

SPECIFICATION

For

heat shrinkable, flexible polyolefin
(Shrinkage 2:1)tubing used for 600V, 135℃.
(Type designation : GSHS-1635F)

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1. Scope

This specification covers the requirements for heat shrinkable, flexible polyolefin, type Class I (Shrinkage 2:1) tubing used for 600V, 135°C.

(Type designation : GSHS-1635F)

2. Reference Standard

The following documents form a part of this specification to the extent specified herein.

UL 224 : Extruded insulating tubing

CSA C22.2 NO.198.1-M1986 : Extruded insulating tubing

SAE AMS-DTL-23053/5 : Insulation, Electrical, Heat Shrinkable, Polyolefin, Flexible, Crosslinked
(MIL-I-23053 & MIL-DTL-23053 Standard was superseded by SAE AMS-DTL-23053)

RoHS Directives

3. Standard

The insulation shall be a flexible irradiated cross-linked polyolefin complying with UL & CSA(125°C), MIL 135°C class I specification (class II:clear).

Expanded inside diameter and recovered thickness at any point of insulation shall be in the attached table 1. The standard colors of insulation are Black, White, Red, Yellow, Blue, Green, Gray, Clear, Brown and Violet.

4. Performance

The following item shall be carried out in accordance with MIL,UL 224 & CSA

Test Item		Characteristics	Test condition
Expanded inside diameter		Attached table 1	-
Recovered inside diameter		Attached table 1	-
Recovered thickness at any point		Attached table 1	-
Unaged	Tensile strength	Min. 1.06 kgf/mm ²	Room temp.
	Elongation	Min. 200%	
	Dielectric strength	Min. 19.7 kV/mm	
Aged	Tensile strength	More than 75% of unaged value	175°C/7 days
	Elongation	Min. 100 %	
Voltage withstand and breakdown Voltage(Unaged)		Withstand 2.5kV for 1minute and breakdown	Room temp.
Voltage withstand and breakdown Voltage(Aged)		Withstand 2.5kV for 1 minute and breakdown at least half of unaged breakdown voltage	158°C/7 days
Copper corrosion		No corrosion of bare copper	175°C/16 hours
Copper stability		No sign of degradation Min. Elongation 100%	158°C/7 days

Flammability (except clear)		Pass	ASTM D 2671 Procedure B/C
Cold bend		No crack	-55°C/4 hours
Maximum secant modulus(2%)		17.59 kgf/mm ²	-
Restricted shrinkage		No crack	175°C/30 minutes
Fluid resistance * Refer to below test fluid	Tensile strength	Min. 0.70	24°C/24 hours
	Dielectric Strength	Min. 15.8kv/mm	24°C/24 hours
Fungus resistance		No growth	-
Water absorption		Max. 0.5%	-
Volume resistivity		Min. 10 ¹⁴ Ω-cm	-
Heat shock		No crack	250°C/4 hrs
Restricted recovery		No split, withstand 2.5kV for 1minute	180°C/30 minutes
Longitudinal change ¹⁾ (except Clear and Over 1.5inch)		-5% ~ 5%	ASTM D2671

- 1) Test specimen should be prepared 152mm(6inch) in accordance with ASTM D2671 and it is freely shrinked without any insert. LS not guaranteed that the longitudinal change when the length of tube is less than 152mm.

※ Test fluid

Fluid	Conforming to
Hydraulic fluid petroleum base JP-8 Lubricating oil Lubricating oil 5 percent NaCl Deicing fluid	MIL-H-5606 MIL-T-5624 MIL-L-7808 MIL-L-23699 A-A-694 MIL-A-8243

Restricted Hazardous Substances	Characteristics	Test Method
Pb	Max. 100	EPA 3050B or EN1122, ICP-AES
Cd	Max. 5	EPA 3050B, ICP-AES
Hg	N.D	EPA 3052, ICP-AES
Cr6+		EPA 3060A
PBBs		With reference to 83/264/EEC and 2003/11/EEC. GC/MS
PBDEs		

N.D : Not detected

5. Marking

The following information shall be legibly and durably ink-printed on the surface of the tube, at intervals of not more than 150mm.

5.1 UL File No. / CSA File No.

5.2 Manufacturer's name

5.3 VW-1 / OFT

5.4 Temperature rating

5.5 Inside diameter

5.6 Type designation

5.7 MIL-I-23053/5 135°C

6.Storage condition

Keep cool. Don't expose tubes to the direct rays of sun to prevent natural shrinkage and don't keep this package over 8 hours at temperature exceeding 40°C(104F)

Attached Table 1.

Standard Size (Metric size)	팽창후(Expanded)		수축후(Recovered)		Standard Length [m]
	Inside Diameter [mm]	Nominal Thickness [mm]	Max. Inside Diameter [mm]	Min. Thick. At any point [mm]	
0.20T X 1 mm	1.4 ± 0.2	0.20	0.50	0.356	200
0.20T X 1.5 mm	1.9 ± 0.2	0.20	0.75	0.432	200
0.20T X 2 mm	2.4 ± 0.2	0.25	1.00	0.432	200
0.25T X 2.5 mm	2.8 ± 0.2	0.25	1.25	0.432	200
0.25T X 3 mm	3.4 ± 0.2	0.25	1.50	0.432	200
0.25T X 3.5 mm	3.8 ± 0.2	0.25	1.75	0.432	200
0.25T X 4 mm	4.4 ± 0.2	0.25	2.00	0.432	200
0.25T X 5 mm	5.4 ± 0.2	0.25	2.50	0.559	100
0.25T X 5.5 mm	5.8 ± 0.2	0.25	2.75	0.559	100
0.25T X 6 mm	6.4 ± 0.2	0.25	3.00	0.559	100
0.25T X 7 mm	7.6 ± 0.3	0.25	3.50	0.559	100
0.25T X 8 mm	8.8 ± 0.4	0.25	4.00	0.559	100
0.25T X 9 mm	9.8 ± 0.4	0.25	4.50	0.559	100
0.25T X 10 mm	10.8 ± 0.4	0.25	5.00	0.559	100
0.25T X 11 mm	11.8 ± 0.4	0.25	5.50	0.559	100
0.25T X 12 mm	12.8 ± 0.4	0.25	6.00	0.559	100
0.30T X 13 mm	13.8 ± 0.4	0.30	6.50	0.686	50
0.30T X 14 mm	14.8 ± 0.4	0.30	7.00	0.686	50
0.30T X 15 mm	15.8 ± 0.4	0.30	7.50	0.686	50
0.30T X 16 mm	17.1 ± 0.4	0.30	8.00	0.686	50
0.35T X 18 mm	19.1 ± 0.4	0.35	9.00	0.762	50
0.35T X 20 mm	21.1 ± 0.4	0.35	10.00	0.762	50
0.40T X 22 mm	23.1 ± 0.4	0.40	11.00	0.762	50

0.40T X 24 mm	24.8 ± 0.5	0.40	12.00	0.762	50
0.40T X 25 mm	26.8 ± 0.5	0.40	12.50	0.864	50
0.40T X 26 mm	27.5 ± 0.7	0.40	13.00	0.864	50
0.40T X 28 mm	29.6 ± 0.7	0.40	14.00	0.864	50
0.40T X 30 mm	31.6 ± 0.7	0.40	15.00	0.864	50
0.40T X 32 mm	33.5 ± 0.7	0.40	16.00	0.864	50
0.40T X 38 mm	40.0 ± 2.0	0.40	19.00	0.864	31
0.50T X 50 mm	53.0 ± 3.0	0.50	25.00	0.965	31
0.55T X 60 mm	65.0 ± 5.0	0.55	30.00	1.07	31

Standard Size (Inch size)	팽창후(Expanded)		수축후(Recovered)		Standard Length [m]
	Inside Diameter [mm]	Nominal Thickness [mm]	Max. Inside Diameter [mm]	Min. Thick. At any point [mm]	
0.20T X 3/64"	1.6 ± 0.3	0.20	0.58	0.330	200
0.20T X 1/16"	2.1 ± 0.3	0.20	0.7	0.356	200
0.25T X 3/32"	3.0 ± 0.3	0.25	1.17	0.432	200
0.25T X 1/8"	3.7 ± 0.3	0.25	1.57	0.432	200
0.25T X 3/16"	5.2 ± 0.3	0.25	2.36	0.432	100
0.30T X 1/4"	6.7 ± 0.3	0.30	3.18	0.559	100
0.30T X 3/8"	10.2 ± 0.6	0.30	4.75	0.559	100
0.30T X 1/2"	13.3 ± 0.6	0.30	6.35	0.559	100
0.30T X 5/8"	17.1 ± 0.4	0.30	7.93	0.686	50
0.35T X 3/4"	20.1 ± 1.0	0.35	9.53	0.686	50
0.40T X 1"	26.7 ± 1.0	0.40	12.70	0.762	50
0.40T X 1-1/4"	33.5 ± 0.7	0.40	16.00	0.864	50
0.43T X 1.5"	39.1 ± 1.0	0.43	19.10	0.864	31
0.50T X 2"	53.0 ± 2.0	0.50	25.40	0.965	31
0.60T X 3"	78.2 ± 2.0	0.60	38.10	1.07	31
0.70T X 4"	104.0 ± 3.0	0.70	50.80	1.17	31
0.70T X 5"	131.0 ± 4.0	0.70	63.50	1.17	31