LEGACY REPORT

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Legacy report on the 1997 *Uniform Building Code*™

DIVISION: 04—MASONRY
Section: 04081—Masonry Anchorage

ITW RAMSET/RED HEAD EPCON SYSTEM

ITW RAMSET/RED HEAD
1300 NORTH MICHAEL DRIVE
WOOD DALE, ILLINOIS 60191

1.0 SUBJECT

ITW Ramset/Red Head Epcon System Ceramic 6 Epoxy Anchors.

2.0 DESCRIPTION

2.1 General:

The ITW Ramset/Red Head Epcon System Ceramic 6 Epoxy Anchors are stud-type adhesive anchors for use in unreinforced brick walls. The anchors consist of a polymer epoxy adhesive, a threaded steel rod, nut and washer. The threaded steel rods are $^5/_8$ inch and $^3/_4$ inch (15.9 mm and 19.1 mm) in diameter, and must conform to ASTM A 307 [F_u = 60,000 psi (415 MPa) minimum]; ASTM A 193, Grade B7 [F_u = 125,000 psi (860 MPa) minimum]; or ASTM F 593, Grade F 593A (Alloy Type 304) [F_u = 115,000 psi (795 MPa) minimum]. Deformed reinforcement bars range from No. 3 to No. 10 and must conform to ASTM A 615, A 616, A 617 or A 706, Grade 60. For installation in unreinforced brick walls, the threaded steel rod, screen tube, steel sleeve, steel plate, nut and washer are used with the epoxy adhesive.

The Epcon polymer epoxy adhesive, identified as "Ceramic 6," comes in a 17.9-fluid-ounce (530 ml) cartridge that has equal amounts of resin and hardener components. The dual-component cartridge is used with a hand-powered injector tool and disposable plastic mixing nozzle that mixes the resin and hardener components as they are pumped through the nozzle.

The recommended shelf life of the cartridges is two years when stored at temperatures of 40˚F to 125˚F (4.4˚C to 52˚C).

2.2 Design:

Allowable static loads for anchors installed in accordance with this report are shown in Section 2.4.

Anchors are not permitted to be subjected to vibratory loads such as those encountered by supports for reciprocating engines, crane loads and moving loads due to vehicles. Anchors are permitted for earthquake load, and wind load applications.

2.3 Unreinforced Brick Walls:

2.3.1 General: Anchors installed in existing unreinforced brick walls with Epcon Ceramic 6 Adhesive resist short-term wind or seismic loads only. Existing unreinforced brick walls must have a minimum thickness of 13 inches (330 mm). Anchors are installed in three configurations, with each utilizing the adhesives, threaded rod and screen tube. Configuration A, shown in Figure 2, has a straight threaded rod embedded 8 inches (203 mm) into the wall. Configuration B, shown in Figure 3, has a threaded rod, bent and installed 13 inches (330 mm) into the wall at a 22.5-degree angle. Configuration C uses a through-bolt, steel sleeve and steel plate, as shown in Figure 4.

The threaded rod for Configurations A and B is a zinc-plated, $^3/_4$-inch-diameter (19.1 mm) ASTM A 307 threaded rod. A $^5/_8$-inch-diameter (15.9 mm) ASTM A 307 threaded rod is used in Configuration C.

The screen tube is electrogalvanized steel wire cloth formed into a tube having a $^{15}/_{16}$-inch (23.8 mm) diameter and a length of 8 inches (203 mm), except for Configuration B, in which the tube length is 13 inches (330 mm). The screen tubes used in Configuration C have a plastic bottom to prevent escape of adhesive and allow through drilling to complete the anchor installation.

A $7^5/_8$-inch-long (194 mm) sleeve formed from No. 16 gage ASTM A 36 steel, used in the through-bolted Configuration C, has an outside diameter of $^{13}/_{16}$ inch (20.6 mm). A plastic plug is inserted in the tapered end of the sleeve. The flared end of the sleeve has hexagonal splines to accept a socket extension. A 6-inch-by-6-inch-by-$^3/_8$-inch-thick (152 mm by 152 mm by 9.5 mm) ASTM A 36 steel plate is located on the backface of the wall at the end of the threaded rod of the through-bolted connection. Adhesives shall cure in accordance with Table 1 before attachments are placed.

Allowable shear for Configuration A is 1,000 pounds (4450 N). The allowable tension for Configuration B is 1,200 pounds (5340 N). These values must be adjusted for in-service temperatures in accordance with Figure 1. The allowable shear for Configuration C is 750 pounds (3340 N). Allowable values are for short-duration seismic or wind loads and cannot be increased for these short-term loads. Where the load combination equation (12.11) in Section 1612.3.1 of the code is used, the 0.75 factor is 1.0. The adhesive for the installed anchors must be protected from direct weather exposure.

***Corrected January 2007 and Revised January 2008**

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2.3.2 Installation: The anchors are installed in 1-inch-diameter (25.4 mm) holes drilled into mortar joints by means of standard rotary drill bits for use in concrete or masonry and a rotary drill or rotary hammer drill used in the "rotation only" mode. The hole is drilled perpendicular to the wall face to an 8-inch (203 mm) depth for Configuration A, and through the wall for Configuration C. The hole for the Configuration B anchor is drilled at the angle and to the embedment described in Section 2.3.1, using a guide that is either hand-held or attached to the drill. The holes are cleaned with oil-free compressed air and a nylon brush.

The mixed adhesive is injected into the screen tube until completely full. The tube is then placed into the drilled hole, and the threaded rod of Configurations A and B or the steel sleeve of Configuration C is slowly pushed and continuously rotated into the screen tube, forcing the adhesive through the screen and into the hole. The adhesive must be cured at the temperature and for the time period noted in Table 1 before load application, in Configurations A and B, or before continuing installation of the Configuration C anchor. After the adhesive is cured in Configuration C, a $^5/_8$-inch-diameter (15.9 mm) hole is drilled through the plastic plug in the end of the steel sleeve, using a standard rotary drill bit. The $^5/_8$-inch (15.9 mm) threaded rod is inserted through the hole and attached to the opposite side of the wall using the metal plate and nut.

2.3.3 Miscellaneous: Acceptability is contingent on the following:

1. Approval by the project engineer.
2. Installation under special inspection in accordance with Section 2.5 of this report.
3. Only seismic or wind loads are imposed on anchors.
4. For seismic or wind shear loads on Configurations A and C:
   a. Allowable load is applicable only where in-place shear tests indicate a minimum mortar strength of 55 psi (380 kPa) when tested in accordance with UBC Standard 21-6.
   b. Twenty-five percent of anchors are tested by a special inspector using a calibrated-torque wrench set to a minimum torque of 60 foot-pounds (80 N-m). No visible deflection or deformation is permitted under torque. Steel sleeves for anchors in Configuration C are tested prior to installation of threaded rods.
   c. Anchors installed in accordance with details for Configuration A or C have a minimum edge distance and spacing of 16 inches (406 mm).
   d. For each project, the project engineer and contractor must submit a report indicating compliance with this evaluation report to the local building department.
5. For seismic or wind tension loads for Configuration B:
   a. Allowable load is applicable only where in-place mortar shear tests indicate a minimum ultimate strength of 55 psi (380 kPa) when tested in accordance with UBC Standard 21-6.
   b. Five percent of anchors are tested in accordance with ASTM E 488, with a minimum of two tests required. Where the wall thickness varies, at least one test is performed on an anchor that has the least embedment. Tests shall indicate that bolts can sustain a tensile load of 3,000 pounds (13350 N) for a five-minute period with an allowable 10 percent deviation.

   Tests are under the supervision of the project engineer or an approved testing laboratory. At a minimum, the test report shall include:
   - Test location(s).
   - Brick/mortar condition.
   - Bolt movement/elongation.
   - Embedment depth.
   - Applied load.

   c. Twenty-five percent of installed anchors are tested by a special inspector using a torque-calibrated wrench set to a minimum torque of 60 foot-pounds (80 N-m). No visible deflection or deformation is permitted under torque.
   d. Configuration B anchors have a minimum edge distance and spacing of 16 inches (406 mm).
   e. For each project, the project engineer and contractor must submit to the local building department a report that includes a statement of compliance with this evaluation report.

2.4 Special Inspection:

Adhesive anchor installations require special inspection in accordance with Section 1701 of the code. The special inspector records the drill bit compliance with ANSI B212.15-1994; hole depth and cleanliness; product description, including product name, rod diameter and length; adhesive expiration date; and verification of anchor installation in accordance with the manufacturer's published instructions and this report.

2.5 Identification:

The Epcon Ceramic 6 Epoxy Anchors are identified by labels on the packaging indicating the manufacturer's name (ITWRamset/Red Head), product name, material type, serial number traceable to production date, length and diameter of the threaded rod, and evaluation report number (ICBO ES ER-4285).

3.0 EVIDENCE SUBMITTED

Data in accordance with Acceptance Criteria for Unreinforced Masonry Anchors (AC60), dated January 1995.

4.0 FINDINGS

That the ITW Ramset/Read Head Epcon System Ceramic 6 Epoxy Anchors described in this report comply with the 1997 *Uniform Building Code*™, subject to the following conditions:

4.1 The anchors are installed in accordance with the manufacturer's instructions and this report.

4.2 Anchors are installed in holes and substrates predrilled with a carbide-tipped masonry drill manufactured within the range of the maximum and minimum drill-tip dimensions of ANSI B212.15-1994 for the allowable values set forth in this report.

4.3 Special inspection in accordance with Section 2.4 is provided for all anchor installations.

4.4 Calculations and details showing compliance with this report are submitted to the building official for approval.

4.5 Anchors are not used in conjunction with fire-resistive construction.

4.6 Anchors are not used to resist tension forces in ceiling or wall installations unless special consideration is given to fire-exposure conditions.

4.7 Anchors are not subjected to vibratory or shock loads, such as those encountered by supports for reciprocating engines or crane rails.

4.8 Adhesive anchors in unreinforced brick walls resist seismic or wind forces only.

4.9 The anchors are limited to interior use, except that installation in concrete in severe, moderate or negligible exterior weathering locations, in accordance with Figure 21-1-1 of UBC Standard 21-1, is permitted when stainless steel threaded rods are installed.

4.10 During installation, the hole and surrounding location must be dry.

4.11 Adhesives are manufactured in Montgomeryville, Pennsylvania, and Wood Dale, Illinois, with quality control inspections by PFS Corporation (AA-652).

This report is subject to re-examination in one year.

TABLE 1—MANUFACTURER'S RECOMMENDED CURE TIME FOR EPCON CERAMIC 6 EPOXY ANCHORS

MINIMUM CONCRETE TEMPERATURE[1] (˚F)	INITIAL SET TIME[2] (hours)	CURE TIME[3] (hours)
65	1.0	24
90	1.0	24

For **SI:** t˚C = $^5/_9$(t˚F – 32).

[1]Adhesives shall be installed in substrates at temperatures of at least 65˚F. Installation in substrates at temperatures below 65˚F is beyond the scope of this report.
[2]Anchors are to be undisturbed during the initial set time.
[3]Cure time required prior to application of allowable (design) tensile and shear loads.

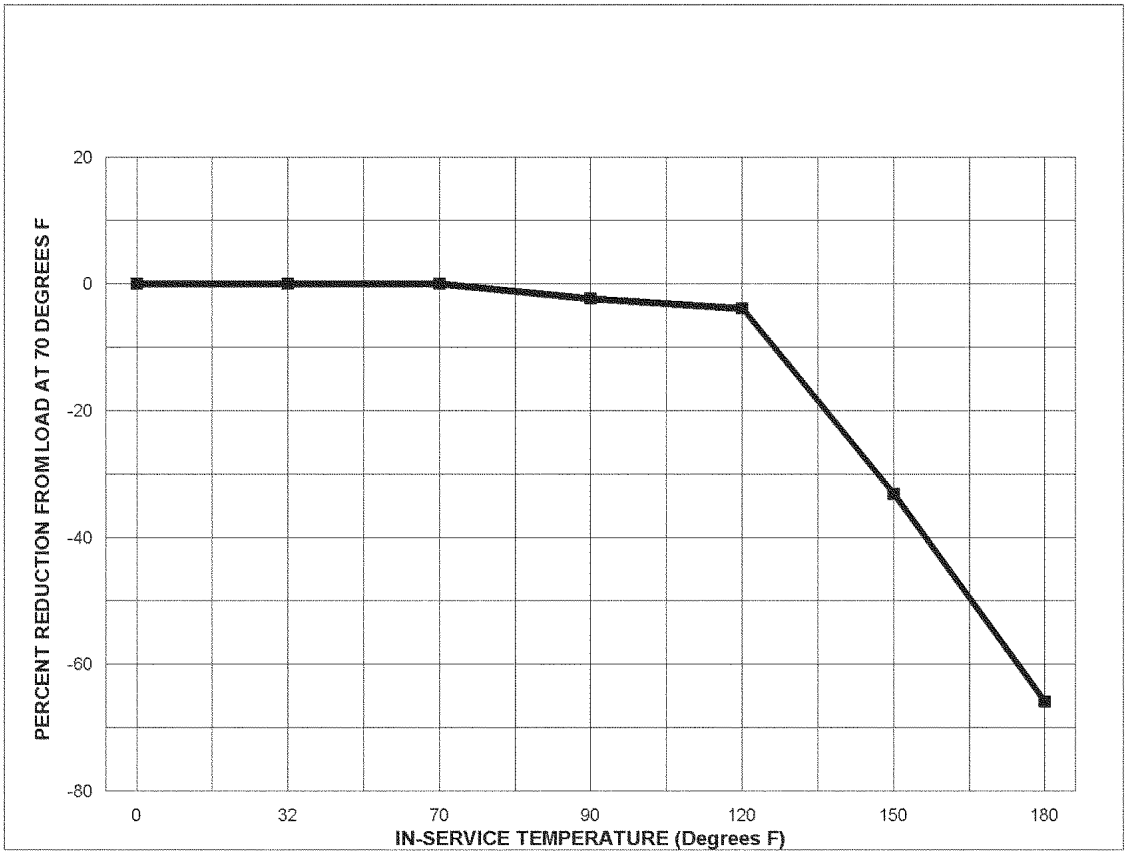

FIGURE 1—LOAD REDUCTION BASED ON IN-SERVICE TEMPERATURE

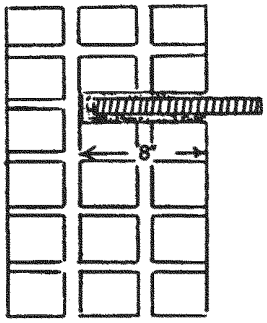

FIGURE 2—CONFIGURATION A

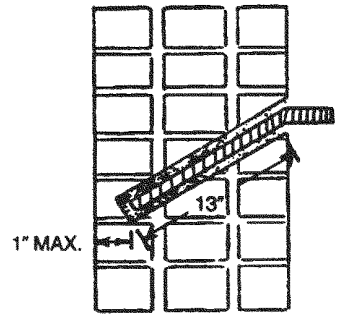

FIGURE 3—CONFIGURATION B

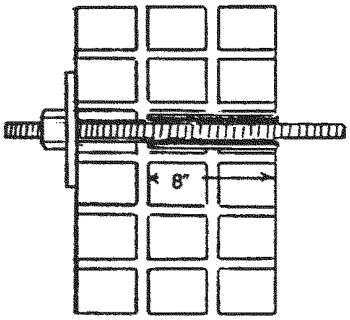

FIGURE 4—CONFIGURATION C