



CTD-1357 Electrical Insulation for HTS Wires

Product Overview

CTD-1357 is an electrical insulation coating for High-Temperature Superconductor (HTS) wires and tapes. This insulation is suitable for both short and long lengths of HTS conductor for use in the construction of cables, coils, or other components.

Product Spotlights

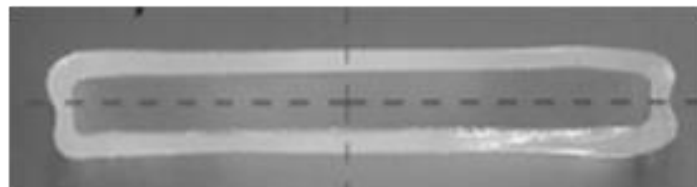
- Cost competitive with polyimide and other insulation processes
- High dielectric strength
- Compatibility with LN₂, GHe, and other cryogenics
- Retains ductility at cryogenic temperatures
- Low coefficient of friction
- Readily strippable
- Successfully insulated 3 phase triaxial HTS cable, tested by the US Navy.



Spools of insulated HTS wire

Property	CTD-1357
Dielectric Breakdown Voltage, 77 K	20.8 kV
Dielectric Breakdown Strength, 77 K	137 kV/mm (3.47 kV/mil)
Deformation Breakdown Strength ¹ , 77 K	131 kV/mm (3.32 kV/mil)
Spark Test at 1 kVAC, 298 K (Pass/Fail)	Pass
Range of thicknesses possible	0.076 to 0.254 mm (3 to 10 mil)

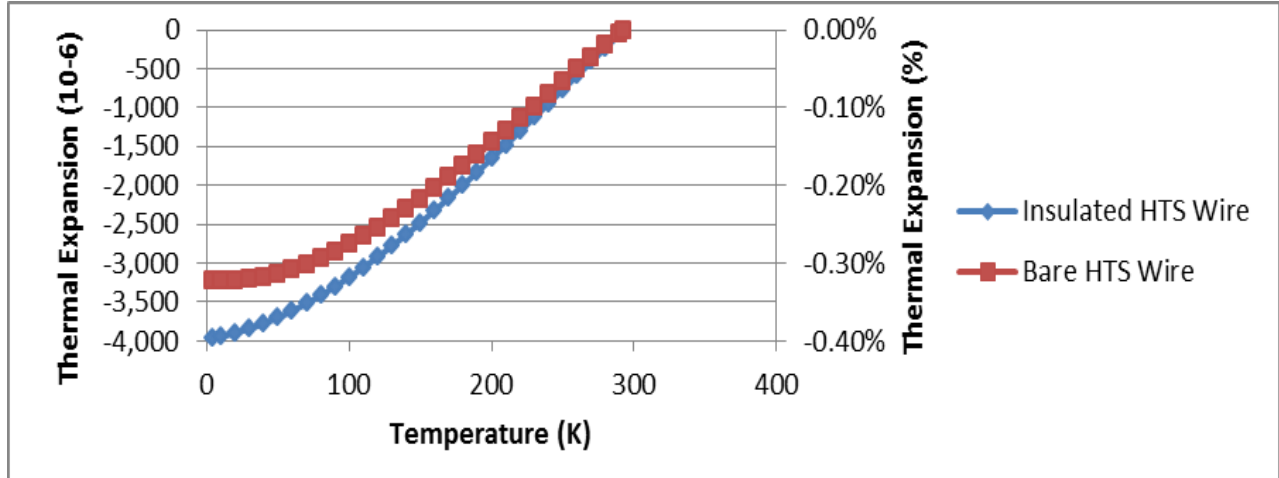
¹ Breakdown strength after deformation by bending around 15.24 cm (6 in) radius mandrel at 77 K



Cross-section of HTS wire with 0.127 mm (5 mil) thick insulation

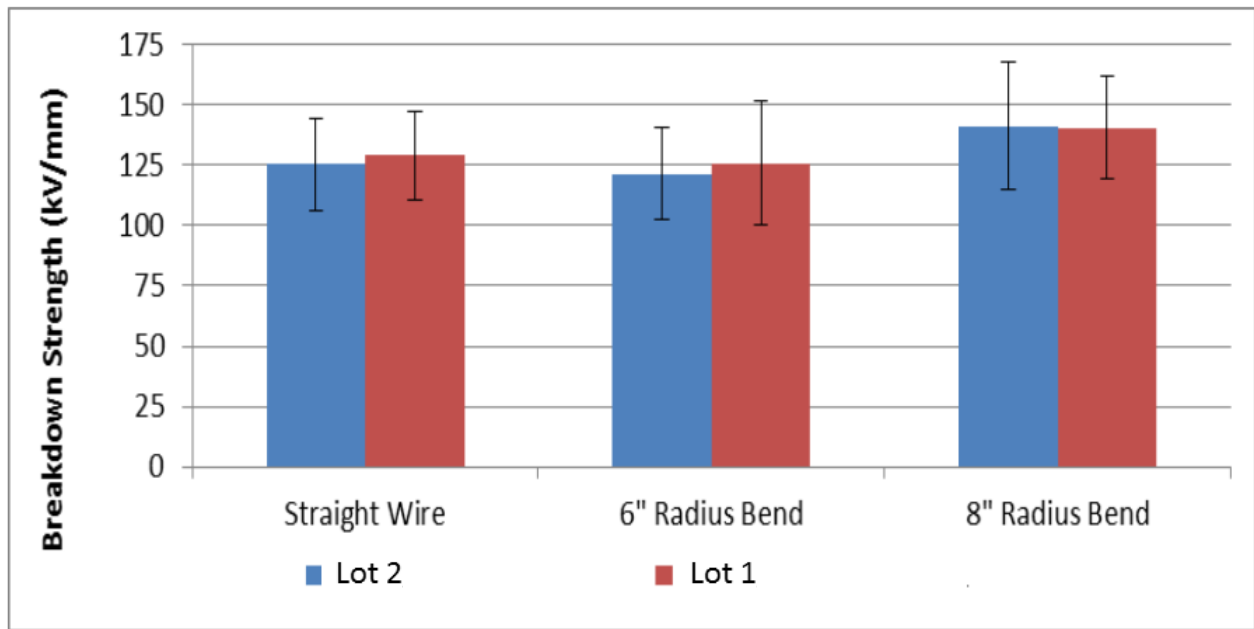


Thermal Expansion



Thermal contraction plot of bare versus insulated HTS wire

Lot-to-Lot Variation



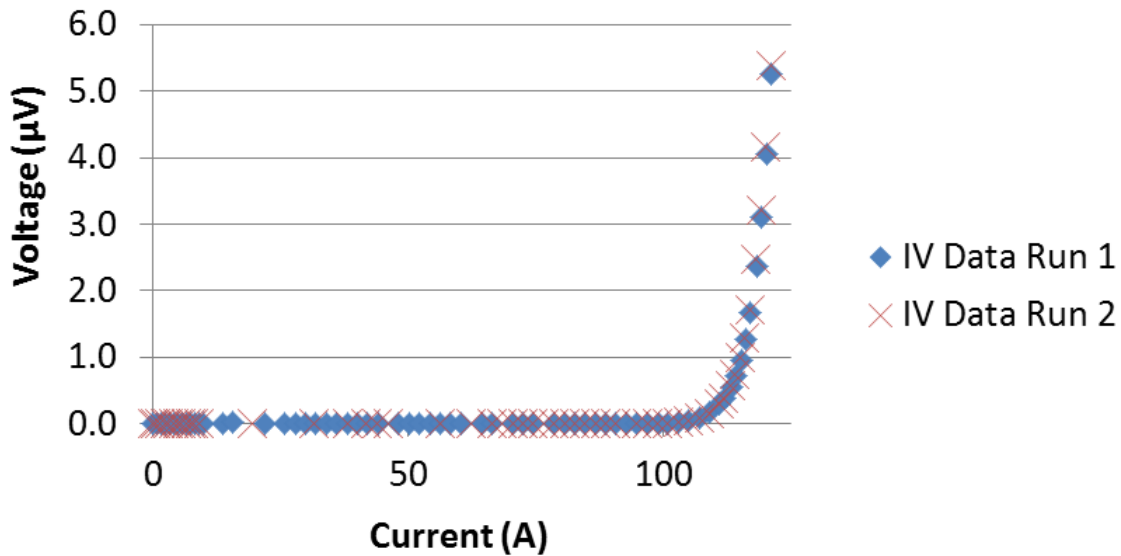
Evaluation of two production lots shows consistent lot-to-lot performance



Insulation Application Effect on Superconductor Performance

Pre-Insulation and Post-Insulation I_c Performance

Wire ID	95% Truncated Average I_c (A)
Wire Run #1	112.34
Wire Run #2	113.24
Wire Run #3	116.71
Wire Run #4	111.77
Wire Run #5	106.77
Wire Run #5	109.92
Average I_c (A)	111.79
Insulated Wire (3m length)	115.23



Insulated 3-meter sample shows desirable zero-slope superconducting state and sharp superconducting to normal state transition