



HIGH PERFORMANCE ADHESIVE TUBING

Adhesive-lined PHSS heat shrinkable tubing is specifically designed to meet automotive industry requirements for environmental sealing and electrical insulation of automotive wire splices, terminations, and components.

PHSS tubing has an outer jacket of radiation-crosslinked, semirigid polyolefin. Flame-retardant and mechanically tough, the jacket provides strain relief and abrasion protection of wire splices and mechanically sensitive components. The inner layer of the tubing is a unique hot-melt adhesive, specially formulated to adhere to all major types of automotive wire insulation and to perform well at an extended temperature range. The adhesive forms an effective barrier against automotive fluids and moisture, helping to protect the harness from the effects of corrosion and water wicking.



Because PHSS tubing has a high shrink ratio, only a few sizes are needed to cover a wide range of splice and component diameters. PHSS tubing dimensions have been engineered to provide low-cost sealing solutions on multiple-wire splices (up to seven wires per side).

1. Scope:

This specification covers PHSS harness Splice Dual Wall Heat Shrink Tube.

2. Feature:

These products are cross-linked, flame retardant (Black only) heat shrinkable tubing for harness in automotive industry. These products are Semi-rigid polyolefin outer layer and Polyamide adhesive liner. These products are RoHS compliant. Operating temperature: -40°~130°

3. Color:

Black/Transparent

4. Dimensions

Dimensions are specified in Table 1.

5. Properties:

Properties are specified in Table 2.

6. Test methods

6.1 Inside diameter

Inside diameter shall be measured by using a taper gage or a gage rod.

In case of using a taper gage---Read the value on the gage when tubing isn't expanded by insertion and there is no visible space between the end of tubing and the taper gage.

In case of using a gage rod---Read the value of the maximum gage rod which passes freely into tubing without expanding the wall of tubing.

6.2 Wall thickness

Wall thickness shall be measured by a pin-dial gage or callipers at several points.

6.3 Shrinking condition

The product has a minimum complete shrinkage temperature of 135°. The product can be fully recovered in a hot air oven at 180°±5° for 5±1 minute.

However, since this product is a double-wall heat-shrinkable tube with hot-melt adhesive inner, the hot-melt adhesive on the inner wall will be deformed by the heat flow, resulting in inaccurate dimensional testing. The electric heat gun can be properly baked, and the heat-shrinkable tube can be completely shrink under the condition that the hot-melt adhesive does not flow, so as to measure the wall thickness and the inner diameter.

6.4 Longitudinal change

Tubing shall be cut into about 130~150mm length, score 100mm and measured.

After full recover, the length shall be remeasured and the longitudinal change shall be calculated from the following formula:

Longitudinal change [%] = (Length after full recovery - Initial length)/Initial length×100%

We certify that the values provided are as accurate as possible. Use of these values, however, remains the sole responsibility of the customer and cannot in any way substitute for testing the product under real conditions of use. The user must assess whether this product is suitable for a particular use. KACAB shall not be held responsible for any loss or anomaly resulting from the correct or incorrect use of this product.



7.0 Storage

These products shall be stored at lower temperature than 50 degrees C without direct sunshine

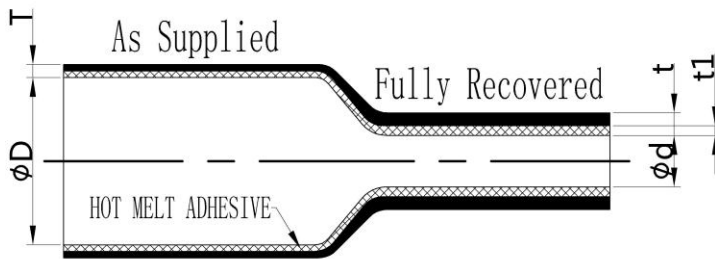
8.0 Package

Use PE plastic bags or paper trays for primary packaging; then use AB corrugated five-layer cardboard cartons for secondary packaging. There is a label on each box of packaging, including: product name, model, size, color, unit length, quantity, production batch number e.t.c.

9.0 Material proof

This product is an environmentally friendly cross-linked polyolefin heat shrinkable material. The composition material is polyolefin plus appropriate filler and auxiliary. Material are specified in Table 3 The company promises, Environmentally hazardous substances in products, Such as halogen, lead (Pb), cadmium (Cd), mercury (Hg), hexavalent chromium (Cr6+), polybrominated biphenyl (PBB) and polybrominated diphenyl ether (PBDE). comply with the environmental requirements of the EU RoHS 2.0 Directive.

Table 1: Dimensions



Type	As supplied (mm)		After recovered (mm)		
	Min.inside diameter (D)	Wall thickness(T)	Max inside diameter (d)	Total wall thickness (t*)	Adhesive Thickness (t1)
PHSS-1	6.0	0.45	1.27	1.2	0.6
PHSS-2	8.0	0.55	1.64	1.6	0.8
PHSS-3	12.0	0.65	2.41	2.0	1.0
PHSS-4	18.0	0.75	4.45	2.0	1.4

Note: Length can be customized according to requirements.

*: Wall thickness will be less if tubing recovery is restricted during shrinkage. tolerance from nominal, $\leq 30\%$ eccentricity.

Longitudinal change: -10% to 0%



Table 2: Properties (Method by NISSAN 24348NDS00)

Property	Typical data	Method of test
Tensile strength	10.3 MPa min.	ASTM D2671
Ultimate elongation	250% min.	ASTM D2671
Secant modulus 2% (Outer layer / recovered)	137MPa min.	ASTM D2671
Heat shock (225 /4hrs) of outer jacket	No cracking, dripping or flowing	ASTM D2671
Dynamic cut through	13.6kg min.	ASTM D3032
Volume resistivity	1.0×10 ¹⁴ Ω.cm min.	ASTM D2671
Flammability (outer jacket only)	Self-extinguishing within 30s	ISO 6722
Splice performance		PHSS
Current leakage	≤0.25μA	/
Room temperature flex test Current leakage	≤0.25μA	/
Thermal shock Current leakag	≤0.25μA	/
Low temperature flexibility dielectric withstand Current leakage	≤0.25μA	/
Heat aging Current leakage	≤0.25μA	/
Fluid immersion Current leakage	≤0.25μA	/

Table 3: Material composition

Heat Shrink Tube	Material Name	Function	CAS No.
Out layer	Polyethylene	Main Resin	9002-88-4
	Ethylene-vinylacetate copolymer	Main Resin	24937-78-8
	1,2-Bis(pentabromophenyl) ethan	Flame Retardant	84852-53-9
	Antimony(III) oxide	Flame Retardant	1309-64-4
	Magnesium hydroxide	Flame Retardant	1309-42-8
	Antioxidant 1010	Antioxidant	6683-19-8
	Carbon black	Colorant	1333-86-4
	Stearic acid	Additives	1333-86-4
Inner layer	Polyamide	Main Resin	63428-83-1
	Polyvinyl acetate	Main Resin	9003-20-7
	Polyethylene	Auxiliary Resin	9002-88-4
	Terpene Resin	Auxiliary Resin	9003-74-1
	Antioxidant MD-1024	Antioxidant	32687-78-8

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