



XLPE Cables :

Electric power transmission and distribution from source to the user can be placed into three categories

High tension networks : Beyond 33 kV

Medium tension networks : upto 33 kV

Low voltage networks : upto 1 kV

For over a century, impregnated paper insulated cables held the sway in all the above categories. Impregnated paper has excellent electrical properties. Moreover, it has capacity to withstand a high degree of thermal overload without excessive deterioration. But it's hygroscopic nature requires the provision of a metal sheath to prevent moisture contamination.

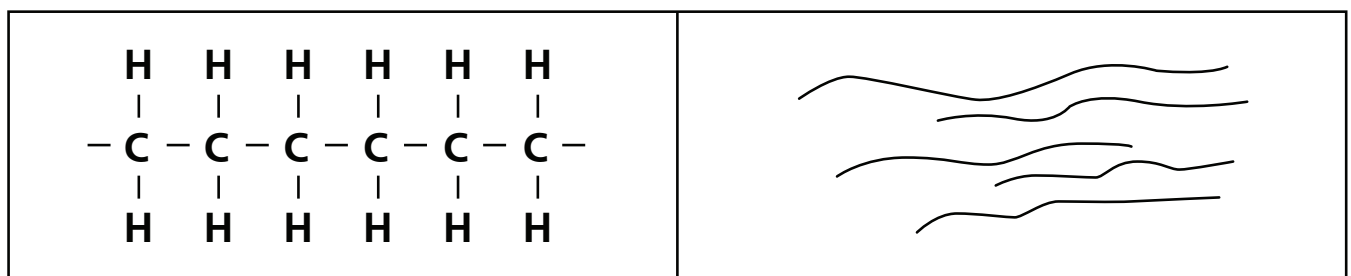
There was therefore a long felt need for power cable insulation material which has a combination of non hygroscopic nature of thermoplastic materials, electrical properties of polyethylene and operational advantages of impregnated paper.

XLPE (cross linked polyethylene) has come up as the dream material. Since several decades now, it has steadily replaced impregnated paper.

What is XLPE ?

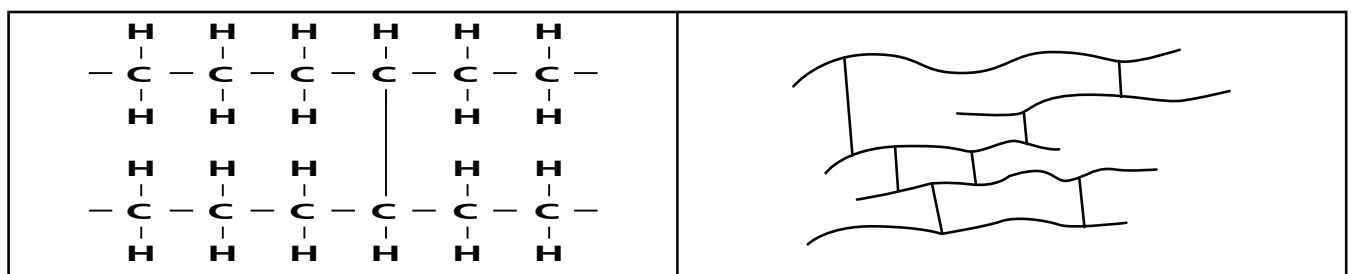
Low density polyethylene polymer is a compound of carbon and hydrogen having linear molecular structure. These long chains being independent, slide with respect to one another, resulting thermoplastic property of the material.

Polyethylene



In cross linking process, these chains are randomly bonded to one another, thus converting the independent molecules to a three dimensional linked network. Now, slippage between molecular chains is prevented and material becomes thermosetting.

XLPE



Comparison of XLPE with other insulation materials

Properties		XLPE	PE	EPR	PVC	Impreg. paper
Rated Temp °C	Normal	90	70	90	70	65
	Emergency	130	90	130	95	110
	Short Circuit	250	140	250	160	160
Mechanical Strength	Tensile Strength kg/ mm ²	2.35	1.4	0.95	1.25 to 2.5	NA
	Elongation %	500 to 600	300 to 600	300 to 800	200 to 400	3
Ageing Resistance	100 °C	Excellent	Good	Excellent	Good	Good
	120 °C	Excellent	Melts	Good	Poor	Fair
	150 °C	Good	Melts	Fair	Poor	Poor
Heat deformation at 150 °C		Good	Melts	Excellent	Poor	Good
Relative Permittivity		2.4	2.3	3.3	8.0	3.5
Specific Gravity g/cc		0.93	0.93	1.4	1.5	0.8
Solvent Resistance		Good	Good	Poor	Poor	Fair
Power Factor (tan δ)		4x10 ⁻⁴	4x10 ⁻⁴	4x10 ⁻⁴	100x10 ³⁻	2x10 ³⁻
Volume resistivity at 20 °C Ω- cm		> 10 ¹⁵	> 10 ¹⁵	> 10 ¹⁵	> 10 ¹³	> 10 ¹⁴
Dielectric Constant		2.3	2.3	3	6 to 8	3.4 to 4
Dielectric Strength kV/mm		50	50	25 to 40	20 to 35	40
Splicing & Termination		Easy	Easy	Easy	Easy	Not Easy
Environmental Stress Cracking resistance		Good	Poor	Poor	Good	NA
Necessity of hygroscopic protection		Not Regd.	Not Regd.	Not Regd.	Not Regd.	Required
Allowable bending radius	Single Core	15D20-D	15D20-D	15D20-D	15D20-D	20D25-D
	Multi Core	12D15-D	12D15-D	12D15-D	12D15-D	15D20-D

As apparent from above table, XLPE has several advantages compared to other insulation materials.

Gulf Cable has experience of manufacturing XLPE insulated Cables for over 25 years. We have supplied thousands of kilometres of low and medium voltage XLPE cables in Kuwait and neighbouring GCC countries.