CITY OF LOS ANGELES
CALIFORNIA

DEPARTMENT OF
BUILDING AND SAFETY
201 NORTH FIGUEROA STREET
LOS ANGELES, CA 90012

ANDREW A. ADELMAN, P.E.
GENERAL MANAGER

TOM WHELAN
EXECUTIVE OFFICER

Powers Fasteners, Inc.
Two Powers Square
New Rochelle, NY 10801

Attn: Mark Ziegler
(914) 235-6300

RESEARCH REPORT: RR 24979
(CSI # 04050)

Expires: April 1, 2005

GENERAL APPROVAL - Renewal/Clerical Modification - Powers Power-Fast Epoxy Adhesive Anchoring System for Use In Unreinforced Brick Masonry Brick Walls (urm).

DETAILS

The Power-Fast Epoxy Anchoring System is approved for use in resisting short duration lateral loading conditions, such as seismic and wind loads. The system shall not be used for sustained gravity loading conditions.

The Power-Fast Epoxy Anchoring System uses Sikadur Injection Gel, a two component structural epoxy, which is packaged in disposable cartridges. The epoxy is dispensed from either a manually or pneumatically operated dispensing tool which keeps the components separated prior to being dispensed through a static motionless mixing nozzle.

Powers stocks three types of stud assemblies for use in unreinforced masonry walls; a through-bolted anchor which resists both shear and/or tension forces, an 8" embedded anchor which resists only shear forces, and a 22-1/2 degree anchor which resists both shear and/or tension forces. Reinforcing bars or other dowels may not be substituted for the threaded rods specified in this approval. The threaded rods are supplied in various lengths and are stamped at the end to identify Power as the manufacturer and to provide the rod's length. Specific details of the anchorage systems may be found within this report.

The Power-Fast System Anchors are approved for installation in existing unreinforced brick masonry walls subject to the following conditions:

1. Each anchor rod shall bear a permanent identification indicating the manufacturer's name or symbol.

2. Use of the Power Fast System Anchors shall be approved by the engineer of record.

3. Anchors shall not be installed in overhead applications such as in the soffit of a beam or arch, or in a ceiling.

4. Installation of the anchors shall be in accordance with the manufacturer's instructions stated in the "Discussion" portion of this report. Anchors shall be stored in a cool location and shall not be exposed to a heat source prior to installation.

5. Weld connections to the zinc plated threaded rods are allowed only if all of the zinc coating is removed from the weld area prior to welding. Welded connections shall comply with Section 91.2205.10 of the 2002 Los Angeles Building Code. Welds shall be made prior to installation of the anchor in the wall. An approved equivalent corrosion resistant coating (such as hot-dip zinc coating or red oxide paint) must be reapplied after welding.

6. Wall thickness shall be a minimum of 3 wythes and 13".

7. The minimum mortar quality in 80% of the in-place shear tests shall not be less than the total of 30 psi plus the axial stress in the wall at the point of the test.

8. The anchors may be installed above the intersection of the roof sheathing with the wall, only where:

   a. Additional in-place shear tests have been performed above the roof intersection at representative locations where mortar and masonry conditions are similar to that at which the anchors are located. Two tests per each wall direction shall be performed.

   b. The minimum quality mortar in each of the tests shall not be less than 50 psi.

9. A called building inspection is required prior to the installation of anchors to verify:

   a. Installer qualification and component identification.

   b. That drilling holes for anchor installation shall be done with a non-impact electric rotary drill. Impact tools shall not be used for drilling holes or for tightening anchors rod nuts.

10. The installed anchors shall not be disturbed until the minimum cure time for the adhesive has elapsed. See Table No. 1 for minimum cure time.

TABLE NO. 1

Recommended Curing Times for Power Fast System Anchors

Masonry Temperature (°F)	Working Life (min.)	Minimum Cure Time (hours)	Full Cure Time (hours)
40	60	16	72
50	45	13	60
60	35	10	42
68	30	8	24
90	15	4	24

11. No gaps shall appear between the anchoring device and the masonry. Any adjustments shall be made during the "working life" of the epoxy. See Table No. 1 for working life.

12. The excess adhesive shall be removed before the working life time period has elapsed.

13. Minimum horizontal edge distance for all bolts shall be 24". Minimum bolt spacing shall be as follows:

    Adhesive Anchor (3/4" Ø x 17" Long Rod) 24" o.c.
    Combination Anchor (5/8" Ø Through Bolt) 24" o.c.
    Shear Anchor (3/4" Ø Rod Embedded 8") 16" o.c.

14. For use of the wall anchor in tension and/or shear:

    a. Design tension loads shall not exceed 1200 pounds. Design shear loads shall not exceed 1000 pounds for 3/4" Ø shear anchors and 3/4" Ø - 22-1/2 degree combination anchors, and 900 pounds for 5/8" Ø through bolted combination anchors. No increase for lateral loading is allowed.

    b. The stud assembly used for tension and/or shear applications where the outside of the wall is accessible consists of a length of zinc-plated 5/8"- diameter threaded rod which meets ASTM A307 specifications. It is used in conjunction with 13/16"-O.D. by 11/16"-I.D. steel sleeve 8" in length, and a 15/16"-diameter screen tube made of steel wire cloth. The 5/8"-diameter rod anchor shall be installed through the steel sleeve on the interior side of the wall and bolted with a 3/8" x 6" x 6" steel gusset plate on the exterior side of the wall.

c. The stud assembly used to resist tension and/or shear loads where the outside of the wall is not accessible consists of a length of zinc-plated 3/4"-diameter threaded rod, which meets ASTM A307 specifications, prevent to a 22.5 degree angle. It is used in conjunction with a 15/16"-diameter screen tube made of electrogalvanized steel wire cloth. The 3/4"-diameter rod shall be installed at an angle of 22.5 degrees in the vertical plane only. The anchor shall be embedded to within one inch of the exterior wall surface without penetrating the exterior wall surface.

d. Tension tests shall be performed on anchors installed at an angle of 22.5 degrees. The testing shall be performed by a testing laboratory approved by the City of Los Angeles for in-place anchor testing. A minimum of 5% of the anchors shall be tested with a minimum of two tests. Where the wall thickness varies, at least one test shall be performed on an anchor which has the least amount of embedment. All tension tests must be performed without blocking, ledgers or hardware in place. The tests shall show that the anchors can maintain a tensile load of 3000 pounds for a period of 5 minutes, with allowable load dissipation of no more than 10% deviation from the initially applied load. The allowable displacement of the anchor from the face of the wall shall be no more than 1/8". The tests shall be performed using the equipment and procedures as follows.

Acceptable test equipment includes any suitable testing or loading system which permit the following conditions to be met. Test equipment shall not bear against the masonry within a distance of the anchors embedment depth or 12" from the anchor. The testing device shall be of sufficient capacity to prevent yielding of its various components and shall ensure that the applied tension load remains parallel to the axis of the anchor during testing. Forces applied to the test rod must be perpendicular to the surface of the brick wall. A continuous increase in load must be applied to the test anchor until the final test load is reached. Any suitable measurement device accurate to at least 0.001" shall be used to measure horizontal displacement of the anchor relative to the face of the wall. The loading system must be calibrated and be capable of measuring forces to an accuracy within ±2% of the applied load.

Test procedures are as follows:

1. Measure projection of rod from face of wall to verify anchor embedment.

2. Attach test system and measuring device to anchor. The measuring device should be positioned on the anchor as close to the wall as possible.

3. Measure and record the initial displacement between a marked point on the wall and reference point on the anchor.

4. Apply 3000 pound test load.

5. After 5 minutes, record the remaining test load and record the final displacement between the marked point on the wall and reference point on the anchor.

The test report shall include:

1. Plan of wall elevations or roof and floor plans as appropriate with dimensioned locations of tests.

2. Brick/mortar condition.

3. Wall thickness.

4. Embedment of anchor.

5. Applied load.

6. Remaining tension test load after 5 minutes.

7. Anchor displacement.

8. Calibration of the tension load test system.

Should any of the anchors fail the above criteria, all of the anchors shall be tested and replaced or substituted as necessary. The test results shall be submitted directly to the Department for all jobs tested.

e. One-fifth (20%) of the steel sleeves of the through-bolted combination anchors shall be tested by a Registered Deputy Inspector using a calibrated torque wrench to a minimum torque of 60 foot-lbs. All requirements of Earthquake Safety Division, Guideline No. 3, " Torque Testing Grouted Bolts and Anchors" shall be met.

15. For use of the wall anchor in shear:

a. Design shear shall not exceed 1000 pounds for 3/4" Ø shear anchors and 3/4" Ø - 22-1/2E combination anchors, and 900 pounds for 5/8" Ø through bolted combination anchors .

b. The stud assembly used to resist only shear loads consists of a length of zinc-plated 3/4"-diameter threaded rod which meets ASTM A307 specifications. It is used in conjunction with a 15/16"-diameter by 8" long screen tube made of electrogalvanized steel wire cloth. The straight anchor rod shall be embedded a minimum of 8" into a 1"-diameter hole drilled into the wall.

c. One-fourth (25%) of the anchors described in (b.) shall be tested by a Registered Deputy Inspector using a calibrated torque wrench to a minimum torque of 60 foot-lbs. All requirements of Earthquake Safety Division, Guide No. 3, "Torque Testing Grouted Bolts and Anchors" shall be met.

16. Drilling for bolts holes shall be done with an electric rotary drill. Impact tools shall not be used for drilling holes or for tightening anchors and shear bolt nuts.

DISCUSSION

The clerical modification is to change the contact person.

The company name and product name changed from the Rawlplug Company Foil-Fast Epoxy Injection Gel Anchoring System.

The approval is based on tests. The tests were performed on three existing unreinforced solid masonry buildings. The manufacturer's recommended cure times are listed in Table No. 1 (Page 3). Working life is the time after mixing during which the epoxy retains sufficient workability for proper use. Minimum cure time is the time required prior to application of allowable (design) tensile and shear loads. The anchors should not be disturbed (torqued, proof-loaded, or bolted-up) for the minimum cure time specified. Full cure time is the time required for the epoxy to reach ultimate strength. The anchors are not recommended for installation in a substrate with a temperature lower than 40EF.

The manufacturer's instructions for the anchors installations are as follows:

One-inch diameter holes are drilled in the "T" joints of the mortar for all three types of anchors. The drill bits used must meet ANSI specification B94.12-77. Impact tools may not be used. The holes are cleaned of dust and debris using a nylon brush and compressed air. Epoxy is injected into the screen tubes until the tubes are completely full and then placed into the drilled holes. Threaded rod or steel sleeves (depending upon application) are then slowly pushed into the screen tube while continuously rotating. If no epoxy is forced back out of the hole, the rod or sleeve should be removed and more epoxy injected into the screen. The rod or sleeve should be reinserted into the screen as soon as possible.

Holes for the through-bolted combination tension/shear anchors are drilled completely through the wall after the steel sleeve has been installed in an 8" deep hole and the epoxy has been given time to cure. A 5/8"-diameter drill bit is used to drill through the plastic plugs in the steel sleeves and through the remaining thickness at the brick wall. A 5/8"-diameter threaded rod is then pushed through to the other side. A metal plate and nut are attached to the end of the rod on the exterior side of the wall.

Holes for the combination tension/shear anchors installed at 22.5 degrees are drilled using a 22.5 degree guide to keep the drill bit at the correct angle. The angled hole is to be drilled in the vertical plane only. The holes are to be drilled a minimum of 13" deep and must extend to within one inch of the outer face without going all the way through the wall.

Holes for the 3/4"-diameter anchors resisting only shear loads are drilled to a depth of 8" perpendicular to the plane of the wall and are installed with a screen as described above.

Addressee to whom this Research Report is issued is responsible for providing copies of it, complete with any attachments indicated, to architects, engineers and builders using items approved herein in design or construction which must be approved by Department of Building and Safety Engineers and Inspectors.

This general approval of an equivalent alternate to the Code is only valid where an engineer and/or inspector of this Department has determined that all conditions of this approval have been met in the project in which it is to be used.

YEUAN CHOU, Chief
Engineering & Research Section

YC:elcm
RR24979/D18/wp8.0
R01/23/03
5B/8808G