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ICC-ES Evaluation Report

ESR-4109

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DIVISION: 04 00 00—MASONRY
Section: 04 05 19.16—Masonry Anchors

REPORT HOLDER:

ITW RED HEAD

EVALUATION SUBJECT:

ITW RED HEAD C6+ ADHESIVE ANCHORING SYSTEMS IN MASONRY

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)

For evaluation for compliance with codes adopted by the Los Angeles Department of Building and Safety (LADBS), see ESR-4109 LABC and LARC supplement.

Property evaluated:

Structural

2.0 USES

The Red Head C6+ Adhesive Anchoring Systems are used to anchor building components to fully grouted concrete masonry walls to resist static, wind or seismic forces, as noted in Section 4.0 of this report.

The Red Head C6+ Adhesive Anchoring Systems are an alternative to Section 2.1.4 of TMS 402/ACI 530/ASCE 5 as referenced in Section 2107 of the IBC. The anchoring system 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 General:

Each Red Head C6+ Adhesive Anchoring System is comprised of Red Head A7+ two-component adhesive filled in cartridges, static mixing nozzles, dispensing tools, hole cleaning equipment and adhesive injection accessories, and steel anchor elements, which are continuously threaded steel rods or deformed steel reinforcing bars as described in Section 3.2.4. The primary components of the ITW Red Head C6+ Adhesive Anchoring Systems are shown in Figure 3 of this report.

The manufacturer's printed installation instructions (MPII) are included with the adhesive packaging and are replicated in Figure 4 of this report.

3.2 Materials:

3.2.1 Red Head C6+ Adhesive: The primary component of the Red Head C6+ Anchoring System is a two-part epoxy packaged in a dual-chamber cartridge at a volumetric ratio of 2:1. The cartridge is available in either 30-ounce (side-by-side) or 15-ounce (side-by-side) sizes as shown in Figure 3. The component is dispensed through a static mixing nozzle which attaches to the cartridge. The original, unopened cartridge has a shelf life of 24 months, as indicated by the "best used by" date stamped onto the cartridge, when stored in a cool, dry, ventilated area.

3.2.2 Hole Cleaning Equipment: Hole cleaning equipment consists of wire brushes, as shown in Figures 3 and 4, and a compressed air nozzle with extension.

3.2.3 Dispensing Tools: Red Head C6+ Adhesive must be dispensed with manual or pneumatic dispensing tools provided by ITW Red Head, as shown in Figure 3.

3.2.4 Steel Anchor Elements:

3.2.4.1 Threaded Steel Rods: The continuously threaded steel rods range from $^3/_8$ inch through $^3/_4$ inches (9.5 mm through 19 mm) in diameter. Carbon steel threaded rods must comply with either ASTM A36 [minimum f_{uta} = 58,000 psi (400 MPa)] or ASTM A193, Grade B7 [minimum f_{uta} = 125,000 psi (860 MPa)]. Stainless steel threaded rods must comply with ASTM F593 (Alloy Type 300, CW1 and CW2) [minimum f_{uta} = 95,000 psi (655 MPa) for CW1, and f_{uta} =80,000 psi (552 MPa) for CW2]. Table 2 notes steel design information for the threaded rods. Carbon steel threaded rods must be furnished with a minimum 0.0002-inch-thick (5 μm) zinc electroplated coating complying with ASTM B633 SC1 or must be hot-dipped galvanized complying with ASTM A153, Class C or D. Threaded steel rods must be straight and free from indentations or other defects along their length.

3.2.4.2 Steel Reinforcing Bars: Steel reinforcing bars must be deformed reinforcing bars as described in Table 5 of this report. The embedded portions of reinforcing bars must be straight, and free of mill scale, rust, mud, oil, and

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other coatings that may impair the bond with the adhesive.

3.3 Grouted-filled Concrete Masonry: The masonry must be fully grouted complying with Chapter 21 of the IBC. The compressive strength of masonry, f'_m, at 28 days must be a minimum of 1,500 psi (13.1 MPa). Fully grouted masonry walls must be constructed from the following:

3.3.1 Concrete Masonry Units (CMUs): Concrete masonry walls must be constructed from minimum nominal 8-inch-wide (203 mm) by 8-inches-high (203 mm) by 16-inches-long (406 mm), lightweight, medium-weight or normal-weight concrete masonry units (CMUs) conforming to ASTM C90.

3.3.2 Grout: Grout-filled concrete masonry units must be fully grouted with grout complying with Section 2103.3 of the 2015 IBC, Section 2103.13 of the 2012 IBC, Section 2103.12 of the 2009 and 2006 IBC, Section R606.2.11 of the 2015 IRC, or Section R609.1.1 of the 2012, 2009 and 2006 IRC, as applicable. Alternatively, the grout must have a minimum compressive strength, when tested in accordance with ASTM C1019, equal to its specified strength, but not less than 2,000 psi (13.8 MPa).

3.3.3 Mortar: Mortar must be Types M, S or N prepared in accordance with Section 2103.2.1 of the 2015 IBC, 2103.9 of the 2012 IBC, Section 2103.8 of the 2009 and 2006 IBC, Section R606.2.7 of the 2015 IRC, or Section R607.1 of the 2012, 2009 and 2006 IRC, as applicable.

4.0 DESIGN AND INSTALLATION

4.1 Strength Design:

4.1.1 General: The design load values for anchor systems described in this report are based on allowable stress design (ASD), as an alternative to TMS 402/ACI 530/ASCE 5 Section 8.1.3 (2013 edition) or Section 2.1.4 (2011 or 2008 editions) as referenced in Section 2107.1 of the IBC. For use under the IRC, an engineered design in accordance with R301.1.3 must be submitted to the code official. Allowable tension and shear loads for installation in grout-filled masonry walls are noted in Tables 3, 4, 6 and 7 of this report. The allowable tension and shear values in this report must be adjusted in accordance with Figure 1 for in-service base material temperatures in excess of 70°F (21°C). Allowable tension and shear loads based on steel strength for threaded rods are described in Table 2. Allowable tension and shear loads based on steel strength for reinforcing bars are described in Table 5.

Allowable stress design tension and shear load values given in Tables 3, 4, 6 and 7 may be used to resist short-term loads such as wind or seismic, in accordance with Section 5.5 and Table 1 of this report. The allowable tension and shear loads are for anchors installed in the area of the face of the grout-filled CMU wall (cell, web, bed joints, and head joints of walls constructed using open-ended blocks or head joint mortared full depth) and for resisting static, wind or earthquake loads.

Critical and minimum spacing and edge distance values, with appropriate reduction values, where applicable, are given in Tables 3, 4, 6 and 7.

4.1.2 Combined Loading: The allowable loads for anchor systems installed in masonry and subjected to combined tension and shear forces must be determined by the following equation:

$$\left(\frac{P_s}{P_t}\right)+\left(\frac{V_s}{V_t}\right)\le 1$$

where:

P_s = Applied service tension load (lbf or kN)

P_t = Allowable service tension load (lbf or kN)

V_s = Applied service shear load (lbf or kN)

V_t = Allowable service shear load (lbf or kN)

4.2 Installation:

4.2.1 General: Anchor systems must be installed in accordance with this report and the manufacturer's printed installation instructions (MPII) represented in Figure 4. The anchor must not be installed until the base material has reached its minimum designated compressive strength. The drill bit size, hole diameter, embedment depth, spacing, edge distance and base material must comply with the requirements of this report. Installation procedures and locations must be in accordance with Tables 3, 4, 6 and 7 as well as Figure 2 of this report, as applicable.

4.2.2 Installation in Grout-filled Concrete Masonry Wall: Anchor systems must be installed in grout-filled concrete masonry walls as specified in Tables 3, 4, 6 and 7. Installation requirements are tabulated for various threaded rod and rebar diameters in Figure 4. The minimum installation temperature is 50°F (10°C) for the adhesive and the masonry. Holes are drilled to predetermined depths using rotary hammer drills and carbide-tipped drill bits that comply with ANSI B212.15-1994. Holes must be cleaned from the back with compressed air and an air-nozzle extension. A wire brush is used to remove dust and debris from the hole, and this is followed by another cleaning with compressed air. A mixing nozzle is attached to the Red Head C6+ cartridge to ensure proper mixing of the adhesive from the dual-component system. Before application, the adhesive is pumped out of the nozzle until the material achieves a uniform dark-gray color. Holes may be dry or damp but must not contain any water at the time of installations. Holes are filled approximately 60% full with the mixed adhesive, and the threaded rods or reinforcing bars are inserted, with a rotating motion, to the back of the hole. The adhesive shall cure in accordance with Figure 4 before the placement of attachments.

4.3 Special Inspection:

Periodic special inspections are required in accordance with IBC Section 1704, and are also applicable for installations under the IRC.

The special inspector must be on the jobsite initially during anchor system installation to verify anchor element type, steel anchor dimensions, masonry type, masonry dimensions and compressive strength, drill bit size, steel anchor spacing, edge distances, embedment, and adherence to the manufacturer's printed installation instructions (MPII).

The special inspector must verify that the initial anchor system installations of each type and size are in compliance with this evaluation report and in accordance with the MPII.

Subsequent installations of the same anchor system type and size by the same construction personnel are permitted to be performed in the absence of the special inspector. Any change in the anchor product being installed or the personnel performing the installation requires an initial inspection. For ongoing installations over an extended period, the special inspector must make regular inspections to confirm correct handling and installation of the product.

5.0 CONDITIONS OF USE

The Red Head C6+ Adhesive Anchoring Systems 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 Red Head C6+ Adhesive anchor systems must be identified and installed in accordance with this report and the manufacturer's printed installation instructions (MPII), as included with the adhesive packaging and reproduced in Figure 4 of this report.

5.2 Anchor sizes, dimensions, and minimum embedment depths are as set forth in this report.

5.3 Red Head C6+ Adhesive Anchoring Systems described in Section 4.1.1 of this evaluation report are capable of resisting seismic and wind loads. When using the basic load combinations in accordance with IBC Section 1605.3.1, allowable loads must not be increased for wind or seismic loading. When using the alternative basic load combinations in 2009 and 2006 IBC Section 1605.3.2 that include seismic or wind loads, the allowable loads may be increased in accordance with Table 1, or the alternative basic load combinations may be decreased by the factors in Table 1, as applicable. For the 2015 and 2012 IBC, the allowable loads or load combinations must not be adjusted.

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

5.5 Prior to anchor system 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.

5.6 Anchor systems are not permitted to support fire-resistive construction. Where not otherwise prohibited by the code, anchor systems are permitted for installation in fire-resistive construction provided at least one of the following conditions is fulfilled:

- Anchor systems are used to resist wind or seismic forces only.
- Anchor systems that support gravity load–bearing structural elements are within a fire-resistive envelope or a fire-resistive membrane, are protected by approved fire-resistive materials, or have been evaluated for resistance to fire exposure in accordance with recognized standards.
- Anchor systems are used to support nonstructural elements.

5.7 Since an ICC-ES acceptance criteria for evaluating data to determine the performance of adhesive anchors in cracked masonry is unavailable at this time, the use of adhesive anchor systems is limited to installation in uncracked masonry. Cracking occurs when $f_t > f_r$ due to service loads or deformations.

5.8 The anchor systems may be installed in base materials having internal temperatures between 50°F (10°C) and 110°F (43°C) at the time of installation. Installation of Red Head C6+ adhesive systems in base materials having temperatures beyond this range is outside the scope of this report.

5.9 When anchor systems are located where the internal base material temperature may exceed 70°F (21°C), allowable tension and shear loads indicated in this report must be adjusted for in-service temperatures in accordance with Figure 1. The use of Red Head C6+ adhesive in base materials having internal temperatures exceeding 176°F (80°C) during service life is beyond the scope of this report.

5.10 Use of Red Head C6+ Adhesive in conjunction with uncoated, or zinc-electroplated carbon steel threaded rods must be limited to interior exposure. Use of the Red Head C6+ adhesive with stainless steel (AISI 304 or Type 316) anchors or hot-dipped galvanized anchors with zinc coating conforming to ASTM A153, Class C or D is permitted for exterior or damp environments.

5.11 The grout and mortar must have attained the minimum design strength prior to installation of the adhesive anchor systems.

5.12 Special inspection in accordance with Section 4.3 of this report must be provided for all anchor system installations.

5.13 Red Head C6+ Adhesive is manufactured under a quality-control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

6.1 Data in accordance with the ICC-ES Acceptance Criteria for Adhesive Anchors in Masonry Elements (AC58), dated November 2015.

6.2 A quality control manual.

7.0 IDENTIFICATION

7.1 The Red Head C6+ Adhesive is identified by labels on the packaging indicating the manufacturer's name (ITW Commercial Construction North America) product name, material type, lot number traceable to production date, and the evaluation report number (ESR-4109). Steel threaded rods and deformed reinforcing bars must comply with Section 3.2.4 of this evaluation report and applicable specifications as set forth in Tables 2 and 5 of this evaluation report.

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

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TABLE 1—ALTERNATIVE BASIC LOAD COMBINATION ADJUSTMENT FACTORS[1,2,3]

Steel Type	Modification Factors			
	Reductions for Alternate Basic Load Combinations		Increase Factor for Allowable Loads for Short-term Loading Conditions	
	Tension	Shear	Tension	Shear
Standard threaded rods	0.75	0.75	1.33	1.33
High-strength rods	0.75	1	1.33	1
Stainless steel rods	0.75	0.87	1.33	1.14
Steel reinforcing bars	0.75	0.75	1.33	1.33

[1]When using the basic load combinations in accordance with IBC Section 1605.3.1, allowable loads must not be increased for wind or seismic loading.
[2]The above modification factors are applicable under the 2009 or 2006 IBC only.
[3]When using the alternative basic load combinations in the 2009 or 2006 IBC Section 1605.3.2 that include wind or seismic loads, the allowable loads for anchors may be increased by the tabulated factors found in the right half of the table. Alternatively, the alternate basic load combinations may be reduced by multiplying them by the reduction factors found in the left half of the table. For example, for stainless steel rods in shear the alternate basic loads for wind or seismic may be multiplied by 0.87 for shear loading or divided by 1.14 (1/1.4 = 0.87), as applicable. For the 2015 and 2012 IBC, the allowable loads or load combination must not be adjusted.

TABLE 2—ALLOWABLE TENSION AND SHEAR LOADS BASED ON STEEL DESIGN INFORMATION FOR U.S. CUSTOMARY UNIT THREADED ROD[1,2,3]

Anchor Diameter (inches)	Tension (lb)			Shear (lb)		
	ASTM A307 F_u = 60 ksi	ASTM A193 Grade B7 F_u = 125 ksi	ASTM F593 SS 304 F_u = 100 ksi	ASTM A307 F_u = 60 ksi	ASTM A193 Grade B7 F_u = 125 ksi	ASTM F593 SS 304 F_u = 100 ksi
3/8	2,185	4,555	3,645	1,125	2,345	1,875
1/2	3,885	8,100	6,480	2,000	4,170	3,335
5/8	6,075	12,655	10,125	3,130	6,520	5,215
3/4	8,750	18,225	12,390	4,505	9,390	6,385

For **SI:** 1 inch = 25.4mm, 1 lbf = 4.45N, 1ft-lbf = 1.356 N-M, 1 psi = 0.006895 MPa.

[1]Allowable loads used in the design must be the lesser of bond values and tabulated steel element values.
[2]Allowable tension and shear loads for threaded rods to resist short term loads, such as wind or seismic, must be calculated in accordance with Section 4.1 as applicable.
[3]Allowable steel loads are based on allowable tension and shear stresses equal to 0.33X F_u and 0.17xF_u, respectively.

TABLE 3—ALLOWABLE RED HEAD C6+ ADHESIVE BOND TENSION LOADS FOR THREADED RODS INSTALLED INTO GROUT-FILLED CONCRETE MASONRY UNITS[1,2,3,4,7,9,10,11,12]

Threaded Rod Size	Minimum Embedment (inches)	Load at s_{cr} and c_{cr} (lb)	Spacing[5]			Edge Distance[6]		
			Critical, s_{cr} (inches)	Minimum, s_{min} (inches)	Load reduction factor for s_{min}[8]	Critical, c_{cr} (inches)	Minimum, c_{min} (inches)	Load reduction factor for c_{min}[8]
3/8	3 3/8	945	13.5	4	1.00	12	4	0.87
1/2	4 1/2	1,395	18	4	0.50	20	4	0.68
5/8	5 5/8	1,825	22.5	4	0.50	20	4	0.68
3/4	6 3/4	2,085	27	4	0.50	20	4	0.68

For **SI:** 1 inch = 25.4 mm; 1 lbf = 0.0044 kN, 1 ksi = 6.894 MPa. **(Refer to Table 4 for footnotes)**

TABLE 4—ALLOWABLE RED HEAD C6+ ADHESIVE BOND SHEAR LOADS FOR THREADED RODS INSTALLED INTO GROUT-FILLED CONCRETE MASONRY UNITS[1,2,3,4,7,9,10,11,12]

Threaded Rod Size	Minimum Embedment (inches)	Load at s_{cr} and c_{cr} ⊥ to edge (lb)	Spacing[5]			Edge Distance[6]		
			Critical, s_{cr} (inches)	Minimum, s_{min} (inches)	Load reduction factor for s_{min}[8]	Critical, c_{cr} (inches)	Minimum, c_{min} (inches)	Load reduction factor for c_{min}[8]
3/8	3 3/8	825	13.5	4	0.50	12	4	0.87
1/2	4 1/2	1,560	18	4	0.50	20	4	0.56
5/8	5 5/8	2,680	22.5	4	0.50	20	4	0.30
3/4	6 3/4	3,180	27	4	0.50	20	4	0.27

For **SI:** 1 inch = 25.4 mm; 1 lbf = 0.0044 kN, 1 ksi = 6.894 MPa.

(The following footnotes apply to both Tables 3 and 4)

[1]All values are for anchors installed in fully grouted concrete masonry with minimum masonry strength of 1500 psi (10.3 MPa). Concrete masonry units must be light-, medium-, or normal-weight conforming to ASTM C 90. Allowable loads have been calculated using a safety factor of 5.0.
[3]Anchors may be installed in any location in the face of the masonry wall (cell, web, bed joint) as shown in Figure 2.
[4]A maximum of two anchors may be installed in a single masonry cell in accordance with the spacing and edge or end distance requirements. Embedment is measured from the outside surface of the concrete masonry unit to the embedded end of the anchor. See Figure 2 of this report.
[5]The critical spacing distance, s_{cr}, is the anchor spacing where full load values in the table may be used. The minimum spacing distance, s_{min}, is the minimum anchor spacing for which values are available and installation is permitted. Spacing distance is measured from the centerline to centerline between two anchors.
[6]The critical edge or end distance, c_{cr}, is the distance where full load values in the table may be used. The minimum edge or end distance, c_{min}, is the minimum distance for which values are available and installation is permitted. Edge or end distance is measured from anchor centerline to the closest unrestrained edge.
[7]The tabulated values are applicable for anchors in the ends of grout-filled concrete masonry units where minimum edge distances are maintained.
[8]Load values for anchors installed less than s_{cr} and c_{cr} must be multiplied by the appropriate load reduction factor based on actual spacing (s) or edge distance (c). Load factors are multiplicative; both spacing and edge reduction factors must be considered.
[9]Linear interpolation of load values between minimum spacing (s_{min}) and critical spacing (s_{cr}) and between minimum edge or end distance (c_{min}) and critical edge or end distance (c_{cr}) is permitted.
[10]Concrete masonry width (wall thickness) must be equal to or greater than 1.5 times the anchor embedment depth (e.g. 3/8-inch- and 1/2-inch-diameter anchors are permitted in minimum nominally 6-inch-thick concrete masonry). The 5/8- and 3/4-inch-diameter anchors must be installed in minimum nominally 8-inch-thick concrete masonry.
[11]Allowable loads must be the lesser of the adjusted masonry or bond values tabulated above and the steel strength values given in Table 2.
[12]Tabulated allowable bond loads must be adjusted for increased in-service base material temperatures in accordance with Figure 1, as applicable.

TABLE 5—ALLOWABLE TENSION AND SHEAR LOADS BASED ON STEEL STRENGTH FOR REINFORCING BARS[1,2,3]

Rebar Size	Tension (lb)	Shear (lb)
	ASTM A615, Grade 60	ASTM A615, Grade 60
No. 3	3,270	1,685
No. 4	5,940	3,060
No. 5	9,205	4,745
No. 6	13,070	6,730

For **SI:** 1 inch = 25.4mm, 1 lbf = 4.45N, 1ft-lbf = 1.356 N-M, 1 psi = 0.006895 MPa.

[1]Allowable load used in the design must be the lesser of bond values and tabulated steel element values.
[2]Allowable tension and shear loads for threaded rods to resist short term loads, such as wind or seismic, must be calculated in accordance with Section 4.1 as applicable.
[3]Allowable steel loads are based on allowable tension and shear stresses equal to 0.33X F_u and 0.17xF_u, respectively.

TABLE 6—ALLOWABLE RED HEAD C6+ ADHESIVE BOND TENSION LOADS FOR REINFORCING BARS INSTALLED INTO GROUT-FILLED CONCRETE MASONRY UNITS[1,2,3,4,7,9,10,11,12]

Rebar Size	Minimum Embedment (inches)	Load at s_{cr} and c_{cr} (lb)	Spacing[5]			Edge Distance[6]		
			Critical, s_{cr} (inches)	Minimum, s_{min} (inches)	Load reduction factor for s_{min}[8]	Critical, c_{cr} (inches)	Minimum, c_{min} (inches)	Load reduction factor for c_{min}[8]
No. 3	3 3/8	785	13.5	4	1.00	12	4	0.87
No. 4	4 1/2	1,355	18	4	0.50	20	4	0.68
No. 5	5 5/8	2,060	22.5	4	0.50	20	4	0.68
No. 6	6 3/4	2,415	27	4	0.50	20	4	0.68

For **SI:** 1 inch = 25.4 mm; 1 lbf = 0.0044 kN, 1 ksi = 6.894 MPa. **(Refer to Table 7 for footnotes)**

TABLE 7—ALLOWABLE RED HEAD C6+ ADHESIVE BOND SHEAR LOADS FOR REINFORCING BARS INSTALLED INTO GROUT-FILLED CONCRETE MASONRY UNITS[1,2,3,4,7,9,10,11,12]

Rebar Size	Minimum Embedment (inches)	Load at s_{cr} and c_{cr} ⊥ to edge (lb)	Spacing[5]			Edge Distance[6]		
			Critical, s_{cr} (inches)	Minimum, s_{min} (inches)	Load reduction factor for s_{min}[8]	Critical, c_{cr} (inches)	Minimum, c_{min} (inches)	Load reduction factor for c_{min}[8]
No. 3	$3^3/_8$	1,230	13.5	4	0.50	12	4	0.73
No. 4	$4^1/_2$	2,340	18	4	0.50	12	4	0.37
No. 5	$5^5/_8$	3,600	22.5	4	0.50	20	4	0.27
No. 6	$6^3/_4$	3,685	27	4	0.50	20	4	0.22

For **SI:** 1 inch = 25.4 mm; 1 lbf = 0.0044 kN, 1 ksi = 6.894 MPa.

(The following footnotes apply to both Tables 6 and 7)

[1]All values are for anchors installed in fully grouted concrete masonry with minimum masonry strength of 1500 psi (10.3 MPa). Concrete masonry units must be light-, medium-, or normal-weight conforming to ASTM C 90. Allowable loads have been calculated using a safety factor of 5.0.
[3]Anchors may be installed in any location in the face of the masonry wall (cell, web, bed joint) as shown in figure 2.
[4]A maximum of two anchors may be installed in a single masonry cell in accordance with the spacing and edge or end distance requirements. Embedment is measured from the outside surface of the concrete masonry unit to the embedded end of the anchor. See Figure 2 of this report.
[5]The critical spacing distance, s_{cr}, is the anchor spacing where full load values in the table may be used. The minimum spacing distance, s_{min}, is the minimum anchor spacing for which values are available and installation is permitted. Spacing distance is measured from the centerline to centerline between two anchors.
[6]The critical edge or end distance, c_{cr}, is the distance where full load values in the table may be used. The minimum edge or end distance, c_{min}, is the minimum distance for which values are available and installation is permitted. Edge or end distance is measured from anchor centerline to the closest unrestrained edge.
[7]The tabulated values are applicable for anchors in the ends of grout-filled concrete masonry units where minimum edge distances are maintained.
[8]Load values for anchors installed less than s_{cr} and c_{cr} must be multiplied by the appropriate load reduction factor based on actual spacing (s) or edge distance (c). Load factors are multiplicative; both spacing and edge reduction factors must be considered.
[9]Linear interpolation of load values between minimum spacing (s_{min}) and critical spacing (s_{cr}) and between minimum edge or end distance (c_{min}) and critical edge or end distance (c_{cr}) is permitted.
[10]Concrete masonry width (wall thickness) must be equal to or greater than 1.5 times the anchor embedment depth (e.g. No. 3 and No. 4 reinforcing bars are permitted in minimum nominally 6-inch-thick concrete masonry). No. 5 and No. 6 reinforcing bars must be installed in minimum nominally 8-inch-thick concrete masonry.
[11]Allowable loads must be the lesser of the adjusted masonry or bond values tabulated above and the steel strength values given in Table 4.
[12]Tabulated allowable bond loads must be adjusted for increased in-service base material temperatures in accordance with Figure 1, as applicable.

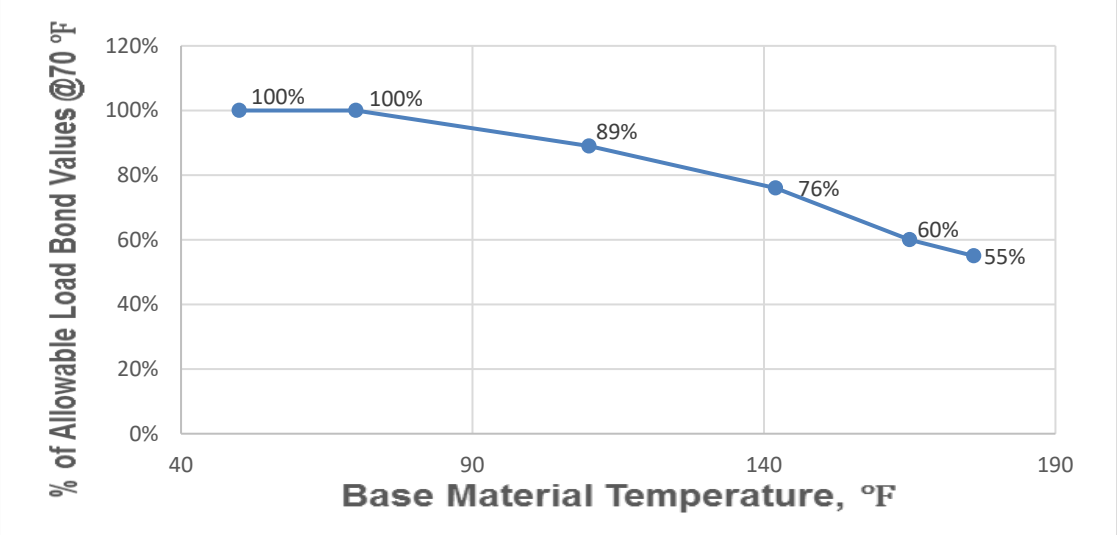


FIGURE 1—INFLUENCE OF BASE MATERIAL TEMPERATURE ON ALLOWABLE ADHESIVE BOND TENSION AND SHEAR LOADS FOR RED HEAD C6+ ADHESIVE ANCHORS INSTALLED INTO THE FACE OF CONCRETE MASONRY UNIT WALLS

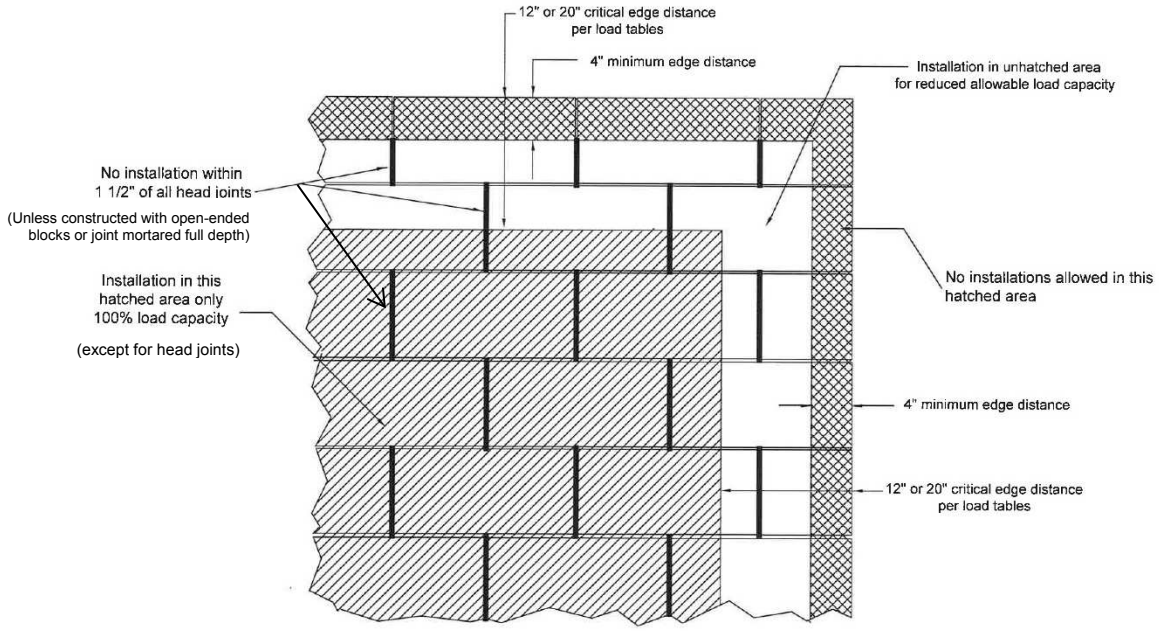


FIGURE 2—ILLUSTRATION OF PERMISSABLE LOCATIONS FOR RED HEAD C6+ ADHESIVE ANCHORS INSTALLED INTO THE FACE OF GROUTED CONCRETE MASONRY WALL (ELEVATION VIEW)

FIGURE 3—RED HEAD C6+ ADHESIVE CARTRIDGES, DISPENSING TOOLS, MIXING NOZZLES, HOLE CLEANING BRUSHES AND HOLE PLUGS

SPECIFICATIONS FOR INSTALLATION OF RED HEAD C6+ ADHESIVE ANCHORS

BRUSH AND CARBIDE DRILL BIT SPECIFICATIONS

Anchor diameter (in)	Carbide drill bit diameter (in)	Brush Part No.	Minimum brush diameter (in)
3/8 No. 3	7/16	WB-038	0.563
1/2 No. 4	9/16 for threaded rod 5/8 for rebar	WB-012	0.675
5/8 No. 5	3/4	WB-058	0.900
3/4 No. 6	7/8	WB-034	1.125

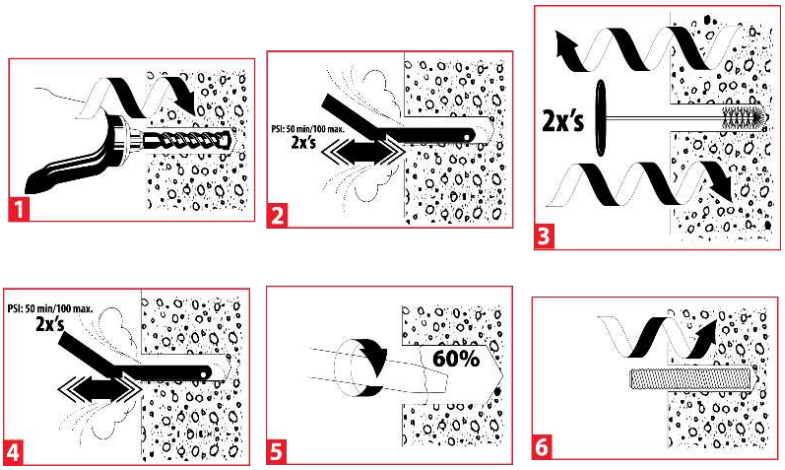
CURE TIMES AND GEL TIMES FOR RED HEAD C6+ ADHESIVE

Concrete Temperature (°F)[1]	Gel Time[2]	Cure Time[3]
110	10 minutes	2 hours
90	14 minutes	2-3/4 hours
70	16 minutes	6-1/2 hours
50	38 minutes	24 hours

For **SI:** t° (°F-32) X .555 = °C.

[1]Adhesive must be installed in concrete temperatures within the noted range or artificially maintained at the noted temperature.
[2]Gel time is the maximum time from the end of mixing to when the insertion of the anchor into the adhesive shall be completed and is based upon the adhesive and concrete temperatures noted.
[3]Cure time is the minimum time from the end of gel time to when the anchor may be torque or loaded. Anchors are to be undisturbed during the cure time.

FIGURE 4—RED HEAD C6+ ADHESIVE INSTALLATION INSTRUCTIONS



*Damp installations require 4x's air, 4x's brushing and 4x's air

1) ▪ Use a rotary hammer drill with a carbide drill bit complying to ANSI B212.15-1994 tolerance requirements. Drill hole to the required embedment depth. See attached table for drill bit specifications and embedment depths.
▪ Installations may be used with maximum $^{3}/_{4}$" diameter rods/rebar for masonry wall applications.
▪ Per construction specification, adhere to minimum spacing, minimum edge distance, and minimum wall thickness.

2) ▪ For dry holes, oscillate a clean air nozzle in and out of the dry hole two times, for a total of two seconds, starting at the bottom of the hole with contaminant-free compressed air, exhausting hole until visually clean (i.e., no dust, debris, etc.)
▪ For water-saturated applications, oscillate a clean air nozzle in and out of the damp hole four times, for a total of four seconds, starting at the bottom of the hole with contaminant-free compressed air, exhausting hole until visually clean (i.e., no dust, debris, etc.)
▪ If required, use an extension on the end of the air nozzle to reach the back of the hole.

3) ▪ Select an appropriately sized Red Head brush for the anchor diameter. Brush must be checked for wear before use. See attached table for brush specifications, including minimum diameter.
▪ Insert the brush into the hole with a clockwise motion. For every ½" forward advancement, complete one full turn until bottom of hole is reached. For faster and more suitable cleaning, attach the brush to a drill.
▪ Using a clockwise motion, for every full turn of the brush, pull the brush ½" out of the hole.
▪ For dry holes, twist/spin the brush two times in/out of the hole.
▪ For water-saturated applications, twist/spin the brush four times in/out of the hole.
▪ If required, use a wire brush extension (part nos. ESDS-38 or EHAN-38) to reach the bottom of the hole.
▪ Air clean the dust off the brush to prevent clogging of the brush.

4) ▪ For dry holes, oscillate a clean air nozzle in and out of the dry hole two times, for a total of two seconds, starting at the bottom of the hole with contaminant-free compressed air, exhausting hole until visually clean (i.e., no dust, debris, etc.)
▪ For water-saturated applications, oscillate a clean air nozzle in and out of the damp hole four times, for a total of four seconds, starting at the bottom of the hole with contaminant-free compressed air, exhausting hole until visually clean (i.e., no dust, debris, etc.)

5) ▪ Review the Safety Data Sheet (SDS) before use.
▪ Check the "Use By" date on the cartridge and that the cartridge has been stored in out of direct sunlight.
▪ Review the gel time/cure time chart, based on the temperature at time of installation, in order to determine tool, cartridge and nozzle requirements.
▪ Assemble the Red Head supplied cartridge and nozzle. Do not modify or remove mixing elements in nozzle.
▪Place the assembly into a hand injection tool or a pneumatic injection tool.
▪ Dispense mixed adhesive outside of hole until uniform color is achieved.
▪ During installations, masonry must be between 50 and 110 degrees F, or artificially maintained.
▪ Insert the nozzle to the bottom of the hole and inject the adhesive at an angle, leaving the nozzle tip always slightly below the fill level.
▪ In a slow circular direction, work the adhesive into the sides of the hole, filling slowly to ensure proper adhesive distribution, until the hole is approximately 60% filled.

6) ▪ Immediately insert the oil, rust and scale free rod/rebar assembly to the required embedment depth, using a counterclockwise motion to ensure proper adhesive distribution.
▪ The anchor rod/rebar must be marked with the required embedment depth.
▪ For installations with masonry or adhesive over 70 degrees F, the anchor rod/rebar must be marked with the required embedment depth and assembled with a Red Head hole plug positioned on the rod/rebar at the required embedment depth.
▪ After installing the anchor, the gap between the rod and the masonry must be completely filled with adhesive. The adhesive must fill voids, crevices and uniformly coat the rod and concrete.
▪ After installation, do not disturb the anchor until the full cure time has elapsed.
▪ Adhesive must be fully cured before applying any load or torque. Do not over torque the anchor as this could adversely affect its performance.

FIGURE 4—RED HEAD C6+ ADHESIVE INSTALLATION INSTRUCTIONS (Continued)

DIVISION: 04 00 00—MASONRY
Section: 04 05 19.16—Masonry Anchors

REPORT HOLDER:

ITW RED HEAD

EVALUATION SUBJECT:

ITW RED HEAD C6+ ADHESIVE ANCHORING SYSTEMS IN MASONRY

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that the ITW Red Head C6+ Adhesive Anchoring Systems in masonry, described in ICC-ES evaluation report ESR-4109, 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:

- 2017 *City of Los Angeles Building Code* (LABC)
- 2017 *City of Los Angeles Residential Code* (LARC)

2.0 CONCLUSIONS

The ITW Red Head C6+ Adhesive Anchoring Systems in masonry, described in Sections 2.0 through 7.0 of the evaluation report ESR-4109, comply with LABC Chapter 21, and LARC, and are subjected to the conditions of use described in this supplement.

3.0 CONDITIONS OF USE

The ITW Red Head C6+ Adhesive Anchoring Systems described in this evaluation report must comply with all of the following conditions:

- All applicable sections in the evaluation report ESR-4109.
- The design, installation, conditions of use and identification of the anchor systems are in accordance with the 2015 *International Building Code®* (2015 IBC) provisions noted in the evaluation report ESR-4109.
- The design, installation and inspection are in accordance with additional requirements of LABC Chapters 16 and 17, and Section 2114, 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 masonry. The connection between the anchors and the connected members shall be checked for capacity (which may govern).

This supplement expires concurrently with the evaluation report, reissued September 2021.

ICC-ES Evaluation Reports are not to be construed as representing aesthetics or any other attributes not specifically addressed, nor are they to be construed as an endorsement of the subject of the report or a recommendation for its use. There is no warranty by ICC Evaluation Service, LLC, express or implied, as to any finding or other matter in this report, or as to any product covered by the report.

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DIVISION: 04 00 00—MASONRY
Section: 04 05 19.16—Masonry Anchors

REPORT HOLDER:

ITW RED HEAD

EVALUATION SUBJECT:

ITW RED HEAD C6+ ADHESIVE ANCHORING SYSTEMS IN MASONRY

1.0 REPORT PURPOSE AND SCOPE

Purpose:

The purpose of this evaluation report supplement is to indicate that the RED HEAD C6+ Adhesive Anchoring System in Masonry, described in ICC-ES evaluation report ESR-4109, has also been evaluated for compliance with the codes noted below.

Applicable code editions:

- 2014 *Florida Building Code—Building*
- 2014 *Florida Building Code—Residential*

2.0 CONCLUSIONS

The RED HEAD C6+ Adhesive Anchoring System in Masonry, described in Sections 2.0 through 7.0 of the evaluation report ESR-4109, complies with the *Florida Building Code—Building* and the *Florida Building Code—Residential*, provided the design and installation are in accordance with the 2012 *International Building Code®* (IBC) provisions noted in the evaluation report, and under the following conditions:

- Design wind loads must be based on Section 1609 of the *Florida Building Code—Building* or Section 301.2.1.1 of the *Florida Building Code—Residential*, as applicable.
- Load combinations must be in accordance with Section 1605.2 or Section 1605.3 of the *Florida Building Code—Building*, as applicable.

Use of the RED HEAD C6+ Adhesive Anchoring System with stainless steel threaded rod materials has also been found to be in compliance with the High-Velocity Hurricane Zone provisions of the *Florida Building Code—Building* and the *Florida Building Code—Residential*, when the following conditions are met:

- The design wind loads for use of the anchors in a High-Velocity Hurricane Zone are based on Section 1620 of the *Florida Building Code—Building*.

Use of RED HEAD C6+ Adhesive Anchoring System with carbon steel threaded rod materials for compliance with the High-velocity Hurricane Zone provisions of the *Florida Building Code—Building* and the *Florida Building Code—Residential* has not been evaluated, and is outside the scope of this supplemental report.

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 evaluation report, reissued September 2021.

ICC-ES Evaluation Reports are not to be construed as representing aesthetics or any other attributes not specifically addressed, nor are they to be construed as an endorsement of the subject of the report or a recommendation for its use. There is no warranty by ICC Evaluation Service, LLC, express or implied, as to any finding or other matter in this report, or as to any product covered by the report.

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MIAMI-DADE COUNTY
PRODUCT CONTROL SECTION
11805 SW 26 Street, Room 208
Miami, Florida 33175-2474
T (786) 315-2590 F (786) 315-2599
www.miamidade.gov/economy

DEPARTMENT OF REGULATORY AND ECONOMIC RESOURCES (RER)
BOARD AND CODE ADMINISTRATION DIVISION

NOTICE OF ACCEPTANCE (NOA)

ITW Buildex
1349 West Bryn Mawr Avenue
Itasca, IL 60143

SCOPE:

This NOA is being issued under the applicable rules and regulations governing the use of construction materials. The documentation submitted has been reviewed and accepted by Miami-Dade County RER-Product Control Section to be used in Miami Dade County and other areas where allowed by the Authority Having Jurisdiction (AHJ).

This NOA shall not be valid after the expiration date stated below. The Miami-Dade County Product Control Section (In Miami Dade County) and/or the AHJ (in areas other than Miami Dade County) reserve the right to have this product or material tested for quality assurance purposes. If this product or material fails to perform in the accepted manner, the manufacturer will incur the expense of such testing and the AHJ may immediately revoke, modify, or suspend the use of such product or material within their jurisdiction. RER reserves the right to revoke this acceptance, if it is determined by Miami-Dade County Product Control Section that this product or material fails to meet the requirements of the applicable building code.

This product is approved as described herein, and has been designed to comply with the Florida Building Code, including the High Velocity Hurricane Zone.

DESCRIPTION: Tapcon® Concrete and Masonry Anchors with Advanced Threadform Technology™

APPROVAL DOCUMENT: Drawing No. **20-31425**, titled "Tapcon Concrete Anchors with Advanced Threadform Technology", sheets 1 and 2 of 2, dated 06/16/2006, with last revision dated 10/20/20, prepared by Engineering Express, signed and sealed by Frank L. Bennardo, P.E. on 01/07/2021, bearing the Miami-Dade County Product Control revision stamp with the Notice of Acceptance number and expiration date by the Miami-Dade County Product Control Section.

MISSILE IMPACT RATING: None

LABELING: Each box shall bear a permanent label with the manufacturer's name or logo, city, state and following statement: "Miami-Dade County Product Control Approved", unless otherwise noted herein.

RENEWAL of this NOA shall be considered after a renewal application has been filed and there has been no change in the applicable building code negatively affecting the performance of this product.

TERMINATION of this NOA will occur after the expiration date or if there has been a revision or change in the materials, use, and/or manufacture of the product or process. Misuse of this NOA as an endorsement of any product, for sales, advertising or any other purposes shall automatically terminate this NOA. Failure to comply with any section of this NOA shall be cause for termination and removal of NOA.

ADVERTISEMENT: The NOA number preceded by the words Miami-Dade County, Florida, and followed by the expiration date may be displayed in advertising literature. If any portion of the NOA is displayed, then it shall be done in its entirety.

INSPECTION: A copy of this entire NOA shall be provided to the user by the manufacturer or its distributors and shall be available for inspection at the job site at the request of the Building Official.

This NOA **renews and revises NOA # 16-1222.06** and consists of this page 1 and evidence pages E-1, E-2 and E-3, as well as approval document mentioned above.

The submitted documentation was reviewed by **Sifang Zhao, P.E.**

MIAMI-DADE COUNTY APPROVED

S.Z.

05/06/2021

NOA No. 21-0201.06
Expiration Date: August 31, 2026
Approval Date: May 06, 2021

NOTICE OF ACCEPTANCE: EVIDENCE SUBMITTED

1. Evidence submitted under previous NOAs

A. DRAWINGS *"Submitted under NOA # 16-1222.06"*

1. Drawing No. **16-3844**, titled "Tapcon Concrete Anchors with Advanced Threadform Technology", sheets 1 and 2 of 2, dated 06/16/2006, with last revision dated 07/25/2014, prepared by Engineering Express, signed and sealed by Frank L. Bennardo, P.E. on 12/13/2016.

B. TESTS *"Submitted under NOA # 07-0315.03"*

1. Tension and Shear Resistance Test of 3/16" SS Tapcon ATFT with Climashield per ASTM E 488, prepared by C.E.L Consulting, Report No. **71B153**, dated 01/31/2007, signed and sealed by Lee W. Mattis, P.E.

2. Corrosion Resistance Test per ASTM G 85 as noted in TAS 114(E), prepared by PRI Construction Materials Technologies, Report No. **ITW-004-02-01**, dated 01/05/2007, signed and sealed by Charles L. Thomas, P.E.

"Submitted under NOA # 05-1020.01"

3. Test report on Tension and Shear Resistance, Report No. **4I131** werc for "Wercs Tapcon Concrete/Masonry Screw Anchors" per ASTM E 488, prepared by Cel Consulting on 04/29/2005, signed and sealed by L. W. Mattis, P.E.

4. Test report on Tension and Shear Resistance, Report No. **4I131** werc Supplement 6519 for Tapcon with Advanced Threadform Technology per ASTM E 488 prepared by Cel Consulting on 05/19/2005, signed and sealed by L. W. Mattis, P.E.

5. Test report of corrosion resistance for fasteners, Project No. **ITW-003-02-01, 02, 03** & **04,** for fasteners with Tapcon Plus, Silver Climaseal, Silver Ultrashield and White Ultrashield per ASTM G85 as noted on TAS 114(E), prepared by Cel Consulting on 10/22/2004 and 05/16/2006, signed and sealed by C. L. Thomas, P.E.

C. CALCULATIONS *"Submitted under NOA # 12-0816.06"*

1. Anchors allowable loads calculations prepared by Engineering Express, dated 08/14/2012, signed and sealed by Frank L. Bennardo, P.E.

"Submitted under NOA # 07-0315.03"

2. Calculations addendum on new stainless steel anchors, prepared by Engineering Express, dated 03/08/2007, signed and sealed by Frank L. Bennardo, P.E.

"Submitted under NOA # 05-1020.01"

3. Calculations of allowable loads for Tapcon with Advanced Threadform Technology, prepared by Engineering Express, dated 06/22/2006, signed and sealed by Frank L. Bennardo, P.E.

Sifang Zhao, P.E.
Product Control Examiner
NOA No. 21-0201.06 Expiration
Date: August 31, 2026
Approval Date: May 06, 2021

NOTICE OF ACCEPTANCE: EVIDENCE SUBMITTED

D. QUALITY ASSURANCE

1. Miami-Dade Department of Regulatory and Economic Resources (RER)

E. MATERIAL CERTIFICATIONS

1. None.

F. STATEMENTS *"Submitted under NOA # 16-1222.06"*

1. Statement letter of code conformance to the 5th edition (2014) FBC issued by Engineering Express, dated 12/13/2016, signed and sealed by Frank L. Bennardo, P.E.

2. Statement letter of no financial interest issued by Engineering Express, dated 12/13/2016, signed and signed by Frank L. Bennardo, P.E.

"Submitted under NOA # 12-0816.06"

3. Drawing No. **06-ITW-0001** statement of code conformance to 2007 and 2010 FBC issued by Engineering Express, dated 08/14/2012, signed and sealed by Frank L. Bennardo, P.E.

"Submitted under NOA # 09-0121.19"

4. Statement letter of code conformance to 2007 FBC issued by Engineering Express, dated 01/05/2009, signed and sealed by Frank L. Bennardo, P.E.

"Submitted under NOA # 05-1020.01"

5. No interest letter issued by Engineering Express, dated 06/23/2006, signed and signed by Frank L. Bennardo, P.E.

Sifang Zhao, P.E.
Product Control Examiner
NOA No. 21-0201.06 Expiration
Date: August 31, 2026
Approval Date: May 06, 2021

NOTICE OF ACCEPTANCE: EVIDENCE SUBMITTED

2. New evidence submitted

A. DRAWINGS

1. Drawing No. **20-31425**, titled "Tapcon Concrete Anchors with Advanced Threadform Technology", sheets 1 and 2 of 2, dated 06/16/2006, with last revision dated 10/20/20, prepared by Engineering Express, signed and sealed by Frank L. Bennardo, P.E. on 01/07/2021.

B. TESTS

1. None.

C. CALCULATIONS

1. None.

D. QUALITY ASSURANCE

1. Miami-Dade Department of Regulatory and Economic Resources (RER)

E. MATERIAL CERTIFICATIONS

1. None.

F. STATEMENTS

1. Statement letter of code conformance to 7th edition (2020) FBC issued by Engineering Express, signed and sealed by Frank L. Bennardo, P.E. on January 07, 2021.

2. Statement letter of no financial interest issued by Engineering Express, signed and sealed by Frank L. Bennardo, P.E. on January 07, 2021.

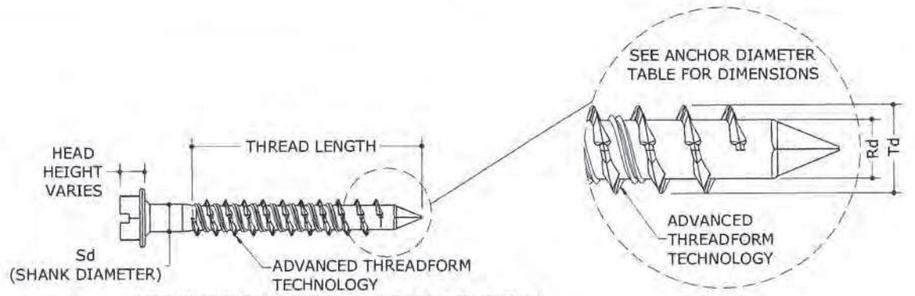
Sifang Zhao, P.E.
Product Control Examiner
NOA No. 21-0201.06 Expiration
Date: August 31, 2026
Approval Date: May 06, 2021

ITW Buildex TAPCON® with ADVANCED THREADFORM TECHNOLOGY™

CONCRETE & MASONRY ANCHOR

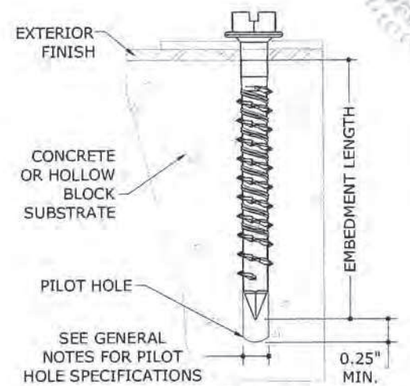
GENERAL NOTES:

1. THIS PRODUCT HAS BEEN DESIGNED & TESTED IN ACCORDANCE WITH THE STRUCTURAL PROVISIONS OF THE FLORIDA BUILDING CODE SEVENTH EDITION (2020), FOR USE WITHIN AND OUTSIDE THE HIGH VELOCITY HURRICANE ZONE, AND THE FOLLOWING STANDARDS: ASTM E488, ASTM G85, & TAS 114.
2. ANCHOR INSTALLATION SHALL BE MADE IN ACCORDANCE WITH MANUFACTURER'S PUBLISHED INSTALLATION INSTRUCTIONS AND THIS NOTICE OF ACCEPTANCE.
3. CONCRETE SHALL CONFORM TO ACI 301 SPECIFICATIONS, WITH STRENGTH PROPERTIES AS SPECIFIED HEREIN. CONCRETE BLOCK SHALL CONFORM TO ASTM C-90.
4. ANCHORS REPRESENTED IN TABLES 1-4 ARE MANUFACTURED FROM HEAT-TREATED STEEL WITH AN ALTERNATING HIGH-LOW ADVANCED THREADFORM TECHNOLOGY. ANCHOR YIELD STRENGTH Fy=100 KSI, ULTIMATE STRENGTH Fu=125 KSI. HEAT TREATED STEEL ANCHORS SHALL HAVE THE CORROSION-RESISTANT COATINGS AS DESCRIBED BELOW IN COMPLIANCE WITH THE FLORIDA BUILDING CODE:
   - SILVER & WHITE ULTRASHIELD
   - BLUE & SILVER CLIMASEAL
5. ANCHORS REPRESENTED IN TABLE 5 ARE OF 410 STAINLESS STEEL ALLOY WITH AN ALTERNATING HIGH-LOW ADVANCED THREADFORM TECHNOLOGY AND SHALL HAVE A CLIMASHIELD CORROSION-RESISTANT COATING IN COMPLIANCE WITH THE FLORIDA BUILDING CODE. ANCHOR YIELD STRENGTH Fy=100 KSI, ULTIMATE STRENGTH Fu=125 KSI.
6. PILOT HOLES FOR ALL INSTALLATIONS SHALL HAVE A DEPTH 1/4" LONGER THAN INDICATED EMBEDMENT DEPTH WITH THE FOLLOWING PILOT HOLE SPECIFICATIONS:
   - 6.1. 3/16" ANCHORS: 5/32" TAPCON DRILL BIT
   - 6.2. 1/4" ANCHORS: 3/16" TAPCON DRILL BIT
7. ALLOWABLE LOAD SHOWN=ULTIMATE LOAD DIVIDED BY 4.0 FOR SOLID NON-CRACKED CONCRETE SUBSTRATES, 5.0 FOR HOLLOW BLOCK SUBSTRATES. NO ALLOWABLE STRESS INCREASE HAS BEEN USED IN PREPARATION OF THIS DOCUMENT.
8. ANCHORS SHALL NOT BE INSTALLED IN CRACKED CONCRETED SUBSTRATES, AS DEFINED IN ACI 355.2.
9. ANCHOR EDGE DISTANCES, EMBEDMENTS, AND SPACINGS BELOW THOSE SHOWN IN DESIGN TABLES HEREIN ARE NOT ACCEPTABLE.
10. ALLOWABLE LOAD CAPACITIES TO SUBSTRATES THAT ARE NOT SHOWN IN THE DESIGN TABLES LISTED HEREIN ARE OUTSIDE THE SCOPE OF THIS CERTIFICATION AND SHALL BE DETERMINED BY A LICENSED PROFESSIONAL ENGINEER.
11. ANCHOR VALUES LISTED HEREIN ARE DETERMINED THROUGH TESTING REPORT DATA AND CHECKED FOR CONSISTENCY WITH EACH TEST PERFORMED.
12. REFERENCE THE FOLLOWING TEST REPORTS:
   - CEL CONSULTING
     - #4I131werc (4/29/2005)
     - #4I131werc SUPPLEMENT 6519 (5/19/2006)
     - #71B153 (01/31/2007)
   - PRI ASPHALT TECHNOLOGIES, INC.
     - #ITW-002-02-01 (12/1/2004)
     - #ITW-003-02-02 (6/15/2006)
     - #ITW-003-02-03 (6/15/2006)
     - #ITW-003-02-04 (6/15/2006)
   - PRI CONSTRUCTION MATERIALS TECHNOLOGIES, INC.
     - #ITW-004-02-01 (11/14/2006)



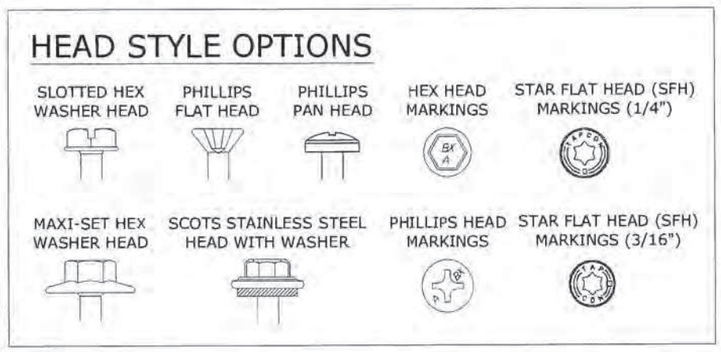
1/1 TAPCON WITH ADVANCED THREADFORM TECHNOLOGY
1:1 SCALE — SIDE VIEW

ANCHOR DIAMETER					
ANCHOR TYPE	D (NOMINAL DIAMETER)	Sd (SHANK DIAMETER)	MINIMUM BASE PLATE CLEARANCE HOLE DIAMETER	Td (THREAD DIAMETER)	Rd (ROOT DIAMETER)
3/16" TAPCON	0.1875"	0.145"	0.250"	CONTACT ITW BUILDEX FOR SPECIFIC ANCHOR DIAMETER INFORMATION	
1/4" TAPCON	0.250"	0.190"	0.3125"		



2/1 TYPICAL SECTION
1:1 SCALE — SIDE VIEW

HEAD STYLE OPTIONS



ANCHOR HEAD DIMENSION		
HEAD STYLE	HEAD HEIGHT	HEAD DIAMETER
3/16" PFH & SFH	0.120"	0.357"
#12 PFH	0.148"	0.414"
1/4" PFH & SFH	0.148"	0.471"

ANCHOR HEAD DIMENSION			
HEAD STYLE	HEAD HEIGHT	ACROSS FLAT	WASHER DIAMETER
3/16" HWH	0.140"	0.246"	0.355"
1/4" HWH	0.180"	0.308"	0.415"
1/4" MAXISET	0.225"	0.308"	0.630"
1/4" SCOTS	0.280"	0.308"	0.587"

PRODUCT REVISED
as complying with the Florida Building Code
NOA-No. 21-0201.06
Expiration Date 08/31/2026
By
Miami-Dade Product Control

ANCHOR LENGTH		
PART LENGTH	THREAD LENGTH	
	3/16" TAPCON	1/4" TAPCON
1-1/4"	FULL THREAD	FULL THREAD
1-3/4"	1-5/8"	1-5/8"
2-1/4"	1-5/8"	1-5/8"
2-3/4"	1-5/8"	1-5/8"
3-1/4"	1-5/8"	1-5/8"
3-3/4"	1-5/8"	1-5/8"
4"	1-5/8"	1-5/8"
5"		1-5/8"
6"		1-5/8"

LONG THREAD ANCHOR LENGTH		
PART LENGTH	THREAD LENGTH	
	3/16" TAPCON	1/4" TAPCON
1-3/4"	FULL THREAD	FULL THREAD
2-1/4"	2-1/8"	2-1/8"
2-3/4"	2-1/8"	2-1/8"
3-1/4"	2-1/8"	2-1/8"
3-3/4"	2-1/8"	2-1/8"
4"	2-1/8"	2-1/8"
5"		2-1/8"
6"		2-1/8"

- DESIGNATES UNAVAILABLE LENGTHS

FRANK BENNARDO, PE
PE0046549 CA# 9885

01/07/2021

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ITW Buildex
Buildex Division of Illinois Tool Works, Inc.
155 Harlem Avenue
Glenview, IL 60025

TAPCON CONCRETE ANCHORS WITH ADVANCED THREADFORM TECHNOLOGY
MIAMI-DADE NOTICE OF ACCEPTANCE

REMARKS	DRWN	CHKD	DATE
INIT ISSUE	CL	FLB	6/16/06
REVISE FOR 07 FBC	TSB	CL	12/30/08
REVISE FOR 10 FBC	CSL	TSB	08/10/12
REV. FBC 5TH ED (2014)	CSL	TSB	07/25/14
2020 FBC	CCB	RWN	10/20/20

20-31425

SCALE:

PAGE DESCRIPTION:

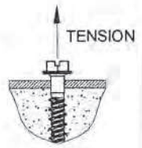
1 2

01/07/2021 - 1:07pm nickn V:\Projects\20-31425 - NOA16-1222.06 - Tapcon Concrete & Masonry Anchors\WP\2020 FBC\40 - 20-31425c - Tapcon ATT NOA - DWG.dwg

STEEL ANCHORS TO NORMAL WEIGHT CONCRETE

1a TENSION CAPACITIES

BASED ON EMBEDMENT, EDGE DISTANCE & SPACING
FOR **SINGLE** ANCHORS



ANCHOR DIAM	EMBED	EDGE DIST	2000 PSI CONC (S=16D)	3000 PSI CONC (S>16D)	4000 PSI CONC (S≥16D)	5000 PSI CONC (S≥16D)
3/16"	1"	1"	125 lb	125 lb	141 lb	141 lb
		1 7/8"	136 lb	164 lb	168 lb	210 lb
	1 1/2"	1"	243 lb	243 lb	279 lb	318 lb
		1 7/8"	268 lb	278 lb	279 lb	327 lb
	1 3/4"	1"	327 lb	358 lb	360 lb	390 lb
		1 7/8"	327 lb	390 lb	401 lb	433 lb
1/4"	1"	1 1/4"	171 lb	174 lb	194 lb	237 lb
		2 1/2"	171 lb	188 lb	199 lb	237 lb
	1 1/2"	1 1/4"	313 lb	313 lb	449 lb	519 lb
		2 1/2"	346 lb	346 lb	454 lb	545 lb
	1 3/4"	1 1/4"	443 lb	465 lb	543 lb	543 lb
		2 1/2"	443 lb	508 lb	594 lb	707 lb

1b SHEAR CAPACITIES

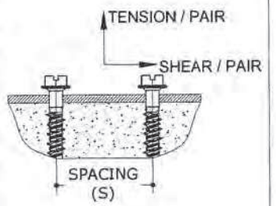
BASED ON EMBEDMENT, EDGE DISTANCE & SPACING
FOR **SINGLE** ANCHORS

ANCHOR DIAM	EMBED	EDGE DIST	2000 PSI CONC (S=16D)	3000 PSI CONC (S>16D)	4000 PSI CONC (S≥16D)	5000 PSI CONC (S≥16D)
3/16"	1"	1 1/8"	126 lb	126 lb	150 lb	150 lb
		2 1/4"	176 lb	181 lb	181 lb	226 lb
	1 1/2"	1 1/8"	186 lb	186 lb	186 lb	186 lb
		2 1/4"	196 lb	215 lb	226 lb	226 lb
	1 3/4"	1 1/8"	204 lb	204 lb	204 lb	204 lb
		2 1/4"	218 lb	218 lb	251 lb	260 lb
1/4"	1"	1 1/2"	196 lb	196 lb	310 lb	310 lb
		3"	237 lb	237 lb	340 lb	359 lb
	1 1/2"	1 1/2"	232 lb	232 lb	346 lb	416 lb
		3"	351 lb	368 lb	417 lb	417 lb
	1 3/4"	1 1/2"	303 lb	303 lb	346 lb	500 lb
		3"	421 lb	421 lb	492 lb	500 lb

PRODUCT REVISED
as complying with the Florida Building Code
NOA–No. 21-0201.06
Expiration Date 08/31/2026
By
Miami–Dade Product Control

2 TENSION, SHEAR CAPACITIES (REDUCED)

BASED ON EMBEDMENT, EDGE DISTANCE & SPACING
FOR **PAIRS** OF ANCHORS*



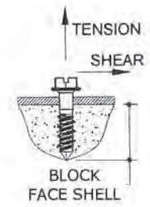
ANCHOR DIAM	EMBED	SPACING (S)	EDGE DIST	2000 PSI CONC OR GREATER TENSION	2000 PSI CONC OR GREATER SHEAR
3/16"	1"	1 1/2"	3"	220 lb	352 lb
		2"		237 lb	352 lb
	1 1/2"	1 1/2"		443 lb	358 lb
		2"		474 lb	369 lb
	1 3/4"	1 1/2"		641 lb	445 lb
		2"		645 lb	455 lb
1/4"	1"	2"	4"	261 lb	447 lb
		3"		302 lb	474 lb
	1 1/2"	2"		533 lb	628 lb
		3"		637 lb	665 lb
	1 3/4"	2"		811 lb	1117 lb
		3"		848 lb	1131 lb

*REFER TO EDGE DISTANCE AND SPACING DETAIL FOR DEPICTION OF ANCHOR SPACING & EDGE DISTANCE REQUIREMENTS FOR PAIRS OF ANCHORS

STEEL ANCHORS TO HOLLOW BLOCK

3 TENSION & SHEAR CAPACITIES

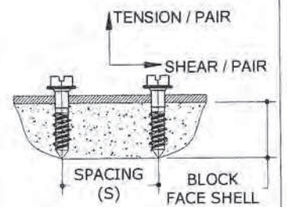
BASED ON EMBEDMENT, EDGE DISTANCE & SPACING
FOR **SINGLE** ANCHORS



ANCHOR DIAM	EMBED	EDGE DIST	LIGHT-WEIGHT CMU BLOCK (S≥16D) TENSION	LIGHT-WEIGHT CMU BLOCK (S≥16D) SHEAR	MEDIUM-WEIGHT CMU BLOCK (S≥16D) TENSION	MEDIUM-WEIGHT CMU BLOCK (S≥16D) SHEAR
3/16"	1"	2"	43 lb	83 lb	68 lb	135 lb
		4"	45 lb	83 lb		147 lb
1/4"	1"	2"	43 lb	108 lb	118 lb	161 lb
		4"	56 lb	125 lb		202 lb

4 TENSION & SHEAR CAPACITIES

BASED ON EMBEDMENT, EDGE DISTANCE & SPACING
FOR **PAIRS** OF ANCHORS*



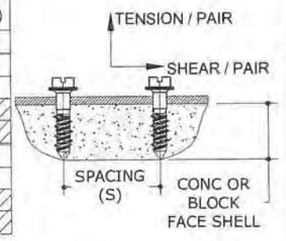
ANCHOR DIAM	EMBED	SPACING (S)	EDGE DIST	LIGHT-WEIGHT CMU BLOCK TENSION	LIGHT-WEIGHT CMU BLOCK SHEAR
3/16"	1"	1 1/2"	3"	103 lb	202 lb
		3"		103 lb	202 lb
1/4"	1"	2"	4"	84 lb	212 lb
		4"		136 lb	224 lb

*REFER TO EDGE DISTANCE AND SPACING DETAIL FOR DEPICTION OF ANCHOR SPACING & EDGE DISTANCE REQUIREMENTS FOR PAIRS OF ANCHORS

STAINLESS STEEL ANCHORS

5 TENSION & SHEAR CAPACITIES

BASED ON EMBEDMENT, EDGE DISTANCE & SPACING
FOR **PAIRS** OF ANCHORS*

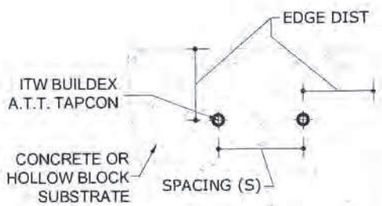


ANCHOR DIAM	EMBED	EDGE DIST	3000 PSI CONCRETE (S≥16D) TENSION	3000 PSI CONCRETE (S≥16D) SHEAR	MEDIUM-WEIGHT CMU BLOCK (S≥16D) TENSION	MEDIUM-WEIGHT CMU BLOCK (S≥16D) SHEAR
3/16"	1"	1"	164 lb	150 lb	54 lb	58 lb
		2 1/2"	164 lb	284 lb	54 lb	99 lb
	1 3/4"	1"	336 lb	169 lb		
		2 1/2"	379 lb	364 lb		
1/4"	1"	1"	187 lb	126 lb	68 lb	51 lb
		2 1/2"	220 lb	301 lb	77 lb	134 lb
	1 3/4"	1"	344 lb	214 lb		
		2 1/2"	473 lb	516 lb		

*REFER TO EDGE DISTANCE AND SPACING DETAIL FOR DEPICTION OF ANCHOR SPACING & EDGE DISTANCE REQUIREMENTS FOR PAIRS OF ANCHORS

CAPACITY TABLE NOTES:

1. ALLOWABLE LOAD SHOWN=ULTIMATE LOAD DIVIDED BY 4.0 FOR SOLID NON-CRACKED CONCRETE SUBSTRATES, 5.0 FOR CONCRETE MASONRY SUBSTRATES. EMBEDMENT VALUES LISTED CONSIDER FULL EMBEDMENT INTO THE CONCRETE OR HOLLOW BLOCK SUBSTRATE. EMBEDMENT DEPTHS DO NOT CONSIDER THE THICKNESS OF WOOD BUCKS, STUCCO OR ANY EXTERIOR FINISHES. ALL FINISHES SHALL BE BY OTHERS AND SHALL NOT EXCEED 1/8" MAXIMUM, OTHERWISE THEY SHALL BE SEPARATELY CERTIFIED TO TRANSFER ALL LOADING TO THE PROJECT SUPERSTRUCTURE.
2. ANCHORS SHALL BE INSTALLED WITH THE MINIMUM CENTER TO CENTER SPACING FOR ANCHOR CAPACITY AS LISTED IN TABLES. NO FURTHER SPACING REDUCTIONS MAY BE APPLIED TO THE VALUES LISTED HEREIN.
3. LINEAR INTERPOLATION MAY BE USED FOR EDGE DISTANCE AND SPACING BETWEEN MINIMUM AND MAXIMUM DISTANCES SHOWN IN TABLES.
4. HAMMER DRILL NOT ALLOWED FOR HOLLOW BLOCK INSTALLATIONS.
5. HOLLOW CONCRETE MASONRY UNITS (CMU) SHALL CONFORM TO ASTM C90 SPECIFICATIONS AND SHALL HAVE DENSITIES AS DEFINED BELOW:
   - "LIGHT WEIGHT" CMU: DENSITY > 95 PCF
   - "MEDIUM WEIGHT" CMU: DENSITY > 117 PCF
6. ▨ DESIGNATES CONDITIONS WHICH ARE NOT ACCEPTABLE FOR USE.



EDGE DIST & SPACING:
"PAIRS OF ANCHORS"

FRANK BENNARDO, PE
PE0045549 CA# 9885
01/07/2021

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Glenview, IL 60025

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TAPCON CONCRETE ANCHORS WITH ADVANCED THREADFORM TECHNOLOGY
MIAMI-DADE NOTICE OF ACCEPTANCE

REMARKS	DRWN	CHKD	DATE
INIT ISSUE	CL	FLB	6/15/06
REVISE FOR 07 FBC	TSB	CL	12/30/08
REVISE FOR 10 FBC	CSL	TSB	08/10/12
REV. FBC 5TH ED (2014)	CSL	TSB	07/25/14
2020 FBC		CCB	RWN 10/20/20

20-31425

SCALE:

PAGE DESCRIPTION:

2

01/07/2021 - 1:07pm rickn V:\Projects\20-31425 - NOA16-1222.06 - Tapcon Concrete & Masonry Anchors\WP\2020 FBC\40 - 20-31425c - Tapcon ATT NOA - DWG.dwg