

26 05 19 – Building Wire and Cable

1. Introduction

A. In general, wiring methods shall be individual copper conductors in conduit.

2. References

A. NFPA 70 National Electrical Code

B. IBC International Building Code

3. Design Standards

A. Building Wire:

1. All power wiring rated 600V and below shall be minimum #12 AWG Type THHN/THWN.
2. All conductors shall be copper. Aluminum is strictly prohibited.
3. Power and lighting circuits #10 AWG and smaller shall be solid conductors. For connections to vibrating equipment, conductors shall be stranded.
4. Conductor sizes #8 AWG and larger shall be Class B stranded conductors.
5. Neutral conductors subject to harmonic loads shall be oversized on Y-grounded systems and considered current carrying conductors when sizing conduits. The neutral conductor shall not be smaller than phase conductors.
6. Color code system wiring for standard clockwise rotation is shown below:

208/120 Volt Systems

Phase A – Black
Phase B – Red
Phase C – Blue
Neutral – White
Ground – Green

408/277 Volt System

Phase A – Brown
Phase B – Orange
Phase C – Yellow
Neutral – Gray
Ground – Green

7. All circuits shall be identified at the connection to the device with source circuit number and panel.
8. Branch circuit wiring shall be sized for a maximum of 3% voltage drop. The maximum total voltage drop on both feeders and branch circuits to the farthest outlet shall not exceed 5%.

9. All power wiring shall be in conduit. For additional requirements related to conduit, see Section 26 05 33.
10. Do not mix conductors serving two separate power systems (i.e., 208/120 volt and 480/277 volt) in the same raceway, pull box or junction box.

Exception: Where control wiring is a different voltage from power for the same system.

11. Joints in solid conductors shall be spliced using wire nut style connectors in junction boxes, outlet boxes and lighting fixtures. Permanent type crimp connectors shall not be used for branch circuit connections. Plug-in type connectors are prohibited except at end-of-run luminaire connections
12. Joints in stranded conductors shall be spliced by mechanical connectors and gum rubber tape or friction tape. Solderless mechanical connectors for splices and taps provided with UL-approved insulating covers may be used instead of mechanical connectors plus tape.

B. Medium Voltage Conductors:

1. All medium and high voltage phase conductors shall be single-conductor, copper tape shielded, ethylene-propylene rubber insulated power cable rated at 15KV. Circuits shall include a separate 600-volt neutral. Cables shall be approved, terminated and tested by Duke University.
2. Shall be copper and listed for 15 kV service.
3. Type MV-105, insulated to 133% insulation level, EPR.
4. All cable shall be suitable for use in wet or dry locations.
5. Cable shall be identified by phase markings on the outer jacket intervals not to exceed 2 feet.
6. Cable shall be installed in concrete encased underground ductbanks and electrical vaults. Direct burial of conductors is prohibited.

4. Documentation and Review Requirements

A. The following design calculations shall be submitted with the construction documents:

1. Building short circuit
2. Building load
3. Feeder voltage drop (100A feeders and above)

5. Installation and Performance Requirements
 - A. Coordinate all required tie-in points with Duke Utilities and Engineering Services (DUES).
 - B. Coordinate all commissioning efforts with DUES.
 - C. Provide floorplans with locations of splices in feeders 100A or larger
6. As-Built Requirements
 - A. N.A.