

***Hongshang***

Hongshang Heat Shrinkable Materials Co., Ltd

No.9 Qilin Rd, Nankeng Cun, Bantian, Longgang, Shenzhen

China, 518129

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Spec. HLB

# Technical Report on HLB Heat Shrinkable Low Voltage Cable Breakout



**Hongshang Heat Shrinkable Materials Co., Ltd**

## 1 Scope

This specification covers the requirements for HLB series heat shrinkable breakouts coated with hot melt adhesive for application in power cable up to 1000KV. These products meet the requirements of Table 1 with a continuous operating temperature range of -55 to +110 °C and meet the requirement of latest RoHS directive.

## 2 APPLICABLE DOCUMENTS

This specification takes precedence over documents referenced herein. Unless otherwise specified, the latest issue of referenced documents applies. The following documents form a part of this specification to the extent specified herein.

ASTM D 2671	Standard Test Method for Heat Shrinkable Tubing for Electrical Use
ASTM D 792	Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement
IEC 93	Methods of test for the determination of the insulation resistance of solid insulating materials
IEC 243	Electric strength of insulating materials - Test methods
ASTM D 570	Standard Test Method for Water Absorption of Plastics
ASTM D1000	Standard Test Methods for Pressure-Sensitive Adhesive-Coated Tapes Used for Electrical and Electronic Applications
ASTM E 28	Standard Test Methods for Softening Point of Resins Derived from Naval Stores by Ring-and-Ball Apparatus

## 3 REQUIREMENTS

### 3.1 Materials

HLB is made from radiation crosslinked polyolefin coated with adhesives. Specially designed formulation make the tubing to have outstanding physical, chemical and electrical properties.

### 3.2 Test samples

Samples for test are randomly selected from stock.

Unless otherwise specified, samples for testing shall be conditioned for at least 4 hours at 25±5°C prior to all testing. The shrink condition shall be at 150 °C for 5 minutes.

### 3.3 Color

The Standard colors for the tubing shall be black

### 3.4 Properties

The breakouts shall meet all requirements of Table 1

**3.5 Test Procedures**

Unless otherwise specified, tests shall be performed on specimens which have been fully recovered by conditioning for 5 minutes in a  $150 \pm 5^\circ\text{C}$  oven. All ovens shall be of the mechanical convection type

**3.5.1 Tensile Strength and Ultimate Elongation**

Three specimens of tubing shall be tested for tensile strength and ultimate elongation in accordance with ASTM D 2671. The rate of jaw separation shall be 50.8mm per minute.

**3.5.2 Volume resistance**

Perform the test in accordance with IEC 93

**3.5.3 Dielectrical strength**

Perform the test in accordance with IEC 243

**3.5.4 Water absorption**

Perform the test in accordance with ASTM D 570 24 hrs. /23 °C.

**3.5.5 Thermal aging**

Perform the test in accordance with ASTM D 2671. Aging condition shall be  $120^\circ\text{C}$  for 168 hrs.

after: immersing in transformer oil at  $23^\circ\text{C}/24\text{hrs}$

**3.5.6 Peel strength test**

Perform the test in accordance with ASTM D 1000

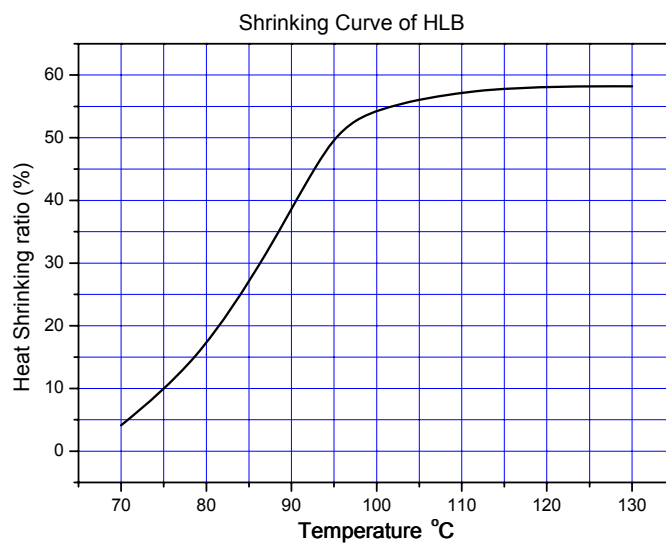
**3.5.7 Adhesive softening point**

Perform the test in accordance with ASTM E28

**Table 1 Requirements**

Property	Unit	Required Value	Test Value
<b>Shrinking properties</b>			
Min. fully shrink temp.	$^\circ\text{C}$		$120^\circ\text{C}$
<b>Physical properties (Jacket layer)</b>			
Tensile strength	MPa	Min. 10 MPa	Min. 13MPa
Elongation	%	Min. 300%	Min 400 %
After aging at $120^\circ\text{C}$ /168 hrs			
Tensile strength		Min. 10 Mpa	Min. 12 Mpa
Ultimate Elongation	%	Min. 250%	Min. 300%
Heat shock		No cracking, flowing,	No cracking, flowing,

225°C / 4 hrs		dropping	dropping
Water absorption		Max.1%	Max. 0.3%
<b>Electrical properties ( Jacket layer )</b>			
Dielectric strength	kV/mm	Min. 12	15
Volume resistance	Ω.cm	Min. 10 <sup>12</sup>	10 <sup>13</sup>
<b>Properties of adhesive</b>			
Peel strength to PE	N/25mm		41
Water absorption	%	Max.1%	Max.0.2
Softening point	°C		90 +/- 5
Water penetration			No penetration after 24 hrs immersion at 23 °C



Checked by: Wang Wei

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Approved by: Dr. Zhong Xiaoguang

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