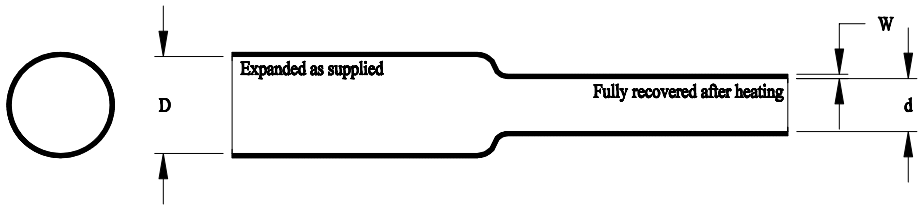
# Altera™
# MT3000
# Flexible, Modified Fluoropolymer, Heat - Shrinkable Tubing




This specification covers the requirements for one type of single wall, flexible, electrical insulating, extruded tubing whose diameter will reduce to a predetermined size upon application of heat in excess of 150° C (302° F).

The tubing is fabricated from modified fluoropolymer crosslinked by irradiation. It shall be homogenous and essentially free from flaws, defects, pinholes, seams, cracks or inclusions.

The tubing is fabricated from materials which meet the requirements of U.S. Pharmacopeia Class VI Plastics. Color shall be black unless otherwise specified.

**Table 1: Dimensions**

| Size | As Supplied | | Recovered | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Inside Diameter Minimum (D) | | Inside Diameter Maximum (d) | | Wall Thickness(Inches, *Millimeters)* (W) | | | | | |
| | in. | *mm.* | in. | *mm.* | Minimum | | Maximum | | Nominal | |
| 3/64 | .046 | *1.17* | .023 | *0.58* | .008 | *0.20* | 0.12 | *0.31* | .010 | *0.25* |
| 1/16 | .063 | *1.60* | .031 | *0.79* | .008 | *0.20* | 0.12 | *0.31* | .010 | *0.25* |
| 3/32 | .093 | *2.36* | .046 | *1.17* | .008 | *0.20* | 0.12 | *0.31* | .010 | *0.25* |
| 1/8 | .125 | *3.18* | .062 | *1.58* | .008 | *0.20* | 0.12 | *0.31* | .010 | *0.25* |
| 3/16 | .187 | *4.75* | .093 | *2.36* | .008 | *0.20* | 0.12 | *0.31* | .010 | *0.25* |
| 1/4 | .250 | *6.35* | .125 | *3.18* | .009 | *0.28* | 0.15 | *0.38* | .012 | *0.33* |
| 3/8 | .375 | *9.53* | .187 | *4.75* | .009 | *0.28* | 0.15 | *0.38* | .012 | *0.33* |
| 1/2 | .500 | *12.70* | .250 | *6.35* | .009 | *0.28* | 0.15 | *0.38* | .012 | *0.33* |
| 3/4 | .750 | *19.05* | .375 | *9.53* | .014 | *0.36* | 0.20 | *0.51* | .017 | *0.43* |
| 1 | 1.000 | *25.40* | .500 | *12.70* | .016 | *0.41* | 0.22 | *0.56* | .019 | *0.48* |

**Table 2: Properties**

| Properties | Unit | Requirement | Test Method |
|---|---|---|---|
| **Physical**<br>* Dimensions | Inches *(mm)* | In accordance with Table 1 | |
| * Longitudinal Change | Percent | +0, -10 | ASTM D 2671 |
| * Concentricity as supplied | Percent | 70 minimum | |
| * Tensile Strength | PSI *(MPa)* | 4000 minimum *(27.6)* | ASTM D 2671, |
| * Ultimate Elongation | Percent | 300 minimum | 20" minute |
| * Secant Modulus (Recovered) | PSI *(MPa)* | 50,000 maximum *(345)* | ASTM D 2671 |
| Heat Resistance<br>336 hours at 225°C (437°F)<br>Followed by test for: | | | ASTM D 2671,<br>20"/minute |
| Ultimate Elongation | Percent | 250 minimum | |
| **Electrical**<br>Dielectric Strength | Volts/mil<br>*(volts/mm)* | 500 minimum *(19,680)* | ASTM D 2671 |
| Dielectric Withstand<br>3000V, 60 Hz | sec | 60 minimum | ASTM D 2671 |
| **Chemical**<br>Fluid Resistance<br>24 hours at 23 ± 3°C *(77 ± 5°F)*<br>Isopropyl Alcohol<br>5% Saline Solution<br>Cidex **<br>Followed by tests for: | | | ASTM D 2671 |
| Dielectric Strength | Volts/mil<br>*(volts/mm)* | 400 minimum *(15,760)* | ASTM D 2671 |
| Tensile Strength | PSI *(MPa)* | 3500 minimum *(24.1)* | ASTM D 2671 |
| Heavy Metal Analysis<br>Cadmium<br>Mercury<br>Lead<br>Bismuth<br>Antimony | ppm | 1 maximum<br>(total of all metals) | USP XXII<br>Physicochemical<br>Tests-Plastics<br><br>(Note 1) |

* Denotes lot acceptance test
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**Note 1:** Sample preparation and extraction is per USP XXII. Metals analysis may be colorimetric as described in USP XXII or by equivalent quantitative analytical method.