

# 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

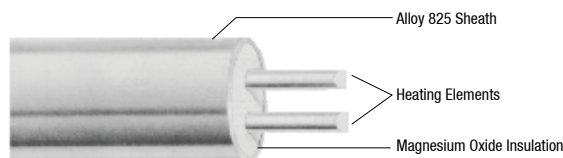
- MI Cable is custom designed and fabricated for specific applications.
- Nelson MI Cable is a high performance, industrial grade heat tracing cable used for applications requiring:
  - High Temperature Exposure
  - Immunity to Stress Corrosion
  - High Maintain Temperature
  - Under tank Heating (Cryogenic 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: IEE5 515-2011, IEE5 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.

# 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

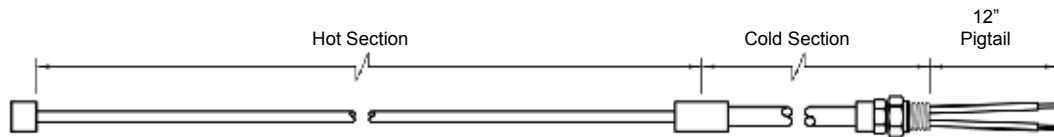
**FM:**  
 Class I, Division 1 and 2, Groups  
 A, B, C, D  
 Class II, Division 1 and 2, Groups  
 E, F, G  
 Class III, Division 1 and 2

**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

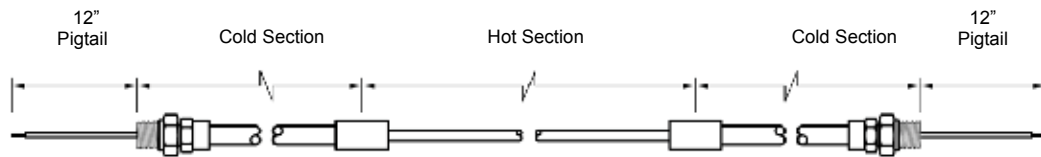
## Cable Ratings

| 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         |

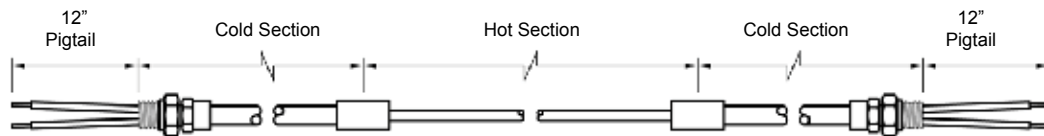
## MI Cables



Form A (2 Conductor)



Form E (1 Conductor)



Form E (2 Conductor)

**NELSON**

INDUSTRIAL HEATING SYSTEMS: INTEGRAL CONNECTION SYSTEMS

# Mineral Insulated Cable

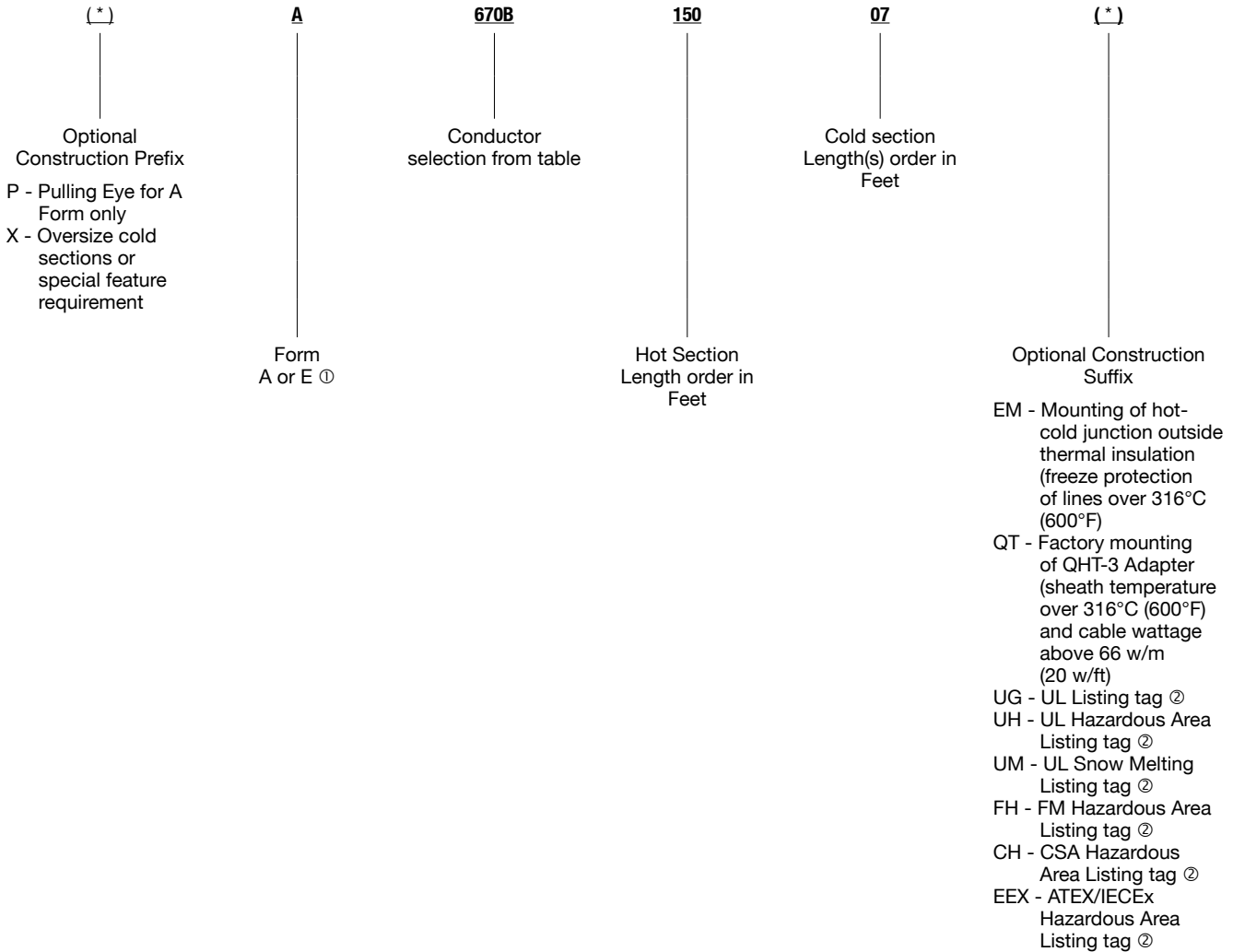
**UL:**  
 Class I, Division 1 and 2,  
 Groups B, C, D  
 Class II, Division 1 and 2,  
 Groups E, F, G  
 Class III, Division 1 and 2

**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

## 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

# 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

## 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   |   |                  |     |

**NELSON™**

INDUSTRIAL HEATING SYSTEMS: INTEGRAL CONNECTION SYSTEMS

# 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

## 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    |   |                  |

**NELSON™**

INDUSTRIAL HEATING SYSTEMS: INTEGRAL CONNECTION SYSTEMS

# 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

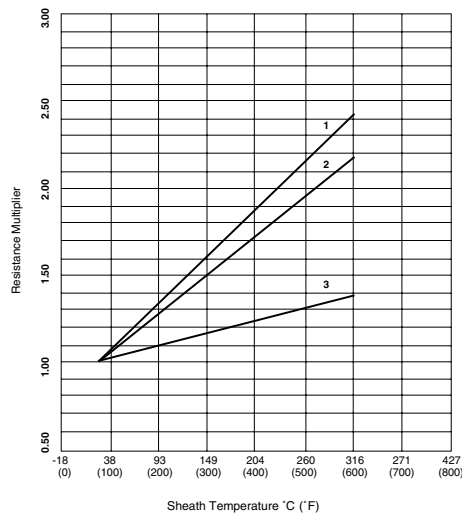
**FM:**  
Class I, Division 1 and 2, Groups  
A, B, C, D  
Class II, Division 1 and 2, Groups  
E, F, G  
Class III, Division 1 and 2

**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

## 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).

# Mineral Insulated Cable

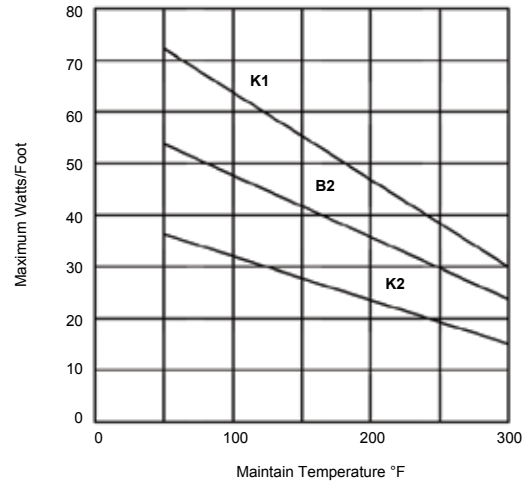
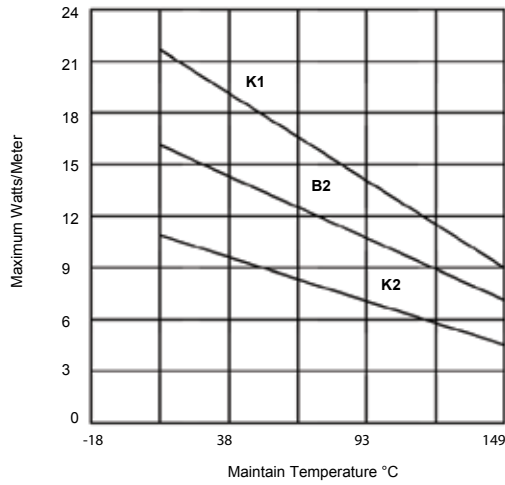
**UL:**  
 Class I, Division 1 and 2,  
 Groups B, C, D  
 Class II, Division 1 and 2,  
 Groups E, F, G  
 Class III, Division 1 and 2

**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

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



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

