

The use of XLPE in place of PVC insulation for LV cables

This bulletin provides a table of technical facts that may justify the use of XLPE insulated low-voltage cables (600/1000V) instead of PVC insulated cables particularly in the event of a shortage of PVC supply. Both types of insulation are allowed in the compulsory specification, SANS 1507, with part 3 covering PVC insulation and part 4 covering XLPE insulation

Property		PVC	XLPE	Comment
Material Comparisons:				
Minimum Tensile Strength	MPa	12.5	12.5	Same requirement for both
Minimum Elongation at Break	%	150	200	Implies XLPE is more elastic
Maximum Operating Temperature	°C	70	90	XLPE operates at a higher temperature
Average halogen content	%	26	< 0.5	XLPE releases little or no toxic HCL gas when burnt
Nature of material		Thermo-plastic	Thermo-set	XLPE does not readily deform under high temperature
Water absorption	mg/cm ²	> 1.0	< 0.15	XLPE is less porous
Electrical Comparisons:				
Typical dielectric loss angle (Tan δ)		0.08	0.0003	XLPE has much lower dielectric heating losses
Current rating (size for size)	%	100	121	XLPE can conduct 21% more current (size for size)
Difference in nominal insulation thickness	%	100	75	XLPE requires 25% less insulation thickness for the same voltage rating
Voltage withstand test requirement	kV	3.0	3.0	Both are subject to same withstand test voltages
Insulation resistance test requirement	MΩ.km	≥ 7	≥ 100	XLPE produces lower leakage currents
Cable mass (size for size, approx.)	%	100	90	XLPE cables are approx. 10% lighter in weight

Some Important Differences:				
Cable diameters (size for size, approx.)	%	100	96	XLPE cables are smaller. Adaptability with glands and cleats must be checked
Earth fault rating (size for size, approx.)	%	100	75	XLPE cables have lower earth fault capacity due to smaller diameter
Removal of insulation (stripping)		Easy	Moderate	XLPE is not as soft as PVC

Electrical comparisons based on standard 4 core copper cable designs ranging from 25mm² to 300mm² with SWA armour

