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ESR-3068

Reissued 07/2018
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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:

DEWALT

EVALUATION SUBJECT:

ULTRACON+® SCREW ANCHORS IN UNCRACKED CONCRETE (DEWALT / POWERS)

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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:

DEWALT

ADDITIONAL LISTEES:

POWERS FASTENERS

ALL POINTS SCREW, BOLT & SPECIALTY

THE HILLMAN GROUP

EVALUATION SUBJECT:

ULTRACON®+ SCREW ANCHORS IN UNCRACKED CONCRETE (DEWALT)

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)

Property evaluated:

Structural

2.0 USES

The Ultracon+ screw anchors are used to resist static and wind tension and shear loads in uncracked normal-weight concrete having a specified compressive strength, f'_c, of 2,500 psi to 8,500 psi (17.2 MPa to 58.6 MPa).

The anchoring system is an alternative to anchors described in Section 1901.3 of the 2018 and 2015 IBC, Sections 1908 and 1909 of the 2012 IBC, and Sections 1911 and 1912 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 Ultracon+ Screw Anchors:

Ultracon+ screw anchors are comprised of a one-piece threaded anchor body with either a hex head, slotted hex head, phillips flat head or trim flat head.

Product names for the report holder and the additional listees are presented in the following table of this report.

COMPANY NAME	PRODUCT NAME
DEWALT	Ultracon®+
Powers Fasteners	Tapper®+
All Points Screw, Bolt & Specialty	AP Tapper+
The Hillman Group	Hillman Tapper+

Available nominal sizes are $^3/_{16}$ inch and $^1/_4$ inch (4.8 mm and 6.4 mm). The anchors are manufactured from low-carbon steel that is case hardened and have a Stalgard® (Perma-Seal® for Tapper+) coating available in various colors. The Ultracon+ screw anchor is illustrated in Figure 2 of this report.

The anchor body is formed with alternating high-low threads and a gimlet point tip. The anchors are installed in a predrilled hole with a powered tool during which the threads on the anchor body tap into the sides of the predrilled hole and interlock with the base material during installation.

3.2 Concrete:

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

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.

Design parameters are based on the 2018 and 2015 IBC (ACI 318-14) and 2012 IBC (ACI 318-11) unless noted otherwise in Sections 4.1.1 through 4.1.11 of this report.

The strength design of anchors must comply with ACI 318-14 17.3.1 or ACI 318-11 D.4.1, as applicable, except as required in ACI 318-14 17.2.3 or ACI 318-11 D.3.3, as applicable.

Strength reduction factors, ϕ, as given in ACI 318-14 17.3.3 or ACI 318-11 D.4.3, as applicable, and noted in Tables 3 and 4, must be used for load combinations calculated in accordance with Section 1605.2 of the IBC, Section 5.3 of ACI 318-14 or Section 9.2 of ACI 318-11. Strength reduction factors, ϕ, as given in ACI 318-11 D.4.4, must be used for load combinations calculated in accordance with ACI 318-11 Appendix C.

The value of f'_c is limited to 8,000 psi (55.2 MPa), maximum, in accordance with ACI 318-14 17.2.7 or ACI 318-11 Section D.3.7, as applicable.

4.1.2 Requirements for Static Steel Strength in Tension, N_{sa}: The nominal static 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 D.5.1.2, as applicable, is given in Table 3 of this report.

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} or N_{cbg}, respectively, must be calculated in accordance with ACI 318-14 17.4.2 or ACI 318-11 D.5.2, as applicable, with modifications as described in this section. The basic concrete breakout strength of a single anchor in tension, N_b, must be calculated according to ACI 318-14 17.4.2.2 or ACI 318-11 D.5.2.2, as applicable, using the values of h_{ef} and k_{uncr} as given in Table 3 of this report, in lieu of h_{ef} and k_c, respectively. The value of $\psi_{c,N} = 1.0$.

4.1.4 Requirements for Static Pullout Strength in Tension, N_{pn}: The nominal pullout strength of a single anchor in accordance with ACI 318-14 17.4.3.1 and 17.4.3.2 or ACI 318-11 D.5.3.1 and D.5.3.2, respectively, as applicable, in uncracked concrete, $N_{p,uncr}$, is given in Table 3 of this report. In lieu of ACI 318-14 17.4.3.6 or ACI 318-11 D.5.3.6, as applicable, $\psi_{c,P} = 1.0$ for all design cases. The nominal pullout strength can be adjusted by calculation according to Eq-1:

$$N_{pn,f'c} = N_{p,uncr} \left(\frac{f'_c}{2{,}500}\right)^n \text{ (lb, psi)} \qquad \text{(Eq-1)}$$

$$N_{pn,f'c} = N_{p,uncr} \left(\frac{f'_c}{17.2}\right)^n \text{ (N, MPa)}$$

where f'_c is the specified concrete compressive strength and whereby the exponent $n = 0.3$ for $^3/_{16}$-inch-diameter (4.8 mm) anchors and $n = 0.4$ for $^1/_4$-inch-diameter (6.4 mm) anchors.

4.1.5 Requirements for Static Steel Shear Strength, 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 D.6.1.2, as applicable, is given in Table 4 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 Eq. D-29, as applicable.

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 D.6.2, as applicable, with modifications as described in this section. The basic concrete breakout strength of a single anchor in shear, V_b, must be calculated in accordance with ACI 318-14 17.5.2.2 or ACI 318-11 D.6.2.2, as applicable, using the value of ℓ_e and d_a (d_o) given in Table 4 of this report.

4.1.7 Requirements for Static Concrete Pryout Strength 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 D.6.3, as applicable, modified by using the value of k_{cp} provided in Table 4 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 tension and shear, the design must be performed in accordance with ACI 318-14 17.6 or ACI 318-11 Section D.7, as applicable.

4.1.9 Requirements for Critical Edge Distance, c_{ac}: In applications where $c < c_{ac}$ and supplemental reinforcement to control splitting of the concrete is not present, the concrete breakout strength in tension for uncracked concrete, calculated according to ACI 318-14 17.4.2 or ACI 318-11 D.5.2, as applicable, must be further multiplied by the factor $\psi_{cp,N}$ given by Eq-2:

$$\psi_{cp,N} = \frac{c}{c_{ac}} \qquad \text{(Eq-2)}$$

whereby the factor $\psi_{cp,N}$ need not be taken 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 D.8.6, as applicable, values of c_{ac} provided in Table 3 of this report must be used.

4.1.10 Requirements for Minimum Member Thickness, Minimum Anchor Spacing and Minimum Edge Distance: In lieu of ACI 318-14 17.7.1 and 17.7.3 or ACI 318-11 D.8.1 and D.8.3,respectively, as applicable, values of s_{min} and c_{min} must comply with Table 1 of this report. In lieu of ACI 318-14 17.7.5 or ACI 318-11 D.8.5, as applicable, minimum member thicknesses, h_{min}, must comply with Table 1 of this report.

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 (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 in accordance with Section 1605.3 of the IBC are required. These are calculated using Eq-3 and Eq-4 as follows:

$$T_{allowable,ASD} = \frac{\phi N_n}{\alpha} \qquad \text{(Eq-3)}$$

$$V_{allowable,ASD} = \frac{\phi V_n}{\alpha} \qquad \text{(Eq-4)}$$

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 (-11, -08) Appendix D or ACI 318-14 Chapter 17

as applicable and 2018 and 2015 IBC Section 1905.1.8, 2009 IBC Section 1908.1.9, and Section 4.1 of this report as applicable (lbf or kN). For the 2012 IBC, Section 1905.1.9 shall be omitted.

ϕV_n = Lowest design strength of an anchor or anchor group in shear as determined in accordance with ACI 318 (-11, -08) Appendix D or ACI 318-14 Chapter 17 as applicable and 2018 and 2015 IBC Section 1905.1.8, 2009 IBC Section 1908.1.9, and Section 4.1 of this report, as applicable (lbf or kN). For the 2012 IBC, Section 1905.1.9 shall be omitted.

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 anchor spacing, described in this report, must apply. An example of allowable stress design tension values for illustrative purposes is shown in Table 5 of this report.

4.2.2 Interaction of Tensile and Shear Forces: The interaction must be calculated, as follows:

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

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

For all other cases: $\frac{T}{T_{allowable,ASD}} + \frac{V}{V_{allowable,ASD}} \le 1.2$ (Eq-5)

4.3 Installation:

Installation parameters are provided in Table 1 and Figure 1 of this report. Anchor locations must comply with this report and plans and specifications approved by the code official. The Ultracon+ must be installed according to manufacturer's published installation instructions (MPII) and this report. Anchors must be installed in holes drilled using carbide-tipped masonry drill bits (Ultracon+ bit) supplied by DEWALT, and complying with the tolerances given in Table 1 of this report.

4.4 Special Inspection:

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, hole dimensions, hole cleaning procedure, drill bit size and type, anchor spacing, edge distances, concrete member thickness, anchor embedment 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 Ultracon®+ screw anchors described in this report 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 Anchor sizes, dimensions, and minimum embedment depths are as set forth in this report.

5.3 Anchors must be installed in 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).

5.4 The values of f'_c used for calculation purposes must not exceed 8,000 psi (55.2 MPa).

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

5.6 Allowable design values must be established in accordance with Section 4.2 of this report.

5.7 Anchor spacing(s) and edge distance(s), and minimum member thickness, must comply with Table 1 of this report, unless otherwise noted.

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 Anchors must not 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.

5.11 The anchors may be used to resist short-term loading due to wind, and for seismic load combinations are limited to locations designated as Seismic Design Categories A and B under the IBC, subject to the conditions of this report.

5.12 Anchors are not permitted to support fire-resistance-rated construction. Where not otherwise prohibited by code, anchors are permitted for installation in fire-resistance-rated construction provided that at least one of the following conditions is fulfilled:

- Anchors that support gravity load–bearing structural elements are within 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 resist wind or seismic forces only.
- Anchors are used to support nonstructural elements.

5.13 Anchors have been evaluated for reliability against brittle failure and found to be not significantly sensitive to stress-induced hydrogen embrittlement.

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

5.15 See ESR-3213 for installations in which Ultracon+ screw anchors are used in contact with treated wood.

5.16 Special inspection must be provided in accordance with Section 4.4.

5.17 Anchors are manufactured under an approved quality control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

6.1 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 / ACI 355.2-04, for use in uncracked concrete.

6.2 Quality control documentation.

7.0 IDENTIFICATION

7.1 The Ultracon+ anchors are identified in the field by dimensional characteristics and packaging. A length letter code is stamped on each anchor head. Packages are identified with the anchor name; part number; type; anchor size and length; quantity; the company name as set forth in Section 3.1 of this report; and the evaluation report number (ESR-3068).

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

DEWALT
701 EAST JOPPA ROAD
TOWSON, MARYLAND 21286
(800) 524-3244
www.DEWALT.com
anchors@DEWALT.com

7.3 The Additional Listees' contact information is the following:

POWERS FASTENERS
701 EAST JOPPA ROAD
TOWSON, MARYLAND 21286
(800) 524-3244
www.powers.com

ALL POINTS SCREW, BOLT & SPECIALTY
1590 NW 27TH AVENUE, #9
POMPANO BEACH, FLORIDA 33069
info@allpointsscrew.com

THE HILLMAN GROUP
10590 HAMILTON AVENUE
CINCINNATI, OHIO 45231
info@hillmangroup.com

TABLE 1—ULTRACON+ SCREW ANCHOR INSTALLATION AND SUPPLEMENTAL INFORMATION[1]

Anchor Property / Setting Information	Symbol	Units	Nominal Anchor Size (inch)	
			$^3/_{16}$	$^1/_4$
Nominal outside anchor diameter	d_a	in. (mm)	0.145 (3.7)	0.185 (4.7)
Nominal drill bit diameter	d_{bit}	in.	$^3/_{16}$ Ultracon+ bit	$^1/_4$ Ultracon+ bit
Ultracon+ bit tolerance range	-	in.	0.170 to 0.176	0.202 to 0.207
Nominal embedment depth	h_{nom}	in. (mm)	$1^3/_4$ (44)	$1^3/_4$ (44)
Effective embedment	h_{ef}	in. (mm)	1.23 (32.2)	1.23 (32.2)
Minimum member thickness	h_{min}	in. (mm)	$3^1/_4$ (83)	$3^1/_4$ (83)
Minimum edge distance	c_{min}	in. (mm)	$1^3/_4$ (44)	$1^3/_4$ (44)
Minimum spacing distance	s_{min}	in. (mm)	1 (25)	2 (51)
Minimum hole depth[4]	h_o	in. (mm)	h_{nom} + $^1/_4$ (6.4)	h_{nom} + $^1/_4$ (6.4)
Minimum overall anchor length[2,3]	ℓ_{anch}	in. (mm)	$2^1/_4$ (57)	$2^1/_4$ (57)
Maximum installation torque	T_{screw} or $T_{inst,max}$	ft.-lb.	Not applicable using Ultracon+ installation socket tool	
Hex head wrench / socket size	d_h	in.	$^1/_4$	$^5/_{16}$
Hex head height	-	in.	$^7/_{64}$	$^9/_{64}$
Flat head bit tip size	-	No.	2	3
Effective tensile stress area	A_{se}	in.^{2}	0.0162	0.0268
Minimum specified ultimate strength	f_{uta}	psi	100,000	100,000
Minimum specified yield strength	f_{ya}	psi	80,000	80,000
Mean axial stiffness, uncracked concrete[5]	β_{uncr}	10^3 lbf/in.	50.9	84.6

For **SI:** 1 inch = 25.4 mm, 1 ft-lb = 1.356 N-m, 1 psi = 0.0069 N/mm^2 (MPa).

[1]The information presented in this table is to be used in conjunction with the design criteria of ACI 318-14 Chapter 17 or ACI 318-11 Appendix D, as applicable. See Figure 1 for location of dimensions.
[2]The listed minimum overall anchor length is based on anchor sizes commercially available at the time of publication compared with the requirements to achieve the minimum nominal embedment depth and consideration of a fixture attachment. See the anchor detail (Figure 1) for hex head and flat head screw anchors. The overall anchor length of the hex head versions is measured from the underside of the head to the tip of the anchor; for the flat head versions the overall anchor length is measured from the top of the head to the tip of the anchor.
[3]The minimum overall anchor length for the hex head versions can be 1.75-inch (44 mm) provided the fixture attachment does not exceed 0.036-inch (0.91mm) in thickness.
[4]The actual minimum hole depth can be calculated as $h_o = \ell_{anch} - t + {}^1/_4$ inch.
[5]Mean values shown; actual stiffness varies considerably depending on concrete strength, loading and geometry of application.

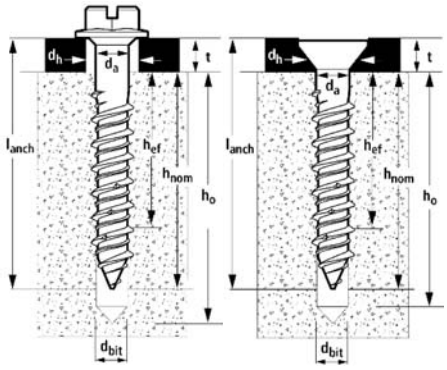


FIGURE 1—SCREW ANCHOR DETAIL (HEX AND FLAT HEAD)

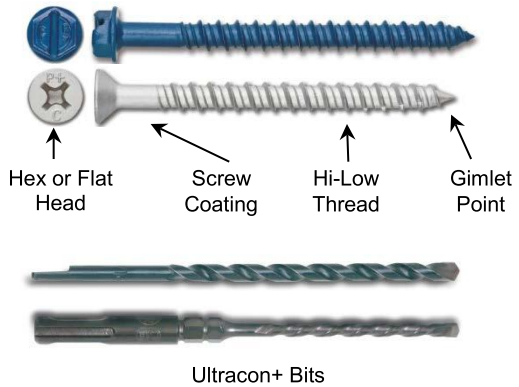
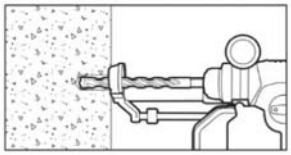


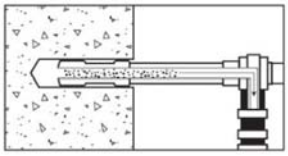
FIGURE 2—ULTRACON+ SCREW ANCHOR AND DRILL BITS

TABLE 2—ULTRACON+ LENGTH IDENTIFICATION CODE SYSTEM

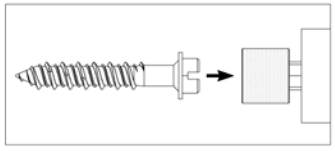
Length ID marking on head		☐	A	B	C	D	E	F	G	H	I	J
Overall anchor length, ℓ_{anch}, (inches)	From	1	$1^1/_2$	2	$2^1/_2$	3	$3^1/_2$	4	$4^1/_2$	5	$5^1/_2$	6
	Up to but not including	$1^1/_2$	2	$2^1/_2$	3	$3^1/_2$	4	$4^1/_2$	5	$5^1/_2$	6	$6^1/_2$



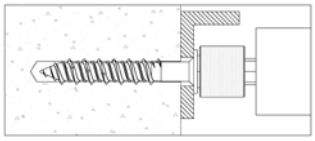
1.) Using the proper Ultracon+ drill bit size, drill a hole into the base material to the required depth, h_o, which is a 1/4-inch deeper than the minimum embedment depth, hnom. The tolerances of the Ultracon+ bit used must meet the tolerance range in Table 1.



2.) Remove dust and debris from hole during drilling (e.g. dust extractor) or following drilling (e.g. suction, forced air) to extract loose particles left from drilling.



3.) Attach a Ultracon+ installation socket tool for the selected anchor size to a percussion drill and set the drill to rotary only mode. Mount the screw anchor head into the socket. For flat head versions a bit tip must be used with the socket tool.



4.) Place the point of the Ultracon+ anchor through the fixture into the predrilled hole and drive the anchor until it is fully seated at the proper embedment. The socket tool will automatically disengage from the head of the Ultracon+.

FIGURE 3—ULTRACON+ INSTALLATION INSTRUCTIONS

TABLE 3—TENSION DESIGN INFORMATION FOR ULTRACON+ ANCHORS IN CONCRETE[1,2]

Design Characteristic	Notation	Units	Nominal Anchor Size (inch)	
			$^3/_{16}$	$^1/_4$
Anchor category	1, 2 or 3	-	1	1
Nominal embedment depth	h_{nom}	in. (mm)	$1^3/_4$ (44)	$1^3/_4$ (44)
STEEL STRENGTH IN TENSION(ACI 318-14 17.4.1 or ACI 318-11 D.5.1)[4]				
Steel strength in tension[5]	N_{sa}	lbf (kN)	1,620 (7.2)	2,680 (11.9)
Reduction factor for steel strength[3]	ϕ	-	0.65	
CONCRETE BREAKOUT IN TENSION(ACI 318-14 17.4.2 or ACI 318-11 D.5.2)[7]				
Effective embedment	h_{ef}	in. (mm)	1.23 (31)	1.23 (31)
Effectiveness factor for uncracked concrete	k_{uncr}	-	24	24
Modification factor for concrete[6]	$\Psi_{c,N}$	-	1.0 (see note 5)	1.0 (see note 5)
Critical edge distance	c_{ac}	in. (mm)	3 (76)	3 (76)
Reduction factor for concrete breakout strength[3]	ϕ	-	0.65 (Condition B)	
PULLOUT STRENGTH IN TENSION(ACI 318-14 17.4.3 or ACI 318-11 D.5.3)[8]				
Characteristic pullout strength, uncracked concrete (2,500 psi)[7]	$N_{p,uncr}$	lbf (kN)	635 (2.8)	940 (4.2)
Reduction factor for pullout strength[3]	ϕ	-	0.65 (Condition B)	

For **SI:** 1 inch = 25.4 mm, 1 ksi = 6.895 N/mm^2, 1 lbf = 0.0044 kN.

TABLE 4—SHEAR DESIGN INFORMATION FOR ULTRACON+ ANCHORS IN CONCRETE[1,2]

Design Characteristic	Notation	Units	Nominal Anchor Size (inch)	
			$^3/_{16}$	$^1/_4$
Anchor category	1, 2 or 3	-	1	1
Nominal embedment depth	h_{nom}	in. (mm)	$1^3/_4$ (44)	$1^3/_4$ (44)
STEEL STRENGTH IN SHEAR(ACI 318-14 17.5.1 or ACI 318-11 D.6.1)[4]				
Steel strength in shear[9]	V_{sa}	lbf (kN)	810 (3.6)	1,180 (5.3)
Reduction factor for steel strength[3]	ϕ	-	0.60	
CONCRETE BREAKOUT IN SHEAR(ACI 318-14 17.5.2 or ACI 318-11 D.6.2)[8]				
Load bearing length of anchor (h_{ef} or $8d_o$, whichever is less)	ℓ_e	in. (mm)	1.23 (32)	1.23 (32)
Nominal outside anchor diameter	d_a	in. (mm)	0.145 (3.7)	0.185 (4.7)
Reduction factor for concrete breakout strength[3]	ϕ	-	0.70 (Condition B)	
PRYOUT STRENGTH IN SHEAR (ACI 318-14 17.5.3 or ACI 318-11 D.6.3)[8]				
Coefficient for pryout strength	k_{cp}	-	1.0	1.0
Effective embedment	h_{ef}	in. (mm)	1.23 (32)	1.23 (32)
Reduction factor for pryout strength[3]	ϕ	-	0.70 (Condition B)	

For **SI:** 1 inch = 25.4 mm, 1 lbf = 0. 0044 kN.

Notes for Tables 3 and 4:

[1]The data in this table is intended to be used with the design provisions of ACI 318-14 Chapter 17 or ACI 318-11 Appendix D, as applicable.

[2]Installation must comply with published instructions and details.

[3]All values of ϕ were determined from the load combinations of IBC Section 1605.2, ACI 318-14 Section 5.3 or ACI 318-11 Section 9.2, as applicable. If the load combinations of ACI 318-11 Appendix C are used, the appropriate value of ϕ must be determined in accordance with ACI 318-11 D.4.4. For reinforcement that meets ACI 318-14 Chapter 17 or ACI 318-11 Appendix D, as applicable, requirements for Condition A, see ACI 318-14 17.3.3 or ACI 318-11 D.4.3, as applicable, for the appropriate ϕ factor.

[4]The Ultracon+ anchor is considered a brittle steel element as defined by ACI 318-14 2.3 or ACI 318-11 D.1, as applicable.

[5]Tabulated values for steel strength in tension must be used for design.

[6]For all design cases use $\Psi_{c,N} = 1.0$. The effectiveness factor for uncracked concrete (k_{uncr}) must be used.

[7]For all design cases use $\psi_{c,P} = 1.0$. The value of N_{puncr}, may be increased in accordance with Section 4.1.4 of this report.

[8]Anchors are permitted to be used in lightweight concrete in accordance with Section 4.1.11 of this report.

[9]Tabulated values for steel strength in shear must be used for design.

TABLE 5—EXAMPLE ALLOWABLE STRESS DESIGN VALUES FOR ILLUSTRATIVE PURPOSES[1,2,3,4,5,6,7,8,9]

Anchor Diameter (inch)	Nominal Embedment Depth (inches)	Effective Embedment (inches)	Allowable Tension Load (pounds)
$^3/_{16}$	$1^3/_4$	1.23	280
$^1/_4$	$1^3/_4$	1.23	410

For **SI:** 1 inch = 25.4 mm, 1 lbf = 0.0044 kN.

[1]Single anchor with static tension load only.

[2]Concrete determined to remain uncracked for the life of the anchorage.

[3]Load combinations are taken from ACI 318-14 Section 5.3 or ACI 318-11 Section 9.2, as applicable (no seismic loading considered).

[4]Assumes 30% dead load and 70% live load, controlling load combination $1.2D + 1.6L$.

[5]Calculation of weighted average for conversion factor $\alpha = 1.2(0.3) + 1.6(0.7) = 1.48$.

[6] $f'_c = 2{,}500$ psi (normal weight concrete).

[7] $c_{a1} = c_{a2} \geq c_{ac}$.

[8] $h \geq h_{min}$.

[9]Values are for Condition B where supplementary reinforcement in accordance with ACI 318-14 17.3.3 or ACI 318-11 D.4.3, as applicable, is not provided.

ICC-ES Evaluation Report

ESR-3068 FBC Supplement

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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:

DEWALT

EVALUATION SUBJECT:

ULTRACON®+ SCREW ANCHORS IN UNCRACKED CONCRETE (DEWALT)

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that the Ultracon+ Screw Anchor in Uncracked Concrete, recognized in ICC-ES master evaluation report ESR-3068, has also been evaluated for compliance with the codes noted below.

Applicable code editions:

- 2017 *Florida Building Code—Building*
- 2017 *Florida Building Code—Residential*

2.0 CONCLUSIONS

The Ultracon+ Screw Anchor in Uncracked Concrete**,** described in Sections 2.0 through 7.0 of the master evaluation report ESR-3068, complies with the *Florida Building Code—Building* and the *Florida Building Code—Residential*, provided the design and installation are in accordance with the 2015 *International Building Code®* provisions noted in the master report.

Use of the Ultracon+ Screw Anchor in Uncracked Concrete has also been found to be in compliance with the High-Velocity Hurricane Zone (HVHZ) provisions of the *Florida Building Code—Building* and the *Florida Building Code—Residential*.

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 July 2018 and revised January 2019.