

Altera medical-grade, very thin wall, polyolefin heat-shrinkable tubing

Altera MT2000 heat-shrinkable tubing is made of a tough, modified polyolefin with a very thin wall construction. It is especially suitable for medical applications requiring lubricity, flexibility, and excellent electrical insulation performance. Altera MT2000 offers a cost-effective alternative to FEP while maintaining performance after gamma sterilization.

Altera MT2000 tubing can provide electrical insulation, mechanical protection, strain relief, color coding, and identification for many medical components and devices.

Altera MT2000A tubing provides an inner layer of adhesive. During installation, the USP Class VI adhesive layer will reflow around the substrate to provide sealing or

blocking against fluids and other bioburden materials.

Altera MT2000 tubing may be sterilized by gamma radiation or ethylene oxide with no significant changes 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**

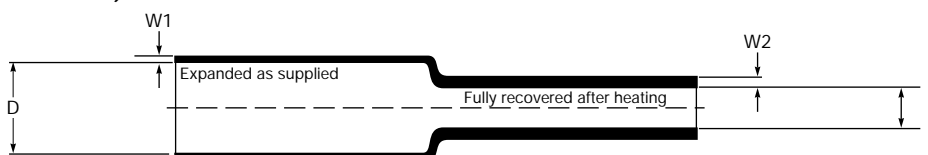
|                                   |                |
|-----------------------------------|----------------|
| Full recovery temperature:        | 140°C          |
| Continuous operating temperature: | -40°C to 105°C |

**Specifications\***

| Type    | Raychem     | Material     | Master File Number |
|---------|-------------|--------------|--------------------|
| MT2000  | MT2000 SCD  | USP Class VI | MAF-727            |
| MT2000A | MT2000A SCD | USP Class VI | MAF-799            |

\*When ordering, always specify latest issue.

**Dimensions (millimeters/inches)**



| Size (mm) | Inside diameter                  |                                     | Wall thickness              |                                 |               |  |
|-----------|----------------------------------|-------------------------------------|-----------------------------|---------------------------------|---------------|--|
|           | D (min.)<br>Expanded as supplied | d (max.)<br>Recovered after heating | W1<br>As supplied (nominal) | W2<br>Recovered after heating** |               |  |
| 1.0       | 1.0 0.040                        | 0.45 0.018                          | 0.12 0.005                  | 0.25 ± 0.05                     | 0.010 ± 0.002 |  |
| 2.0       | 2.0 0.080                        | 0.80 0.032                          | 0.12 0.005                  | 0.25 ± 0.05                     | 0.010 ± 0.002 |  |
| 3.0       | 3.0 0.120                        | 1.20 0.048                          | 0.12 0.005                  | 0.25 ± 0.05                     | 0.010 ± 0.002 |  |
| 6.0       | 6.0 0.240                        | 2.40 0.096                          | 0.12 0.005                  | 0.25 ± 0.05                     | 0.010 ± 0.002 |  |
| 10.0      | 10.0 0.400                       | 4.00 0.160                          | 0.15 0.006                  | 0.36 ± 0.05                     | 0.014 ± 0.002 |  |

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

**Ordering information**

|                      |                                                                                                                                                                               |
|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Colors               | <b>Standard</b> Black, clear<br><b>Nonstandard</b> White, red, yellow, blue, orange                                                                                           |
| 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 plastic spools, double-bagged                                                                                                                                              |
| Ordering description | Specify product name, size, and color; for example, MT2000-3.0-0 (0=Black).<br>Specify MT2000A for adhesive-lined constructions in sizes 3.0 and larger only (special order). |

## 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                                                                    | 60 minimum                                   | ASTM D 2671                     |                                               |
|            | Tensile strength                                                                                      | psi ( <i>Mpa</i> )                                                         | 3000 ( <i>20.7</i> ) minimum                 | ASTM D 2671                     |                                               |
|            | Ultimate elongation                                                                                   | percent                                                                    | 200 minimum                                  | ASTM D 2671                     |                                               |
|            | Secant modulus (expanded)                                                                             | psi ( <i>Mpa</i> )                                                         | 5.0 X 10 <sup>4</sup> ( <i>344</i> ) minimum | ASTM D 2671                     |                                               |
|            | Heat resistance<br>(168 hours at 125°C/257°F)                                                         |                                                                            |                                              | ASTM D 2671                     |                                               |
|            | Followed by test for:                                                                                 |                                                                            |                                              |                                 |                                               |
|            | Ultimate Elongation                                                                                   | percent                                                                    | 200 minimum                                  | ASTM D 2671                     |                                               |
| Electrical | Dielectric strength                                                                                   | volts/mil ( <i>volts/mm</i> )                                              | 1000 ( <i>39,360</i> ) 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> )                | 1000 ( <i>39,360</i> ) minimum  | ASTM D 2671                                   |
|            |                                                                                                       | Tensile strength                                                           | psi ( <i>Mpa</i> )                           | 3000 ( <i>20.7</i> ) minimum    | ASTM D 2671                                   |
|            |                                                                                                       | Heavy metals analysis<br>Cadmium<br>Mercury<br>Lead<br>Bismuth<br>Antimony | ppm                                          | 1 maximum (total of all metals) | USP XXII<br>Physiochemical<br>Test - Plastics |

## Typical performance values

|                                         | Property                      | Unit | Performance | Method of Test |
|-----------------------------------------|-------------------------------|------|-------------|----------------|
| Adhesive Properties<br>(MT2000A only)** | Ring and ball softening point | °C   | 121 ± 5     | ASTM E 28      |
|                                         | Adhesion to:                  |      |             |                |
|                                         | Polypropylene                 |      | Poor        |                |
|                                         | HDPE                          |      | Fair        |                |
|                                         | Polyurethane                  |      | Good        |                |
|                                         | PVC                           |      | Good        |                |
|                                         | Steel                         |      | Excellent   |                |

\*Trademark of Johnson & Johnson Company \*\*Not recommended for use on Teflon or silicone substrates.

†Or equivalent dilute glutaraldehyde sterilizing solution.

Note: Consult the MT2000 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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