

05

METALS

DIVISION

SECTION 055000-METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Steel framing and supports for applications where framing and supports are not specified in other Sections.
 - 2. Adhesive anchor bolts.
- B. Products furnished, but not installed, under this Section include the following:
 - 1. Anchor bolts, steel pipe sleeves, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
- C. Related Sections include the following:
 - 1. Division 03 Section "Cast-in-Place Concrete" for installing anchor bolts and other items indicated to be cast into concrete.
 - 2. Division 04 Section "Unit Masonry" for anchor bolts and other items indicated to be built into unit masonry.

1.3 SUBMITTALS

- A. Quality Assurance/Control Submittals:
 - 1. Product Data: For the following
 - a. Adhesive anchor bolts.

1.4 COORDINATION

- A. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
 - 2. Products: Subject to compliance with requirements, provide one of the products specified.
- B. Products of other manufacturers will be considered for acceptance provided they equal or exceed the material requirements and functional qualities of the specified product. The "Substitution Request Form" and complete technical data for evaluation must accompany request for A/E's approval. All materials for evaluation must be received by the Project Manager and Specification Department at least 10 days prior to bid due date. Additional approved manufacturers will be issued by Addendum.

2.2 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces, unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.3 FERROUS METALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36.
- B. Slotted Channel Framing: Cold-formed metal channels with continuous slot complying with MFMA-3.
 - 1. Size of Channels: 1-5/8 by 1-5/8 inches.
 - 2. Material: Steel complying with ASTM A 1008, structural steel, Grade 33; 0.0528-inch minimum thickness; coated with rust-inhibitive, baked-on, acrylic enamel.
 - a. Galvanized steel complying with ASTM A 653, structural steel, Grade 33, with G90 coating; 0.079-inch nominal thickness, where indicated.

2.4 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, at exterior walls. Provide stainless-steel fasteners for fastening aluminum. Select fasteners for type, grade, and class required.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM F1554, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.
- C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, nuts and, where indicated, flat washers; ASTM F 593 for bolts and ASTM F 594 for nuts, Alloy Group 1.
- D. Anchor Bolts: ASTM F 1554, Grade 36.
 - 1. Provide hot-dip or mechanically deposited, zinc-coated anchor bolts where item being fastened is indicated to be galvanized.
- E. Eyebolts: ASTM A 489.
- F. Machine Screws: ASME B18.6.3.
- G. Lag Bolts: ASME B18.2.1.
- H. Wood Screws: Flat head, ASME B18.6.1.
- I. Plain Washers: Round, ASME B18.22.1.
- J. Lock Washers: Helical, spring type, ASME B18.21.1.
- K. Cast-in-Place Anchors in Concrete: Anchors capable of sustaining, without failure, a load equal to four times the load imposed, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
 - 1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47 malleable iron or ASTM A 27 cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153.

- L. Expansion Anchors: Anchor bolt and sleeve assembly with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
1. Material for Anchors in Exterior Locations: Alloy Group 1 stainless-steel bolts complying with ASTM F 593 and nuts complying with ASTM F 594.
- M. Adhesive Anchor Bolts (In Concrete): Chemically grouted adhesive anchor bolts. Subject to compliance with requirements, provide one of the following:
1. Products:
 - a. HILTI HVA Adhesive Anchors; Hilti, Inc.
 - b. Ceramic 6 EPCON System Adhesive Anchors; ITW Ramset/Red Head.
 - c. Chem Stud Adhesive Anchors; Powers Fasteners, Inc.
 - d. Simpson Set Epoxy-Tie Adhesive Anchors; Simpson Strong-Tie Company, Inc.
 2. Anchors to be ASTM A36 or A307, zinc plated steel threaded rods (Fy = 36 ksi) unless otherwise noted.
 3. Where noted on the drawings anchors to be ASTM F593, Condition CW stainless steel threaded rods (Fy = 65 ksi for diameters 3/8 inch through 5/8 inch and Fy = 45 ksi for diameters 3/4 inch through 1-1/4 inch).
 4. Anchors to be installed in strict conformance to manufacturer's installation instructions.
 5. Adhesive Anchors shall have the following minimum allowable load capacities: (Based on embedment in 4000 psi concrete and a minimum safety factor on ultimate load capacities of 3.5. Use proportional allowable loads for other strengths of concrete. Note: Actual anchor load capacity varies with spacing and edge distance.)

<u>Size</u>	<u>Allowable Shear</u>	<u>Allowable Tension</u>	<u>Minimum Embedment</u>
3/8 inch	1000 lbs.	2100 lbs.	3-3/8 inch
1/2 inch	1850 lbs.	3300 lbs.	4-1/4 inch
5/8 inch	2900 lbs.	5100 lbs.	5 inches
3/4 inch	4200 lbs.	6800 lbs.	6-5/8 inch
1 inch	7500 lbs.	11,000 lbs.	8-1/4 inch

- N. Adhesive Anchor Bolts (In Masonry)
1. In hollow CMU: Chemically grouted adhesive anchor systems with nylon or stainless steel screen inserts.
 - a. Products:
 - 1) HIT HY20 Adhesive Anchors, Hilti, Inc.
 - 2) Ceramic 6 EPCON System, ITW/Ramset/Red Head
 - 3) Power-Fast + Adhesive Anchors, Powers Fasteners, Inc.
 - 4) Simpson Set Epoxy-Tie Adhesive Anchors, Simpson Strong-Tie Company, Inc.
 2. In solid grouted CMU: Chemically grouted adhesive anchor systems.
 - a. Products:
 - 1) HIT HY150 Adhesive Anchors, Hilti, Inc.
 - 2) Ceramic 6 EPCON System, ITW/Ramset/Redhead
 - 3) Power-Fast + Adhesive Anchors, Powers Fasteners, Inc.
 - 4) Simpson Set Epoxy-Tie Adhesive Anchors, Simpson Strong-Tie Company, Inc.
 3. Anchors to be ASTM A36 or A307 zinc plated steel threaded rods (Fy = 36 ksi) unless otherwise noted.
 4. Where noted on the drawings, anchors to be ASTM F593, Condition CW stainless steel threaded rods (Fy = 65 ksi for diameters 3/8 inch through 5/8 inch and Fy = 45 ksi for diameters 3/4 inch through 1-1/4 inch).
 5. Anchors to be installed in strict conformance to manufacturer's installation instructions.
 6. Adhesive anchors shall have the following minimum allowable load capacities: (Based on F'm = 1500 psi , grout with fc = 2500 psi at 28 days and a minimum safety factor on ultimate load capacities of 3.5. Note: Actual anchor load capacity varies with spacing and edge distance.)

a. In Hollow CMU:

<u>Size</u>	<u>Allowable Shear</u>	<u>Allowable Tension</u>	<u>Minimum Embedment</u>
3/8 inch	750 lbs.	500 lbs.	3 inch
1/2 inch	800 lbs.	550 lbs.	4-1/2 inch
5/8 inch	850 lbs.	550 lbs.	6 inch

b. In Solid Grouted CMU:

<u>Size</u>	<u>Allowable Shear</u>	<u>Allowable Tension</u>	<u>Minimum Embedment</u>
1/2 inch	1900 lbs.	1750 lbs.	4-1/4 inch
5/8 inch	2000 lbs.	2200 lbs.	5 inch
3/4 inch	2000 lbs.	2900 lbs.	6-5/8 inch

7. Adhesive anchor bolt suppliers shall submit product data, including certified test results showing the ultimate and allowable shear and tension load capacities for all anchors sizes and types to be furnished.

2.5 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.
1. Fabricate units from slotted channel framing where indicated.

2.6 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:
- ASTM A 123, for galvanizing steel and iron products.
 - ASTM A 153, for galvanizing steel and iron hardware.

PART 3 - EXECUTION

3.1 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

3.2 ADJUSTING AND CLEANING

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 055000