



# Heat Shrink Tubing FP-301

## Flexible Polyolefin; Shrink Ratio 2:1

### Product description

3M™ Heat Shrink Tubing FP-301 offers an outstanding balance of electrical, physical and chemical properties for a wide variety of industrial and military applications. Rated for 135°C (275°F) continuous operation, all FP-301 tubing is split resistant, mechanically tough, easily marked and resists cold flow.

FP-301 tubing meets AMS-DTL-23053/5\* Class 1 & 2 requirements. It is UL Recognized and CSA Certified at 600 volts at 125°C (257°F) (UL File No. E-39100; CSA No. 38227).

FP-301 tubing is rated for continuous operation from -55°C (-67°F) to 135°C (275°F) and withstands elevated temperatures to 300°C (572°F) for short periods. Minimum shrink temperature for all FP-301 tubing is 100°C (212°F).

### Typical applications

FP-301 tubing is typically used as a shrink-fit electrical insulation over cable splices and terminations. It is also used for lightweight wire harness covering, wire marking, wire bundling, component packaging and fire-resistant covering.

### Shrink ratio

FP-301 polyolefin 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 of the tubing is proportional to the degree of recovery.

High expansion-ratio FP-301 tubing meeting AMS-DTL-23053/5\* Class 1 requirements for overexpansion is available subject to factory quotation.

### Colors

Class 1 (flame retardant): black. Class 2 (non-flame retardant): clear. Also available in Class 1: blue, green, red, white and yellow. Price, minimum order quantity and lead times will vary for these, however.

### Standard packaging

Four-foot lengths, large spools (21" diameter) and small spools (8-1/2" diameter).

### Ordering information

Order FP-301 tubing by product name, size equivalent to expanded inside diameter, package type and color. Always order the largest size that will shrink snugly over the item to be covered.

*Example: FP-301 tubing, 1/4", 4 ft., white.*

### Standard Sizes and Dimensions

Ordering Size in.	Expanded I.D. (Minimum)		Recovered I.D. <sup>†</sup> (Maximum)		Recovered Wall Thickness (Nominal)	
	in.	(mm)	in.	(mm)	in.	(mm)
3/64	.046	(1,17)	.023	(0,58)	.016	(0,41)
1/16	.063	(1,60)	.031	(0,79)	.017	(0,43)
3/32	.093	(2,36)	.046	(1,17)	.020	(0,51)
1/8	.125	(3,18)	.062	(1,57)	.020	(0,51)
3/16	.187	(4,75)	.093	(2,36)	.020	(0,51)
1/4	.250	(6,35)	.125	(3,18)	.025	(0,64)
3/8	.375	(9,53)	.187	(4,75)	.025	(0,64)
1/2	.500	(12,70)	.250	(6,35)	.025	(0,64)
3/4	.750	(19,05)	.375	(9,53)	.030	(0,76)
1	1.000	(25,40)	.500	(12,70)	.035	(0,89)
1-1/2	1.500	(38,10)	.750	(19,05)	.040	(1,02)
2	2.000	(50,80)	1.000	(25,40)	.045	(1,14)
3	3.000	(76,20)	1.500	(38,10)	.050	(1,27)
4	4.000	(101,60)	2.000	(50,80)	.055	(1,40)

Note: Dimensions in inches are approximate.

### Typical Properties

#### Applicable Specification

**SAE-AMS-DTL-23053/5\*<sup>†</sup>, Class 1, 2; UL File E-39100; CSA LR38227; ABS**

#### Physical

Tensile Strength 2400 PSI  
 Ultimate Elongation 400%  
 Longitudinal Change ±5%  
 Secant Modulus (2%) 13,000 PSI  
 Specific Gravity 1.3 (Black)  
 .93 (Clear)  
 Heat Aging Elongation (336 hrs. @ 175°C) 175%  
 Heat Shock No dripping, (4 hrs. @ 250°C) cracking, passes mandrel wrap test

#### Electrical

Dielectric Strength 900 V/mil  
 Volume Resistivity 10<sup>15</sup> ohm-cm

#### Chemical

Corrosive Effect Non-corrosive  
 Solvent Resistance  
 Tensile Strength 1000 PSI  
 Dielectric Strength 400 V/mil  
 Water Absorption 0.2%  
 Fungus Resistance Non-nutrient

Low Temperature Flexibility (4 hrs. @ -55°C) No cracking  
 Flammability Self-extinguish meets UL 224 All-Tubing Flame Test (Class 1 only)

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+23053/5 and MIL-DTL-23053/5

† Product meets functional but not dimensional requirements



# Heat Shrink Tubing Kits FP-301

Heat Shrink Tubing Kits and Refill Packs; Shrink Ratio 2:1

## Product Description

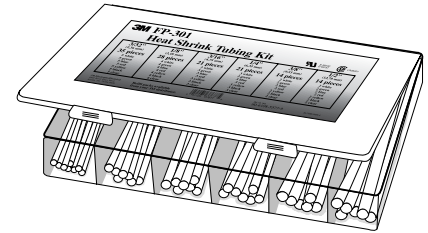
The 3M™ Heat Shrink Tubing Kits FP-301 are a versatile assortment of flexible polyolefin heat shrink tubing. The kits are available in two different types: Assorted Colors or Black only. Each box is 7" x 11" x 2 1/2" (177.7 x 279.3 x 63.4 mm) of rugged translucent plastic with product and installation information on the cover. Both heat shrink kits allow an engineer, designer or technician to have a complete selection of popular sizes and colors for small projects and product development programs.

The **Assorted Color Kit** has a total of 133 pieces and contains seven colors: black, red, white, yellow, blue, green and clear. The Assorted Color Kit contents, by expanded diameter, are listed in the chart below.

The **Black Kit** contains 102 pieces, all of 6 inch (152.4 mm) lengths.

The Black Kit contents, by expanded diameter, are listed in the chart below.

Each diameter has a corresponding refill pack that allows the customer to repurchase a single package of a specific diameter to replenish the kit. FP-301 tubing is a 2:1 shrink ratio polyolefin heat-shrinkable tubing that is widely used in a variety of electronic and electrical applications.



## Assorted Colors Kit

Description	Size	Pieces
FP-301	3/32" (2,36 mm)	35
FP-301	1/8" (3,18 mm)	28
FP-301	3/16" (4,75 mm)	21
FP-301	1/4" (6,35 mm)	21
FP-301	3/8" (9,53 mm)	14
FP-301	1/2" (12,70 mm)	14

## Assorted Colors\*

### 6" Refill Packs

Ordering Size	Quantity	Packs/Carton
3/32" (2,36 mm)	35 pieces	10
1/8" (3,18 mm)	28 pieces	10
3/16" (4,75 mm)	21 pieces	10
1/4" (6,35 mm)	21 pieces	10
3/8" (9,53 mm)	14 pieces	10
1/2" (12,70 mm)	14 pieces	10

\* 7 different colors in each pack

## Black Kit

Description	Size	Pieces
FP-301	3/16" (4,8 mm)	30
FP-301	1/4" (6,4 mm)	28
FP-301	3/8" (9,6 mm)	20
FP-301	1/2" (12,7 mm)	14
FP-301	3/4" (19,1 mm)	6
FP-301	1" (25,4 mm)	4

## Black

### 6" Refill Packs

Ordering Size	Quantity	Packs/Carton
3/16" (4,75 mm)	30 pieces	10
1/4" (6,35 mm)	26 pieces	10
3/8" (9,53 mm)	24 pieces	10
1/2" (12,70 mm)	20 pieces	10
3/4" (19,05 mm)	14 pieces	10
1" (25,40 mm)	10 pieces	10