

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



Versafit V2 heat-shrinkable tubing is a cost-effective, environmentally friendly choice for many commercial applications. V2 tubing is made from a specially formulated, crosslinked polyolefin with low recovery temperature, excellent flexibility, and high flame-retardance (VW-1).

Unlike other typical flame-retardant tubings, V2 tubing is free of polybrominated biphenyls (PBBs) and poly-brominated biphenyl oxides (PBBOs). In Europe, these chemicals

are classified as environmentally hazardous substances.

Compared to noncrosslinked materials, V2 tubing has a higher temperature rating and exhibits better thermal stability and resistance to physical abuse.

V2 tubing performs a variety of functions in commercial applications:

- Electrically insulates and protects in-line components, disconnect terminals, and splices.

- Bundles wires for very flexible light-duty harnesses.
- Strain-relieves electrical wire connections for long-term reliability.

V2 tubing offers a faster, easier, more reliable replacement for molding in place, dip coating, and tape wrapping.

V2 is UL-recognized and CSA-certified at 125°C, 600 V, with UL VW-1 and CSA OFT flame-retardancy ratings.

**Temperature rating**

|                                   |                |
|-----------------------------------|----------------|
| Full recovery temperature:        | 90°C           |
| Continuous operating temperature: | -45°C to 125°C |

**Specifications\***

| Type     | Raychem | UL          | CSA          |
|----------|---------|-------------|--------------|
| Versafit | RW-3023 | E35586 VW-1 | LR31929 VW-1 |

\* When ordering, always specify latest issue.

**Dimensions (millimeters)**



| Size | As supplied       |                          | Fully recovered          |                           |
|------|-------------------|--------------------------|--------------------------|---------------------------|
|      | D Inside diameter | Wall thickness (nominal) | d (max.) Inside diameter | W (min.) Wall thickness** |
| 1.0  | 1.6 ± 0.2         | 0.20                     | 0.50                     | 0.33                      |
| 1.5  | 2.1 ± 0.2         | 0.20                     | 0.75                     | 0.35                      |
| 2.0  | 2.6 ± 0.2         | 0.25                     | 1.00                     | 0.43                      |
| 2.5  | 3.1 ± 0.2         | 0.25                     | 1.25                     | 0.43                      |
| 3.0  | 3.6 ± 0.2         | 0.25                     | 1.50                     | 0.43                      |
| 3.5  | 4.1 ± 0.3         | 0.25                     | 1.75                     | 0.43                      |
| 4.0  | 4.6 ± 0.3         | 0.25                     | 2.00                     | 0.43                      |
| 5.0  | 5.6 ± 0.3         | 0.30                     | 2.50                     | 0.56                      |
| 6.0  | 6.6 ± 0.3         | 0.30                     | 3.00                     | 0.56                      |
| 7.0  | 7.6 ± 0.3         | 0.30                     | 3.50                     | 0.56                      |
| 8.0  | 8.6 ± 0.3         | 0.30                     | 4.00                     | 0.56                      |
| 9.0  | 9.6 ± 0.3         | 0.30                     | 4.50                     | 0.56                      |
| 10.0 | 10.4 ± 0.3        | 0.30                     | 5.00                     | 0.56                      |

| Size | As supplied       |                          | Fully recovered          |                           |
|------|-------------------|--------------------------|--------------------------|---------------------------|
|      | D Inside diameter | Wall thickness (nominal) | d (max.) Inside diameter | W (min.) Wall thickness** |
| 11.0 | 11.4 ± 0.3        | 0.30                     | 5.5                      | 0.56                      |
| 12.0 | 12.7 ± 0.3        | 0.30                     | 6.0                      | 0.56                      |
| 13.0 | 13.5 ± 0.3        | 0.35                     | 6.5                      | 0.66                      |
| 14.0 | 14.4 ± 0.4        | 0.35                     | 7.0                      | 0.68                      |
| 15.0 | 15.7 ± 0.4        | 0.35                     | 7.5                      | 0.68                      |
| 16.0 | 16.9 ± 0.4        | 0.35                     | 8.0                      | 0.68                      |
| 18.0 | 19.0 ± 0.4        | 0.40                     | 9.0                      | 0.76                      |
| 20.0 | 21.4 ± 0.4        | 0.40                     | 10.0                     | 0.76                      |
| 22.0 | 23.2 ± 0.4        | 0.45                     | 11.0                     | 0.89                      |
| 25.0 | 26.8 ± 0.4        | 0.45                     | 12.5                     | 0.89                      |
| 27.0 | 28.2 ± 0.5        | 0.45                     | 12.5                     | 0.89                      |
| 28.0 | 30.0 ± 0.5        | 0.45                     | 14.0                     | 0.89                      |
| 30.0 | 32.1 ± 0.5        | 0.45                     | 15.0                     | 0.89                      |

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

**Ordering information**

|                      |  |
|----------------------|--|
| Colors               | <b>Standard</b> Black<br><b>Nonstandard</b> Red, blue, yellow, green, white, orange, brown, violet, gray |
| Size selection       | Always order the largest size that will shrink snugly over the component being covered.                  |
| Standard packaging   | On spools  |
| Marking              | Marked with UL, CSA, and Japan -F- Mark legends.   |
| Ordering description | Specify product name, size, and color; for example, V2 2.0-0 (0=Black).                                  |

## Specification values

|                      | Property  | Unit                       | Requirement  | Method of test      |
|----------------------|---|----------------------------|--|---------------------|
| <b>Physical</b>      | Dimensions  | mm                         | See reverse  | ASTM D 2671         |
|                      | Longitudinal change                                     |                            |  |                     |
|                      | ASTM D 2671   | percent                    | +1, -5   | ASTM D 2671         |
|                      | UL 224  | percent                    | +3, -3   | UL 224              |
|                      | Eccentricity (recovered)                                | percent                    | 30 maximum   | ASTM D 2671         |
|                      | Tensile strength  | MPa ( <i>psi</i> )         | 10.3 (1500) minimum  | ASTM D 2671         |
|                      | Ultimate elongation                                     | percent                    | 200 minimum  | ASTM D 2671         |
|                      | Secant modulus (as supplied)                            | MPa ( <i>psi</i> )         | 172 (2.5 x 10 <sup>4</sup> ) maximum   | ASTM D 2671         |
|                      | Low-temperature flexibility<br>(1 hour at -30°C/-22°F)  |                            | No cracking  | UL 224              |
|                      | Heat shock<br>(4 hours at 250°C/482°F)                  |                            | No cracking  | UL 224              |
|                      | Heat aging<br>(7 days at 158°C/316°F)                   |                            |  | UL 224              |
|                      | Followed by tests for:                                  |                            |  |                     |
|                      | Tensile strength  | MPa ( <i>psi</i> )         | 70% minimum<br>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   | ASTM D 2671         |
|                      | Dielectric breakdown                                    | volts                      | 50% minimum<br>of unaged specimens   | ASTM D 2671         |
| Dielectric strength  | kV/mm ( <i>volts/mil</i> )                              | 19.7 (500) minimum         | ASTM D 2671  |                     |
| Restricted shrinkage |   | Pass                       | UL 224   |                     |
| <b>Electrical</b>    | Dielectric withstand<br>at 2500 V                       | seconds                    | 60 minimum   | ASTM D 2671         |
|                      | Dielectric strength                                     | kV/mm ( <i>volts/mil</i> ) | 19.7 (500) minimum   | ASTM D 2671         |
|                      | 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,<br>cracking, or severe<br>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  | MPa ( <i>psi</i> )         | 10.3 (1500) minimum  | ASTM D 2671         |
|                      | Ultimate elongation                                     | percent                    | 200 minimum  | ASTM D 2671         |
| Dielectric strength  | kV/mm ( <i>volts/mil</i> )                              | 19.7 (500) minimum         | ASTM D 2671  |                     |

Note: Consult RW-3023 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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