tyco Electronics

# Versafit

Raychem

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

PBBs PBBEs PBBOs

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*

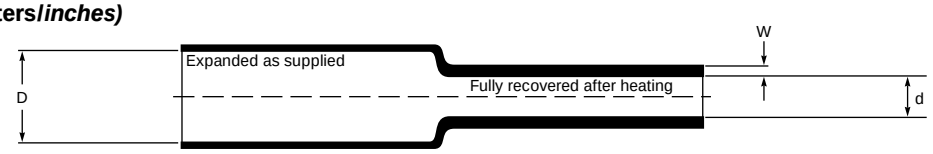
| | |
|---|---|
| Full recovery temperature: | 90°C |
| Continuous operating temperature: | –55°C to 135°C |

### *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)*




| | Inside diameter | | | | Wall thickness | |
|---|---|---|---|---|---|---|
| | D | | d (max.) | | W | |
| Size | Expanded as supplied | | 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 | **Standard** | Black, white, red, blue, yellow and green |
| | **Nonstandard** | Brown, orange, violet, and gray |
| Size selection | Always order the largest size that will shrink snugly over the component being covered.<br>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 *(inches)* | 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 *(MPa)* | 1500 *(10.3)* minimum | ASTM D 2671 |
| | Ultimate elongation | percent | 200 minimum | ASTM D 2671 |
| | Secant modulus (expanded) | psi *(MPa)* | 2.5 X $10^4$ *(172)* maximum | ASTM D 2671 |
| | Low-temperature flexibility (1 hour at –45°C/*–49°F*) | | No cracking | UL 224 |
| | Heat shock (1 hour at 136°C/*277°F*) | | No cracking | UL 224 |
| | Heat resistance (7 days at 158°C/*316°F*) | | | ASTM D 2671 |
| | Followed by tests for: | | | |
| | Tensile strength | psi *(MPa)* | 70% minimum of unaged specimens | UL 224 |
| | Ultimate elongation | percent | 100 minimum | UL 224 |
| | Flexibility | | No cracking | UL 224 |
| | Dielectric withstand at 2500 V | seconds | 60 minimum | UL 224 |
| | Dielectric breakdown | volts | 50% minimum of unaged specimens | ASTM D 2671 |
| | Dielectric strength | volts/mil *(kV/mm)* | 500 *(19.7)* minimum | ASTM D 2671 |
| | Restricted shrinkage | | Pass | UL 224 |
| **Electrical** | Dielectric strength | volts/mil *(kV/mm)* | 500 *(19.7)* minimum | ASTM D 2671 |
| | Dielectric withstand at 2500 V | seconds | 60 minimum | UL 224 |
| | Volume resistivity | ohm-cm | $10^{14}$ minimum | ASTM D 2671 |
| **Chemical** | Corrosive effect (7 days at 158°C/*316°F*) | | No corrosion | ASTM D 2671 |
| | Copper stability (7 days at 158°C/*316°F*) | | No brittleness, glazing, cracking, or severe discoloration of tubing. 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) (24 hours at 23°C/*73°F*) | percent | 0.5 maximum | ASTM D 2671 |
| | Fungus resistance | | | ISO 846 Method B |
| | Followed by tests for: | | | |
| | Tensile strength | psi *(MPa)* | 1500 *(10.3)* minimum | ASTM D 2671 |
| | Ultimate elongation | percent | 200 minimum | ASTM D 2671 |
| | Dielectric strength | volts/mil *(kV/mm)* | 500 *(19.7)* 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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