

Hongshang

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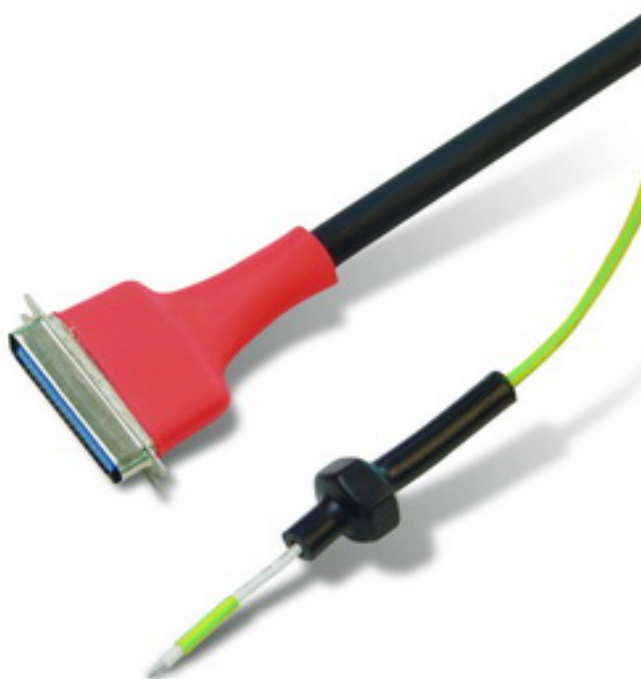
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Spec. H-2 (3X)

TECHNICAL REPORT ON

H-2 (3X) Flexible

Flame Retardant Thin Wall Tubing



Hongshang Heat Shrinkable Materials Co., Ltd

1 SCOPE

This specification covers the requirements of flexible, flame retardant thin wall tubing. The diameter of the tubing will reduce to a predetermined size upon the application of heat in excess of 70°C. This tubing meets the requirements of Table 1 with a continuous operating temperature range of -55 °C to +125 °C. H-2 (3X) meets the requirement of UL 224, CSA and the latest RoHS directives.

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
CSA	CANADIAN STANDARDS ASSOCIATION C22.2 No.198.1 Extruded Insulating Tubing
ASTM D 2671	Standard Test Method for Heat Shrinkable Tubing for Electrical Use

3 REQUIREMENTS

3.1 Materials

H-2 (3X) flexible, flame retardant thin wall tubing is made from radiation cross linked polyolefin. Specially designed formulation makes the tubing to have outstanding physical, chemical and electrical properties. The tubing is idea for color coding.

3.2 Color

The standard colors for the tubing shall be black, special colors are available on request.

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 3 minutes in a 200 ± 2°C oven. All ovens should be the mechanical convection type

3.4.1 Dimensions and Longitudinal Change

Dimensions and Longitudinal Changes are measured according to the method described in section 6.14 in UL 224 Standard.

$$LC(\%) = (L_1 - L_0)/L_0 \times 100$$

LC = longitudinal change
 L_0 = length before shrinkage
 L_1 = length after shrinkage

3.4.2 Eccentricity

Perform the test in accordance with ASTM D 2671.

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

W1 = minimum wall thickness

W2 = maximum wall thickness

3.4.3 Tensile Strength and Ultimate Elongation

Perform the test in accordance with ASTM D 2671.

3.4.4 Volume resistance

Perform the test in accordance with ASTM D 2671

3.4.5 Dielectrical strength

Perform the test in accordance with ASTM D 2671

3.4.6 Water absorption

Perform the test in accordance with ISO 62 24 hrs. /23 °C

3.4.7 Heat shock

Perform the test in accordance with ASTM D 2671. The specimen may be placed horizontally in the oven at 250 °C for 4 hours. While in the oven and after removal from the oven, the specimen shall be examined for evidence of flowing and dropping.

3.4.8 Thermal aging

Perform the test in accordance with UL 224. Aging condition shall be 158°C ± 1°C for 168 hours.

3.4.9 Cold bend test

Perform the test in accordance with UL 224. -30°C ± 1°C /1 hrs

3.4.10 Flammability

Perform the test in accordance with UL 224.

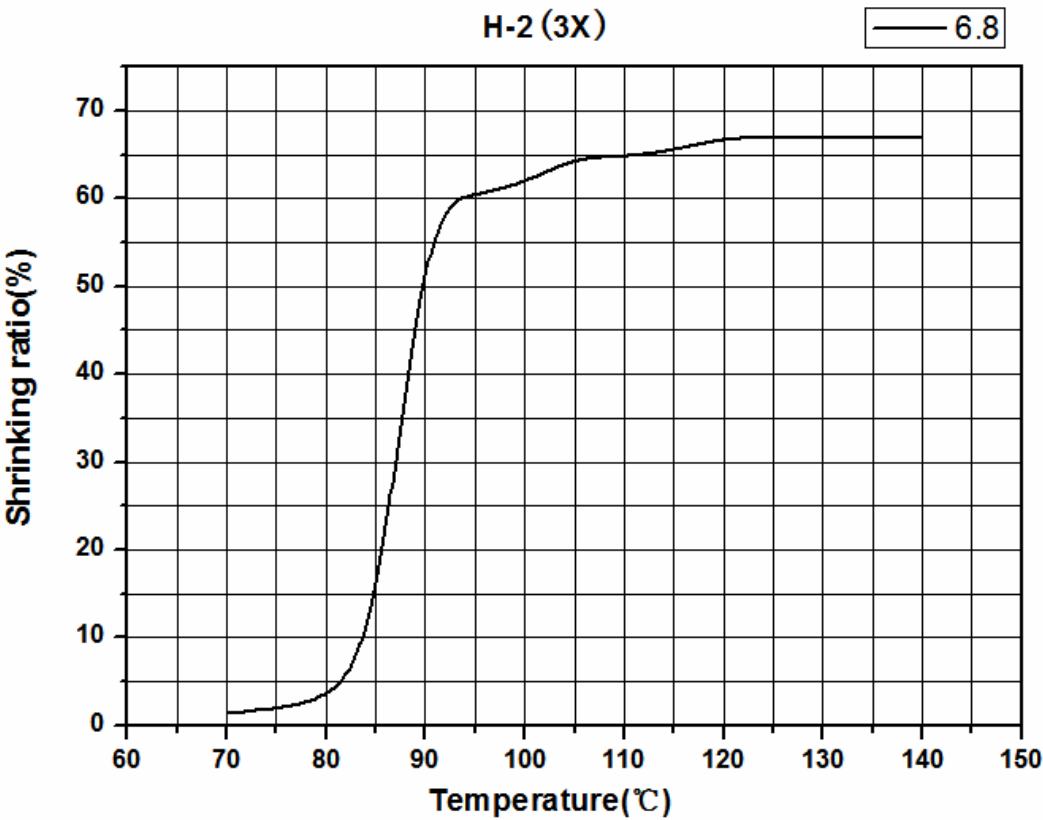
3.4.11 Corrosion test

Specimen tubing was shrunk on a bare copper tube followed by aging at 158 °C for 168 hrs. The surface of copper tube shall be no sign of corrosion except for thermal oxidation.

Table 1 Requirements

Property	Unit	Required Value	Test Value
Shrinking properties			
Longitudinal Changes	%	0 to -10%	0 to -3%
Eccentricity	%	Max. 35%	Max 25%
Physical properties			
Tensile strength	MPa	Min. 10.3 MPa	Min. 14MPa
Elongation	%	Min. 200%	Min 400 %
After aging at 158°C /168 hrs			
Tensile strength	Mpa	Min. 7.2 MPa	Min. 12 Mpa
Ultimate Elongation	%	Min. 100%	Min. 350%
Heat shock 250°C /4 hrs		No flowing, dropping, cracking	No flowing, dropping, cracking
Cold bend test -30°C /1 hrs		No cracking	No cracking
Electrical properties			
Dielectric strength	kV/mm	Min. 19.7	Min. 22
Volume resistance	Ω.cm	Min. 10 ¹⁴	10 ¹⁴
Chemical properties			
Water absorption	%	Max. 0.5	0.2
Copper corrosion		No corrosion	No corrosion
Flammability		VW-1	Pass

3.5 Shrinking curve



Checked by: Zeng Wan

Date: 2011-9-19

Approved by:

Date: