

SECTION 26 05 29

~~~ PROJECT NOTE ~~~~~

ARCHITECT OF RECORD/ENGINEER OF RECORD IS RESPONSIBLE FOR REVIEWING THIS SPECIFICATION SECTION IN DETAIL FOR COORDINATION WITH THE PROJECT SCOPE OF WORK.

ALL "PROJECT NOTE" TEXT IS TO BE REMOVED FOLLOWING REVIEW OF THE CONTENT OF EACH NOTE BY THE ARCHITECT OF RECORD/ENGINEER OF RECORD.

EDIT THE DOCUMENT FOOTER TO INCLUDE THE PROJECT NAME AND NUMBER.

EDIT THE DOCUMENT HEADER TO INDICATE THE ARCHITECT OF RECORD PROJECT ISSUE" DATE. THE "CPS CONTROL" DATE SHOULD NOT BE EDITED.

ANY MODIFICATIONS TO THE TECHNICAL STANDARDS IN THIS SECTION - INCLUDING THE REMOVAL OR ADDITION OF MANUFACTURERS - MUST BE APPROVED BY CPS.

REQUESTS FOR MODIFICATION ARE TO BE SUBMITTED TO THE DESIGN MANAGER DURING THE DESIGN PHASE FOR REVIEW AND APPROVAL.

~~~ END OF PROJECT NOTE ~~~~~

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

~~~ PROJECT NOTE ~~~~~

CONSTRUCTION REQUIREMENTS FOR CONCRETE BASES TO NOT BE USED IF SPECIFICATION SECTION 03 30 00 "CAST-IN-PLACE CONCRETE" IS USED. COORDINATE WITH ARCHITECTURAL SPECIFICATIONS.

~~~ END OF PROJECT NOTE ~~~~~

1.01 SECTION INCLUDES

- A. Support and attachment components for equipment, conduit, cable, boxes, and other electrical systems and work.
- B. Construction requirements for concrete bases.

1.02 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- C. ASTM A325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 2014.
- D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- E. ASTM A780/A780M - Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings; 2009 (Reapproved 2015).
- F. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2015.
- G. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015, with Errata (2016).
- H. Chicago Electrical Code - Municipal Code of the City of Chicago, Building/Electrical Code Requirements; 2018.
- I. MFMA-4 - Metal Framing Standards Publication; 2004.

- J. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2009.
- K. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.
- L. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2013.
- M. NFPA 70 - National Electrical Code; 2017.
- N. SSPC-PA 1 - Shop, Field, and Maintenance Painting of Steel; 2004.
- O. UL 5B - Strut-Type Channel Raceways and Fittings; Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Coordination:
 - 1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
 - 2. Coordinate the work with other trades to provide additional framing and materials required for installation.
 - 3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
 - 4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
 - 5. Install floor-mounted electrical equipment on a minimum of 4 inch concrete housekeeping pad, with a minimum of 4 inches of equipment inset on all sides. Concrete shall be in accordance with Section 03 30 00 - Cast-in-Place Concrete.
 - 6. Provide steel supports, anchor bolts, inserts, etc., for all equipment specified under this section of the specifications.
 - 7. Provide formed steel support channels extending from and solidly anchored to the floor and ceiling slabs and mount the designated equipment thereto.
 - 8. Coordinate installation of roof curbs, equipment supports, and roof penetrations specified under Section 07 72 00 - Roof Accessories.
 - 9. Notify Architect/Engineer of Record of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.
 - 10. Provide concrete pads for:
 - a. Switchboards.
 - b. Transformers.
 - 11. Provide steel support channels for:
 - a. Communication and special systems cabinets.
 - b. Disconnect switches.
 - c. Fire alarm system cabinets.
 - d. Individual motor starters.
 - e. Individual circuit breakers.
 - f. Panelboards.
 - g. Wall mounted transformers.
- B. Sequencing:
 - 1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 03 30 00 - Cast-in-Place Concrete.

1.04 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel (strut) framing systems, non-penetrating rooftop supports, and post-installed concrete and masonry anchors.
- C. Shop Drawings: Include details for fabricated hangers and supports where materials or methods other than those indicated are proposed for substitution.
- D. Installer's Qualification Statement: Include evidence of compliance with specified requirements.

- E. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.05 QUALITY ASSURANCE

- A. Comply with the City of Chicago Electrical Code.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Installer Qualification for Field-Welding: Procedures and personnel according to AWS D1.1/D1.1M
- D. Manufacturer's Qualifications: Company specializing in manufacturing products specified in this Section with a minimum three years' experience.
- E. Listing and Labeling: Provide products specified in this section that are listed and labeled.
- F. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" as defined in OSHA Regulation 1910.7.
- G. Product Listing Organization Qualifications: An organization recognized by OSHA Regulation 1910.7 as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions and in original packaging.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

- A. General Requirements:
 - 1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
 - 2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
 - 3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
 - 4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
 - 5. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
 - a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
 - b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.
 - 1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
 - 2. Conduit Clamps: Bolted type unless otherwise indicated.
- C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.

~~~ **PROJECT NOTE** ~~~~~  
*METAL CHANNELS MAY NOT BE UTILIZED WITHIN PROJECT. COORDINATE WITH DESIGN INTENT AND PROJECT SCOPE.*  
~~~ **END OF PROJECT NOTE** ~~~~~

- D. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
 - 1. Comply with MFMA-4.
 - 2. Channel (Strut) Used as Raceway (only where specifically indicated): Listed and labeled as complying with UL 5B.
 - 3. Channel Material:
 - a. Indoor Dry Locations: Use zinc coating or treatment of equivalent corrosion resistance using approved alternative treatment, finish, or inherent material characteristic.
 - b. Outdoor and Damp or Wet Indoor Locations: Use hot-dip galvanized.
 - 4. Manufacturers:
 - a. Cooper B-Line, a division of Eaton Corporation: www.cooperindustries.com.
 - b. Thomas & Betts Corporation: www.tnb.com.
 - c. Unistrut, a brand of Atkore International Inc.: www.unistrut.com.
 - d. GS Metals Corporation; www.cmdgroup.com.
 - e. Allied Tube & Conduit, part of Atkore International; www.alliedeg.us
- E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
 - 1. Minimum Size, Unless Otherwise Indicated or Required:
- F. Anchors and Fasteners:
 - 1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
 - 2. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
 - 3. Steel: Use beam clamps, machine bolts, or welded threaded studs.
 - 4. Plastic and lead anchors are not permitted.
 - 5. Powder-actuated fasteners are permitted only as follows:
 - a. Use only threaded studs; do not use pins.
 - 1) Threaded-heat-treated steel stud, for use in hardened Portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used..
 - 6. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
 - a. Comply with MFMA-4 or MSS SP-58.
 - b. Channel Material: Use Steel or malleable-iron, slotted support system units similar to MSS Type 18..
 - c. Manufacturer: Same as manufacturer of metal channel (strut) framing system.
 - 7. Manufacturers - Mechanical Anchors:
 - a. 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.
 - 1) Hilti, Inc.: www.us.hilti.com.
 - 2) ITW Red Head, a division of Illinois Tool Works, Inc.: www.itwredhead.com.
 - 3) Cooper B-Line, a division of Eaton Corporation; www.cooperindustries.com.
 - 4) Empire Tool and Manufacturing Company; www.empireindustries.com
 - 5) MKT Fastening, LLC; www.mktfastening.com
 - 8. Manufacturers - Powder-Actuated Fastening Systems:
 - a. Hilti, Inc.: www.us.hilti.com.
 - b. ITW Ramset, a division of Illinois Tool Works, Inc.: www.ramset.com.
 - c. Simpson Strong-Tie Company Inc.: www.strongtie.com.
 - d. MKT Fastening, LLC; www.mktfastening.com.
- G. Clamps (attachment to steel structural elements):
 - 1. MSS SP-58, suitable for attached structural element.
- H. Through Bolts:

1. Structural type, hex head, and high strength.
 2. Comply with ASTM A325.
- I. Toggle Bolts:
1. All-steel springhead type.
- J. Hanger Rods:
1. Threaded steel.

~~~ PROJECT NOTE ~~~~~
EOR TO REVIEW VIBRATION ISOLATOR REQUIREMENTS. SMALL PROJECTS MAY ALLOW FOR THIS SUBJECT TO BE COVERED HERE. LARGER PROJECT SHOULD CONSIDER THE CONTENT OF SECTION 26 05 48 - NOISE AND VIBRATION CONTROL FOR ELECTRICAL SYSTEMS.
~~~ END OF PROJECT NOTE ~~~~~

2.02 VIBRATION ISOLATORS

- A. General: Provide vibration isolators with either known undeflected heights or other markings so that, after adjustment, when carrying their load, the deflection under load can be verified, thus determining that the load is within the proper range of the device and that the correct degree of vibration isolation is being provided according to the design.
1. Provide isolators that operate in the linear portion of their load versus deflection curve. Furnish load versus deflection curves from the manufacturer that are linear, over a deflection range 50% above the design deflection.
- B. Manufacturers:
1. California Dynamics Company; www.caldyn.com
 2. Mason Industries: www.mason-ind.com
- C. Vibration Isolator Types:
1. General Properties:
 - a. The ratio of lateral to vertical stiffness shall be not less than 0.9 or greater than 1.5.
 - b. The theoretical vertical natural frequency for each support point, based upon the load per isolator and isolator stiffness, shall not differ from the design objectives for the equipment as a whole by more than (+/-) 10%.
 - c. Wave motion through the isolator shall be reduced to the following extent: Isolation above the primary vertical system resonance frequency shall follow the theoretically predicted isolation curve for single degree of freedom systems with 1- dB to 50 dB at all frequencies above the 150 Hz.
 - d. All neoprene mountings shall have a shore hardness of 40 -65 after minimum aging of 30 days, or corresponding open-aging.
 2. Isolator Description:
 - a. Type MS shall be spring type, without housings or snubbers, equipped with leveling bolts and with two layers of ribbed or waffled neoprene pads, separated by a 1/16" galvanized steel plate under the base plate. Neoprene sleeves and washer shall be installed at all anchor bolts.
 - b. Type HS shall be suspension hangers having a steel frame and spring element, in series with a neoprene pad, cut or washer. The isolator shall be designed so that hanger rod may be misaligned 15 degrees in any direction relative to the vertical, without contacting hanger box frame.
 - c. Type MN shall be neoprene isolator support type unit having a minimum static deflection of 1/4".
 - d. Type HN shall be a suspension hanger type employing a neoprene isolator unit having a minimum static deflection of 1/4".
- D. Equipment Frames
1. Mounting frames and brackets shall be provided to carry the load of the equipment without causing mechanical distortion or stress to the equipment.
 2. The mounting frames shall consist of welded, wide flange or channel structural steel, with welder brackets to accept the isolators. The section depth of any frame member shall be

not less than 1/10th of the length of the longest frame member, and not less than 1/10th of the greatest span between support points. All frame members shall have the same depth.

2.03 MANUFACTURER SUPPORTING DEVICES

- A. Raceway Supports: Clevis hangers, riser clamps, conduit straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring steel clamps as described in NECA 1 and NECA 101.
- B. Conduit Sealing Bushings: Factory-fabricated watertight conduit sealing bushing assemblies suitable for sealing around conduit, or tubing passing through concrete floors and walls. Construct seals with steel sleeve, malleable iron body, neoprene sealing grommets or rings, metal pressure rings, pressure clamps, and cap screws.
- C. Cable Supports for Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug for non-armored electrical cables in riser conduits. Plugs shall have number and size of conductor gripping holes as required to suit individual risers. Construct body of malleable-iron casting with hot-dip galvanized finish. Provide OZ/Gedney type "S" cable support or equal.
- D. U-Channel Systems: 12-gauge steel channels, with 9/16 inch diameter holes, at a minimum of 2 inches on center, in top surface. Provide fittings and accessories that mate and match with U-channel and are of the same manufacturer.
- 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:

2.04 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

- A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
- B. Materials: Comply with requirements in Section 05 50 00 - Metal Fabrications for steel shapes and plates.
- C. Pipe Sleeves: Provide pipe sleeves of one of the following:
 - 1. Sheet Metal: Fabricate from galvanized sheet metal; round tube closed with snaplock joint, welded spiral seams, or welded longitudinal joint. Fabricate sleeves from the following gage metal for sleeve diameter noted:
 - a. 3 inch and smaller: 2 gauge.
 - b. 4 inch to 6 inch: 16 gauge.
 - c. Over 6 inch: 14 gauge.
 - 2. Steel Pipe: Fabricate from Schedule 40 galvanized steel pipe.
 - 3. Plastic Pipe: Fabricate from Schedule 80 PVC plastic pipe.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive support and attachment components.
- C. Verify that conditions are satisfactory for installation prior to starting work.

~~~ **PROJECT NOTE** ~~~~~  
*MANUFACTURER'S INSTALLATION INSTRUCTIONS TO BE UTILIZED UNLESS EXTENSIVE REQUIREMENTS OCCUR IN PROJECT (I.E. TRANSFORMERS ABOVE 300KVA ON ISOLATION UNIT USING MS SPRINGS).*

~~~ **END OF PROJECT NOTE** ~~~~~

3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install support and attachment components in a neat and workmanlike manner in accordance with NECA 1 and .NECA 101
- C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- D. Unless specifically indicated or approved by Architect/Engineer of Record, do not provide support from suspended ceiling support system or ceiling grid.
- E. Unless specifically indicated or approved by Architect/Engineer of Record, do not provide support from roof deck.
- F. RMC, IMC, and EMT may be supported by openings through structure members, as permitted in the Chicago Electrical Code.
- G. Minimum static design load used for strength of support assemblies shall be weight of supported components plus 200 pounds.
- H. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

~~~ PROJECT NOTE ~~~~~
BUILDING MATERIAL AND CONSTRUCTION TYPE TO BE CONSIDERED WHEN SELECTING EQUIPMENT SUPPORT AND ATTACHMENT. REVIEW CONSTRUCTION TYPES WITH ARCHITECTURAL SPECIFICATIONS PRIOR TO SELECTIONS FOR SPECIFICATIONS.
~~~ END OF PROJECT NOTE ~~~~~

- I. Equipment Support and Attachment:
 - 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
 - 2. 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.
 - 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations 1 inch off of wall or surface.
 - 4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
 - 5. To Wood: Fasten with lag screws or through bolts.
 - 6. To New Concrete: Bolt to concrete inserts.
 - a. Do not penetrate water proofing.
 - 7. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - 8. To Existing Concrete: Expansion anchor fasteners.
 - a. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.
 - 9. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts Spring-tension clamps.
 - a. Welding to steel structure may be used only for threaded studs, not for conduits, pipe straps, or other items.
 - 10. To Light Steel: Sheet metal screws.
 - 11. Fasteners: Select so the load applied to each fastener does not of its proof test load.
 - 12. Ensure that the load applied to any fastener does not exceed 25 percent of the proof test load. Use vibration and shock-resistant fasteners for attachments to concrete slabs.
 - 13. Provide weight-distributing facilities, where required, so as not to exceed the load-bearing capabilities of floors or walls that bear the weight of, or support, electrical systems.

14. Exposed part of hangers and supports shall be painted with one coat of rust-inhibiting primer.
 15. Equipment shall not be held in place by its own dead weight. Provide base anchor fasteners in each case.
 16. Miscellaneous Supports: Support miscellaneous electrical components as required to provide the same structural safety factors as specified for raceway supports. Install metal channel or angle iron racks for mounting cabinets, panelboards, disconnects, control enclosures, pull boxes, junction boxes, transformers, and other devices.
- J. Conduit Support and Attachment: Also comply with Section 26 05 33.13 - Conduit for Electrical Systems.
- K. Box Support and Attachment: Also comply with Section 26 05 33.16 - Boxes for Electrical Systems.
- L. Interior Luminaire Support and Attachment: Also comply with Section 26 51 00 - Interior Lighting.
- M. Exterior Luminaire Support and Attachment: Also comply with Section 26 56 00 - Exterior Lighting.
- N. Preset Concrete Inserts: Use manufacturer provided closure strips to inhibit concrete seepage during concrete pour.
- O. Overhead boxes shall be supported independently of associated raceways.
- P. Secure fasteners according to manufacturer's recommended torque settings.
- Q. Remove temporary supports.
- R. Concrete Bases:
1. Construct concrete bases of dimensions indicated but not less than 4 inches larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.
 2. Concrete materials, reinforcement, and placement requirements are specified in Section 03 30 00 - Cast-in-Place Concrete.
 3. Anchor equipment to concrete base.
 - a. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - b. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - c. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
- S. Installation of Fabricated metal Supports:
1. Install metal channel racks for mounting cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices unless components are mounted directly to structural elements of adequate strength.
 2. Comply with installation requirements in Section 05 50 00 - Metal Fabrications for site-fabricated metal supports.
 3. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
 4. Field Welding: Comply with AWS D1.1/D1.1M.

3.03 SCHEDULE, TABLE 1: SPACING FOR RACEWAY SUPPORTS:

- A. * Maximum spacing for IMC above apply to straight runs only. Otherwise the maximums for EMT apply.

| RACEWAY SIZE (INCHS) | NO. OF CONDUCTORS IN RUN | | MAXIMUM SPACING OF SUPPORTS (FEET) FOR RGS AND IMC | MAXIMUM SPACING OF SUPPORTS (FEET) FOR EMT |
|-------------------------|--------------------------------|--|--|--|
| <u>HORIZONTAL RUNS</u> | | | | |
| 1/2, 3/4 | 1 or 2 | Flat ceiling or wall | 5 | 5 |
| 1/2, 3/4 | 1 OR 2 | Where limited to support by building construction. | 7 | 7 |
| 1/2, 3/4 | 3 or more | Any location | 7 | 7 |
| 1/2-1 | 3 or more | Any location | 7 | 7 |
| 1 and larger | 1 or 2 | Flat ceiling or wall | 6 | 6 |
| 1 and larger | 1 or 2 | Where limited to support by building construction. | 10 | 10 |
| 1 and larger | 3 or more | Any location | 10 | 10 |
| Any | - | Concealed | 10 | 10 |
| <u>VERTICAL RUNS</u> | | | | |
| 1/2, 3/4 | - | Exposed | 7 | 7 |
| 1, 1 1/4 | - | Exposed | 8 | 8 |
| 1 1/2 and larger | - | Exposed | 10 | 10 |
| Up to 2 | - | Shaftway | 14 | 10 |
| 2 1/2 | - | Shaftway | 16 | 10 |
| 3 and larger | - | Shaftway | 20 | 10 |
| Any | - | Concealed | 10 | 10 |

* Maximum spacing for IMC above apply to straight runs only. Otherwise the maximums for EMT apply.

B. Abbreviations:

1. EMT: Electrical metallic tubing.
2. IMC: Intermediate metallic conduit.
3. RGS: Rigid galvanized steel conduit.

3.04 FIELD QUALITY CONTROL

- A. See Section 01 40 00 - Quality Requirements, for additional requirements.
- B. Inspect support and attachment components for damage and defects.
- C. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- D. Correct deficiencies and replace damaged or defective support and attachment components.

3.05 CLEANING AND PAINTING

~~~ **PROJECT NOTE** ~~~~~  
*VERIFY IF DIVISION 9 - PAINTING SECTION IS INCLUDED WITH PROJECT MANUAL. IF DIVISION 9 IS INCLUDED, REMOVE 1ST PARAGRAPH STATING TO COMPLY WITH SSPC-PA 1.*  
 ~~~ **END OF PROJECT NOTE** ~~~~~

- 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.

~~~ PROJECT NOTE ~~~~~
VERIFY IF DIVISION 9 - PAINTING SECTION IS INCLUDED WITH PROJECT MANUAL. IF DIVISION 9 IS NOT INCLUDED, REMOVE PARAGRAPH STATING TO COMPLY WITH DIVISION 09 SECTION "PAINTING".

~~~ END OF PROJECT NOTE ~~~~~

- B. Touchup: Comply with requirements in Section 09 91 23 - Interior Painting 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/A780M.

END OF SECTION 26 05 29