

SECTION 05501

ANCHOR BOLTS AND DRILLED-IN ANCHORS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope

1. Equipment anchor bolts
2. Structural anchor bolts
3. Expansion anchors
4. Adhesive anchors

B. Additional Requirements Specified Elsewhere

1. Section 01340: Shop Drawings, Product Data and Samples
2. Section 01600: Materials and Equipment

C. Related Requirements Specified Elsewhere

1. Section 03300: Cast-In-Place Concrete
2. Section 03600: Grout
3. Section 04200: Unit Masonry
4. Section 05500: Metal Fabrications
5. Division 11: Equipment

1.2 SUBMITTALS

- A. Product Data: Sufficient to verify compliance with specifications in accordance with Section 01340

1.3 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver anchor bolts and templates in time to permit setting when structural concrete and equipment base concrete is placed
- B. Store adhesive anchor capsules in accordance with manufacturer's recommendations with respect to temperature, sunlight exposure and shelf life

PART 2 - PRODUCTS

2.1 MATERIALS

A. Bolts

1. Carbon steel: ASTM F1554 Grade 36
2. Galvanized steel
 - a. Carbon steel, hot-dip galvanized, ASTM A153

- b. Zinc plated ASTM A164, Type GS
 - 3. Stainless steel
 - a. Non-submerged locations: Type 304 or 316
 - b. Where indicated for submerged, wet locations and other locations specified: Type 316
- B. Nuts
 - 1. Same material as bolts
 - 2. Carbon steel: ASTM A307, Grade B heavy hexagonal
 - 3. Self-locking: Prevailing torque, IFI-100, Grade A
- C. Washers
 - 1. Same material as bolts
 - 2. Flat: ANSI B27.2
 - 3. Locking: Spring type, ANSI B27.1
- D. Sleeves
 - 1. Pipe: ASTM A53
 - 2. Bearing plates: ASTM A36, galvanized
 - 3. Hot dip galvanize after fabrication
 - 4. Or Wilson anchor sleeves
- E. Expansion Anchors
 - 1. Fed. Spec. FF-S-325
 - 2. In hardened concrete
 - a. Wedge-type: Group II, Type 4, Class I
 - b. Self-drilling: Group III, Type I, flush type
 - c. Non-drilling, internally threaded: Group VIII, Type 1, drop in
 - d. Non-drilling, externally threaded: Group VIII, Type 2
 - 3. In hollow and solid masonry
 - a. Lag shield: Group II, Type 1, Class 1
 - b. Split sleeve: Group II, Type 3, Class 3
- F. Adhesive Anchors
 - 1. Adhesive capsules
 - a. Self contained, plastic encapsulation
 - b. Suitable for overhead installation
 - c. Containing two-component adhesive composed of polyvinyl or urethane methacrylate based resin and accelerator
 - d. Adhesive to be non-expansive
 - e. Containing no hazardous chemicals
 - 1) NSF Standard 61 approved for use in potable water
 - 2. Threaded rods
 - a. Galvanized steel: Carbon steel ASTM A36 or ASTM A193, Grade B7; hot-dip galvanized or zinc plated
 - b. Stainless steel: Type 304

3. Internally threaded inserts
 - a. Galvanized steel: Carbon steel ASTM A36 or ASTM A193, Grade B7; hot-dip galvanized or zinc plated
 - b. Stainless steel: Type 316
4. Design basis: Hilti HVA Adhesive System with HVA capsules, ICBO ER-5369

2.2 FABRICATION AND MANUFACTURE

A. Anchor Bolts

1. $\frac{3}{4}$ " minimum, unless otherwise indicated on the Drawings
2. Type
 - a. General use: L-shaped hook type
 - b. Where indicated on Drawings or specified
 - 1) Straight bolt with square head
 - 2) Straight bolt with square plate welded to bolt and nut welded to plate and bolt
 - 3) Through bolt with sleeve and square plate assembly
 - 4) Coupled bolt with sleeve welded to square plate and bolt

B. Expansion Anchors

1. $\frac{3}{4}$ " minimum unless otherwise indicated on Drawings
2. Do not use cinch anchors
3. Length: As required for proper embedment
4. Material
 - a. General use: Galvanized steel
 - b. Wet or submerged service: Stainless steel, Type 316
 - c. Where indicated on the Drawings: Stainless steel, Type 316

C. Adhesive Anchors

1. $\frac{3}{4}$ " minimum unless otherwise indicated on Drawings
2. Length: As required for proper embedment
3. Material
 - a. General use: Galvanized steel
 - b. Wet or submerged service: Stainless steel, Type 316
 - c. Where indicated on the Drawings: Stainless steel, Type 316
4. Threaded rods
 - a. 45 degree chisel point
 - b. Furnish with nuts and washers of matching alloy group
5. Internally threaded inserts
 - a. 45 degree chisel point

PART 3 - EXECUTION

3.1 INSPECTION

- A. Verify that holes for anchor bolts in forms and templates match applicable equipment shop drawings

3.2 INSTALLATION

A. Anchor Bolts

1. Where installed in cast-in-place concrete, install a nut on the concrete side of the form or supporting template
2. Provide three nuts for each anchor bolt for which a lock nut is indicated, two for others
3. Sleeved anchor bolts
 - a. Centered in pipe sleeve
 - b. Sleeve I.D.: Approximately $2\frac{1}{2}$ times bolt OD
 - c. Sleeve length: Approximately 8 times bolt OD
 - d. Bearing plate minimum thickness: $\frac{1}{2}$ times bolt OD
4. Through bolts
 - a. Sleeved with bearing plates
 - b. Bearing plates welded to bolt and plate welded to sleeve
 - c. Dimensions: As specified for sleeved anchor bolts

B. Expansion Anchors

1. Install in conformity with the manufacturer's instructions
2. Minimum embedment: 6 bolt diameters or manufacturer's recommendations, whichever is greater
3. Minimum distance between expansion anchor centerline and any edge or exterior corner of concrete: $4\frac{1}{2}$ bolt hole diameters unless otherwise noted
4. All installations for structural components shall be specifically inspected

C. Adhesive Anchors

1. Install in conformity with the manufacturer's instructions
 - a. Install with equipment conforming to manufacturer's recommendations
 - b. Observe manufacturer's recommendations with respect to installation temperature
2. Minimum embedment: 6 bolt diameters or manufacturer's recommendations, whichever is greater
3. Clean drilled holes to remove loose material and drilling dust prior to installation of adhesive capsule
4. Remove water from drilled holes in such a manner as to achieve a dry surface condition
5. Do not disturb or load anchors before manufacturer's specified cure time has elapsed
6. All installations for structural components shall be specifically inspected

3.3 SCHEDULE

- A. General: Anchor bolts to be galvanized or zinc plated unless indicated on the Drawings or specified otherwise
- B. All sleeves and plates galvanized unless indicated on the drawings or specified otherwise

- C. Galvanized steel nuts unless otherwise indicated on the Drawings or specified
- D. Stainless steel bolts, nuts and washers in wet or submerged locations

END OF SECTION