



Highly flame-retardant, low recovery temperature, heat-shrinkable tubing

Versafit heat-shrinkable tubing is a cost-effective choice for many commercial and military applications. Versafit tubing is made from a specially formulated, crosslinked polyolefin to provide high flame-retardance (VW-1), excellent flexibility, and a low shrink temperature (to reduce installation time).

Versafit tubing performs a variety of functions in commercial and military applications:

- Electrically insulates and protects in-line components, disconnect terminals, and splices.
- Bundles wires for very flexible light-duty harnesses.
- Identifies or color-codes wires, cables, terminals, and components. Versafit tubing hot-stamps extremely well.

Compared to noncrosslinked materials, Versafit tubing has a higher temperature rating and exhibits better

thermal stability and resistance to physical abuse.

Unlike other typical flame-retardant tubings, Versafit tubing is free of polybrominated biphenyls (PBBs) and polybrominated biphenyl oxides and ethers (PBBOs/PBBEs). In Europe, these chemicals are classified as environmentally hazardous substances.

**Temperature rating**

|                                   |                |
|-----------------------------------|----------------|
| Full recovery temperature:        | 90°C           |
| Continuous operating temperature: | -55°C to 135°C |

**Specifications\***

| Type     | Raychem | UL                         | CSA                         | Military                           |
|----------|---------|----------------------------|-----------------------------|------------------------------------|
| Versafit | RW-3009 | E35586 VW-1<br>600V, 125°C | LR31929 VW-1<br>600V, 125°C | AMS-DTL-23053/5<br>Classes 1 and 3 |

\*When ordering, always specify latest issue.

**Dimensions (millimeters/inches)**



| Size  | Inside diameter           |                      | d (max.)                |                         | Wall thickness                 |                           |
|-------|---------------------------|----------------------|-------------------------|-------------------------|--------------------------------|---------------------------|
|       | D<br>Expanded as supplied | Expanded as supplied | Recovered after heating | Recovered after heating | W<br>Recovered after heating** | Recovered after heating** |
| 3/64  | 1.63 ± 0.2                | 0.064 ± 0.008        | 0.6                     | 0.023                   | 0.40 ± 0.08                    | 0.016 ± 0.003             |
| 1/16  | 1.85 ± 0.2                | 0.073 ± 0.007        | 0.8                     | 0.031                   | 0.43 ± 0.08                    | 0.017 ± 0.003             |
| 3/32  | 2.79 ± 0.2                | 0.110 ± 0.007        | 1.2                     | 0.046                   | 0.51 ± 0.08                    | 0.020 ± 0.003             |
| 1/8   | 3.43 ± 0.2                | 0.135 ± 0.007        | 1.6                     | 0.062                   | 0.51 ± 0.08                    | 0.020 ± 0.003             |
| 3/16  | 5.21 ± 0.3                | 0.205 ± 0.010        | 2.4                     | 0.093                   | 0.51 ± 0.08                    | 0.020 ± 0.003             |
| 1/4   | 7.11 ± 0.3                | 0.280 ± 0.010        | 3.2                     | 0.125                   | 0.64 ± 0.08                    | 0.025 ± 0.003             |
| 3/8   | 10.16 ± 0.4               | 0.400 ± 0.015        | 4.8                     | 0.187                   | 0.64 ± 0.08                    | 0.025 ± 0.003             |
| 1/2   | 13.72 ± 0.4               | 0.540 ± 0.015        | 6.4                     | 0.250                   | 0.64 ± 0.08                    | 0.025 ± 0.003             |
| 5/8   | 16.90 ± 0.4               | 0.665 ± 0.015        | 8.0                     | 0.315                   | 0.76 ± 0.08                    | 0.030 ± 0.003             |
| 3/4   | 20.45 ± 0.4               | 0.805 ± 0.015        | 9.5                     | 0.375                   | 0.76 ± 0.08                    | 0.030 ± 0.003             |
| 1     | 25.53 ± 0.4               | 1.055 ± 0.015        | 12.7                    | 0.500                   | 0.89 ± 0.13                    | 0.035 ± 0.005             |
| 1 1/4 | 33.40 ± 0.7               | 1.315 ± 0.025        | 15.9                    | 0.625                   | 1.02 ± 0.15                    | 0.040 ± 0.006             |
| 1 1/2 | 39.88 ± 0.8               | 1.570 ± 0.030        | 19.1                    | 0.750                   | 1.02 ± 0.15                    | 0.040 ± 0.006             |
| 2     | 52.83 ± 1.0               | 2.080 ± 0.040        | 25.4                    | 1.000                   | 1.14 ± 0.16                    | 0.045 ± 0.007             |
| 3     | 78.49 ± 1.0               | 3.090 ± 0.040        | 38.1                    | 1.500                   | 1.27 ± 0.20                    | 0.050 ± 0.008             |
| 4     | 104.14 ± 1.3              | 4.100 ± 0.050        | 50.8                    | 2.000                   | 1.40 ± 0.23                    | 0.055 ± 0.009             |

\*\*Wall thickness will be less if tubing recovery is restricted during shrinkage.

**Ordering information**

|                      |   |   |
|----------------------|---|---|
| Colors               | <b>Standard</b>   | Black, white, red, blue, yellow and green |
|                      | <b>Nonstandard</b>  | Brown, orange, violet, and gray           |
| Size selection       | Always order the largest size that will shrink snugly over the component being covered. A variety of special order sizes are available. |   |
| Standard packaging   | On spools.  |   |
| Ordering description | Specify product name, size, and color; for example, Versafit 1/4-0 (0=Black).   |   |

## Specification values

|                                   | Property  | Unit                        | Requirement   | Method of test              |
|-----------------------------------|---|-----------------------------|---|-----------------------------|
| Physical                          | Dimensions  | mm ( <i>inches</i> )        | See reverse   | ASTM D 2671                 |
|                                   | Longitudinal change                                     |                             |   |                             |
|                                   | ASTM D 2671   | percent                     | +1, -5  | ASTM D 2671                 |
|                                   | UL 224  | percent                     | +3, -3  | UL224                       |
|                                   | Eccentricity (recovered)                                | percent                     | 30 maximum  | ASTM D 2671                 |
|                                   | Tensile strength  | psi ( <i>MPa</i> )          | 1500 ( <i>10.3</i> ) minimum  | ASTM D 2671                 |
|                                   | Ultimate elongation                                     | percent                     | 200 minimum   | ASTM D 2671                 |
|                                   | Secant modulus (expanded)                               | psi ( <i>MPa</i> )          | 2.5 X 10 <sup>4</sup> ( <i>172</i> ) maximum  | ASTM D 2671                 |
|                                   | Low-temperature flexibility<br>(1 hour at -45°C/-49°F)  |                             | No cracking   | UL 224                      |
|                                   | Heat shock<br>(1 hour at 136°C/277°F)                   |                             | No cracking   | UL 224                      |
|                                   | Heat resistance<br>(7 days at 158°C/316°F)              |                             |   | ASTM D 2671                 |
|                                   | Followed by tests for:                                  |                             |   |                             |
|                                   | Tensile strength  | psi ( <i>MPa</i> )          | 70% minimum of unaged specimens   | UL 224                      |
|                                   | Ultimate elongation                                     | percent                     | 100 minimum   | UL 224                      |
|                                   | Flexibility   |                             | No cracking   | UL 224                      |
|                                   | Dielectric withstand<br>at 2500 V                       | seconds                     | 60 minimum  | UL 224                      |
|                                   | Dielectric breakdown                                    | volts                       | 50% minimum of unaged specimens   | ASTM D 2671                 |
|                                   | Dielectric strength                                     | volts/mil ( <i>kV/mm</i> )  | 500 ( <i>19.7</i> ) minimum   | ASTM D 2671                 |
|                                   | Restricted shrinkage                                    |                             | Pass  | UL 224                      |
|                                   | Electrical  | Dielectric strength         | volts/mil ( <i>kV/mm</i> )  | 500 ( <i>19.7</i> ) minimum |
| Dielectric withstand<br>at 2500 V |   | seconds                     | 60 minimum  | UL 224                      |
|                                   | Volume resistivity                                      | ohm-cm                      | 10 <sup>14</sup> minimum  | ASTM D 2671                 |
| Chemical                          | Corrosive effect<br>(7 days at 158°C/316°F)             |                             | No corrosion  | ASTM D 2671                 |
|                                   | Copper stability<br>(7 days at 158°C/316°F)             |                             | No brittleness, glazing, cracking,<br>or severe discoloration of tubing.<br>No pitting or blackening of copper. | ASTM D 2671                 |
|                                   | Followed by test for:                                   |                             |   |                             |
|                                   | Ultimate elongation                                     | percent                     | 100 minimum   | ASTM D 2671                 |
|                                   | Flammability  |                             | Pass  | UL 224, VW-1                |
|                                   | Water absorption (recovered)<br>(24 hours at 23°C/73°F) | percent                     | 0.5 maximum   | ASTM D 2671                 |
|                                   | Fungus resistance                                       |                             |   | ISO 846<br>Method B         |
|                                   | Followed by tests for:                                  |                             |   |                             |
|                                   | Tensile strength  | psi ( <i>MPa</i> )          | 1500 ( <i>10.3</i> ) minimum  | ASTM D 2671                 |
|                                   | Ultimate elongation                                     | percent                     | 200 minimum   | ASTM D 2671                 |
| Dielectric strength               | volts/mil ( <i>kV/mm</i> )                              | 500 ( <i>19.7</i> ) minimum | ASTM D 2671   |                             |

Note: Consult RW-3009 for specific details about test procedures.

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### Users should independently evaluate the suitability of the product for their application.

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