

3M™ Heat Shrink Tubing Selection Guide

Product	Material/Typical Applications	Operating Temperature Range	Shrink Temp. (Min.)	Shrink Ratio	Standard Sizes Expanded Diameter	Dielectric Strength (V/mil)	Volume Resistivity (ohm-cm)	Tensile Strength (Psi)
Single-Wall Polyolefin Tubing								
FP-301	Flexible Polyolefin General purpose flame retardant insulation for UL, CSA and MIL-DTL-23053/5 applications; cable and component covering. Class 1 = opaque colors; Class 2 = clear.	-55°C to +135°C	212°F 100°C	2:1	3/64" to 4"	900	10 ¹⁵	2400
FP-301VV	Highly Flame-Retardant, Flexible Polyolefin Insulation applications, flame-retardant applications requiring UL VW-1 and CSA OFT, fire-resistant wiring.	-55°C to +135°C	212°F 100°C	2:1	3/64" to 4"	900	10 ¹⁵	2400
VFP-876	Very Flexible Polyolefin Terminal insulation, low shrink-temperature applications.	-55°C to +135°C	212°F 100°C	2:1	3/64" to 2"	800	10 ¹⁴	2100
SFTW-203	Very Flexible Polyolefin Shrink-fit jacketing and insulation of flexible wire bundles and temperature-sensitive components.	-55°C to +135°C	212°F 100°C	3:1	1/16" to 1 1/2"	700	10 ¹⁵	2600
Adhesive-Lined, Polyolefin Tubing								
MW	Multiple Wall Polyolefin Insulation, strain relief and sealing of electrical connections, wire splices and components.	-55°C to +110°C	275°F 135°C	2.5:1	1/8" to 1"	900	10 ¹⁵	2200
EPS-200	Environmental Protection Sleeve Insulation, strain relief and environmental protection of electrical wire bundles and components.	-55°C to +110°C	250°F 121°C	2:1	1/8" to 2"	800	10 ¹⁴	2100
EPS-300	Environmental Protection Sleeve Insulation, strain relief and environmental protection for automotive and marine wire bundles and splices.	-55°C to +110°C	250°F 121°C	3:1	1/8" to 1-1/2"	700	10 ¹⁴	2100
EPS-400	Environmental Protection Sleeve Insulation, strain relief and environmental protection for sealing voids in multiple wire bundles for automotive and marine applications.	-55°C to +110°C	250°F 121°C	4:1	.300" to .700"	700	10 ¹⁴	1900
TMW	Semi-Rigid Multiple Wall Terminal Protection Sleeve Insulation, strain relief and environmental protection. Uses include the manufacture of heat shrink butt connectors, ring terminals and fork terminals.	-55°C to +110°C	275°F 135°C		.183" to .330"	900	10 ¹⁴	2500
TES SMS	All-Weather, Heat-Shrinkable, Dual Wall, Polyolefin Tubing for Automotive Wire Harnesses.	-55°C to +110°C	250°F 121°C	4:1 4:1	.220" to .700"	500	10 ¹⁴	2450 1900
Special Purpose Tubing								
MFP	Polyvinylidene Fluoride Heat-resistant transparent insulation and marking for electronic and appliance applications.	-55°C to 175°C	347°F 175°C	2:1	3/64" to 1"	900	10 ¹⁴	5500
NST	Modified Neoprene Insulation and abrasion resistant covering of wiring and cable harnesses. Oil resistant coverings.	-70°C to +121°C	275°F 135°C	2:1	1/8" to 3"	800	10 ¹²	2100
VTN-200	Fluoroelastomer Synthetic fuel and hydraulic oil resistant applications, high-temperature coverings.	-55°C to +200°C	347°F 175°C	2:1	1/8" to 2"	500	10 ¹²	2400
PSTH	Flexible Elastomeric Polyester Designed for harsh operating conditions.	-55°C to +150°C	338°F 170°C	2:1	3/16" to 2"	500	10 ¹⁴	2200
Heavy-Duty Tubing								
MDT	Medium-Duty Excellent abrasion, corrosion and environmental protection. Flame retardant.	-55°C to +110°C	250°F 121°C	3:1	.400" to 4.30"	500	10 ¹⁴	2400
HDT	Heavy-Duty Fabricated from specially formulated cross-linked polyolefin, assuring long-term environmental protection. Highly chemical, abrasion and split resistant.	-55°C to +110°C	250°F 121°C	3:1	.300" to 7.00"	500	10 ¹⁴	2400
BBI	Bus Bar Tubing , Designed for insulating rectangular, square, or round bus bar rated 5 kV through 35 kV.	-55°C to +110°C	250°F 121°C		2.38" to 10.28"	550	10 ¹³	2200

Note: The materials are rated on a scale of 1–10 for flexibility: 1 = most flexible and 10 = most rigid.

*Material characteristics only.

Ultimate Elongation (%)	Longitudinal Change (± %)	Specific Gravity	Flammability	Corrosive Effect	Abrasion Resistance	Flexibility (see note below)	Fuel & Oil Resistance	Solvent Resistance	Resistance To Acids and Alkalis	Applicable Specifications
400	5	1.3	Self-Extinguish meets UL 224 All-Tubing Flame Test (except clear)	Non-Corrosive	Good	3	Good	Exc.	Exc.	SAE-AMS-DTL-23053/5*, Class 1, 2; UL File E-39100; CSA LR38227
400	+1, -10	1.5	Self-Extinguish meets UL 224 VW-1 Test	Non-Corrosive	Good	3	Good	Exc.	Exc.	SAE-AMS-DTL-23053/5*, Class 3; UL File E-39100, VW-1; CSA LR38227, OFT
450	5	1.3	Self-Extinguish meets UL 224 All-Tubing Flame Test	Non-Corrosive	Good	2	Good	Exc.	Exc.	SAE-AMS-DTL-23053/5*, Class 1; UL File E-39100; CSA LR38227
400	5	1.29	Self-Extinguish	Non-Corrosive	Good	3	Good	Good	Exc.	UL File E-48398; CSA LR38227 Meets functional requirements of SAE-AMS-DTL-28053/5, Class 1
400	+1, -10	1.0	Non-Flame Retardant	Non-Corrosive	Good	7	Good	Good	Exc.	SAE-AMS-DTL-23053/4*, Class 1; UL File E-157227; CSA LR38227
450	+1, -5	1.3	Self-Extinguish meets UL 224 All-Tubing Flame Test (jacket)	Non-Corrosive	Good	3	Good	Good	Exc.	SAE-AMS-DTL-23053/4*, Class 2; UL File E-39100; CSA LR38227
450	+1, -15	1.3	Self-Extinguish meets UL 224 All-Tubing Flame Test (jacket)	Non-Corrosive	Good	3	Good	Good	Exc.	UL File E-157227; CSA LR38227
400	+1, -10	1.25	Self-Extinguish	Non-Corrosive	Good	7	Good	Good	Exc.	UL File E-157227; CSA LR38227
400	+1, -10	1.0	Non-Flame Retardant	Non-Corrosive	Good	7	Good	Good	Exc.	UL File E-157227; CSA LR38227
450 350	+0, -10 +0, -10	0.97 1.25	TES Non-Flame Retardant SMS Self-Extinguish	Non-Corrosive Non-Corrosive	Good Good	TES 5 SMS 3	Good Good	Good Good	Exc. Exc.	ESB-M99D56-Ford MS-DB56-Chrysler
350	+1, -10	1.7	Self-Extinguish meets UL 224 VW-1 Test	Non-Corrosive	Exc.	10	Exc.	Exc.	Exc.	Meets performance claims of SAE-AMS-DTL-23053/18*, Class 1; SAE-AMS-DTL-23053/8*; UL File E-39100, VW-1, CSA LR38227 OFT
500	+1, -10	1.3	Self-Extinguish	Non-Corrosive	Exc.	1	Exc.	Good	Exc.	SAE-AMS-DTL-23053/1*, Class 1, 2; UL File E-39100; SC-X-15112
450	+1, -10	1.7	Self-Extinguish	Non-Corrosive	Exc.	4	Exc.	Exc.	Exc.	SAE-AMS-DTL-23053/13*
350	+2, -8	1.6	Self-Extinguish	Non-Corrosive	Exc.	4	Exc.	Exc.	Exc.	SC-X15111C; meets the functional requirements of SAE-AMS-DTL-23053/16*
475	+1, -10	1.28	Self-Extinguish	Non-Corrosive	Good	8	Good	Good	Exc.	SAE-AMS-DTL-23053/15*, Class 2
475	+1, -10	1.28	Self-Extinguish	Non-Corrosive	Good	9	Good	Good	Exc.	SAE-AMS-DTL-23053/15*, Class 1
575	+0, -10	1.20	Self-Extinguish	Non-Corrosive	Good	8	Good	Good	Exc.	ASTM-D-257, 149, 150, 2303; IEC 216; ANSI/IEEE Std C37.20

*Formerly MIL+23053 and MIL-DTL-23058 for sheet number noted after slash mark.

3M™ MFP Heat Shrink Tubing

Modified Polyvinylidene Fluoride; Shrink Ratio 2:1

Product description

3M Heat Shrink Tubing LMFP is a cross-linked, thin-walled, heat-shrinkable tubing offering a high degree of mechanical strength and high-temperature resistance. Fabricated from polyvinylidene fluoride, the tubing has excellent abrasion resistance and cut-through properties in combination with high dielectric strength. It is inherently flame retardant, semi-rigid and highly resistant to most industrial fuels, chemicals and solvents. When heated in excess of 175°C (347°F), 3M MFP tubing rapidly shrinks to a skintight fit. This tubing is rated for continuous operation from -55°C (-67°F) to 175°C (347°F).

Typical applications

3M MFP tubing is designed for shrink-fit protection and strain relief of wires, solder joints, terminals and connections. Suggested applications include automotive wiring, jackets, fuse coverings and military wire markers. Because the tubing is transparent, it allows see-through inspection and identification and is ideal for use as a jacketing for components such as resistors and capacitors. The tubing is readily marked by hot-stamp and print-wheel equipment.

Shrink ratio

3M MFP tubing has a 2:1 shrink ratio. When freely recovered, the tubing will shrink to 50% of its as-supplied internal diameter. The recovered wall thickness is proportional to the degree of recovery.

Standard color

Clear. Colors available subject to factory quotation.

Standard packaging

Four-foot lengths.

Ordering information

Order 3M MFP tubing by product name, size equivalent to the expanded inside diameter, package type and color. Always order the largest size that will shrink snugly over the item to be covered. *Example: MFP tubing, 3/8", 4 ft., clear.*

Standard Sizes and Dimensions

Ordering Size	Expanded I.D.(Minimum)		Recovered I.D. (Maximum)		Recovered Wall Thickness (Nominal)	
	in.	(mm)	in.	(mm)	in.	(mm)
3/64	.046	(1,17)	.023	(0,58)	.010	(0,25)
1/16	.063	(1,60)	.031	(0,79)	.010	(0,25)
3/32	.093	(2,36)	.046	(1,17)	.010	(0,25)
1/8	.125	(3,18)	.062	(1,57)	.010	(0,25)
3/16	.187	(4,75)	.093	(2,36)	.010	(0,25)
1/4	.250	(6,35)	.125	(3,18)	.012	(0,30)
3/8	.375	(9,53)	.187	(4,75)	.012	(0,30)
1/2	.500	(12,70)	.250	(6,35)	.012	(0,30)
5/8	.625	(15,88)	.313	(7,94)	.014	(0,36)
3/4	.750	(19,05)	.375	(9,53)	.017	(0,43)
1	1.000	(25,40)	.500	(12,70)	.019	(0,48)

Note: Dimensions in inches are approximate.

Typical Properties

SAE-AMS-DTL-23053/8*, Meets functional requirements of SAE-AMS-DTL-23053/18, Class 1; UL File E-39100, VW-1; CSA LR 38227, OFT**

Physical

Tensile Strength 5500 PSI
 Ultimate Elongation 350%
 Longitudinal Change +1, -10%
 Specific Gravity 1.7
 Operating Temperature Range -55°C to +175°C
 Shrink Temperature (Min.) 175°C (347°F)
 Low Temperature Flexibility (4 hrs. @ -55°C) No cracking
 Flammability Self-extinguish meets UL 224 VW-1 Test

Secant Modulus (2%) 123,000 PSI

Electrical

Dielectric Strength 900 V/mil
 Volume Resistivity 10¹⁴ ohm-cm

Chemical

Corrosion Resistance Non-corrosive
 Fuel & Oil Resistance Excellent
 Abrasion Resistance Excellent
 Acids & Alkalis Resistance Excellent

Technical information provided consists of typical product data and should not be used for specification purposes. Unless otherwise noted, all tests are performed at room temperature.

* Formerly MIL+23053/8 and MIL-DTL-23053/8

** Formerly MIL+23053/18 and MIL-DTL-23053/18