

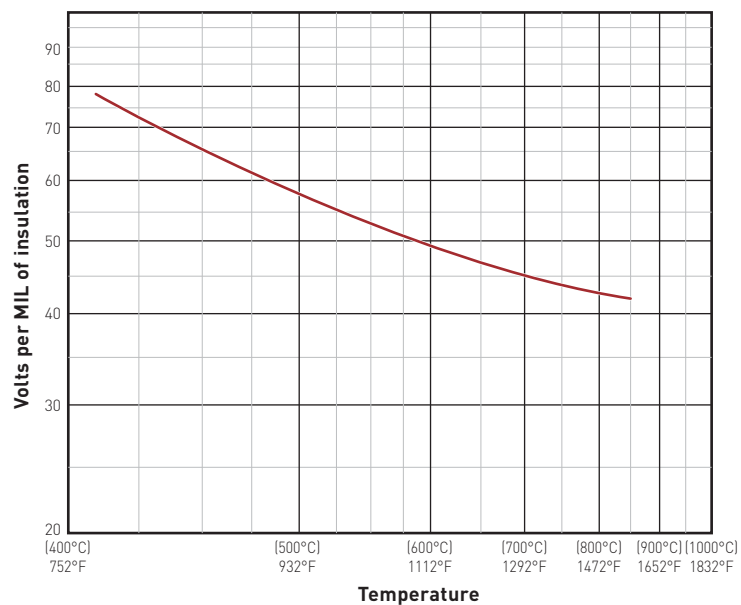
# MAGNESIUM OXIDE INSULATION CHARACTERISTICS

## MOISTURE PENETRATION

Magnesium oxide is hygroscopic, resulting in the uptake and retention of moisture under certain humidity and temperature conditions. When MI cable is not properly sealed and is subjected to these conditions, moisture penetrates several inches into the insulation, thereby reducing the insulation resistance. Pentair Thermal Management's tests confirm that the moisture will not penetrate further into the cable and can be removed by applying heat to the cable to force the moisture out the open end. The insulation resistance will be restored once the cable has been dried and sealed.

## DIELECTRIC STRENGTH

Although the dielectric strength of magnesium oxide insulation decreases with temperature, because of the way MI cables are constructed this decrease has no detrimental effect on cable functionality.

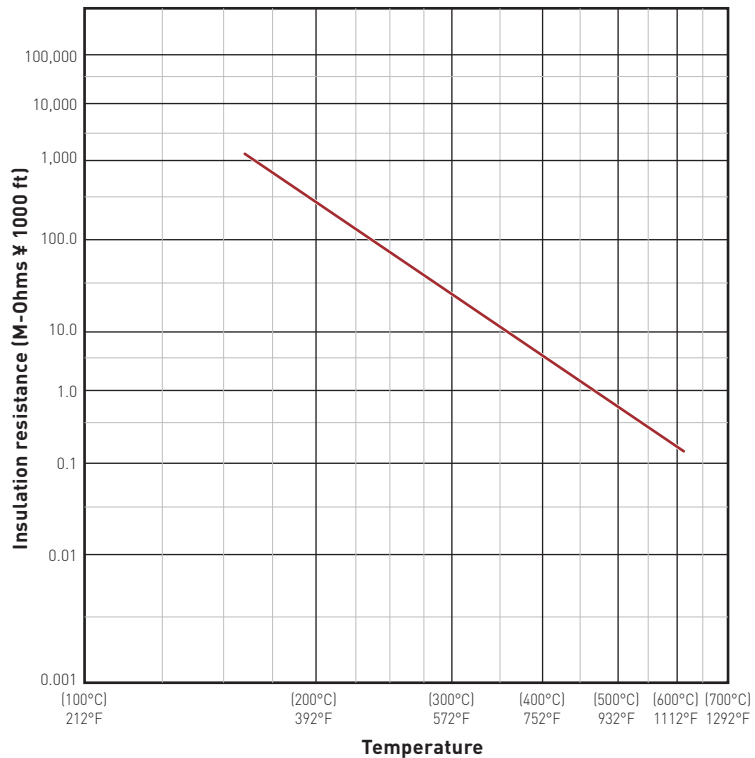


Graph 1 Dielectric strength of MI cable as a function of temperature

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## INSULATION RESISTANCE

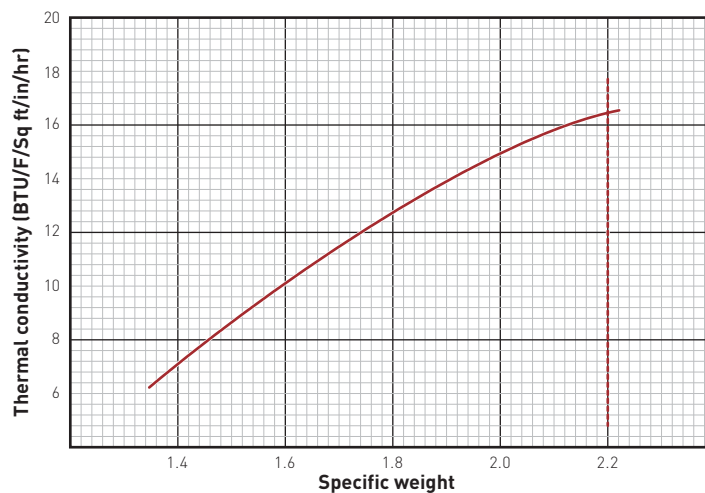
The insulation resistance of magnesium oxide decreases with increasing temperatures as shown. This decrease is unimportant at temperatures up to 250°C (482°F), the maximum continuous operating temperature of MI cable.



Graph 2 Insulation resistance of MI cable as a function of temperature

## THERMAL CONDUCTIVITY

Unlike most electrical insulations, magnesium oxide has a relatively high thermal conductivity. This enables the heat to be quickly conducted from the outside sheath and dissipated to the -surrounding air. This conductivity increases when magnesium oxide is compacted. The -manufacturing process produces a specific weight of approximately 2.2 and a thermal conductivity of 16.4 BTU/°F/sq ft/in/hr.



Graph 3 Thermal conductivity of magnesium oxide at different levels of compaction

**POWER FACTOR**

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The power factor of magnesium oxide insulation is very low compared to that of most electrical cable insulations. When measured at room temperature, 60 Hz and 40 volts per mil, it is approximately 0.1%. This value increases with temperature to approximately 1.0% at 250°C (482°F).

**DIELECTRIC CONSTANT**

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The dielectric constant is approximately 4 over a range from 60 Hz to 400 MHz and is relatively constant up to 300°C (572°F).



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