with Section 1909.2.7 [DSA-SS/CC], and Section 1910A.5 [DSA-SS] of the CBC, as applicable.

2.2.2 Special Inspection Requirements: Periodic special inspection is required, in accordance with Section 1705A.1.1 and Table 1705A.3 [DSA-SS, DSA-SS/CC] of the CBC. In addition, special inspection is required for special seismic certification for designated seismic system in accordance with amended Section 1705A.12.4 [DSA-SS, DSA-SS/CC] of the CBC, as applicable.

2.2.3 Conditions of Use:

1. Where moment resistance is assumed at the base of the superstructure elements, deformation of the superstructure to foundation connection shall be considered in accordance with Section 1617A.1.16 [OSHPD 1 & 4] of the CBC.

This supplement expires concurrently with the evaluation report, reissued October 2024.

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DIVISION: 03 00 00—CONCRETE
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REPORT HOLDER:

BRIGHTON BEST INTERNATIONAL, INC.

EVALUATION SUBJECT:

US ANCHOR ULTRAWEDGE+ WEDGE ANCHORS IN CRACKED AND 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+ Wedge Anchors in cracked and uncracked concrete, described in ICC-ES evaluation report ESR-3981, have also been evaluated for compliance with the codes noted below.

Applicable code editions:

- 2020 *Florida Building Code—Building*
- 2020 *Florida Building Code—Residential*

2.0 CONCLUSIONS

The Brighton Best International, Inc. US Anchor Ultrawedge+ Wedge Anchors in cracked and uncracked concrete, described in evaluation report ESR-3981, comply with the *Florida Building Code—Building* and the *Florida Building Code—Residential*, provided the design requirements are determined in accordance with the *Florida Building Code—Building* and the *Florida Building Code—Residential*, as applicable. The installation requirements noted in ICC-ES evaluation report ESR-3981 for the 2018 *International Building Code®* meet the requirements of the *Florida Building Code—Building* and the *Florida Building Code—Residential,* as applicable.

Use of the Brighton Best International, Inc. US Anchor Ultrawedge+ Wedge Anchors in cracked and uncracked concrete has also been found to be in compliance with the High-Velocity Hurricane Zone provisions of the *Florida Building Code—Building* and *Florida Building Code—Residential,* with the following conditions:

a) For anchorage to wood members, the connection subject to uplift, must be designed for no less than 700 pounds (3114 N).

b) For connection to aluminum members, all expansion anchors must be installed no less than 3 inches from the edge of concrete slab and/or footing. All expansion anchors shall develop an ultimate withdrawal resisting force equal to four times the imposed load, with no stress increase for duration of load.

For products falling under Florida Rule 61G20-3, 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 evaluation report, reissued October 2024.