

Altera medical-grade, thin wall, flexible,  
fluoropolymer heat-shrinkable tubing

Altera MT3000 heat-shrinkable tubing is tough, flexible tubing with a very thin wall construction. It is especially suitable for applications requiring high temperature performance and resistance to abrasion, cut-through, and a variety of fluids. In polar media, such as aqueous systems and alcohols, property retention and dimensional stability are exceptional.

Altera MT3000 tubing provides electrical insulation and strain relief for components that are exposed to high temperatures - either during operation or during sterilization. With its exceptional flexibility and thin-wall construction, Altera MT3000 tubing is ideal for applications where pliancy coupled with small overall bundle size is desired.

Altera MT3000 tubing may be sterilized by radiation, ethylene oxide, and dry heat with no significant change in properties. It is fabricated from materials that meet the requirements of U.S. Pharmacopeia (USP) Class VI plastics (contact with injectables and body fluids or tissue).

**Temperature rating**

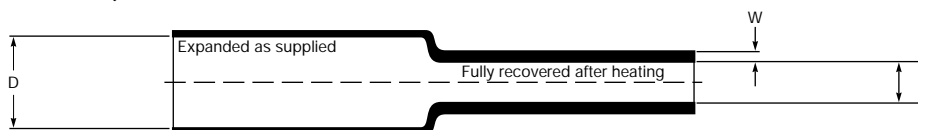
|   |                |
|---|----------------|
| Full recovery temperature:                                      | 150°C          |
| Continuous operating temperature:                               | -55°C to 150°C |
| Recommended maximum temperature for use as a primary insulator: | 135°C          |

**Specifications\***

| Type   | Raychem    | Material     | Master File Number |
|--------|------------|--------------|--------------------|
| MT3000 | MT3000 SCD | USP Class VI | MAF-472            |

\*When ordering, always specify latest issue.

**Dimensions (millimeters/inches)**



| Size    | Inside diameter                     |  | Wall thickness                    |               |
|---------|-------------------------------------|--|-----------------------------------|---------------|
|         | D (min.)<br>Expanded<br>as supplied | d (max.)<br>Recovered after<br>heating | W<br>Recovered after<br>heating** |               |
| 3/64*** | 1.2 0.046                           | 0.6 0.023                              | 0.25 ± 0.05                       | 0.010 ± 0.002 |
| 1/16    | 1.6 0.063                           | 0.8 0.031                              | 0.25 ± 0.05                       | 0.010 ± 0.002 |
| 3/32    | 2.4 0.093                           | 1.2 0.046                              | 0.25 ± 0.05                       | 0.010 ± 0.002 |
| 1/8     | 3.2 0.125                           | 1.6 0.062                              | 0.25 ± 0.05                       | 0.010 ± 0.002 |
| 3/16    | 4.8 0.187                           | 2.4 0.093                              | 0.25 ± 0.05                       | 0.010 ± 0.002 |
| 1/4     | 6.4 0.250                           | 3.2 0.125                              | 0.30 ± 0.05                       | 0.012 ± 0.003 |
| 3/8     | 9.5 0.375                           | 4.8 0.187                              | 0.30 ± 0.05                       | 0.012 ± 0.003 |
| 1/2     | 12.7 0.500                          | 6.4 0.250                              | 0.30 ± 0.05                       | 0.012 ± 0.003 |
| 3/4***  | 19.1 0.750                          | 9.5 0.375                              | 0.43 ± 0.08                       | 0.017 ± 0.003 |
| 1***    | 25.4 1.000                          | 12.7 0.500                             | 0.48 ± 0.08                       | 0.019 ± 0.003 |

\*\*Wall thickness will be less if tubing recovery is restricted during shrinkage. \*\*\*Nonstandard size; available by special order only.

**Ordering information**

|                      |   |                |
|----------------------|---|----------------|
| Colors               | Standard<br>Nonstandard   | Black<br>White |
| Size selection       | Always order the largest size that will shrink snugly over the component being covered.<br>A variety of special order sizes may be made available upon request. |                |
| Standard packaging   | On plastic spools, double-bagged  |                |
| Ordering description | Specify product name, size, and color, for example MT3000 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   | percent                       | +0, -10                         | ASTM D 2671      |
|            | Concentricity as supplied   | percent                       | 70 minimum                      | ASTM D 2671      |
|            | Tensile strength  | psi ( <i>Mpa</i> )            | 4000 (27.6) minimum             | ASTM D 2671      |
|            | Ultimate elongation   | percent                       | 300 minimum                     | ASTM D 2671      |
|            | Secant modulus (recovered)  | psi ( <i>Mpa</i> )            | 50,000 (345) maximum            | ASTM D 2671      |
|            | Heat resistance<br>(336 hours at 225°C/437°F)   |                               |                                 | ASTM D 2671      |
|            | Followed by test for:   |                               |                                 |                  |
|            | Ultimate Elongation   | percent                       | 250 minimum                     | ASTM D 2671      |
| Electrical | Dielectric strength   | volts/mil ( <i>volts/mm</i> ) | 500 (19,680) minimum            | ASTM D 2671      |
|            | Dielectric withstand<br>3000 V, 60 Hz   | seconds                       | 60 minimum                      | ASTM D 2671      |
| Chemical   | Fluid resistance<br>(24 hours at 23°C/73°F) in:<br>Isopropyl Alcohol<br>5% Saline Solution<br>Cidex*† |                               |                                 | ASTM D 2671      |
|            | Followed by tests for:  |                               |                                 |                  |
|            | Dielectric strength   | volts/mil ( <i>volts/mm</i> ) | 400 (15,760) minimum            | ASTM D 2671      |
|            | Tensile strength  | psi ( <i>Mpa</i> )            | 3500 (24.1) minimum             | ASTM D 2671      |
|            | Heavy metals analysis   | ppm                           | 1 maximum (total of all metals) | USP XXII         |
|            | Cadmium   |                               |                                 | Physiochemical   |
|            | Mercury   |                               |                                 | Tests - Plastics |
|            | Lead  |                               |                                 |                  |
|            | Bismuth   |                               |                                 |                  |
|            | Antimony  |                               |                                 |                  |

## Typical performance values

|            | Property              | Unit                          | Performance   | Method of Test |
|------------|-----------------------|-------------------------------|---------------|----------------|
| Electrical | Dielectric strength** | volts/mil ( <i>volts/mm</i> ) |               | ASTM D 2671    |
|            | 0.005" < IWT ≤ 0.010" |                               | 1200 (47,244) |                |
|            | 0.010" < IWT ≤ 0.015" |                               | 1000 (39,370) |                |
|            | 0.015" < IWT ≤ 0.020" |                               | 700 (27,559)  |                |

\*Trademark of Johnson & Johnson Company \*\*IWT = Installed wall thickness.

†Or equivalent dilute glutaraldehyde sterilizing solution.

Note: Consult the MT3000 SCD 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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