

# SPECIFICATION

For

heat shrinkable PVdF (Shrinkage 2:1)tubing used for 600V, 175°C.

(Type designation : GSHS-1675)

PREPARED BY



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## 1. Scope

This specification covers the requirements for heat shrinkable PVdF (Shrinkage 2:1) tubing used for 600V, 175°C. (Type designation : GSHS-1675)

## 2. Reference Standard

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

UL 224 : Extruded insulating tubing

AMS-DTL-23053/8 : Insulation Sleeving, Electrical, Heat shrinkable, Polyvinylidene Fluoride, Semi-rigid, Crosslinked.

## 3. Standard

The insulation shall be a Semi-rigid irradiated cross-linked polyvinylidene fluoride complying with UL & MIL specification.

Expanded inside diameter and recovered thickness at any point of insulation shall be in the attached table 1. The standard color of insulation is natural.

## 4. Applied Recipe

The used material of insulation is in the attached table 2.

## 5. Performance

The following item shall be carried out in accordance with UL 224 & AMS-DTL-23053/8.

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. 3.52 kgf/mm <sup>2</sup>	ASTM D 638
	Elongation	Min. 150%	
Aged	Elongation	Min. 50 %	250°C/7 days ASTM D 638
Voltage withstand		Pass	2,500V/min
Clarity stability		Pass	175°C/24 hours
Copper corrosion		No corrosion at operating Temp.	-
Concentricity		Min.70%	-
Flammability		Pass (UL 224 : VW-1)	ASTM D 2671 Procedure C
crystalline melt point		Min. 150°C	ASTM D 4951
Secant modulus(2% strain)		Min. 70.38 kgf/mm <sup>2</sup>	ASTM D 882
Restricted shrinkage		No crack	175°C/30 minutes

Fluid resistance * Refer to below test fluid	Tensile strength	Min. 3.52 kgf/mm <sup>2</sup>	ASTM D 638
	Dielectric Strength	Min. 19.7kv/mm	ASTM D 2671
Fungus resistance		Rating less than 1	ASTM G 21
Water absorption		Max. 0.5% @ 23°C/24 hours	ASTM D 570
Dielectric strength		Size to 12.7mm:Min.31.5kv/mm Size over 12.7mm:Min.23.6kv/mm	ASTM D 2671
Volume resistivity		Min. 10 <sup>13</sup> Ω-cm	ASTM D 876
Heat shock		No crack, flowing or dripping	300°C/4 hrs
Low temperature flexibility		No crack	-55°C/4 hours
Longitudinal shrinkage		+10 ~ -10 %	200°C/3 min.

※ Test fluid

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

(RoHS Requirement)

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		

(Halogen free Requirement)

Halogen Substances	Characteristics	Test Method
Br	Max. 800	IEC 62149-2-21 IPC 4101B LG Philips LCD std.
Cl	Max. 800	
Total halogen	Max. 1000	

N.D : Not detected


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 (Inch size)	Expanded		Recovered		Standard Length [M]
	Inside Diameter [mm]	Nominal Thickness [mm]	Max. Inside Diameter [mm]	Min. Thick. At any point [mm]	
0.10T X 3/64"	1.6 ± 0.3	0.10	0.60	0.203	1.2M/4ft
0.10T X 1/16"	2.1 ± 0.3	0.10	0.79	0.203	1.2M/4ft
<b>0.12T X 3/32"</b>	<b>2.8 ± 0.3</b>	0.12	1.19	0.229	1.2M/4ft
0.12T X 1/8"	3.7 ± 0.3	0.12	1.59	0.229	1.2M/4ft
0.12T X 3/16"	5.2 ± 0.3	0.12	2.38	0.229	1.2M/4ft
0.14T X 1/4"	6.7 ± 0.3	0.14	3.18	0.279	1.2M/4ft
0.14T X 3/8"	10.1 ± 0.6	0.14	4.76	0.279	1.2M/4ft
0.14T X 1/2"	13.3 ± 0.6	0.14	6.35	0.279	1.2M/4ft
0.18T X 3/4"	20.1 ± 1.0	0.18	9.53	0.356	1.2M/4ft
0.20T X 1"	26.7 ± 1.0	0.20	12.70	0.406	1.2M/4ft
0.20T X 1.5"	39.1 ± 1.0	0.20	19.10	0.406	1.2M/4ft
0.10T X 1mm	1.4 ± 0.2	0.10	0.50	0.178	1.2
0.12T X 3mm	3.3 ± 0.2	0.12	1.50	0.229	1.2
0.12T X 4mm	4.4 ± 0.2	0.12	2.00	0.203	1.2
0.13T X 8mm	8.8 ± 0.4	0.13	4.00	0.229	1.2
0.20T X 30mm	31.2 ± 0.8	0.20	15.00	0.406	1.2
0.20T X 35mm	35.8 ± 0.8	0.20	17.50	0.406	1.2
0.20T X 40mm	41.0 ± 1.0	0.20	20.00	0.406	1.2

Attached Table 2.

MATERIAL IDENTIFICATION	IDENTI. No	LSCGBT-980506
	ISSUED DATE	Apr. 12. 2013
NOMENCLATURE	HEAT-SHRINKABLE PVdF TUBE	
TYPE & STYLE	GSHS-1675	
BRIEF DESCRIPTION	RATING	600V, 175°C
	DESCRIPTION OF RAW MATERIAL	1) MATERIAL OF COMPOUND ;Heat Shrinkable polyvinylidene fluoride  2) MANUFACTURER OF COMPOUND ; LS cable & System Ltd.
REMARKS	REFERENCE SPECIFICATION : UL 224 & AMS-DTL-23053/8 FILE No. : UL- E84393	
<p>WE CERTIFY THAT THE ABOVE MENTIONED MATERIAL HAS BEEN USED</p> <p>LS Cable &amp; System Ltd.</p> <div style="text-align: right;"> _____ YOUNG - HOON YANG General Manager</div>		