

ELECTRICAL

SECTION 260519 - LOW-VOLTAGE (600V OR LESS) ELECTRICAL POWER CONDUCTORS AND CABLES

- 1.1 MATERIALS
- A. CONDUCTORS AND CABLES:
1. CONDUCTORS: COPPER.
 2. CONDUCTOR INSULATION: TYPE THHN/THWN-2, TYPE XHHW-2, TYPE USE AND TYPE TYPE SO.
 3. MULTICONDUCTOR CABLE: METAL-CLAD CABLE, TYPE MC WITH GROUND WIRE, AS APPLICABLE.
- 1.2 CONDUCTOR MATERIAL APPLICATIONS
- A. FEEDERS: COPPER, SOLID FOR NO. 10 AWG AND SMALLER; STRANDED FOR NO. 8 AWG AND LARGER.
- B. BRANCH CIRCUITS: COPPER, SOLID FOR NO. 12 AWG AND SMALLER; STRANDED FOR NO. 10 AWG AND LARGER, EXCEPT VFC CABLE, WHICH SHALL BE EXTRA FLEXIBLE STRANDED.
- 1.3 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS
- A. SERVICE ENTRANCE: TYPE THHN/THWN-2, SINGLE CONDUCTORS IN RACEWAY.
- B. EXPOSED FEEDERS: TYPE THHN/THWN-2, SINGLE CONDUCTORS IN RACEWAY.
- C. FEEDERS CONCEALED IN CEILINGS, WALLS, PARTITIONS, AND CRAWLSPACES: TYPE THHN/THWN-2, SINGLE CONDUCTORS IN RACEWAY.
- D. FEEDERS CONCEALED IN CONCRETE, BELOW SLABS-ON-GRADE, AND UNDERGROUND: TYPE THHN/THWN-2, SINGLE CONDUCTORS IN RACEWAY.
- E. EXPOSED BRANCH CIRCUITS, INCLUDING IN CRAWLSPACES: TYPE THHN/THWN-2, SINGLE CONDUCTORS IN RACEWAY.
- F. BRANCH CIRCUITS CONCEALED IN CEILINGS, WALLS, AND PARTITIONS: TYPE THHN/THWN-2, SINGLE CONDUCTORS IN RACEWAY.
- G. BRANCH CIRCUITS CONCEALED IN CONCRETE, BELOW SLABS-ON-GRADE, AND UNDERGROUND: TYPE THHN/THWN-2, SINGLE CONDUCTORS IN RACEWAY.
- H. CORD DROPS AND PORTABLE APPLIANCE CONNECTIONS: TYPE SO, HARD SERVICE CORD WITH STAINLESS-STEEL, WIRE-MESH, STRAIN RELIEF DEVICE AT TERMINATIONS TO SUIT APPLICATION.

- 1.4 FIELD QUALITY CONTROL
- A. TESTING: BY CONTRACTOR.

END OF SECTION 260519

ELECTRICAL

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

- 1.1 QUALITY ASSURANCE
- A. QUALITY STANDARD FOR GROUNDING AND BONDING MATERIALS AND EQUIPMENT: UL 467.
- 1.2 PRODUCTS
- A. INSULATED CONDUCTORS: COPPER WIRE OR CABLE.
- B. BARE COPPER CONDUCTORS:
1. SOLID CONDUCTORS.
 2. STRANDED CONDUCTORS.
 3. TINNED CONDUCTORS.
 4. STRANDED BONDING CONDUCTORS.
 5. COPPER TAPE BRAIDED BONDING JUMPERS.
 6. TINNED-COPPER BRAIDED BONDING JUMPERS.
- C. CONNECTORS: BOLTED AND EXOTHERMIC-WELDED TYPE.
- D. GROUNDING ELECTRODES:
1. GROUND RODS: COPPER-CLAD STEEL, SECTIONAL TYPE WITH GROUND WELL AND COVER.
- 1.3 FIELD QUALITY CONTROL
- A. GROUND RESISTANCE TESTING: BY CONTRACTOR-ENGAGED AGENCY.

END OF SECTION 260526

ELECTRICAL

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

- 1.1 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.
- 1.2 PRODUCTS
- A. SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS:
1. STEEL SLOTTED SUPPORT SYSTEMS WITH METALLIC PAINTED COATINGS.
 2. NONMETALLIC SLOTTED SUPPORT SYSTEMS.
 3. RACEWAY AND CABLE SUPPORTS.
 4. STEEL AND MALLEABLE-IRON CONDUIT AND CABLE HANGERS, CLAMPS, AND ASSOCIATED ACCESSORIES.
 5. SUPPORT FOR NON-ARMORED CONDUCTORS AND CABLES IN VERTICAL CONDUIT RISERS.
 6. STRUCTURAL STEEL FOR FABRICATED SUPPORTS AND RESTRAINTS.
 7. MOUNTING, ANCHORING, AND ATTACHMENT COMPONENTS:
 - a. POWDER-ACTUATED FASTENERS.
 - b. MECHANICAL-EXPANSION ANCHORS.
 - c. CONCRETE INSERTS.
 - d. CLAMPS FOR ATTACHMENT TO STEEL STRUCTURAL ELEMENTS.
 - e. ALL STEEL, SPRINGHEAD TOGGLE BOLTS.
 - f. THREADED HANGER RODS.
- B. FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES: WELDED OR BOLTED STEEL SHAPES.

END OF SECTION 260529

ELECTRICAL

SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

- 1.1 MATERIALS
- A. METAL CONDUITS, TUBING, AND FITTINGS:
1. GRC.
 2. EMT.
 3. FMC: ZINC-COATED STEEL.
 4. LFMC.
 5. FITTINGS:
 - a. EMT, STEEL, SETSCREW OR COMPRESSION TYPE.
 - b. EXPANSION FITTINGS.
- B. NONMETALLIC CONDUITS, TUBING, AND FITTINGS:
1. RNC.
 2. FITTINGS: MATCH CONDUIT.
 3. SOLVENT CEMENTS AND ADHESIVE PRIMERS SHALL HAVE A VOC CONTENT OF 510 AND 550 G/L OR LESS, RESPECTIVELY.
- C. METAL WIREWAYS AND AUXILIARY GUTTERS: SHEET METAL WITH SCREW COVERS.
- D. SURFACE METAL RACEWAYS: METAL, GALVANIZED STEEL, WITH SNAP-ON COVERS.
- E. BOXES, ENCLOSURES, AND CABINETS:
1. METAL OUTLET AND DEVICE BOXES: ALUMINUM
 2. METAL FLOOR BOXES: CAST METAL OR SHEET METAL, FULLY ADJUSTABLE.
 3. LUMINAIRE OUTLET BOXES: NONADJUSTABLE, DESIGNED FOR ATTACHMENT OF LUMINAIRE WEIGHING 50 LB (23 KG).
 4. SMALL SHEET METAL PULL AND JUNCTION BOXES.
 5. CAST-METAL ACCESS, PULL, AND JUNCTION BOXES.
 6. BOX EXTENSIONS.
 7. GANGABLE BOXES ARE PROHIBITED.
 8. HINGED-COVER ENCLOSURES: METAL.
 9. CABINETS: GALVANIZED STEEL.
- F. HANDHOLES AND BOXES FOR EXTERIOR UNDERGROUND WIRING: POLYMER CONCRETE WITH POLYMER-CONCRETE FRAME AND COVER, PROTOTYPE TESTED FOR COMPLIANCE WITH SCTE 77.
1. CONFIGURATION: CLOSED BOTTOM
 2. WEATHERPROOF COVER
 3. COVER LEGEND: "ELECTRIC"

1.2 RACEWAY APPLICATION

- A. OUTDOORS:
1. EXPOSED: GRC.
 2. CONCEALED, ABOVEGROUND: RNC, TYPE EPC-40-PVC.
 3. UNDERGROUND: RNC, TYPE EPC-40-PVC, DIRECT BURIED.
 4. CONNECTION TO VIBRATING EQUIPMENT: LFMC.
 5. BOXES AND ENCLOSURES, ABOVEGROUND: TYPE 3R OR TYPE 4.
- B. INDOORS:
1. EXPOSED, NOT SUBJECT TO PHYSICAL DAMAGE: GRC.
 2. EXPOSED, NOT SUBJECT TO SEVERE PHYSICAL DAMAGE: EMT.
 3. CONCEALED: EMT.
 4. CONNECTION TO VIBRATING EQUIPMENT: FMC, EXCEPT LFMC IN DAMP OR WET LOCATIONS.
 5. DAMP OR WET LOCATIONS: GRC.
 6. BOXES AND ENCLOSURES: TYPE 1, EXCEPT TYPE 4 NONMETALLIC IN DAMP OR WET LOCATIONS.
- C. MINIMUM RACEWAY SIZE: 3/4-INCH (21-MM) TRADE SIZE.
- D. RACEWAY FITTINGS: COMPATIBLE WITH RACEWAYS AND SUITABLE FOR USE AND LOCATION.
1. RIGID AND INTERMEDIATE STEEL CONDUIT: THREADED RIGID STEEL CONDUIT FITTINGS.
 2. PVC EXTERNALLY COATED, RIGID STEEL CONDUITS: FITTINGS LISTED FOR USE WITH THIS TYPE OF CONDUIT.
 3. EMT: SET SCREW OR STEEL FITTINGS.
 4. FLEXIBLE CONDUIT: FITTINGS LISTED FOR USE WITH FLEXIBLE CONDUIT.

END OF SECTION 260533

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SECTION 260536 - CABLE TRAYS FOR ELECTRICAL SYSTEMS

1.1 CABLE TRAY TYPES

- A. LADDER.
- B. SINGLE RAIL.
- C. TROUGH.

1.2 MATERIALS

- A. CABLE TRAYS, FITTINGS, AND ACCESSORIES: STEEL
1. FACTORY-STANDARD PRIMER; WITH CHROMIUM-ZINC-PLATED HARDWARE.
 2. MILL GALVANIZED BEFORE FABRICATION; WITH GALVANIZED HARDWARE.
 3. ELECTROGALVANIZED BEFORE FABRICATION; WITH GALVANIZED HARDWARE.
 4. HOT-DIP GALVANIZED AFTER FABRICATION; WITH TYPE 316 STAINLESS-STEEL HARDWARE.
 5. POWER-COAT ENAMEL PAINT; WITH TYPE 316 STAINLESS-STEEL HARDWARE.
 6. BLACK OXIDE FINISH FOR SUPPORT ACCESSORIES AND MISCELLANEOUS HARDWARE.
- B. CABLE TRAYS, FITTINGS, AND ACCESSORIES: ALUMINUM; WITH STAINLESS-STEEL HARDWARE.
- C. CABLE TRAY ACCESSORIES:
1. COVERS: SOLID TYPE
 2. BARRIER STRIPS.
 3. CABLE TRAY SUPPORTS AND CONNECTORS.
- D. WARNING SIGNS: 1-1/2-INCH- (40-MM-) HIGH, BLACK LETTERS ON YELLOW BACKGROUND WITH LEGEND "WARNING! NOT TO BE USED AS WALKWAY, LADDER, OR SUPPORT FOR LADDERS OR PERSONNEL".

- 1.3 SOURCE QUALITY CONTROL
- A. TESTED ACCORDING TO NEMA FG 1 OR NEMA VE 1

END OF SECTION 260536

ELECTRICAL

SECTION 260544 - SLEEVES AND SLEEVE SEALS FOR ELECTRICAL RACEWAYS AND CABLING

1.1 MATERIALS

- A. SLEEVES:
1. SCHEDULE 40 STEEL PIPE.
 2. CAST-IRON PIPE.
 3. GALVANIZED-STEEL SHEET FOR CONDUITS PENETRATING NON-FIRE-RATED GYPSUM-BOARD ASSEMBLIES.
 4. MOLDED-PE OR -PP PIPE.
 5. GALVANIZED-STEEL SHEET FOR RECTANGULAR OPENINGS.
- B. SLEEVE SEALS:
1. EPDM RUBBER SEALING ELEMENTS.
 2. PLASTIC OR STAINLESS-STEEL PRESSURE PLATES.
 3. STAINLESS-STEEL CONNECTING BOLTS AND NUTS.
- C. HYDRAULIC-CEMENT GROUT.
- D. SILICONE SEALANTS:
1. SINGLE-COMPONENT, SILICONE-BASED, NEUTRAL-CURING ELASTOMERIC SEALANT.
 2. MULTICOMPONENT, SILICONE-BASED LIQUID ELASTOMERIC NONSHRINKING FOAM.
3. VOC CONTENT OF 250 G/L OR LESS.

END OF SECTION 260544

ELECTRICAL

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

- 1.1 QUALITY ASSURANCE
- A. COMPLY WITH ANSI A13.1 AND IEEE C2.
- 1.2 PRODUCTS
- A. POWER AND CONTROL RACEWAY IDENTIFICATION: VINYL LABELS
- B. POWER AND CONTROL CABLE IDENTIFICATION: VINYL LABELS
- C. CONDUCTOR IDENTIFICATION: COLOR-CODING CONDUCTOR TAPE
- D. FLOOR MARKING TAPE: 2-INCH- (50-MM) WIDE PRESSURE-SENSITIVE VINYL TAPE.
- E. UNDERGROUND-LINE WARNING TAPE: PIGMENTED POLYOLEFIN
- F. WARNING LABELS AND SIGNS: SELF-ADHESIVE WARNING LABELS
- G. INSTRUCTION SIGNS: ADHESIVE FILM
- H. EQUIPMENT IDENTIFICATION LABELS: ENGRAVED, LAMINATED, ACRYLIC OR MELAMINE PLASTIC

END OF SECTION 260553

ELECTRICAL

SECTION 260923 - LIGHTING CONTROL DEVICES

- 1.1 PRODUCTS
- A. TIME SWITCHES: ELECTRONIC, PROGRAMMABLE UNITS, WITH SINGLE CHANNEL OR ELECTROMECHANICAL-DAIL TYPE; ASTRONOMIC TIME, SEVEN-DAY PROGRAMMABLE WITH MINIMUM 8 ON/OFF SET POINTS PER 24 HOUR SCHEDULE.
- B. OUTDOOR PHOTOELECTRIC SWITCHES: SOLID STATE, WITH DRY CONTACTS, 15-SECOND TIME DELAY, AND METAL-OXIDE VARISTOR SURGE PROTECTION.
- C. DAYLIGHT-HARVESTING SWITCHING CONTROLS: CEILING MOUNTED WITH ADJUSTABLE TIME DELAY AND SET-POINTS.
- D. INDOOR OCCUPANCY SENSORS: ULTRASONIC TYPE WITH SEPARATE, EXTERNALLY MOUNTED RELAY UNIT.
- E. SWITCHBOX-MOUNTED OCCUPANCY SENSORS.
- F. LIGHTING CONTACTORS: ELECTRICALLY OPERATED AND MECHANICALLY OR ELECTRICALLY HELD, WITH NONFUSED DISCONNECT IN NEMA 250 ENCLOSURE. PROVIDE WITH CONTROL AND PILOT DEVICES AS INDICATED IN PLANS.
- G. EMERGENCY SHUNT RELAY: NORMALLY CLOSED, ELECTRICALLY HELD, ARRANGED FOR WIRING IN PARALLEL WITH MANUAL SWITCHING CONTACTS.
- H. CONTROL CABLES:
1. POWER CABLES: NOT SMALLER THAN NO. 12 AWG.
 2. CLASSES 2 AND 3 CONTROL CABLES: STRANDED-COPPER CONDUCTORS, NOT SMALLER THAN NO. 18 AWG.
 3. CLASS 1 CONTROL CABLES: STRANDED-COPPER CONDUCTORS, NOT SMALLER THAN NO. 14 AWG.

END OF SECTION 260923

ISSUED FOR CONSTRUCTION - 08/23/2017



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