

**Table 15 – Test requirements for mechanical characteristics  
of insulating compounds (before and after ageing)**

Designation of compounds (see 4.2)	Unit	PVC/A	EPR		HEPR		XLPE	
			0,6/1(1,2) kV cables with copper conductors	All other cables	0,6/1(1,2) kV cables with copper conductors	All other cables	0,6/1(1,2) kV cables with copper conductors	All other cables
Maximum conductor temperature in normal operation (see 4.2)	°C	70	90	90	90	90	90	90
<i>Without ageing (IEC 60811-501)</i>								
Tensile strength, minimum	N/mm <sup>2</sup>	12,5	4,2	4,2	8,5	8,5	12,5	12,5
Elongation-at-break, minimum	%	150	200	200	200	200	200	200
<i>After ageing in an air oven (IEC 60811-401)</i>								
After ageing without conductor								
Treatment:								
– temperature	°C	100	135	135	135	135	135	135
– tolerance	K	±2	±3	±3	±3	±3	±3	±3
– duration	h	168	168	168	168	168	168	168
Tensile strength:								
a) value after ageing, minimum	N/mm <sup>2</sup>	12,5	–	–	–	–	–	–
b) variation <sup>a</sup> , maximum	%	±25	±30	±30	±30	±30	±25	±25
Elongation-at-break:								
a) value after ageing, minimum	%	150	–	–	–	–	–	–
b) variation <sup>a</sup> , maximum	%	±25	±30	±30	±30	±30	±25	±25
After ageing with copper conductor followed by the tensile test <sup>b</sup>				–				
Treatment:								
– temperature	°C	–	150	–	150	–	150	–
– tolerance	K	–	±3	–	±3	–	±3	–
– duration	h	–	168	–	168	–	168	–
Tensile strength:								
Variation <sup>a</sup> , maximum	%	–	±30	–	±30	–	±30	–
Elongation-at-break:								
Variation <sup>a</sup> , maximum	%	–	±30	–	±30	–	±30	–
After ageing with copper conductor followed by bending test (only if the tensile test is not practicable) <sup>b</sup>								
Treatment:								
– temperature	°C	–	150	–	150	–	150	–
– tolerance	K	–	±3	–	±3	–	±3	–
– duration	h	–	240	–	240	–	240	–
Results to be obtained		–	No cracks	–	No cracks	–	No cracks	–

<sup>a</sup> Variation: difference between the median value obtained after ageing and the median value obtained without ageing expressed as a percentage of the latter.

<sup>b</sup> See 18.4.2.

**Table 17 – Test requirements for particular characteristics of various cross-linked insulating compounds**

Designation of compound (see 4.2)	Unit	EPR	HEPR	XLPE
<i>Ozone resistance</i> (IEC 60811-403)				
Ozone concentration (by volume)	%	0,025 to 0,030	0,025 to 0,030	–
Test duration without cracks	h	24	24	–
<i>Hot set test</i> (IEC 60811-507)				
Treatment:				
– air temperature (tolerance $\pm 3$ K)	$^{\circ}\text{C}$	250	250	200
– mechanical stress	N/cm <sup>2</sup>	20	20	20
Maximum elongation under load	%	175	175	175
Maximum permanent elongation after cooling	%	15	15	15
<i>Water absorption</i> (IEC 60811-402)				
Gravimetric method:				
Treatment:				
– temperature (tolerance $\pm 2$ K)	$^{\circ}\text{C}$	85	85	85
– duration	h	336	336	336
Maximum increase of mass	mg/cm <sup>2</sup>	5	5	1 <sup>a</sup>
<i>Shrinkage test</i> (IEC 60811-502)				
Distance <i>L</i> between marks	mm	–	–	200
Treatment:				
– temperature (tolerance $\pm 3$ K)	$^{\circ}\text{C}$	–	–	130
– duration	h	–	–	1
Maximum shrinkage	%	–	–	4
<i>Determination of hardness</i> (see Annex C)				
IRHD <sup>b</sup> , minimum		–	80	–
<i>Determination of elastic modulus</i> (see 18.20)				
Modulus at 150 % elongation, minimum	N/mm <sup>2</sup>	–	4,5	–
<sup>a</sup> An increase greater than 1 mg/cm <sup>2</sup> is being considered for densities of XLPE greater than 1 g/cm <sup>3</sup> . <sup>b</sup> IRHD: international rubber hardness degree.				

**Table 16 – Test requirements for particular characteristics  
of PVC insulating compounds**

Designation of compound (see 4.2)	Unit	PVC/A
<b>Use of the PVC compound</b>		<b>Insulation</b>
<i>Pressure test at high temperature</i> (IEC 60811-508) – temperature (tolerance $\pm 2$ K) – requirement: maximum indentation value	°C %	80 50
<i>Behaviour at low temperature<sup>a</sup></i> (IEC 60811-504, IEC 60811-505) Test to be carried out without previous ageing: – cold bending test for diameter < 12,5 mm – temperature (tolerance $\pm 2$ K) – requirement	°C	–15 no cracks
Cold elongation test on dumb-bells: – temperature (tolerance $\pm 2$ K) – requirement	°C %	–15 $\geq 20$
<i>Heat shock test</i> (IEC 60811-509) – temperature (tolerance $\pm 3$ K) – duration – requirement	°C h	150 1 no cracks
<i>Water absorption</i> (IEC 60811-402) Electrical method: – temperature (tolerance $\pm 2$ K) – duration – requirement	°C h	70 240 no breakdown
<sup>a</sup> Due to climatic conditions, national standards may require the use of a lower temperature.		