

RNF-150

**High-Performance,
Flame-Resistant, Flexible,
Fluoropolymer Tubing**

Product Facts

- 2:1 shrink ratio
- Approximately 40 percent thinner walls than most general purpose polyolefin tubings
- High flame-resistance
- Excellent physical and electrical properties after exposure to many chemicals and solvents at 50°C [122°F] (but not recommended for use in direct contact with ketones)
- Recommended maximum temperature for use as a primary insulator: 135°C [275°F]
- RoHS compliant



Applications

Can be used for jacketing and bundling of wires to form light-duty harnesses, especially where a low profile, abrasion resistance, and flexibility are needed. Can also be used to provide insulation and strain relief of electrical connections and wire terminations, identification of wires, and packaging of components.


Installation

Minimum shrink temperature: 110°C [230°F]
Minimum full recovery temperature: 150°C [302°F]

Operating Temperature Range

-55°C to 150°C
[-67°F to 302°F]

Specifications/Approvals

Series	UL 	Military	Raychem
RNF-150	E35586 VW-1 600 V, 150°C	AMS-DTL-23053/18*, Class 2	RT-370

*Formerly MIL-I-23053/18 and MIL-DTL-23053/18.

Available in:	Americas	Europe	Asia Pacific
	■	■	■

RNF-150 (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness**
	Minimum Expanded as Supplied	Maximum Recovered After Heating	After 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 ± 0.08 [0.012 ± 0.003]
3/8	9.5 [0.375]	4.8 [0.187]	0.30 ± 0.08 [0.012 ± 0.003]
1/2	12.7 [0.500]	6.4 [0.250]	0.30 ± 0.08 [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.

Ordering Information

Color	Standard	Black (-0)
	Nonstandard	White (-9)
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Special order sizes are available upon request.	
Standard packaging	On spools.	
Ordering description***	Specify product name, size and color (for example, RNF-150 1/4-0).	

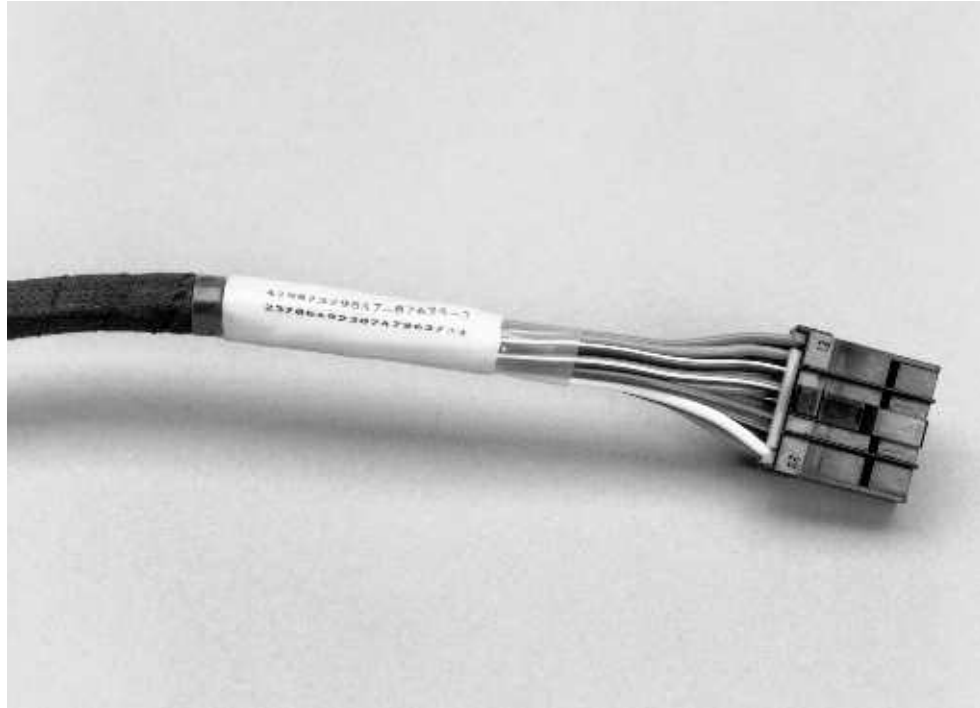
***Europe only. For supply to MIL, Def Stan and BS add -MS, -DS or -BS to ordering description.

RT-375

Clear, Flame-Resistant, Flexible, Fluoropolymer Tubing

Product Facts

- 2:1 shrink ratio
- Exceptional clarity and clarity stability
- Toughness, chemical resistance, and high-temperature performance
- High flame-resistance
- Approximately 40 percent thinner walls than most general purpose polyolefin tubings
- Recommended maximum temperature for use as a primary insulator: 135°C [275°F]
- RoHS compliant



Applications

Protects wire and cable markers subject to extreme abuse, while permitting full inspectability of each item covered. Provides bundling and jacketing of wires and cables, protecting them from mechanical and chemical abuse. Protects electronic components while permitting their identification and inspection.



Installation

Minimum shrink temperature: 125°C [257°F]
 Minimum full recovery temperature: 150°C [302°F]

Operating Temperature Range

-55°C to 150°C
 [-67°F to 302°F]

Specifications/Approvals

Series	UL 	CSA 	Military	Raychem
RT-375	E35586 VW-1 600 V, 150°C	LR31929 VW-1 600 V, 150°C	AMS-DTL-23053/18*, Class 2	RT-375

*Formerly MIL-I-23053/18 and MIL-DTL-23053/18.

Available in:	Americas	Europe	Asia Pacific
	■	■	■

RT-375 (Continued)

Product Dimensions

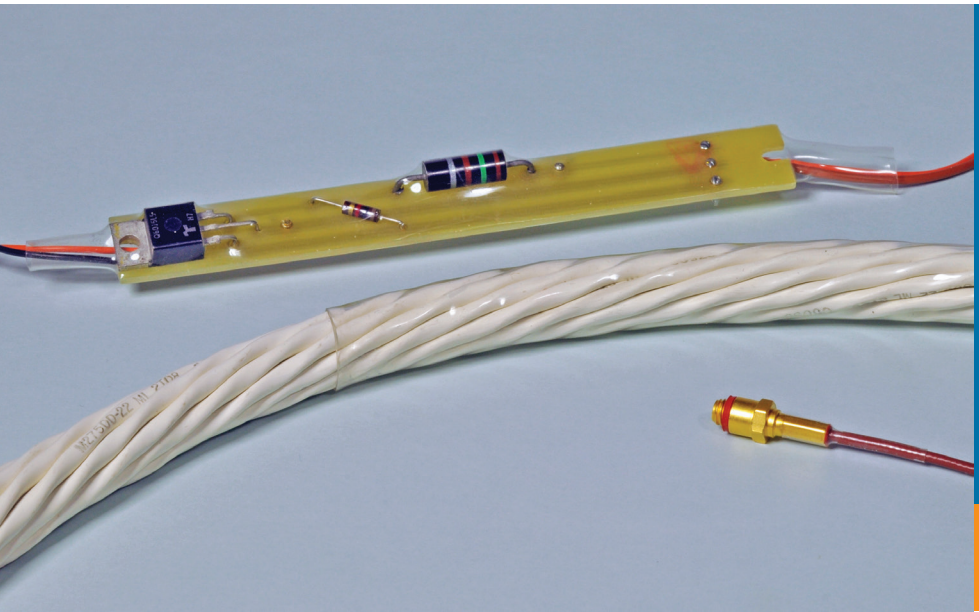
Size	Inside Diameter		Recovered Wall Thickness**
	Minimum Expanded as Supplied	Maximum Recovered After Heating	After Heating
3/64	1.2 [0.046]	0.6 [0.023]	0.25 ± 0.05 [0.010 ± 0.002]
1/16	1.6 [0.063]	0.8 [0.031]	0.25 ± 0.05 [0.010 ± 0.002]
3/32	2.4 [0.093]	1.2 [0.046]	0.25 ± 0.05 [0.010 ± 0.002]
1/8	3.2 [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 ± 0.08 [0.012 ± 0.003]
3/8	9.5 [0.375]	4.8 [0.187]	0.30 ± 0.08 [0.012 ± 0.003]
1/2	12.7 [0.500]	6.4 [0.250]	0.30 ± 0.08 [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.

Ordering Information

Color	Standard	Clear (-X)
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Special order sizes are available upon request.	
Standard packaging	On spools.	
Ordering description***	Specify product name, size and color (for example, RT-375 1/4-X).	

***Europe only. For supply to MIL, Def Stan and BS add -MS, -DS or -BS to ordering description.



HT-200 HIGH TEMPERATURE HEAT SHRINK TUBING

HT-200 heat-shrinkable tubing is a very flexible, highly flame-resistant, high-clarity, high-temperature, chemical-resistant tubing made from a fluoropolymer material. This Raychem tubing 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 ASTM D2671, Procedure C.
- High temperature performance that meets or exceeds military and industrial standards
- Low recovery temperature helps protect temperature-sensitive substrates
- 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

HT-200 High Temperature Heat Shrink Tubing

Quick Reference Guide

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)

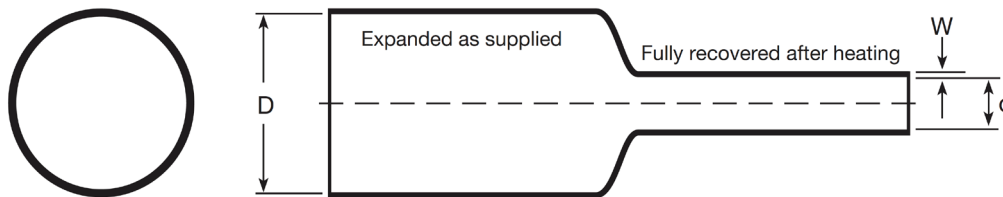
STANDARDS AND SPECIFICATIONS

- RW-1200
- SAE AS23053/18 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.

HT-200 DIMENSIONS



Size	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 High Temperature Heat Shrink Tubing

Quick Reference Guide

PROPERTY REQUIREMENTS

Property	Unit	Requirement	Test Method
PHYSICAL			
Dimensions	Inch (mm)	As shown on HT-200 Dimensions table	ASTM D2671 ^{NOTE 1}
Longitudinal Change	Percent	+0, -10 maximum	
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 ⁴ (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
ELECTRICAL			
Dielectric Strength	Volts/mil (V/mm)	500 (19,700) minimum	ASTM D2671 ^{NOTE 2}
Volume Resistivity	Ohm-cm	1 X 10 ¹³ minimum	ASTM D2671
CHEMICAL			
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.

HT-200 High Temperature Heat Shrink Tubing

Quick Reference Guide

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

NOTE : Samples of each part number in these tables are available from inventory.

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