

## SECTION 05090 – POST-INSTALLED CONCRETE AND MASONRY ANCHORS

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. Section Includes:
  - 1. Post-installed mechanical and adhesive type anchors for detailed structural connections and exterior signage.
  - 2. Post-installed mechanical type anchors for sales floor merchandise shelving fixtures and storage racks.
  - 3. Post-installed general use anchors not included in the above.
- B. Related Requirements:
  - 1. Section 01351 – Regulatory Compliance:
    - a. Disposal and removal of construction and universal waste.
    - b. Work practice control methods for airborne respirable dust.

## 1.2 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. Publications are referenced within the text by the basic designation only.
- B. Occupational Safety and Health Administration (OSHA):
  - 1. OSHA 01926.1153 Respirable Crystalline Silica.

## 1.3 ENVIRONMENTAL REQUIREMENTS

- A. Minimize dust emissions and provide equipment that suppresses dust.
- B. Dispose of construction waste in accordance with the requirements of Section 01351 Regulatory Compliance Supplement.

## 1.4 SUBMITTALS

- A. Code approval reports showing evidence of published performance data for each structural anchor used shall be available for review by the Structural Engineer of Record (SER) or Architect of Record (AOR) upon request. Evidence may be in the form of current ICC-ESR report of UES-ER report, as noted below, or a report by an independent testing laboratory.
- B. Reports are not necessary for general use anchors, unless required by AHJ.

## 1.5 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. Publications are referenced within the text by the basic designation only.
- B. ASTM International (ASTM):
  - 1. ASTM C 881 - Epoxy-Resin-Based Bonding Systems for Concrete

## 1.6 QUALITY ASSURANCE

- A. Reports showing evidence of published performance data for each anchor used shall be available for review by the Structural Engineer of Record upon request. Evidence may be in the form of current ICC-ER report or a report by an independent testing laboratory.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Provide products from one of the following manufacturers:
  - 1. Hilti, Inc. (800) 879-8000
  - 2. ITW Red Head (800) 899-7890
  - 3. Simpson Strong Tie Co. Inc. (800) 999-5099
  - 4. DeWalt/Powers Fasteners, Inc (800) 524-3244

### 2.2 MATERIALS

- A. Substitutions: Substitutions of products from manufacturers not listed are not permitted.
- B. Alternate Products: Alternate products from the manufacturers listed may be used upon approval based upon suitability for the installation involved as determined by the Structural Engineer of Record.
- C. Provide proprietary anchor products as specified below unless otherwise shown on the drawings or specified in other sections. Anchors may be any one of the products listed for the type specified unless otherwise shown or specified.
- D. Manufacturer's Instructions: Provide complete installation instructions with items furnished to the field.

### 2.3 STRUCTURAL MECHANICAL ANCHORS

- A. Interior Use Anchors: Zinc plated carbon steel anchors.
- B. Exterior Use Anchors: Stainless steel with stainless steel nuts and washers of matching alloy group and minimum proof stress equal to or greater than the specified minimum full-size tensile strength of the externally threaded fastener.
- C. Wedge Expansion Anchors: Torque-controlled, with impact section to prevent thread damage complete with required nuts and washers. Type and size as indicated on Drawings. Provide one of the following:
  - 1. Hilti:
    - a. Kwik Bolt 3.
      - 1) Grout Filled CMU (ESR 1385)
    - b. Kwik Bolt TZ.
      - 1) Concrete (ESR 1917)
      - 2) Grout Filled CMU (ESR 3785)
  - 2. ITW Red Head:
    - a. Trubolt+.
      - 1) Concrete (ESR 2427)
  - 3. DeWalt/Powers:
    - a. Power-Stud.+ SD1
      - 1) Concrete (ESR 2818)
      - 2) Grout Filled CMU (ESR 2966)
  - 4. Simpson:
    - a. Wedge All.
      - 1) Grout Filled CMU (ESR 1396)
    - b. Strong-Bolt 2
      - 1) Concrete (ESR 3037)
      - 2) Grout Filled CMU (ER 240)
- D. Sleeve Anchors: Torque controlled, exhibiting follow-up expansion under load, with provision for rotation prevention during installation. Provide one of the following:
  - 1. Hilti: HLC Sleeve Anchor.
    - a. Exterior signage connections only.

- E. Screw Anchors: Single piece anchor installed in a pre-drilled hole using a bit matching manufacturer tolerances. Anchors shall have 360-degree contact with the base material and shall not require oversized or undersized holes for installation. Provide one of the following:
1. Hilti:
    - a. KH-EZ
      - 1) Concrete (ESR 3027)
      - 2) Grout Filled CMU (ESR 3056)
  2. ITW:
    - a. Tapcon+
      - 1) Concrete (ESR 3699)
    - b. Large Diameter Tapcon (LDT).
      - 1) Shelving fixture upright connection only.
  3. DeWalt/Powers
    - a. Screw-Bolt+
      - 1) Concrete (ESR 3889)
    - b. Tapper+
      - 1) Grout Filled CMU (ESR 3196)
  4. Simpson
    - a. Titen HD
      - 1) Concrete (ESR 2713)
      - 2) Grout Filled CMU (ESR 1056)

#### 2.4 STRUCTURAL ADHESIVE ANCHORS

- A. Adhesive Anchor Bolts: Stud-type anchors consisting of threaded steel rod, nut, and washer or deformed reinforcing bar, and anchor adhesive. Use type and size as indicated on Drawings. Use stainless steel or zinc coated carbon steel for exterior exposure.
- B. Adhesive: Adhesive shall be a cartridge type, two-component, epoxy, acrylic, or hybrid based system dispensed and mixed through a static mixing nozzle supplied by the manufacturer. Acceptable installation and performance temperature ranges shall be verified with manufacturer's literature prior to installation. Provide one of the following:
1. Hilti:
    - a. HIT-HY 200 (A/R)
      - 1) Concrete (ESR 3187)
      - 2) Grout Filled CMU (ESR 3963)
    - b. HIT-HY 70
      - 1) Hollow and Grout Filled CMU (ESR 2682)
    - c. HIT-RE 500 V3
      - 1) Concrete (ESR 3814)
  2. Simpson:
    - a. SET-XP
      - 1) Concrete (ESR 2508)
      - 2) Grout Filled CMU (ER 265)
    - b. AT-XP
      - 1) Concrete (ER263)
      - 2) Grout Filled CMU (ER 281)
  3. ITW Red Head:
    - a. Epcon C6+
      - 1) Concrete (ESR 3577)
    - b. Epcon A7+
      - 1) Concrete (ESR 3908)
      - 2) Grout Filled CMU (ESR 3200)
  4. DeWalt/Powers:
    - a. AC100+ Gold
      - 1) Concrete (ESR 2582)
      - 2) Grout Filled CMU (ESR 3200)

- b. AC200+
  - 1) Concrete (ESR 4027)

## 2.5 GENERAL USE ANCHORS

- A. General use anchors shall be adequate for the loads they support.
- B. Testing and inspection are not required for general use anchors.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine conditions and adjacent areas where products and materials will be installed and verify that conditions conform to product manufacturer's requirements. Verify that structural components are ready to receive Work. Do not proceed until unsatisfactory conditions have been corrected.
- B. Beginning of installation indicates acceptance of existing conditions.

### 3.2 INSTALLATION

- A. Post-installed anchors installed for missing or misplaced cast-in-place anchors shall be approved by the Structural Engineer of Record.
- B. Where manufacturer recommends use of special tools for installation of anchors, such tools shall be used, unless otherwise permitted specifically by the Structural Engineer of Record.
- C. Where holes are drilled in concrete or masonry, provide drills equipped with a HEPA-rated filter vacuum dust collection system recommended by the manufacturer to maintain dust emissions below the permissible level.
- D. Drill holes accurately and squarely and. Clean holes in accordance with the manufacturer's recommendations using HEPA-rated filter vacuum.
- E. Post-installed Anchor Installation (General):
  - 1. Install post-installed anchors where shown on the drawings.
  - 2. Perform anchor installation in accordance with manufacturer instructions. Install anchors at not less than the minimum embedment, edge distance, and spacing recommended by the manufacturer.
  - 3. Drill holes with rotary impact hammer drills using carbide-tipped bits. Drill bits shall be of diameters as specified by the anchor manufacturer. Unless otherwise shown on the Drawings, all holes shall be drilled perpendicular to the base material surface.
    - a. Cored Holes: Where anchors are to be installed in cored holes, use core bits with matched tolerances as specified by the manufacturer.
    - b. Embedded Items: Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Avoid damage to existing reinforcing or embedded items during coring or drilling. Avoid damaging electrical and telecommunications conduit and gas lines. Notify the Engineer if reinforcing steel or other embedded items are encountered during drilling.
    - c. Base Material Strength: Unless otherwise specified, do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
    - d. Hollow Substrates: Where anchors are noted to be installed in hollow substrates, holes shall be drilled using rotation mode only.
  - 4. Use anchors of the same anchor manufacturer for anchors of the same type.
- F. Mechanical Anchor Installation: Protect threads from damage during anchor installation. Sleeve anchors shall be installed with sleeve fully engaged in part to be fastened. Set anchors to manufacturer's recommended torque, using a torque wrench.

- G. Adhesive Anchor Installation:

1. When the base material temperature drops below 40-degrees F, use only acrylic adhesive. See manufacturer's instructions for additional minimum temperature requirements. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install under environmental conditions outside manufacturer's absolute limits.
2. Hollow Substrates: Anchorage into hollow substrates is not allowed unless specifically indicated on the contract documents. Where applicable, the adhesive manufacturer's screen tubes shall be used for adhesive installation into hollow substrate applications.
3. Oversized Holes: Refer to manufacturer's information if drilled hole size is larger than what is recommended.
4. Core Drilled Holes: Refer to manufacturer's information if holes are drilled with a core-drill bit.
5. Clean holes per manufacturer instructions to remove loose material and drilling dust prior to installation of adhesive. Inject adhesive into holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive. Follow manufacturer recommendations to ensure proper mixing of adhesive components. Sufficient adhesive shall be injected in the hole to ensure that the annular gap is filled to the surface. Remove excess adhesive from the surface. Shim anchors with suitable device to center the anchor in the hole. Do not disturb or load anchors before manufacturer specified cure time has elapsed.

### 3.3 REPAIR OF DEFECTIVE WORK

- A. Remove and replace misplaced, defective, or malfunctioning anchors. Anchors that fail a shear or pullout test, if directed or installation torque requirements shall be regarded as malfunctioning. Fill empty anchor holes and patch failed anchor locations with high-strength non-shrink, nonmetallic grout.

### 3.4 FIELD QUALITY CONTROL

- A. Field quality control shall be the responsibility of the Contractor in accordance with Section 01452. Except as specified as mandatory, field quality control testing and inspection shall be at the discretion of the Contractor as necessary to assure compliance with Contract requirements.

END OF SECTION