

Mineral Insulated cables for nucleonic systems



Key features

- Optimized geometries to minimize surface transfer impedance
- Designed to maintain screening performance of measurement chain
- Very high insulation resistance to minimize signal losses
- All cable supplied fully tested
- Dimensions and lengths can be adapted to applications

Overview

A key requirement of high performance instrumentation systems is the provision of adequate interference immunity from the source of the signal through the complete measurement chain.

Mineral Insulated (MI) cables are typically used within the reactor core but standard MI cables are inadequate in maintaining immunity and low losses.

Curtiss-Wright's MI cables are designed to transmit very small pulse or dc signals through regions of high temperature, radiation and electromagnetic noise found within the core of a nuclear reactor.

Technical specification

Specialized cable geometries have been developed to maintain levels of insulation resistance and minimize the surface transfer impedance. These make use of multiple metal and insulating sheaths.

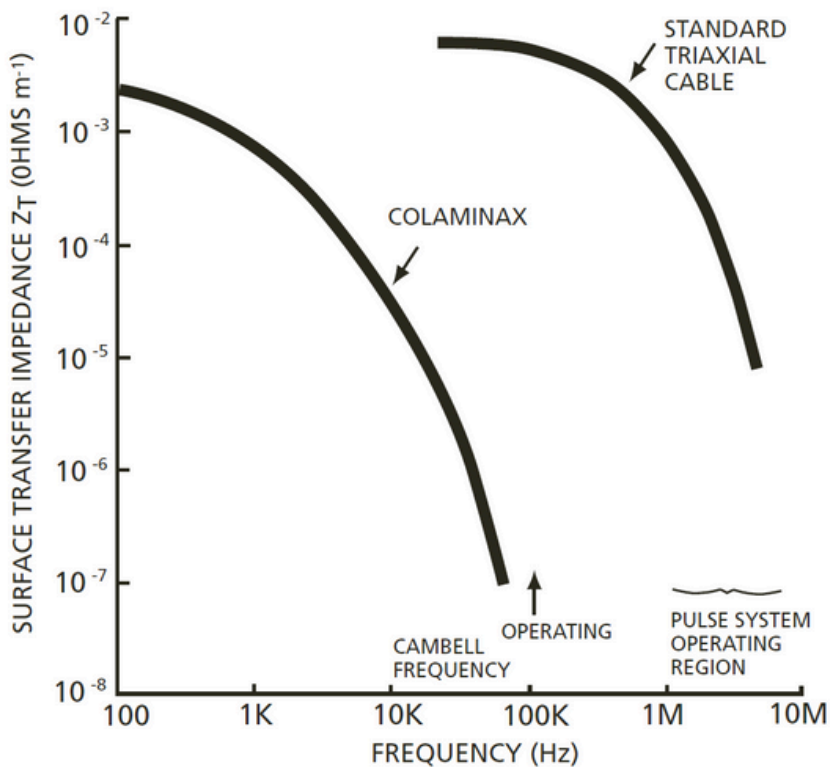
Two different types of cable are available: Triaxial and Colaminax, and these offer varied screening properties for different applications.

Triaxial cables achieve good high frequency screening and are suitable for a wide range of signal applications.

Colaminax cable provides effective screening at lower frequencies and is ideal for Campbell flux measuring systems. Colaminax is a good match with 'soft' superscreened cables.

Both cables will operate in high neutron flux fields and at temperatures of up to 700 °C whilst maintaining a high insulation resistance. At their typical operating temperature of 550 °C, the insulation is better than 3×10^{-9} amps per meter.

The overall cable dimensions can be specified for each application but standard diameters are 4.75 mm for Triaxial cables and 5.38 mm for Colaminax cables.



Cable Surface Transfer Performance

Technical specification

Feature		Colaminax MI cable	Triaxial MI cable
Materials	Conductor	High conductivity copper	
	Inner sheath		
	Outer sheath	Stainless steel/copper/mild steel/copper	Stainless steel
	Insulant	Magnesia	
Dimensions	Inner sheath OD	N/A	2.95 – 3.20 mm
	Outer sheath OD	5.28 - 5.49 mm	4.65 – 4.85 mm
	Center conductor OD	0.50 – 0.70 mm	
	Eccentricity	Less than 15% of insulant radial thickness	
Electrical performance at room temperature	Centre conductor resistance	70 – 120 mΩ m	65.5 – 115 mΩ m
	Center conductor sheath capacitance	200 – 350 pF m	197 – 328 pF m
	Center conductor sheath leakage at 100V	<1 x 10 ⁻⁹ A m	< 3 x 10 ⁻⁹ A m
	Inner to outer sheath leakage at 100V	N/A	< 3 x 10 ⁻⁹ A m
Electrical performance at 550 °C	Center conductor sheath leakage at 100V	< 3 x 10 ⁻⁹ A. m	< 3 x 10 ⁻⁹ A m
	Inner to outer sheath leakage at 100V	N/A	< 3 x 10 ⁻⁹ A m
	Breakdown	Free from small pulse breakdown to 1 kV	

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About Curtiss-Wright

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Curtiss-Wright Corporation (NYSE: CW) is a global integrated business that provides highly engineered products, solutions and services mainly to Aerospace & Defense markets, as well as critical technologies in demanding commercial power, process and industrial markets. We leverage a workforce of approximately 8,600 highly skilled employees who develop, design and build what we believe are the best engineered solutions to the markets we serve. Building on the heritage of Glenn Curtiss and the Wright brothers, Curtiss-Wright has a long tradition of providing innovative solutions through trusted customer relationships.