

# 3M™ Heat Shrink Tubing FP-301

## Flexible, Polyolefin

Data Sheet

July 2010

### 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 continuous operation, all FP-301 tubing is split resistant, mechanically tough, easily marked and resists cold flow.

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

### Agency Approvals & Self Certifications

Meets requirements of:

- SAE-AMS-DTL-23053/5, Class 1, Class 2 (Clear)\*
- AMS-3636, AMS-3637
- UL Recognized, File E-39100, at 600 volts maximum @ 125°C
- CSA Certified, CSA LR38227, at 600 volts maximum @ 125°C
- ABS

**\*Formerly MIL-I-23053/5 and MIL-DTL-23053/5**

### 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 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 Sizes and Dimensions

| Ordering Size (Nominal) | Expanded I.D. (Minimum)<br>In. (mm) | Recovered I.D. (Maximum)<br>In. (mm) | Recovered Wall Thickness (Nominal)<br>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)                                    |

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## Typical Properties

Not for specifications. Values are typical, not to be considered minimum or maximum. Properties measured at room temperature 73°F (23°C) unless otherwise stated.

| Physical Property                                                                     | Typical Value<br>US units (metric)                          |
|---------------------------------------------------------------------------------------|-------------------------------------------------------------|
| Tensile Strength                                                                      | 2400 psi                                                    |
| Ultimate Elongation                                                                   | 400%                                                        |
| Longitudinal Change                                                                   | ±5%                                                         |
| Secant Modulus (2%)                                                                   | 13,000 psi                                                  |
| Specific Gravity                                                                      | 1.3 (Opaque)<br>.93 (Clear)                                 |
| Operating Temperature                                                                 | -67° to 275°F (-55° to +135°C)                              |
| Shrink Temperature (minimum)                                                          | 212°F (100°C)                                               |
| Heat Aging (336 hrs. @ 175° C)                                                        | Elongation 175%                                             |
| Heat shock (4 hrs. @ 250° C)                                                          | No dripping, flowing, cracking,<br>passes mandrel wrap test |
| Low Temperature Flexibility<br>(4 hrs @ -55° C)                                       | No cracking                                                 |
| Scant Modules (2%)                                                                    | 13,000 psi                                                  |
| Flammability<br>Self-extinguish, Meets UL 224 All-Tubing<br>Flame Test (Except Clear) | Pass                                                        |

| Electrical Property (Test Method) | Typical Value           |
|-----------------------------------|-------------------------|
| Dielectric Strength               | 900 V/mil               |
| Volume Resistivity                | 10 <sup>15</sup> ohm/cm |

| Chemical Property (Test Method)      | Typical Value |
|--------------------------------------|---------------|
| Corrosion Resistance (Copper mirror) | Non-corrosive |
| Fungus Resistance                    | Non-nutrient  |
| Water Absorption                     | 0.2%          |
| Solvent Resistance                   | Excellent     |

## Standard Colors

Black, Clear

Also available in Blue, Green, Red, White and Yellow. Price, MOQ and Lead Time will vary for these colors. Please contact Local Sales Representative or Customer Service Representative for more information.

NOTE: The clear tubing is not flame retardant or UL listed.

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| <b>Shelf Life &amp; Storage</b> | 3M™ Heat Shrink Tubing FP-301 has a 10-year shelf life from date of manufacture when stored in a humidity controlled storage (10°C/50°F to 27°C/80°F and <75% relative humidity). |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

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|                     |                                                                                                         |
|---------------------|---------------------------------------------------------------------------------------------------------|
| <b>Availability</b> | <b>Standard Packaging</b>                                                                               |
|                     | Four-foot lengths, large spools (21" diameter) and small spools (8½" diameter).                         |
|                     | Please contact your local distributor; available from 3M.com/oem [Where to Buy] or call 1-800-676-8381. |

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