

## SECTION 05 05 23

### STANDARDS FOR ANCHORS AND FASTENERS

#### PART 1 GENERAL

##### 1.01 SUMMARY

- A. Section Includes:
  - 1. This section establishes standards for anchors and fasteners to be incorporated in Specification Sections where referenced.

##### 1.02 REFERENCE STANDARDS

- A. American National Standards Institute:
  - 1. ANSI A10.3 - Safety Requirements for Powder-Actuated Fastening Systems.
- B. ASTM International:
  - 1. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
  - 2. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts.
  - 3. ASTM F436 - Standard Specification for Hardened Steel Washers.
- C. Federal Specifications:
  - 1. FS FF-B-561 - Bolts, (Screw), Lag.
  - 2. FS FF-S-92 - Screw Machine; Slotted Cross-Recessed Head/
  - 3. FS FF-S-111 - Screw, Wood.
  - 4. FS FF-S-325 - Shield Expansions; Nail, Expansion; and Nail, Drive Screws (Devices, Anchors, Masonry).
  - 5. FS FF-W-84 - Washer, Lock (Spring).
- D. ICC Evaluation Service, Inc.
  - 1. ESR - ICC-ES Evaluation Report.
- E. U. S. Corps of Engineers, Concrete Research Division:
  - 1. CRD-C621 - Non-Shrink Grout.

##### 1.03 ADMINISTRATIVE REQUIREMENTS

- A. [Coordination:]
- B. [Preinstallation Meeting:]
- C. [Sequencing:]
- D. [Scheduling:]

##### 1.04 SUBMITTALS

- A. See Section 01 33 00 - Submittal Procedures, for submittal procedures.
- B. Provide Product Data: Submit for approval manufacturer's product data to include description, type, reference numbers, sizes, installation methods, and design values by a recognized testing agency, for each type of anchor and fastener required.

- C. Provide ICC ES Evaluation Reports for all expansion anchors and fasteners. Indicate proposed use.
- D. Certificates: Certify that products of this section meet or exceed specified requirements.
- E. Warranty: Submit manufacturer warranty and ensure that forms have been completed in University's name and registered with manufacturer.

## PART 2 PRODUCTS

### 2.01 MATERIALS

- A. Grout:
  - 1. Description: Non-metallic, non-shrink, pre-mixed, factory packaged non-staining, non-corrosive, non-gaseous, complying with certification grade CRD-C621. Provide grout specifically recommended by manufacturer's applications of type specified in this Section.
  - 2. Manufacture: The Euclid Chemical Co.; BASF Building Systems; or equal.
- B. Anchors and Fasteners:
  - 1. General: Provide stainless steel fasteners for exterior use and wet locations or when installed into exterior walls. Select fasteners of type, grade, and class as required for specific installations.
  - 2. Bolts: Regular hexagon head type, ASTM A307, Grade A.
  - 3. Nuts: ASTM A563, Type 1.
  - 4. Washers: ASTM F436, Type 1.
  - 5. Lag Bolts: Square head type, FS FF-B-561.
  - 6. Machine Screws: Cadmium-plated steel, FS FF-S-92.
  - 7. Wood Screws: Flat carbon steel: FS FF-S-111.
  - 8. Powder Driven Fasteners:
    - a. Description: Low velocity type, 0.177-inch diameter, length to provide 1-1/2 inch embedment in concrete
    - b. Product: Hilti DS Heavy Duty Pins (ESR 1663); or equal.
  - 9. Lock Washers: Helical spring type, carbon steel, FS FF-W-84.
  - 10. Metal Screws:
    - a. Description:
      - 1) Self-drilling, self-tapping, sheet metal screws with current ESR.
      - 2) Length shall expose 3 threads minimum past item fastened.
      - 3) Refer to Drawings for sizes and spacing.
      - 4) Locate symmetrically and within 3 inches of ends of items to be fastened unless otherwise indicated on the Drawings.
    - b. Product: ITW Buildex "TEK Screw (ESR-1976)", or equal.
  - 11. Where expansion anchors are called for on Drawings, use the following:
    - a. Description: Carbon steel concrete expansion anchors.
    - b. Product: Hilti KB TZ (ESR-1917); or equal.
  - 12. Ceiling Hanger Anchors:
    - a. Diagonal Wires: Hilti KB TZ (3/8-inch diameter); or equal.
    - b. Vertical Wires: Hilti CC27ALH27; or equal.
- C. Isolation Material:
  - 1. At angles to support equipment, provide 1/8-inch-thick rubber pad, cut to fit angle bracket size. Place between angle and equipment being anchored.
  - 2. At screw attaching angle bracket to equipment, provide 1/4 by 1/4-inch nylon flange bearing, Micro Plastics 10SC250025, 145-410; Tacoma Screw Products; or equal.

## 2.02 LOW VELOCITY POWDER DRIVEN FASTENERS

- A. Requirements of low velocity powder driven fasteners: Minimum shank: 0.177-inch diameter, minimum penetration: 1.50 inches for 3000 psi concrete, minimum rated tensile strength: 310 pounds, minimum rated shear strength: 420 pounds.
  - 1. Weight suspended from each connection shall not exceed 200 pounds.
  - 2. Where designated by University's Representative, anchors, fasteners and ties installed utilizing low velocity powder actuated tools will be tested by an independent testing laboratory to resist two times the dead load. In the event of a single failure to the testing, all anchors, fasteners, or ties of the failed type shall be tested. Any such anchor, fastener, or tie which fails such a test shall be replaced by Contractor at no cost to University.

## PART 3 EXECUTION

### 3.01 INSTALLATION

- A. Installation of anchors shall be in accordance with the manufacturer's recommendations indicated on the corresponding ICC Evaluation Report submitted by Contractor. Install anchors spaced for maximum strength performance unless specifically shown otherwise on the Contract Documents.
- B. Drill concrete carefully to avoid fracturing.
- C. Take measures to coordinate construction procedures to prevent interference with reinforcing steel during concrete anchor installations. If reinforcing steel is encountered during drilling, adjust anchor locations, if possible, and notify the University's Representative.
- D. Do not cut through or damage reinforcing steel unless directed to do so by the University's Representative.
- E. Unless otherwise noted on the contract documents or in the submitted ICC Evaluation Reports, the minimum embedment of anchors shall be as follows:

Effective Minimum Anchor Diameter	Embedment Expansion
3/8 inch	2 inches
1/2 inch	2 inches
5/8 inch	3 1/8 inches

### 3.02 CONCRETE ANCHORS

- A. Install anchors in accordance with values given in ICC Evaluation Report and Contract Documents.
- B. Limitation on Anchors in Withdrawal: Anchors acting in withdrawal shall not be used for major connections such as anchoring tie-downs, heavy continuously applied loads, frequent vibratory loads, and similar items.
- C. Anchor diameter refers to the thread size for expansion anchors.

### 3.03 LOW VELOCITY POWDER DRIVEN FASTENERS

- A. The use of low velocity powder actuated tools is permitted only for the conditions described

below. The use of medium and high velocity powder driven fasteners as defined by ANSI A10.3 is prohibited.

1. Anchoring metal track for interior non-load bearing walls. Note: Door frames shall be fastened with two-piece expansion anchors.
  2. Fastening of furring strips to concrete walls.
  3. Temporary fastening and concrete forming.
  4. Fastening of plaster accessories, flashing and similar items with negligible loading.
  5. Installation of incidental straps and/or wires used to suspend the following:
    - a. Metal duct work of 25 pounds per lineal foot or less.
    - b. Piping of 1 inch diameter or less.
    - c. Electrical conduit of 1" diameter or less.
  6. Installation of wires used to suspend or brace the following utilizing two anchors and wires per each suspension or bracing point:
    - a. Acoustical ceilings.
    - b. Lighting fixtures in acoustical ceiling systems.
    - c. Ceiling diffusers and/or registers in acoustical ceiling systems.
- B. Procedures for use of low velocity powder actuated tools:
1. The use of low velocity powder actuated tools shall comply with Federal OSHA safety requirements and California Code of Regulations Title 24, including the requirement that the operator of the tool be trained and certified. Contractor to submit certification.

### 3.04 TESTING

- A. Anchors drilled into concrete will be proof tested by the University. Conform to requirements of Section 01 40 00 - Quality Control.
- B. If any anchor fails testing, test anchors of the same category not previously tested until 20 consecutive anchors pass, then resume initial testing frequency. Additional testing required because of test failure(s) shall be paid for by Contractor.
- C. Test load may be applied by any method that will effectively measure the tension of the anchor such as direct pull with a hydraulic jack, torque wrench calibrated spring-loading devices, or similar items.
- D. All testing shall be performed in the presence of the Project Inspector of Record.
- E. Testing shall occur no sooner than 24 hours after installation.
- F. Test one in 10 ceiling vertical hanger wires for 200 pounds. Test one in 10 splay wires for 440 pound load.
- G. Test expansion anchors as follows:
  1. Torque Wrench Method: The applicable test torque must be reached within one-half turn of the nut.

#### TEST VALUES

##### Hard Rock or Lightweight Concrete

Expansion Anchor Diameter	Torque
3/8 inch	25 ft./lbs.
1/2 inch	40 ft./lbs.
5/8 inch	60 ft./lbs.

**END OF SECTION**