

# Introducing HT-200

HT-200 heat-shrinkable tubing is a very flexible, highly flame-resistant, high-clarity, high-temperature, chemical-resistant tubing made from a fluoropolymer material. It provides very-thin-wall insulation and strain relief of multipin connectors, solder joints and other delicate electrical connections and terminations. It is well-suited for applications that require dense packing of components or visual inspection of covered components such as downhole sensors. It is especially suitable for applications requiring superior chemical and solvent resistance. Its high temperature performance meets or exceeds military and industrial standards. HT-200 meets NASA outgassing requirements making it suitable for use in space applications such as satellites.

## KEY FEATURES

- 2:1 shrink ratio for all standard sizes
- Tough, very flexible, very-thin-wall insulation
- High flame-resistance meeting the requirements of AMS-DTL-23053, Test C, and ASTM D2671, Procedure C.
- High temperature performance that meets or exceeds military and industrial standards
- Protection from most industrial solvents, fuels, and chemicals
- Meets NASA outgassing requirements

## APPLICATIONS

- Downhole oil and gas exploration tools
- Military and commercial aircraft
- Satellites
- Automotive engines
- Industrial equipment
- Battery covers

## ELECTRICAL

- Provides excellent electrical insulation
- Not recommended for use as a primary insulator at temperatures exceeding 135°C [275°F]

## MECHANICAL

- Tough fluoropolymer material provides abrasion and cut-through resistance
- Provides strain relief when installed on delicate electrical connections and terminations

## TEMPERATURE RATING

- Full recovery temperature: 130°C [266°F]
- Operating temperature range: -70°C to 200°C [-94°F to 392°F]

## STANDARDS AND SPECIFICATIONS

- RW-1200
- SAE-AMS-DTL-23053/18, Class 3

## ORDERING INFORMATION

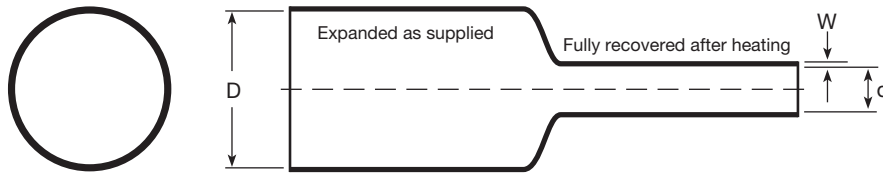
- Color: Clear (-X) Standard; other colors available on request
- Standard packaging: On spools (-SP), varying lengths (consult TE for details)
- Ordering description: Specify product name, size, color and packaging; for example, HT-200-3/16-X-SP.

**SAMPLES NOW AVAILABLE**

[te.com/products/HT-200](https://te.com/products/HT-200)



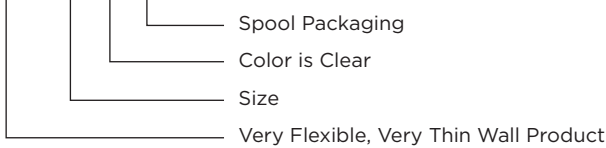
**HT-200 DIMENSIONS**



| Size | Minimum Expanded I.D. (D) |       | Maximum Recovered I.D. (d) |       | Nominal Recovered Jacket Wall (W) |            |
|------|---------------------------|-------|----------------------------|-------|-----------------------------------|------------|
|      | in.                       | mm.   | in.                        | mm.   | in.                               | mm.        |
| 3/64 | .046                      | 1.17  | .023                       | .58   | .010 ± .002                       | .25 ± .051 |
| 1/16 | .063                      | 1.60  | .031                       | .79   | .010 ± .002                       | .25 ± .051 |
| 3/32 | .093                      | 2.36  | .046                       | 1.17  | .010 ± .002                       | .25 ± .051 |
| 1/8  | .125                      | 3.18  | .062                       | 1.58  | .010 ± .002                       | .25 ± .051 |
| 3/16 | .187                      | 4.75  | .093                       | 2.36  | .010 ± .002                       | .25 ± .051 |
| 1/4  | .250                      | 6.35  | .125                       | 3.18  | .012 ± .003                       | .30 ± .076 |
| 3/8  | .375                      | 9.53  | .187                       | 4.75  | .012 ± .003                       | .30 ± .076 |
| 1/2  | .500                      | 12.70 | .250                       | 6.35  | .012 ± .003                       | .30 ± .076 |
| 3/4  | .750                      | 19.05 | .375                       | 9.53  | .017 ± .003                       | .43 ± .076 |
| 1    | 1.000                     | 25.40 | .500                       | 12.70 | .019 ± .003                       | .48 ± .076 |

**HT-200 ORDERING DESCRIPTION**

**HT-200-3/8-X-SP**



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## PRODUCT OFFERING

| Material Description | Material Number |
|----------------------|-----------------|
| HT-200-3/64-X-SP     | CV4354-000      |
| HT-200-1/16-X-SP     | CV4355-000      |
| HT-200-3/32-X-SP     | CV4356-000      |
| HT-200-1/8-X-SP      | CV4357-000      |
| HT-200-3/16-X-SP     | CV4358-000      |

| Material Description | Material Number |
|----------------------|-----------------|
| HT-200-1/4-X-SP      | CV4359-000      |
| HT-200-3/8-X-SP      | CV4360-000      |
| HT-200-1/2-X-SP      | CV4361-000      |
| HT-200-3/4-X-SP      | CV4362-000      |
| HT-200-1-X-SP        | CV4363-000      |

## SAMPLE INVENTORY

|                  |
|------------------|
| HT-200-3/64-X-SP |
| HT-200-1/16-X-SP |
| HT-200-3/32-X-SP |
| HT-200-1/8-X-SP  |
| HT-200-3/16-X-SP |
| HT-200-1/4-X-SP  |
| HT-200-3/8-X-SP  |
| HT-200-1/2-X-SP  |
| HT-200-3/4-X-SP  |
| HT-200-1-X-SP    |

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**PROPERTY REQUIREMENTS**

| Property   | Unit                 | Requirement   | Test Method  |
|--|----------------------|---|--|
| <b>PHYSICAL</b>  |                      |   |  |
| Dimensions   | Inch (mm)            | As shown on HT-200 Dimensions table +0, -10 maximum         | ASTM D2671 <sup>NOTE 1</sup>   |
| Longitudinal Change  | Percent              |   |  |
| Tensile Strength   | psi (MPa)            | 1500 (10.3) minimum   | RW-1200, Section 4.3.1   |
| Ultimate Elongation  | Percent              | 250 minimum   | ASTM D2671   |
| Concentricity (Expanded)   | Percent              | 70 minimum  | ASTM D2671   |
| Secant Modulus (Expanded)  | psi (MPa)            | 2.5 x 10 <sup>4</sup> (172) maximum                         | ASTM D2671   |
| Specific Gravity   |                      | 2.0 maximum   | ASTM D2671   |
| Low Temperature Flexibility<br>4 hours at -70°C ± 2°C (-94 ± 4°F)  |                      | No cracking   | AMS-DTL-23053, Paragraph 4.6.7.1                                       |
| Heat Shock<br>4 hours at 300 ± 3°C (482 ± 5°F)   |                      | No dripping, flowing or cracking                            | RW-1200, Table 2<br>ASTM D2671   |
| Heat Resistance<br>168 hours at 250 ± 3°C (437 ± 5°F)<br>Followed by tests for:<br>Tensile Strength<br>Ultimate elongation   | psi (MPa)<br>Percent | 1200 (8.3) minimum<br>200 minimum                           | AMS-DTL-23053, Paragraph 4.6.9<br>RW-1200, Section 4.3.1<br>ASTM D2671 |
| Vacuum Outgassing<br>TML (Total Mass Loss)<br>VCM (Volatile Condensable Material)  | Percent<br>Percent   | 1.0 maximum<br>0.1 maximum                                  | NASA SP-R-0022A  |
| Clarity Stability<br>24 hours at 200 ± 3°C (392 ± 5°F)   |                      | Marking legible through tubing wall (Clear only)            | AMS-DTL-23053  |
| <b>ELECTRICAL</b>  |                      |   |  |
| Dielectric Strength  | Volts/mil (V/mm)     | 500 (19,700) minimum  | ASTM D2671 <sup>NOTE 2</sup>   |
| Volume Resistivity   | Ohm-cm               | 1 X 10 <sup>13</sup> minimum                                | ASTM D2671   |
| <b>CHEMICAL</b>  |                      |   |  |
| Copper Mirror Corrosion<br>16 hours at 175 ± 2°C (347 ± 4°F)   |                      | Non-corrosive   | ASTM D2671, Procedure A  |
| Flammability   |                      | Self extinguishing within 15 seconds, 25% maximum flag burn | ASTM D2671, Procedure C  |
| Fungus Resistance  |                      | Rating of 0   | ASTM G21   |
| Water Absorption<br>24 hours at 23 ± 3°C (73 ± 5°F)  | Percent              | 0.1 maximum   | ASTM D2671   |
| Fluid Resistance<br>24 hours at 24 ± 3°C (75 ± 5°F)<br>JP-8 Fuel (MIL-DTL-83133)<br>Hydraulic Fluid (MIL-PRF-5606)<br>Lubricating Oil (MIL-PRF-23699)<br>Lubricating Oil (MIL-PRF-7808)<br>SKYDROL 500 Hydraulic Fluid<br>Salt Water (5% NaCl, A-A-694)<br>De-icing Fluid (AMS 1424)<br>Water<br>Followed by tests for:<br>Tensile Strength<br>Ultimate Elongation | psi (MPa)<br>Percent | 1200 (8.3) minimum<br>250                                   | AMS-DTL-23053, Paragraph 4.6.11<br>ASTM D2671                          |

NOTE 1: Condition the specimens for 3 minutes at 200 ± 3°C (392 ± 5°F) and cool to room temperature before final measurements.

NOTE 2: Recover the specimen on the metal mandrels for 10 minutes, minimum, at 175 ± 2°C (347 ± 4°F) or until the tubing is completely shrunk on the mandrels.

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