Product Specification

Number: L-KLS8-01140-HT-12-S

Name: Heat shrinkable tubing

Customer: _____

Date: 2025-03-07

Customer Signature:

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Compi	Check	Review	Approva
Jenny	Jack.C		

1 Content and Application

This specification defines technical requirement, testing method, testing rules and packing of Halogen Free Flame-Retardant Heat shrinkable Tube.

This specification applies to wire connection, disposal of wire termination, sign of the wire bind, insulate protection of resistance and capacitance, surface protection of sport equipment and the steel frame, rust-proof and corrosion-proof of relative products, wire protection and other application of Halogen Free Flame-Retardant Heat shrinkable Tube.

2 Standard

Standard for Extruded Electrical Tubing UL 224。

3 Terms

3.1 Heat shrinkable material

The heat-shrinkable materials are obtained by cross-linking of polyethylene with chemical or radiation method. The shape of a product is formed at high temperatures and then solidified by cooling it to a room temperature. Owing its “shape memory”, it will attempt to return to its original shape, thus significantly decreasing its cross dimensions and tightly closing the object placed previous into it. This ensures electrical insulation, anticorrosion protection, improve aesthetics.

3.2 Heat shrinkable tubes

The polymer or polymer alloy through extrusion molding are defined size tubular intermediate product, irradiation (or chemical) heating expansion after cross linking, cooling and shaping with certain size tubular products have become heat shrinkable sleeve.

4 Technical requirement

4.1 Conditions

4.1.1 The use of the environment temperatures: -55℃～125℃

4.1.2 Can be used in acid, alkali conditions.

4.1.3 Use with strict requirement about environment.

4.2 Appearance requirement

4.2.1 No obvious scuffing, sags and crests, bamboo-shaped flaw on products.

4.2.2 The surfaces on the products are polished and spotless, without oil stain, without laying dust.

4.2.3 Printing clear

4.3 Heat shrinking property.

4.3.1 Minimum shrink temperature:70℃

Minimum full recovery temperature for thin wall:110℃

Minimum full recovery temperature for normal wall:125℃

According to the UL224 standard, the temperature required for tube to recover completely is 200℃ and the time required is 3 minutes.

4.3.2 Longitudinal shrinking ratio less than ±5%.

4.4 Material performance

Material physical and chemical performance confirm to table 1.

4.5 Products' dimension

Thin wall Halogen Free Flame-Retardant Heat shrinkable Tube dimension confirm to table 2

Normal wall Halogen Free Flame-Retardant Heat shrinkable Tube dimension confirm to table 3

4.6 Color

Standard Color: Black、Red、Blue、Green、Yellow、White、Yellow/Green; Other colors such as Purple、Gray、Brown can be made according to the customers' requirements.

4.7 Storage requirements and storage period.

Avoid direct sunlight, rain and trampling.

Temperature：-10℃-45℃

Humidity：annual mean≤75%, less than 30 days ＞75%，≤95% one year.

Max storage period：36 months from the date of production.

4.8 The method of usage

In the use process, in order to ensure the heat shrinkable sleeve can complete contraction in place, the use of forced air oven thermostat, and the shrinkage temperature control in 125℃. In particular, when the heat shrinkable sleeve is put into the oven, oven temperature has a downward trend, to reach the set temperature requires a certain amount of time. At the same time, the heat shrinkable sleeve to achieve the ultimate shrinkage temperature also needs a certain time by hot air circulating in the oven. Therefore, we must make oven reach the set temperature and keep the temperature for 3 minutes, heat shrinkable sleeve can complete contraction in place.

TABLE 1 Halogen Free Flame-Retardant Heat shrinkable Tube Characters

ITEM			TESTING METHOD	REQURIMENT
Physical	Tensile strength/MPa		UL224	≥10.4
	Elongation/%		UL224	≥200
	Tensile strength afer aging/MPa		UL224;158℃×168hr	≥7.3
	Elongation after aging/%		UL224;158℃×168hr	≥100
	Heat Shock		UL224;	No viscidity No cracking
	Cold Blend		UL224;-30℃×1hr	No cracking
Electrical	Dielectric Withstand	300V	UL224;1500V 1min	without breakdown
		600V	UL224;2500V 1min	without breakdown
	Dielectric Strength/KV/mm		UL224	≥15
	Volume resistance/Ω•cm		UL224	≥1×10^{14}
Chemical	Copper stability		UL224；158℃×168hr	PASS
	Anti Corrosion		UL224；158℃×168hr	PASS
	Flammability		ASTM D2671 C	☆

Note: Yellow and White flame retardant performance needs to be improved, the other color can

reach the required flame retardant properties

TABLE 2 Thin wall Halogen Free Flame-Retardant Heat shrinkable Tube Dimensional Requirement

Spec（mm）	As supplied(mm)		After shrinkage(mm)		Packing	Application range(mm)
	I.D	W.T	I.D	W.T	Meter/ Spool	
Φ0.6CB	0.90±0.20	0.13±0.05	≤0.40	0.20±0.10	200	0.40～0.70
Φ0.8CB	1.10±0.20	0.13±0.05	≤0.50	0.20±0.10	200	0.60～0.80
Φ1.0CB	1.40±0.20	0.13±0.05	≤0.65	0.20±0.10	200	0.70～1.00
Φ1.5CB	1.90±0.20	0.13±0.05	≤0.85	0.20±0.10	200	0.90～1.40
Φ2.0CB	2.40±0.20	0.13±0.05	≤1.00	0.22±0.10	200	1.10～1.80
Φ2.5CB	2.90±0.20	0.13±0.05	≤1.30	0.25±0.10	200	1.40～2.30
Φ3.0CB	3.40±0.20	0.13±0.05	≤1.50	0.28±0.10	200	1.60～2.70
Φ3.5CB	3.90±0.20	0.13±0.05	≤1.80	0.28±0.10	200	1.90～3.20
Φ4.0CB	4.40±0.20	0.15±0.05	≤2.00	0.30±0.10	200	2.10～3.60
Φ4.5CB	4.90±0.20	0.15±0.05	≤2.30	0.30±0.10	100	2.40～4.00
Φ5.0CB	5.50±0.20	0.15±0.05	≤2.50	0.32±0.10	100	2.60～4.50
Φ6.0CB	6.50±0.20	0.15±0.05	≤3.00	0.32±0.10	100	3.10～5.40
Φ7CB	7.50±0.30	0.15±0.05	≤3.50	0.32±0.10	200	3.70～6.30
Φ8CB	8.50±0.30	0.15±0.05	≤4.00	0.32±0.10	200	4.20～7.20
Φ9CB	9.50±0.30	0.15±0.05	≤4.50	0.35±0.10	200	4.70～8.00
Φ10CB	10.50±0.30	0.15±0.05	≤5.00	0.35±0.10	200	5.20～9.00
Φ11CB	11.50±0.30	0.18±0.05	≤5.50	0.40±0.10	200	5.70～10.00
Φ12CB	12.50±0.30	0.20±0.05	≤6.00	0.40±0.10	200	6.20～11.00
Φ13CB	13.50±0.30	0.20±0.05	≤6.50	0.40±0.10	200	6.70～12.00
Φ14CB	14.50±0.30	0.20±0.05	≤7.00	0.40±0.10	200	7.30～13.00
Φ15CB	15.50±0.40	0.20±0.05	≤7.50	0.40±0.10	200	7.80～14.00
Φ16CB	16.50±0.40	0.22±0.05	≤8.00	0.40±0.10	200	8.30～15.80
Φ17CB	17.50±0.40	0.22±0.05	≤8.50	0.40±0.10	200	8.80～16.00
Φ18CB	18.50±0.40	0.22±0.05	≤9.00	0.42±0.10	200	9.30～17.00
Φ20CB	20.50±0.50	0.25±0.05	≤10.00	0.45±0.10	200	10.50～19.00
Φ22CB	22.50±0.50	0.25±0.05	≤11.00	0.45±0.10	200	11.50～20.50
Φ25CB	25.50±0.50	0.25±0.05	≤12.50	0.45±0.10	100	13.00～24.00

★None Yellow/Green production

★Print Content of Thin wall Halogen Free Flame-Retardant Heat shrinkable Tube:

Spec. less than 1.0: TUBE 125℃ VW-1 H (φ 0.8CB)

Spec. for the rest: TUBE 125℃ VW -1 H (φ 9CB)

TABLE 3 Normal wall Halogen Free Flame-Retardant Heat shrinkable Tube Dimensional Requirement

Spec.（mm）	As supplied(mm)		After shrinkage(mm)		Small Packing	Big Packin	Application range(mm)
	I.D	W.T	I.D	W.T	Meter/ Spool	Meter/ Spool	
Φ0.4	0.60±0.20	0.18±0.05	≤0.30	0.33±0.10	400	400	0.30～0.40
Φ0.5	0.80±0.20	0.18±0.05	≤0.35	0.33±0.10	400	400	0.40～0.60
Φ0.6	0.90±0.20	0.18±0.05	≤0.40	0.33±0.10	200	400	0.45～0.70
Φ0.8	1.10±0.20	0.18±0.05	≤0.50	0.33±0.10	200	400	0.60～0.80
Φ1.0	1.50±0.20	0.20±0.05	≤0.65	0.36±0.10	200	400	0.75～0.90
Φ1.5	2.00±0.20	0.20±0.05	≤0.85	0.36±0.10	200	400	0.95～1.40
Φ2.0	2.50±0.20	0.20±0.05	≤1.00	0.45±0.10	200	400	1.10～1.80
Φ2.5	3.00±0.20	0.20±0.05	≤1.30	0.45±0.10	200	400	1.35～2.30
Φ3.0	3.50±0.20	0.20±0.05	≤1.50	0.45±0.10	200	400	1.60～2.70
Φ3.5	4.00±0.20	0.23±0.05	≤1.80	0.45±0.10	200	400	1.85～3.20
Φ4.0	4.70±0.20	0.25±0.05	≤2.00	0.45±0.10	200	400	2.10～3.60
Φ4.5	5.00±0.20	0.28±0.05	≤2.30	0.56±0.10	100	200	2.35～4.00
Φ5.0	5.50±0.20	0.28±0.05	≤2.50	0.56±0.10	100	200	2.60～4.50
Φ5.5	6.00±0.20	0.28±0.05	≤2.80	0.56±0.10	100	200	2.90～5.00
Φ6.0	6.50±0.20	0.28±0.05	≤3.00	0.56±0.10	100	200	3.10～5.40
Φ7.0	7.50±0.30	0.30±0.05	≤3.50	0.56±0.10	100	100	3.70～6.30
Φ8.0	8.50±0.30	0.30±0.08	≤4.00	0.56±0.10	100	100	4.20～7.20
Φ9.0	9.50±0.30	0.30±0.08	≤4.50	0.56±0.10	100	100	4.70～8.00
Φ10	10.5±0.30	0.30±0.08	≤5.00	0.56±0.10	100	100	5.20～9.00
Φ11	11.5±0.30	0.30±0.08	≤5.50	0.56±0.10	100	100	5.70～10.00
Φ12	12.5±0.30	0.30±0.08	≤6.00	0.56±0.10	100	100	6.20～11.00
Φ13	13.5±0.30	0.35±0.08	≤6.50	0.70±0.10	100	100	6.70～12.00
Φ14	14.5±0.30	0.35±0.10	≤7.00	0.70±0.10	100	100	7.30～13.00
Φ15	15.5±0.40	0.35±0.10	≤7.50	0.70±0.10	100	100	7.80～14.00
Φ16	16.5±0.40	0.35±0.10	≤8.00	0.70±0.10	100	100	8.30～15.00
Φ17	17.5±0.40	0.35±0.10	≤8.50	0.70±0.10	100	100	8.80～16.00
Φ18	19.0±0.50	0.35±0.10	≤9.00	0.70±0.10	100	100	9.30～17.00
Φ20	22.0±0.50	0.40±0.10	≤10.00	0.83±0.10	100	100	10.40～19.00
Φ22	24.0±0.50	0.40±0.12	≤11.00	0.83±0.15	100	100	11.40～21.00
Φ25	26.0±0.50	0.45±0.12	≤12.50	0.90±0.15	50	50	12.80～24.00
Φ28	29.0±0.50	0.45±0.12	≤14.00	0.90±0.15	50	50	14.40～29.00

★Yellow/Green production starts at Φ1.0 and only provides small packing production.

★Print Content of Halogen Free Flame-Retardant Heat shrinkable Tube(Example of 9):

TUBE 125℃ VW -1 H (φ 9)

4.9 Environmental material

This specification promise that our products nonuse materials as below. Four heavy metals、PBB、PBDE etc have pass the SGS inspection. We also promise that meet SONY-SS-00259, REACH standard. The environmental characteristics are listed in table 4.

TABLE 4 Halogen Free Flame-Retardant Heat shrinkable Tube environmental characteristics

Harmful Materials	Content	Test Method
PBBS	≤1000ppm	IEC62321
PBDES	≤1000ppm	IEC62321
DBP	≤1000ppm	IEC62321
BBP	≤1000ppm	IEC62321
DEHP	≤1000ppm	IEC62321
DIBP	≤1000ppm	IEC62321
Cr6+	≤1000ppm	IEC62321
Pb	≤1000ppm	IEC62321
Hg	≤1000ppm	IEC62321
Cd	≤100ppm	IEC62321
Cl	≤900ppm	EN 14582 Method B
Br	≤900ppm	EN 14582 Method B

5 Material Composition

is a flame retardant tubes made from Polyolefin and Flame-Retardant Material etc.
The contents of Pb,Cd,Hg,Cr6+,PBBS,PBDES are all confirmed to requirements of (EU) 2015/863 (RoHS2.0) standards. The contents of Cl and Br confirmed to SONY-SS-00259 standards. The

main components as follows:

Raw Material Name		Using aim	Content	CAS.NO.
Name	make up of			
Ethylene-vinyl acetate copolymer	(CH2-CH2)m-(CH2-CH-COOCH3)n	Main Material	50%	24937-78-8
Magnesium hydroxid	Mg(OH)2	Flame-Retardant Material	35%	1309-42-8
Phosphorus	P	Flame-Retardant Material	10%	7723-14-0
Color Material Grain	Pigment	Colorant Material	5%	—
Printint ink	Ink	Printint ink	—	—

6 Technology documents

（1） ISO9001 certificate

（2） ISO14001 certificate

（3） ISO/TS16949 certificate