

## ELECTRICAL SPECIFICATIONS

### ELECTRICAL CONDUCTORS

- A. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
- ALCAN PRODUCTS CORPORATION; ALCAN CABLE DIVISION.
  - AMERICAN INSULATED WIRE CORP.; LEVITON COMPANY.
  - GENERAL CABLE CORPORATION.
  - SINATOR CABLE COMPANY.
  - SOUTHWIRE COMPANY.
- CO. CONDUCTOR CONDUCTORS: COMPLY WITH NEMA WC 70.
- CONDUCTOR INSULATION: COMPLY WITH NEMA WC 70 FOR TYPES THW, THHN, THHW, UF, USE AND SO.
- TRICONDUCTOR CABLE: COMPLY WITH NEMA WC 70 FOR ARMORED CABLE, TYPE AC, METAL-CLAD CABLE, TYPE MC, TYPE SD, AND TYPE USE WITH GROUND WIRE.
- B. CONDUCTOR MATERIAL APPLICATIONS:
- COPPER: SOLID FOR NO. 10 AND SMALLER; STRANDED FOR NO. 8 AWG AND LARGER.
- C. CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS:
- SERVICE ENTRANCE: TYPE THN-THHN, SINGLE CONDUCTORS IN RACEWAY, TYPE SE OR USE MULTICONDUCTOR CABLE.
  - EXPOSED FEEDERS: TYPE THN-THHN, SINGLE CONDUCTORS IN RACEWAY.
  - FEEDERS CONCEALED IN CEILINGS, WALLS, PARTITIONS, AND CRAWLSPACES: TYPE THN-THHN, SINGLE CONDUCTORS IN RACEWAY.
  - FEEDERS CONCEALED IN CONCRETE, BELOW SLABS-ON-GRADE, AND UNDERGROUND: TYPE THN-THHN, SINGLE CONDUCTORS IN RACEWAY.
  - FEEDERS INSTALLED BELOW RAISED FLOORING: TYPE THN-THHN, SINGLE CONDUCTORS IN RACEWAY.
  - EXPOSED BRANCH CIRCUITS INCLUDING IN CRAWLSPACES: TYPE THN-THHN, SINGLE CONDUCTORS IN RACEWAY, METAL-CLAD CABLE, TYPE MC.
  - BRANCH CIRCUITS CONCEALED IN CEILINGS, WALLS, AND PARTITIONS: TYPE THN-THHN, SINGLE CONDUCTORS IN RACEWAY, ARMORED CABLE, TYPE AC, METAL-CLAD CABLE, TYPE MC.
  - BRANCH CIRCUITS CONCEALED IN CONCRETE, BELOW SLABS-ON-GRADE, AND UNDERGROUND: TYPE THN-THHN, SINGLE CONDUCTORS IN RACEWAY.
  - BRANCH CIRCUITS INSTALLED BELOW RAISED FLOORING: TYPE THN-THHN, SINGLE CONDUCTORS IN RACEWAY OR ARMORED CABLE, TYPE AC, METAL-CLAD CABLE, TYPE MC.
  - BRANCH CIRCUITS INSTALLED IN PATIENT CARE AREAS: TYPE HFC-WRAP OR AC-HFC WITH ASSEMBLY CERTIFIED AS AN EQUIPMENT GROUNDING CONDUCTOR AND A GREEN INSULATED EQUIPMENT GROUNDING CONDUCTOR CONNECTED TO ALL RECEPTABLES, METALLIC BOXES CONTAINING RECEPTABLES, AND ALL METALLIC EQUIPMENT CASINGS.

### GROUNDING

- A. INSULATED CONDUCTORS: COPPER WIRE OR CABLE INSULATED FOR 600 V UNLESS OTHERWISE REQUIRED BY APPLICABLE CODE OR AUTHORITIES HAVING JURISDICTION.
- B. BARE COPPER CONDUCTORS:
- SOLID CONDUCTORS: ASTM B 3.
  - STRANDED CONDUCTORS: ASTM B 8.
  - BONDING CABLE: 28 NOM. 14 STRANDED OF NO. 17 AWG CONDUCTOR, 1/4 INCH (6 MM) IN DIAMETER.
  - BONDING CONDUIT: NO. 4 OR NO. 6 AWG, STRANDED CONDUCTOR.
  - BONDING LIMBS: COPPER TAPS; BRANDED CONDUCTORS CURRENTLY AVAILABLE WITH COPPER FERRULES; 1-5/8 INCHES (41 MM) WIDE AND 1/16 INCH (1.6 MM) THICK.
- C. GROUNDING BUS: PREFRILLED RECTANGULAR BARS OF ANNEALED COPPER, 1/4 BY 4 INCHES (6.3 BY 100 MM) IN CROSS SECTION, WITH 9/32-INCH (2.14-MM) HOLES SPACED 1-1/8 INCHES (28 MM) APART. STAND-OFF INSULATORS FOR MOUNTING SHALL COMPLY WITH UL 891 FOR USE IN SWITCHBOARDS, 600 V. LEXAN, IMPULSE TESTED AT 5000 V.
- D. CONNECTORS: LISTED AND LABELED BY AN NRTL ACCEPTED TO AUTHORITIES HAVING JURISDICTION FOR APPLICATION AND USE FOR SPECIFIC TYPES, SIZES, AND COMBINATIONS OF CONDUCTORS AND OTHER ITEMS CONNECTED.
- E. BOLTED CONNECTORS FOR CONDUCTORS AND PIPES: COPPER OR COPPER ALLOY, PRESSURE TUBE WITH AT LEAST TWO BOLTS.
- F. WELDED CONNECTORS: CLAMP TYPE, SIZED FOR PIPE.
- G. BUS-BAR CONNECTORS: EXOTHERMIC-WELDING KITS OF TYPES RECOMMENDED BY KIT MANUFACTURER FOR MATERIALS BEING JOINED AND INSTALLATION CONDITIONS.
- H. BUS-BAR CONNECTORS: MECHANICAL TYPE, CAST SILICON BRONZE, SOLDERLESS COMPRESSION-TYPE WIRE TERMINALS, AND LONG-BARREL, TWO-BOLT CONNECTION TO GROUND BUS BAR.
- H. CONDUCTORS: INSTALL SOLID CONDUCTOR FOR NO. 8 AWG AND SMALLER, AND STRANDED CONDUCTORS FOR NO. 6 AWG AND LARGER.
- I. ISOLATED GROUNDING CONDUCTORS: GREEN-COLORED INSULATION WITH CONTINUOUS YELLOW STRIPE, ON FEEDERS WITH ISOLATED GROUNDING. IDENTIFY GROUNDING CONDUCTOR WHERE VISIBLE TO NORMAL INSPECTION, WITH ALTERNATING BANDS OF GREEN AND YELLOW TAPE, WITH AT LEAST THREE BANDS OF GREEN AND TWO BANDS OF YELLOW.
- J. CONDUCTOR TERMINATIONS AND CONNECTIONS:
- PIPE AND EQUIPMENT GROUNDING CONDUCTOR TERMINATIONS: BOLTED CONNECTORS.
  - UNDERGROUND CONNECTIONS: WELDED CONNECTORS EXCEPT AT TEST WELLS AND AS OTHERWISE INDICATED. CONNECTIONS TO GROUND RODS AT TEST WELLS: BOLTED CONNECTIONS. CONNECTIONS TO STRUCTURAL STEEL: WELDED CONNECTORS.
- K. EQUIPMENT GROUNDING:
- INSTALL INSULATED EQUIPMENT GROUNDING CONDUCTORS TO COMPLY WITH THE NEC AND AS INDICATED ON THE DRAWINGS.

### ELECTRICAL HANGERS AND SUPPORTS

- 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. MAXIMUM SUPPORT SPACING AND MINIMUM HANGER ROD SIZE FOR RACEWAY SPACE SUPPORTS FOR EMT, IMC, AND RMC AS SCHEDULED IN NECA 1, WHERE ITS TABLE 1 LISTS MAXIMUM SPACINGS LESS THAN STATED IN NFPA 70. MINIMUM ROD SIZE SHALL BE 1/4 INCH (6 MM) IN DIAMETER. MULTIPLE RACEWAYS OR CABLES: INSTALL TRAPEZOID-TYPE SUPPORTS FABRICATED WITH STEEL SLOTTED OR OTHER SUPPORT SYSTEM, SIZED TO CAPACITY CAN BE INCREASED BY AT LEAST 25 PERCENT IN FUTURE WITHOUT EXCEEDING SPECIFIED DESIGN LOAD LIMITS. SECURE RACEWAYS AND CABLES TO THESE SUPPORTS WITH TWO-BOLT CONDUIT CLAMPS, SPRING-STEEL CLAMPS DESIGNED FOR SUPPORTING SINGLE CONDUCTORS WITHOUT BOLTS MAY BE USED FOR 1-1/2-INCH (38-MM) AND SMALLER RACEWAYS SERVING BRANCH CIRCUITS AND COMMUNICATION SYSTEMS ABOVE SUSPENDED CEILINGS AND FOR FASTENING RACEWAYS TO TRAPEZOID SUPPORTS.
- B. SUPPORT INSTALLATION: COMPLY WITH NECA 1 AND NECA 101 FOR INSTALLATION REQUIREMENTS EXCEPT AS SPECIFIED IN THIS ARTICLE.
- C. RACEWAY SUPPORT METHODS: IN ADDITION TO METHODS DESCRIBED IN NECA 1, EMT, IMC, AND RMC MAY BE SUPPORTED BY OPENINGS THROUGH STRUCTURE MEMBERS, AS PERMITTED IN NFPA 70.
- D. STRENGTH OF SUPPORT ASSEMBLIES: WHERE NOT INDICATED, SELECT SIZES OF COMPONENTS SO STRENGTH WILL BE ADEQUATE TO CARRY PRESENT AND FUTURE STATIC LOADS WITH SPECIFIED LOADING LIMITS. MINIMUM STATIC DESIGN LOAD USED FOR STRENGTH DETERMINATION SHALL BE WEIGHT OF SUPPORTED COMPONENTS PLUS 200 LB (90 KG).
- E. MOUNTING AND ANCHORAGE OF SURFACE-MOUNTED EQUIPMENT AND COMPONENTS: ANCHOR AND FASTEN ELECTRICAL ITEMS AND THEIR SUPPORTS TO BUILDING STRUCTURE MEMBERS BY THE FOLLOWING METHODS UNLESS OTHERWISE INDICATED BY CODE:
- TO WOOD: FASTEN WITH LAG SCREWS OR THROUGH BOLTS.
  - TO NEW CONCRETE: BOLT TO CONCRETE INSERTS.
  - TO MASONRY: APPROVED TOGGLE-TYPE BOLTS ON HOLLOW MASONRY UNITS AND EXPANSION ANCHOR FASTENERS ON SOLID MASONRY.
  - TO EXISTING CONCRETE: EXPANSION ANCHOR FASTENERS.
  - INSTEAD OF EXPANSION ANCHORS, POWER-ACTUATED DRIVEN THREADED STUDS PROVIDED WITH LOCK WASHERS AND NUTS MAY BE USED IN EXISTING STANDARD-WEIGHT CONCRETE 4 INCHES (100 MM) THICK OR GREATER. DO NOT USE FOR STEEL. WELDED THREADED STUDS COMPLYING WITH AWS D1.1/D1.1M, WITH LOCK WASHERS AND NUTS OR BEAM CLAMPS (MSS TYPE 19, 21, 23, 25, OR 27) COMPLYING WITH MSS SP-68.
  - TO LIGHT STEEL: SHEET METAL SCREWS.
  - DRILL HOLES FOR EXPANSION ANCHORS IN CONCRETE AT LOCATIONS AND TO DEPTHS THAT AVOID REINFORCING BARS.

### ELECTRICAL CONDUIT

- A. METAL CONDUIT AND TUBING MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
- AFC CABLE SYSTEMS, INC.
  - ALFLEX INC.
  - ALLEN TUBE & CONDUIT; A TYCO INTERNATIONAL LTD. CO.
  - AMNET ELECTRICAL, INC.; ANACONDA METAL HOSE.
  - ELECTRI-FLEX CO.
  - MAVERICK TUBE CORPORATION.
  - O-Z/GEDNEY; A UNIT OF GENERAL SIGNAL.
  - WHEATLAND TUBE COMPANY.
- B. RIGID STEEL CONDUIT: ANSI C80.1
- C. ALUMINUM RIGID CONDUIT: ANSI C80.5
- D. IMC: ANSI C80.6
- E. PVC-COATED STEEL CONDUIT: PVC-COATED RIGID STEEL CONDUIT. COMPLY WITH NEMA DW.
- F. COATING THICKNESS: 0.040 INCH (1 MM), MINIMUM.
- G. EMT: ANSI C80.3
- H. FMC: ZINC-COATED STEEL.
- I. FMC: FLEXIBLE STEEL CONDUIT WITH PVC JACKET.
- J. FITTINGS FOR CONDUIT INCLUDING ALL TYPES AND FLEXIBLE AND LIQUDTIGHT, EMT, AND CABLE: NEMA FB 1, LISTED FOR TYPE AND SIZE RACEWAY WITH WHICH USED, AND FOR APPLICATION AND ENVIRONMENT IN WHICH INSTALLED.
- FITTINGS FOR EMT: STEEL SET-SCREW OR COMPRESSION TYPE. DIE-CAST IS NOT ACCEPTABLE.
  - COATING FOR FITTINGS FOR PVC-COATED CONDUIT: MINIMUM THICKNESS, 0.040 INCH (1 MM), WITH OVERLAPPING SLEEVES PROTECTING THREADED JOINTS.
- L. JOINT COMPOUNDS AND SEALERS: LISTED FOR USE IN CABLE CONNECTOR ASSEMBLIES, AND COMPOUNDED FOR USE TO LUBRICATE AND PROTECT THREADED RACEWAY JOINTS FROM CORROSION AND ENHANCE THEIR CONDUCTIVITY.
- M. SHEET METAL ACCESS, PULL, AND JUNCTION BOXES: NEMA 1B, GALVANIZED, CAST IRON WITH ASSEMBLY CERTIFIED AS AN EQUIPMENT GROUNDING CONDUCTOR AND A GREEN INSULATED EQUIPMENT GROUNDING CONDUCTOR CONNECTED TO ALL RECEPTABLES, METALLIC BOXES CONTAINING RECEPTABLES, AND ALL METALLIC EQUIPMENT CASINGS.
- THOMAS & BETTS CORPORATION.
  - WALKER SYSTEMS, INC.; WIREMOLD COMPANY (THE).
  - WIREMOLD COMPANY (THE), ELECTRICAL SALES DIVISION.
- N. MANUFACTURERS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
- COOPER CROUSE-HINDS; DIV. OF COOPER INDUSTRIES, INC.
  - EGS/APPLETON ELECTRIC.
  - HOFFMAN.
  - HUBBELL INCORPORATED; KILLARK ELECTRIC MANUFACTURING CO. DIVISION.
  - O-Z/GEDNEY; A UNIT OF GENERAL SIGNAL.
  - RADC; A HUBBELL COMPANY.
  - ROBROY INDUSTRIES, INC.; ENCLOSURE DIVISION.
  - THOMAS & BETTS CORPORATION.
  - WALKER SYSTEMS, INC.; WIREMOLD COMPANY (THE).
  - WIREMOLD COMPANY (THE), NEMA 1B.
- O. SHEET METAL OUTLET AND DEVICE BOXES: NEMA 1B, FERROUS ALLOY, TYPE FD, WITH GASKETED COVER.
- P. METAL PANEL BOXES: CAST METAL, FULLY ADJUSTABLE, RECTANGULAR.
- Q. MAIN SHEET METAL PULL AND JUNCTION BOXES: NEMA OS 1.
- R. CAST-METAL OUTLET AND DEVICE BOXES: NEMA 1B, FERROUS ALLOY, TYPE FD, WITH GASKETED COVER.
- S. HINGED-COVER ENCLOSURES: NEMA 250, TYPE 1, WITH CONTINUOUS-HINGE COVER WITH FLUSH LATCH, UNLESS OTHERWISE INDICATED.
- METAL ENCLOSURES: STEEL, FINISHED INSIDE AND OUT WITH MANUFACTURER'S STANDARD ENAMEL.
    - A. IN STANDARD PARTITIONS, WHERE 1/2" AND 3/4" CONDUITS ARE EMPLOYED: 4" SQUARE BY 2-1/8" DEEP BOXES WITH 1-1/8" GANG OR 2-GANG PLASTER COVERS SHALL BE USED, NO. 4SD-SPL.
    - B. IN THIN PARTITIONS MEASURING 3-1/2" OR LESS: 4" SQUARE BY 1-1/2" DEEP BOXES WITH 1-1/8" GANG OR 2-GANG PLASTER COVERS SHALL BE USED, NO. 4SD-SPL.
    - C. IN STANDARD PARTITIONS, WHERE CONDUITS OF A SIZE GREATER THAN 3/4" ARE EMPLOYED: 4" SQUARE BY 2-1/8" DEEP BOXES WITH 1-GANG OR 2-GANG PLASTER COVERS SHALL BE USED, NO. 4SD-SPL.
    - D. WHEREBY NO TWO (2) OUTLET BOXES ARE INSTALLED CLOSER THAN 24" ON CENTER, AND SECURELY ATTACHED TO THE PARTITION STUDS, WITH AT LEAST ONE (1) PARTITION STUD SEPARATING THE OUTLET BOXES. IT IS NOT ACCEPTABLE TO SECURE OUTLET BOXES ONLY TO WALL PARTITION.
- U. CABINETS:
- NEMA 250, TYPE 1, GALVANIZED-STEEL BOX WITH REMOVABLE INTERIOR PANEL AND REMOVABLE FRONT, FINISHED INSIDE AND OUT WITH MANUFACTURER'S STANDARD ENAMEL.
  - HINGED DOOR IN FRONT COVER WITH FLUSH LATCH AND CONCEALED HINGE.
  - KEY LATCH TO MATCH PANELBOARDS.
  - METAL BARRIERS TO DIMENSIONS OF DIFFERENT SYSTEMS AND VOLTAGE.
  - ACCESSORY FEET WHERE REQUIRED FOR FREESTANDING EQUIPMENT.
- V. INTERIOR APPLICATIONS:
- OUTDOORS: APPLY RACEWAY PRODUCTS AS SPECIFIED BELOW, UNLESS OTHERWISE INDICATED:
- EXPOSED CONDUIT: RIGID STEEL CONDUIT, EMT, RMC.
  - CONCEALED CONDUIT: ADORCEALED RIGID STEEL CONDUIT, EMT, RMC.
  - UNDERGROUND CONDUIT: RVC, TYPE EPC-40 PVC, DIRECT BURIED.
  - CONNECTION TO VIBRATING EQUIPMENT (INCLUDING TRANSFORMERS AND HYDRAULIC, PNEUMATIC, ELECTRIC SOLENOID, OR MOTOR-DRIVEN EQUIPMENT): LFMC.
  - BOXES AND ENCLOSURES: ADVISE NEMA 250, TYPE 3R.
- W. COMPLY WITH THE FOLLOWING INDOOR APPLICATIONS, UNLESS OTHERWISE INDICATED:
- EXPOSED, NOT SUBJECT TO PHYSICAL DAMAGE: EMT.
  - EXPOSED, NOT SUBJECT TO PHYSICAL DAMAGE: EMT.
  - EXPOSED AND SUBJECT TO SEVERE PHYSICAL DAMAGE: RIGID STEEL CONDUIT, INCLUDES RACEWAYS IN THE FOLLOWING LOCATIONS: LOADING DOCK, CORRIDORS USED FOR TRAFFIC OF MECHANIZED CARTS, FORKLIFTS, AND PALLET-HANDLING UNITS, MECHANICAL ROOMS.
  - CONCEALED IN CEILINGS AND INTERIOR WALLS AND PARTITIONS: EMT.
  - CONNECTION TO VIBRATING EQUIPMENT (INCLUDING TRANSFORMERS AND HYDRAULIC, PNEUMATIC, ELECTRIC SOLENOID, OR MOTOR-DRIVEN EQUIPMENT): FMC, EXCEPT USE LFMC IN DAMP OR WET LOCATIONS.
  - DAMP OR WET LOCATIONS: RIGID STEEL CONDUIT.
  - RACEWAYS FOR OPTICAL FIBER OR COMMUNICATIONS CABLE IN SPACES USED FOR ENVIRONMENTAL AIR: PLENUM-TYPE, OPTICAL FIBER/COMMUNICATIONS CABLE RACEWAY, EMT.
  - RACEWAYS FOR OPTICAL FIBER OR COMMUNICATIONS CABLE RISERS IN VERTICAL SHAFTS: RISER-TYPE, OPTICAL FIBER/COMMUNICATIONS CABLE RACEWAY, EMT.
  - RACEWAYS FOR CONCEALED GENERAL PURPOSE DISTRIBUTION OF OPTICAL FIBER OR COMMUNICATIONS CABLE: GENERAL-PURPOSE, OPTICAL FIBER/COMMUNICATIONS CABLE RACEWAY, RISER-TYPE, OPTICAL FIBER/COMMUNICATIONS CABLE RACEWAY, EMT.
  - BOXES AND ENCLOSURES: NEMA 250, TYPE 1, EXCEPT USE NEMA 250, TYPE 4K.
  - STAINLESS STEEL IN DAMP OR WET LOCATIONS.
  - MINIMUM RACEWAY SIZE: 1/2-INCH (16-MM) TRADE SIZE.
- X. RACEWAY FITTINGS: COMPATIBLE WITH RACEWAYS AND SUITABLE FOR USE AND LOCATION.
- Y. RIGID AND INTERMEDIATE STEEL CONDUIT: USE THREADED RIGID CONDUIT FITTINGS, UNLESS OTHERWISE INDICATED.
- PVC EXTERNALLY COATED, RIGID STEEL CONDUITS: USE ONLY FITTINGS LISTED FOR USE WITH THAT MATERIAL. PATCH AND SEAL ALL JOINTS, NOTCHES, AND SCRAPS IN PVC COATING AFTER INSTALLING CONDUITS AND FITTINGS. USE SEALANT RECOMMENDED BY FITTING MANUFACTURER.
- Z. INSTALLATION:
- COMPLY WITH NECA 1 FOR INSTALLATION REQUIREMENTS APPLICABLE TO PRODUCTS SPECIFIED EXCEPT WHERE REQUIREMENTS ON DRAWINGS OR IN THIS ARTICLE ARE STRICTER.
- AA. KEEP RACEWAYS AT LEAST 6 INCHES (150 MM) AWAY FROM PARALLEL RUNS OF FLUES AND STEAM OR HOT-WATER PIPES. INSTALL HORIZONTAL RACEWAY RUNS ABOVE WATER AND STEAM PIPING.
- AB. COMPLETE RACEWAY INSTALLATION BEFORE STARTING CONDUIT INSTALLATION.
- AC. SUPPORT RACEWAYS AS SPECIFIED IN "HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS."
- AD. ARRANGE STUB-UPS SO CURVED PORTIONS OF BENDS ARE NOT VISIBLE ABOVE THE FINISHED FLOOR.
- AE. INSTALL NO MORE THAN THE EQUIVALENT OF THREE 90-DEGREE BENDS IN ANY CONDUIT RUN EXCEPT FOR COMMUNICATIONS CONDUITS, FOR WHICH FEMER BENDS ARE ALLOWED.
- AF. CONCEAL CONDUIT AND EMT WITH FINISHED WALLS, CEILINGS, AND FLOORS, UNLESS OTHERWISE INDICATED.
- AG. RACEWAYS EMBEDDED IN SLABS:
- RUN CONDUIT LARGER THAN 1-INCH (25-MM) TRADE SIZE, PARALLEL OR AT RIGHT ANGLES TO MAIN REINFORCEMENT, WHERE AT RIGHT ANGLES TO REINFORCEMENT, PLACE CONDUIT CLOSE TO SLAB SUPPORT.
  - ARRANGE RACEWAYS TO CROSS BUILDING EXPANSION JOINTS AT RIGHT ANGLES WITH EXPANSION FITTINGS.
  - CHANGE FROM EMT TO RIGID, TYPE EPC-40-PVC, RIGID STEEL CONDUIT, OR IMC BEFORE RISING ABOVE THE FLOOR.
- AH. THREADED CONDUIT JOINTS, EXPOSED TO WET, DAMP, CORROSIIVE, OR OUTDOOR CONDITIONS, APPLY LISTED COMPOUND TO THREADED RACEWAY JOINTS BEFORE MAKING UP JOINTS. FOLLOW COMPOUND MANUFACTURER'S WRITTEN INSTRUCTIONS.
- AI. RACEWAY TERMINATIONS AT LOCATIONS SUBJECT TO MOISTURE OR VIBRATION: USE SEALING BUSHINGS TO PROTECT CONDUITS, INCLUDING CONDUITS SMALLER THAN NO. 4 AWG.
- AJ. INSTALL PULL WIRES IN EMPTY RACEWAYS. USE POLYPROPYLENE OR MONOPOLYMER PLASTIC LINE WITH HOT LESS THAN 200-15 (90-NO) TENSILE STRENGTH. LEAVE AT LEAST 12 INCHES (303 MM) OF SLACK AT EACH END OF PULL WIRE.
- AK. RACEWAYS FOR OPTICAL FIBER AND COMMUNICATIONS CABLE: INSTALL RACEWAYS, METALLIC AND NONMETALLIC, RIGID AND FLEXIBLE, AS FOLLOWS:
- 3/4-INCH (19-MM) TRADE SIZE AND SMALLER: INSTALL RACEWAYS IN MAXIMUM LENGTHS OF 50 FEET (15 M).
  - 1-INCH (25-MM) TRADE SIZE AND LARGER: INSTALL RACEWAYS IN MAXIMUM LENGTHS OF 75 FEET (23 M).
  - INSTALL WITH A MAXIMUM OF TWO 90-DEGREE BENDS OR EQUIVALENT FOR EACH LENGTH OF RACEWAY UNLESS DRAWINGS SHOW STRICTER REQUIREMENTS. SEPARATE LENGTHS WITH PULL OR JOINTION BOXES OR TERMINATIONS AT DISTRIBUTION FRAMES OR CABINETS WHERE NECESSARY TO COMPLY WITH THESE REQUIREMENTS.
- AL. INSTALL RACEWAY SEALING FITTINGS AT SUITABLE, APPROVED, AND ACCESSIBLE LOCATIONS AND FILL THEM WITH LISTED SEALING COMPOUND. FOR CONCEALED RACEWAYS, INSTALL EACH FITTING IN A FLUSH STEEL BOX WITH A BLANK COVER PLATE HAVING A FINISH SIMILAR TO THAT OF ADJACENT PLATES OR SURFACES. INSTALL RACEWAY SEALING FITTINGS AT THE FOLLOWING POINTS:
- WHERE CONDUITS PASS FROM WARM TO COLD LOCATIONS, SUCH AS BOUNDARIES OF REFRIGERATED SPACES.
  - WHERE OTHERWISE REQUIRED BY NFPA 70.

### TRANSFORMERS

- A. SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PRODUCTS BY ONE OF THE FOLLOWING:
- ACME ELECTRIC CORPORATION; POWER DISTRIBUTION PRODUCTS DIVISION.
  - EATON ELECTRICAL, INC.; CUTLER-HAMMER PRODUCTS.
  - GENERAL ELECTRIC COMPANY.
  - SIEMENS ENERGY & AUTOMATION, INC.
  - SOLA-BRAND-DUITY.
  - SQUARE D; SCHNEDER ELECTRIC.
- B. GENERAL TRANSFORMER REQUIREMENTS:
- DESCRIPTION: FACTORY-ASSEMBLED AND -TESTED, AIR-COOLED UNITS FOR 60-HZ SERVICE. GRAY-Oriented, NON-INSULATED SILICON STEEL.
  - CONTINUOUS WINDINGS WITHOUT SPIRES EXCEPT FOR TAPS.
  - INTERNAL COIL CONNECTIONS: BRACED OR PRESSURE TYPE.
  - COIL MATERIAL: COPPER.
- C. COMPLY WITH NEMA ST 20, AND LIST AND LABEL AS COMPLYING WITH UL 1561, ONE LED PER PHASE.
- D. ENCLOSURE: VENTILATED, NEMA 250, TYPE 3R, CORE AND COIL SHALL BE ENCAPSULATED WITHIN RESIN COMPOUND, SEALING OUT MOISTURE AND AIR.
- E. ENCLOSURE: VENTILATED, NEMA 250, TYPE 3R, CORE AND COIL SHALL BE ENCAPSULATED WITHIN RESIN COMPOUND, SEALING OUT MOISTURE AND AIR.
- F. TRANSFORMER ENCLOSURE FINISH: COMPLY WITH NEMA 250, FINISH COLOR: GRAY.
- G. TAPS FOR TRANSFORMERS SMALLER THAN 7.5 KVA: ONE 5 PERCENT TAP ABOVE NORMAL FULL CAPACITY.
- H. TAPS FOR TRANSFORMERS 7.5 TO 24 KVA: ONE 5 PERCENT TAP ABOVE AND ONE 5 PERCENT TAP BELOW NORMAL FULL CAPACITY.
- I. TAPS FOR TRANSFORMERS 25 KVA AND LARGER: TWO 2.5 PERCENT TAPS ABOVE AND TWO 2.5 PERCENT TAPS BELOW NORMAL FULL CAPACITY.
- J. INSULATION CLASS: 220 DEG. C, UL-COMPONENT-RECOGNIZED INSULATION SYSTEM WITH A MAXIMUM OF 115 DEG. C RISE ABOVE 40 DEG. C AMBIENT TEMPERATURE.
- K. ENERGY EFFICIENCY:
- FOR TRANSFORMERS RATED 15 KVA AND LARGER, COMPLYING WITH DOE-2016 10 KTR PART 431.

- L. K-FACTOR RATING: TRANSFORMERS INDICATED TO BE K-FACTOR RATED SHALL COMPLY WITH UL 1561 METAL BOX RACEWAYS: CAST METAL, FULLY ADJUSTABLE, RECTANGULAR. MAIN SHEET METAL PULL AND JUNCTION BOXES: NEMA OS 1.
- M. ELECTROSTATIC SHIELDING: EACH WINDING SHALL HAVE AN INDIVIDUAL, SINGLE-FILL-WITH COPPER ELECTROSTATIC SHIELD ARRANGED TO MINIMIZE INTERWINDING CAPACITANCE, ARRANGE COIL LEADS AND TERMINAL STRIPS TO MINIMIZE CAPACITIVE COUPLING BETWEEN INPUT AND OUTPUT TERMINALS, INCLUDE SMOOTH TERMINAL FOR ORGANIZING AND SHIELDING CAPACITANCE BETWEEN PRIMARY AND SECONDARY WINDINGS; NOT TO EXCEED 133 PHOFARDS OVER A FREQUENCY RANGE OF 400 K HZ AND AVERAGE RATED LIFE OF 20,000 HOURS UNLESS OTHERWISE INDICATED.
- N. FUNGUS PROOFING: PERMANENT FUNGICIDAL TREATMENT FOR COIL AND CORE.
- O. LUG RATING: ALL LUG CONNECTIONS SHALL BE RATED FOR CONNECTION OF 75 DEG. C INSULATION CONDUCTORS.

### PANELBOARDS

- A. ENCLOSURES: FLUSH- AND SURFACE-MOUNTED CABINETS, RATED FOR ENVIRONMENTAL CONDITIONS AT INSTALLED LOCATION, INDOOR DRY AND CLEAN LOCATIONS: NEMA 250, TYPE 1, OUTDOOR LOCATIONS: NEMA 250, TYPE 3R. WET OR DAMP INDOOR LOCATIONS: NEMA 250, TYPE 4X STAINLESS STEEL.
- B. FRONT: SECURED TO BACK WITH CONCEALED TRIM CLAMPS, FOR SURFACE-MOUNTED FRONTS. MATCH BOX DIMENSIONS; FOR FLUSH-MOUNTED FRONTS, OVERLAP BOX.
- C. HINGED FRONT COVER: ENTIRE FRONT TRIM HINGED TO BOX AND WITH STANDARD DOOR WITHIN RATED TRIM COVER.
- D. FINISHES:
- ANNEAL-TYPE: GALVANIZED STEEL, FACTORY FINISHED IMMEDIATELY AFTER CLEANING AND PRETREATING WITH MANUFACTURER'S STANDARD TWO-COAT, BAKED-ON FINISH CONSISTING OF PRIME COAT AND THERMOSETTING TOPCOAT.
- E. BACK BOXES: GALVANIZED STEEL.
- F. FUNGUS PROOFING: PERMANENT FUNGICIDAL TREATMENT FOR OVERCURRENT PROTECTIVE DEVICES AND OTHER COMPONENTS.
- G. DIRECTORY CARD: INSIDE PANELBOARD DOOR, MOUNTED IN TRANSPARENT CARD HOLDER.
- H. INCOMING MAINS LOCATION: TOP AND BOTTOM.
- I. PHASE, NEUTRAL AND GROUND BUSSES:
- MATERIAL: THIN-PLATED ALUMINUM OR HARD-BRAZED COPPER, 98 PERCENT CONDUCTIVITY.
  - CONFIGURATION: 5-COIL AND RMC AS SCHEDULED IN NECA 1, WHERE ITS TABLE 1 LISTS MAXIMUM SPACINGS LESS THAN STATED IN NFPA 70. MINIMUM ROD SIZE SHALL BE 1/4 INCH (6 MM) IN DIAMETER. MULTIPLE RACEWAYS OR CABLES: INSTALL TRAPEZOID-TYPE SUPPORTS FABRICATED WITH STEEL SLOTTED OR OTHER SUPPORT SYSTEM, SIZED TO CAPACITY CAN BE INCREASED BY AT LEAST 25 PERCENT IN FUTURE WITHOUT EXCEEDING SPECIFIED DESIGN LOAD LIMITS. SECURE RACEWAYS AND CABLES TO THESE SUPPORTS WITH TWO-BOLT CONDUIT CLAMPS, SPRING-STEEL CLAMPS DESIGNED FOR SUPPORTING SINGLE CONDUCTORS WITHOUT BOLTS MAY BE USED FOR 1-1/2-INCH (38-MM) AND SMALLER RACEWAYS SERVING BRANCH CIRCUITS AND COMMUNICATION SYSTEMS ABOVE SUSPENDED CEILINGS AND FOR FASTENING RACEWAYS TO TRAPEZOID SUPPORTS.
- J. CONDUCTOR CONNECTORS: SUITABLE FOR USE WITH CONDUCTOR MATERIAL AND SIZES. MATERIAL: THIN-PLATED ALUMINUM OR HARD-BRAZED COPPER, 98 PERCENT CONDUCTIVITY. MAIN AND NEUTRAL LUGS: COMPRESSION LUGS AND BUS-COMPRESSION LUGS. TERMINATORS: COMPRESSION TYPE, FEED-THROUGH BUS, COMPRESSION TYPE, SUITABLE FOR USE WITH CONDUCTOR MATERIAL. LOCATE AT POSITIVE END OF BUS FROM INCOMING LUGS OR MAIN DEVICE. RATED FOR CONNECTION OF 75 DEG. C INSULATED CONDUCTORS.
- K. PANELBOARD SHORT-CIRCUIT CURRENT RATING: FULLY RATED TO INTERRUPT SYMMETRICAL SHORT-CIRCUIT CURRENT AVAILABLE AT TERMINAL.
- L. LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS:
- MATERIAL: THIN-PLATED ALUMINUM OR HARD-BRAZED COPPER, 98 PERCENT CONDUCTIVITY.
  - GENERAL DESCRIPTION: STRAIGHT BLADE, FEED-THROUGH TYPE. COMPLY WITH NEMA WD 1, NEMA DW 6, UL 498, AND UL 943, CLASS A, AND INCLUDE INDICATOR LIGHT THAT IS LIGHTED WHEN DEVICE IS TRIPPED AND UNLIT WHEN DEVICE IS RESET TO NORMAL. SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:
    - 1. LEVITON; 16341-2W (SINGLE), 16362-2W (DUPLEX).
    - 2. ANY EQUAL OR ABOVE LISTED MANUFACTURERS.
- M. SNAP SWITCHES, COMPLY WITH NEMA WD 1 AND UL 20, SWITCHES, 120/277 V, 20 A; PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:
1. LEVITON; 5621-2W (SINGLE POLE), 5622-2 (TWO POLE), 5623-2 (THREE WAY)
  2. ANY EQUAL OR ABOVE LISTED MANUFACTURERS.

### SWITCHES

- A. WALL-BOX DIMMERS, DIMMER SWITCHES: MODULAR, FULL-WAVE, SOLID-STATE UNITS WITH INTEGRAL, QUIET ON-OFF SWITCHES, WITH AUDIBLE FREQUENCY AND EM/RFI SUPPRESSION FILTERS, CONTROL: CONTINUOUSLY ADJUSTABLE SLIDER, WITH SINGLE-POLE OR THREE-WAY SWITCHING. COMPLY WITH UL 1472.
- INCANDESCENT LAMP DIMMERS: 120 V, CONTROL SHALL FOLLOW SQUARE-LAW DIMMING CURVE. ON-OFF SWITCH POSITIONS SHALL BYPASS DIMMER MODULE. 2000 W, DIMMERS SHALL REQUIRE NO DERATING WHEN GANGED WITH OTHER DEVICES.
  - FLOURESCENT LAMP DIMMER SWITCHES: MODULAR, COMPATIBLE WITH DIMMER BALLASTS; TRIP POTENTIAL: ADJUSTABLE.
  - WET-LOCATION DIMMERS: DIMMER-BALLAST COMBINATION CAPABLE OF CONSISTENT DIMMING WITH LOW END NOT GREATER THAN 20 PERCENT OF FULL BRIGHTNESS.
  - ACCEPTABLE MANUFACTURERS: LUTRON, LEVITON.
- B. VACANCY/OCCUPANCY SENSORS, WALL-SWITCH SENSORS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:
1. LUTRON; MS-8102 (PROGRAMMED FOR VACANCY OR OCCUPANCY OPERATION AS SHOWN)
  2. ANY EQUAL, BY NOVITAS, WATTSTOPPER, LEVITON OR SENSOARY SWITCH.
- C. DESCRIPTION: DUAL TECHNOLOGY TYPE 120/277 V, ADJUSTABLE TIME DELAY UP TO 20 MINUTES, 180-DEGREE FLEW OF VIEW, WITH A MINIMUM COVERAGE AREA OF 900 SQ. FT. (81 SQ. M), MANUAL-ON/AUTO-OFF OR AUTO-ON TO 50%/AUTO-OFF.
- D. WALL PLATES, SINGLE AND COMBINATION TYPES TO MATCH CORRESPONDING WIRING DEVICES. PLATE-SECURING SCREWS: METAL WITH HEAD COLOR TO MATCH PLATE FINISH.
- MATERIAL FOR FINISHED SPACES: SMOOTH, HIGH-IMPACT THERMOPLASTIC 0.035-INCH- (3/4-MM)-THICK.
  - MATERIAL FOR UNFINISHED SPACES: SMOOTH, HIGH-IMPACT THERMOPLASTIC.
  - MATERIAL FOR DAMP LOCATIONS: THERMOPLASTIC WITH SPRING-LOADED LIFT COVER, AND LISTED AND LABELED FOR USE IN WET LOCATIONS.
  - WET-LOCATION, WEATHERPROOF COVER PLATES: NEMA 250, COMPLYING WITH TYPE 3R WEATHER-RESISTANT, THERMOPLASTIC WITH LOCKABLE COVER.

### BALLASTS

- A. BALLASTS FOR LINEAR FLUORESCENT LAMPS, GENERAL REQUIREMENTS FOR ELECTRONIC BALLASTS:
1. COMPLY WITH UL 935 AND WITH ANSI C82.11.
  2. DESIGNED FOR TYPE AND QUANTITY OF LAMP SERVED.
  3. BALLASTS SHALL BE DESIGNED FOR BALLAST FULL LIGHT OUTPUT UNLESS ANOTHER BF, DIMMER, OR BR-LEVEL CONTROL IS INDICATED.
  4. SOUND RATING: CLASS 5.
  5. TOTAL HARMONIC DISTORTION RATING: LESS THAN 10 PERCENT.
  6. TRANSIENT VOLTAGE PROTECTION: IEEE C82.41.1 AND IEEE C82.41.2, CATEGORY A OR BETTER.
  7. OPERATING FREQUENCY: 42 KHZ OR HIGHER.
  8. LAMP CURRENT GREST FACTOR: 1.7 OR LESS.
  9. BF: 0.05 OR HIGHER UNLESS OTHERWISE INDICATED.
  10. POWER FACTOR: 0.95 OR HIGHER.
- B. PARALLEL LAMP CIRCUITS: MULTIPLE LAMP BALLASTS SHALL COMPLY WITH ANSI C82.11 AND BE CONNECTED TO MAINTAIN FULL LIGHT OUTPUT ON SURVIVING LAMPS IF ONE OR MORE LAMPS FAIL.
- C. LAMP END-OF-LIFE DETECTION AND SHUTDOWN CIRCUIT FOR 15 DIAMETER LAMPS:
2. AUTOMATIC LAMP STARTING AFTER LAMP REPLACEMENT.
- D. ELECTROMAGNETIC BALLASTS: COMPLY WITH ANSI C82.1; ENERGY SAVING, HIGH-POWER FACTORS, CLASS P, AND HAVING AUTOMATIC-RESET THERMAL PROTECTION.
- E. BALLAST MANUFACTURER CERTIFICATION: INDICATED BY LABEL.
- F. SINGLE BALLAST FOR MULTIPLE LIGHTING FIXTURES: FACTORY WIRED WITH BALLAST ARRANGEMENTS AND BUNDLED EXTENSION WIRING TO SUIT FINAL INSTALLATION CONDITIONS WITHOUT MODIFICATION OR REWIRING IN THE FIELD.
- G. BALLASTS FOR COMPACT FLUORESCENT LAMPS:
- DESCRIPTION: ELECTRONIC-PROGRAMMED RAPID-START TYPE, COMPLYING WITH UL 935 AND WITH ANSI C 82.11, DESIGNED FOR TYPE AND QUANTITY OF LAMPS INDICATED. BALLAST SHALL BE DESIGNED FOR FULL LIGHT OUTPUT UNLESS DIMMER OR BR-LEVEL CONTROL IS INDICATED.
  - 1. LAMP END-OF-LIFE DETECTION AND SHUTDOWN CIRCUIT FOR 15 DIAMETER LAMPS.
  - 2. AUTOMATIC LAMP STARTING AFTER LAMP REPLACEMENT.
  - 3. SOUND RATING: CLASS 5.
  - 4. TOTAL HARMONIC DISTORTION RATING: LESS THAN 20 PERCENT.
  - 5. TRANSIENT VOLTAGE PROTECTION: IEEE C82.41.1 AND IEEE C82.41.2, CATEGORY A OR BETTER.
  - 6. OPERATING FREQUENCY: 20 KHZ OR HIGHER.
  - 7. LAMP CURRENT GREST FACTOR: 1.7 OR LESS.
  - 8. BF: 0.05 OR HIGHER UNLESS OTHERWISE INDICATED.
  - 9. POWER FACTOR: 0.95 OR HIGHER.
  - 10. INTERFERENCE: COMPLY WITH 47 CFR 18, CH. 1, SUBPART C, FOR LIMITATIONS ON ELECTROMAGNETIC AND RADIO-FREQUENCY INTERFERENCE FOR NONCONSUMER EQUIPMENT.

### FLUORESCENT LAMPS

- A. T8 RAPID-START LAMPS, RATED 32 W MAXIMUM, NOMINAL LENGTH OF 48 INCHES (1220 MM), 2900 INITIAL LUMENS (MINIMUM), CRI 85 (MINIMUM), COLOR TEMPERATURE 3000 K, AND AVERAGE RATED LIFE 20,000 HOURS UNLESS OTHERWISE INDICATED.
- B. T8 RAPID-START LAMPS, RATED 17 W MAXIMUM, NOMINAL LENGTH OF 24 INCHES (610 MM), 1300 INITIAL LUMENS (MINIMUM), CRI 85 (MINIMUM), COLOR TEMPERATURE 3000 K, AND AVERAGE RATED LIFE OF 20,000 HOURS UNLESS OTHERWISE INDICATED.
- C. T5 RAPID-START LAMPS, RATED 28 W MAXIMUM, NOMINAL LENGTH OF 45.2 INCHES (1150 MM), 2900 INITIAL LUMENS (MINIMUM), CRI 85 (MINIMUM), COLOR TEMPERATURE 3000 K, AND AVERAGE RATED LIFE OF 20,000 HOURS UNLESS OTHERWISE INDICATED.
- D. T5HO RAPID-START, LARGE-OUTPUT LAMPS, RATED 54 W MAXIMUM, NOMINAL LENGTH OF 45.2 INCHES (1150 MM), 5000 INITIAL LUMENS (MINIMUM), CRI 85 (MINIMUM), COLOR TEMPERATURE 4100 K, AND AVERAGE RATED LIFE OF 20,000 HOURS UNLESS OTHERWISE INDICATED.
- E. COMPACT FLUORESCENT LAMPS: 4-PIN, CRI 80 (MINIMUM), COLOR TEMPERATURE 3000 K, AVERAGE RATED LIFE OF 10,000 HOURS AT THREE HOURS OPERATION PER START, AND SUITABLE FOR USE WITH DIMMING BALLASTS UNLESS OTHERWISE INDICATED.
1. 13 W T4, DOUBLE OR TRIPLE TUBE, RATED 900 INITIAL LUMENS (MINIMUM).
  2. 18 W T4, DOUBLE OR TRIPLE TUBE, RATED 1200 INITIAL LUMENS (MINIMUM).
  3. 26 W T4, DOUBLE OR TRIPLE TUBE, RATED 1800 INITIAL LUMENS (MINIMUM).
  4. 32 W T4, TRIPLE TUBE, RATED 2400 INITIAL LUMENS (MINIMUM).
  5. 42 W T4, TRIPLE TUBE, RATED 3200 INITIAL LUMENS (MINIMUM).
  6. 57 W T4, TRIPLE TUBE, RATED 4300 INITIAL LUMENS (MINIMUM).
  7. 70 W T4, TRIPLE TUBE, RATED 5200 INITIAL LUMENS (MINIMUM).

### LED LAMPS

- A. MINIMUM LUMENS PER SCHEDULED FIXTURE.
- B. MINIMUM ALLOWABLE EFFICACY OF 85 LM/W.
- C. MATCH BOX DIMENSIONS; FOR FLUSH-MOUNTED FRONTS, OVERLAP BOX.
- D. RATED LAMP LIFE OF 50,000 HOURS TO L70.
- E. DIMMABLE FROM 100 PERCENT TO 1 PERCENT OF MAXIMUM LIGHT OUTPUT.
- F. INTERNAL APPLICATIONS:
- USER-REPLACEABLE LAMPS:
    - 1. BULB SHAPE COMPLYING WITH ANSI C78.79.
    - 2. LAMP BASE COMPLYING WITH ANSI C81.61 OR IEC 60061-1.

### WIRING DEVICES

- A. MANUFACTURERS:
- COOPER WIRING DEVICES.
  - HUBBELL INCORPORATED; WIRING DEVICE-KELLUMS
  - LEVITON MFG. COMPANY INC.
  - PASS & SEYMOUR/LEGRAIN; WIRING DEVICES & ACCESSORIES
- B. ALL WIRING DEVICES TO BE WHITE OR COLOR AS SELECTED BY ARCHITECT.
- C. STRAIGHT BLADE RECEPTABLES: CONVENIENCE RECEPTABLES, 125 V, 20 A; COMPLY WITH NEMA WD 1, NEMA DW 6 CONFIGURATION 5-COIL AND RMC AS SCHEDULED IN NECA 1, WHERE ITS TABLE 1 LISTS MAXIMUM SPACINGS LESS THAN STATED IN NFPA 70. MINIMUM ROD SIZE SHALL BE 1/4 INCH (6 MM) IN DIAMETER. MULTIPLE RACEWAYS OR CABLES: INSTALL TRAPEZOID-TYPE SUPPORTS FABRICATED WITH STEEL SLOTTED OR OTHER SUPPORT SYSTEM, SIZED TO CAPACITY CAN BE INCREASED BY AT LEAST 25 PERCENT IN FUTURE WITHOUT EXCEEDING SPECIFIED DESIGN LOAD LIMITS. SECURE RACEWAYS AND CABLES TO THESE SUPPORTS WITH TWO-BOLT CONDUIT CLAMPS, SPRING-STEEL CLAMPS DESIGNED FOR SUPPORTING SINGLE CONDUCTORS WITHOUT BOLTS MAY BE USED FOR 1-1/2-INCH (38-MM) AND SMALLER RACEWAYS SERVING BRANCH CIRCUITS AND COMMUNICATION SYSTEMS ABOVE SUSPENDED CEILINGS AND FOR FASTENING RACEWAYS TO TRAPEZOID SUPPORTS.
- D. ISOLATED-GROUND, DUPLEX CONVENIENCE RECEPTABLES, 125 V, 20 A; COMPLY WITH NFPA 70, UL 1575, AND UL 1578, CLASS A, AND INCLUDE INDICATOR LIGHT THAT IS LIGHTED WHEN DEVICE IS TRIPPED AND UNLIT WHEN DEVICE IS RESET TO NORMAL. SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:
1. LEVITON; 16362-2W.
  2. ANY EQUAL OR ABOVE LISTED MANUFACTURERS.
- E. GFCI RECEPTABLES:
- GENERAL DESCRIPTION: STRAIGHT BLADE, FEED-THROUGH TYPE. COMPLY WITH NEMA WD 1, NEMA DW 6, UL 498, AND UL 943, CLASS A, AND INCLUDE INDICATOR LIGHT THAT IS LIGHTED WHEN DEVICE IS TRIPPED AND UNLIT WHEN DEVICE IS RESET TO NORMAL. SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:
    - 1. LEVITON; 7899-W.
    - 2. ANY EQUAL OR ABOVE LISTED MANUFACTURERS.
- F. SNAP SWITCHES, COMPLY WITH NEMA WD 1 AND UL 20, SWITCHES, 120/277 V, 20 A; PRODUCTS: SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE ONE OF THE FOLLOWING:
1. LEVITON; 5621-2W (SINGLE POLE), 5622-2 (TWO POLE), 5623-2 (THREE WAY)
  2. ANY EQUAL OR ABOVE LISTED MANUFACTURERS.
- G. WALL-BOX DIMMERS, DIMMER SWITCHES: MODULAR, FULL-WAVE, SOLID-STATE UNITS WITH INTEGRAL, QUIET ON-OFF SWITCHES, WITH AUDIBLE FREQUENCY AND EM/RFI SUPPRESSION FILTERS, CONTROL: CONTINUOUSLY ADJUSTABLE SLIDER, WITH SINGLE-POLE OR THREE-WAY SWITCHING. COMPLY WITH UL 1472.
- INCANDESCENT LAMP DIMMERS: 120 V, CONTROL SHALL FOLLOW SQUARE-LAW DIMMING CURVE. ON-OFF SWITCH POSITIONS SHALL BYPASS DIMMER MODULE. 2000 W, DIMMERS SHALL REQUIRE NO DERATING WHEN GANGED WITH OTHER DEVICES.
  - FLOURESCENT LAMP DIMMER SWITCHES: MODULAR, COMPATIBLE WITH DIMMER BALLASTS; TRIP POTENTIAL: ADJUSTABLE.
  - WET-LOCATION DIMMERS: DIMMER-BALLAST COMBINATION CAPABLE OF CONSISTENT DIMMING WITH LOW END NOT GREATER THAN 20 PERCENT OF FULL BRIGHTNESS.
  - ACCEPTABLE MANUFACTURERS: LUTRON, LEVITON.