



深圳市沃尔核材股份有限公司

ShenZhen Woer Heat—Shrinkable Material Co.,Ltd.

SPECIFICATION FOR APPROVAL

Edition: A/1

Product Name	Halogen Free Flame-Retardant Heat shrinkable Tube	Supplier Code	
Size	All specs	Customer Code	

Supplier Confirm(The Electronic Department of ShenZhen Woer Heat—Shrinkable Material Co.,Ltd.)

Maker/Date	Reviewer/Date
Songlin Fan/July 25 2022	Lidong Wei/ July 25 2022

Customer confirm

Customer Approved/Date	Grupo Yllaconza Import & Export	July 25 2022
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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: $-55^{\circ}\text{C} \sim 125^{\circ}\text{C}$

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°C

Minimum full recovery temperature for thin wall: 110°C

Minimum full recovery temperature for normal wall: 125°C

4.3.2 Longitudinal shrinking ratio less than $\pm 5\%$.

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; 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°C-45°C

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°C. 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	REQUIREMENT	
Physical	Tensile strength/MPa	UL224	≥10.4	
	Elongation/%	UL224	≥200	
	Tensile strength after aging/MPa	UL224;158°C×168hr	≥7.3	
	Elongation after aging/%	UL224;158°C×168hr	≥100	
	Heat Shock	UL224;	No viscosity No cracking	
	Cold Blend	UL224;-30°C×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°C×168hr	PASS
	Anti Corrosion	UL224; 158°C×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 Meter/ Spool	Application range(mm)
	I.D	W.T	I.D	W.T		
Φ0.6CB	0.90±0.2	0.13±0.05	≤0.40	0.20±0.10	200	0.40~0.70
Φ0.8CB	1.10±0.2	0.13±0.05	≤0.50	0.20±0.10	200	0.60~0.80
Φ1.0CB	1.40±0.2	0.13±0.05	≤0.65	0.20±0.10	200	0.70~1.00
Φ1.5CB	1.90±0.2	0.13±0.05	≤0.85	0.20±0.10	200	0.90~1.40
Φ2.0CB	2.40±0.2	0.13±0.05	≤1.00	0.22±0.10	200	1.10~1.80
Φ2.5CB	2.90±0.2	0.13±0.05	≤1.30	0.25±0.10	200	1.40~2.30
Φ3.0CB	3.40±0.2	0.13±0.05	≤1.50	0.28±0.10	200	1.60~2.70
Φ3.5CB	3.90±0.2	0.13±0.05	≤1.80	0.28±0.10	200	1.90~3.20
Φ4.0CB	4.40±0.2	0.15±0.05	≤2.00	0.30±0.10	200	2.10~3.60
Φ4.5CB	4.90±0.2	0.15±0.05	≤2.30	0.30±0.10	100	2.40~4.00
Φ5.0CB	5.50±0.2	0.15±0.05	≤2.5	0.32±0.10	100	2.60~4.50
Φ6.0CB	6.50±0.2	0.15±0.05	≤3.0	0.32±0.10	100	3.10~5.40
Φ7CB	7.50±0.3	0.15±0.05	≤3.5	0.32±0.10	200	3.7~6.3
Φ8CB	8.50±0.3	0.15±0.05	≤4.0	0.32±0.10	200	4.2~7.2
Φ9CB	9.50±0.3	0.15±0.05	≤4.5	0.35±0.10	200	4.7~8.0
Φ10CB	10.5±0.3	0.15±0.05	≤5.0	0.35±0.10	200	5.2~9.0
Φ11CB	11.5±0.3	0.18±0.05	≤5.5	0.40±0.10	200	5.7~10.0
Φ12CB	12.5±0.3	0.20±0.05	≤6.0	0.40±0.10	200	6.2~11.0
Φ13CB	13.5±0.3	0.20±0.05	≤6.5	0.40±0.10	200	6.7~12.0
Φ14CB	14.5±0.3	0.20±0.05	≤7.0	0.40±0.10	200	7.3~13.0
Φ15CB	15.5±0.4	0.20±0.05	≤7.5	0.40±0.10	200	7.8~14.0
Φ16CB	16.5±0.4	0.22±0.05	≤8.0	0.40±0.10	200	8.3~15.8
Φ17CB	17.5±0.4	0.22±0.05	≤8.5	0.40±0.10	200	8.8~16.0
Φ18CB	18.5±0.4	0.22±0.05	≤9.0	0.42±0.10	200	9.3~17.0
Φ20CB	20.5±0.5	0.25±0.05	≤10.0	0.45±0.10	200	10.5~19.0
Φ22CB	22.5±0.5	0.25±0.05	≤11.0	0.45±0.10	200	11.5~20.5

Φ25CB	25.5±0.5	0.25±0.05	≤12.5	0.45±0.10	100	13.0~24.0
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★Print Content of Thin wall Halogen Free Flame-Retardant Heat shrinkable Tube:

Spec. less than 1.0: E203950    WOER RSFR-H TUBE 125°C VW-1 H (φ 0.8CB)

Spec. for the rest: E203950    WOER RSFR(CB) TUBE 125°C 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 Packing	Application range(mm)
	I.D	W.T	I.D	W.T	Meter/ Spool	Meter/ Spool	
Φ0.4	0.60±0.2	0.18±0.05	≤0.30	0.33±0.10	400	400	0.30~0.40
Φ0.5	0.80±0.2	0.18±0.05	≤0.35	0.33±0.10	400	400	0.40~0.60
Φ0.6	0.90±0.2	0.18±0.05	≤0.40	0.33±0.10	200	400	0.45~0.70
Φ0.8	1.10±0.2	0.18±0.05	≤0.50	0.33±0.10	200	400	0.60~0.80
Φ1.0	1.50±0.2	0.20±0.05	≤0.65	0.36±0.10	200	400	0.75~0.90
Φ1.5	2.00±0.2	0.20±0.05	≤0.85	0.36±0.10	200	400	0.95~1.40
Φ2.0	2.50±0.2	0.20±0.05	≤1.00	0.45±0.10	200	400	1.10~1.80
Φ2.5	3.00±0.2	0.20±0.05	≤1.30	0.45±0.10	200	400	1.35~2.30
Φ3.0	3.50±0.2	0.20±0.05	≤1.50	0.45±0.10	200	400	1.60~2.70
Φ3.5	4.00±0.2	0.23±0.05	≤1.80	0.45±0.10	200	400	1.85~3.20
Φ4.0	4.70±0.2	0.25±0.05	≤2.00	0.45±0.10	200	400	2.10~3.60
Φ4.5	5.00±0.2	0.28±0.05	≤2.30	0.56±0.10	100	200	2.35~4.00
Φ5.0	5.50±0.2	0.28±0.05	≤2.50	0.56±0.10	100	200	2.60~4.50
Φ5.5	6.00±0.2	0.28±0.05	≤2.80	0.56±0.10	100	200	2.90~5.00
Φ6.0	6.50±0.2	0.28±0.05	≤3.00	0.56±0.10	100	200	3.10~5.40
Φ7.0	7.50±0.3	0.30±0.05	≤3.50	0.56±0.10	100	100	3.7~6.3
Φ8.0	8.50±0.3	0.30±0.08	≤4.00	0.56±0.10	100	100	4.2~7.2
Φ9.0	9.50±0.3	0.30±0.08	≤4.50	0.56±0.10	100	100	4.7~8.0
Φ10	10.5±0.3	0.30±0.08	≤5.00	0.56±0.10	100	100	5.2~9.0
Φ11	11.5±0.3	0.30±0.08	≤5.50	0.56±0.10	100	100	5.7~10.0
Φ12	12.5±0.3	0.30±0.08	≤6.00	0.56±0.10	100	100	6.2~11.0
Φ13	13.5±0.3	0.35±0.08	≤6.50	0.70±0.10	100	100	6.7~12.0
Φ14	14.5±0.3	0.35±0.10	≤7.00	0.70±0.10	100	100	7.3~13.0
Φ15	15.5±0.4	0.35±0.10	≤7.50	0.70±0.10	100	100	7.8~14.0
Φ16	16.5±0.4	0.35±0.10	≤8.00	0.70±0.10	100	100	8.3~15.0

Φ17	17.5±0.4	0.35±0.10	≤8.50	0.70±0.10	100	100	8.8~16.0
Φ18	19.0±0.5	0.35±0.10	≤9.00	0.70±0.10	100	100	9.3~17.0
Φ20	22.0±0.5	0.40±0.10	≤10.00	0.83±0.10	100	100	10.4~19.0
Φ22	24.0±0.5	0.40±0.12	≤11.00	0.83±0.15	100	100	11.4~21.0
Φ25	26.0±0.5	0.45±0.12	≤12.50	0.90±0.15	50	50	12.8~24.0
Φ28	29.0±0.5	0.45±0.12	≤14.00	0.90±0.15	50	50	14.4~29.0
Φ30	31.5±1.0	0.45±0.12	≤15.00	1.00±0.15	50	50	16~29
Φ35	36.5±1.0	0.45±0.12	≤17.50	1.00±0.15	50	50	18~34
Φ40	41.5±1.0	0.50±0.12	≤20.00	1.00±0.15	50	50	21~39
Φ45	46.5±1.0	0.50±0.15	≤22.50	1.00±0.20	25	25	24~44
Φ50	≥50	0.50±0.15	≤25.00	1.10±0.20	25	25	26~49

Note: These products (above Φ30) are considered as G Tubes(comply with (EU)2015/863(RoHS2.0),You should note in the order if you need halogen-free tubes.

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

E203950 c  us  WOER RSFR-H TUBE 125°C 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

Halogen Free Flame-Retardant Heat shrinkable Tube of Shen Zhen Woer Heat-Shrinkable Material Co.,Ltd. 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	Manufacturer	CAS.NO.
Name	make up of				
Ethylene-vinyl acetate copolymer	(CH ₂ -CH ₂) _m -(CH ₂ -CH-COOCH ₃) _n	Main Material	50%	China Sinopec	24937-78-8
Magnesium hydroxid	Mg(OH) ₂	Flame-Retardant Material	35%	Jinhaohui Material Co.,Ltd.	1309-42-8
Phosphorus	P	Flame-Retardant Material	10%	Shanghai Haiyi Co.,Ltd	7723-14-0
Color Material Grain	Pigment	Colorant Material	5%	Huawangcai Co.,Ltd.	—
Printint ink	Ink	Printint ink	—	Shanghai Jiexin Co.,Ltd.	—

6 Technology documents

- (1) ISO9001 certificate
- (2) ISO14001 certificate
- (3) ISO/TS16949 certificate
- (4) UL/cUL certificate

ShenZhen Woer Heat-Shrinkable Material Co.,Ltd.

July 25 2022