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ITW RED HEAD A7+ ADHESIVE ANCHORING SYSTEM IN MASONRY

CSI Section: 04 05 19.16 Masonry Anchors

1.0 RECOGNITION

ITW CCNA Red Head A7+ Adhesive Anchoring System in Masonry recognized in this report has been evaluated for use as an alternative to anchor bolts for connections to masonry. The structural performance properties of the Red Head A7+ Adhesive Anchoring System in Masonry comply with the intent of the provisions of the following codes and regulations:

- 2021, 2018, 2015, 2012, and 2009 International Building Code® (IBC)
- 2021, 2018, 2015, 2012, and 2009 International Residential Code® (IRC)
- 2023 and 2020 Florida Building Code, Building (FBC, Building) – attached Supplement
- 2023 and 2020 Florida Building Code, Residential (FBC, Residential) – attached Supplement
- 2022 California Building Code (CBC) – attached Supplement
- 2022 California Residential Code (CRC) – attached Supplement
- 2023 Los Angeles Building Code (LABC) – attached Supplement
- 2023 Los Angeles Residential Code (LARC) – attached Supplement
- 2013 Abu Dhabi International Building Code® (ADIBC) – attached Supplement

2.0 LIMITATIONS (UTILIZATIONS)

Use of the ITW Red Head A7+ Adhesive Anchoring System in Masonry recognized in this report is subject to the following limitations:

2.1 The ITW Red Head A7+ Adhesive Anchoring System in Masonry shall be installed in accordance with the applicable code, the manufacturer's published installation instructions, and this report. Where conflicts between this report and the published instructions occur, the more restrictive shall prevail.

2.2 The ITW Red Head A7+ Adhesive Anchoring System in Masonry is recognized for use to resist short-term and long-term loads, including wind and earthquake loads in accordance with Section 3.2 of this report.

2.3 The ITW Red Head A7+ Adhesive Anchoring System in Masonry shall be installed in concrete masonry completely filled with grout in holes predrilled with carbide-tipped drill bits complying with ANSI B212.15-1994.

2.4 Special inspection in accordance with Section 3.4 of this report shall be required for all anchor installations.

2.5 Prior to installation, calculations and details showing conformity with this report shall be submitted to the building official. Calculations and details shall be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.

2.6 Since an IAPMO Evaluation Criteria for evaluating data to determine the performance of adhesive anchors subjected to fatigue or shock loading is unavailable at this time, using the anchors for these loadings is outside the scope of this report.

2.7 The ITW Red Head A7+ Adhesive Anchoring System in Masonry may resist tension and shear loadings in wall installations only if consideration is given to the effects of elevated temperature conditions on anchor performance. Figure 1 of this report describes load reduction factors for elevated temperatures.

2.8 Anchors are not permitted to support fire-resistive construction. Where not otherwise disallowed in the applicable code, the ITW Red Head A7+ Adhesive Anchoring System in Masonry is permitted for use in fire-resistive construction provided at least one of the following conditions is fulfilled:

- Anchors are used to resist wind or earthquake forces only.
- Anchors 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.
- Anchors are used to support nonstructural elements.

2.9 Threaded rods, nuts, washers, and deformed reinforcing bars are standard elements and shall be identified according to the applicable national or international specifications.

The product described in this Uniform Evaluation Service (UES) Report has been evaluated as an alternative material, design or method of construction in order to satisfy and comply with the intent of the provision of the code, as noted in this report, and for at least equivalence to that prescribed in the code in quality, strength, effectiveness, fire resistance, durability and safety, as applicable, in accordance with IBC Section 104.11. This document shall only be reproduced in its entirety.





2.10 Use of zinc-plated carbon steel threaded rods or steel reinforcing bars is limited to interior locations. Installations exposed to severe, moderate, or negligible exterior weathering conditions, as defined in Figure 1 of ASTM C62 (IBC or IRC), are permitted where stainless steel or zinc-coated anchors are used. Zinc coating shall be either hot-dipped in accordance with ASTM A153 with a Class C or D coating weight or mechanically deposited in accordance with ASTM B695 with a Class 65 coating having a minimum thickness of 2.1 mils (0.533 mm).

2.11 Anchors installed in masonry shall be installed in dry or damp holes free of water.

2.12 The ITW Red Head A7+ Adhesive Anchoring System in Masonry shall be installed in masonry having internal base material temperatures between 14°F (-10°C) and 110°F (43°C) at the time of anchor installation. Installation of anchors in base material having internal temperatures outside of these limits is outside the scope of this report.

2.13 The anchors are restricted to use in uncracked masonry. Cracking in masonry occurs when $f_i > f_r$ when subjected to service loads or deformations.

2.14 When anchors are placed where the internal masonry temperature may surpass 70°F (21°C) in service, allowable loads in this report shall be adjusted for operating temperatures in accordance with Figure 1 of this report. The use of the A7+ Adhesive Anchoring System in base materials having interior temperatures exceeding 176°F (80°C) in service is outside the scope of this report.

2.15 Steel anchoring materials in contact with preservative-treated and fire-retardant-treated wood shall be zinc-coated steel or stainless steel. Coating weights for zinc-coated steel shall be in accordance with ASTM A153 Class C or D.

2.16 Use of the ITW Red Head A7+ Adhesive Anchoring System in dry-stack masonry as described in IBC Section 2114 is outside the scope of this report.

2.17 The ITW Red Head A7+ Adhesive Anchoring System recognized in this report is produced under a quality program with inspections by IAPMO UES.

3.0 PRODUCT USE

3.1 General: The ITW CCNA Red Head A7+ Adhesive Anchoring System consists of post-installed adhesive anchors used for anchoring building components to grout-filled concrete masonry. The threaded steel rods and deformed steel reinforcing bars installed with Red Head A7+ Adhesive resist dead, live, seismic, and wind loads, as noted in Section 3.2 of this evaluation report. Post-installed anchors are alternatives to anchor bolts specified in Section 2107 of

the IBC and Chapters 6 and 8 of 2016 and 2013 TMS 402/ACI 530/ASCE 5, and Chapters 1 and 2 of 2011 and 2008 TMS 402/ACI 530/ASCE 5, as applicable.

3.2 Design:

3.2.1 General: Anchor capacities in this report are allowable load values for use in allowable stress design as set forth in Section 2107 of the IBC. For use under the IRC, an engineered design complying with IRC Section R301.1.3 shall be submitted to the building official for approval.

Allowable tension and shear loads noted in this report shall be reduced for in-service base-material temperatures in accordance with Figure 1 of this report for anchors installed or cured in base materials having a temperature of 70°F (21°C) and above. Anchors installed or cured at temperatures below 14°F (-10°C) or above 110°F (43°C) are outside the scope of this report.

Allowable loads for applied tension forces in combination with shear forces shall be determined by Eq-1:

$$\left(\frac{P_s}{P_t}\right) + \left(\frac{V_s}{V_t}\right) \leq 1.0 \quad \text{Eq-1}$$

where:

P_s = Applied tension load.

P_t = Allowable tension load.

V_s = Applied shear load.

V_t = Allowable shear load.

For installations in fully grouted concrete masonry construction, anchors are permitted to resist dead, live, wind, and earthquake load applications. When using the allowable stress design load combinations in 2021 IBC Section 1605.1 (Section 2.4 of ASCE/SEI 7-16) or the basic allowable stress design load combinations in accordance with the 2018, 2015, 2012, or 2009 IBC Section 1605.3.1, the allowable loads are not permitted to be increased for earthquake or wind loading. For the alternative basic allowable stress design load combinations in 2009 IBC Section 1605.3.2 that incorporate earthquake or wind loads, the allowable tension and shear loads for anchors are permitted to be increased by $33\frac{1}{3}$ percent, or the alternative basic load combinations may be reduced by a factor of 0.75 as noted in Table 9 of this report. When using the alternative basic allowable stress design load combinations in 2021 IBC Section 1605.2 or 2018, 2015, and 2012 IBC Section 1605.3.2 that include earthquake or wind loads, no adjustments are permitted.

For use with the 2009 IBC or 2009 IRC only, allowable stress design tension and shear values given in Tables 2, 3, 5, and 6 of this report may resist short-term forces from wind and earthquake with the application of the adjustment factors noted in Table 9 of this report.



3.2.2 Design of Threaded Steel Rods Installed in the Vertical Face of Grout-filled CMU Walls (Resisting Dead, Live, Wind, and Earthquake Load Applications): Tables 1, 2, and 3 of this report specify allowable tension and shear values for $3/8$ -, $1/2$ -, $5/8$ -, and $3/4$ -inch-diameter (9.5, 12.7, 15.9, and 19.1 mm) threaded rods installed in the face of the fully grouted CMU masonry wall construction (face shell, web, and bed joint locations are shown in Figure 2 of this report), for anchors designed to resist dead, live, wind, and earthquake load applications. Edge and end distances, spacing requirements, and allowable load reduction factors are noted in Tables 2 and 3 of this report. The allowable load shall be the lesser of bond strengths in Table 2 or Table 3 of this report and threaded steel rod strengths in Table 1 of this report.

3.2.3 Design of Deformed Steel Rebars Installed in the Vertical Face of Grout-filled CMU Walls (Resisting Dead, Live, Wind, and Earthquake Load Applications): Tables 4, 5, and 6 of this report specify allowable tension and shear values for No. 3, No. 4, No. 5, and No. 6 deformed steel rebars installed in the vertical side of the fully grout-filled CMU masonry wall construction (face shell, web, and bed joint locations are shown in Figure 2 of this report), for anchors designed to resist dead, live, wind, and earthquake load applications. Edge and end distances, spacing requirements, and allowable load reduction factors are noted in Table 5 or 6 of this report. The allowable load shall be taken as the least result of bond strengths in Table 5 or 6 of this report and steel rebar strengths in Table 4 of this report.

3.3 Installation:

3.3.1 General: Anchors shall be installed in compliance with the manufacturer's published installation instructions (MPII) and the provisions of this report. Where conflicts between this report and the published instructions occur, the more restrictive shall prevail. Anchors shall be installed only when the base material attains the minimum specified compressive strength set forth in Section 4.2.5 of this report. Hole diameters, embedment depths, spacings, edge distances, and base materials shall comply with the provisions of this report. Anchor locations shall comply with approved construction documents.

Anchors installed or cured in masonry at temperatures below 14°F (-10°C) or above 110°F (43°C) are outside the scope of this report. The manufacturer's recommended gel and cure times are shown in Table 7 of this report. After installation into the hole, the anchor shall be undisturbed during the gel time and shall be allowed to fully cure before building components are attached.

3.3.2 Installation in Grout-filled Concrete Masonry: Anchor systems shall be installed in the vertical side of the grout-filled CMU wall. Holes shall be drilled into the grout-

filled concrete masonry to a predetermined depth, using an electro-pneumatic rotary hammer drill, in either a rotation-and-hammering or rotation-only mode, having a carbide-tipped drill bit conforming to ANSI B212.15-1994. Drill bit sizes corresponding to the anchor size are provided in Table 8 of this report. Holes may be either drilled in the face shell of the CMU, or the mortar bed joints, except, installation is permitted in head joints of open-end CMU. Anchor holes shall be cleaned and entirely free of dust and debris using oil-free compressed air and a wire brush. During installation, the holes shall be dry or damp only and free of water.

A clean, static-mixing nozzle shall be attached to the Red Head A7+ adhesive cartridge. Before the adhesive is injected into the pre-drilled hole, an initial amount of adhesive shall be dispensed through the nozzle until the two adhesive components are uniformly blended and exhibit an even dark-gray color. An initial amount of adhesive shall be discarded. The adhesive shall be injected into the hole, beginning at the hole's bottom or back, until the hole is roughly 60 percent full. Anchor rods or bars, which shall be free of oil, scale, and rust, shall be inserted into the hole with a slow twisting motion to the specified embedment depth. As a minimum, the adhesive shall be flush with the concrete masonry surface after insertion of the anchor.

For installations of anchors in the vertical side of the fully grouted masonry wall construction (face shell, web, and bed joint), the anchor location shall comply with the critical and minimum edge and end distances and the critical and minimum spacing noted in Tables 2, 3, 5, or 6 of this report, as applicable, and shown in Figure 2 of this report.

Threaded rods and reinforcing bars shall not be bent after installation except as set forth in Section 26.6.3.1 of ACI 318-19 and -14 or Section 7.3.2 of ACI 318-11 and -08, with the additional condition that the rods and bars shall be bent cold, and heating of threaded rods and reinforcing bars to facilitate field bending is not permitted. The torquing of threaded rods is beyond the scope of this report.

3.4 Special Inspection

3.4.1 IBC and IRC: For the IBC and IRC, adhesive anchors shall be installed with special inspection in accordance with Sections 1704 and 1705 of the IBC. The quality assurance program shall comply with TMS 402 and TMS 602, except continuous inspection is required for all sustained tension loading installations. A statement of special inspections complying with Section 1705.4 of the 2021, 2018, 2015, and 2012 IBC or Section 1705 of the 2009 IBC shall be prepared and submitted to the registered design professional and the building official. An approved special inspector shall furnish the building official and the registered design professional in responsible charge with an inspection report that includes the following:



1. Anchor description, including the adhesive product identification and expiration date, anchor steel type, grade, cleanliness condition, and nominal anchor diameter and length.
2. Masonry unit type and dimensions, grout type, mortar type, and compressive strength.
3. Drilled hole description, including verification of drill bit compliance with ANSI B212.15-1994, hole diameter, location, and depth.
4. Hole cleaning in accordance with the manufacturer's printed installation instructions.
5. Installation description including, verification of anchor installation location (spacing and edge distance), installation temperature, gel time and cure time, and general installation requirements in accordance with the approved plans, the manufacturer's published installation instructions, and this report.

4.0 PRODUCT DESCRIPTION

4.1 Product Information: The ITW Red Head A7+ Adhesive Anchoring System consists of the following components:

- A7+ Adhesive packaged in cartridges
- Adhesive mixing and adhesive dispensing equipment
- Equipment for hole cleaning

The A7+ adhesive is used with either fully threaded steel rods or deformed steel reinforcing bars. Installation information and parameters are included with each adhesive unit package.

4.2 Material Information

4.2.1 ITW Red Head A7+ Adhesive: The ITW Red Head A7+ adhesive is an injectable, two-component, vinyl ester-based adhesive that is mixed in a 10 to 1 ratio of resin to initiator by volume. These two components combine and react when dispensed from a static mixing nozzle attached to the cartridge. The shelf life of the ITW Red Head A7+ adhesive in unopened cartridges is 18 months from the date of manufacture when stored in a cool, dry, and ventilated area. As illustrated in Figure 3 of this report, ITW Red Head A7+ is available in 9.5-ounce (281 mL) side-by-side cartridges and 28 ounce (828 mL) co-axial cartridges.

4.2.2 Dispensing Equipment: ITW Red Head A7+ adhesive shall be dispensed using ITW Red Head manual dispensing tools, or pneumatic dispensing tools as listed in Figure 3 of this report.

4.2.3 Equipment for Hole Preparation: Hole cleaning equipment consists of hole-cleaning brushes and air nozzles. Brushes shall be ITW Red Head wire hole cleaning brushes as listed in Table 8 of this report. Air nozzles shall be

equipped with an extension capable of reaching the bottom/back of the drilled hole.

4.2.4 Anchor Materials

4.2.4.1 Threaded Steel Rods: Threaded anchor rods, having diameters from $\frac{3}{8}$ inch to $\frac{3}{4}$ inch (9.5 mm to 19.1 mm), shall be carbon steel conforming to ASTM A307, or ASTM A193 Grade B7; or stainless steel conforming to ASTM F593, Group 1, Alloy 304, Condition CW1. The steel rods shall be continuously threaded, clean, straight, and without any deformations, indentations, or other defects.

4.2.4.2 Deformed Reinforcing Bars (Rebar): Deformed steel rebar, in sizes No. 3 to No. 6, shall conform to ASTM A615 Grade 60 minimum. The embedded zones of reinforcing bars shall be straight, and cleaned of mud, oil, rust mill scale, and other materials that may reduce the bond with adhesive.

4.2.5 Grout-filled Concrete Masonry: The masonry compressive strength, f'_m , at 28 days shall be at least 1,500 psi (10.3 MPa). Each cell of the CMUs shall be filled with grout. The grout-filled masonry walls shall be constructed using the following materials:

4.2.5.1 Concrete Masonry Units (CMU): CMU shall be open or closed-end lightweight, medium-weight, or normal-weight concrete masonry conforming to IBC Section 2103.1 or IRC Section R606.2, and ASTM C90. The minimum allowable nominal size of CMU shall be 8 inches (203 mm) wide by 8 inches (203 mm) high by 16 inches (406 mm) long (i.e., 8×8×16) for threaded rod and rebar installed with ITW Red Head A7+ Adhesive in the vertical side of the masonry wall construction.

4.2.5.2 Grout: Grout shall comply with IBC Section 2103.3 or IRC Section R606.2.12 (2021 and 2018 IRC), R606.11 (2015 IRC), or R609 (2012 and 2009 IRC). As an alternative, the grout shall exhibit a compressive strength equal to or exceeding its specified strength, and at least 2,000 psi (13.8 MPa), when tested in accordance with ASTM C1019.

4.2.5.3 Mortar: Mortar (Type M, S or N) shall comply with IBC Section 2103.2, or IRC Section R606.2.8 (2021 and 2018 IRC), R606.2.7 (2015 IRC), or R607.1 (2012 and 2009 IRC), as applicable. Mortar shall have a minimum compressive strength of 1,500 psi (10.3 MPa).

5.0 IDENTIFICATION

5.1 The ITW Red Head A7+ Adhesive Anchoring System is identified by the ITW Commercial Construction North America (CCNA) name and trademark, product name, production date code, and evaluation report number (ER-890).



5.2 The Anchor Materials shall be identified as set forth in the applicable ASTM Specification.

The IAPMO Uniform Evaluation Service Mark of Conformity may also be used as shown below:



IAPMO UES ER-890

6.0 SUBSTANTIATING DATA

6.1 Test reports are from laboratories in compliance with ISO/IEC 17025.

6.2 Data complying with AC58, the ICC-ES Acceptance Criteria for Adhesive Anchors in Masonry Elements, issued March 2018, (editorially revised May 2021), including static tension and shear, and seismic tension and shear tests.

6.3 Quality Documentation.

7.0 STATEMENT OF RECOGNITION

This evaluation report describes the results of research completed by IAPMO Uniform Evaluation Service on the ITW CCNA Red Head A7+ Adhesive Anchoring System to assess conformance to the codes shown in Section 1.0 of this report and serves as documentation of the product certification. Products in accordance with Section 2.17 of this report under a quality control program with periodic inspection under the supervision of IAPMO UES.

For additional information about this evaluation report, please visit www.uniform-es.org or email us at info@uniform-es.org



TABLE 1—ALLOWABLE TENSION AND SHEAR STRENGTHS FOR STEEL THREADED RODS^{1,2}

| Threaded Rod Diameter (inches) | Tension (lbf) ³ | | | Shear (lbf) ⁴ | | |
|--------------------------------|--------------------------------------|---|---|--------------------------------------|---|---|
| | 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 = 25.4 mm, 1 lbf = 4.48 N, 1 ksi = 6.89 MPa.

¹ The allowable design load shall be the lesser of bond strengths in Table 3 or Table 4 of this report and steel threaded rod strength in Table 1 of this report.

² Allowable tension and shear strengths for steel threaded rods resisting short-term loadings, such as wind or seismic, shall be calculated in accordance with Section 3.2.1 of this report, as applicable.

³ The allowable tension steel strength is based on the following equation: $F_t = 0.33 \times F_u \times \text{Tensile Stress Area}$.

⁴ The allowable shear steel strength is based on the following equation: $F_v = 0.17 \times F_u \times \text{Tensile Stress Area}$.

TABLE 2—ALLOWABLE TENSION BOND STRENGTHS LOADS FOR THREADED RODS WITH RED HEAD A7+ ADHESIVE INSTALLED INTO COMPLETELY GROUTED CONCRETE MASONRY UNITS^{1,2,3,4,5,16,17}

| Threaded Rod Diameter (inches) | Minimum Rod Embedment ⁶ (inches) | Strength at s _{cr} and c _{cr} (lbf) | Spacing ⁷ | | | Edge Distance ¹⁰ | | |
|--------------------------------|---|---|---|---|---|--|--|---|
| | | | Critical, s _{cr} ⁸ (inches) | Minimum, s _{min} ⁹ (inches) | Load reduction factor for s _{min} ^{13,14} | Critical, c _{cr} ¹¹ (inches) | Minimum, c _{min} ¹² (inches) | Load reduction factor for c _{min} ^{13,15} |
| 3/8 | 3 3/8 | 1,125 | 13.5 | 4 | 1.00 | 12 | 4 | 1.00 |
| 1/2 | 4 1/2 | 1,695 | 18 | 4 | 0.60 | 20 | 4 | 0.90 |
| 5/8 | 5 5/8 | 2,015 | 22.5 | 4 | 0.60 | 20 | 4 | 0.90 |
| 3/4 | 6 3/4 | 3,145 | 27 | 4 | 0.60 | 20 | 4 | 0.63 |

For SI: 1 inch = 25.4 mm; 1 lbf = 4.48 N, 1 ksi = 6.89 MPa. (The footnotes follow Table 3 of this report)

TABLE 3—ALLOWABLE SHEAR BOND STRENGTHS FOR THREADED RODS WITH RED HEAD A7+ ADHESIVE INSTALLED INTO COMPLETELY GROUTED CONCRETE MASONRY UNITS^{1,2,3,4,5,16,17,20}

| Threaded Rod Diameter (inches) | Minimum Rod Embedment ⁶ (inches) | Strength at s _{cr} and c _{cr} ⊥ to edge (lb) | Spacing ⁷ | | | Edge Distance ¹⁰ | | |
|--------------------------------|---|--|---|---|---|--|--|---|
| | | | Critical, s _{cr} ⁸ (inches) | Minimum, s _{min} ⁹ (inches) | Load reduction factor for s _{min} ^{13,18} | Critical, c _{cr} ¹¹ (inches) | Minimum, c _{min} ¹² (inches) | Load reduction factor for c _{min} ^{13,19} |
| 3/8 | 3 3/8 | 750 | 13.5 | 4 | 0.50 | 12 | 4 | 0.95 |
| 1/2 | 4 1/2 | 1,520 | 18 | 4 | 0.50 | 12 | 4 | 0.44 |
| 5/8 | 5 5/8 | 2,285 | 22.5 | 4 | 0.50 | 20 | 4 | 0.26 |
| 3/4 | 6 3/4 | 2,345 | 27 | 4 | 0.50 | 20 | 4 | 0.26 |

For SI: 1 inch = 25.4 mm; 1 lbf = 4.48 N, 1 ksi = 6.89 MPa

(The following footnotes apply to both Tables 2 and 3. – continued on next page)

¹ The allowable design strength shall be the lesser of bond strengths in Table 3 or Table 4 of this report and steel threaded rod strengths in Table 1 of this report.

² The tabulated allowable bond strengths are established using a safety factor of 5.0 or greater for installations under the IBC and the IRC.

³ The masonry shall comply with Section 4.2.5 of this report.

⁴ Anchors shall be permitted to be installed at any location in the vertical side of the fully grouted masonry wall construction (cell, web, or mortar bed joint) as illustrated in Figure 2 of this report.

⁵ One or two anchors of the same diameter may be placed in a single CMU cell provided the tabulated spacings and edge distances are observed.

⁶ Embedment depth shall be determined as the distance from the outside face of the masonry wall to the inserted end of the steel.

⁷ Anchor spacing (s_{cr} or s_{min}) is the distance from center to center of two anchors.

⁸ Critical spacing, s_{cr}, is the least anchor spacing at which the tabulated allowable load of an anchor is achieved such that anchor performance is not influenced by adjacent anchors.

⁹ Minimum spacing, s_{min}, is the least spacing where an anchor has an allowable load capacity, which shall be determined by multiplying the allowable loads assigned to anchors installed at the critical spacing distance, s_{cr}, by the corresponding load reduction factors.

¹⁰ Edge distance (c_{cr} or c_{min}) is the distance measured from the anchor centerline to the edge or end of the CMU masonry wall. Figure 2 of this report illustrates critical and minimum edge and end distances. The tabulated strengths apply to anchors located at the ends of grouted CMU provided the minimum edge distances are observed.

¹¹ Critical edge distance, c_{cr}, is the least edge distance at which the tabulated allowable load of an anchor is achieved where a load reduction factor equals 1.0 (no load reduction).

¹² Minimum edge distance, c_{min}, is the least edge distance where an anchor has an allowable load capacity, which shall be determined by multiplying the allowable loads assigned to anchors installed at critical edge distance, c_{cr}, by the tabulated load reduction factors.

¹³ Reduction factors are cumulative. Multiple reduction factors for more than one spacing or edge or end distance shall be calculated separately and multiplied.

¹⁴ Load reduction factors for anchors loaded in tension with spacings between critical and minimum shall be obtained by linear interpolation.

¹⁵ Load reduction factors for anchors loaded in tension with edge distances between critical and minimum shall be obtained by linear interpolation.



¹⁶ The wall thickness shall be at least 1½ times the actual embedment depth. For example, ½-inch-diameter at ¾ inch embedment (4.5x1.5 = 6.75 inches) requires a minimum nominal 8-inch-thick CMU.

¹⁷ The tabulated allowable bond strengths shall be reduced when elevated in-service temperatures in the base material occur, in accordance with Figure 1 of this report.

¹⁸ Load reduction factors for anchors loaded in shear with spacings between critical and minimum shall be obtained by linear interpolation.

¹⁹ Load reduction factors for anchors loaded in shear with edge distances between critical and minimum shall be obtained by linear interpolation.

²⁰ Shear loads are permitted to be applied in any direction on the wall.

TABLE 4—ALLOWABLE TENSION AND SHEAR STRENGTHS FOR DEFORMED STEEL REINFORCING BARS^{1,2}

| Bar Designation | Tension (lbf) ³ | Shear (lbf) ⁴ |
|-----------------|---|---|
| | ASTM A615, Grade 60 (F _u = 80 ksi) | ASTM A615, Grade 60 (F _u = 80 ksi) |
| 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 lbf = 4.48 N, 1 ksi = 6.89 MPa.

¹ The allowable design load shall be the lesser of bond strengths in Table 5 or Table 6 of this report and steel reinforcing bar strengths in Table 4 of this report.

² Allowable tension and shear strengths for threaded rods to resist short-term loads, such as wind or seismic, shall be calculated in accordance with Section 3.2.1 of this report, as applicable.

³ The allowable tension steel strength is based on the following equation: F_t = 0.33 × F_u.

⁴ The allowable shear steel strength is based on the following equation: F_v = 0.17 × F_u.

TABLE 5— ALLOWABLE TENSION BOND STRENGTHS FOR STEEL REINFORCING BARS WITH RED HEAD A7+ ADHESIVE INSTALLED INTO COMPLETELY GROUTED CONCRETE MASONRY UNITS^{1,2,3,4,5,16,17}

| Bar Designation | Minimum Embedment (inches) ⁶ | Strength at s _{cr} and c _{cr} (lb) | Spacing ⁵ | | | Edge Distance ¹⁰ | | |
|-----------------|---|--|---|---|---|------------------------------------|--|---|
| | | | Critical, s _{cr} ⁸ (inches) | Minimum, s _{min} ⁹ (inches) | Load reduction factor for s _{min} ^{13,14} | Critical, c _{cr} (inches) | Minimum, c _{min} ¹² (inches) | Load reduction factor for c _{min} ^{14,15} |
| No. 3 | 3 ³ / ₈ | 1,530 | 13.5 | 4 | 1.00 | 12 | 4 | 1.00 |
| No. 4 | 4 ¹ / ₂ | 1,845 | 18 | 4 | 0.60 | 20 | 4 | 0.90 |
| No. 5 | 5 ⁵ / ₈ | 2,465 | 22.5 | 4 | 0.60 | 20 | 4 | 0.90 |
| No. 6 | 6 ³ / ₄ | 2,380 | 27 | 4 | 0.60 | 20 | 4 | 0.63 |

For SI: 1 inch = 25.4 mm; 1 lbf = 4.48 N, 1 ksi = 6.89 MPa (The footnotes follow Table 6 of this report)

TABLE 6—ALLOWABLE SHEAR BOND STRENGTHS FOR REINFORCING BARS WITH RED HEAD A7+ ADHESIVE INSTALLED INTO COMPLETELY GROUTED CONCRETE MASONRY UNITS^{1,2,3,4,5,16,17,20}

| Bar Designation | Minimum Embedment ⁶ (inches) | Strength at s _{cr} and c _{cr} ⊥ to edge (lb) | Spacing ⁷ | | | Edge Distance ¹⁰ | | |
|-----------------|---|--|---|---|---|--|--|---|
| | | | Critical, s _{cr} ⁸ (inches) | Minimum, s _{min} ⁹ (inches) | Load reduction factor for s _{min} ^{13,18} | Critical, c _{cr} ¹¹ (inches) | Minimum, c _{min} ¹² (inches) | Load reduction factor for c _{min} ^{13,19} |
| No. 3 | 3 ³ / ₈ | 1,410 | 13.5 | 4 | 0.50 | 12 | 4 | 0.95 |
| No. 4 | 4 ¹ / ₂ | 1,680 | 18 | 4 | 0.50 | 12 | 4 | 0.44 |
| No. 5 | 5 ⁵ / ₈ | 3,245 | 22.5 | 4 | 0.50 | 20 | 4 | 0.44 |
| No. 6 | 6 ³ / ₄ | 4,000 | 27 | 4 | 0.50 | 20 | 4 | 0.26 |

For SI: 1 inch = 25.4 mm; 1 lbf = 4.48 N, 1 ksi = 6.89 MPa (The following footnotes apply to both Tables 5 and 6 of this report – continued on next page)

¹ The allowable design load shall be the lesser of bond strengths in Table 5 or Table 6 of this report and steel reinforcing bar strengths in Table 4 of this report.

² The tabulated allowable bond strengths are established using a safety factor of 5.0 or greater 5.0 for installations under the IBC and the IRC.

³ The masonry shall comply with Section 4.2.5 of this report.

⁴ Anchors shall be permitted to be installed at any location in vertical side of the fully grouted masonry wall construction (cell, web, or mortar bed joint) as illustrated in Figure 2 of this report.

⁵ One or two anchors of the same diameter may be placed in a single CMU cell provided the tabulated spacings and edge distances are observed.

⁶ Embedment depth shall be determined as the distance from the outside face of the masonry wall to the inserted end of the steel.

⁷ Anchor spacing (s_{cr} or s_{min}) is the distance from center to center of two anchors.

⁸ Critical spacing, s_{cr}, is the least anchor spacing at which the tabulated allowable load of an anchor is achieved such that anchor performance is not influenced by adjacent anchors.

⁹ Minimum spacing, s_{min}, is the least spacing where an anchor has an allowable load capacity, which shall be determined by multiplying the allowable loads assigned to anchors installed at the critical spacing distance, s_{cr}, by the corresponding load reduction factors.

¹⁰ Edge distance (c_{cr} or c_{min}) is the distance measured from the anchor centerline to the edge or end of the CMU masonry wall. Figure 2 of this report illustrates critical and minimum edge and end distances. The tabulated strengths apply to anchors located at the ends of grouted CMU provided the minimum edge distances are observed.

¹¹ Critical edge distance, c_{cr}, is the least edge distance at which the tabulated allowable load of an anchor is achieved where a load reduction factor equals 1.0 (no load reduction).



¹² Minimum edge distance, c_{min} , is the least edge distance where an anchor has an allowable load capacity, which shall be determined by multiplying the allowable loads assigned to anchors installed at critical edge distance, c_{cr} , by the tabulated load reduction factors.

¹³ Reduction factors are cumulative. Multiple reduction factors for more than one spacing or edge or end distance shall be calculated separately and multiplied.

¹⁴ Load reduction factors for anchors loaded in tension with spacing between critical and minimum shall be obtained by linear interpolation.

¹⁵ Load reduction factors for anchors loaded in tension with edge distances between critical and minimum shall be obtained by linear interpolation.

¹⁶ The wall thickness shall be at least 1½ times the actual embedment depth. For example, ½-inch-diameter at 4½ inch embedment ($4.5 \times 1.5 = 6.75$ inches) requires a minimum nominal 8-inch-thick CMU.

¹⁷ The tabulated allowable bond strengths shall be reduced when elevated in-service temperatures in the base material occur, in accordance with Figure 1 of this report.

¹⁸ Load reduction factors for anchors loaded in shear with spacings between critical and minimum shall be obtained by linear interpolation.

¹⁹ Load reduction factors for anchors loaded in shear with edge distances between critical and minimum shall be obtained by linear interpolation.

²⁰ Shear loads are permitted to be applied in any direction on the wall.

TABLE 7—GEL AND CURE TIMES FOR RED HEAD A7+ ADHESIVE CORRESPONDING TO TEMPERATURE

| BASE MATERIAL (F°/C°) | GEL TIME | FULL CURE TIME |
|--------------------------|-------------|----------------|
| 110°/43° | 1.5 minutes | 45 minutes |
| 90°/32° | 3 minutes | 45 minutes |
| 70°/21° | 5 minutes | 45 minutes |
| 50°/10° | 16 minutes | 90 minutes |
| 32°/0° | 35 minutes | 4 hours |
| 14°/-10° | 35 minutes | 24 hours |

TABLE 8—WIRE BRUSHES AND DRILL BITS FOR RED HEAD A7+ ADHESIVE

| PART No. | ANCHOR DIA. (IN) | REBAR DIA. (IN) | DRILL BIT DIA. (IN) | OVERALL LENGTH (IN) | BRUSH DIA. (IN) |
|----------|------------------|-----------------|---------------------|---------------------|-----------------|
| WB-038 | 3/8 | No. 3 | 7/16 | 4-7/8 | 0.563 |
| WB-012 | 1/2 | No. 4 | 5/8 | 4-7/8 | 0.675 |
| WB-058 | 5/8 | No. 5 | 3/4 | 4-7/8 | 0.900 |
| WB-34 | 3/4 | No. 6 | 7/8 | 4-7/8 | 1.125 |

For SI: 1 inch = 25.4 mm

TABLE 9—2009 IBC ALTERNATIVE ALLOWABLE STRESS DESIGN (ASD) BASIC LOAD COMBINATION ADJUSTMENT FACTORS^{1,2}

| Anchor Type | Adjustment Factors for 2009 IBC Section 1605.3.2 ASD Alternative Basic Load Combinations | | | |
|-----------------------------------|--|-------|--|-------|
| | Reduction Factors to Load Combinations | | Increase Factors for ASD Tabulated Loads | |
| | Tension | Shear | Tension | Shear |
| Mild steel threaded rods | 0.75 | 0.75 | 1.33 | 1.33 |
| High-strength steel threaded rods | 0.75 | 1.00 | 1.33 | 1.00 |
| Stainless steel threaded rods | 0.75 | 0.87 | 1.33 | 1.14 |
| Steel reinforcing bars | 0.75 | 0.75 | 1.33 | 1.33 |

¹ In accordance with 2009 IBC Section 1605.3.1.1, the provisions of this table do not apply to basic load combinations provided in 2009 IBC Section 1605.3.1.

² For alternative basic load combinations in the 2009 IBC Section 1605.3.2 with wind or seismic loads, the load combinations are permitted to be reduced by applying the reduction factors located in the left portion of the table. As an alternative, the tabulated allowable bond or steel loads for anchors in this report may be increased by the increase factors located in the right portion of the table. For example, for mild steel threaded rods in tension or shear, the basic load combinations including wind or seismic may be reduced by 0.75; or the tabulated allowable bond or steel loads may be increased by 1.33.

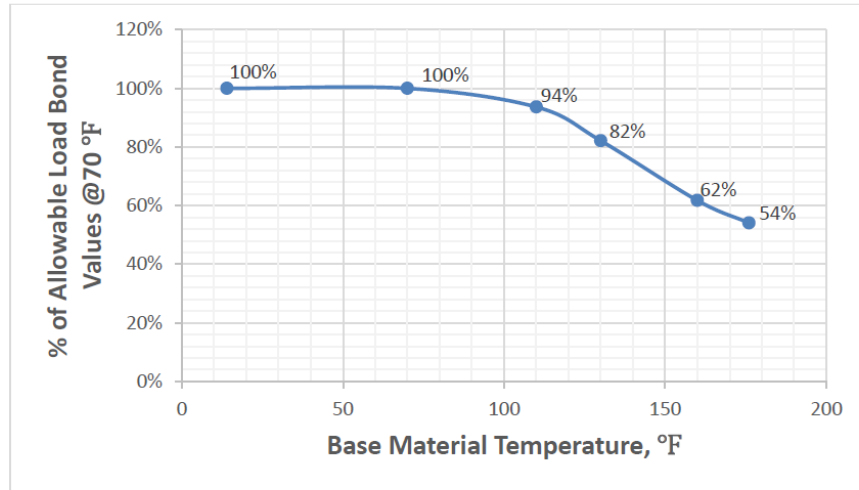


FIGURE 1—INFLUENCE OF BASE MATERIAL TEMPERATURE ON ALLOWABLE ADHESIVE BOND TENSION AND SHEAR LOADS FOR RED HEAD A7+ ADHESIVE ANCHORS INSTALLED INTO THE FACE OF CONCRETE MASONRY UNIT WALLS

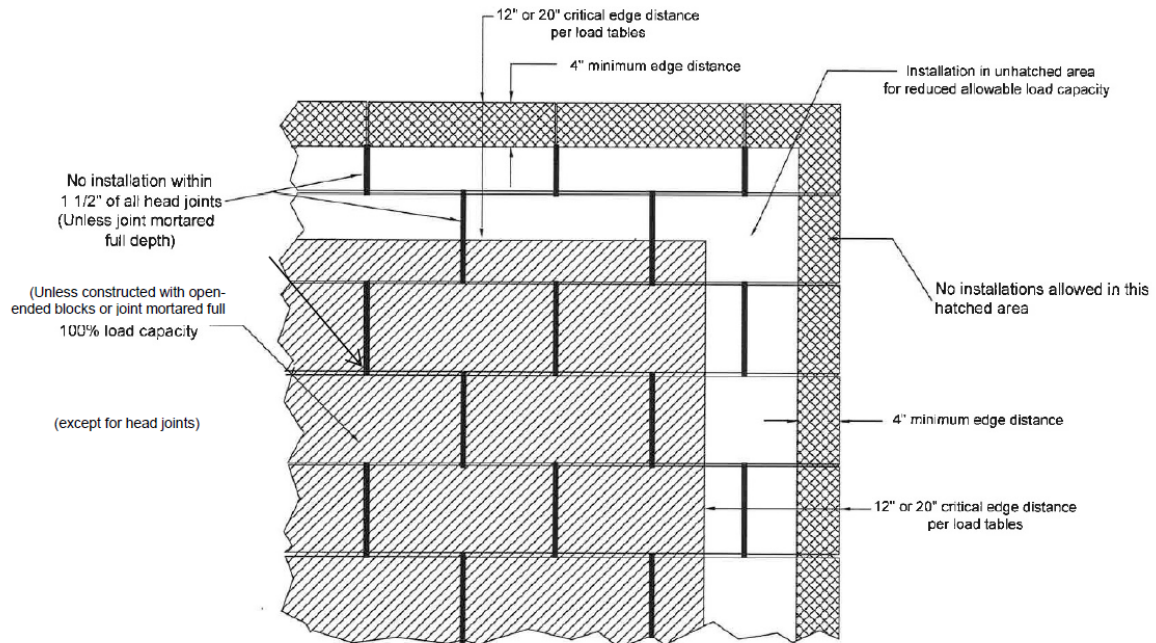


FIGURE 2—ILLUSTRATION OF PERMISSIBLE LOCATIONS FOR RED HEAD A7+ ADHESIVE ANCHORS INSTALLED INTO THE FACE OF GROUTED CONCRETE MASONRY WALL (ELEVATION VIEW)



A7P-10
9.5 ounce cartridge



A7P-28
28 ounce cartridge



A7+ Dispensing Tools



Wire Brush
(see Table)

FIGURE 3 -- RED HEAD A7+ ADHESIVE ANCHORING SYSTEM COMPONENTS CONSISTING OF CARTRIDGES, DISPENSING TOOLS, AND CLEANING BRUSHES



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ITW RED HEAD A7+ ADHESIVE ANCHORING SYSTEM IN MASONRY

CSI Section: 04 05 19.16 Masonry Anchors

1.0 RECOGNITION

The ITW Red Head A7+ Adhesive Anchoring System in Masonry, as evaluated and represented in IAPMO UES Evaluation Report ER-890 and with changes as noted in this supplement is a satisfactory alternative for use in buildings built under the following codes (and regulations):

- 2023 and 2020 Florida Building Code, Building, 8th and 7th Edition (FBC--Building)
- 2023 and 2020 Florida Building Code, Residential, 8th and 7th Edition (FBC--Residential)

2.0 LIMITATIONS (UTILIZATIONS)

Use of the ITW Red Head A7+ Adhesive Anchoring System in Masonry recognized in this report supplement is subject to the following limitations:

2.1 For use under the 2023 FBC--Building or 2023 FBC--Residential, the design and installation of the ITW Red Head A7+ Adhesive Anchoring System in Masonry shall be in accordance with the 2021 International Building Code and the 2021 International Residential Code as noted in ER-890.

2.2 For use under the 2020 FBC--Building or 2020 FBC--Residential, the design and installation of the ITW Red Head A7+ Adhesive Anchoring System in Masonry shall be in accordance with the 2018 International Building Code and the 2018 International Residential Code as noted in ER-890.

2.3 Load combinations shall be in accordance with Sections 1605.1 or 1605.2 of the 2023 FBC--Building or Section 1605.2 of the 2020 FBC--Building, as applicable.

2.4 Design wind loads shall be in accordance with Section 1609.1.1 of the FBC--Building or Section R301.2.1.1 of the FBC--Residential, as applicable, and Section 1620 of the FBC--Building where used in High-velocity Hurricane Zones (HVHZ).

2.5 Use of the ITW Red Head A7+ Adhesive Anchoring System in Masonry in High-velocity Hurricane Zones (HVHZ) as set forth in Section 2321.5.2 of the FBC--Building and Section R4409 of the FBC--Residential to resist wind uplift is permitted. The anchors shall be designed to resist the uplift forces as required in Section 1620 (HVHZ) of the FBC--Building or 700 pounds (3114 N), whichever is greater, per FBC--Building Section 2321.7.

2.6 Use of the ITW Red Head A7+ Adhesive Anchoring System in Masonry in High-velocity Hurricane Zones (HVHZ) as set forth in Section 2122.7 of the FBC--Building and Section R4407 of the FBC--Residential to resist wind forces is permitted. The anchors shall be designed to resist the horizontal forces as required in Section 1620 (HVHZ) of the FBC--Building or 200 pounds per lineal foot (2919 N/m) of wall, whichever is greater, per FBC--Building Section 2122.7.3.

2.7 Use of the ITW Red Head A7+ Adhesive Anchoring System in Masonry with stainless steel or galvanized carbon steel threaded rod complies with the High-Velocity Hurricane Zone (HVHZ) provisions set forth in Sections 2324.2 of the FBC--Building.

2.8 Use of the ITW Red Head A7+ Adhesive Anchoring System in Masonry with carbon steel threaded rods or reinforcing bars in applications exposed to the weather within High-velocity Hurricane Zones (HVHZ) set forth in the FBC--Building and the FBC--Residential is beyond the scope of this supplemental report.

2.9 For products falling under Section (5)(d) of Florida Rule 61G20-3.008, verification that the report holder's quality assurance program is audited by a quality assurance entity approved by the Florida Building Commission (or the building official when the report holder does not possess an approval by the Commission) is required to provide oversight and determine that the products are being manufactured as described in this evaluation report to establish continual product performance.

2.10 This supplement expires concurrently with ER-890.

For additional information about this evaluation report, please visit www.uniform-es.org or email us at info@uniform-es.org



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ITW RED HEAD A7+ ADHESIVE ANCHORING SYSTEM IN MASONRY

CSI Section: 04 05 19.16 Masonry Anchors

1.0 RECOGNITION

The ITW Red Head A7+ Adhesive Anchoring System in Masonry as evaluated and represented in IAPMO UES Evaluation Report ER-890 and with changes as noted in this supplement is a satisfactory alternative for use in buildings built under the following codes (and regulations):

- 2022 California Building Code (CBC)
- 2022 California Residential Code (CRC)

2.0 LIMITATIONS (UTILIZATIONS)

Use of the ITW Red Head A7+ Adhesive Anchoring System in Masonry recognized in this report supplement is subject to the following limitations:

2.1 The design, installation, conditions of use, and identification of the ITW Red Head A7+ Adhesive Anchoring System in Masonry shall be in accordance with the 2021 International Building Code and the 2021 International Residential Code as noted in the California Supplement.

2.2 The design, installation, and inspection of the ITW Red Head A7+ Adhesive Anchoring System in Masonry shall be in accordance with CBC Chapters 16, 16A, 17, 17A, 21, and 21A as applicable, due to local amendments to these chapters.

2.3 For installations regulated by the DSA or HCAi (formerly OSHPD), the ITW Red Head A7+ Adhesive Anchoring System in Masonry has been qualified for seismic applications as specified in CBC Section 1617A1.1.19, subject to the requirements of this supplement and ER-890.

2.4 For seismic design installations regulated by the HCAi (formerly OSHPD), anchor sizes shall comply with CBC Section 2106.1.1.4.

2.5 For installations regulated by the DSA, anchor sizes shall comply with CBC Section 2115.9.1.3.

2.6 For seismic design installations regulated by the DSA and HCAi (formerly OSHPD), anchor sizes shall comply with CBC Section 2106A.1.4.

2.7 This supplement expires concurrently with ER-890.

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ITW RED HEAD A7+ ADHESIVE ANCHORING SYSTEM IN MASONRY

CSI Section: 04 05 19.16 Masonry Anchors

1.0 RECOGNITION

The ITW Red Head A7+ Adhesive Anchoring System in Masonry, as evaluated and represented in IAPMO UES Evaluation Report ER-890 and with changes as noted in this supplement is a satisfactory alternative for use in buildings built under the following codes (and regulations):

- 2023 City of Los Angeles Building Code (LABC)
- 2023 City of Los Angeles Residential Code (LARC)

2.0 LIMITATIONS (UTILIZATIONS)

Use of the ITW Red Head A7+ Adhesive Anchoring System in Masonry recognized in this report supplement is subject to the following limitations:

2.1 The design, installation, conditions of use, and identification of the ITW Red Head A7+ Adhesive Anchoring System in Masonry shall be in accordance with the 2022 California Building Code and the 2022 California Residential Code as noted in the California Supplement.

2.2 Prior to installation, calculations and details showing conformity with this report supplement and the Los Angeles Building Code or Los Angeles Residential Code shall be submitted to the structural plan check section for review and approval. The calculations and details shall be prepared, stamped, and signed by a California registered design professional.

2.3 The design, installation, and inspection of the ITW Red Head A7+ Adhesive Anchoring System in Masonry shall be in accordance with LABC Chapters 16 and 17, as applicable, due to local amendments to these chapters.

2.4 The design information listed in the report and tables of ER-890 is valid for anchorage to masonry only. Connected members also shall be analyzed for structural capacities in accordance with the applicable requirements in the LABC and LARC.

2.5 The capacities of the ITW Red Head A7+ Adhesive Anchoring System in Masonry used in connecting walls to flexible diaphragms shall comply with the LADBS Information Bulletin P/BC 2020-071, Wall Anchorage Assemblies to Flexible Diaphragms.

2.6 Periodic special inspection shall be provided by the Registered Deputy Inspector in accordance with Section 1705 of the LABC during installations of the ITW Red Head A7+ Adhesive Anchoring System in Masonry.

2.7 Under the LARC, a design in accordance with Section R301.1.3 shall be submitted.

2.8 The ITW Red Head A7+ Adhesive Anchoring System in Masonry is not approved for unreinforced masonry walls.

2.9 This supplement expires concurrently with ER-890.

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ITW RED HEAD A7+ ADHESIVE ANCHORING SYSTEM IN MASONRY

CSI Section: 04 05 19.16 Masonry Anchors

1.0 RECOGNITION

The ITW Red Head A7+ Adhesive Anchoring System in Masonry, as evaluated and represented in IAPMO UES Evaluation Report ER-890 and with changes as noted in this supplement is a satisfactory alternative for use in buildings built under the following codes (and regulations):

- 2013 Abu Dhabi International Building Code (ADIBC)

2.0 LIMITATIONS (UTILIZATIONS)

Use of the ITW Red Head A7+ Adhesive Anchoring System in Masonry recognized in this report is subject to the following limitations:

2.1 The ITW Red Head A7+ Adhesive Anchoring System in Masonry described in ER-890, complies with Chapter 21 of the 2013 ADIBC, given the design and installation are in accordance with the 2009 International Building Code® (IBC).

2.2 Special inspection of the Adhesive Anchoring System shall be provided at the job site as required by Sections 1704.4 and 1709.1 of the 2013 ADIBC and Section 3.4 of ER-890.

2.3 This supplement expires concurrently with ER-890.

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