

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**

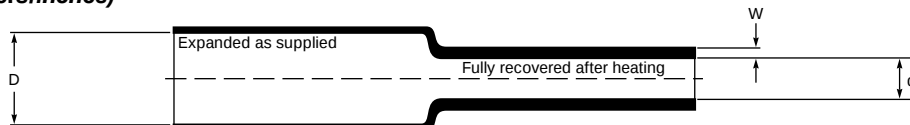
|                                   |                |
|-----------------------------------|----------------|
| Full recovery temperature:        | 90°C           |
| Continuous operating temperature: | -55°C to 135°C |

**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 |               | Recovered after heating |       | W<br>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      |
|-------------------|---------------------------------------------------------|----------------------------|-----------------------------------------------------------------------------------------------------------------|---------------------|
| <b>Physical</b>   | 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              |
| <b>Electrical</b> | Dielectric strength                                     | volts/mil ( <i>kV/mm</i> ) | 500 ( <i>19.7</i> ) minimum                                                                                     | ASTM D 2671         |
|                   | Dielectric withstand<br>at 2500 V                       | seconds                    | 60 minimum                                                                                                      | UL 224              |
|                   | Volume resistivity                                      | ohm-cm                     | 10 <sup>14</sup> minimum                                                                                        | ASTM D 2671         |
| <b>Chemical</b>   | 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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