# **Insulation System**

### Conductor Shielding

A conductor shield is provided on all cables rated 5-46 kV. The standard conductor shield on Nexans ENERGEX® cables is extruded semi-conducting crosslinked polyolefin (XLPO), which meets, or exceeds the CSA, AEIC, and ICEA requirements shown below. In addition, Nexans offers cables with a high performance "supersmooth" conductor shielding which enhances the life expectancy of the cable.

Requirements for Extruded Semi-conducting XLPO Conductor Shield		
Unaged tensile strength	7.0 MPa min.	
Volume resistivity - at room temperature	1000 Ω•m max.	
- at 90°C	1000 Ω•m max.	
- at 130°C	1000 Ω•m max.	
Elongation, aged 168 hr. at 121°C	100% min.	
Brittleness temperature	-25°C max.	
Voids > 0.076 mm	none	
Protrusions into insulation	0.076 mm max.	
Protrusions into conductor shield	0.18 mm max.	

Conductor Shield Thickness		
Conductor Size	Thickness, mm	
(AWG/kcmil)	Minimum at 1 Pt.	
8 - 4/0	0.31	
250 - 500	0.41	
600 - 1000	0.51	

#### Insulation

The standard insulation on Nexans ENERGEX<sup>®</sup> cables is unfilled "tree retardant" crosslinked polyethylene (TRXLPE) meeting, or exceeding the requirements of CSA C68.3, AEIC CS8, and ICEA S-94-649 as shown below.

Using Nexans EXCELCURE™ process, the conductor shield, insulation, and insulation shield are true-triple extruded and cured together in a sealed dry curing system.

All insulating compounds are conveyed through an "Extra Clean" compound handling system to minimize contamination and increase life expectancy.

Requirements for TRXLPE insulation		
Unaged tensile strength	12.4 MPa min.	
Elongation at rupture	250% min.	
Aged 168 hr. at 121°C		
Tensile strength	75% of unaged value min.	
Elongation	75% of unaged value min.	
Heat distortion at 121°C		
4/0 AWG and smaller	25% max.	
Larger than 4/0	15% max.	
Moisture absorption at 75°C		
Dielectric constant after 24 hr.	3.5 max.	
Increase in capacitance 1-14 days	3.0% max.	
7-14 days	1.5% max.	
Stability factor after 14 days	1.0 max.	
Solvent extraction after 20 hr.	30% max.	
Power factor at room temperature	2.0% max.	
Insulation resistance: K at 15°C	6000 GΩ•m min.	

Insulation Thickness and Minimum Conductor Size				
		Thickness, mm		
Rated	Minimum size	100%	133%	
Voltage	AWG	insulation level	insulation level	
5	8	2.29	2.92	
8	6	2.92	3.56	
15	2	4.45	5.59	
25	1	6.60	8.13	
28	1	7.11	8.76	
35	1/0	8.76	10.67	
46	4/0	11.30		

The 133% insulation level is frequently specified for systems without a grounded neutral, or where fault durations may exceed 1 minute, but not 1 hour. In the case where the fault duration exceeds 1 hour, we recommend a voltage rating of at least 1.73 times the system voltage.

## Insulation Shielding

The standard insulation shield on Nexans ENERGEX® cables is semi-conducting crosslinked polyolefin (XLPO), meeting or exceeding the requirements of CSA, AEIC, and ICEA as shown below.

## Requirements for Extruded Semi-conducting XLPO Insulation Shield

Unaged tensile strength 7.0 MPa min. Volume resistivity - at room temperature - at 90°C 500 Ω•m max. 500 Ω•m max. - at 130°C 500 Ω•m max. Elongation, aged 168 hr. at 121°C 100% min. Brittleness temperature -25°C max. Voids > 0.13 mm none Protrusions into insulation 0.13 mm max. Protrusions into insulation shield 0.13 mm max.

Insulation Shield Thickness			
Insulation			
diameter	Thickness, mm		
(mm)	Min. at 1 Pt.	Max. at 1 Pt.	
= < 25.4	0.76	1.80	
= < 38.1	1.00	2.20	
= < 50.8	1.40	2.50	
> 50.8	1.40	2.90	