CITY OF FORT WAYNE MASTER UPDATED: 11/16/18

SECTION 26 05 23

INSTRUMENTATION CABLES

1. GENERAL
	1. DESCRIPTION
		1. Scope:
			1. Contractor shall provide all labor, materials, equipment, and incidentals shown, specified, and required to furnish and install instrumentation and communication cables.

NTS: Edit paragraph “2”, below, to suit the project.

* + - 1. Types of cables include the following:
				1. Shielded instrumentation cables.
		1. Related Sections:

NTS: List below only sections covering products, construction, and equipment specifically identified in this section and specified in another section and directly referenced in this specification. Do not list Administrative and Procedural Division 01 Sections.

* + - 1. Section 26 05 26, Grounding and Bonding for Electrical Systems.
			2. Section 26 05 33, Raceways and Boxes for Electrical Systems.
			3. Section 26 05 53, Identification for Electrical Systems.
	1. TERMINOLOGY
		1. The following words or terms are not defined but, when used in this Section, have the following meaning:
			1. “CPE” means chlorinated polyethylene.
			2. “FEP” means fluorinated ethylene-propylene.
			3. “PE” means Polyethylene
			4. “STP” means shielded twisted pair
			5. “UTP” means unshielded twisted pair
			6. “XLPE” means cross-linked polyethylene.
	2. REFERENCES

NTS: Retain applicable standards and add others as required.

* + 1. Standards referenced in this Section are:
			1. ANSI/TIA/EIA-568, Commercial Building Telecommunications Cabling (requirements and restrictions of Technical Service Bulletins (TSBs) apply.)
			2. UL 13, Power-Limited Circuit Cables.
			3. UL 1581, Electrical Wires, Cables and Flexible Cords.
			4. UL VW-1, Vertical Wire Flame Test.

NTS: Edit article “1.3” below to suit the Project. DO NOT DELETE (NOT USED) ITEMS.

* 1. SUBMITTALS
		1. Action Submittals: Submit the following:
			1. Product Data
				1. Manufacturer’s technical information for instrumentation cables and communications cables proposed.

NTS: Remove paragraph “3.” below if not required for the project.

* + - 1. Shop Drawings
				1. For cable tray layout, showing cable tray route to scale, with relationship between the tray and adjacent structural, electrical, and mechanical elements. Include the following:

Vertical and horizontal offsets and transitions.

Clearances for access above and to side of cable trays.

Vertical elevation of cable trays above the floor or bottom of ceiling structure.

Load calculations to show dead and live loads as not exceeding manufacturer's rating for tray and its support elements.

* + - 1. Samples (NOT USED)
		1. Informational Submittals: Submit the following:
			1. Certificates (NOT USED)
			2. Delegated Design Submittal (NOT USED)
			3. Test and Evaluation Reports (NOT USED)
			4. Manufacturers’ Instructions (NOT USED)
			5. Source Quality Control Submittals (NOT USED)
			6. Field Quality Control Submittals
				1. Written report of results of field quality control testing specified in this Section.
			7. Manufacturer Reports (NOT USED)
			8. Sustainable Design Submittals (NOT USED)
			9. Special Procedure Submittals (NOT USED)
			10. Qualifications Statements (NOT USED)
		2. Closeout Submittals. (NOT USED)
			1. Maintenance Contracts (NOT USED)
			2. Operation and Maintenance Data (NOT USED)
			3. Bonds (NOT USED)
			4. Warranty Documentation (NOT USED)
			5. Record Documentation (NOT USED)
			6. Sustainable Design Closeout (NOT USED)
			7. Software (NOT USED)
		3. Maintenance Material Submittals. (NOT USED)
			1. Spare Parts (NOT USED)
			2. Extra Stock Materials (NOT USED)
			3. Tools (NOT USED)
	1. QUALITY ASSURANCE
		1. Regulatory Requirements:

NTS: Retain applicable codes and add others as required.

* + - 1. NEC 725, Class 1, Class 2, and Class 3 Remote-Control, Signaling and Power-Limited Circuits.
			2. NEC 727, Instrumentation Tray Cable.
			3. NEC 800, Communications Circuits.
			4. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
				1. Flame-Spread Index: 25 or less.
				2. Smoke-Developed Index: 50 or less.
			5. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
		1. Qualifications:
			1. Independent Testing Agency:
				1. Contractor shall retain services of testing agency for field quality control testing of installed instrumentation and communication cables.
				2. Member company of an NRTL.
	1. DELIVERY, STORAGE, AND HANDLING
		1. Deliver instrumentation and communication cable on factory reels conforming to NEMA Standard WC 26.
		2. Store cables on reels on elevated platforms in clean, dry location.
		3. Do not lay reels’ flat
	2. PROJECT CONDITIONS
		1. Environmental Limitations: Do not deliver or install UTP and optical fiber cables and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
1. PRODUCTS
	1. MATERIALS
		1. General:
			1. Cables shall bear the UL label.
		2. Single Shielded Pair Instrument Cables:
			1. Tinned copper, PE or XLPE insulated, stranded conductors, not less than no. 16 AWG, twisted pair, with overall shield, stranded tinned no. 18 AWG copper drain wire and overall PVC or CPE jacket. Rated for not less than 600 volts and complying with UL 1581.
		3. Multi-Paired Shielded Instrument Cables:
			1. Tinned copper, PE or XLPE insulated stranded conductors, not less than no. 16 AWG, twisted pairs with shield over each pair, stranded tinned no. 18 AWG copper drain wire, and overall PVC or CPE outer jacket. Rated for not less than 600 volts and complying with either UL 1581 or UL 13.
		4. Multi-Conductor Shielded Instrument Cables:
			1. Tinned copper, PE or XLPE insulated stranded conductors, not less than no. 16 AWG, stranded tinned no. 18 AWG copper drain wire, with overall 100 percent foil shield and overall PVC or CPE jacket. Rated for not less than 600 volts.
		5. Multi-Conductor Shielded High-Temperature Instrument Cables:
			1. Silver-plated copper, extruded Teflon insulation, stranded conductors, not less than no. 16 AWG, with overall 90 percent silver-plated copper braid shield and overall Teflon tape-wrapped jacket. Rated for not less than 300 volts and complying with UL VW-1.

NTS: Edit paragraph “F” below, for data highway, coaxial, and other cables required. Coordinate specific cable requirements with division 27 and division 40, and the project’s instrumentation and controls Engineer.

* + 1. Cable Support Hardware:
			1. Conduit:
				1. Where conduit is shown or indicated on the Drawings, comply with Section 26 05 33, Raceways and Boxes for Electrical Systems.

NTS: Insert additional project specific instrumentation and communication cables after paragraph “F”. Additional cables could include but are not limited to ControlNet Cables, DeviceNet Cables, and Modbus Cables.

* + 1. Wire and Cable Markers
			1. Provide wire and cable markers in accordance with Section 26 05 53, Identification for Electrical Systems.
1. EXECUTION
	1. INSPECTION
		1. Examine conditions under which materials and equipment will be installed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.
	2. INSTALLATION
		1. General:
			1. Install cables complete with proper terminations at both ends.
			2. Use hook and loop for bundling cables (Velcro only).
			3. Install in conduit separate from power cables, unless shown or indicated otherwise.
			4. Ground shield on shielded cables at one end only and as recommended by instrument manufacturer.
			5. Identify conductors in accordance with Section 26 05 53, Identification for Electrical Systems.
			6. Install and terminate Supplier-furnished cable in accordance with equipment manufacturer requirements and cable manufacturer’s recommendations.
			7. Install in accordance with Laws and Regulations, including NEC.
		2. Color-code CAT 6 cables as follows:
			1. Colors: Match color scheme in use at the Site. If the Site does not have an existing color scheme, use the following colors:

| **System** | **Color** |
| --- | --- |
| Process Control Network Cable | Yellow |
| Business Information  | Red |
| Security | Green |

* 1. INSTALLATION OF PATHWAYS
		1. Comply with requirements in Section 26 05 33, Raceway and Boxes for Electrical Systems for installation of conduits and wireways.
		2. Pathway Installation in Equipment Rooms:
			1. Extend conduits [3 inches (75 mm)] above finished floor.
			2. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.
	2. REMOVAL OF CONDUCTORS AND CABLES
		1. Remove abandoned conductors and cables.

Remove paragraph 3.5 below if firestopping is not required for the project. If firestopping is required for the project, insert at (--1--) below applicable section where firestopping requirements are included or edit section 3.6 below to include all project specific firestopping requirements.

* 1. FIRESTOPPING
		1. Comply with firestopping requirements in section (--1--).
	2. GROUNDING
		1. For low-voltage wiring and cabling, comply with requirements in Section 26 05 26 Grounding and Bonding for Electrical Systems.
	3. FIELD QUALITY CONTROL
		1. Site Tests:
			1. Test shielded instrumentation cable shields with ohmmeter for continuity along full length of cables, and for shield continuity to ground.
			2. Connect shielded instrumentation cables to calibrated 4 to 20 mA dc signal transmitter and receiver. Test at 4 and 20 mA transmitter settings.
			3. Replace with new cables the full length of cables that fail test.
			4. Test equipment shall be provided by Contractor.
		2. Perform tests and inspections.
		3. Tests and Inspections:
			1. Visually inspect cable placement, cable termination, grounding and bonding, equipment, and labeling of all components.
		4. End-to-end cabling will be considered defective if it does not pass tests and inspections. Cabling shall be removed and replaced.
		5. Prepare test and inspection reports.

+ + END OF SECTION + +