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SECTION 26 05 19 LSZH-JACKETED FIRE-RATED WIRING

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PART 1 GENERAL

1.1. SUMMARY

- A. Section includes a complete Two-Hour Fire-Resistive Electrical Circuit Integrity System for tunnels and other damp areas, comprised of Low-Smoke, Zero-Halogen-jacketed mineral insulated cable, fasteners, terminations, and other accessories.

1.2. REFERENCES

- A. Abbreviations, Acronyms, Definitions
 - 1. LSZH Low-Smoke, Zero-Halogen; refers to jacket material property wherein smoke density and halogen emission during fire conditions satisfy code requirements as specified.
 - 2. MI Mineral Insulated; refers to cable construction wherein solid copper conductor is insulated from copper sheath by magnesium oxide powder insulation.
- B. Reference Standards
 - 1. NFPA 70 – National Electrical Code
 - a. Article 695 – Fire Pumps
 - b. Article 700 – Emergency Systems
 - 2. NFPA 130 – Standard for Fixed Guideway Transit and Passenger Rail Systems
 - a. Chapter 6 – Emergency Lighting and Communications circuits (6.4.7.3)
 - b. Chapter 7 – Emergency Ventilation Systems
 - c. Chapter 12 – Wire and Cable Requirements
 - 3. Canadian Electrical Code
 - 4. UL 2196 – Tests for Fire-Resistive Cables
See also: UL Fire-Resistive Cable Directory, online
 - 5. ULC S-139 – Standard Method of Fire-Test for Evaluation of Integrity of Electrical Power and Data Cables
See also: ULC Fire-Resistive Cable Directory, online
 - 6. UL 2556 – Wire and Cable Test Methods
 - 7. CSA C22.2 #124-04 – Mineral Insulated Cable



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1.3. ADMINISTRATIVE REQUIREMENTS

A. Coordination

1. *Section 01 31 00 – Project Management and Coordination*

Prior to final selection of cable size, Electrical and General Contractors shall agree upon cable route. Some consideration shall be made for variance from routing presented at tender stage versus final route determined during construction.

1.4. ACTION SUBMITTALS / INFORMATIONAL SUBMITTALS

A. Product Data Shall:

1. Indicate cable references (sizes) to be used for each electrical service
2. Indicate termination part numbers for each service
3. Indicate accessories and supports / fasteners to be installed
4. Indicate agency approvals

B. Shop Drawings

C. Samples

D. Manufacturer's Instructions

1. Wiring Cable Installation Manual
2. Termination Kit Installation Manual

1.5. CLOSEOUT SUBMITTALS

A. Operation And Maintenance Data

1. Commissioning and training session: Record date, attendance, and items covered.

B. Warranty Documentation

1. Cable manufacturer's warranty policy
2. Cable manufacturer's warranty registration record

C. Record Documentation

1. Installation inspection & test records in accordance with manufacturer's field quality control recommendations (refer to installation manual). Instructions shall be current and referenced by UL FHIT listing at time of installation, if application demands fire-rating.

1.6. QUALITY ASSURANCE

A. Qualifications

1. Manufacturers
 - a. Manufacturer to demonstrate minimum of ten (10) years of experience in manufacturing fire-resistive cables.



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- b. Manufacturer shall be ISO 9001 registered.
- c. Manufacturer shall provide products consistent with and listed to regulatory agency requirements listed in section 1.2(B).

1.7. DELIVERY, STORAGE, AND HANDLING

A. Delivery And Acceptance Requirements

- 1. Deliver and handle products in accordance with manufacturer's instructions, to prevent their deterioration or damage due to moisture, temperature changes, contamination, mechanical or other causes.
- 2. Deliver product to site on original spools, with intact and legible manufacturers' labels identifying cable size, batch/serial number, and date of shipment.

1.8. WARRANTY

A. Manufacturer Warranty

- 1. nVent warrants all goods listed below for two (2) years from date of purchase against faulty workmanship and use of defective materials when such goods are properly installed, operated, and maintained according to product documentation.
 - 1) Fire-Rated and performance wiring, components, and accessories.

B. Extended Warranty

- 1. A thirty (30) year limited warranty from date of purchase is available on the following products. The contractor must complete the Installation Inspection and Commissioning Record(s) located in the installation manual, and complete the online warranty registration form at nVent.com within thirty (30) days of the installation date, otherwise standard warranty shall apply.
 - 1) nVent PYROTENAX System 1850 fire-rated performance wiring and associated accessories.

PART 2 PRODUCTS

2.1. LOW-SMOKE, ZERO-HALOGEN JACKETED, FIRE-RATED WIRING

A. Manufacturers

- 1. All products integral to the system – cable, installation accessories, and terminations – shall be supplied by the same manufacturer unless substitutions are accepted by the project team in accordance with Division 01 General Requirements.
- 2. Basis of Design Manufacturer: Subject to compliance with requirements, provide PYROTENAX LSZH-Jacketed, Mineral Insulated products of nVent, 250 West Street, Trenton, ON, K8V 5S2, Canada.

3. **OPTIONAL: <Insert names of manufacturers with comparable products>**



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4. OPTIONAL: Submit request for substitutions in accordance with Instructions to Bidders and Division 01 General Requirements

B. Regulatory Requirements

1. Fire-Resistance: All products installed in "fire zone" shall be listed as per UL 2196 (US) and ULC S-139 (CAN), for fire rating as required in the NEC (US) or NBC-CEC (CAN).
2. Flame Propagation: All products installed in "fire zone" shall be FT4 certified.
3. Low Smoke: All products installed in "fire zone" shall be designated "low smoke" according to UL 1685 / ST1, "Smoke Release" test.
4. Zero Halogen: All products installed in "fire zone" shall be "zero halogen" per IEC 60754-1.

C. Performance / Design Criteria

1. Moisture Resistance: Jacketed cable shall be designed to resist corrosion.
2. Oil Resistance: Jacketed cable shall satisfy UL 1685 Oil Resistance I and II requirements.
3. Gasoline Resistance: Jacketed cable shall satisfy UL 1685 Gasoline Resistance requirement.

D. Materials

1. Cable shall have the following material characteristics:
 - a. Low-Smoke Zero-Halogen Jacketed, Mineral Insulated cable
 - b. ANSI/NFPA 70, type MI
 - c. Solid high-conductivity copper conductor
 - d. Magnesium Oxide Insulation, Rated 600V
 - e. Temperature rating 90°C (one time fire survivability to 1010°C for two hours)
 - f. Seamless soft-drawn copper sheath

2.2. ACCESSORIES

A. Mounting Accessories

1. Product supports shall be in accordance with manufacturer's recommendations and UL FHIT (ULC FHITC) listing directory.

B. Cable Terminations

1. Terminations shall be in accordance with manufacturer's recommendations, and shall be selected to suit distribution equipment requirements, nVent type PyroPak or QuickTerm or approved equivalent.

PART 3 EXECUTION

3.1. EXAMINATION

A. Verification Of Conditions

B. Preinstallation Testing



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1. Upon receipt of cables, continuity (conductor resistance) and Insulation Resistance tests shall be performed. Records shall be kept for each cable in the test results table provided at the back of the installation manual. Detailed test instructions shall be included in the installation manual.
 - a. Continuity Test
 - 1) Using a standard multimeter, continuity from one end of the cable conductor to the other shall be verified.
 - b. Insulation Resistance Test
 - 1) Using a megohmmeter, Insulation Resistance between the conductor and copper cable sheath shall be measured and recorded. It is recommended that the test be performed at 500 VDC. Upon receipt, minimum acceptable insulation resistance shall be 200 MΩ in a dry environment; refer to manufacturer's installation manual for exceptions. Manufacturer's installation manual shall provide instructions for improving insulation resistance.

3.2. PREPARATION

A. Protection Of In-Place Conditions

1. Prior to releasing cable for manufacturing, coordinate installation route with General Contractor to ensure that field-measured lengths are accurate and will not encounter interference from other trades.
2. Prepare the cable pull with pulleys, sheaves, swivels, and other equipment in accordance with manufacturer's recommendations. Observe bending radius requirements to protect cable and minimize pulling tension.

B. Surface Preparation

1. Ensure that cable will be protected from physical damage during pull.
2. Metal mounting components shall be suitable for the environment in which installed.

3.3. ERECTION / INSTALLATION / APPLICATION / [USER-DEFINED PROCESS]

A. Special Techniques

1. Fire-Rated cable installation procedures may differ from NEC/CEC standard wire and cable requirements. Systems listed under the UL 2196 / ULC S-139 Electrical Circuit Protective Systems shall be installed in accordance with instructions outlined in the system's respective UL / ULC Online Certifications Directory and as per the system manufacturer's installation and operating manual.

3.4. FIELD [OR] SITE QUALITY CONTROL

- A. After installing cable, and again after terminating cable, continuity (conductor resistance) and Insulation Resistance tests shall be performed. Records shall be kept for each cable in the test results table provided at the back of the installation manual. Detailed test instructions shall be included in the installation manual.



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1. Continuity Test
 - a. Using a standard multi-meter, continuity from one end of the cable conductor to the other shall be verified.
2. Insulation Resistance Test
 - a. Using a megohm-meter, Insulation Resistance between the conductor and copper cable sheath shall be measured and recorded. It is recommended that the test be performed at 500 VDC. In a warm, dry environment, IR readings should be 200 MΩ or higher. In an outdoor environment or indoors in wet or humid conditions, IR readings should all be above 100 MΩ.

B. Non-Conforming Work

1. Manufacturer's installation manual shall provide instructions for improving insulation resistance.
2. Manufacturer shall have field technician services available to evaluate installation issues should they arise.

C. Manufacturer Services

1. Manufacturer may be retained to provide varying levels of service. Contractor shall carry associated costs:
 - a. Supply of Product
 - b. Supply and Field Inspection
 - c. Supply, Site-Training, and Field Inspection
 - d. Supply, Installation, and Field Inspection

3.5. SYSTEM STARTUP

- A. Equipment startup procedures shall refer to respective device specification sections.**

END OF SECTION