

SECTION 16073

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section

1.2 SUMMARY

- A. This Section includes the following
 - 1. Hangers and supports for electrical equipment and systems
 - 2. Construction requirements for concrete bases

1.3 DEFINITIONS

- A. EMT: Electrical metallic tubing
- B. IMC: Intermediate metal conduit
- C. GRC: Galvanized rigid metal conduit

1.4 PERFORMANCE REQUIREMENTS

- A. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents
- B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components

1.5 QUALITY ASSURANCE

- A. Comply with NFPA 70

1.6 COORDINATION

- A. Coordinate Size and Location of Concrete Bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 3

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

- A. Metal Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly
 - 1. Available manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following
 - a. Allied Tube & Conduit
 - b. Cooper B-Line, Inc.; a division of Cooper Industries
 - c. ERICO International Corporation
 - d. GS Metals Corp.
 - e. Thomas & Betts Corporation
 - f. Unistrut; Tyco International, Ltd.
 - g. Wesanco, Inc.
 - 2. Metallic coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4
 - 3. Nonmetallic coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4
 - 4. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4
 - 5. Channel dimensions: Selected for applicable load criteria
 - 6. Where indicated, utilize aluminum slotted support channels
- B. Raceway and Cable Supports: As described in NECA 1 and NECA 101
- C. Conduit and Cable Support Devices: Steel hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported
- D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron
- E. Structural Steel for Fabricated Supports and Restraints: ASTM A36/A36M, steel plates, shapes, and bars; black and galvanized
- F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
 - 1. Mechanical expansion anchors: Insert-wedge-type, zinc-coated steel, for use in hardened Portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used
 - a. Available manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1) Cooper B-Line, Inc.; a division of Cooper Industries

- 2) Empire Tool and Manufacturing Co., Inc.
- 3) Hilti Inc.
- 4) ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
- 5) MKT Fastening, LLC
2. Concrete inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58
3. Clamps for attachment to steel structural elements: MSS SP-58, type suitable for attached structural element
4. Through bolts: Structural type, hex head, and high strength. Comply with ASTM A325
5. Toggle bolts: All-steel springhead type
6. Hanger rods: Threaded steel
7. Where indicated, utilize stainless steel mounting hardware

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment

PART 3 - EXECUTION

3.1 APPLICATION

- A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter
- B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and GRC as scheduled in NECA 1, where it's Table 1 lists maximum spacing less than stated in NFPA 70. Minimum rod size shall be 1/4 inch in diameter
- C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits
 1. Secure raceways and cables to these supports with single-bolt conduit clamps using spring friction action for retention in support channel
- D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1½-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports

3.2 SUPPORT INSTALLATION

- A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article
- B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC, and GRC may be supported by openings through structure members, as permitted in NFPA 70

- C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb
- D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - 1. To wood: Fasten with lag screws or through bolts
 - 2. To new concrete: Bolt to concrete inserts
 - 3. To masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units
 - 4. To existing concrete: Expansion anchor fasteners
 - 5. To steel: Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.
 - 6. To light steel: Sheet metal screws
 - 7. Items mounted on hollow walls and nonstructural building surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate
- E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

- A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment
- B. Field Welding: Comply with AWS D1.1/D1.1M

3.4 CONCRETE BASES

- A. Construct concrete bases of dimensions indicated but not less than 2 inches larger in all directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base
- B. Concrete materials, reinforcement, and placement requirements are specified in Section 03300
- C. Anchor equipment to concrete base
 - 1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded
 - 2. Install anchor bolts to elevations required for proper attachment to supported equipment
 - 3. Install anchor bolts according to anchor-bolt manufacturer's written instructions

3.5 PAINTING

- A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces
 - 1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils
- B. Touchup: Comply with requirements in Division 9 painting Sections for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal
- C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A780

END OF SECTION