



深圳市沃尔核材股份有限公司

ShenZhen Woer Heat—Shrinkable Material Co.,Ltd.

## SPECIFICATION FOR APPROVAL

Part Name	Halogen Free Flame-retardant Heat Shrinkable Tube	Supplier No.	
Specification	All Spec.	Customer No.	

### Supplier Approval

(Shenzhen Woer Heat-Shrinkable Material Co.,Ltd.)

Editor/Date	Approval/Date
Hehong Chen/Jul 7 2010	Jinhua Zhao/Jul 7 2010

### Customer Approval

Approval/Date		
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## 1 CONTENT AND APPLICATIONS

This specification defines technical requirement, testing method, testing rules and packing of heat shrinkable tubes.

This specification applies to wire connection, protection, identification, insulation.

## 2 STANDARD

Standard for Extruded Electrical Tubing UL 224.

## 3 TERMS

### 3.1 heat shrinkable material.

Radiate the tubes to make it cross linked and heating and expand it.

### 3.2 Heat shrinkable tubes

Extrude the tubes to the required size, radiate to make it cross linked, then expand and cool the tubes.

## 4 TECHNICAL REQUIREMENT

### 4.1 CONDITIONS

4.1.1 Temperature ranges :  $-55^{\circ}\text{C}\sim 125^{\circ}\text{C}$ .

4.1.2 Use under acid and alkali.

4.1.3 Use with strict requirement about environment.

### 4.2 appearance

4.2.1 No cracking in appearance.

4.2.2 Smooth, no oil or duty in appearance.

4. Printing clear.

### 4.3 heat shrinking property

4.3.1 shrinking temperature  $70^{\circ}\text{C}$  ; shrunk totally at  $120^{\circ}\text{C}$  for thin wall tubes, shrunk totally at  $125^{\circ}\text{C}$  for normal wall tubes.

4.3.2 longitudinal shrinking less than  $\pm 5\%$ .

### 4.4 Physical and Chemical Property

refer to table 1

4.5 Specification refer to table 2, Thin wall tubes specification refer to table3.

### 4.6 Colour

Black, red, blue, yellow, green, white, purple or according to requirement.

TABLE 1 Physical and Chemical PropertyTABLE

	Property	Test Method	Standard
Physical	Tensile strength /MPa	GB/T1040	$\geq 10.4$
	Elongation/%	GB/T1040	$\geq 200$

	Tensile strength afer aging/MPa		UL 224 158°C×168hr	≥7.3
	Elongation after aging/%		UL 224 158°C×168hr	≥100
	Heat Resistance		UL 224 -30°C×4hr	No viscosity、 No Cracking
	Cold blend		UL 224 -30°C×4hr	No Cracking
Eletrical	Dielectric Strength(KV/mm)		GB/T1408	≥15
	Dielectric Withstand	300V/Thin wall	UL 224	No breakdown for 1500V
		600V	UL 224	No breakdown for 2500V
	Volume resistance/Ω·cm		GB/T1410	≥1×10 <sup>14</sup>
Chemical	Anti Corrosion		UL 224 158°C×168hr	PASS
	Copper stability		UL 224 158°C×168hr	PASS
	Flammability		UL 224	VW-1

TABLE 2 THIN WALL HEAT SHRINKABLE TUBE SPECIFICATION

ITEM (mm)	As supplied (mm)		After recovery (mm)		meter/ne wspool packing	meter/ol d spool packing	Application (mm)
	I.D.	W.T.	I.D.	W.T.			
Φ0.6CB	0.9±0.2	0.13±0.05	≤0.40	0.20±0.10	400	200	0.4~0.7
Φ0.8CB	1.1±0.2	0.13±0.05	≤0.50	0.20±0.10	400	200	0.6~0.8
Φ1.0CB	1.40±0.2	0.13±0.05	≤0.65	0.20±0.10	400	200	0.7~1.0
Φ1.5CB	1.90±0.2	0.13±0.05	≤0.85	0.20±0.10	400	200	0.9~1.4
Φ2.0CB	2.40±0.2	0.13±0.05	≤1.00	0.22±0.10	400	200	1.1~1.8
Φ2.5CB	2.90±0.2	0.13±0.05	≤1.30	0.25±0.10	400	200	1.4~2.3
Φ3.0CB	3.40±0.2	0.13±0.05	≤1.50	0.28±0.10	400	200	1.6~2.7
Φ3.5CB	3.90±0.2	0.13±0.05	≤1.80	0.28±0.10	400	200	1.9~3.2
Φ4.0CB	4.40±0.2	0.15±0.05	≤2.00	0.30±0.10	400	200	2.1~3.6
Φ4.5CB	4.90±0.2	0.15±0.05	≤2.30	0.30±0.10	200	100	2.4~4.0
Φ5.0CB	5.50±0.2	0.15±0.05	≤2.5	0.32±0.10	200	100	2.6~4.5
Φ6.0CB	6.50±0.2	0.15±0.05	≤3.0	0.32±0.10	200	100	3.1~5.4
Φ7CB	7.50±0.3	0.15±0.05	≤3.5	0.32±0.10	200	100	3.7~6.3
Φ8CB	8.50±0.3	0.15±0.05	≤4.0	0.32±0.10	200	100	4.2~7.2
Φ9CB	9.50±0.3	0.15±0.05	≤4.5	0.35±0.10	200	100	4.7~8.0

Φ10CB	10.5±0.3	0.15±0.05	≤5.0	0.35±0.10	200	100	5.2~9.0
Φ11CB	11.5±0.3	0.18±0.05	≤5.5	0.40±0.10	200	100	5.7~10.0
Φ12CB	12.5±0.3	0.20±0.05	≤6.0	0.40±0.10	200	100	6.2~11.0
Φ13CB	13.5±0.3	0.20±0.05	≤6.5	0.40±0.10	200	100	6.7~12.0
Φ14CB	14.5±0.3	0.20±0.05	≤7.0	0.40±0.10	200	100	7.3~13.0
Φ15CB	15.5±0.4	0.20±0.05	≤7.5	0.40±0.10	200	100	7.8~14.0
Φ16CB	16.5±0.4	0.22±0.05	≤8.0	0.40±0.10	200	100	8.3~15.8
Φ17CB	17.5±0.4	0.22±0.05	≤8.5	0.40±0.10	200	100	8.8~16.0
Φ18CB	18.5±0.4	0.22±0.05	≤9.0	0.42±0.10	200	100	9.3~17.0
Φ20CB	20.5±0.5	0.25±0.05	≤10.0	0.45±0.10	200	100	10.5~19.0
Φ22CB	22.5±0.5	0.25±0.05	≤11.0	0.45±0.10	200	100	11.5~20.5
Φ25CB	25.5±0.5	0.25±0.05	≤12.5	0.45±0.10	100	50	13.0~24.0

TABLE 3 HEAT SHRINKABLE TUBES SPECIFICATION

ITEM (mm)	As supplied (mm)		After recovery (mm)		meter/new spool packing	meter/old spool packing	Application (mm)
	I.D.	W.T.	I.D.	W.T.			
Φ0.5	0.8±0.2	0.15±0.05	≤0.30	0.22±0.10	400	—	0.4~0.7
Φ0.6	0.9±0.2	0.15±0.05	≤0.40	0.22±0.10	400	200	0.5~0.7
Φ0.8	1.1±0.2	0.15±0.05	≤0.50	0.22±0.10	400	200	0.6~0.8
Φ1.0	1.5±0.2	0.15±0.05	≤0.65	0.28±0.10	400	200	0.75~0.9
Φ1.5	2.0±0.2	0.18±0.05	≤0.85	0.32±0.10	400	200	0.95~1.4
Φ2.0	2.5±0.2	0.18±0.05	≤1.00	0.35±0.10	400	200	1.1~1.8
Φ2.5	3.0±0.2	0.18±0.05	≤1.30	0.38±0.10	400	200	1.35~2.3
Φ3.0	3.5±0.2	0.18±0.05	≤1.50	0.40±0.10	400	200	1.6~2.7
Φ3.5	4.0±0.2	0.22±0.05	≤1.80	0.42±0.10	400	200	1.85~3.2
Φ4.0	4.5±0.2	0.25±0.05	≤2.00	0.45±0.10	400	200	2.1~3.6
Φ4.5	5.0±0.2	0.25±0.05	≤2.30	0.50±0.10	200	100	2.35~4.0
Φ5.0	5.5±0.2	0.25±0.05	≤2.50	0.55±0.10	200	100	2.6~4.5
Φ5.5	6.0±0.2	0.25±0.05	≤2.75	0.55±0.10	200	100	2.85~5.0
Φ6.0	6.5±0.2	0.28±0.05	≤3.00	0.55±0.10	200	100	3.1~5.4
Φ7.0	7.5±0.3	0.28±0.05	≤3.50	0.55±0.10	100	100	3.7~6.3
Φ8.0	8.5±0.3	0.28±0.05	≤4.00	0.60±0.10	100	100	4.2~7.2
Φ9.0	9.5±0.3	0.30±0.08	≤4.50	0.60±0.10	100	100	4.7~8.0
Φ10	10.5±0.3	0.30±0.08	≤5.00	0.60±0.10	100	100	5.2~9.0
Φ11	11.5±0.3	0.30±0.08	≤5.50	0.60±0.10	100	100	5.7~10
Φ12	12.5±0.3	0.30±0.08	≤6.00	0.60±0.10	100	100	6.2~11
Φ13	13.5±0.3	0.35±0.10	≤6.50	0.65±0.08	100	100	6.7~12
Φ14	14.5±0.3	0.35±0.10	≤7.00	0.65±0.10	100	100	7.3~13

ITEM (mm)	As supplied (mm)		After recovery (mm)		meter/new spool packing	meter/old spool packing	Application (mm)
	I.D.	W.T.	I.D.	W.T.			
Φ15	15.5±0.4	0.40±0.12	≤7.50	0.70±0.10	100	100	7.8~14
Φ16	16.5±0.4	0.40±0.12	≤8.00	0.70±0.10	100	100	8.3~15
Φ17	17.5±0.4	0.40±0.12	≤8.50	0.70±0.10	100	100	8.8~16
Φ18	19.0±0.5	0.40±0.15	≤9.00	0.80±0.15	100	100	9.3~17
Φ20	21.0±0.5	0.40±0.15	≤10.00	0.80±0.15	100	100	10.4~19
Φ22	23.0±0.5	0.40±0.15	≤11.00	0.80±0.15	100	100	11.4~21
Φ25	26.0±0.5	0.50±0.15	≤12.50	0.90±0.15	50	50	12.8~24
Φ28	29.0±0.5	0.50±0.15	≤14.00	0.90±0.15	50	50	14.4~29
Φ30	31.5±1.0	0.50±0.15	≤15.00	0.95±0.15	50	50	16~29
Φ35	36.5±1.0	0.50±0.15	≤17.50	1.00±0.15	50	50	18~34
Φ40	41.5±1.0	0.55±0.15	≤20.00	1.00±0.15	50	50	21~39
Φ45	46.5±1.0	0.55±0.15	≤22.50	1.00±0.15	25	25	23.5~44
Φ50	≥50	0.55±0.15	≤25.00	1.00±0.15	25	25	26~49

Note: The size above Φ28 meet RoHS 2002/95/EC standard, if you require Halogen Free Flame-retardant Heat Shrinkable Tube, you can remark when you order.

#### 4.7 The Method of Used

Easy for using, using oven or heating gun and it will shrink, shrinking temperature start at 70°C and shrunk totally at 120°C, suggest the shrink-time had 3 minutes.

#### 4.8 Hazardous Element

The part promises compliant RoHS by SGS, CTI or ITS, Environment Friendly Characteristics see Table 3.

1. PCB
2. PCN
3. Chlorinated Paraffins
4. Mirex
5. Other organic chlorinated compounds
6. PBBs
7. PBDEs
8. TBT&TPT
9. Asbestos
10. Azo compound
11. Formaldehyde

Table 3 Environment Friendly Characteristics

Hazardous Element	Content(ppm)	Test Method
F	≤200 ppm	EN 14582 Method B

Cl	≤800 ppm	EN 14582 Method B
Br	≤800 ppm	EN 14582 Method B
I	≤200 ppm	EN 14582 Method B
Hg	≤5ppm	IEC 62321
Pb	≤90ppm	IEC 62321
Cd	≤5ppm	IEC 62321
Cr <sup>6+</sup>	≤5ppm	IEC 62321
Ba	≤1000ppm	EPA 3052
Sb	≤60ppm	EPA 3052
As	≤50ppm	EPA 3052
Se	≤25ppm	EPA 3052

## 5. Material testify

Halogen Free Flame-retardant Heat Shrinkable Tube of SHENZHEN 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,Cr<sup>6+</sup>,PBB,PBDE are all confirmed to requirements of Sony-SS-00259 and RoHS 2002/95/EC standards. The main components as follows:

Raw Material Name		Using aim	content	Manufacturer	CAS No.
English Name	make up of				
Polyolefin	PE	Main Material	50%	China Sinopec	9002-88-4
Magnesium hydroxide	Mg(OH) <sub>2</sub>	Flame-Retardant Material	35%	Jinhaohui Material Co.,Ltd.	1309-42-8
Phosphorus	Red Phosphorus	Flame-Retardant Material	10%	Shanghai Haiyi Co.,Ltd	7723-14-0
Color Material Grain	Pigment	Colorant Material	5%	Huawangcai Co.,Ltd.	—
Printing Ink	Ink	Printing	—	New East Co.,Ltd.	—

## 6. Enterprise Certification

- (1)The Certificate Of ISO9001
- (2)The Certificate Of ISO914001
- (3)The Certificate Of ISO/TS16949
- (4)The Testing Report Of SGS/ITS/CTI