



# Heat Shrink Tubing Selection Guide

HEAT SHRINK TUBING



# 3M™ Heat Shrink Tubing Selection Guide

| PRODUCT                                  | MATERIAL/<br>TYPICAL<br>APPLICATIONS                                                                                                                                                                               | OPERATING<br>TEMPERATURE<br>RANGE | SHRINK TEMP.<br>(Min.) | SHRINK RATIO | STANDARD SIZES<br>EXPANDED DIAMETER | DIELECTRIC<br>STRENGTH<br>(V/mil) | VOLUME<br>RESISTIVITY<br>(ohm-cm) | TENSILE STRENGTH<br>(PSI) |
|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|------------------------|--------------|-------------------------------------|-----------------------------------|-----------------------------------|---------------------------|
| <b>Single-Wall Polyolefin Tubing</b>     |                                                                                                                                                                                                                    |                                   |                        |              |                                     |                                   |                                   |                           |
| <b>FP-301</b>                            | <b>Flexible Polyolefin</b> 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<br>to<br>+135°C             | 212°F<br>100°C         | 2:1          | 3/64"<br>to<br>4"                   | 900                               | 10 <sup>15</sup>                  | 2400                      |
| <b>FP-301VW</b>                          | <b>Highly Flame-Retardant, Flexible Polyolefin</b> Insulation applications, flame-retardant applications requiring UL VW-1 and CSA OFT, fire-resistant wiring.                                                     | -55°C<br>to<br>+135°C             | 212°F<br>100°C         | 2:1          | 3/64"<br>to<br>4"                   | 900                               | 10 <sup>15</sup>                  | 2400                      |
| <b>VFP-876</b>                           | <b>Very Flexible Polyolefin</b> Terminal insulation, low shrink-temperature applications.                                                                                                                          | -55°C<br>to<br>+135°C             | 212°F<br>100°C         | 2:1          | 3/64"<br>to<br>2"                   | 800                               | 10 <sup>14</sup>                  | 2100                      |
| <b>SFTW-203</b>                          | <b>Very Flexible Polyolefin</b> Shrink-fit jacketing and insulation of flexible wire bundles and temperature-sensitive components.                                                                                 | -55°C<br>to<br>+135°C             | 212°F<br>100°C         | 3:1          | 1/16"<br>to<br>1 1/2"               | 700                               | 10 <sup>15</sup>                  | 2600                      |
| <b>SFTW-202<br/>GYS</b>                  | <b>Green and Yellow Striped</b> , 2:1 very flexible polyolefin, primarily used for ground wire identification.                                                                                                     | -55°C<br>to<br>+135°C             | 212°F<br>100°C         | 2:1          | 1/8"<br>to<br>3/4"                  | 700                               | 10 <sup>14</sup>                  | 2600                      |
| <b>CP-221</b>                            | <b>Commercial Grade Polyolefin</b> Terminal strip wire markers and general purpose insulation.                                                                                                                     | -55°C<br>to<br>+125°C             | 250°F<br>121°C         | 2:1          | 3/64"<br>to<br>2"                   | 550                               | 10 <sup>14</sup>                  | 1800                      |
| <b>Adhesive-Lined, Polyolefin Tubing</b> |                                                                                                                                                                                                                    |                                   |                        |              |                                     |                                   |                                   |                           |
| <b>MW</b>                                | <b>Multiple Wall Polyolefin</b> Insulation, strain relief and sealing of electrical connections, wire splices and components.                                                                                      | -55°C<br>to<br>+110°C             | 275°F<br>135°C         | 2.5:1        | 1/8"<br>to<br>1"                    | 900                               | 10 <sup>15</sup>                  | 2200                      |
| <b>EPS-200</b>                           | <b>Environmental Protection Sleeve</b> Insulation, strain relief and environmental protection of electrical wire bundles and components.                                                                           | -55°C<br>to<br>+110°C             | 250°F<br>121°C         | 2:1          | 1/8"<br>to<br>2"                    | 800                               | 10 <sup>14</sup>                  | 2100                      |
| <b>EPS-300</b>                           | <b>Environmental Protection Sleeve</b> Insulation, strain relief and environmental protection for automotive and marine wire bundles and splices.                                                                  | -55°C<br>to<br>+110°C             | 250°F<br>121°C         | 3:1          | 1/8"<br>to<br>1-1/2"                | 700                               | 10 <sup>14</sup>                  | 2100                      |
| <b>EPS-400</b>                           | <b>Environmental Protection Sleeve</b> Insulation, strain relief and environmental protection for sealing voids in multiple wire bundles for automotive and marine applications.                                   | -55°C<br>to<br>+110°C             | 250°F<br>121°C         | 4:1          | .300"<br>to<br>.700"                | 700                               | 10 <sup>14</sup>                  | 1900                      |
| <b>TMW</b>                               | <b>Semi-Rigid Multiple Wall Terminal Protection Sleeve</b> Insulation, strain relief and environmental protection. Uses include the manufacture of heat shrink butt connectors, ring terminals and fork terminals. | -55°C<br>to<br>+110°C             | 275°F<br>135°C         |              | .183"<br>to<br>.330"                | 900                               | 10 <sup>14</sup>                  | 2500                      |
| <b>TES<br/>SMS</b>                       | All-Weather, Heat-Shrinkable, Dual Wall, Polyolefin Tubing for Automotive Wire Harnesses                                                                                                                           | -55°C<br>to<br>+110°C             | 250°F<br>121°C         | 4:1<br>4:1   | .220"<br>to<br>.700"                | 500                               | 10 <sup>14</sup>                  | 2450<br>1900              |
| <b>Special Purpose Tubing</b>            |                                                                                                                                                                                                                    |                                   |                        |              |                                     |                                   |                                   |                           |
| <b>KYNAR®</b>                            | <b>Polyvinylidene Fluoride</b> Heat-resistant transparent insulation and marking for electronic and appliance applications.                                                                                        | -55°C<br>to<br>+175°C             | 347°F<br>175°C         | 2:1          | 3/64"<br>to<br>2"                   | 900                               | 10 <sup>14</sup>                  | 5500                      |
| <b>NST</b>                               | <b>Modified Neoprene</b> Insulation and abrasion resistant covering of wiring and cable harnesses. Oil resistant coverings.                                                                                        | -70°C<br>to<br>+121°C             | 275°F<br>135°C         | 2:1          | 1/8"<br>to<br>3"                    | 800                               | 10 <sup>12</sup>                  | 2100                      |
| <b>VTN-200</b>                           | <b>Fluoroelastomer</b> Synthetic fuel and hydraulic oil resistant applications, high-temperature coverings.                                                                                                        | -55°C<br>to<br>+200°C             | 347°F<br>175°C         | 2:1          | 1/8"<br>to<br>2"                    | 500                               | 10 <sup>12</sup>                  | 2400                      |
| <b>PSTH</b>                              | <b>Flexible Elastomeric Polyester</b> Designed for harsh operating conditions.                                                                                                                                     | -55°C<br>to<br>+150°C             | 338°F<br>170°C         | 2:1          | 3/16"<br>to<br>2 1/2"               | 500                               | 10 <sup>14</sup>                  | 2200                      |
| <b>Heavy-Duty Tubing</b>                 |                                                                                                                                                                                                                    |                                   |                        |              |                                     |                                   |                                   |                           |
| <b>MDT</b>                               | <b>Medium-Duty</b> Excellent abrasion, corrosion and environmental protection. Flame retardant.                                                                                                                    | -55°C<br>to<br>+110°C             | 250°F<br>121°C         | 3:1          | .400"<br>to<br>4.30"                | 500                               | 10 <sup>14</sup>                  | 2400                      |
| <b>HDT</b>                               | <b>Heavy-Duty</b> Fabricated from specially formulated cross-linked polyolefin, assuring long-term environmental protection. Highly chemical, abrasion and split resistant.                                        | -55°C<br>to<br>+110°C             | 250°F<br>121°C         | 3:1          | .300"<br>to<br>7.00"                | 500                               | 10 <sup>14</sup>                  | 2400                      |
| <b>CCT</b>                               | <b>Adhesive-lined</b> , 3:1 flexible polyolefin for sealing and insulating CATV connections.                                                                                                                       | -55°C<br>to<br>+110°C             | 250°F<br>121°C         | 3:1          | .400"<br>to<br>3.00"                | 500                               | 10 <sup>14</sup>                  | 2000                      |
| <b>BBI</b>                               | <b>Bus Bar Tubing</b> , Designed for insulating rectangular, square, or round bus bar rated 5 kV through 35 kV.                                                                                                    | -55°C<br>to<br>+110°C             | 250°F<br>121°C         |              | 2.38"<br>to<br>10.28"               | 550                               | 10 <sup>13</sup>                  | 2200                      |

| 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.                            | MIL-DTL-23053/5, Class 1, 2; AMS-3636 & 3637; UL File E-39100; CSA LR38227; ABS                      |
| 400                     | +1, -10                   | 1.5              | Self-Extinguish meets UL 224 VW-1 Test                            | Non-Corrosive                  | Good                | 3                            | Good                  | Exc.               | Exc.                            | MIL-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.                            | MIL-R-46846, Type V; UL File E-39100; CSA LR38227, MIL-DTL-23053/5                                   |
| 400                     | 5                         | 1.29             | Self-Extinguish                                                   | Non-Corrosive                  | Good                | 3                            | Good                  | Good               | Exc.                            | MIL-DTL-23053/5*, Class 1; UL File E-48398; CSA LR38227                                              |
| 400                     | 5                         | 1.29             | Self-Extinguish                                                   | Non-Corrosive                  | Good                | 3                            | Good                  | Good               | Exc.                            | MIL-DTL-23053/5, Class 1; UL File E-48398; CSA LR38227                                               |
| 400                     | 5                         | 1.1              | Self-Extinguish                                                   | Non-Corrosive                  | Good                | 4                            | Good                  | Good               | Exc.                            |                                                                                                      |
| 400                     | +1, -10                   | 1.0              | Non-Flame Retardant                                               | Non-Corrosive                  | Good                | 7                            | Good                  | Good               | Exc.                            | MIL-DTL-23053/4, Class 1; AMS-3634; UL File E-157227                                                 |
| 450                     | +1, -5                    | 1.3              | Self-Extinguish meets UL 224 All-Tubing Flame Test (jacket)       | Non-Corrosive                  | Good                | 3                            | Good                  | Good               | Exc.                            | MIL-DTL-23053/4, Class 2; UL File E-39100                                                            |
| 450                     | +1, -15                   | 1.3              | Self-Extinguish meets UL 224 All-Tubing Flame Test (jacket)       | Non-Corrosive                  | Good                | 3                            | Good                  | Good               | Exc.                            | MIL-DTL-23053/4, Class 3; UL File E-157227; ABS                                                      |
| 400                     | +1, -10                   | 1.25             | Self-Extinguish                                                   | Non-Corrosive                  | Good                | 7                            | Good                  | Good               | Exc.                            | UL File E-157227                                                                                     |
| 400                     | +1, -10                   | 1.0              | Non-Flame Retardant                                               | Non-Corrosive                  | Good                | 7                            | Good                  | Good               | Exc.                            | UL File E-157227                                                                                     |
| 450<br>350              | +0, -10<br>+0, -10        | 0.97<br>1.25     | TES Non-Flame Retardant<br>SMS Self-Extinguish                    | Non-Corrosive<br>Non-Corrosive | Good<br>Good        | TES 5<br>SMS 3               | Good<br>Good          | Good<br>Good       | Exc.<br>Exc.                    | ESB-M99D56-Ford<br>MS-DB56-Chrysler                                                                  |
| 350                     | +1, -10                   | 1.7              | Self-Extinguish meets UL 224 VW-1 Test                            | Non-Corrosive                  | Exc.                | 10                           | Exc.                  | Exc.               | Exc.                            | MIL-DTL-23053/18, Class 1; MIL-DTL-23053/8; AMS-3632; UL File E-39100, VW-1, E69751; CSA LR38227 OFT |
| 500                     | +1, -10                   | 1.3              | Self-Extinguish                                                   | Non-Corrosive                  | Exc.                | 1                            | Exc.                  | Good               | Exc.                            | MIL-R-46846, Type I, Class 1; MIL-DTL-23053/1, Class 1, 2; AMS-3623, SC-X-15112                      |
| 450                     | +1, -10                   | 1.7              | Self-Extinguish                                                   | Non-Corrosive                  | Exc.                | 4                            | Exc.                  | Exc.               | Exc.                            | MIL-R-46846, Type III, Class 1; MIL-DTL-23053/13                                                     |
| 350                     | +2, -8                    | 1.6              | Self-Extinguish                                                   | Non-Corrosive                  | Exc.                | 4                            | Exc.                  | Exc.               | Exc.                            | SC-X15111C; meets the functional requirements of MIL-DTL-23053/16                                    |
| 475                     | +1, -10                   | 1.28             | Self-Extinguish                                                   | Non-Corrosive                  | Good                | 8                            | Good                  | Good               | Exc.                            | MIL-DTL-23053/15, Class 2; ABS                                                                       |
| 475                     | +1, -10                   | 1.28             | Self-Extinguish                                                   | Non-Corrosive                  | Good                | 9                            | Good                  | Good               | Exc.                            | MIL-DTL-23053/15, Class 1; ABS                                                                       |
| 400                     | +1, -10                   | 1.30             | Self-Extinguish                                                   | Non-Corrosive                  | Good                | 8                            | Good                  | Good               | Exc.                            |                                                                                                      |
| 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                                            |

### **Important Notice**

Before using this product, you must evaluate it and determine if it is suitable for your intended application. You assume all risks and liability associated with such use.

### **Warranty; Limited Remedy; Limited Liability.**

3M's product warranty is stated in its Product Literature available upon request. 3M MAKES NO OTHER WARRANTIES INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. If this product is defective within the warranty period stated

above, your exclusive remedy shall be, at 3M's option, to replace or repair the 3M product or refund the purchase price of the 3M product. Except where prohibited by law, 3M will not be liable for any loss or damage arising from this 3M product, whether direct, indirect, special, incidental or consequential regardless of the legal theory asserted.



### **Electrical Markets Division**

6801 River Place Blvd.  
Austin, TX 78726-9000  
800 676 8381  
Fax 800 828 9329  
<http://www.3M.com/electrical>



40% Pre-consumer waste paper  
10% Post-consumer waste paper

Litho in USA.

© 3M 2004 80-6109-4340-1B(1092.0)W

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[3M:](#)

[FP-301-VW-1-Black](#) [SFTW-203-1/16-48-Black](#) [SFTW-203-1/8-48-Black](#) [SFTW-203-1/4-48-Black](#) [SFTW-203-3/8-48-Black](#) [SFTW-203-1/2-48-Black](#) [SFTW-203-3/4-48-Black](#) [SFTW-203-3/4-Black](#) [SFTW-203-1 1/2-Black](#) [SFTW-203-1-48-BLACK](#) [SFTW-203-1-1/2-48-Black](#) [FP-301VW-3/32-Black-500'](#) [FP-301-VW-1 1/2-Black](#) [FP-301-VW-3/32-Black](#) [FP-301-VW-3/16-Black](#) [FP-301-VW-3/4-Black](#) [FP-301-VW-3-Black](#) [FP-301-VW-1/4-Black](#) [FP-301-VW-3/8-Black](#) [FP-301VW-3-Black-50'](#) [FP-301-VW-2-Black](#) [FPVW-1 1/2-48"-Black-Bulk](#) [FPVW-1/8-48"-Black](#) [FPVW-1/8-48"-Black-Bulk](#) [FPVW-1-48"-Black](#) [FPVW-2-48"-Black](#) [FPVW-2-48"-Black-Bulk](#) [FPVW-3/8-48"-Black-Bulk](#) [FPVW-3/32-48"-Black](#) [FPVW-3/32-48"-Black-Bulk](#) [FPVW-3-48"-Black](#) [FPVW-3-48"-Black-Bulk](#) [FPVW-1 1/2-48"-Black](#)