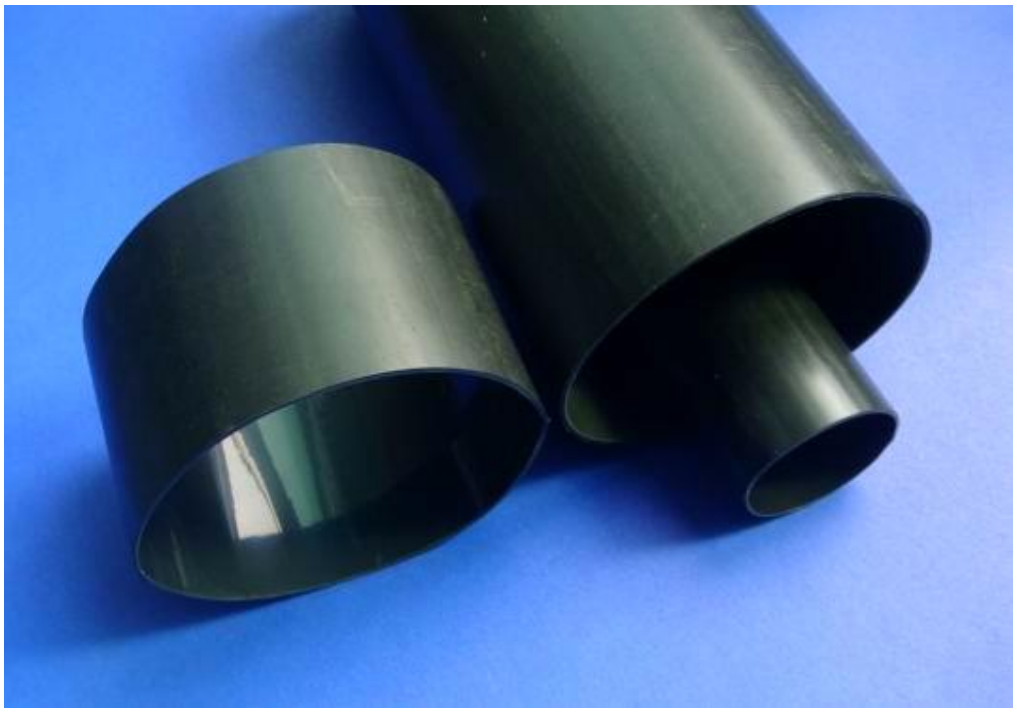
KEHONG

TECHNICAL REPORT

KHA2-M Co-Extrusion Medium Wall

Heat Shrinkable Tubing with flat Hot Melting Adhesive



KEHONG ENTERPRISES CO LTD

1 SCOPE

This specification covers the requirements for non-flame retarded co-extrusion medium wall electrical Insulating tubing coated with hot melt adhesive whose diameter will reduce to a predetermined size upon the application of heat in excess of 120°C.

This tubing meets the requirements of Table 1 with a continuous operating temperature range of -55 to +110 ℃.

KHA2-M is free of polybrominated biphenyls (PBB) and polybrominated biphenyl oxides (PBDE) 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.

UL 224		Extruded Insulating Tubing
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 Volume Resistivity and Surface Resistivity of Solid Electrical Insulating Materials
IEC 60243		Electric Strength of Insulating Materials - Test Methods
ISO 62		Plastics-Determination of Water Absorption
ISO 846		Plastics -- Evaluation of the Action of Microorganisms
ASTM G154		Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials
ASTM	D1000	Standard Test Methods for Pressure-Sensitive Adhesive-Coated Tapes Used for Electrical and Electronic Applications
ASTM	E28	Standard Test Methods for Softening Point of Resins Derived from Naval Stores by Ring-and-Ball Apparatus

3 REQUIREMENTS

3.1 Materials

KHA2-M flexible heat shrinkable tubing is made from radiation crosslinked Polyolefin. Specially designed for insulating, protecting and sealing electrical connections and joints in medium and low-voltage cables, which was installed on splices and joints. It is also resistant to chemicals, UV, moisture and oils.

3.2 Color

The Standard colors for the tubing shall be black.

3.3 Properties

The tubing shall meet all requirements of Table 1.

3.4 Test Procedures

Unless otherwise specified, tests shall be performed on specimens which have been fully recovered by conditioning for 5 minutes in a 200 ± 2°C oven. All ovens shall be of the mechanical convection type.

3.4.1 Dimensions and Longitudinal Change

Three 150-mm specimens of tubing, as supplied, shall be measured for length ± 1 mm and inside diameter in accordance with UL 224, conditioned for 5 minutes in a 200 ± 2°C oven, cooled to 23 ± 3°C and then re-measured. Prior to and after conditioning, the dimensions of the tubing shall be in accordance with Table 1. Longitudinal change (LC) shall be calculated as follows:

$$LC = (L1 - L0)/L0 \times 100$$

where

LC = longitudinal change

L0 = length before shrinkage

L1 = length after shrinkage

3.4.2 Eccentricity

Perform the test in accordance with UL 224. Eccentricity (EC) shall be calculated as follows:

$$EC = (1 - W1/W2) \times 100$$

where

W1 = minimum wall thickness

W2 = maximum wall thickness

3.4.3 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.

3.4.4 Secant Modulus

From the tubing sample in the expanded form, determine the secant modulus in accordance with ASTM D 2671. The secant modulus shall be calculated from the following formula after determining the tensile stress necessary to produce a 2 percent strain:

$$SM2 = (S2/0.02) = 50S2$$

where

SM2 = secant modulus at 2 percent strain, MPa

3.4.5 Thermal aging

Perform the test in accordance with ASTM D 2671. Aging condition shall be 150℃ for 168 hrs.

3.4.6 Heat shock

Perform the test in accordance with ASTM D 2671. The specimen may be Placed horizontally in the oven at 225 ℃ for 4 hours. While in the oven and after removal from the oven, the specimen shall be examined for evidence of cracking.

3.4.7 Cold bend test

Perform the test in accordance with ASTM D 2671 at the condition of -40℃ for 4 hrs.

3.4.8 Water absorption

Perform the test in accordance with ISO 62 at the condition of 23 ℃ for 24hrs.

3.4.9 Density

Perform the test in accordance with ASTM D 792.

3.4.10 Volume resistance

Perform the test in accordance with ASTM D 2671.

3.4.11 Dielectric strength

Perform the test in accordance with IEC 60243.

3.4.12 Corrosion test

Perform the test in accordance with ASTM D 2671 Procedure A(150℃ /168hrs).

3.4.13 UV resistance

Perform the test in accordance with ASTM G154. The test condition is 8h UV at 60±3℃, 4h condensation at 50±3℃, total exposure time:1000hrs.

3.4.14 Peel strength test

Perform the test in accordance with ASTM D 2671.

3.4.15 Softening point

Perform the test in accordance with ASTM E 28.

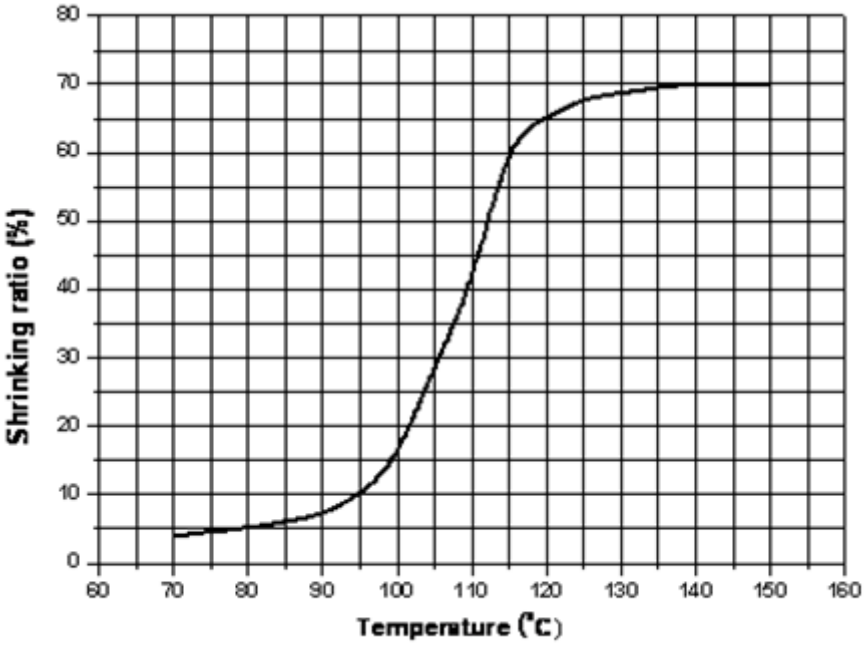
3.4.16 Resistance to fungus and decay

Perform the test in accordance with ISO 846.

Table 1 Requirements

Property	Unit	Required Value	Test Value
Shrinking properties			
Longitudinal Changes	%	0 to -10%	0 to -8%
Eccentricity	%	Max. 40%	0 to 40 %
Physical properties（Jacket layer）			
Tensile strength	MPa	Min. 12 MPa	Min. 14MPa
Ultimate Elongation	%	Min. 350%	Min 400 %
Secant Modulus / 2% Strain	MPa	Min.185	250
After aging at 150℃ /168 hrs Tensile strength Ultimate Elongation	 MPa %	 Min.12MPa Min. 300%	 Min. 12 MPa Min. 300%
Heat shock 225℃ / 4 hrs		No cracking, flowing, dropping	No cracking, flowing, dropping
Cold bend test -40℃ / 4 hrs		No cracking	No cracking
Water absorption	%	Max. 0.5	0.15
Density	g/cm^3		1.05
Electrical properties（Jacket layer）			
Dielectric strength	kV/mm	Min. 12	19
Volume resistance	Ω.cm	Min. 10^{12}	10^{14}
Chemical properties（Jacket layer）			
Copper corrosion		No corrosion	No corrosion
UV resistance		No color change and crack	No color change and crack
Properties of adhesive			
Peel strength to PE	Pli		40
Peel strength to aluminum	Pli		36
Water absorption	%	Max.0.2	0.1
Softening point	℃		105 ±5
Corrosion		No corrosion	No corrosion
Resistance to fungus and decay		ISO 846	Pass

3.5 Shrinking curve of KHA2-M 33/8mm Flat glue coated



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