

# Mineral Insulated Cable

**UL:**  
Class I, Division 1 and 2,  
Groups B, C, D  
Class II, Division 1 and 2,  
Groups E, F, G  
Class III, Division 1 and 2

**CSA:**  
Class I, Division 1 and 2, Groups B, C, D  
Class II, Division 1 and 2, Groups E, F, G  
Class III, Division 1 and 2  
Class I, Zone 1 and 2  
Zone 1, Ex de IIB + H<sub>2</sub> T1-T6

**FM:**  
Class I, Division 1 and 2, Groups  
A, B, C, D  
Class II, Division 1 and 2, Groups  
E, F, G  
Class III, Division 1 and 2

**ATEX/IECEx:**  
Ex db 60079-30-1 IIB + H<sub>2</sub> T6 T1 Gb  
Ex tb 60079-30-1 IIIC T80°C  
T440 °C Db  
-55°C ≤ Tamb ≤ +55°C IP67

## Application

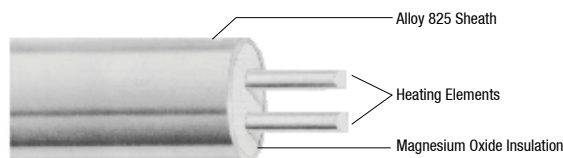
- MI Cable is custom designed and fabricated for specific applications.
- Nelson MI Cable is a high performance, industrial grade heat tracing cable used for applications requiring:
  - High Temperature Exposure
  - Immunity to Stress Corrosion
  - High Maintain Temperature
  - Under tank Heating (Cryogenic Tanks)
  - High Power Output
  - Constant Power Output Over Entire Length
  - Rugged Cable Construction Heater Length
  - Extended Heater Life

## Features

- Mineral insulated cable is a metal sheathed cable that uses a metallic conductor as the heating element.
- The conductor is electrically insulated from the metal sheath with magnesium oxide (MgO).
- Mineral insulated cable is a series resistance heater that generates heat by passing current through the electrical conductor.
- Power output per unit length of the cable therefore varies with the applied voltage and the resistance of the conductor.
- Mineral Insulated Cables are available with either one or two conductors.
- The one conductor cable is available in the E Form where a cold splice is provided at both cable ends for electrical connection. The two-conductor cable is available in two forms.
- The A Form provides an out-and-back circuit with a single cold splice connection at one end.
- The E Form provides cold splices at both ends of the cable.
- Outer sheath construction is Alloy 825, a high temperature corrosion resistant alloy with superior flexibility. Two cable diameters are available.
  - K cable diameter is 4.76 mm (0.1875 in)
  - B cable diameter is 7.94 mm (0.3125 in)
- A unique manufacturing process provides for a thin wall construction which improves flexibility and ease of installation.
- This process also allows the use of high performance alloy conductors for high temperature applications.

## Operating Principle

- The series conductor generates heat when voltage is applied as a result of current passing through the conductor.
- Power output per unit length varies with the applied voltage and circuit resistance.
- The circuit resistance, in turn, varies with cable length.
- MI cables are available with a wide selection of conductor resistances.
- Based on voltage and desired cable length, a specific conductor is selected with a cable resistance that provides the desired power output.



## Options

- Pulling Eye for A Form only. Add prefix - **P** to catalog number.
- Oversize cold sections or special feature requirement. Add prefix - **X** to catalog number.
  - “K” Single Conductor 40A Standard, 55A Oversized
  - “K” Two Conductor 25A Standard, 40A Oversized
  - “B” Two Conductor 25A Standard, 40A Oversized
- Mounting of hot-cold junction outside thermal insulation (freeze protection of lines over +316°C (+600°F). Add suffix - **EM** to catalog number.
- Factory mounting of QHT-3 Adapter (sheath temperature over 600°F (316°C) and cable wattage above 20 w/ft (66 w/m). Add suffix - **QT** to catalog number.
- UL Listing tag ①. Add suffix - **UG** to catalog number.
- UL Hazardous Area Listing tag ①. Add suffix - **UH** to catalog number.
- UL Snow Melting Listing tag ①. Add suffix - **UM** to catalog number.
- FM Hazardous Area Listing tag ①. Add suffix - **FH** to catalog number.
- CSA Hazardous Area Listing tag ①. Add suffix - **CH** to catalog number.
- ATEX/IECEx Hazardous Area Listing tag ①. Add suffix - **EEX** to catalog number.
- QHT-3 HIGH TEMPERATURE ADAPTER is used to heat sink the hot section transition as it passes through the thermal insulation when the hot to cold connection must be located outside the thermal insulation due to sheath temperatures over +316°C (+600°F) and cable Wattage exceeds 66 w/m (20 w/ft).

## Certifications and Compliances

- UL Listed: E33597, E53501, E49805
- CSA Standard: C22.2 No. 130-16
- CSA Certified: LR42103, LR42104
- FM Approved: JI 3D0A5.AX, JI 1M1A4.AF, JI 1X6A9.AX
- Other Standards: IEEE 515-2011, IEEE 515.1-2012

① Requires volts, amps, watts and calculated sheath temperature with each cable order

Note:

Cable voltage,amps and watts must be provided for approval tags. Calculated sheath temperature must also be provided for hazardous (classified) approval tags.

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 Class II, Division 1 and 2, Groups E, F, G  
 Class III, Division 1 and 2  
 Class I, Zone 1 and 2  
 Zone 1, Ex de IIB + H<sub>2</sub> T1-T6

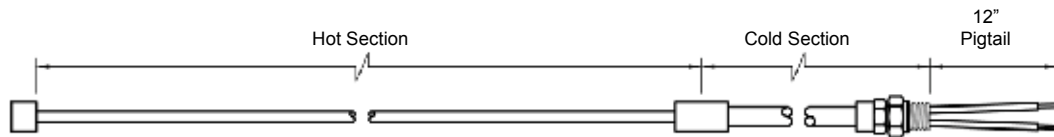
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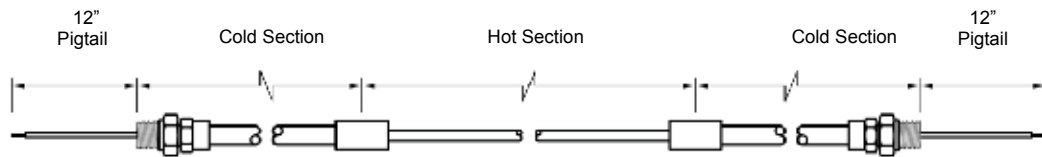
## Cable Ratings

Sheath Material	Cable Diameter in Millimeters (Inches)	Number of Conductors	Maximum Voltage	Maximum Exposure °C (°F)	Maximum Power Watts/m (Watts/ft)	Weight kg/m (Lbs/Ft)	Standard Cold Lead m (ft)	Forms	Cable Type
	4.76 (0.19)	1	600		204 (62.0)	0.10 (0.07)		E	K1
Alloy 825	4.76 (0.19)	2	300	593 (1100)	204 (62.0)	0.10 (0.07)	2.1 (7.0)	A and E	K2
	7.94 (0.31)	2	600		289 (88.0)	0.33 (0.22)		A and E	B2

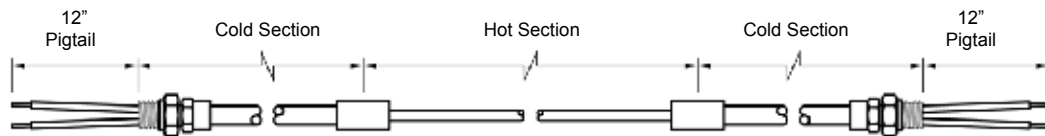
## MI Cables



Form A (2 Conductor)



Form E (1 Conductor)



Form E (2 Conductor)

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INDUSTRIAL HEATING SYSTEMS: INTEGRAL CONNECTION SYSTEMS

# Mineral Insulated Cable

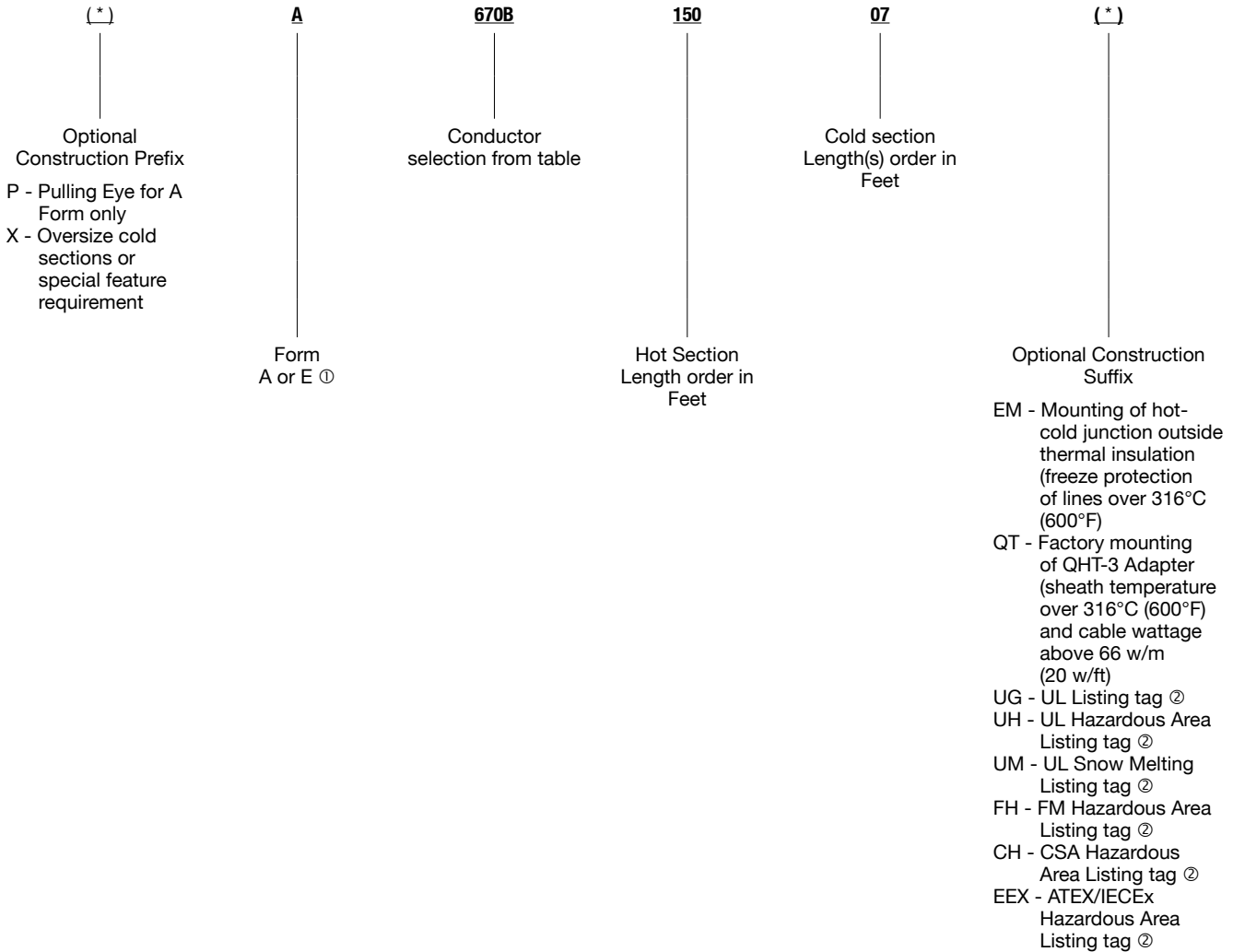
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## Catalog Numbering Guide



① When E Form cold sections are specified, both cold section lengths must be provided for proper cable construction. Example: E 279K 500 0707 for 2.1 m (7 ft) cold sections on both cable ends.

② Requires volts, amps, watts and calculated sheath temperature with each cable order

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## Custom Cable Resistance Characteristics

2-Conductor Cable, 4.76 mm (0.19 in) Diameter Alloy 825, 300 Volts					
Cable Number	Cable Resistance at 20°C (68°F)		Maximum Exposure Temperature Rating °C (°F)	Resistance Curve	
	Ohms/Meter	Ohms/Foot			
556K	0.1411	0.0430	316 (600)	1	
658K	0.1906	0.0581		1	
674K	0.2434	0.0742		1	
693K	0.3038	0.0926		1	
712K	0.3839	0.1170		1	
715K	0.4823	0.1470		1	
721K	0.6988	0.2130		3	
722K	0.6988	0.2130		1	
732K	1.0466	0.3190		593 (1100)	N/A
742K	1.3648	0.4160			
752K	1.7060	0.5200			
766K	2.1654	0.6600			
774K	2.4278	0.7400			
810K	3.2808	1.0000			
813K	4.2651	1.3000			
818K	5.9055	1.8000			
824K	7.6772	2.3400			
830K	9.7113	2.9600			
838K	12.1391	3.7000			
846K	15.4856	4.7200			
860K	18.3727	5.6000			
866K	21.6535	6.6000			
894K	29.5276	9.0000			
919K	59.0551	18.0000			

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## Custom Cable Resistance Characteristics

2-Conductor Cable, 4.76 mm (0.19 in) Diameter Alloy 825, 600 Volts				
Cable Number	Cable Resistance at 20°C (68°F)		Maximum Exposure Temperature Rating °C (°F)	Resistance Curve
	Ohms/Meter	Ohms/Foot		
588B	0.0233	0.0071	316 (600)	1
614B	0.0489	0.0149		1
627B	0.0886	0.0270		2
640B	0.1312	0.0400		3
670B	0.2133	0.0650	593 (1100)	N/A
710B	0.3412	0.1040		
715B	0.5315	0.1620		
720B	0.6726	0.2050		
732B	1.0663	0.3250		
750B	1.6404	0.5000		
774B	2.4114	0.7350		
810B	3.8123	1.1620		
819B	6.1352	1.8700		
830B	9.7441	2.9700		
840B	14.1076	4.3000		
859B	19.6194	5.9800		

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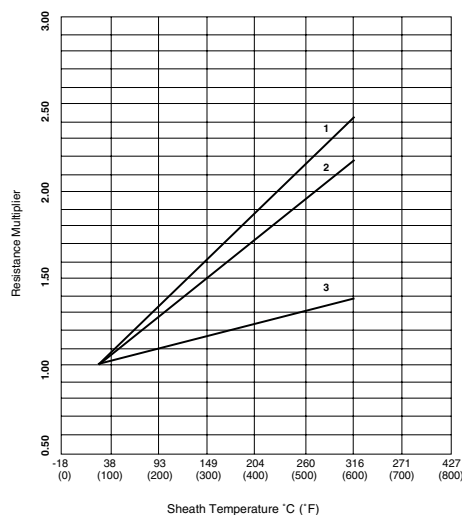
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## Custom Cable Resistance Characteristics

1-Conductor Cable, 4.76 mm (0.19 in) Diameter Alloy 825, 600 Volts					
Cable Number	Cable Resistance at 20°C (68°F)		Maximum Exposure Temperature Rating °C (°F)	Resistance Curve	
	Ohms/Meter	Ohms/Foot			
145K	0.0151	0.0046	316 (600)	1	
189K	0.0295	0.0090		1	
216K	0.0541	0.0165		2	
239K	0.1280	0.0390		593 (1100)	N/A
250K	0.1640	0.0500			
279K	0.2592	0.0790			
310K	0.3117	0.0950			
316K	0.5151	0.1570			
326K	0.8530	0.2600			
333K	1.0827	0.3300			
346K	1.4993	0.4570			
372K	2.3950	0.7300			
412K	3.8386	1.1700			
415K	4.8556	1.4800			
423K	7.7428	2.3600			
430K	9.1864	2.8000			
447K	14.7638	4.5000			

## Cable Resistance vs Temperature Multiplier



**Note:** Factory design required for the following applications:  
 1. Exposure temperature greater than 593°C (1100°F).  
 2. Maintain temperature greater than (204°C) (400°F).

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INDUSTRIAL HEATING SYSTEMS: INTEGRAL CONNECTION SYSTEMS

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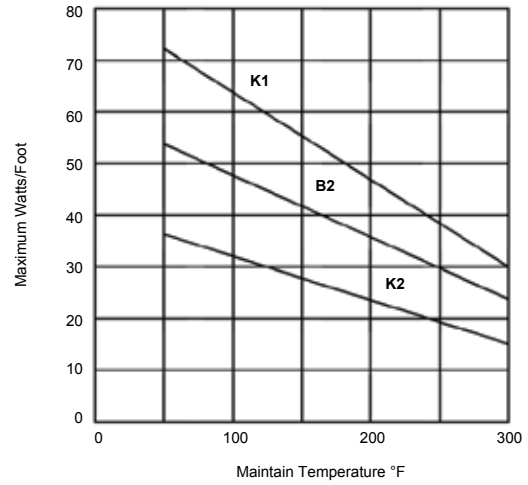
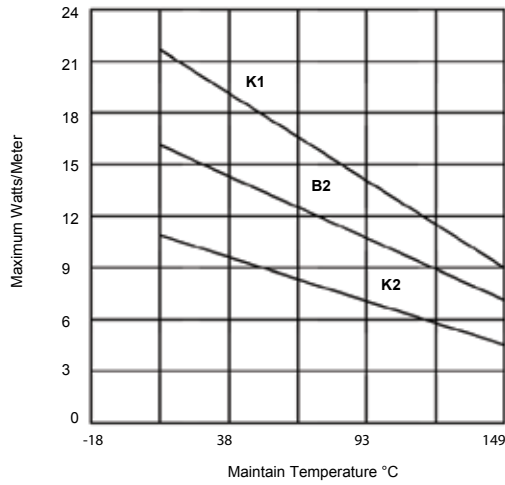
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## Maximum Wattages – All Cables With Hot / Cold Junction Under Thermal Insulation



## Maximum Wattages – All Cables With Hot / Cold Junction Outside Thermal Insulation

