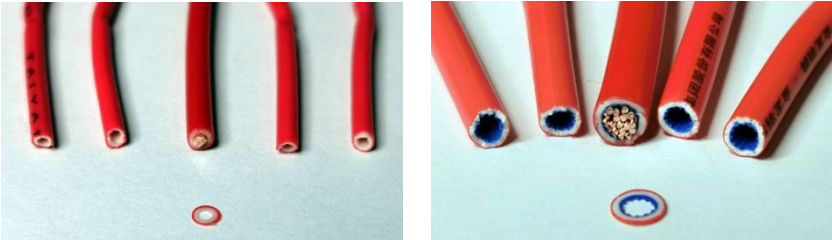


CTL DECISION SHEET (DSH)

Standard(s) (incl. year)	Subclause(s)	Tracking No.	Year
IEC 60227-1:2007	4.1.1 & 5.2.2	DSH 2166	2020
Category			
CABL			
Subject	Keywords	Developed by	Approved at
Coherent layers for insulation and coloured surface for core identification	- Coherent layers for insulation - Coloured surface	ETF 06	2021 CTL Plenary Meeting
Question			
<p>Some cables manufactured by co-extrusion or other similar technique possess two or more coherent and non-separable layers in insulation having the same or different colour. As the insulation with coherent layers is not referred to in clause 5.2.2 in IEC 60227-1:2007 three questions arise accordingly as below.</p> <p>Q1: Is it permitted to apply the insulation in a number of coherent and non-separable layers?</p> <p>Q2. How to handle the testing for cables of such kind of structure?</p> <p>Q3. Is it acceptable that coloured surface is used for core identification as one “other suitable method” as stated in the 1st paragraph of Cl. 4.1.1 in IEC 60227-1:2007?</p>			
Decision			
<p>1: It is permitted to apply the insulation in a number of coherent and non-separable layers.</p> <p>2: All testing shall be carried out on the complete insulation as though it were a single layer.</p> <p>3: The method of coloured surface is acceptable for core identification as one “other suitable method” stated in the 1st paragraph of Cl. 4.1.1 in IEC 60227-1:2007.</p>			
Explanatory notes			
<p>Background:</p> <p>Cables with coherent layers within insulation (as illustrated in Fig. 1) are generally manufactured by co-extrusion or other similar techniques, as these techniques enable much higher efficiency and non-stop production when changing the surface colour of insulation as well as high-speed extrusion.</p>			
			
<p>Fig. 1 Typical images of cross section and tubular test pieces after tensile testing of cables with two (left picture) and three (right picture) coherent layers within insulation</p>			

Rationale:

1. Since clause 5.2.2 of IEC 60227-1:2007 doesn't give any specific requirement regarding the coherent layers within insulation, it could be interpreted that this structure of insulation with coherent layers would not be excluded as long as the whole insulation fulfills relevant requirements.
2. As these adjacent layers closely adhere to each other and cannot be separated it is practical to treat them as a whole like a single layer during testing.
3. The corresponding regional standard EN 50525-1:2011 can be taken for reference as Cl. 5.3.2 states that
"It is permitted to apply the insulation in a single layer, or in a number of coherent layers. Where more than one layer is used, all testing shall be carried out on the complete insulation as though it were a single layer"
and Cl. 5.4.1 states that
"Identification of the cores of a cable shall be achieved by the use of coloured insulation or by a coloured surface".
The same wording about coherent layers in insulation can also be found in IEC 62930:2017
"Electric cables for photovoltaic systems".