260513-H: SUPPLEMENTAL MEDIUM, LOW AND CONTROL VOLTAGE CABLES (16120-H)

Related Sections

Basis Guideline: 260513 – “Medium, Low and Control Voltage Cables”
260800-H – “Supplemental Electrical Acceptance Test”
260553-H – “Supplemental Electrical Equipment Identification”

For an explanation of the use of these guidelines, see “Design Guidelines for UMHHC Facilities”

Conductors

1. Medium Voltage Cables
   a. The size of conductors used for interior distribution of medium voltage power need not adhere to 350-MCM noted in the campus guideline.
   b. Larger or smaller sizes, appropriate for the load being served, may be selected

2. Low Voltage (600-volt class) Power Wires and Cables
   a. All conductors related to the powering of X-ray systems are to be stranded type THHN, unless otherwise noted, or required by system manufacturers.
   b. The wiring of the branch circuit wiring from the Isolated Power Systems located in Operating Rooms, Invasive Procedure Rooms, and like areas shall have dielectric constant of 3.5 or less. Typically XHHW meets this need.
   c. Use HFC MC type wiring listed and labeled for Health Care applications in both patient care and non-patient care areas as allowed for ‘in-wall’ wiring per 16050.
   d. In facilities where non-metallic [Type NM Series (Romex)] cables are already installed, and the area is being renovated, the Type NM may be extended only under the following conditions:
      i. The building is of Type I construction – ‘fire resistive’ as defined by NFPA 220.
      ii. The building is of Type II construction – ‘non-combustible’ as defined by NFPA 220.
      iii. The function of the space is not patient care.

Splices

1. No splices in any conductor are to be made inside raceway. Splices are to only be made in approved junction box, pull boxes, or manholes/handholes.
2. Heat Shrink insulating splicing kits suitable for submersible applications shall be used in wet locations.
3. Wire and cable larger than #8 are to be joined or terminated with copper compression type connectors or lugs.
4. Connectors for splicing branch circuit wiring (smaller than #8), lighting wiring, and control and instrumentation wiring shall be of the solderless wire nut type.
5. Lugs for terminating control and instrumentation wiring shall be of the solderless compression ring or spade type.
6. Exam lighting for Operating Rooms shall use type XHHW-2 wire and crimp type splices.
7. Compression connectors and lugs shall be crimped with tools specifically designed for the termination's being crimped.

Tapping

All splicing or taps in Type THHN, or XHHW conductors #8 and larger are to be insulated with two half-lapped layers of Minnesota Mining #33 electrical tape if uninsulated connectors are used.
Grounding

1. Any conductor intended solely for equipment grounding purposes is to be solid green or green stripe in color, unless bare is allowed for specific applications, in grounding section of these guidelines. Power conductors having green covering are only to be used to indicate ground.

2. Each box and device is to be individually grounded.

Neutrals

1. Power conductors having white or gray covering are to only indicate neutral (grounded) conductors.

2. Branch circuits shall each have a separate neutral conductor: Do not share neutral. The dedicated neutral prevents service disruptions on other circuits, when maintenance needs to be performed on the neutral of another circuit. Where NEC requires it, derate current carrying rating of all the conductors in the raceway (or install additional raceway) -to reflect the neutral being a current carrying conductor.

3. Low voltage three phase feeders, serving loads that contain a high percentage of non-linear (harmonic current loads) shall have neutrals sized at 150% whenever possible. If investigation shows the current THD of the load allows it, a 100% neutral may be installed.

4. Single-phase branch circuits shall not share neutrals with other circuits – they shall have dedicated neutrals. Exceptions to this rule would include ‘general use’ areas of leased facilities.

Installation Requirements

1. Cable lubricant shall be used when pulling power distribution cables. Cables shall be pulled carefully to avoid exceeding the maximum pulling tension, maximum side wall pressure or minimum bend radius. Do not, however, use pulling lubricants on X-ray systems or operating room isolated power system wiring.

2. For cables number 1 AWG and smaller, install cables by hand.

3. For cables larger than number 1 AWG, power pulling winches with cable tension monitoring equipment may be used.

4. Ensure cable pulling crew have all calculations and cable pulling limitations while pulling cables. The Engineer may require replacing the cable if cable pulling tension exceeds 75% of maximum recommended levels as published by the cable manufacture.

5. Home runs of 20 amps, 120 volt branch circuits that exceed 150 feet in length shall be No. 10 AWG.

6. Normally the shields of shielded instrumentation and control cables shall have their drain wires grounded at one end only. The shields at the other end shall be insulated from ground. This may not be appropriate unless we add a 50-volt class cable section.

7. Identification tags shall be installed on all cables and conductors terminated in panels.

8. Wire is not to be installed, until all other work that may cause injury to the wiring, including pouring of concrete, is complete.

9. Color coding for wiring systems is to be in accordance with Section 260553-H – “Electrical Equipment Identification”.

10. All conductors (phase and neutral) in a panel are to be identified with numbered tabs.

11. Balance the load on 3 phase panels to within 25% (or less). Require contractor to rework circuits and panel directories, whenever imbalance is greater than 25% under normal conditions. When re-balancing is required wire color change identifications of phase shall be done.

Field Quality Control

The contractor shall perform testing in accordance with Section 260800-H, and shall submit a test report.

Pre Fabricated Wiring for Lighting Fixtures

Pre-fabricated, UL listed, wiring assemblies intended for wiring lighting fixtures, above dropped (accessible) ceilings, are an exception to the above guidelines for wiring of lighting fixtures. These
assemblies shall be installed so that any excess cable length is neatly coiled and tied to ceiling drop wires. Wiring to the switches themselves, and homeruns to panels, shall be standard pipe and wire and in full accordance with the main body of this section of the guidelines.