

SERVICE ENTRANCE WIRING SYSTEM (U.S.)

1. GENERAL

Furnish and install a Service Entrance wiring system consisting of specified wiring cable, cable tray and terminations and accessories listed specifically for use with the system.

1.1. REFERENCES

- 1.1.1. UL 2196
- 1.1.2. UL Fire Resistance Directory
- 1.1.3. CSA 22.2 No.124-04

1.2. SUBMITTALS

- 1.2.1. Provide product data for cable and termination types.
- 1.2.2. Provide manufacturer's Installation Instructions: Indicate application conditions and limitations of use; indicate installation requirements.

1.3. QUALIFICATIONS

- 1.3.1. Supplier: Company specializing in manufacturing products specified in this Section.

1.4. REGULATORY REQUIREMENTS

- 1.4.1. Conform to requirements of ANSI/NFPA 70.
- 1.4.2. Conform to requirements of the Electrical Circuit Protective System listing in the UL Fire Resistance Directory.

2. PRODUCTS

2.1. FIRE-RATED WIRING CABLE

- 2.1.1. 2-hour fire-rated Mineral Insulated (Pyrotenax System 1850 MI), 350 kcmil and 500 kcmil Cables shall be acceptable.
 - 2.1.1.1. The wiring cable shall be listed in the UL Fire Resistance Directory.
 - 2.1.1.2. Mineral Insulated wiring Type MI cable shall have:
 - Description: ANSI/NFPA 70, Type MI
 - Conductor: solid high conductivity copper
 - Insulation Voltage Rating: 600 V
 - Cable Temperature Rating: 90°C
 - Termination Temperature Rating: 90°C
 - Insulation Material: magnesium oxide
 - Sheath Material: seamless soft-drawn copper
 - Cable shall be capable of passing electrical impulse test requirement of: BIL: 7kV; Switching surge: 5kV.
 - Cable splices shall not be acceptable.
 - Over-jacket: None required

2.2. SUPPORT SYSTEM

2.2.1. The tray shall be supplied as part of the system, and shall consist of a NEMA Class 12B hot dipped mill-galvanized steel ventilated cable tray complete with 45° and 90° bends, off sets, etc. as required, and louvered cover to be directly attached to tray top.

2.2.2. Steel rod and channel trapeze supports.

2.3. WIRING COMPONENTS AND TERMINATIONS

2.3.1. Description: Pyrotanax Service Entrance (SE) Quickterm™ kits.

- Sized-up termination: Flexible tail AWG size is larger than MI conductor size.
- Size-to-size termination: Flexible tail AWG size is same size as MI conductor size.
- Sized-up Quickterm ampere rating is suitable for landing on busbar not less than 24 in (610 mm) from circuit breaker.
- Pyrotanax installation instructions: No. 620U for sized-up terminations and No. 622U for size-to-size terminations.
- Termination shall be capable of passing electrical impulse requirement of: BIL: 7kV; Switching surge: 5kV.

SIZED-UP SE QUICKTERM KIT

MI cable size (kcmil)	Flexible tail size (kcmil)	Maximum ampacity (A)
350	750	505
500	750	535

SIZE-TO-SIZE SE QUICKTERM KIT

MI cable size (kcmil)	Flexible tail size (kcmil)	Maximum ampacity (A)
350	350	310
500	500	380

2.3.2. Description: Lightning Arresters:

- Cooper Power Systems "Storm Trapper H.E." arresters as specified by the manufacturer
- shall be connected to each phase and neutral at both ends of the MI service.
- The arresters shall be visually inspected periodically for damage due to lightning strokes.

3. EXECUTION

3.1. EXAMINATION

3.1.1. Verify that the factory installed end seals are intact.

3.1.2. Verify that no moisture has entered cable.

3.2. STORAGE

3.2.1. Cable shall be stored in a clean dry location.

3.2.2. If cable has been cut, protect the exposed cable ends with heat shrink end caps or other suitable means such as standard conduit sealing compound and PVC tape.

3.3. HANDLING

3.3.1. Cable shall be uncoiled by rolling or rotating supply reel.

3.3.2. Take precautions necessary to prevent damage to cable from contact with sharp objects, such as when pulled over foreign material on sheaves.

3.4. WIRING METHODS

- 3.4.1. Use only fire-rated MI cable, mechanically and electrically protected as specified herein.
- 3.4.2. Use wiring methods indicated on Drawings and as specified herein.
- 3.4.3. Mechanical Protection: Service entrance cable must be mechanically protected and must comply with the requirements listed under installation.

3.5. INSTALLATION

- 3.5.1. Install MI cable and Service Entrance Quick-term termination kits under the supervision of the manufacturer’s Field Services Engineer and in accordance with manufacturer’s instructions (H57864).
- 3.5.2. Bending: Bending radius must not be less than ten (10) times the cable diameter
- 3.5.3. Pulling: Use 24 in (610 mm) or larger sheaves. Cables shall not be pulled more than 360 degrees in total. On pulls requiring more than 360 degrees, contact manufacturer for assistance.
- 3.5.4. Terminations: Field made terminations shall be made with cable manufacturer’s Service Entrance Quickterm termination kits only. Stripping tools, available from the manufacturer, shall be used for proper cable termination. Terminations must be completed immediately once started to avoid moisture ingress from surrounding air. Prior to completing each termination, test insulation resistance and follow manufacturer’s drying procedures until insulation resistance reaches an acceptable level. Connections to ferrous cabinets shall incorporate brass plates 1/4 in (6.4 mm) thick by 4 in (102 mm) minimum width by length as required with 1-1/4 in (32 mm) drilled and tapped holes. Install per manufacturer’s drawing.
- 3.5.5. Sheath Induction Reduction: When multi-phase circuits have paralleled single conductors, cables shall be run in triangular or square configuration having one of each phase in each group. Each set of paralleled conductors shall be separated by at least 2.15 single cable diameters. Each group of cables shall be fastened tightly together every 24 in (610 mm) along the cable run.
- 3.5.6. Mechanical Protection: MI cable must be protected by a ventilated tray system such that willful or accidental damage may not be readily done to the cable. The basic tray will be a trough type cable tray, 40% ventilation, with a louvered cover. The tray is to be mounted on a steel strut framing system suspended from 1/2 in (13 mm), 5/8 in (16 mm), or 3/4 in (19 mm) threaded steel rods. Tray and cable combined load not to exceed nVent recommended loading for two-hour fire rating. The tray is to be labeled prominently with a warning to stay away from the live 600 V Electrical Service in the tray (nVent drawing LBL 1007 applies).
- 3.5.7. Tray support loading guidelines: The tables following show the recommendations for steel support rod size and the number of struts required for 350 kcmil and 500 kcmil MI Service Entrance cable.

Example: For 6 sets 500 kcmil cable: Use 1/2 in (13 mm) diameter steel rod and double strut 4 ft (1.22 m) spacing or 5/8 in (16 mm) diameter steel rod and double strut on 6 ft (1.83 m) spacing. See table:

ROD AND STRUT REQUIREMENT FOR 350 KCMIL MI CABLE

No. of cable sets	Support spacing		Number of struts
	4 ft (1.22 m)	6 ft (1.83 m)	
1 – 3		1/2 in	Single
4		1/2 in	Single
5 – 6		1/2 in	Double
7 – 9	1/2 in	5/8 in	Double
10 – 14	5/8 in	3/4 in	Double

ROD AND STRUT REQUIREMENT FOR 500 KCMIL MI CABLE

No. of cable sets	Support spacing		Number of struts
	4 ft (1.22 m)	6 ft (1.83 m)	
1 – 3		1/2 in	Single
4		1/2 in	Double
5 – 6	1/2 in	5/8 in	Double
7 – 9	5/8 in	3/4 in	Double
10	5/8 in		Double
11 – 14	3/4 in		Double

3.6. FIELD QUALITY CONTROL

- 3.6.1. Inspect cable for physical damage and proper connection.
- 3.6.2. Measure tightness of any bolted connections and compare torque measurements with manufacturer's recommended values.
- 3.6.3. Verify continuity of each conductor.
- 3.6.4. Prior to energizing cables, measure insulation resistance of each cable. Tabulate and submit for approval.
- 3.6.5. Provide certification from cable manufacturer that installation is in accordance with their requirements and the requirements of the UL "Electrical Circuit Protection System" listing.
- 3.6.6. Any corrections or adjustments found necessary during certification shall be at the expense of the installer.

North America

Tel +1.800.545.6258
Fax +1.800.527.5703
thermal.info@nvent.com

Europe, Middle East, Africa

Tel +32.16.213.511
Fax +32.16.213.604
thermal.info@nvent.com

Asia Pacific

Tel +86.21.2412.1688
Fax +86.21.5426.3167
cn.thermal.info@nvent.com

Latin America

Tel +1.713.868.4800
Fax +1.713.868.2333
thermal.info@nvent.com



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