

# 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**



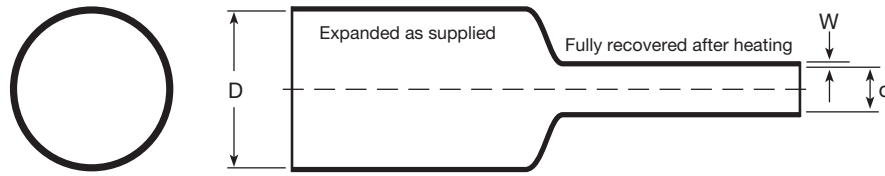
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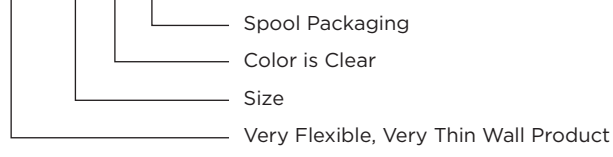
**HT-200 DIMENSIONS**



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**



**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



## 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 4 hours at -70°C ± 2°C (-94 ± 4°F)		No cracking	AMS-DTL-23053, Paragraph 4.6.7.1
Heat Shock 4 hours at 300 ± 3°C (482 ± 5°F)		No dripping, flowing or cracking	RW-1200, Table 2 ASTM D2671
Heat Resistance 168 hours at 250 ± 3°C (437 ± 5°F) Followed by tests for: Tensile Strength Ultimate elongation	psi (MPa) Percent	1200 (8.3) minimum 200 minimum	AMS-DTL-23053, Paragraph 4.6.9 RW-1200, Section 4.3.1 ASTM D2671
Vacuum Outgassing TML (Total Mass Loss) VCM (Volatile Condensable Material)	Percent Percent	1.0 maximum 0.1 maximum	NASA SP-R-0022A
Clarity Stability 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 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 24 hours at 23 ± 3°C (73 ± 5°F)	Percent	0.1 maximum	ASTM D2671
Fluid Resistance 24 hours at 24 ± 3°C (75 ± 5°F) JP-8 Fuel (MIL-DTL-83133) Hydraulic Fluid (MIL-PRF-5606) Lubricating Oil (MIL-PRF-23699) Lubricating Oil (MIL-PRF-7808) SKYDROL 500 Hydraulic Fluid Salt Water (5% NaCl, A-A-694) De-icing Fluid (AMS 1424) Water Followed by tests for: Tensile Strength Ultimate Elongation	psi (MPa) Percent	1200 (8.3) minimum 250	AMS-DTL-23053, Paragraph 4.6.11 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.

