PART 1 - GENERAL

1.01 SECTION INCLUDES

1. Building Wire and Cable
2. Remote Control and Signal Cable
3. Power Limited Fire Protective Signaling Cable
4. Wiring Connectors and Connections

1.02 RELATED SECTIONS

1. Section 26 05 33.13 Conduit and Raceways
2. Section 26 05 33.16 Boxes
3. Section 26 05 53 Electrical Identification

1.03 REFERENCES

1. ANSI/NFPA 70—National Electrical Code (NEC)
2. NEMA WC5—Thermoplastic-insulated wire and cable for the transmission and distribution of electrical energy

1.04 PROJECT CONDITIONS

1. Verify that field measurements are as shown on drawings.
2. All conductors shall be copper.
3. Conductor sizes are based on copper.
4. Where wire and cable routing is not shown, and destination only is indicated, determine exact routing and lengths required.

1.05 COORDINATION

A. Coordinate work under provisions of Division 01.

B. Determine required separation between cable and other work.

C. Determine cable routing to avoid interference with other work.

PART 2 - PRODUCTS

2.01 BUILDING WIRE AND CABLE

* 1. Description: Single conductor insulated wire
	2. Conductor: Copper
	3. Insulation Voltage Rating: 600 volts
	4. Insulation: ANSI/NFPA 70, Type THHN/THWN, XHHW material rated 90°C

2.02 CLASS 1 REMOTE CONTROL AND SIGNAL CABLE

* 1. Description: ANSI/NFPA 70, Type TFFN, THHN
	2. Conductor: Copper
	3. Insulation Voltage Rating: 600 volts

2.03 CLASS 2 OR 3 REMOTE CONTROL AND SIGNAL CABLE

* 1. Description: NEMA/ICEA WC5, thermoplastic insulated cable, individual insulated conductors twisted together, metallic shielded and covered with PVC jacket when installed in metal raceway
	2. Conductor: Copper, stranded
	3. Insulation Voltage Rating: 300 volts

2.04 CLASS 1 AND NON POWER—LIMITED FIRE PROTECTIVE SIGNALING CABLES

* 1. Description: NEMA/NFPA 70, Type TFFN, THHN installed in metal raceway
	2. Conductor: Copper
	3. Insulation Voltage Rating: 600 volts

2.05 POWER LIMITED FIRE PROTECTIVE SIGNALING CABLES

* 1. Description: NEMA/NFPA 70, Type TFFN, THHN installed in metal raceway
	2. Conductor: Copper
	3. Insulation Voltage Rating: 600 volts

2.06 POWER LIMITED FIRE PROTECTIVE SIGNALING CABLES

* 1. Description: NEMA/NFPA 70, Type FPL, FPLR installed in metal raceway
	2. Conductor: Copper
	3. Insulation Voltage Rating: 300 Volts

2.07 POWER LIMITED FIRE PROTECTIVE SIGNALING CABLES

* 1. Description: NEMA/NFPA 70, Type FPLP installed in metal raceway
	2. Conductor: Copper
	3. Insulation Voltage Rating: 300 volts

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that interior of building has been protected from weather.

B. Verify that mechanical work, likely to damage wire and cable, has been completed.

3.02 PREPARATION

Completely and thoroughly swab raceway before installing wire.

3.03 WIRING METHODS

A. Concealed Dry Interior Locations: Use only building wire and cable (all types) in raceway.

B. Exposed Dry Interior Locations: For feeders, branch circuits, and Class 1 remote control circuits, use only building wire in raceway. For Class 2 or 3 control cable and power limited fire protective signaling cables, run in raceway.

C. Above Accessible Ceilings: For feeders, branch circuits and Class 1 remote control cables use only building wire in raceway. For Class 2 or 3 remote control cables run exposed. For power limited fire protective signaling cables, run in raceway.

D. Wet or Damp Interior Locations: For feeders, branch circuits and Class 1 remote control cables use only building wire in raceway. For Class 2 or 3 remote control cable and power limited fire protective signaling cables run in raceway.

E. Exterior Locations: For feeders, branch circuits and Class 1 remote control cables, use only building wire run in raceway. For Class 2 or 3 remote control cables and fire protective signaling cables, run in raceway.

F. Underground Installations: For feeders, branch circuits and Class 1 remote control cables, use only building wire run in raceway. For Class 2 or 3 remote control cables and power limited fire protective signaling cables, run in raceway.

G. Use wiring methods indicated on drawings.

3.04 INSTALLATION

A. Install products in accordance with manufacturer’s instructions.

B. Each computer/clean power receptacle and lighting circuits shall have a dedicated neutral conductor.

C. If stranded conductors are used for branch-circuits, the devices shall be pressure terminal type.

D. Use stranded conductors for control circuits and for feeder and branch circuits No. 10 and larger.

E. Use conductor not smaller than #12 AWG for power and lighting circuits.

F. Use conductor not smaller than #14 AWG for control circuits.

G. Use #10 AWG conductors for 20 ampere, 120 volt branch circuits longer than 75 feet throughout the entire length of the branch circuit. Branch circuits of exceptionally longer lengths (i.e., site lighting, marquee signs, basketball court power, etc.) shall require an increase in conductor size.

H. Use #10 AWG conductors for 20 ampere, 277 volt branch circuits longer than 200 feet.

1. All phase conductors shall have color coded insulation. All branch circuit, feeder and service entrance conductors shall be color coded the entire length. All color coding shall be with the same color being used with its respective phase or bus through the entire length of conductor with enclosures, boxes, cabinets, wireways, panels, switchboards, as follows:

|  |  |  |
| --- | --- | --- |
| 120/240 VOLTS | 120/208 VOLTS | 277/480 VOLTS |
| Phase A…..Black | Phase A ........Black | Phase A……Brown |
| Phase B…..Orange (Hi-Leg) | Phase B ........Red | Phase B……Orange |
| Phase C…..Blue | Phase C ........Blue | Phase C……Yellow |
| Neutral……White | Neutral ..........White | Neutral..........Gray |
| Ground……Green | Ground ..........Green | Ground .........Green |
| Travelers…Purple | Travelers……Purple | Travelers ......Purple |

J. Grounded conductors (neutral) shall be identified with a continuous outer finish that is white or gray. Color coding with plastic tape is not acceptable. Grounded conductors (larger than size #4) shall be color coded at 12" intervals with a continuous white or gray outer finish or by white plastic tape on other than green insulation along its entire length at its terminations. This marking shall encircle the conductor or insulation and cover the entire exposed portion of the conductor at the terminations.

K. Equipment grounding conductors shall be identified with a continuous outer finish that is green or green with one or more yellow stripes. Color coding with plastic tape is not acceptable. Grounding conductors (larger than size #4) shall be color coded at each end and at every point where the conductor is accessible. Identification shall encircle the conductor and shall be accomplished by one of the following:

1) Stripping the insulation or covering from the entire exposed length.

2) Cover the entire length of exposed insulation with green plastic tape at all locations the conductor is accessible.

L. Use suitable, approved, wire pulling lubricant for building wire where needed.

M. Protect exposed cable from damage.

N. All conduits entering boxes, enclosures, cabinets, wireways, etc., shall be labeled with a suitable approved permanent marker identifying the appropriate panel/panelboard and branch circuit number serving same. The same shall apply to all enclosure covers.

O. Use suitable cable fittings and connectors.

P. Neatly train and lace wiring inside boxes, equipment, and panelboards.

Q. Clean conductor surfaces before installing lugs and connectors.

R. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.

S. Use Utilco blocks for copper conductor splices and taps, #6 AWG and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.

T. Terminate spare conductors with electrical tape or wire nut.

U. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, #8 AWG and smaller.

V. Splice only in accessible junction boxes.

W. Do not use quick-connect splice devices.

X. Feeders and service entrance conductors (as defined by NEC Article 100) shall not be spliced.

3.05 INTERFACE WITH OTHER PRODUCTS

Identify wire and cable under provisions of Section 26 05 53.

3.06 FIELD QUALITY CONTROL

A. Perform field inspection and testing under provisions of Division 01.

B. Inspect wire and cable for physical damage and proper connection.

C. Measure tightness of bolted connections and compare torque measurements with manufacturer's recommended values.

D. Verify continuity of each branch circuit conductor.

E. Verify continuity of each control circuit conductor.

F. Verify proper phasing of conductors prior to energizing or reenergizing any and all electrical equipment.

**END OF SECTION**