Idaho Laboratories Corporation

Phone: (208) 522-0055 Fax: (208) 522-4522 Email: sales@idaholabs.com

Insulation Resistance of Mineral Insulated Cable

The following information is compiled from published technical references and taken from actual testing performed at Idaho Laboratories Corporation. Actual results will vary. **The following information should be used as a guide only.**

The table below refers to three common mineral oxides: Aluminum Oxide, Magnesium Oxide, and Hafnia Oxide when used as electrical insulation in mineral insulated cable with a metallic sheath. The Insulation resistance will vary with purity, types of impurities in the ceramic, compaction, thickness of insulation, and temperature.

The approximate electrical resistances of these ceramics in mineral insulated cable are listed below. These values are averaged from many sources and should be used for comparison only. Resistance is in ohms/mm of insulation thickness with an applied voltage of 10 to 500 vdc for short lengths of mineral insulated cable. These are the maximum values observed. Inspection values for longer lengths or thinner insulation thickness will be reduced.

Temperature	Al203	MgO 99.4%	MgO 96.4%	HfO2
25˚C	100,000 meg	100,000 meg	10,000 meg	10,000 meg
400˚C	10,000 meg	10,000 meg	1,000 meg	10,000 meg
800˚C	10 meg	10 meg	1 meg	10,000 meg
1000˚C	1 meg	1 meg	25 kilo	8,200 meg
1200˚C	25 kilo	25 kilo	10 kilo	170 meg
1500˚C	10 kilo	10 kilo	1,000 ohms	3 meg

The use of MgO and Al2O3 at temperatures above 1300˚C for compacted mineral insulated cable is not advised. The rapid loss of insulation resistance at these elevated temperatures is pronounced. If these materials are required, the insulation thickness should be increased.

The maximum temperature limit for Hafnia oxide is approximately 2500˚C. The upper temperature limit for an assembly will be determined by the maximum temperature limits of the individual components. Example: cable made with a 316 SST sheath will have a maximum service temperature of 900˚C while the ceramic insulation will have a higher rating.

Compaction density of the ceramic will greatly affect insulation resistance. The values listed above are with maximum densities, obtained only by swaging. Lesser compaction densities obtained by drawing usually produce insulation resistances decreased by one decade (ie 1 x 10^1).