

Flexible, rugged, modified elastomeric heat-shrinkable tubing

NT-MIL modified elastomeric heat-shrinkable tubing offers outstanding resistance to abrasion and physical abuse while providing flexibility and strain relief needed in many harnessing applications. NT-MIL tubing is widely used for insulation, strain relief and abrasion protection on cable harnesses and wire bundles in the military and aerospace industries. It meets the stringent requirements of AMS-DTL-23053/1, Classes 1 and 2.

NT-MIL tubing remains flexible at temperatures as low as -70°C without cracking. It also withstands heat shock at 200°C without dripping, flowing or cracking.

NT-MIL tubing is resistant to common fluids and solvents including aviation and ground vehicle fuels, lubricating oil, and hydraulic fluids. It retains excellent physical and electrical properties following exposure.

No special skills are required to install NT-MIL tubing. Using standard heating tools, one operator can complete an installation in minutes, substantially reducing labor costs.

NT-MIL tubing is supplied in a wide range of sizes. Because NT-MIL is heat-shrinkable, each size can accommodate a variety of harness sizes, minimizing inventory and related costs.

**Temperature rating**

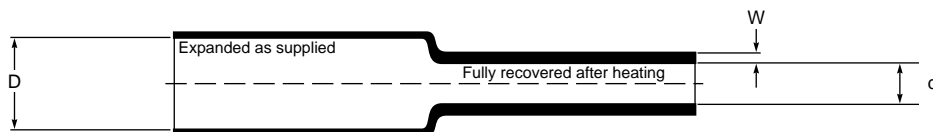
|                                   |                |
|-----------------------------------|----------------|
| Full recovery temperature:        | 135°C          |
| Continuous operating temperature: | -70°C to 121°C |

**Specifications\***

| Type   | Raychem | Military                     |
|--------|---------|------------------------------|
| NT-MIL | RW-3030 | AMS-DTL-23053/1, Cl. 1 and 2 |

\*When ordering, always specify latest issue.

**Dimensions (millimeters/inches)**



| Size | Inside diameter               |                                  | Wall thickness             |       | Size        | Inside diameter               |                                  | Wall thickness              |       |      |       |             |               |
|------|-------------------------------|----------------------------------|----------------------------|-------|-------------|-------------------------------|----------------------------------|-----------------------------|-------|------|-------|-------------|---------------|
|      | D (min.) Expanded as supplied | d (max.) Recovered after heating | W Recovered after heating* |       |             | D (min.) Expanded as supplied | d (max.) Recovered after heating | W Recovered after heating** |       |      |       |             |               |
| 1/8  | 3.2                           | 0.125                            | 1.6                        | 0.062 | 0.66 ± 0.20 | 0.026 ± 0.008                 | 1                                | 25.4                        | 1.000 | 14.5 | 0.570 | 1.77 ± 0.51 | 0.070 ± 0.020 |
| 3/16 | 4.8                           | 0.187                            | 2.4                        | 0.093 | 0.84 ± 0.25 | 0.033 ± 0.010                 | 1 1/4                            | 31.8                        | 1.250 | 18.1 | 0.714 | 2.20 ± 0.51 | 0.087 ± 0.020 |
| 1/4  | 6.4                           | 0.250                            | 3.6                        | 0.143 | 0.89 ± 0.25 | 0.035 ± 0.010                 | 1 1/2                            | 38.1                        | 1.500 | 21.8 | 0.857 | 2.41 ± 0.51 | 0.095 ± 0.020 |
| 3/8  | 9.5                           | 0.375                            | 5.4                        | 0.211 | 1.01 ± 0.25 | 0.040 ± 0.010                 | 1 3/4                            | 44.5                        | 1.750 | 25.4 | 1.000 | 2.71 ± 0.51 | 0.107 ± 0.020 |
| 1/2  | 12.7                          | 0.500                            | 7.3                        | 0.286 | 1.21 ± 0.38 | 0.048 ± 0.015                 | 2                                | 50.8                        | 2.000 | 29.0 | 1.140 | 2.79 ± 0.51 | 0.110 ± 0.020 |
| 5/8  | 15.9                          | 0.625                            | 9.1                        | 0.357 | 1.32 ± 0.38 | 0.052 ± 0.015                 | 3                                | 76.2                        | 3.000 | 43.4 | 1.710 | 3.17 ± 0.51 | 0.125 ± 0.020 |
| 3/4  | 19.1                          | 0.750                            | 10.9                       | 0.428 | 1.44 ± 0.38 | 0.057 ± 0.015                 | 4                                | 101.6                       | 4.000 | 57.9 | 2.280 | 3.55 ± 0.51 | 0.140 ± 0.020 |
| 7/8  | 22.2                          | 0.875                            | 12.7                       | 0.500 | 1.65 ± 0.38 | 0.065 ± 0.015                 |                                  |                             |       |      |       |             |               |

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

**Ordering information**

|                      |   |
|----------------------|---|
| Colors               | Black   |
| Size selection       | Always order the largest size that will shrink snugly over the component being covered. |
| Standard packaging   | On spools   |
| Ordering description | Specify product name, size, and color; for example, NT-MIL 1/4-0 (0=Black).             |

## Specification values

|                   | Property   | Unit                       | Requirement  | Method of test             |
|-------------------|--|----------------------------|--|----------------------------|
| <b>Material</b>   | Dimensions   | mm ( <i>inches</i> )       | See Reverse  | ASTM D 2671                |
|                   | Longitudinal change  | percent                    | +1, -10  | ASTM D 2671                |
|                   | Tensile strength   | psi ( <i>Mpa</i> )         | 1500 ( <i>10.3</i> ) minimum   | ASTM D 412                 |
|                   | Ultimate elongation  | percent                    | 225 minimum  | ASTM D 412                 |
|                   | Tensile stress at 200% elongation  | psi ( <i>Mpa</i> )         | 1500 ( <i>10.3</i> ) maximum   | AMS-DTL-23053              |
|                   | Restricted shrinkage<br>(30 minutes at 135°C/275°F)  |                            | No cracks  | AMS-DTL-23053              |
|                   | Followed by test for:  |                            |  |                            |
|                   | Voltage withstand  |                            | Pass   |                            |
|                   | Low temperature flexibility<br>(4 hours at -70°C/-94°F)  |                            | No cracks  | AMS-DTL-23053              |
|                   | Heat shock<br>(4 hours at 200°C/392°F)   |                            | No cracks, flowing or dripping   | AMS-DTL-23053              |
|                   | Heat resistance<br>(168 hours at 121°C/250°F)  |                            |  | ASTM D 2671                |
|                   | Followed by tests for:   |                            |  |                            |
|                   | Tensile strength   | psi ( <i>Mpa</i> )         | 1200 ( <i>8.3</i> ) minimum  | ASTM D 412                 |
|                   | Ultimate elongation  | percent                    | 175 minimum  | ASTM D 412                 |
|                   | Dielectric strength  | volts/mil ( <i>kV/mm</i> ) | Sizes up to 7/8:<br>300 ( <i>11.8</i> ) minimum<br>Sizes 1 and larger:<br>200 ( <i>7.8</i> ) minimum | ASTM D 2671                |
| <b>Electrical</b> | Dielectric strength  | volts/mil ( <i>kV/mm</i> ) | Sizes up to 7/8:<br>300 ( <i>11.8</i> ) minimum<br>Sizes 1 and larger:<br>200 ( <i>7.8</i> ) minimum | ASTM D 2671                |
|                   | Volume resistivity   | ohm-cm                     | 1 x 10 <sup>11</sup> minimum   | ASTM D 876                 |
| <b>Chemical</b>   | Copper mirror corrosion<br>(16 hours at 150°C/302°F)   |                            | No pitting or corrosion  | AMS-DTL-23053              |
|                   | Copper contact corrosion<br>(16 hours at 150°C/302°F)  |                            | No pitting or blackening of copper   | AMS-DTL-23053              |
|                   | Flammability   |                            | Self-extinguishing in 15 seconds; 3 inches maximum burn length                                       | ASTM D 2671<br>Procedure A |
|                   | Fungus resistance  |                            | No growth  | ASTM G 21                  |
|                   | Water absorption<br>(24 hours at 23°C/73°F)  | percent                    | 1.0 maximum  | ASTM D 570                 |
|                   | Fluid resistance<br>(24 hours at 23°C/73°F) in:<br>JP-8 fuel (MIL-T-83133)<br>Hydraulic fluid (MIL-H-5606)<br>Lubricating oil (MIL-L-7808)<br>Lubricating oil (MIL-L 23699)<br>Salt water (5% salt)<br>Anti-icing fluid (MIL-A-8243) |                            |  | AMS-DTL-23053              |
|                   | Followed by tests for:   |                            |  |                            |
|                   | Tensile strength   | psi ( <i>Mpa</i> )         | 1000 ( <i>6.9</i> ) minimum  | ASTM D 412                 |
|                   | Ultimate elongation  | percent                    | 175 minimum  | ASTM D 412                 |
|                   | Dielectric strength  | volts/mil ( <i>kV/mm</i> ) | 250 ( <i>9.8</i> ) minimum   | ASTM D 2671                |

Note: Consult RW-3030 for specific details about test procedures.

Raychem is a trademark of Tyco Electronics Corporation.

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