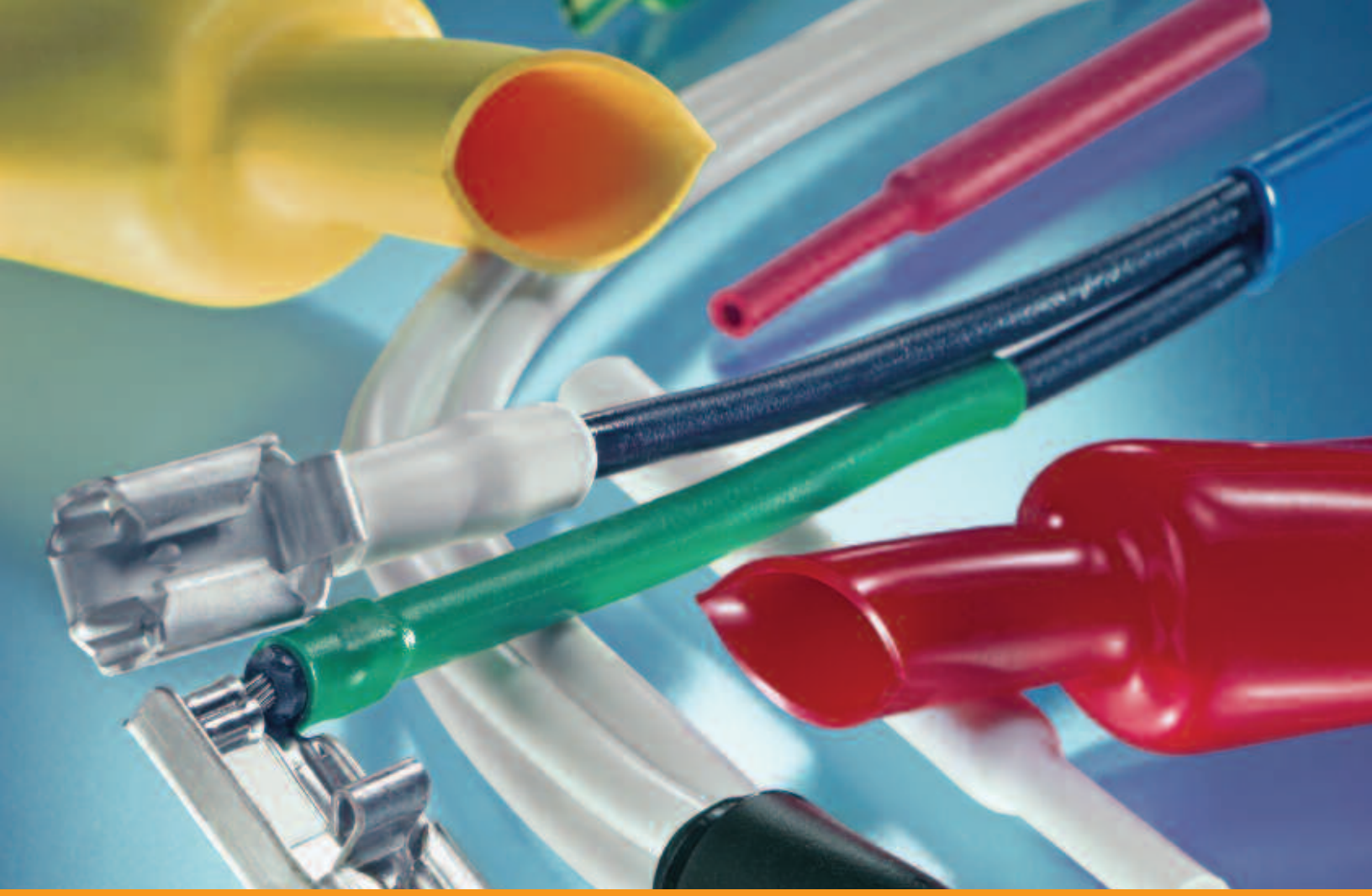

RAYCHEM Tubing Products

TE connectivity

Restriction on the use of Hazardous Substances (RoHS)

At TE Connectivity (TE), we're ready to support your RoHS requirements. We've assessed more than 1.5 million end items/components for RoHS compliance, and issued new part numbers where any change was required to eliminate the restricted materials.

Part numbers in this catalog are RoHS Compliant, unless marked otherwise. These products comply with European Union Directive 2002/95/EC, as amended 1 January 2006, that restricts the use of lead, mercury, cadmium, hexavalent chromium, PBB, and PBDE in certain electrical and electronic products sold into the EU as of 1 July 2006.

Note: For purposes of this Catalog, included within the definition of RoHS Compliant are products that are clearly "Out of Scope" of the RoHS Directive such as hand tools and other non-electrical accessories. Information regarding RoHS compliance is provided based on reasonable inquiry of our suppliers and represents our current actual knowledge based on the information provided by our suppliers. This information is subject to change. For latest compliance status, refer to our website referenced at right.

Getting the Information You Need

Our comprehensive on-line RoHS Customer Support Center provides a forum to answer your questions and support your RoHS needs. A RoHS FAQ (Frequently Asked Questions) is available with links to more detailed information. You can also submit RoHS questions and receive a response within 24 hours during a normal work week. The Support Center also provides:

- Cross-Reference from Non-compliant to Compliant Products
- Ability to browse RoHS Compliant Products in our on-line catalog
- Downloadable Technical Data
- Customer Information Presentation
- More detailed information regarding the definitions used above

So whatever your questions when it comes to RoHS, we have the answers at **www.tycoelectronics.com/leadfree**

RoHS Customer Support Center

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Overview

TE Connectivity's (TE) Raychem brand of tubing was developed when our scientists pioneered the application of radiation crosslinking and the development of heat-shrinkable polymer products. Today TE is recognized worldwide for its expertise in these areas.

The Raychem brand of tubings are made of polyolefins, fluoropolymers, and elastomers enhanced by radiation crosslinking and heat-shrinkability. When heated during installation, our tubings shrink to conform to virtually any shape. They provide dependable insulation, mechanical protection, and strain relief, as well as aesthetic appeal.

Single wall tubings are available in thin-wall, medium-wall, and thick-wall versions. With dual wall tubings, an inner wall — either an encapsulant or an adhesive — melts and flows during installation heating, to protect against environmental damage. Encapsulants protect connections and components from splashes and corrosion. Adhesives go a step further, sealing to plastic, metal, rubber, or other substrates.

You can choose from tubings that are highly flexible or semirigid, designed for operation in high- or low-temperature environments, halogen-free and flame-retardant to meet a range of industry standards.

Available in many sizes, constructions, lengths, and colors to meet commercial, military or medical specifications, our tubings can also be customized for special applications.

Installation is fast and easy with handheld heating tools or bench-mounted heaters. A range of automatic and semi-automatic installation equipment is available for high-volume applications.

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Tubing Categories

	Type	Product Name			
Single Wall	Very Flexible	LSTT Versafit	Versafit V2 Versafit V4	Versafit 3X	
	Flexible	BRST CGPE-105 CGPT	DCPT RNF-100 RNF-3000	RP-4800 TUGA	
	Semirigid	CRN	RT-3		
Dual Wall	Semi-flexible	ATUM	DWP-125	HTAT	
	Flexible	CGAT DWTC	PTCM RPPM	TAT-125	
	Semirigid	DSPL ES1000	ES2000 FL2500	SCL SCT	
Heavy Duty		BSTS/BSTS-FR HF	HRHT HRHF/HRNF/HRSR RMW	RHW SST/SST-FR URHT	
Special Purpose	Elastomers	DR-25 NT NT-MIL NTFR	RW-200 RW-200-E SFR SRFR		
	Fluoropolymers	RNF-150 RT-375	RT555 RW-175	TFE and TFER	
	MicroFit	MFT-MT1000	MFT-MT2000		
	Caps	ES Caps PD Caps	TC Caps		
	Conduit	HCTE			
	Kits	RayBlock 85 RayBlock 105	RaySpool Tubing Kits and Mini-Spools		
	Low toxicity	XFFR ZH-100	ZH2 ZH4	ZHTM	
	Edging material	Rayrim			
	Fiber and fabric	HFT5000			
	Braid	Versaflex			
Medical-grade		MFT-MT1000 MFT-MT2000	MT1000 MT2000 MT3000	MT5000 MT6000	MT-FEP MT-LWA

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Tubing Selection Guide

		PRODUCT	Polyolefin	Fluoropolymer	Elastomer	Operating Temperature °C / [°F]		Min. shrink temperature (°C)	Min. full recovery temperature (°C)	Shrink ratio
Single Wall	Very flexible	LSTT	•			-40 to 125	[-40 to 257]	65	110	2:1
		Versafit	•			-55 to 135	[-67 to 275]	70	90	2:1
		Versafit-3X	•			-55 to 135	[-67 to 275]	70	90	3:1
		Versafit V2	•			-30 to 125	[-22 to 257]	70	90	2:1
		Versafit V4	•			-30 to 125	[-22 to 257]	70	90	2:1
	Flexible	BRST	•			-40 to 120	[-40 to 248]	95	130	2:1
		CGPE-105	•			-70 to 105	[-94 to 221]	85	110	2:1
		CGPT	•			-40 to 135	[-40 to 275]	80	120	2:1
		DCPT	•			-55 to 135	[-67 to 275]	95	120	2:1
		RNF-100	•			-55 to 135	[-67 to 275]	95	121	2:1
		RNF-3000	•			-55 to 135	[-67 to 275]	80	120	3:1
		RP-4800	•			-55 to 135	[-67 to 275]	95	121	4:1
		TUGA	•			-55 to 125	[-67 to 257]	85	110	2:1
	Semirigid	CRN	•			-55 to 135	[-67 to 275]	110	135	2:1
		RT-3	•			-55 to 135	[-67 to 275]	110	135	2.5:1
Dual wall [adhesive-and encapsulant-lined]	Semiflexible	ATUM	•			-55 to 110	[-67 to 230]	80	110	3:1 4:1
		DWP-125	•			-40 to 110	[-40 to 230]	80	125	3:1
		HTAT	•			-55 to 125	[-67 to 257]	80	110	4:1
	Flexible	CGAT	•			-30 to 80	[-22 to 176]	80	115	3:1
		DWTC	•			-55 to 75	[-67 to 167]	60	100	4:1
		PTCM	•			-40 to 85	[-40 to 185]	60	80	6:1
		RPPM	•			-40 to 85	[-40 to 185]	60	80	4:1
		TAT-125	•			-55 to 110	[-67 to 230]	95	121	2:1
	Semirigid	DSPL	•			-40 to 125	[-40 to 257]	110	135	4:1
		ES1000	•			-40 to 130	[-40 to 266]	110	135	4:1
		ES2000	•			-40 to 130	[-40 to 266]	110	135	4:1
		FL2500	•			-40 to 135	[-40 to 275]	110	135	4:1
		SCL	•			-55 to 110	[-67 to 230]	125	135	3:1
		SCT	•			-40 to 150	[-40 to 302]	110	135	4:1
Heavy Duty		BSTS/BSTS-FR	•			-55 to 90	[-67 to 194]	90	121	3:1
		HF	•			-55 to 90	[-67 to 194]	80	121	3:1
		HRHF/HRNF/HRSR	•			-55 to 90	[-67 to 194]	80	121	5.6:1
		RHW	•			-55 to 110	[-67 to 230]	110	125	3:1
		RMW	•			-55 to 110	[-67 to 230]	110	125	3:1
		SST/SST-FR	•			-55 to 90	[-67 to 194]	90	121	3:1
Special Purpose	Elastomers	DR-25			•	-75 to 150	[-103 to 302]	150	175	2:1
		NT			•	-55 to 90	[-67 to 194]	90	135	2:1
		NT-MIL			•	-70 to 121	[-94 to 250]	90	135	2:1
		NTFR			•	-70 to 121	[-94 to 250]	90	135	2:1
		RW-200			•	-40 to 200	[-40 to 392]	100	175	2:1
		RW-200-E			•	-55 to 200	[-67 to 392]	100	175	2:1
		SFR			•	-75 to 180	[-103 to 356]	135	175	1.75:1
		SRFR			•	-75 to 200	[-103 to 392]	135	175	1.5:1
	Fluoropolymers	RNF-150		•		-55 to 150	[-67 to 302]	110	150	2:1
		RT-375		•		-55 to 150	[-67 to 302]	125	150	2:1
		RT555		•		-65 to 200	[-85 to 392]	150	220	2:1
		RW-175		•		-55 to 175	[-67 to 347]	155	175	2:1
		TFE and TFER		•		-67 to 250	[-89 to 482]	330	340	1.8:1/ 3.2:1
	Medical-grade	MT1000		•		-55 to 175	[-67 to 347]	155	175	2:1
		MT2000	•			-40 to 105	[-40 to 221]	110	140	2.5:1
		MT3000		•		-55 to 150	[-67 to 302]	110	150	2:1
		MT5000	•			-70 to 105	[-94 to 221]	90	110	2:1
		MT6000	•			-70 to 90	[-94 to 194]	90	110	4:1
		MT-FEP		•		-70 to 190	[-94 to 374]	190	210	1.6:1
		MT-LWA	•			Same as RNF-100-clear				
	MicroFit	MFT-MT1000		•		-55 to 125	[-67 to 257]	155	175	2.5:1
		MFT-MT2000	•			-40 to 105	[-40 to 221]	110	140	2.5:1
	Caps	ES Caps	•			-40 to 105	[-40 to 221]	100	135	4:1
		PD Caps	•			-55 to 110	[-67 to 230]	125	135	3:1
		TC Caps	•			-55 to 135	[-67 to 275]	110	135	2.5:1

*For specific MIL-Spec information for each product, refer to individual product pages or the Tubing Cross-Reference Guide on page 3-6.
**Sizes 9/3 through 70/21 only. †Clear is not flame-retardant.

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Tubing Selection Guide (Continued)

Size range (inside diameter as supplied)	Colored	Clear	Flame-retardant	UL 224	CSA	VW-1 (UL/CSA)	MIL Spec*	USP Class VI	ABS	UL D486**	DESCRIPTION
1.6 mm to 38 mm	•	•									Non-flame-retardant polyolefin
3/64" to 4"	•		•	•	•	•	•				Highly flame-retardant, multi-spec polyolefin
1/8" to 1"	•		•	•	•	•					3:1 shrink ratio, highly flame-retardant polyolefin
1 mm to 30 mm	•		•	•	•	•					Highly flame-retardant polyolefin
3/64" to 1"	•		•	•	•	•					Very-thin-wall, highly flame-retardant polyolefin
1 mm to 10 mm	•		•	•	•	•					
4 mm to 24 mm	•										2:1 shrink ratio, black, round, flexible tubing
3/64" to 2"	•	•									Brightly colored, general purpose polyolefin
1.6 mm to 38 mm	•	•	•	•	•						General purpose, flame-retardant polyolefin†
3 mm to 38 mm	•		•	•	•						Green and yellow striped polyolefin
3/64" to 5"	•	•	•	•	•		•				High-performance flexible polyolefin†
1.5 mm to 39 mm	•	•	•	•	•						3:1 shrink ratio general-purpose polyolefin†
3/4" to 4 1/2"	•		•	•			•				4:1 shrink ratio polyolefin
1.2 mm to 38 mm	•										Shiny, tough polyolefin
3/64" to 3/4"	•	•	•	•	•		•				Flame-retardant polyolefin†
.240" to .485"	•		•	•	•						Semirigid polyolefin for terminal insulation
3 mm to 40 mm	•	•	•	•			•				3:1 and 4:1 shrink ratio adhesive-lined polyolefin†
4 mm to 52 mm	•		•	•							
1/8" to 1"	•		•	•	•						3:1 shrink ratio adhesive-lined polyolefin
4 mm to 48 mm	•		•								High-temperature adhesive-lined polyolefin
3 mm to 39 mm	•	•	•	•							3:1 shrink ratio commercial-grade adhesive-lined tubing†
4 mm to 16 mm		•									4:1 shrink ratio, clear, dual wall tubing
9 mm		•									Very high shrink ratio, dual wall, flexible polyolefin tubing
4 mm to 16 mm	•	•									Dual wall, moisture-proof polyolefin
1/8" to 1 1/2"	•	•	•	•			•				2:1 adhesive-lined polyolefin†
5.7 mm to 17.5 mm	•	•	•								High shrink ratio, dual wall, moisture proof, semirigid tubing†
.225" to .700"		•		•							Clear high-shrink-ratio adhesive-lined polyolefin
.225" to .700"	•		•	•							Flame-retardant adhesive-lined polyolefin
.300" to .700"	•		•								Fully flame-retardant, adhesive-lined polyolefin
1/8" to 1"	•			•			•				3:1 shrink ratio encapsulant-lined polyolefin
.300" to .700"	•		•								High-temperature adhesive-lined polyolefin
.3" to 4.5"	•	•	•						•		Rugged, general purpose, thick-wall polyolefin†
.4" to 2.7"	•		•						•		Highly flexible, thick-wall polyolefin
.6" to 4"	•		•						•		High-shrink-ratio repair sleeve
12 mm to 390 mm	•									•	Heavy wall adhesive-lined polyolefin
10 mm to 285 mm	•										Medium wall polyolefin
.3" to 4.5"	•		•				•		•		Self-sealing, dual wall polyolefin
1/8" to 3"	•		•				•				Diesel-resistant elastomer
1/8" to 4"	•		•								Flexible general-purpose modified elastomer
1/8" to 4"	•		•				•				Flexible rugged modified elastomer
1/8" to 3"	•		•				•				Very flexible rugged neoprene
1/8" to 2"	•		•				•				High-temperature flexible elastomer
1/8" to 2"	•		•				•				High-temperature flexible elastomer
1/4" to 2"	•		•				•				Very flexible silicone
2.9 mm to 51 mm	•		•	•		•					Very flexible silicone rubber
3/64" to 1"	•		•	•		•	•				High-performance flexible fluoropolymer
3/64" to 1 1/2"	•	•	•	•	•	•	•				Clear high-performance flexible fluoropolymer
1/8" to 2"	•		•	•		•					Fluid- and chemical-resistant fluoropolymer
3/64" to 1 1/2"	•	•	•	•	•	•	•				High-performance fluoropolymer
0.8 mm to 11.9 mm/ 2 mm to 32 mm		•	•				•				High-temperature tubing made of PTFE
1/16" to 1"	•	•						•			Autoclavable semirigid fluoropolymer
1 mm to 10 mm	•	•						•			Lubricious thin-wall polyolefin
1/16" to 1"	•							•			High-temperature flexible fluoropolymer
1/16" to 1"	•	•						•			Flexible polyolefin
1/16" to 1/2"	•	•						•			High expansion ratio polyolefin
.051" to .579"	•	•						•			Heat-shrinkable fluorinated ethylene propylene
		•						•			Heat-shrinkable polyolefin for laser-welding
.014" to .045"	•	•						•			Semirigid medical-grade fluoropolymer microtubing
.014" to .045"	•	•						•			Lubricious medical-grade polyolefin microtubing
.225" to .427"	•	•	•	•							High-ratio, adhesive-lined caps†
1/8" to 1/2"	•			•							Semirigid encapsulant-lined polyolefin caps
1/16" to 1/4"	•		•	•							Semirigid flame-retardant polyolefin caps

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Tubing Selection Guide (Continued)

		PRODUCT	Polyolefin	Fluoropolymer	Elastomer	Operating Temperature °C / [°F]	Min. shrink temperature (°C)	Min. full recovery temperature (°C)	Shrink ratio
Special Purpose (Continued)	Conduit	HCTE		•		-55 to 200 [-67 to 392]	N/A	N/A	N/A
	Kits	RayBlock 85	•			-40 to 85 [-40 to 185]	80	110	4:1
		RayBlock 105	•			-40 to 105 [-40 to 221]	80	110	4:1
		Tubing Kits and Mini-Spools	•			Various; see page 139-140	See page 139-140	See page 139-140	2:1 up to 4:1
	Low Toxicity	XFFR	•			-55 to 105 [-67 to 221]	70	121	3:1
		ZH-100	•			-30 to 105 [-22 to 221]	80	120	2:1
		ZH2	•			-30 to 125 [-22 to 257]	70	90	2:1
		ZH4	•			-30 to 125 [-22 to 257]	70	90	2:1
		ZHTM	•			-30 to 105 [-22 to 221]	80	121	2:1
	Edging Matl	Rayrim	•			-55 to 80 [-67 to 176]	120	150	N/A
	Fiber & Fabric	HFT5000				-40 to 125 [-40 to 257]	80	110	2:1
	Braids	Versaflex				-50 to 150 [-58 to 302]	N/A	N/A	N/A
		Versaflex-FR				-50 to 150 [-58 to 302]	N/A	N/A	N/A

*For specific MIL-Spec information for each product, refer to individual product pages or the Tubing Cross-Reference Guide on page 3-6.
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Tubing Selection Guide (Continued)

DESCRIPTION	Size range (inside diameter as supplied)	Colored	Clear	Flame-retardant	UL 224	CSA	VW-1 (UL/CSA)	MIL Spec*	USP Class VI	ABS	UL D486**	
.187" to 2"		•		•								Modified ETFE, helically convoluted tubing
12 mm to 32 mm		•		•								Heat-shrinkable water blocking system
12 mm to 32 mm		•		•								Heat-shrinkable water blocking system
See page 139-140		•	•	•	•	•	•	•				Smaller packaging options for single wall and adhesive-lined tubing
.4" to 3"		•		•						•		Halogen-free, flame-retardant polyolefin
1/8" to 2"		•		•								Thin-wall, low-fire-hazard polyolefin
0.8 mm to 30 mm		•		•	•	•	•					Highly flame-retardant ZEROHAL polyolefin
0.6 mm to 10 mm		•		•	•	•	•					Very-thin-wall highly flame-retardant ZEROHAL polyolefin
3 mm to 40 mm		•		•								Low toxicity, flexible polyolefin
0.8 mm to 4.5 mm		•										Protective self-adhering edging material
12 mm to 80 mm		•										Heat-shrinkable, fabric tubing
3 mm to 50 mm		•										Expandable, braided polyester sleeving
1/8" to 2"		•		•	•		•					Flame-retardant, expandable polyester sleeving

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Specification Cross-Reference Guide

Product Type	UL File	CSA File	AMS-DTL-23053* Sheet	AMS-DTL-23053* Class	MIL-PRF-46846 Type	MIL-PRF-46846 Class	Raychem Specification	Page No.
ATUM	E85381**		/4	3			RW-2063 & RK-6024	1-1
BRST							RK-6766	1-3
BSTS							RW-2017	1-5
BSTS-FR			/15	1 & 2***			RW-2017	1-5
CGAT	E85381						RW-2050	1-7
CGPE-105							CGPE-105 SCD	1-9
CGPT	E35586	LR31929					RW-2059	1-11
CRN Type 1 (colors)	E35586	LR31929†	/6	1			RT-360, Type 1	1-13
CRN Type 2 (clear)			/6	2			RT-360, Type 2	1-13
DCPT	E35586	LR31929					RW-2056	1-15
DR-25			/16				RT-1116	1-17
DSPL							RK-6755	1-19
DWP-125	E35586	LR31929					DWP-125 SCD	1-21
DWTC							RK-6204	1-23
ES1000	E85381						RT-1113	1-25
ES2000	E85381						RT-1112	1-27
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HCTE							RT-1162	1-33
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HTAT							RW-2052	1-43
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RT-375	E35586 VW-1	LR31929 VW-1	/18	2			RT-375	1-101
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Canada: 1-905-475-6222
Mexico: 52-55-1106-0800
L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

Specification Cross-Reference Guide (Continued)

Product Type	UL File	CSA File	AMS-DTL-23053* Sheet	AMS-DTL-23053* Class	MIL-PRF-46846 Type	MIL-PRF-46846 Class	Raychem Specification	Page No.
TUGA-GP							RW-2201	1-127
URHT							URHT SCD	1-129
Versafit	E35586 VW-1	LR31929 VW-1	/5	1 & 3			RW-3009	1-131
Versafit-3X	E35586 VW-1	LR31929 VW-1					RW-3009	1-133
Versafit V2	E35586 VW-1	LR31929 VW-1					RW-3023	1-135
Versafit V4	E85381 VW-1	LR31929 VW-1					RW-3023	1-137
Versaflex							RK-6772	1-139
Versaflex-FR	E306976 VW-1							1-139
XFFR							RW-2016	1-141
ZH2	E35586 VW-1	LR31929 VW-1					RW-3036	1-143
ZH4	E85381 VW-1	LR31929 VW-1					RW-3036	1-145
ZH-100							RW-2031	1-147
ZHTM							RW-2058	1-149

*Formerly MIL-I-23053 and MIL-DTL-23053 **Black only, except sizes 3/1 and 4/1. ***Sizes 9/3 through 70/21 only.
†Black only †† Overexpanded †††With exception to dimensions and longitudinal change.

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UK: 44-800-267-666

ATUM

High-Shrink-Ratio, Adhesive-Lined Polyolefin Tubing

Product Facts

- 3:1 and 4:1 shrink ratios allow for connector-to-cable sealing
- Tubing environmentally seals and protects components and interconnections
- Medium wall provides increased mechanical protection
- The adhesive in ATUM tubing bonds to a wide variety of plastics, rubbers, and metals, including polyethylene, aluminum, steel, and copper
- RoHS compliant

Applications

Environmentally seals and protects a wide variety of electrical applications, including back end connector sealing, breakouts, and connector-to-cable transitions. High expansion ratio makes it possible to repair most damaged cable jackets without removing connectors.

Installation

Minimum shrink temperature: 80°C [176°F]

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

Operating Temperature Range

-55°C to 110°C
[-67°F to 230°F]

Specifications/Approvals

Series	UL**	Military	Raychem
ATUM	E85381 600V, 110°C	AMS-DTL-23053/4,* Class 3	RW-2063 - Black RK-6024 - Colors and clear

*Formerly MIL-I-23053/4 and MIL-DTL-23053/4. Sizes 3/1, 6/2, 12/4, 24/8, and 40/13 only.
**Black only, except sizes 3/1 and 4/1.

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

ATUM (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness**	
	Minimum Expanded as Supplied	Maximum Recovered After Heating	Total Wall After Heating	Adhesive Wall After Heating (Nominal)
3:1				
3/1	3.0 [0.118]	1.0 [0.039]	1.00 ± 0.28 [0.039 ± 0.010]	0.50 [0.020]
4.5/1.5	4.5 [0.177]	1.5 [0.059]	1.10 ± 0.25 [0.043 ± 0.011]	0.50 [0.020]
6/2	6.0 [0.236]	2.0 [0.079]	1.00 ± 0.28 [0.039 ± 0.010]	0.50 [0.020]
9/3	9.0 [0.354]	3.0 [0.118]	1.40 ± 0.28 [0.055 ± 0.010]	0.61 [0.024]
12/4	12.0 [0.472]	4.0 [0.157]	1.78 ± 0.38 [0.070 ± 0.015]	0.76 [0.030]
19/6	19.0 [0.748]	6.0 [0.236]	2.25 ± 0.55 [0.088 ± 0.022]	0.76 [0.030]
24/8	24.0 [0.940]	8.0 [0.315]	2.54 ± 0.55 [0.100 ± 0.022]	1.02 [0.040]
40/13	40.0 [1.570]	13.0 [0.512]	2.54 ± 0.55 [0.100 ± 0.022]	1.02 [0.040]
4:1				
4/1	4.0 [0.157]	1.0 [0.039]	1.00 ± 0.28 [0.039 ± 0.010]	0.50 [0.020]
8/2	8.0 [0.315]	2.0 [0.079]	1.00 ± 0.28 [0.039 ± 0.010]	0.50 [0.020]
12/3	12.0 [0.472]	3.0 [0.118]	1.40 ± 0.28 [0.055 ± 0.010]	0.61 [0.024]
16/4	16.0 [0.630]	4.0 [0.157]	1.78 ± 0.38 [0.070 ± 0.015]	0.76 [0.030]
24/6	24.0 [0.945]	6.0 [0.236]	2.25 ± 0.55 [0.088 ± 0.022]	0.76 [0.030]
32/8	32.0 [1.260]	8.0 [0.315]	2.54 ± 0.55 [0.100 ± 0.022]	1.02 [0.040]
52/13	52.0 [2.050]	13.0 [0.512]	2.54 ± 0.55 [0.100 ± 0.022]	1.02 [0.040]

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

Ordering Information

Color	Standard	Black (-0)
	Nonstandard	Clear in 3:1 sizes only (-X, non-flame-retardant jacket); other colors available on request.
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***	In 1.2-meter [4-foot] lengths or on spools.	
Ordering description****	Specify product name, size and color (for example, ATUM 8/2-0).	

***Only 1.2 meter [4-foot] lengths are standard in the Americas. ATUM tubing on spools is nonstandard.
****For supply to MIL spec., add -MS to ordering description.

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Japan: 81-44-844-8013
UK: 44-800-267-666

BRST

Simple Specification, Single Wall Polyolefin Tubing

Product Facts

- 2:1 shrink ratio
- Non-flame-retardant
- Quick shrinking
- Satin finish
- RoHS compliant

Applications

Provides excellent electrical insulation. Can be used for noise suppression and where mechanical protection is required.

Installation

Minimum shrink temperature: 95°C [203°F)

Minimum full recovery temperature: 130°C [266°F]

Operating Temperature Range

-40°C to 120°C
[-40°F to 248°F]

Specifications/Approvals

Series	Raychem
BRST	RK-6766

Available in:	Americas	Europe	Asia Pacific
		■	

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China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

BRST (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness**
	Minimum Expanded as Supplied	Maximum Recovered After Heating	After Heating
4/2	4 [0.157]	2 [0.079]	0.4 ± 0.08 [0.016 ± 0.003]
6/3	6 [0.236]	3 [0.118]	0.4 ± 0.08 [0.016 ± 0.003]
10/5	10 [0.394]	5 [0.197]	0.5 ± 0.08 [0.020 ± 0.003]
16/8	16 [0.630]	8 [0.315]	0.75 ± 0.08 [0.030 ± 0.003]
24/12	24 [0.945]	12 [0.472]	0.85 ± 0.08 [0.033 ± 0.003]

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

Ordering Information

Color	Standard Black (-0)
Size selection	Always order the largest size that will shrink snugly over the component to be covered.
Standard packaging	On spools.
Ordering description	Specify product name, size and color (for example, BRST-4/2-0).

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China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

BSTS/BSTS-FR

General Purpose, Heat-Shrinkable Tubing

Product Facts

- **Excellent thick-wall insulation and abrasion protection**
- **No adhesive – can be removed easily**
- **Expansion ratios as high as 3:1**
- **Availability in flame-retardant material with FR callout (see "Ordering information and Part numbering system" on the next page)**
- **BSTS has the following agency approvals:**
  - **ABS (American Bureau of Shipping)**
  - **Lloyd's (Lloyd's Register of Shipping)**
- **RoHS compliant**

Applications

BSTS heat-shrinkable tubing is made of a rugged polymer that resists moisture, fungus, and weathering. It also has excellent electrical properties. This tubing is useful in applications where insulation, abrasion resistance, and strain relief are important. When used with sealant tape (S-1305 for flame-retardant or S-1278 for non-flame-retardant), it can provide a watertight system in nonpressurized applications.

Installation

Minimum shrink temperature: 90°C [194°F]

Minimum full recovery temperature: 121°C [250°F]

Operating Temperature Range

-55°C to 110°C
[-67°F to 230°F]

Specifications/Approvals

Series	Military	Industry	Raychem
BSTS	—	—	RW-2017
BSTS-FR	AMS-DTL-23053/15*, Class 1 and Class 2**	ASTM D 685, nonburning	RW-2017

*Formerly MIL-I-23053/15 and MIL-DTL-23053/15.
**Except for coatings requirement. Refer to SST-FR when coating is required.

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

BSTS/BSTS-FR (Continued)

Product Dimensions

Size	Inside Diameter		Wall Thickness (Nominal)	
	Minimum Expanded as Supplied	Maximum Recovered After Heating	Expanded as Supplied	Recovered After Heating***
BSTS-03	7.62 [0.300]	2.54 [0.100]	0.63 [0.025]	1.78 [0.070]
BSTS-04	10.16 [0.400]	3.81 [0.150]	0.63 [0.025]	1.78 [0.070]
BSTS-07	19.05 [0.750]	5.59 [0.220]	0.76 [0.030]	2.41 [0.095]
BSTS-11	27.94 [1.100]	9.52 [0.375]	1.02 [0.040]	3.05 [0.120]
BSTS-13	33.02 [1.300]	9.52 [0.375]	0.89 [0.035]	3.05 [0.120]
BSTS-15	38.10 [1.500]	12.70 [0.500]	1.27 [0.050]	3.56 [0.140]
BSTS-17	43.18 [1.700]	12.70 [0.500]	1.14 [0.045]	3.56 [0.140]
BSTS-20	50.80 [2.000]	19.05 [0.750]	1.27 [0.050]	3.94 [0.160]
BSTS-27	65.58 [2.700]	22.86 [0.900]	1.27 [0.050]	3.94 [0.160]
BSTS-30	76.20 [3.000]	31.75 [1.250]	1.27 [0.050]	3.94 [0.160]
BSTS-35	88.90 [3.500]	31.75 [1.250]	1.27 [0.050]	3.94 [0.160]
BSTS-40	101.60 [4.000]	44.45 [1.750]	1.27 [0.050]	3.94 [0.160]
BSTS-45	114.30 [4.500]	44.45 [1.750]	1.27 [0.050]	3.94 [0.160]

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

Ordering Information

Color	Standard	Black
	Nonstandard	White, Yellow, Red and Clear (Clear is non-flame retardant)
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	1.2-meter [4-foot] or 7.5-meter [25-foot] lengths.	
Ordering description	See below.	

Part Numbering System

BSTS - _ x _ _ / _ / _

- **"NM"** - no mark
- **Color**
  - Black / leave blank (standard)
  - White / WHT
  - Red / RED
  - Clear / CL
- **"FR"** - flame-retardant
- **Length** in feet (4 and 25 feet standard)
- **Size**
- **Family**

Example: BSTS-11X4/NM

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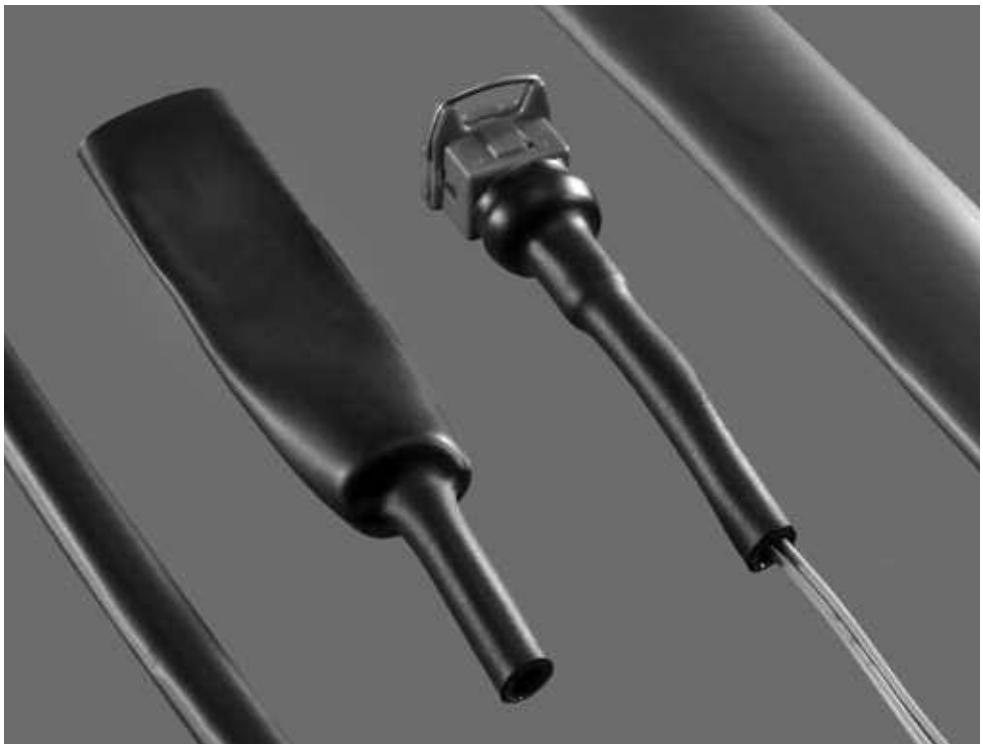
Japan: 81-44-844-8013
UK: 44-800-267-666

CGAT

Adhesive-Lined, Flexible, Polyolefin Heat-Shrinkable Tubing

Product Facts

- 3:1 Shrink ratio
- High-strength bonding
- Moisture-proof
- Environmental sealing
- RoHS compliant



Applications

CGAT is a flexible polyolefin heat-shrinkable tubing with an inner meltable adhesive lining designed for the commercial marketplace. It is suitable for the environmental protection of electrical components and the sealing of conductors. Typical applications are environmental sealing for electrical components, wire breakouts and cable jackets.

Installation

Minimum shrink temperature: 80°C [176°F]

Minimum full recovery temperature: 115°C [239°F]

Operating Temperature Range

-30°C to 80°C
[-22°F to 176°F]

Specifications/Approvals

Series	UL*	Raychem
CGAT	E85381 600V, 80°C	RW-2050

*Black only. Clear product is not flame-retardant

Available in:	Americas	Europe	Asia Pacific
		■	

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UK: 44-800-267-666

CGAT (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness*	
	Minimum Expanded as Supplied	Maximum Recovered After Heating	After Heating Black	After Heating Clear
3/1	3.0 [0.118]	1.0 [0.039]	1.00±0.25 [0.039±.010]	1.00±0.30 [0.039±.012]
6/2	6.0 [0.236]	2.0 [0.079]	1.00±0.25 [0.039±.010]	1.00±0.30 [0.039±.012]
9/3	9.0 [0.354]	3.0 [0.118]	1.35±0.25 [0.053±.010]	1.40±0.30 [0.055±.012]
12/4	12.0 [0.472]	4.0 [0.157]	1.50±0.25 [0.059±.010]	1.75±0.40 [0.039±.012]
18/6	18.0 [0.709]	6.0 [0.236]	1.70±0.25 [0.067±.010]	2.25±0.55 [0.089±.022]
24/8	24.0 [0.945]	8.0 [0.315]	1.90±0.25 [0.075±.010]	2.55±0.55 [0.100±.022]
39/13	39.0 [1.535]	13.0 [0.512]	2.10±0.25 [0.083±.010]	2.55±0.55 [0.100±.022]

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

Ordering Information

Color	Standard	Black (-0) Clear (X, non-flame-retardant jacket)
Size selection	Always order the largest size that will shrink snugly over the component to be covered.	
Standard packaging**	In 1.2 meter (4 foot) lengths or on spools.	
Ordering description	Specify product name, size and color (for example, CGAT-3/1-0).	

**Available in the convenient RaySpool packaging/dispensing system, for sizes 3/1 to 24/8.

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CGPE-105

Brightly Colored, Shiny, Non-Flame-Retardant Polyolefin Tubing

Product Facts

- **Bright, shiny surface; clear version offers exceptional clarity**
- **Can be easily hot-stamped**
- **Economical, yet offers the improved performance of a crosslinked material**
- **Conforms to substrates more uniformly and with less longitudinal change than most PVC-based materials**
- **RoHS compliant**

Applications

Attractive covering for many automotive, appliance, and consumer-goods applications. Commercial grade tubing for applications where a flame-retardant product is not needed. Provides both insulation and protection of components and wires while also providing a smooth, glossy finish with a choice of seven colors as well as clear. Exceptional transparency of clear CGPE-105 makes it a well-suited choice for protecting marked surfaces.

Installation

Minimum shrink temperature: 85°C [185°F]

Minimum full recovery temperature: 110°C [230°F] for black; 100°C [212°F] for all other colors and clear

Operating Temperature Range

-70°C to 105°C
[-94°F to 221°F]

Specifications/Approvals

Series	Raychem
CGPE-105	CGPE-105 SCD

Available in:	Americas	Europe	Asia Pacific
	■		■

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Japan: 81-44-844-8013
UK: 44-800-267-666

CGPE-105 (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]	0.40 ± 0.08 [0.016 ± 0.003]
1/16	1.6 [0.063]	0.8 [0.031]	0.43 ± 0.08 [0.017 ± 0.003]
3/32	2.4 [0.093]	1.2 [0.046]	0.51 ± 0.08 [0.020 ± 0.003]
1/8	3.2 [0.125]	1.6 [0.062]	0.51 ± 0.08 [0.020 ± 0.003]
3/16	4.8 [0.187]	2.4 [0.093]	0.51 ± 0.08 [0.020 ± 0.003]
1/4	6.4 [0.250]	3.2 [0.125]	0.64 ± 0.08 [0.025 ± 0.003]
3/8	9.5 [0.375]	4.8 [0.187]	0.64 ± 0.08 [0.025 ± 0.003]
1/2	12.7 [0.500]	6.4 [0.250]	0.64 ± 0.08 [0.025 ± 0.003]
3/4	19.1 [0.750]	9.5 [0.375]	0.76 ± 0.08 [0.030 ± 0.003]
1	25.4 [1.000]	12.7 [0.500]	0.89 ± 0.12 [0.035 ± 0.005]
1 1/2	38.1 [1.500]	19.1 [0.750]	1.02 ± 0.15 [0.040 ± 0.006]
2	50.8 [2.000]	25.4 [1.000]	1.14 ± 0.18 [0.045 ± 0.007]

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

Ordering Information

Color	Black (-0), White (-9), Clear (-X), Red (-2), Bue (-6), Yellow (-4) Green (-5), Violet (-7)
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, CGPE-105-1/4-0).

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Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-475-6222
Mexico: 52-55-1106-0800
L. & S. America: 54-11-4733-2200

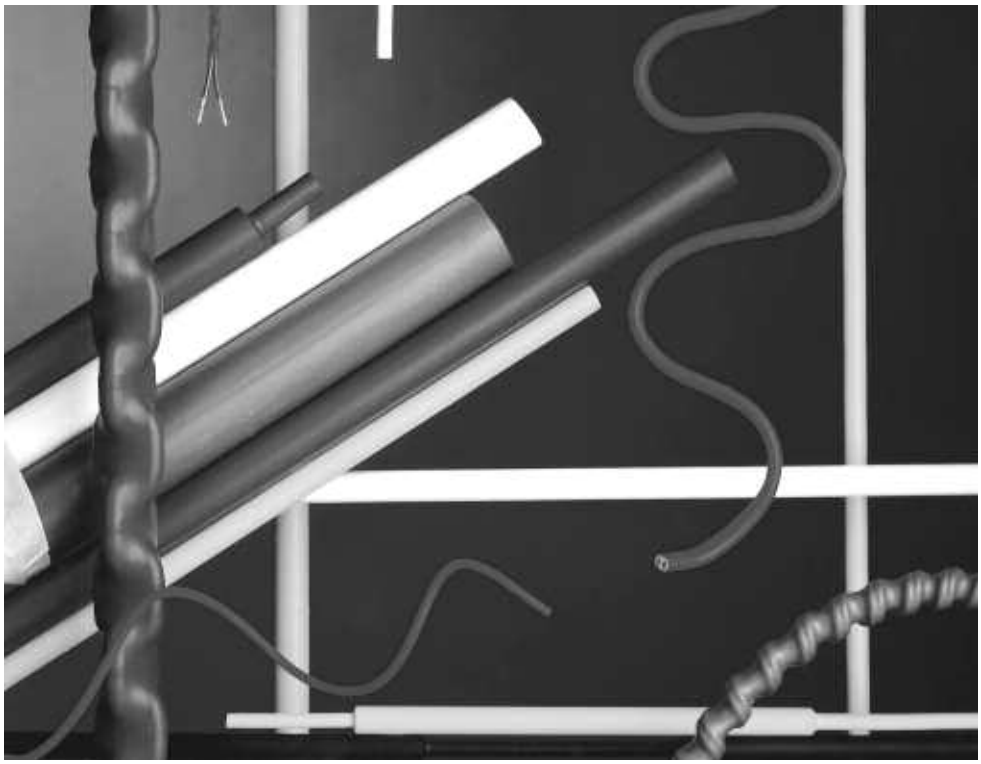
Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

CGPT

General Purpose, Flame-Retardant* Polyolefin Tubing

Product Facts

- **2:1 and 3:1 shrink ratio**
- **Very good chemical and solvent resistance**
- **Flexible**
- **Excellent physical and electrical performance**
- **RoHS compliant**



Applications

CGPT is a tough, flexible, general purpose polyolefin tubing with good resistance to common fluids and solvents and a high dielectric strength. Its unique blend of chemical, electrical, and physical properties makes it suitable for a wide range of applications, including electrical insulation, strain relief, cable bundling, color-coding and identification of wires, cables, pipes, and electrical and electronic components, and mechanical protection.

Installation

Minimum shrink temperature: 80°C [176°F]

Minimum full recovery temperature: 120°C [248°F]

Operating Temperature Range

-40°C to 135°C
[-40°F to 275°F]

Specifications/Approvals

Series	UL	CSA	Raychem
CGPT	E35586 600 V, 125°C	LR31929 600 V, 125°C	RW-2059

*Clear product (-X) is not flame-retardant.

Available in:	Americas	Europe	Asia Pacific
		■	

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Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

CGPT (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness**
	Minimum Expanded as Supplied	Maximum Recovered After Heating	After Heating
2:1			
1.2/06	1.2 [0.046]	0.6 [0.023]	0.45 ± 0.12 [0.018 ± 0.005]
1.6/0.8	1.6 [0.062]	0.8 [0.031]	0.45 ± 0.12 [0.018 ± 0.005]
2.4/1.2	2.4 [0.093]	1.2 [0.046]	0.50 ± 0.12 [0.019 ± 0.005]
3.2/1.6	3.2 [0.125]	1.6 [0.062]	0.50 ± 0.12 [0.019 ± 0.005]***
4.8/2.4	4.8 [0.187]	2.4 [0.093]	0.50 ± 0.12 [0.019 ± 0.005]***
6.4/3.2	6.4 [0.250]	3.2 [0.125]	0.65 ± 0.15 [0.026 ± 0.006]***
9.5/4.8	9.5 [0.375]	4.8 [0.187]	0.65 ± 0.15 [0.026 ± 0.006]***
12.7/6.4	12.7 [0.500]	6.4 [0.250]	0.65 ± 0.15 [0.026 ± 0.006]***
19/9.5	19.0 [0.748]	9.5 [0.375]	0.75 ± 0.15 [0.029 ± 0.006]***
25.4/12.7	25.4 [1.000]	12.7 [0.500]	0.90 ± 0.20 [0.035 ± 0.008]***
32/16	32.0 [1.250]	16.0 [0.630]	0.95 ± 0.20 [0.037 ± 0.008]
38/19	38.0 [1.496]	19.0 [0.748]	1.00 ± 0.20 [0.039 ± 0.008]***
51/26	51.0 [2.000]	26.0 [1.000]	1.15 ± 0.25 [0.045 ± 0.010]
76/38	76.0 [2.992]	38.0 [1.496]	1.25 ± 0.25 [0.049 ± 0.010]
102/51	102.0 [4.016]	51.0 [2.008]	1.40 ± 0.30 [0.055 ± 0.012]
3:1			
1.5/0.5	1.5 [0.059]	0.5 [0.020]	0.45 ± 0.12 [0.018 ± 0.005]
3/1	3.0 [0.118]	1.0 [0.040]	0.55 ± 0.12 [0.022 ± 0.005]
6/2	6.0 [0.236]	2.0 [0.079]	0.65 ± 0.12 [0.026 ± 0.005]
9/3	9.0 [0.354]	3.0 [0.118]	0.75 ± 0.15 [0.030 ± 0.006]
12/4	12.0 [0.472]	4.0 [0.157]	0.75 ± 0.15 [0.030 ± 0.006]
18/6	18.0 [0.709]	6.0 [0.236]	0.85 ± 0.15 [0.033 ± 0.006]
24/8	24.0 [0.945]	8.0 [0.315]	1.00 ± 0.20 [0.039 ± 0.008]
39/13	39.0 [1.540]	13.0 [0.512]	1.15 ± 0.25 [0.045 ± 0.010]

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

Ordering Information

Color	Standard	Black (-0), White (-9), Red (-2), Blue (-6), Yellow (-4), Brown (-1), Grey (-8), Clear (-X), Yellow/Green (-45) as indicated by an ***
	Nonstandard	Orange (-3), Green (-5), Violet (-7), in 2:1 sizes, 1.2/0.6 through 51/26 only.
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, CGPT 4.8/2.4-0).	

****Available in the convenient RaySpool packaging/dispensing system for sizes:
2:1 - 2.4/1.2 up to 25.4/12.7
3:1 - 3/1 up to 24/8

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L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

CRN

Semirigid, Flame-Retardant, Polyolefin Tubing

Product Facts

- 2:1 shrink ratio
- High abrasion resistance
- Transfer of flex stress away from typically weak points such as solder and crimp joints, helping ensure a reliable connection
- Flame-retardance (black only)
- Outstanding physical and electrical performance
- Excellent chemical and solvent-resistance properties
- RoHS compliant

Applications

Well-suited for wire strain-relief applications such as soldered or crimped connections, wire splices, and terminations. Provides mechanical protection for delicate components. Can be used for component packaging and for rugged marking of cables.

Installation

Minimum shrink temperature: 110°C [230°F]

Minimum full recovery temperature: 135°C [275°F]

Operating Temperature Range

-55°C to 135°C [-67°F to 275°F]

Specifications/Approvals

Series	UL	CSA	Military	Raychem
CRN Type 1 (black)	E35586 600 V, 125°C	LR31929 (black only) 600 V, 125°C	AMS-DTL-23053/6*, Class I	RT-360, Type 1 RK-6003
CRN Type 2 (clear)	—	—	AMS-DTL-23053/6*, Class 2	RT-360, Type 2

*Formerly MIL-I-23053/6 and MIL-DTL-23053/6.

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

CRN (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]	0.51 ± 0.08 [0.020 ± 0.003]
1/16	1.6 [0.063]	0.8 [0.031]	0.51 ± 0.08 [0.020 ± 0.003]
3/32	2.4 [0.093]	1.2 [0.046]	0.51 ± 0.08 [0.020 ± 0.003]
1/8	3.2 [0.125]	1.6 [0.062]	0.51 ± 0.08 [0.020 ± 0.003]
3/16	4.8 [0.187]	2.4 [0.093]	0.64 ± 0.08 [0.025 ± 0.003]
1/4	6.4 [0.250]	3.2 [0.125]	0.64 ± 0.08 [0.025 ± 0.003]
3/8	9.5 [0.375]	4.8 [0.187]	0.76 ± 0.08 [0.030 ± 0.003]
1/2	12.7 [0.500]	6.4 [0.250]	0.76 ± 0.08 [0.030 ± 0.003]
3/4	19.1 [0.750]	9.5 [0.375]	0.89 ± 0.12 [0.035 ± 0.005]

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

Ordering Information

Color	Standard	Black (-0)
	Nonstandard	Clear (-X, not flame-retardant)
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	In 1.2-meter [4-foot] lengths.	
Ordering description***	Specify product name, size and color (for example, CRN 1/4-0).	

***Europe only. For supply to MIL spec., add -MS to ordering description.

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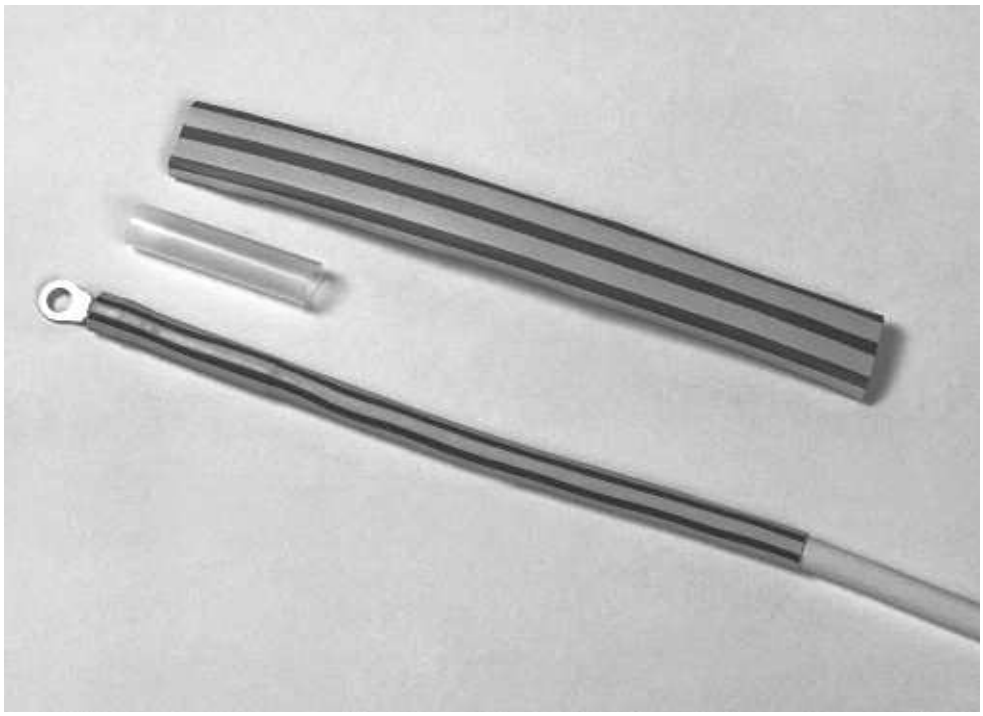
Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

DCPT

Flexible, Flame-Retardant, Dual-Color, Polyolefin Tubing

Product Facts

- 2:1 and 3:1 shrink ratio
- Dual colors (yellow/green) for instant identification
- Co-extrusion of tubing colors, giving color permanence superior to that of conventional ink marking
- Flame-retardance
- Flexibility: able to conform to irregular shapes
- Excellent physical, chemical, and electrical properties that meet industry standards for highly reliable, general purpose tubing
- RoHS compliant



Applications

Used to identify “ground” on wires and in cables, and to jacket and insulate light-duty harnesses.

Easily marked by conventional techniques for additional identification of wires and cables.

Installation

Minimum shrink temperature: 95°C [203°F]

Minimum full recovery temperature: 120°C [248°F]

Operating Temperature Range

-55°C to 135°C [-67°F to 275°F]

Specifications/Approvals

Series	UL	CSA	Military	Agency	Raychem
DCPT	E35586 600 V, 125°C	LR31929 600 V, 125°C	VG 95343 Pt 5 Type A	AFS 2270 DIN 29807 VDE 0341 Pt 9005 Type A	RW-2056

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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USA: 1-800-522-6752
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Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

DCPT (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness**
	Minimum Expanded as Supplied	Maximum Recovered After Heating	After Heating
2:1			
3/1.5	3.0 [0.118]	1.5 [0.059]	0.51 ± 0.10 [0.020 ± 0.004]
6/3	6.0 [0.236]	3.0 [0.118]	0.58 ± 0.10 [0.023 ± 0.004]
8/4	8.0 [0.315]	4.0 [0.158]	0.64 ± 0.10 [0.025 ± 0.004]
10/5	10.0 [0.394]	5.0 [0.197]	0.64 ± 0.10 [0.025 ± 0.004]
12/6	12.0 [0.472]	6.0 [0.236]	0.64 ± 0.10 [0.025 ± 0.004]
19/9	19.0 [0.748]	9.0 [0.354]	0.76 ± 0.12 [0.030 ± 0.005]
26/13	26.0 [1.024]	13.0 [0.512]	0.89 ± 0.12 [0.035 ± 0.005]
38/19	38.0 [1.500]	19.0 [0.748]	1.00 ± 0.12 [0.039 ± 0.005]
51/19	51.0 [2.000]	19.0 [0.748]	1.02 ± 0.15 [0.040 ± 0.006]
3:1			
3/1	3.0 [0.118]	1.0 [0.039]	0.55 ± 0.10 [0.022 ± 0.004]
6/2	6.0 [0.236]	2.0 [0.079]	0.65 ± 0.10 [0.026 ± 0.004]
9/3	9.0 [0.354]	3.0 [0.118]	0.75 ± 0.15 [0.030 ± 0.006]
12/4	12.0 [0.472]	4.0 [0.157]	0.75 ± 0.15 [0.030 ± 0.006]
18/6	18.0 [0.709]	6.0 [0.236]	0.85 ± 0.15 [0.033 ± 0.006]
24/8	24.0 [0.945]	8.0 [0.315]	1.00 ± 0.20 [0.039 ± 0.008]
39/13	39.0 [1.535]	13.0 [0.512]	1.15 ± 0.20 [0.045 ± 0.008]

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

Ordering Information

Color	Standard	Yellow/green stripe (-45)
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, DCPT 8/4-45).	

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USA: 1-800-522-6752
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Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

DR-25

Heat-Shrinkable, Flexible, Chemical and Abrasion Resistant Tubing

Product Facts

- **Flame-retardant**
- **System 25 tubing**
- **Shrink ratio 2:1**
- **RoHS compliant**

Applications

Specially formulated for optimum high-temperature fluid resistance, and long term heat resistance. Resistant to aviation and diesel fuels, hydraulic fluids and lubricating oils.

Particularly suitable as a jacketing material for military ground vehicle cables and harnesses. It is also well suited for the demands of motorsport cable harnesses. When used in conjunction with System 25 heat-shrinkable molded shapes and S1125 high performance adhesive, these products provide a complete cable harness system.

Installation

Minimum shrink temperature: 150°C [302°F]

Minimum full recovery temperature: 175°C [347°F]

Operating Temperature Range

-75°C to 150°C
[-103°F to 302°F]
(per VG 95343 Part 5 Type D)

Specifications/Approvals

Series	Military	Raychem
DR-25	AMS-DTL-23053/16* VG95343 Part 5 Type D VDE 0341/Pt 9005 Def Stan 59-97 Issue 3 Type 6B BS 4G-198 Part 3 10A	RT-1116 RK-6008/1

*Formerly MIL-I-23053/16 and MIL-DTL-23053/16.

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

DR-25 (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness**
	Minimum Expanded as Supplied	Maximum Recovered After Heating	After Heating
1/8	3.2 [0.125]	1.6 [0.062]	0.76 ± 0.15 [0.030 ± 0.006]
3/16	4.8 [0.187]	2.4 [0.093]	0.84 ± 0.15 [0.033 ± 0.006]
1/4	6.4 [0.250]	3.2 [0.125]	0.89 ± 0.15 [0.035 ± 0.006]
3/8	9.5 [0.375]	4.8 [0.187]	1.02 ± 0.20 [0.040 ± 0.008]
1/2	12.7 [0.500]	6.4 [0.250]	1.22 ± 0.20 [0.048 ± 0.008]
3/4	19.0 [0.748]	9.5 [0.375]	1.45 ± 0.28 [0.057 ± 0.011]
1	25.4 [1.000]	12.7 [0.500]	1.78 ± 0.28 [0.070 ± 0.011]
1 1/2	38.0 [1.500]	19.1 [0.750]	2.41 ± 0.41 [0.095 ± 0.016]
2	51.0 [2.000]	25.4 [1.000]	2.79 ± 0.41 [0.110 ± 0.016]
3	76.0 [3.000]	38.0 [1.500]	3.18 ± 0.50 [0.125 ± 0.020]

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

Ordering Information

Color	Standard Black (-0)
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, DR-25 1/8-0).

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

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L. & S. America: 54-11-4733-2200

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China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

DSPL

Commercial, Dual Wall, Heat-Shrinkable Tubing to Seal and Protect Splices

Product Facts

- 4:1 shrink ratio allows a few sizes to cover a wide range of applications
- Flame-retardant jacket (black only)
- Performs well at elevated temperatures and in aggressive environments
- Provides excellent environmental sealing from dust, dirt and many fluids, which can cause wire splices to corrode or electrical systems to fail
- Mechanically tough tubing provides protection from flexing and abrasion
- RoHS compliant

Applications

Specially designed for environmental sealing, electrical insulation and protection of electrical splices, terminals and other components in areas where they will be exposed to moisture.

Installation

Minimum shrink temperature: 110°C [230°F]

Minimum full recovery temperature: 135°C [275°F]

Operating Temperature Range

-40°C to 125°C
[-40°F to 257°F]

Specifications/Approvals

Series	Raychem
DSPL	RK-6755

Available in:	Americas	Europe	Asia Pacific
		■	

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L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

DSPL (Continued)

Product Dimensions

Part Number	Minimum Expanded as Supplied	Maximum Recovered After Heating	Recovered Wall Thickness* After Heating
DSPL-NR1	5.69 [0.224]	1.27 [0.050]	1.15 [0.045]
DSPL-NR2	7.49 [0.295]	1.65 [0.065]	1.40 [0.055]
DSPL-NR3	10.80 [0.425]	2.40 [0.094]	1.80 [0.071]
DSPL-NR4	17.50 [0.689]	4.50 [0.177]	2.10 [0.083]

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

Ordering Information

Color	Standard	Black (-0), Clear (-X) (except DSPL-NR4)
Size selection	Always order the largest size that will shrink snugly over the component to be covered.**	
Standard packaging	In cut pieces and 1.2 meter [4-foot] lengths.	
Ordering description	Specify product name, size and color (for example, DSPL-NR1-0).	

** Sleeves are number coded to assist with correct size selection

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China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

DWP-125

Flexible, High-Shrink-Ratio, Adhesive-Lined, Polyolefin Tubing

Product Facts

- **3:1 shrink ratio allows for insulation and sealing of irregular shapes**
- **Medium wall provides increased mechanical protection while maintaining flexibility when installed**
- **Adhesive bonds to a wide variety of plastics, rubber, and metals, including polyethylene, neoprene, and steel**
- **RoHS compliant**

Applications

Environmentally seals and protects a wide variety of electrical applications, including wire splices, breakouts, and connector-to-cable transitions. Suitable for applications where UL recognized/CSA certified adhesive-lined tubing is required.

Installation

Minimum shrink temperature: 80°C [176°F]

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

Operating Temperature Range

-40°C to 110°C
[-40°F to 230°F]

Specifications/Approvals

Series	UL	CSA	Raychem
DWP-125	E35586 600 V, 125°C	LR31929 600 V, 125°C	DWP-125 SCD

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

DWP-125 (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness*	
	Minimum Expanded as Supplied	Maximum Recovered After Heating	Nominal Total Wall After Heating	Nominal Adhesive Wall After Heating
1/8	3.2 [0.125]	1.0 [0.040]	1.02 [0.040]	0.18 [0.007]
3/16	4.8 [0.187]	1.5 [0.060]	1.40 [0.055]	0.51 [0.020]
1/4	6.4 [0.250]	2.0 [0.080]	1.45 [0.057]	0.56 [0.022]
3/8	9.5 [0.375]	3.1 [0.120]	1.65 [0.065]	0.68 [0.027]
1/2	12.7 [0.500]	4.0 [0.157]	1.78 [0.070]	0.76 [0.030]
3/4	19.1 [0.750]	5.8 [0.230]	2.03 [0.080]	0.76 [0.030]
1	25.4 [1.000]	8.1 [0.320]	2.50 [0.100]	0.76 [0.030]

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

Ordering Information

Color	Standard	Black (-0)
	Nonstandard	White (-9), Red (-2), Blue (-6), Yellow (-4), Green (-5), Clear (-X, non-flame-retardant jacket). Other colors available upon request.
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	In 1.2-meter [4-foot] lengths.	
Ordering description	Specify product name, size and color (for example, DWP-125 1/4-0).	

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Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-475-6222
Mexico: 52-55-1106-0800
L. & S. America: 54-11-4733-2200

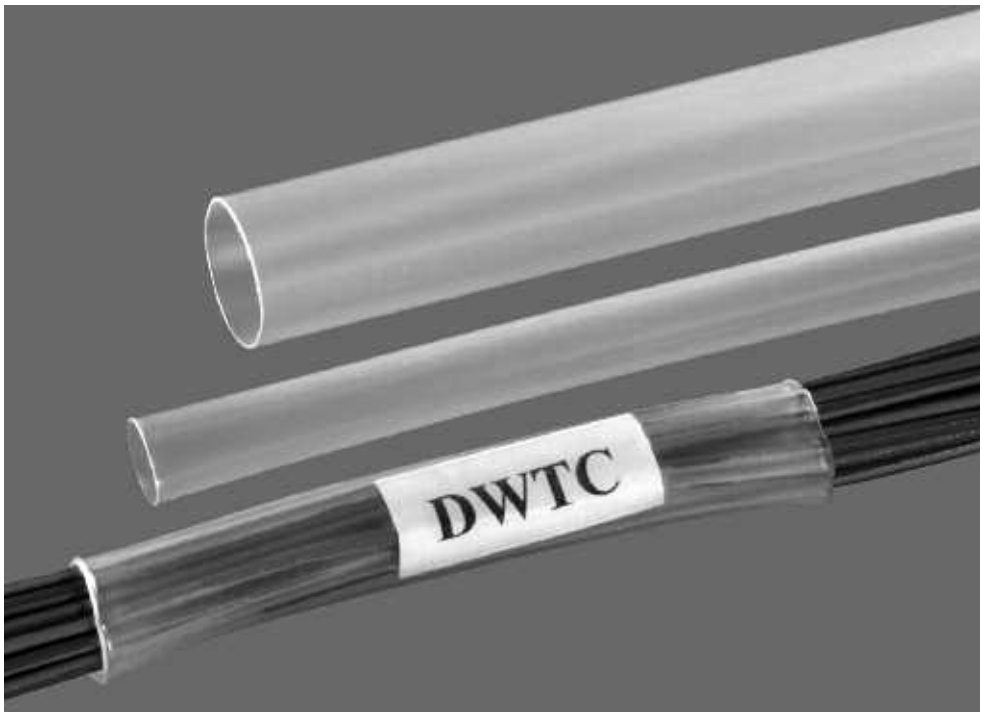
Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

DWTC

Flexible, Dual Wall, Moisture-Proof, Heat-Shrinkable Polyolefin Tubing

Product Facts

- Excellent mechanical strength
- Abrasion resistance
- Excellent optical clarity
- Environmental sealing
- Shrink ratio 4:1
- RoHS compliant



Applications

DWTC is a flexible, heat-shrinkable, dual wall tubing with an integrally bonded meltable adhesive inner liner designed to offer moisture proof encapsulation to a wide variety of substrates. In particular, it adheres well to PVC. Available in clear, DWTC offers excellent clarity for protection of substrates that may need to be inspected during service.

The tough outer jacket gives excellent mechanical strength with a high resistance to splitting. The high-shrink-ratio means that only four sizes are needed to give protection to a full range of irregular shapes with widely varying dimensions.

Installation

Minimum shrink temperature: 60°C [140°F]

Minimum full recovery temperature: 100°C [212°F]

Operating Temperature Range

-55°C to 75°C
[-67°F to 167°F]

Specifications/Approvals

Series	Raychem
DWTC	RK-6204

Available in:	Americas	Europe	Asia Pacific
		■	■

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Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

DWTC (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness*	
	Minimum Expanded as Supplied	Maximum Recovered After Heating	Nominal Total Wall After Heating	Nominal Adhesive Wall After Heating
4/1	4.0 [0.158]	1.0 [0.039]	0.8 [0.032]	0.3 [0.012]
8/2	8.0 [0.315]	2.0 [0.079]	0.9 [0.035]	0.3 [0.012]
12/3	12.0 [0.472]	3.0 [0.118]	1.2 [0.047]	0.4 [0.016]
16/4	16.0 [0.630]	4.0 [0.158]	1.5 [0.059]	0.5 [0.020]

*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.
Standard packaging	On spools, in 1.2-meter [4-foot] lengths.
Ordering description	Specify product name, size and color (for example DWTC-4/1-X-STK).

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L. & S. America: 54-11-4733-2200

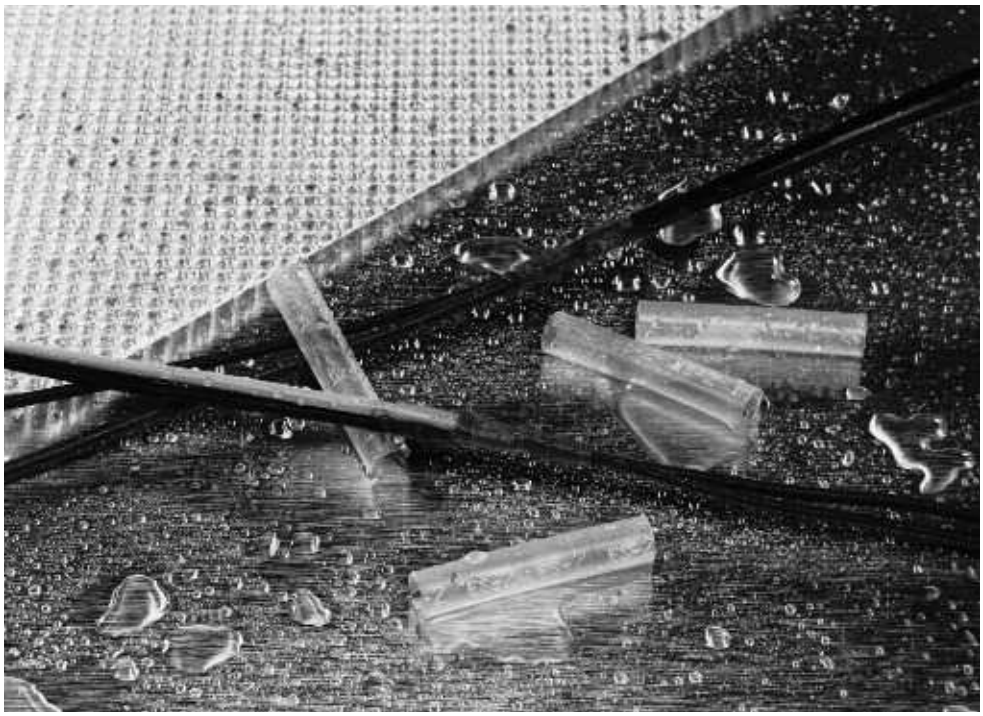
Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

ES1000

Clear, High-Shrink-Ratio, Adhesive-Lined, Semirigid Polyolefin Tubing

Product Facts

- 4:1 shrink ratio allows a few sizes to cover a wide range of splice and component diameters
- Mechanically tough tubing provides strain relief and abrasion protection of wire splices, terminals and other components
- Thick adhesive liner forms an effective barrier against fluids and moisture and performs well at an extended temperature range
- UL recognized
- RoHS compliant



Applications

Specially designed for environmental sealing and electrical insulation of wire splices, terminations, and components where see-through inspection is required.

Installation

Minimum shrink temperature: 110°C [230°F]

Minimum full recovery temperature: 135°C [275°F]

Operating Temperature Range

-40°C to 130°C
[-40°F to 266°F]

Specifications/Approvals

Series	UL*	Raychem
ES1000	E85381 600 V, 125°C	RT-1113

Available in:	Americas	Europe	Asia Pacific
	■		■

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Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

ES1000 (Continued)

Product Dimensions

Part Number	Inside Diameter (Including Core)		Recovered Wall Thickness*		
	Minimum Expanded as Supplied	Maximum Recovered After Heating	Minimum Total Wall After Heating	Minimum Jacket Wall After Heating	Minimum Adhesive Wall After Heating
ES1000-No.1	5.72 [0.225]	1.27 [0.050]	1.20 [0.047]	0.64 [0.025]	0.56 [0.022]
ES1000-No.2	7.44 [0.293]	1.65 [0.065]	1.52 [0.060]	0.76 [0.030]	0.76 [0.030]
ES1000-No.3	10.85 [0.427]	2.41 [0.095]	1.91 [0.075]	0.89 [0.035]	1.02 [0.040]
ES1000-No.4	17.78 [0.700]	4.45 [0.175]	2.41 [0.095]	1.04 [0.041]	1.37 [0.054]

*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.
Standard packaging	Cut pieces.
Marking	Tubing will be printed with its numbered size (such as ES-1, ES-2, ES-3, or ES-4).
Ordering description	Specify product name, numbered size, color, and cut length (for example, ES1000-NO. 2-B9-X-50MM).

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Canada: 1-905-475-6222
Mexico: 52-55-1106-0800
L. & S. America: 54-11-4733-2200

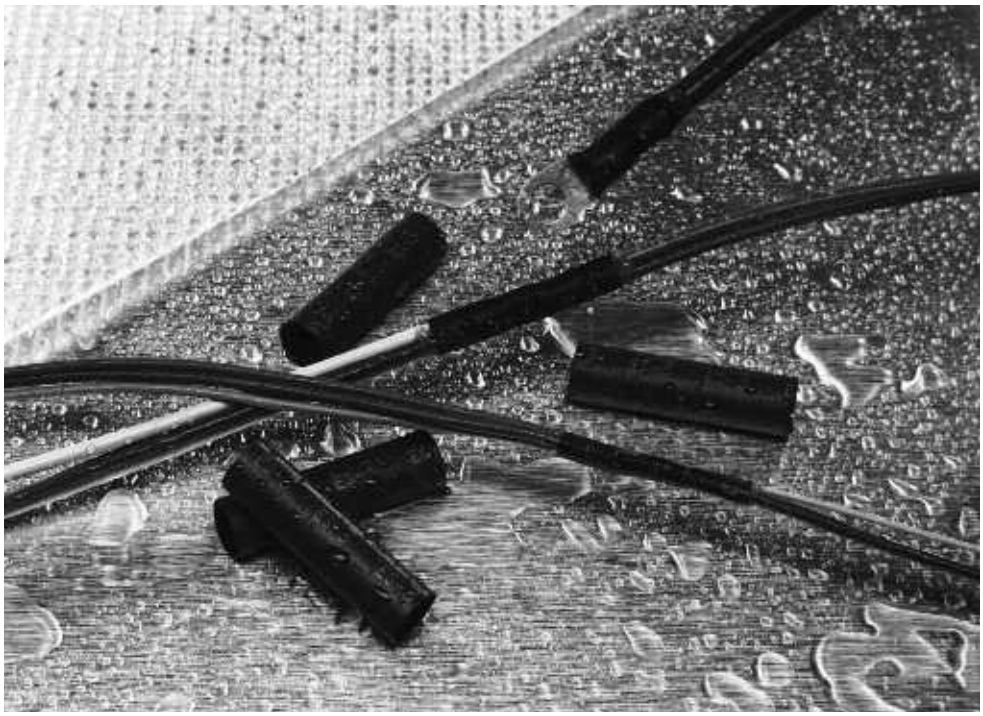
Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

ES2000

Flame-Retardant, High-Shrink-Ratio, Adhesive-Lined Semirigid Polyolefin Tubing

Product Facts

- **4:1 shrink ratio allows a few sizes to cover a wide range of splice and component diameters**
- **Flame-retardant and mechanically tough, the tubing provides strain relief and abrasion protection of wire splices, terminals, and other components**
- **Thick adhesive liner forms an effective barrier against fluids and moisture and performs well at an extended temperature range**
- **UL recognized**
- **RoHS compliant**



Applications

Specially designed for environmental sealing and electrical insulation of wire splices, terminations, and components.

Installation

Minimum shrink temperature: 110°C [230°F]

Minimum full recovery temperature: 135°C [275°F]

Operating Temperature Range

-40°C to 130°C
[-40°F to 266°F]

Specifications/Approvals

Series	UL*	Raychem
ES2000	E85381 600 V, 125°C	RT-1112

Available in:	Americas	Europe	Asia Pacific
	■		■

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Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-475-6222
Mexico: 52-55-1106-0800
L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

ES2000 (Continued)

Product Dimensions

Part Number	Inside Diameter (Including Core)		Recovered Wall Thickness*		
	Minimum Expanded as Supplied	Maximum Recovered After Heating	Minimum Total Wall After Heating	Minimum Jacket Wall After Heating	Minimum Adhesive Wall After Heating
ES2000-No.1	5.72 [0.225]	1.27 [0.050]	1.20 [0.047]	0.64 [0.025]	0.56 [0.022]
ES2000-No.2	7.44 [0.293]	1.65 [0.065]	1.52 [0.060]	0.76 [0.030]	0.76 [0.030]
ES2000-No.3	10.85 [0.427]	2.41 [0.095]	1.91 [0.075]	0.89 [0.035]	1.02 [0.040]
ES2000-No.4	17.78 [0.700]	4.45 [0.175]	2.41 [0.095]	1.04 [0.041]	1.37 [0.054]

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

Ordering Information

Color	Standard Black (-0)
Size selection	Always order the largest size that will shrink snugly over the component to be covered.
Standard packaging	Cut pieces.
Marking	Tubing will be printed with its numbered size (such as ES-1, ES-2, ES-3, or ES-4).
Ordering description	Specify product name, numbered size, color, and cut length (for example, ES2000-NO. 2-B9-0-50MM).

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L. & S. America: 54-11-4733-2200

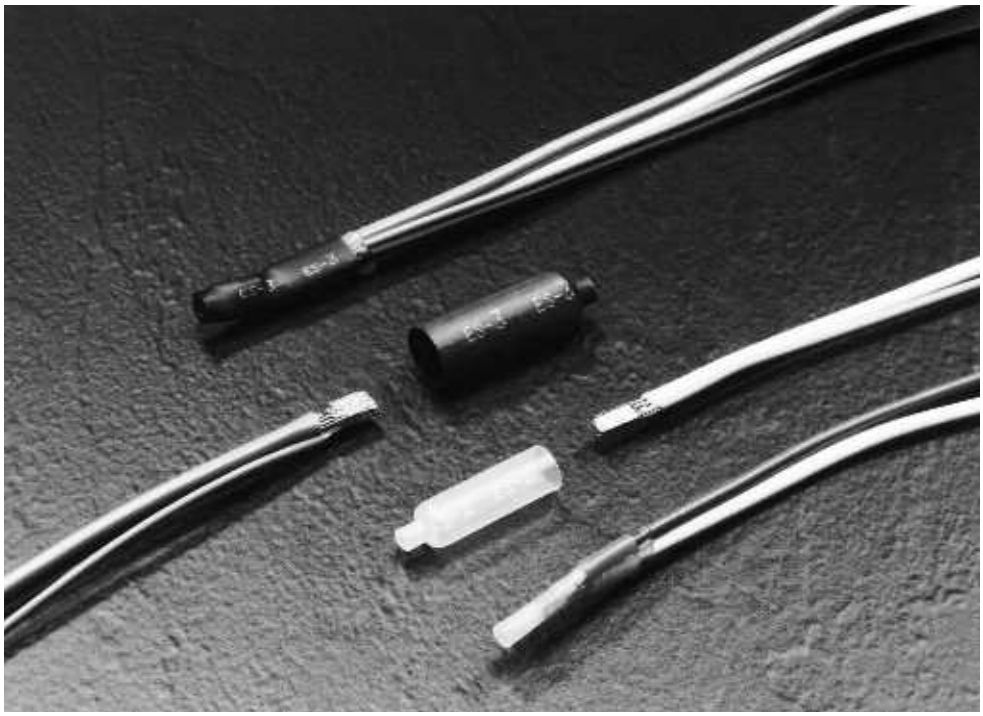
Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

ES Caps

High-Shrink-Ratio, Adhesive-Lined, Semirigid Polyolefin Caps

Product Facts

- 4:1 shrink ratio allows a few sizes to cover a wide range of splice and component diameters
- Mechanically tough jacket provides strain relief and abrasion protection
- Thick adhesive liner forms an effective barrier against fluids and moisture and performs well at an extended temperature range
- UL recognized
- RoHS compliant



Applications

Specially designed to provide mechanical and environmental protection of stub splices in electrical harnesses. Clear caps allow see-through inspection; black caps are flame-retardant.

Installation

Minimum shrink temperature: 100°C [212°F]

Minimum full recovery temperature: 135°C [275°F]

Operating Temperature Range

-40°C to 105°C
[-40°F to 221°F]

Specifications/Approvals

Series	UL*	Raychem
ES Caps	E85381 600 V, 125°C	RW-3006

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

ES Caps (Continued)

Product Dimensions

Part Number	Standard Length* as Supplied (Millimeters)	Inside Diameter (Including Core)		Recovered Wall Thickness**		
		Minimum Expanded as supplied	Maximum Recovered After Heating	Minimum Total Wall After Heating	Minimum Jacket Wall After Heating	Minimum Adhesive Wall After Heating
ES Cap-No.1	30, 35	5.72 [0.225]	1.27 [0.050]	1.20 [0.047]	0.64 [0.025]	0.56 [0.022]
ES Cap-No.2	30, 35	7.44 [0.293]	1.65 [0.065]	1.52 [0.060]	0.76 [0.030]	0.76 [0.030]
ES Cap-No.3	40, 50	10.85 [0.427]	2.41 [0.095]	1.91 [0.075]	0.89 [0.035]	1.02 [0.040]

*Other cap lengths available upon request.
**Wall thickness will be less if cap recovery is restricted during shrinkage.

Ordering Information

Color	Standard Black (-0), clear (-X)
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Other cap lengths available on request.
Standard packaging	In pieces.
Marking	Caps will be marked with their numbered size (such as ES-1, ES-2, or ES-3).
Ordering description	Specify product name, size, color, and length (for example, ES CAP-NO. 2-B9-X-35MM).

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L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

FL2500

Fully Flame-Retardant, Adhesive-Lined, Polyolefin Heat-Shrinkable Tubing

Product Facts

- **4:1 shrink ratio allows a few sizes to cover a wide range of wire terminations and components**
- **Flame-retardant tubing jacket and adhesive provide full flame-retardancy**
- **Fully flame-retardant and mechanically tough, the tubing provides strain relief and abrasion protection of wire splices, terminals and other components**
- **Thick high-performance adhesive lining offers permanent sealing of splices, fusible links, terminals and in-line components**
- **RoHS compliant**

Applications

Tough flame-retardant polyolefin tubing lined with a flame-retardant adhesive provides the optimum solution for applications where full flame-retardancy is preferred or specified.

Rated to 135°C [275°F] for 3000 hours, FL2500 is suitable for use in the automotive harness market and other harsh environments. As the tubing shrinks, the adhesive lining melts and flows to fill all voids and create a complete seal against moisture, oils, chemicals and other fluids.

Installation

Minimum shrink temperature: 110°C [230°F]

Minimum full recovery temperature: 135°C [275°F]

Operating Temperature Range

-40°C to 135°C [-40°F to 275°F]

Specifications/Approvals

Series	Raychem
FL2500	FL2500 SCD

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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USA: 1-800-522-6752
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L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

FL2500 (Continued)

Product Dimensions

Part Number	Inside Diameter (Including Core)		Recovered Wall Thickness*	
	Minimum Expanded as Supplied	Maximum Recovered After Heating	Total Wall After Heating	Minimum Adhesive Wall After Heating
FL2500-No. 1	7.62 [0.300]	1.65 [0.065]	1.52 ± 0.3 [0.060 ± 0.012]	0.71 [0.028]
FL2500-No. 2	9.02 [0.355]	2.29 [0.090]	1.52 ± 0.3 [0.060 ± 0.012]	0.71 [0.028]
FL2500-No. 3	11.56 [0.455]	2.54 [0.100]	2.29 ± 0.3 [0.090 ± 0.012]	1.32 [0.052]
FL2500-No. 4	17.79 [0.700]	4.45 [0.175]	2.54 ± 0.3 [0.100 ± 0.012]	1.35 [0.053]

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

Ordering Information

Color	Black (-0) with a white adhesive liner.
Size selection	Always order the largest size that will shrink snugly over the component to be covered.
Standard packaging	Cut pieces.
Marking	Tubing will be marked with its numbered size (such as FL-1, FL-2, FL-3, or FL-4).
Ordering description	Specify product name, size, color, and cut length (for example, FL2500-NO.2-I9-0-50MM).

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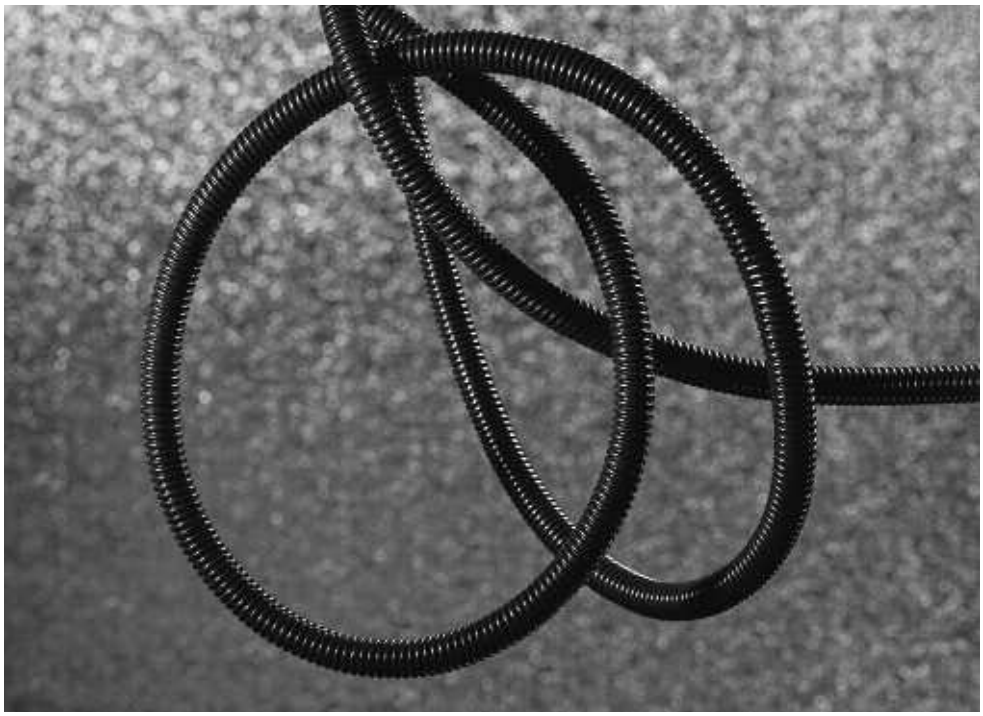
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

HCTE

Helical Convolex Tubing with a High Crush Resistance

Product Facts

- Highly flame-retardant
- Highly flexible and fluid resistant
- Not heat-shrinkable
- High crush resistance
- System 300 conduit tubing
- RoHS compliant



Applications

Used as a conduit to provide mechanical protection for electrical wiring systems in applications requiring flexibility, high-temperature performance and good resistance to a variety of fluids. Widely used in the military and commercial aerospace industries. Can be used in conjunction with other Raychem components to form an integrated harnessing system.

Installation

It is recommended that no more than 70% of the internal area (“fill factor”) of the HCTE conduit be occupied by wires in any application.

Operating Temperature Range

-55°C to 200°C
[-67°F to 392°F]

Specifications/Approvals

Series	Military	Raychem
HCTE	VG 96936 Part 6	RT-1162

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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Japan: 81-44-844-8013
UK: 44-800-267-666

HCTE (Continued)

Product Dimensions

Size	Inside Diameter Minimum	Outside Diameter Maximum	Maximum Wall Thickness
0187	4.60 [0.181]	8.10 [0.320]	0.46 [0.018]
0281	6.90 [0.273]	10.50 [0.414]	0.46 [0.018]
0312	7.70 [0.306]	11.80 [0.450]	0.46 [0.018]
0375	9.20 [0.364]	12.90 [0.510]	0.46 [0.018]
0437	10.80 [0.427]	14.50 [0.571]	0.46 [0.018]
0500	12.30 [0.485]	16.50 [0.650]	0.58 [0.023]
0625	15.40 [0.608]	19.50 [0.770]	0.58 [0.023]
0750	17.90 [0.730]	23.60 [0.930]	0.58 [0.023]
0875	21.80 [0.860]	27.20 [1.073]	0.58 [0.023]
1000	24.70 [0.975]	31.10 [1.226]	0.58 [0.023]
1250	30.70 [1.210]	35.30 [1.539]	0.58 [0.023]
1500	36.50 [1.437]	46.50 [1.832]	0.58 [0.023]
1625	39.60 [1.562]	50.17 [1.975]	0.58 [0.023]
1750	42.67 [1.688]	52.88 [2.082]	0.58 [0.023]
2000	49.20 [1.937]	59.23 [2.332]	0.58 [0.023]

Ordering Information

Color	Standard Black (-0)
Size selection	Always order a conduit size that will ensure that a “fill factor” of 70% is not exceeded.
Standard packaging	On spools.
Ordering description	Specify product name, size and color (for example, HCTE-0187-0).

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Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

HF

High-Flex, Heavy-Wall, Heat-Shrinkable Tubing

Product Facts

- **Offers high flexibility**
- **Provides excellent insulation and abrasion protection, per U.S. Mine Safety and Health Administration (MSHA) regulations**
- **Flame-retardant**
- **HF has the following agency approvals:**
  - **ABS (American Bureau of Shipping)**
  - **Lloyd's (Lloyd's Register of Shipping)**
- **RoHS compliant**

Applications

Developed for cable jacketing applications where cable flexibility is important, high-flex (HF) tubing is good for jacketing cables where sharp bends or turns are required. Also suitable for situations where the cable is subject to motion. Such situations are common for industrial machinery, transportation equipment, robotics, welding, and many other cabling applications. To complete the cable jacket seal, the ends may be sealed for further water and corrosion protection by using available tape sealant or adhesive.

Installation

Minimum shrink temperature: 80°C [176°F]

Minimum full recovery temperature: 121°C [250°F]

Operating Temperature Range

-55°C to 90°C
[-67°F to 194°F]

Specifications/Approvals

Series	Military	Agency	Raychem
HF	AMS-DTL-23053/15* Class 2**	ABS, Lloyd's	RW-2023

*Formerly MIL-I-23053/15 and MIL-DTL-23053/15.
**Except for coatings requirement.

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

HF (Continued)

Product Dimensions

Size	Standard Nominal Length (m/ft)	Inside Diameter		Wall Thickness**
		Minimum Expanded as Supplied	Maximum Recovered After Heating	Nominal Recovered After Heating
HF04	1.2, 7.5 [4, 25]	10.16 [0.400]	3.81 [0.150]	1.52 [0.060]
HF07	1.2, 7.5 [4, 25]	19.05 [0.750]	5.59 [0.220]	1.52 [0.060]
HF11	1.2, 7.5 [4, 25]	27.94 [1.100]	9.52 [0.375]	2.67 [0.105]
HF13	1.2, 7.5 [4, 25]	33.02 [1.300]	9.52 [0.375]	2.67 [0.105]
HF15	1.2, 7.5 [4, 25]	38.10 [1.500]	12.70 [0.500]	3.05 [0.120]
HF17	1.2, 7.5 [4, 25]	43.14 [1.700]	12.70 [0.500]	3.05 [0.120]
HF20	1.2, 7.5 [4, 25]	50.80 [2.000]	19.05 [0.750]	3.56 [0.140]
HF27	1.2, 7.5 [4, 25]	68.58 [2.700]	22.86 [0.900]	3.94 [0.155]

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

Ordering Information

Color	Standard Black
Size selection	Always order the largest size that will shrink snugly over the component to be covered.
Standard packaging	1.2-meter [4-foot] or 7.5-meter [25-foot] lengths. Nonstandard lengths are available upon request.
Ordering description	See below.

Part Numbering System

HF - _ FR X _ / _

- **"NM"** - no mark
- **Length** in feet (4 and 25 feet standard)
- **"FR"** - flame-retardant
- **Size**
- **Product Name**

Example: HF-17FRX25/NM

9-1773447-9
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Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-475-6222
Mexico: 52-55-1106-0800
L. & S. America: 54-11-4733-2200

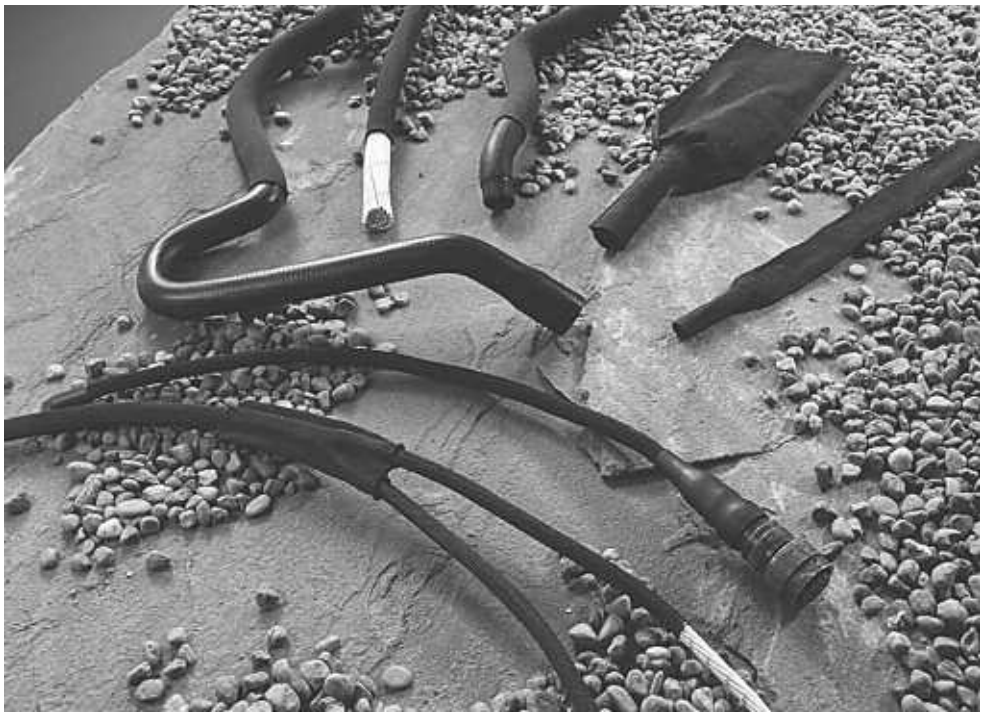
Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

HFT5000

Heat-Shrinkable Fabric Tubing

Product Facts

- Highly flexible woven fabric tubing
- Polyethylene/polyester construction for excellent abrasion resistance
- Halogen free
- Heat-shrinkable to grip substrates tightly without additonal fixing
- 2:1 shrink ratio for easy installation onto different substrate diameters and sizes
- Highly flexible woven fabric construction for easy, compliant installation onto awkward substrates such as bent hoses
- Outstanding abrasion resistance over a wide temperature range
- Easily cut with standard industrial cutting equipment
- Resistant to harsh environments
- Multifilament construction that ensures soft, safe handling
- Low shrink temperature for safe installation onto heat sensitive substrates
- RoHS compliant



Applications

Designed primarily to provide mechanical abrasion protection for components such as rubber hoses, plastic pipes, and harness wiring bundles. Also suitable for other applications, such as noise and rattle suppression.

The woven construction makes HFT5000 extremely flexible and resistant to trapping water, heat and humidity. Provides outstanding abrasion, chafing and cutting protection, even at high-temperatures.

Installation

Minimum shrink temperature: 80°C [176°F]

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

Maximum storage temperature: 60°C [140°F]

Operating Temperature Range

3000 hours:
-40°C to 125°C
[-40°F to 257°F]

1000 hours:
-40°C to 150°C
[-40°F to 302°F]

Specifications/Approvals

Series	UL*	Raychem
HFT5000	E199379 Rated 135°C	RW-2060

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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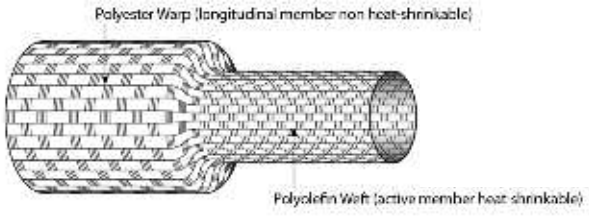
Japan: 81-44-844-8013
UK: 44-800-267-666

HFT5000 (Continued)

Product Dimensions



Size	Inside Diameter	
	Minimum Expanded as Supplied	Maximum Recovered After Heating
Standard		
12/6	12 [0.47]	6 [0.24]
20/10	20 [0.79]	10 [0.39]
30/15	30 [1.18]	15 [0.59]
40/20	40 [1.57]	20 [0.79]
50/25	50 [1.97]	25 [0.98]
60/30	60 [2.36]	30 [1.18]
70/35	70 [2.76]	35 [1.38]
Non-Standard High Volume		
25/12	25 [0.98]	12 [0.47]
34/17	34 [1.34]	17 [0.67]
80/40	80 [3.15]	40 [1.57]

Ordering Information

Color	Standard	Black (-0)
Standard packaging	On spools.	
Ordering description	Specify product name, size and color (for example, HFT5000-12/6-0).	

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Japan: 81-44-844-8013
UK: 44-800-267-666

HRHF/HRNF/HRSR

High-Ratio, Heat-Shrinkable Tubing

Product Facts

- **Offers toughness and durability**
- **Provides excellent insulation and abrasion protection**
- **Is available in flame-retardant material**
- **Shrinks to fit (5.6:1)**
- **FR callouts meet all of the requirements of AMS-DTL-23053/15*, except for some of the tubing sizes, which do not meet the exact recovered wall thickness requirements**
- **HRHF and HRSR have the following agency approvals:**
  - **ABS (American Bureau of Shipping)**
  - **Lloyd's (Lloyd's Register of Shipping**
- **RoHS compliant**

Applications

High-ratio (HR) heat-shrinkable tubing, with expansion ratios as high as 5.6 to 1, is designed to accommodate large size differences between cables and cable connectors and backshells, thus simplifying repair of damaged cable. High-ratio tubing is available in semirigid flame-retardant (SR), standard (NF), or high-flex flame-retardant (HF) material and with or without factory-applied sealants and adhesives. The water-proofing sealant provides environmental sealing and is watertight in wet and corrosive locations. The thermoplastic adhesive coating offers excellent strain relief and environmental sealing.

Installation

Minimum shrink temperature: 80°C [176°F]

Minimum full recovery temperature: 121°C [250°F]

Operating Temperature Range

-55°C to 110°C
[-67°F to 230°F]

Specifications/Approvals

Series	Agency	Raychem
HRSR	ABS, Lloyd's	RW-2013
HRHF	ABS, Lloyd's	RW-2013
HRNF	—	RW-2013

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

HRHF/HRNF/HRSR (Continued)

Product Dimensions

Size†	Inside Diameter		Recovered Wall Thickness††
	Minimum Expanded as Supplied	Maximum Recovered After Heating	Nominal After Heating
HR**060	15.24 [0.600]	3.81 [0.150]	1.52 [0.060]
HR**125	31.75 [1.250]	6.10 [0.240]	1.52 [0.060]
HR**175	44.45 [1.750]	8.00 [0.315]	2.41 [0.095]
HR**200	50.80 [2.000]	9.52 [0.375]	2.67 [0.105]
HR**250	63.50 [2.500]	12.70 [0.500]	3.05 [0.120]
HR**300	76.20 [3.000]	19.05 [0.750]	3.05 [0.120]
HR**400	101.60 [4.000]	22.86 [0.900]	3.56 [0.140]

†For ** substitute HF, NF or SR for material required.
††Wall thickness will be less if tubing recovery is restricted during shrinkage.

Ordering Information

Color	Standard	Black (-0)
	Nonstandard	Clear available on request (not flame-retardant; HRHF only)
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Other sizes are available upon request.	
Standard packaging	Up to 18 inch lengths maximum.*	
Ordering description	See below.	

*Cutting tolerance is ± 0.125".

Part Numbering System

HRHF - _ _ - _ / _ _

"NM" - no mark

Coating
Adhesive (/97)
Sealant (/226)
Blank for no coating

Length in inches (up to 18 inch length maximum)

"FR" - flame-retardant for SR and HF
"CL" - Clear, non-flame-retardant; HF only

Size

Product Name
HRHF - high flex
HRNF - non-flame-retardant
HRSR - semirigid

Example: HRHF-125FR-10/226-NM

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L. & S. America: 54-11-4733-2200

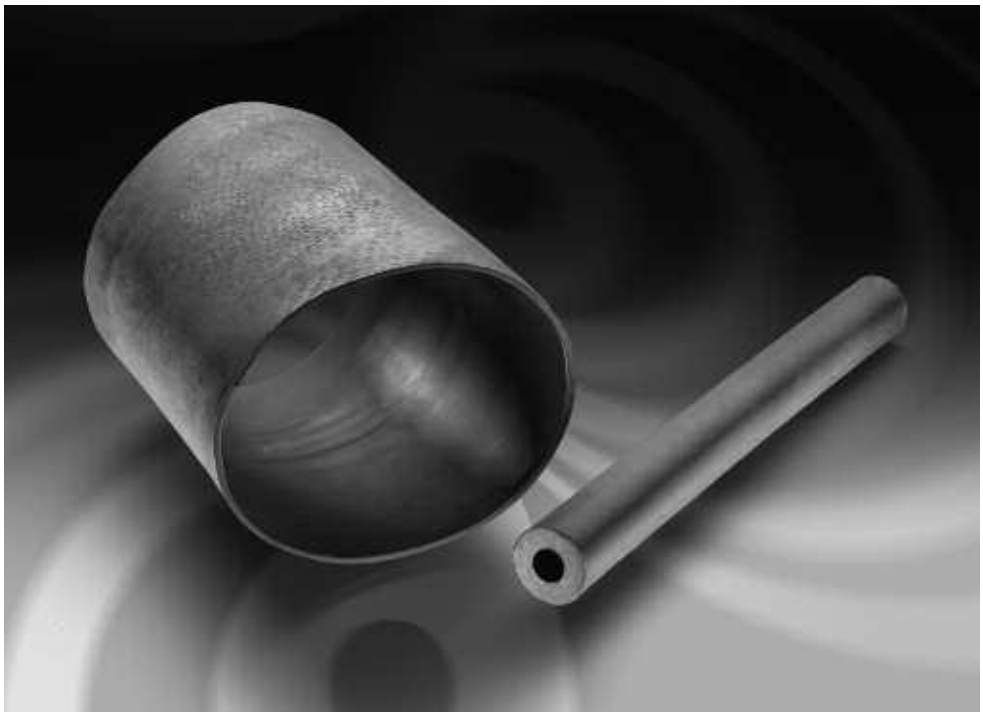
Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

HRHT

High-Ratio, High-Temperature, Flexible, Thick Wall Polyolefin Heat-Shrinkable Tubing

Product Facts

- Shrink ratios as high as 6:1
- Specially formulated for thick wall insulation, strain relief and abrasion protection
- Flame-retardant passing ASTM D 635
- Excellent performance in both hot and cold environments
- Optional factory applied adhesive provides watertight environmental sealing in wet and corrosive locations
- RoHS compliant



Applications

High-ratio (HR), high–temperature (HT) heat-shrinkable tubing, with shrink ratios as high as 6-to-1, is designed to conform to odd shapes and shrink over large transitions, allowing for the repair and sealing of cable connectors and equipment. This product can be used to seal the back end of a connector or simply repair the damaged outer insulation of a cable or wire.

Cable harnesses can be repaired and released without disassembly.

HRHT tubing is available with an optional hot melt adhesive lining. A high-performance adhesive is also available for more demanding applications.

Installation

Minimum shrink temperature: 135°C [275°F]

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

Operating Temperature Range

-55°C to 135°C
[-67°F to 275°F]

Specifications/Approvals

Series	Military	Raychem
HRHT	SAE-AS81765/1, Type II*	HRHT SCD

*heat-shrinkable, crosslinked, flexible polyolefin

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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Dimensions are shown for reference purposes only. Specifications subject to change.

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L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

HRHT (Continued)

Product Dimensions

Size†	Inside Diameter		Wall Thickness††
	Minimum Expanded as Supplied	Maximum Recovered After Heating	Nominal Recovered After Heating
HRHT-1/X	19.05 [0.750]	3.05 [0.120]	3.94 [0.155]
HRHT-2/X	38.16 [1.500]	5.84 [0.230]	3.94 [0.155]
HRHT-3/X	50.80 [2.000]	9.14 [0.360]	3.94 [0.155]
HRHT-4/X	76.20 [3.000]	12.70 [0.500]	3.94 [0.155]
HRHT-5/X	114.30 [4.500]	19.05 [0.750]	3.94 [0.155]

†"X" indicates recovered length in inches (e.g. for 3.0-inch length: HRHT-2/3). The tolerance shall be +/- 10% of the specified recovered length.
††Wall thickness will be less if tubing recovery is restricted during shrinkage.

Ordering Information

Color	Standard Black (-0)
Size selection	Always order the largest size that will shrink snugly over the component to be covered.
Standard packaging	In pieces.
Ordering description	Specify product name, size and cut length (for example, HRHT-1/3).

Part Numbering System

HRHT - _ / _ _

Add **"NA"** to the end of the part number if no adhesive is required

Unrestricted recovered length

Expanded inside diameter - as supplied

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Mexico: 52-55-1106-0800
L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

HTAT

Semiflexible, Dual Wall, Moisture-Resistant, Heat-Shrinkable Tubing

Product Facts

- 4:1 shrink ratio
- Environmental sealing
- High-strength bonding
- Well-suited connector sealing covering large diameter differences
- RoHS compliant

Applications

Designed to provide environmental sealing for a range of substrates, at elevated temperatures. Manufactured by TE from radiation-crosslinked polyolefins, the inner wall melts when heated and is forced into interstices by the shrinking of the outer wall so that, when cooled, the substrate is encapsulated by a tough, protective moisture barrier.

An operating range of -55˚C to 125˚C [-67˚F to 257˚F] and a high-shrink-ratio as standard, mean that the tubing offers superior environmental protection to a wide range of irregular shapes with varying dimensions. The jacket is flame-retardant to reduce flame propagation.

Installation

Minimum shrink temperature: 80°C [176°F]

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

Operating Temperature Range

-55°C to 125°C [-67°F to 257°F]

Specifications/Approvals

Series	Raychem
HTAT	RW-2052

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-475-6222
Mexico: 52-55-1106-0800
L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

HTAT (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness*	
	Minimum Expanded as Supplied	Maximum Recovered After Heating	Nominal Total Wall After Heating	Nominal Adhesive Wall After Heating
4/1	4.0 [0.158]	1.0 [0.039]	1.00 [0.039]	0.40 [0.016]
8/2	8.0 [0.315]	2.0 [0.079]	1.00 [0.039]	0.50 [0.020]
12/3	12.0 [0.472]	3.0 [0.118]	1.40 [0.055]	0.60 [0.024]
16/4	16.0 [0.630]	4.0 [0.158]	1.75 [0.069]	0.75 [0.030]
24/6	24.0 [0.945]	6.0 [0.236]	2.25 [0.088]	0.80 [0.032]
32/8	32.0 [1.260]	8.0 [0.315]	2.50 [0.098]	1.00 [0.039]
48/13	48.0 [1.890]	13.0 [0.512]	2.55 [0.100]	1.00 [0.039]

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

Ordering Information

Color	Standard Black (-0)
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	In 1.2-meter [4-foot] lengths.
Ordering description	Specify product name, size and color (for example, HTAT 8/2-0).

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Canada: 1-905-475-6222
Mexico: 52-55-1106-0800
L. & S. America: 54-11-4733-2200

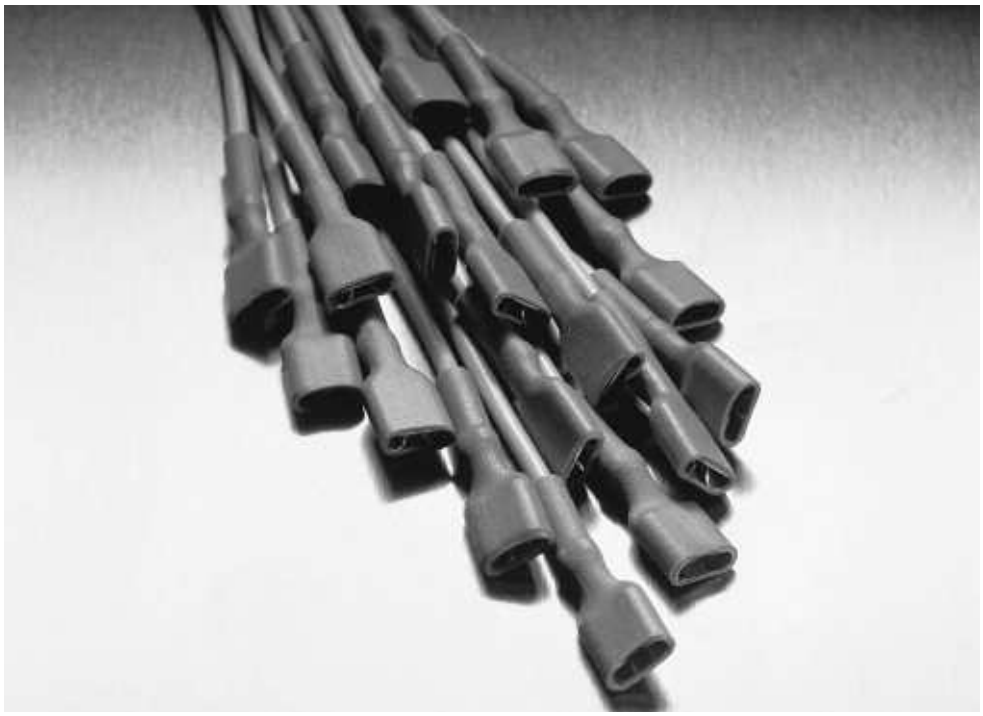
Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

LSTT

Low-Shrink-Temperature, Non-Flame-Retardant, Heat-Shrinkable, Polyolefin tubing

Product Facts

- 2:1 shrink ratio
- Rapid recovery at low temperatures
- Can be used with temperature-sensitive materials
- Flexible
- Not flame-retardant
- Excellent physical and electrical performance
- RoHS compliant



Applications

LSTT is a highly flexible, low-shrink-temperature, heat-shrinkable tubing. Its low shrink temperature offers exceptionally fast recovery for maximum efficiency in high-volume commercial applications and makes it suitable for use on or near delicate, temperature-sensitive materials, such as PVC jacketed wire and cable. Although not flame-retardant, LSTT meets the automotive flame propagation standard MVSS 302.

Typical applications include electrical termination insulation, color-coding, covering of heat-sensitive devices, cosmetic coverings, and mechanical protection.

Installation

Minimum shrink temperature: 65°C [149°F]

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

Operating Temperature Range

-40°C to 125°C
[-40°F to 257°F]

Specifications/Approvals

Series	Industry	Raychem
LSTT	MVSS302	RW-2051

Available in:	Americas	Europe	Asia Pacific
		■	

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L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

LSTT (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness*
	Minimum Expanded as Supplied	Maximum Recovered After Heating	Nominal After Heating
1.6	1.6 [0.063]	0.8 [0.031]	0.50 ± 0.12 [0.018 ± 0.005]
2.4	2.4 [0.093]	1.2 [0.046]	0.55 ± 0.12 [0.022 ± 0.005]
3.2	3.2 [0.125]	1.6 [0.062]	0.55 ± 0.12 [0.022 ± 0.005]
4.8	4.8 [0.187]	2.4 [0.093]	0.55 ± 0.12 [0.022 ± 0.005]
6.4	6.4 [0.250]	3.2 [0.125]	0.65 ± 0.15 [0.026 ± 0.006]
9.5	9.5 [0.375]	4.8 [0.187]	0.65 ± 0.15 [0.026 ± 0.006]
12.7	12.7 [0.500]	6.4 [0.250]	0.65 ± 0.15 [0.026 ± 0.006]
19.0	19.0 [0.748]	9.5 [0.375]	0.80 ± 0.15 [0.032 ± 0.006]
25.4	25.4 [1.000]	12.7 [0.500]	0.95 ± 0.18 [0.037 ± 0.007]
32.0	32.0 [1.260]	16.0 [0.630]	1.05 ± 0.20 [0.041 ± 0.008]
38.0	38.0 [1.496]	19.0 [0.748]	1.05 ± 0.20 [0.041 ± 0.008]
52.0**	52.0 [2.047]	26.0 [1.024]	1.14 ± 0.18 [0.045 ± 0.007]

*Wall thickness will be les if tubing recovery is restricted during shrinkage.
**Available in black only.

Ordering Information

Color	Standard	Black (-0), red (-2), blue (-6), yellow (-4)
	Nonstandard	Green (-5), grey (-8), white (-9), clear (-X)
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Other sizes are available upon request.	
Standard packaging	On spools***	
Ordering description	Specify product name, size and color (for example, LSTT 6.4-0).	

***Available in the convenient RaySpool packaging/dispensing system, for sizes 2.4 up to 25.4

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UK: 44-800-267-666

MicroFit

Small-Diameter, High-Shrink-Ratio Tubing

Product Facts

- Small diameter
- High shrink ratio
- Thin wall
- Polyolefin and fluoropolymer materials
- RoHS compliant
- ISO 10993-1 compliant
- USP Class VI material, no heavy metals
- Compatibility with gamma, ETO, steam and dry-heat sterilization

Applications

The family of MicroFit small diameter, high-shrink-ratio tubing is suitable for electrical insulation, mechanical protection, and strain relief in smaller, more compact medical devices and commercial electronics products. Offered in a variety of materials.

Installation

Minimum full recovery temperature:

175°C [347°F] (MT1000)

140°C [284°F] (MT2000)

Operating Temperature Range

MT1000: -55°C to 150°C [-67°F to 302°F]

MT2000: -40°C to 105°C [-40°F to 221°F]

Specifications/Approvals

Series	Material	Raychem
MT1000 is semi-rigid polyvinylidene fluoride material	USP Class VI (MT1000)	Altera MicroFit SCD
MT2000 is medical grade polyolefin material	USP Class VI (MT2000)	

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

MicroFit (Continued)

Product Dimensions

Size	As Supplied mm [inches]	Recovered mm [inches]	
	Expanded I.D. Minimum (D)	Recovered I.D. Maximum (d)	Recovered Wall Maximum (W)
MFT-*-No. 14-**	0.356 [0.014]	0.203 [0.008]	0.152 [0.006]
MFT-*-No. 2-**	0.610 [0.024]	0.305 [0.012]	0.152 [0.006]
MFT-*-No. 33-**	1.143 [0.045]	0.432 [0.017]	0.118 [0.007]
MFT-*-No. 65-**	0.635 [0.025]	0.254 [0.010]	0.330 [0.013]

*Replace single asterisk with material type: MT1000 or MT2000.
**Replace double asterisk with color-code number.
***Wall thickness will be less if tubing recovery is restricted during shrinkage.

Ordering Information

		MT1000	MT2000
Color	Standard	Translucent (-X)	Black (-0), clear (-X)
	Nonstandard	Black (-0)	White (-9), red (-2), yellow (-4), blue (-6), orange (-3)
Size selection	Always order the largest size that will shrink snugly over the component to be covered.		
Standard packaging	On plastic spools****		
Ordering description	Specify product name, material, size and color (for example, MFT-MT2000-NO.14-0).		

****MFT-MT1000 and MFT-MT2000 are double bagged.

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Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-475-6222
Mexico: 52-55-1106-0800
L. & S. America: 54-11-4733-2200

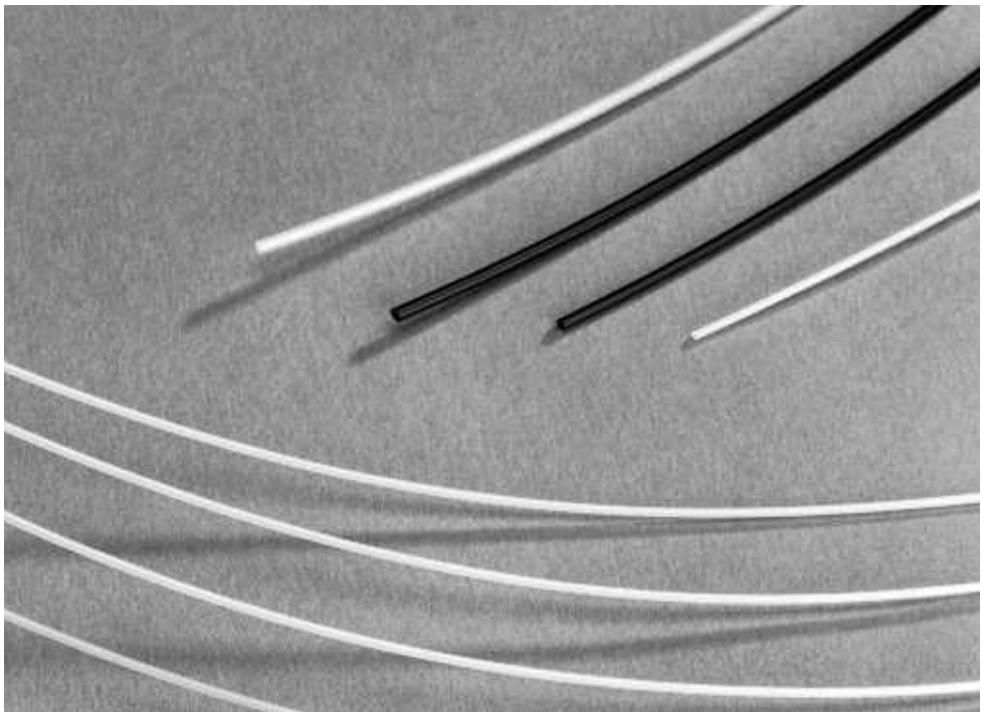
Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

MT1000

Altera Medical-Grade, USP Class VI, High-Temperature, Semirigid, Fluoropolymer Tubing

Product Facts

- **2:1 shrink ratio**
- **Tough, semirigid, very-thin-wall insulation**
- **Excellent resistance to a variety of fluids**
- **Optional inner adhesive lining (MT1000A)**
- **USP Class VI material, no heavy metals**
- **ISO 10993-1 compliant**
- **Double-bagged packaging**
- **Compatibility with gamma, ETO, steam, and dry-heat sterilization**
- **RoHS compliant**



Applications

Well-suited for electrical insulation and strain relief of components that are exposed to high temperatures - either during operation or during sterilization.

Thin-wall construction is well-suited for applications with clearance constraints.

Installation

Minimum shrink temperature: 155°C [311°F]

Minimum full recovery temperature: 175°C [347°F]

Operating Temperature Range

-55°C to 150°C [-67°F to 302°F]

Specifications/Approvals

Series	Material	Raychem
MT1000	USP Class VI	MT1000 SCD
MT1000A	USP Class VI	MT1000A SCD

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

MT1000 (Continued)

Product Dimensions

Size	As Supplied mm [inches]	Recovered mm [inches]			
	Inside Diameter Minimum (D)	Inside Diameter Maximum (d)	Wall Thickness (W) Minimum	Maximum	Nominal
3/64	1.17 [0.046]	0.58 [0.023]	0.20 [0.008]	0.31 [0.12]	0.25 [0.010]
1/16	1.60 [0.063]	0.79 [0.031]	0.20 [0.008]	0.31 [0.12]	0.25 [0.010]
3/32	2.36 [0.093]	1.17 [0.046]	0.20 [0.009]	0.31 [0.12]	0.25 [0.010]
1/8	3.18 [0.125]	1.58 [0.062]	0.20 [0.009]	0.31 [0.12]	0.25 [0.010]
3/16	4.75 [0.187]	2.36 [0.093]	0.20 [0.009]	0.31 [0.12]	0.25 [0.010]
1/4	6.35 [0.250]	3.18 [0.125]	0.28 [0.011]	0.38 [0.15]	0.33 [0.013]
3/8	9.53 [0.375]	4.75 [0.187]	0.28 [0.011]	0.38 [0.15]	0.33 [0.013]
1/2	12.70 [0.500]	6.35 [0.250]	0.28 [0.011]	0.38 [0.15]	0.33 [0.013]

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

Ordering Information

Color	Standard	Black (-0), Translucent (-X)
	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	In 1.2-meter (4-foot) lengths, double bagged.	
Ordering description	Specify product name, size and color (for example, MT1000-1/8-X). Specify MT1000A for adhesive-lined constructions (special order).	

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Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

MT2000

Altera Medical-Grade, USP Class VI, Lubricious, Thin-Wall, Polyolefin Tubing

Product Facts

- **2.5:1 shrink ratio**
- **Lubricity comparable to FEP**
- **Excellent electrical insulation properties**
- **Can be manufactured with a very thin wall**
- **Optional inner adhesive lining (MT2000A)**
- **USP Class VI material, no heavy metals**
- **ISO 10993-1 compliant**
- **Plastic spools and double-bagged packaging**
- **Compatibility with gamma and ETO sterilization**
- **RoHS compliant**

Applications

Especially suitable for medical applications requiring lubricity, flexibility, and excellent electrical insulation performance. A cost-effective alternative to FEP (fluorinated ethylene-propylene) while maintaining performance after gamma sterilization.

Installation

Minimum shrink temperature: 110°C [230°F]

Minimum full recovery temperature: 140°C [284°F]

Operating Temperature Range

-40°C to 105°C [-40°F to 221°F]

Specifications/Approvals

Series	Material	Raychem
MT2000	USP Class VI	MT2000 SCD
MT2000A	USP Class VI	MT2000A SCD

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

MT2000 (Continued)

Product Dimensions

Size	As Supplied mm [inches]	Recovered mm [inches]			
	Inside Diameter Minimum (D)	Inside Diameter Maximum (d)	Wall Thickness (W) Minimum	Maximum	Nominal
1 mm	1.0 [0.040]	0.45 [0.018]	0.20 [0.008]	0.30 [0.12]	0.25 [0.010]
2 mm	2.0 [0.080]	0.80 [0.032]	0.20 [0.008]	0.30 [0.12]	0.25 [0.010]
3 mm	3.0 [0.120]	1.20 [0.048]	0.20 [0.008]	0.30 [0.12]	0.25 [0.010]
6 mm	6.0 [0.240]	2.40 [0.096]	0.20 [0.008]	0.30 [0.12]	0.25 [0.010]
10 mm	10.0 [0.400]	4.00 [0.160]	0.30 [0.012]	0.41 [0.16]	0.36 [0.014]

Ordering Information

Color	Standard	Black (-0), clear (-X)
	Nonstandard	White (-9), red (-2), blue (-6), yellow (-4), orange (-3)
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 plastic spools, double-bagged.	
Ordering description	Specify product name, size and color (for example, MT2000-3.0-0). Specify MT2000A for adhesive-lined constructions (special order).	

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Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

MT3000

Altera Medical-Grade, USP Class VI, High-Temperature, Flexible, Fluoropolymer Tubing

Product Facts

- **2:1 shrink ratio**
- **Tough, flexible, very-thin-wall insulation**
- **Excellent resistance to a variety of fluids**
- **Optional inner adhesive lining (MT3000A)**
- **USP Class VI material, no heavy metals**
- **ISO 10993-1 compliant**
- **Plastic spools and double-bagged packaging**
- **Compatibility with steam (limited cycles), gamma, ETO, and dry-heat sterilization**
- **RoHS compliant**

Applications

Used for electrical insulation and strain relief of components that are exposed to high temperatures - either during operation or during sterilization. Exceptional flexibility and thin-wall construction are well-suited for applications where pliancy coupled with small overall bundle size is desired.

Installation

Minimum shrink temperature: 140°C [284°F]

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

Operating Temperature Range

-55°C to 140°C [-67°F to 284°F]

Specifications/Approvals

Series	Material	Raychem
MT3000	USP Class VI	MT3000 SCD
MT3000A	USP Class VI	MT3000A SCD

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

MT3000 (Continued)

Product Dimensions

Size	As Supplied mm [inches]	Recovered mm [inches]			
	Inside Diameter Minimum (D)	Inside Diameter Maximum (d)	Wall Thickness (W) Minimum	Maximum	Nominal
3/64	1.17 [0.046]	0.58 [0.023]	0.20 [0.008]	0.31 [0.12]	0.25 [0.010]
1/16	1.60 [0.063]	0.79 [0.031]	0.20 [0.008]	0.31 [0.12]	0.25 [0.010]
3/32	2.36 [0.093]	1.17 [0.046]	0.20 [0.008]	0.31 [0.12]	0.25 [0.010]
1/8	3.18 [0.125]	1.58 [0.062]	0.20 [0.008]	0.31 [0.12]	0.25 [0.010]
3/16	4.75 [0.187]	2.36 [0.093]	0.20 [0.008]	0.31 [0.12]	0.25 [0.010]
1/4	6.35 [0.250]	3.18 [0.125]	0.28 [0.009]	0.38 [0.15]	0.33 [0.012]
3/8	9.53 [0.375]	4.75 [0.187]	0.28 [0.009]	0.38 [0.15]	0.33 [0.012]
1/2	12.70 [0.500]	6.35 [0.250]	0.28 [0.009]	0.38 [0.15]	0.33 [0.012]

*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 plastic spools, double-bagged.	
Ordering description	Specify product name, size and color (for example, MT3000 1/4-0).	

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Japan: 81-44-844-8013
UK: 44-800-267-666

MT5000

Altera Medical-Grade, USP Class VI, Flexible, Polyolefin Tubing

Product Facts

- 2:1 shrink ratio
- Flexibility; variety of colors
- Excellent electrical insulation properties
- Inner adhesive lining optional (MT5000A)
- USP Class VI material, no heavy metals
- ISO 10993-1 compliant
- Plastic spools and double-bagged packaging
- Compatibility with gamma and ETO sterilization
- RoHS compliant

Applications

Especially suitable for applications requiring excellent electrical insulation performance and resistance to abrasion and harmful solvents such as electrosurgical instruments. Also used for strain relief, color coding, and identification of many medical components and devices.

Installation

Minimum shrink temperature: 90°C [194°F]

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

Operating Temperature Range

-70°C to 90°C
[-94°F to 194°F]

Specifications/Approvals

Series	Material	Raychem
MT5000	USP Class VI	MT5000 SCD
MT5000A	USP Class VI	MT5000A SCD

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

MT5000 (Continued)

Product Dimensions

Size	As Supplied mm [inches]	Recovered mm [inches]			
	Inside Diameter Minimum (D)	Inside Diameter Maximum (d)	Wall Thickness (W) Minimum	Wall Thickness (W) Maximum	Wall Thickness (W) Nominal
3/64	1.17 [0.046]	0.58 [0.023]	0.33 [0.013]	0.48 [0.019]	0.40 [0.016]
1/16	1.60 [0.063]	0.79 [0.031]	0.35 [0.014]	0.50 [0.020]	0.43 [0.017]
3/32	2.36 [0.093]	1.17 [0.046]	0.43 [0.017]	0.58 [0.023]	0.50 [0.020]
1/8	3.18 [0.125]	1.58 [0.062]	0.43 [0.017]	0.58 [0.023]	0.50 [0.020]
3/16	4.75 [0.187]	2.36 [0.093]	0.43 [0.017]	0.58 [0.023]	0.50 [0.020]
1/4	6.35 [0.250]	3.18 [0.125]	0.56 [0.022]	0.71 [0.028]	0.64 [0.025]
3/8	9.53 [0.375]	4.75 [0.187]	0.56 [0.022]	0.71 [0.028]	0.64 [0.025]
1/2	12.70 [0.500]	6.35 [0.250]	0.56 [0.022]	0.71 [0.028]	0.64 [0.025]
3/4	19.05 [0.750]	9.53 [0.375]	0.69 [0.027]	0.84 [0.033]	0.76 [0.030]

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

Ordering Information

Color	Standard	Black (-0), clear (-X), and blue (-6)
	Nonstandard	White (-9), red (-2), yellow (-4), green (-5)
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 plastic spools, double-bagged.	
Ordering description	Specify product name, size and color (for example, MT5000-1/4-0). Specify MT5000A for adhesive-lined constructions (special order).	

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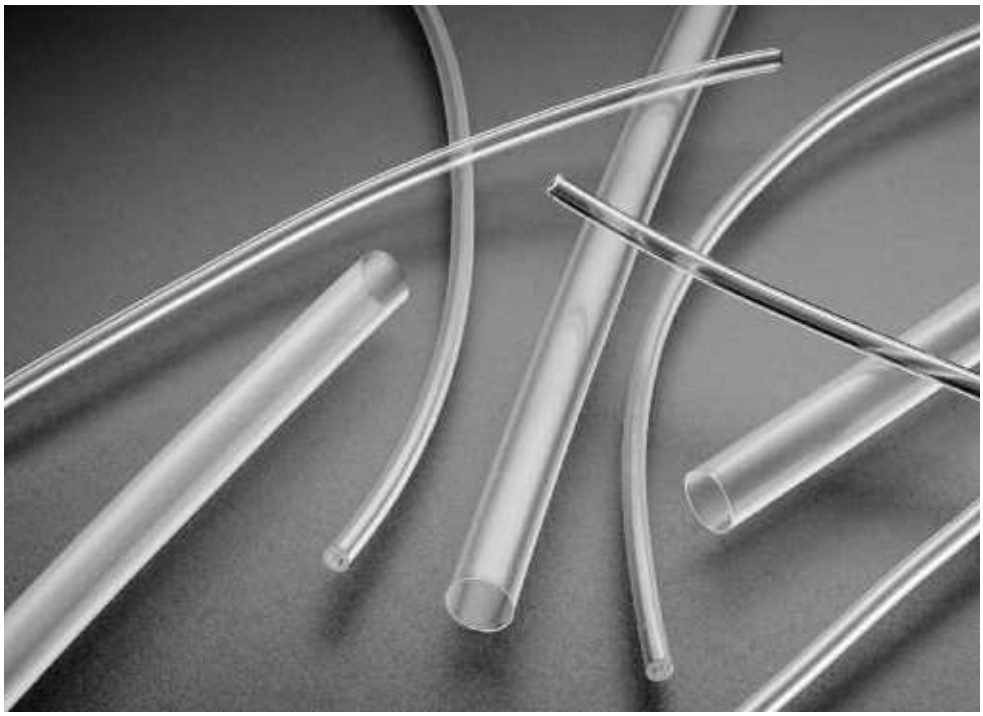
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

MT6000

Altera Medical-Grade, USP Class VI, High Shrink Ratio, Polyolefin Tubing

Product Facts

- **4:1 shrink ratio or greater**
- **Custom and larger shrink ratios available**
- **Flexible; variety of colors**
- **Excellent electrical insulation properties**
- **Inner adhesive lining optional (MT6000A)**
- **USP Class VI material, no heavy metals**
- **ISO 10993-1 compliant**
- **Plastic spools and double-bagged packaging**
- **Compatibility with gamma and ETO sterilization**
- **RoHS compliant**



Applications

Designed for applications that need 4:1 or larger shrink ratios. Provides excellent electrical insulation performance and resistance to abrasion and harmful solvents. Also used for strain relief, color coding, identification of components and devices, and process aid.

Installation

Minimum shrink temperature: 90°C [194°F]

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

Operating Temperature Range

-70°C to 90°C
[-94°F to 194°F]

Specifications/Approvals

Series	Material	Raychem
MT6000	USP Class VI	MT6000 SCD
MT6000A	USP Class VI	MT6000A SCD

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

MT6000 (Continued)

Product Dimensions

Size	As Supplied mm [inches]	Recovered mm [inches]			
	Inside Diameter Minimum (D)	Inside Diameter Maximum (d)	Wall Thickness (W) Minimum	Maximum	Nominal
3/16	4.75 [0.187]	1.17 [0.046]	0.43 [0.017]	0.58 [0.023]	0.51 [0.020]
1/4	6.35 [0.250]	1.57 [0.062]	0.43 [0.017]	0.58 [0.023]	0.51 [0.020]
3/8	9.53 [0.375]	2.36 [0.093]	0.43 [0.017]	0.58 [0.023]	0.51 [0.020]
1/2	12.70 [0.500]	3.18 [0.125]	0.56 [0.022]	0.71 [0.028]	0.64 [0.025]

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

Ordering Information

Color	Standard	Black (-0), clear (-X)
	Nonstandard	Blue (-6), red (-2), white (-9), yellow (-4), green (-5)
Size selection	Always order the largest size that will recover snugly over the substrate. Special order sizes are available upon request.	
Standard packaging	On plastic spools, double-bagged.	
Ordering description	Specify product name, size and color (for example, MT6000-3/16-X) Specify MT6000A for adhesive-lined constructions (special order).	

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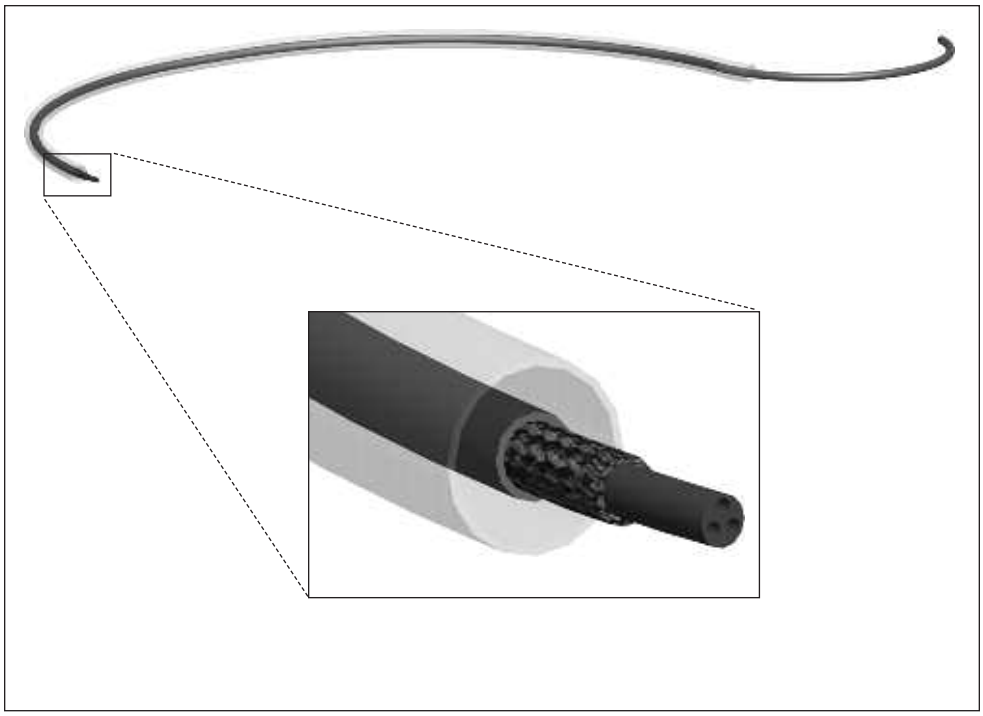
Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

MT-FEP (Heat-Shrinkable Fluorinated Ethylene Propylene)

Altera Medical-Grade, USP Class VI, Heat-Shrinkable FEP Tubing

Product Facts

- **Standard 1.6:1 shrink ratio**
- **Tight control of longitudinal change, standard +/- 5%**
- **High temperature, low friction, non-reactive material**
- **Excellent electrical insulation, mechanical protection, and chemical resistance**
- **Cut pieces, double bagged**
- **Transparent and resistant to UV damage**
- **USP Class VI material, no heavy metals**
- **ISO 10993-1 compliant**
- **Compatible with autoclave sterilization; ethylene oxide, steam, and dry-heat**
- **RoHS compliant**



Applications

Designed specifically to meet the demanding needs of the catheter and medical device industry. Well-suited for process aid as well as electrical insulation, mechanical protection, and chemical resistance.

Installation

Minimum shrink temperature: 190°C [374°F]

Minimum full recovery temperature: 210°C [410°F]

Specifications/Approvals

Series	Material	Raychem
MT-FEP	USP Class VI	MT-FEP SCD

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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UK: 44-800-267-666

MT-FEP (Continued)

Product Dimensions

Size	As Supplied mm [inches]	Recovered mm [inches]			
	Inside Diameter Minimum (D)	Inside Diameter Maximum (d)	Wall Thickness (W) Minimum	Wall Thickness (W) Maximum	Wall Thickness (W) Nominal
1/32	0.9 [0.035]	0.6 [0.025]	0.15 [0.006]	0.25 [0.010]	0.20 [0.008]
3/64	1.1 [0.045]	0.8 [0.032]	0.15 [0.006]	0.25 [0.010]	0.20 [0.008]
1/16	1.6 [0.063]	1.0 [0.040]	0.15 [0.006]	0.25 [0.010]	0.20 [0.008]
3/32	2.7 [0.093]	1.4 [0.056]	0.15 [0.006]	0.25 [0.010]	0.20 [0.008]
1/8	3.2 [0.125]	1.9 [0.075]	0.18 [0.007]	0.33 [0.013]	0.25 [0.010]
3/16	4.8 [0.188]	2.9 [0.115]	0.18 [0.007]	0.33 [0.013]	0.25 [0.010]
1/4	6.4 [0.250]	3.8 [0.150]	0.18 [0.007]	0.33 [0.013]	0.25 [0.010]
3/8	9.5 [0.375]	5.7 [0.225]	0.23 [0.009]	0.38 [0.015]	0.30 [0.012]
1/2	12.7 [0.500]	7.6 [0.300]	0.28 [0.011]	0.48 [0.019]	0.38 [0.015]

Ordering Information

Color	Clear (-X) standard
Size selection	Order the appropriate FEP size based on your substrate. Special order sizes are available upon request.
Standard packaging	In 4-foot (1.2 meter) lengths (-stk) double bagged.
Ordering description	Specify product name and size (for example, MT-FEP-093-056-X-STK).

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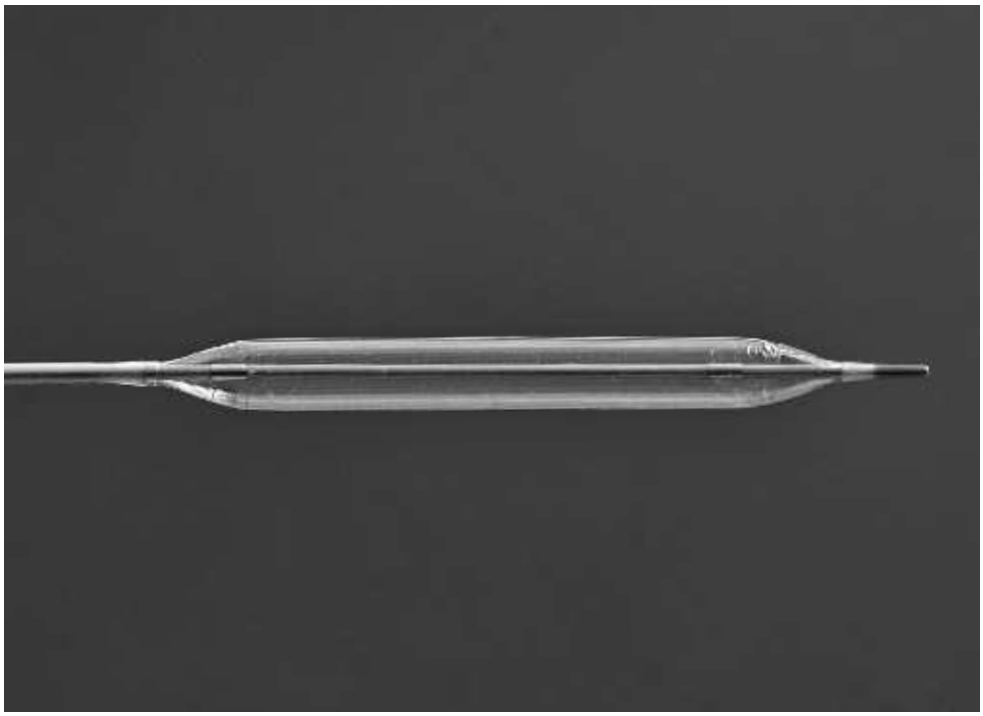
Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

MT-LWA

Altera Medical Grade, Laser-Welding Application Process Aid, Polyolefin Tubing

Product Facts

- **3:1 shrink ratio, custom ratios and sizes available**
- **Flexible; forms to irregular shapes**
- **Good clarity needed for laser welding and other bonding operations**
- **Excellent electrical insulation properties**
- **Removes easily after application, good axial tear propagation**
- **On plastic spools double bag packaging**
- **USP Class VI, no heavy metals**
- **ISO 10993-1 compliant**
- **RoHS compliant**



Applications

Well-suited for laser-welding operations of stents and balloons, hot jaw bonding or other secondary value-added processes. Heat-shrinkable product will hold joints in place during operation and removes easily without residue or damage to the end product.

Installation

Minimum shrink temperature: 95°C [203°F]

Minimum full recovery temperature: 121°C [250°F]

Specifications/Approvals

Series	Raychem
MT-LWA	MT-LWA SCD

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-475-6222
Mexico: 52-55-1106-0800
L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

MT-LWA (Continued)

Product Dimensions

2:1 Expansion Ratio Dimensions (±)

Size	As Supplied mm [inches] Inside Diameter (D)	Recovered mm [inches] Inside Diameter (d)	Recovered mm [inches] Wall Thickness (W)
1/32	1.02 ± 0.13 [0.040 ± 0.005]	0.33 ± 0.05 [0.013 ± 0.002]	0.25 ± 0.05 [0.010 ± 0.002]
3/64	1.40 ± 0.13 [0.055 ± 0.005]	0.51 ± 0.08 [0.020 ± 0.003]	0.31 ± 0.05 [0.012 ± 0.002]
1/16	1.83 ± 0.13 [0.072 ± 0.005]	0.69 ± 0.10 [0.027 ± 0.004]	0.43 ± 0.08 [0.017 ± 0.003]
3/32	2.72 ± 0.20 [0.107 ± 0.008]	1.07 ± 0.10 [0.042 ± 0.004]	0.51 ± 0.08 [0.020 ± 0.003]
1/8	3.56 ± 0.25 [0.140 ± 0.010]	1.45 ± 0.13 [0.057 ± 0.005]	0.51 ± 0.08 [0.020 ± 0.003]
3/16	5.21 ± 0.25 [0.205 ± 0.010]	2.18 ± 0.18 [0.086 ± 0.007]	0.51 ± 0.08 [0.020 ± 0.003]
1/4	6.99 ± 0.38 [0.275 ± 0.015]	2.97 ± 0.20 [0.117 ± 0.008]	0.64 ± 0.08 [0.025 ± 0.003]
3/8	10.54 ± 0.51 [0.415 ± 0.020]	4.34 ± 0.41 [0.171 ± 0.016]	0.64 ± 0.08 [0.025 ± 0.003]

3:1 Expansion Ratio Dimensions (Min./Max)

Size	As Supplied mm [inches] Inside Diameter (D) Minimum	Recovered mm [inches] Inside Diameter (d) Maximum	Recovered mm [inches] Wall Thickness (W) Nominal
0.032	0.81 [0.032]	0.28 [0.011]	0.25 ± 0.05 [0.010 ± 0.002]
0.063	1.60 [0.063]	0.53 [0.021]	0.41 ± 0.05 [0.016 ± 0.002]
0.078	1.98 [0.078]	0.64 [0.025]	0.41 ± 0.05 [0.016 ± 0.002]
0.094	2.39 [0.094]	0.79 [0.031]	0.51 ± 0.08 [0.020 ± 0.003]
0.110	2.79 [0.110]	0.86 [0.034]	0.51 ± 0.08 [0.020 ± 0.003]
0.125	3.18 [0.125]	1.07 [0.042]	0.51 ± 0.08 [0.020 ± 0.003]
0.188	4.78 [0.188]	1.60 [0.063]	0.51 ± 0.08 [0.020 ± 0.003]
0.250	6.35 [0.250]	2.11 [0.083]	0.64 ± 0.08 [0.025 ± 0.003]
0.375	9.53 [0.375]	3.18 [1.125]	0.64 ± 0.08 [0.025 ± 0.003]

Ordering Information

Color	Clear (-X) Only
Size selection	Always order the largest size that will recover snugly over the substrate. Special order sizes are available upon request.
Standard packaging	On plastic spools (SP), double-bagged.
Ordering description	Specify product name and size (for example, MT-LWA-032-X-SP).

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Japan: 81-44-844-8013
UK: 44-800-267-666

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Japan: 81-44-844-8013
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Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

NT

Flexible, General Purpose Modified Elastomeric Tubing

Product Facts

- **Remains flexible at temperatures as low as -55˚C [-67˚F]**
- **Offers good resistance to abrasion and physical abuse while providing the flexibility and strain relief needed in general-purpose harnessing applications**
- **Resistant to most common fluids and solvents**
- **RoHS compliant**

Applications

Widely used for insulation, strain relief, and abrasion protection on cable harnesses and wire bundles in the commercial electronics industries where a reliable general-purpose tubing is needed. Suitable for applications requiring some exposure to common fluids and solvents.

Installation

Minimum shrink temperature: 90°C [194°F]

Minimum full recovery temperature: 135°C [275°F]

Operating Temperature Range

-55°C to 90°C [-67°F to 194°F]

Specifications/Approvals

Series	Raychem
NT	RT-510

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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USA: 1-800-522-6752
Canada: 1-905-475-6222
Mexico: 52-55-1106-0800
L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

NT (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness**
	Minimum Expanded as Supplied	Maximum Recovered After Heating	After Heating
1/8	3.2 [0.125]	1.6 [0.061]	0.69 ± 0.20 [0.027 ± 0.008]
3/16	4.8 [0.187]	2.5 [0.100]	0.84 ± 0.25 [0.033 ± 0.010]
1/4	6.4 [0.250]	3.6 [0.143]	0.89 ± 0.25 [0.035 ± 0.010]
3/8	9.5 [0.375]	5.5 [0.214]	1.01 ± 0.25 [0.040 ± 0.010]
1/2	12.7 [0.500]	7.3 [0.286]	1.21 ± 0.38 [0.048 ± 0.015]
5/8	15.9 [0.625]	9.1 [0.357]	1.32 ± 0.38 [0.052 ± 0.015]
3/4	19.1 [0.750]	10.9 [0.428]	1.44 ± 0.38 [0.057 ± 0.015]
7/8	22.2 [0.875]	12.7 [0.500]	1.65 ± 0.38 [0.065 ± 0.015]
1	25.4 [1.000]	14.5 [0.570]	1.77 ± 0.51 [0.070 ± 0.020]
1 1/4	31.8 [1.250]	18.1 [0.714]	2.20 ± 0.51 [0.087 ± 0.020]
1 1/2	38.1 [1.500]	21.8 [0.857]	2.41 ± 0.51 [0.095 ± 0.020]
1 3/4	44.5 [1.750]	25.4 [1.000]	2.71 ± 0.51 [0.107 ± 0.020]
2	50.8 [2.000]	29.0 [1.140]	2.79 ± 0.51 [0.110 ± 0.020]
3	76.2 [3.000]	43.4 [1.710]	3.17 ± 0.51 [0.125 ± 0.020]
4	101.6 [4.000]	57.9 [2.280]	3.55 ± 0.51 [0.140 ± 0.020]

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

Ordering Information

Color	Standard Black (-0)
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, NT 1/4-0).

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Mexico: 52-55-1106-0800
L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

NT-MIL

Flexible, Rugged, Modified Elastomeric Tubing

Product Facts

- **Remains flexible at temperatures as low as -70°C [94°F] without cracking**
- **Withstands heat shock at 200°C [392°F] without dripping, flowing or cracking**
- **Offers outstanding resistance to abrasion and physical abuse while providing flexibility and strain relief needed in rugged harnessing applications**
- **Resistant to most fluids and solvents, including aviation and ground vehicle fuels, lubricating oil, and hydraulic fluids**
- **Meets the stringent requirements of SAE-AMS-DTL-23053/1, Classes 1 and 2**
- **RoHS compliant**

Applications

Widely used for insulation, strain relief and abrasion protection on cable harnesses and wire bundles in the military and aerospace industries where a reliable rugged tubing is needed. Especially suitable for applications requiring exposure to common fluids and solvents.

Installation

Minimum shrink temperature: 90°C [194°F]

Minimum full recovery temperature: 135°C [275°F]

Operating Temperature Range

-70°C to 121°C
[-94°F to 250°F]

Specifications/Approvals

Series	Military	Raychem
NT-MIL	AMS-DTL-23053/1*, Classes 1 & 2	RW-3030

*Formerly MIL-I-23053/1 and MIL-DTL-23053/1

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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USA: 1-800-522-6752
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Mexico: 52-55-1106-0800
L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

NT-MIL (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness*
	Minimum Expanded as Supplied	Maximum Recovered After Heating	After Heating
1/8	3.2 [0.125]	1.6 [0.061]	0.69 ± 0.20 [0.027 ± 0.008]
3/16	4.8 [0.187]	2.5 [0.100]	0.84 ± 0.25 [0.033 ± 0.010]
1/4	6.4 [0.250]	3.6 [0.143]	0.89 ± 0.25 [0.035 ± 0.010]
3/8	9.5 [0.375]	5.4 [0.211]	1.01 ± 0.25 [0.040 ± 0.010]
1/2	12.7 [0.500]	7.3 [0.286]	1.21 ± 0.38 [0.048 ± 0.015]
5/8	15.9 [0.625]	9.1 [0.357]	1.32 ± 0.38 [0.052 ± 0.015]
3/4	19.1 [0.750]	10.9 [0.428]	1.44 ± 0.38 [0.057 ± 0.015]
7/8	22.2 [0.875]	12.7 [0.500]	1.65 ± 0.38 [0.065 ± 0.015]
1	25.4 [1.000]	14.5 [0.570]	1.77 ± 0.51 [0.070 ± 0.020]
1 1/4	31.8 [1.250]	18.1 [0.714]	2.20 ± 0.51 [0.087 ± 0.020]
1 1/2	38.1 [1.500]	21.8 [0.857]	2.41 ± 0.51 [0.095 ± 0.020]
1 3/4	44.5 [1.750]	25.4 [1.000]	2.71 ± 0.51 [0.107 ± 0.020]
2	50.8 [2.000]	29.0 [1.140]	2.79 ± 0.51 [0.110 ± 0.020]
3	76.2 [3.000]	43.4 [1.710]	3.17 ± 0.51 [0.125 ± 0.020]
4	101.6 [4.000]	57.9 [2.280]	3.55 ± 0.51 [0.140 ± 0.020]

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

Ordering Information

Color	Standard Black (-0)
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, NT-MIL 1/4-0).

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Mexico: 52-55-1106-0800
L. & S. America: 54-11-4733-2200

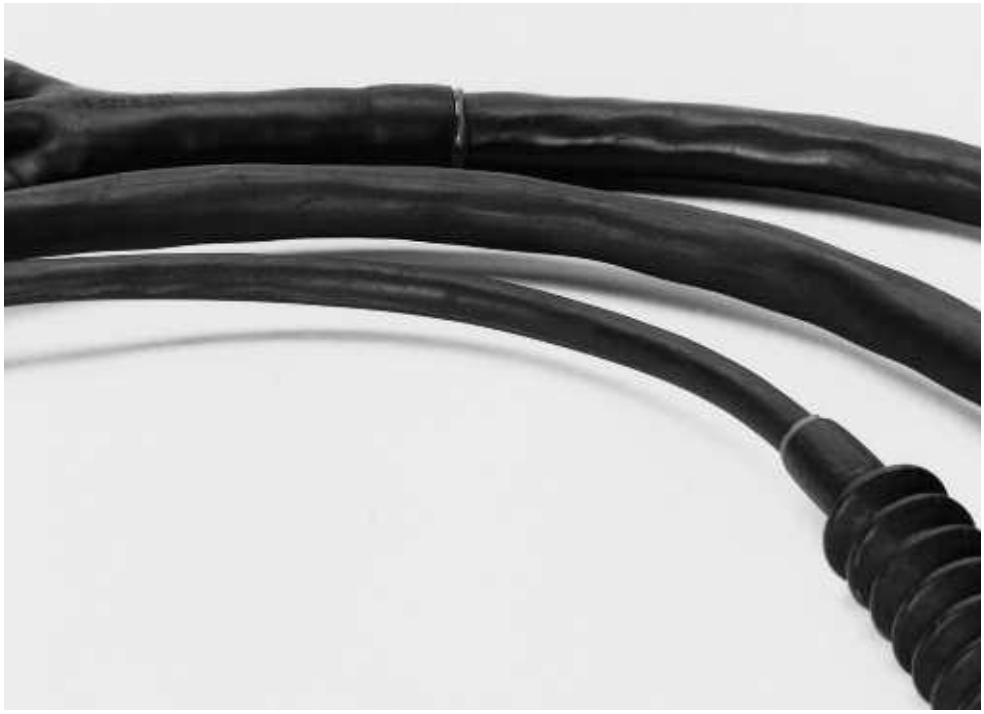
Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

NTFR

Very Flexible, Rugged Neoprene Elastomer Tubing

Product Facts

- Remains flexible at low temperatures without cracking
- Offers outstanding resistance to abrasion and physical abuse while providing the flexibility and strain relief needed for rugged applications
- Resistant to most fluids and solvents, including aviation and ground-vehicle fuels, lubricating oil, and hydraulic fluids (see Raychem Specification RT-511)
- Performance exceeds the stringent requirements of SAE-AMS-DTL-23053/1, Class 2
- System 20
- RoHS compliant



Applications

Widely used for insulation, strain relief, and abrasion protection on cable harnesses and wire bundles in the military and aerospace industries. Especially suitable for applications requiring exposure to fluids and solvents at elevated temperatures.

Installation

Minimum shrink temperature: 90°C [194°F]

Minimum full recovery temperature: 135°C [275°F]

Operating Temperature Range

-70°C to 121°C
[-94°F to 250°F]

Specifications/Approvals

Series	Military	Agency	Raychem
NTFR	SC-X-15112	AMS 3623	RT-511

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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USA: 1-800-522-6752
Canada: 1-905-475-6222
Mexico: 52-55-1106-0800
L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

NTFR (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness**
	Minimum Expanded as Supplied	Maximum Recovered After Heating	After Heating
1/8	3.2 [0.125]	1.6 [0.061]	0.69 ± 0.20 [0.027 ± 0.008]
3/16	4.8 [0.187]	2.5 [0.100]	0.84 ± 0.25 [0.033 ± 0.010]
1/4	6.4 [0.250]	3.6 [0.143]	0.89 ± 0.25 [0.035 ± 0.010]
3/8	9.5 [0.375]	5.5 [0.214]	1.01 ± 0.25 [0.040 ± 0.010]
1/2	12.7 [0.500]	7.3 [0.286]	1.21 ± 0.38 [0.048 ± 0.015]
5/8	15.9 [0.625]	9.1 [0.357]	1.32 ± 0.38 [0.052 ± 0.015]
3/4	19.1 [0.750]	10.9 [0.428]	1.44 ± 0.38 [0.057 ± 0.015]
7/8	22.2 [0.875]	12.7 [0.500]	1.65 ± 0.38 [0.065 ± 0.015]
1	25.4 [1.000]	14.5 [0.570]	1.77 ± 0.51 [0.070 ± 0.020]
1 1/4	31.8 [1.250]	18.1 [0.714]	2.20 ± 0.51 [0.087 ± 0.020]
1 1/2	38.1 [1.500]	21.8 [0.857]	2.41 ± 0.51 [0.095 ± 0.020]
1 3/4	44.5 [1.750]	25.4 [1.000]	2.71 ± 0.51 [0.107 ± 0.020]
2	50.8 [2.000]	29.0 [1.140]	2.79 ± 0.51 [0.110 ± 0.020]
3	76.2 [3.000]	43.4 [1.710]	3.17 ± 0.51 [0.125 ± 0.020]

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

Ordering Information

Color	Standard Black (-0)
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, NTFR 1/4-0).

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Japan: 81-44-844-8013
UK: 44-800-267-666

PD Caps

Semirigid, Encapsulant-Lined, Polyolefin Caps

Product Facts

- 3:1 shrink ratio
- Permanent or temporary way to terminate wires
- Rapid, simple installation
- Rugged protection against abrasion, vibration, and flexing
- PD caps provide a splash-resistant, moisture-resistant covering (but not intended for use where immersion in fluids is required)
- RoHS compliant

Applications

PD Caps offer an improved, inexpensive way to encapsulate crimped electrical connections, including those on motor coils. Their encapsulant lining melts and flows to fill surface irregularities of the substrate. These vibration-proof caps are used to insulate and terminate dead-end electrical cables, fixtures, connectors, and other electrical components.

Installation

Minimum shrink temperature: 125°C [257°F]

Minimum full recovery temperature: 135°C [275°F]

Operating Temperature Range

-55°C to 110°C
[-67°F to 230°F]

Specifications/Approvals

Series	UL	Raychem
PD Caps	E85381 600 V, 125°C	PD Caps SCD

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

PD Caps (Continued)

Product Dimensions

Size	Length		Inside Diameter		Recovered Wall Thickness** Total Wall After Heating
	Nominal Overall as Supplied	Minimum Open Barrel as Supplied*	Minimum Expanded as Supplied	Maximum Recovered After Heating	
1/8	25.4 [1.00]	12.7 [0.50]	3.18 [0.125]	0.58 [0.023]	1.22 ± 0.15 [0.048 ± 0.006]
3/16	25.4 [1.00]	15.2 [0.60]	4.75 [0.187]	1.52 [0.060]	1.57 ± 0.20 [0.062 ± 0.008]
1/4	28.4 [1.12]	15.2 [0.60]	6.35 [0.250]	2.03 [0.080]	1.98 ± 0.25 [0.078 ± 0.010]
3/8	31.8 [1.25]	18.3 [0.72]	9.53 [0.375]	2.29 [0.090]	2.08 ± 0.25 [0.082 ± 0.010]
1/2	38.1 [1.50]	21.6 [0.85]	12.70 [0.500]	2.29 [0.090]	2.54 ± 0.25 [0.100 ± 0.010]

*See glossary for definition of “barrel.”
**Wall thickness will be less if recovery is restricted during shrinkage.

Ordering Information

Color	Standard Black (-0)
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	In pieces.
Ordering description	Specify product name, size and color (for example, PD Caps 1/4-0).

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USA: 1-800-522-6752
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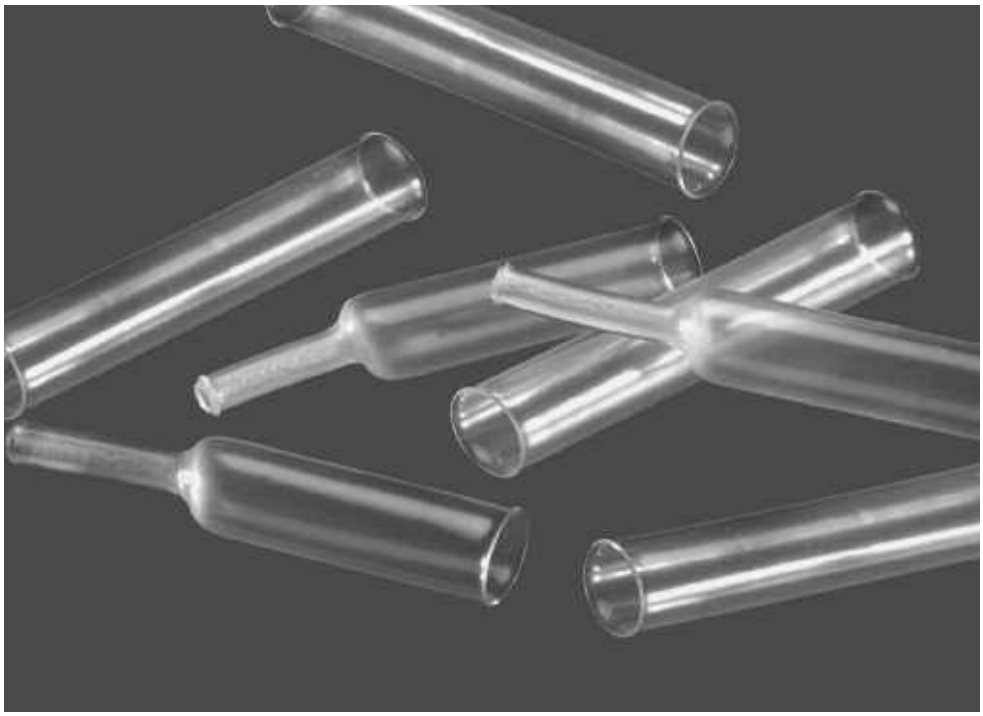
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

PTCM

Very High-Shrink-Ratio, Dual Wall, Flexible Heat-Shrinkable Tubing

Product Facts

- 6:1 shrink ratio
- Exceptional abrasion and cut through resistance
- Low shrink temperature for rapid installation
- Excellent mechanical strength
- RoHS compliant



Applications

PTCM is a flexible, heat-shrinkable, dual wall tubing with an integrally bonded meltable adhesive liner. PTCM offers outstanding mechanical and environmental protection to wire splices and terminals and is used for moisture proof encapsulation of a wide variety of components. In particular, it adheres well to PVC. With an impressive 6:1 expansion ratio, one product can protect and insulate a wide range of applications. PTCM also offers exceptional clarity for protection of substrates that may need to be inspected during service.

Installation

Minimum shrink temperature: 60°C [140°F]

Minimum full recovery temperature: 80°C [176°F]

Operating Temperature Range

-40°C to 85°C
[-40°F to 185°F]

Specifications/Approvals

Series	Raychem
PTCM	RK-6768

Available in:	Americas	Europe	Asia Pacific
		■	

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Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

PTCM (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness*
	Minimum Expanded as Supplied	Maximum Recovered After Heating	After Heating
9/1.5	9.0 [0.354]	1.5 [0.059]	1.60 ± 0.20 [0.062 ± 0.008]

*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.
Standard packaging	On spools.
Ordering description	PTCM-9/1.5-X-SP

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Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

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USA: 1-800-522-6752
Canada: 1-905-475-6222
Mexico: 52-55-1106-0800
L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

RayBlock 85

Heat-Shrinkable Water-Blocking System

Product Facts

- Environmentally seals wire bundles of up to 20 wires
- Withstands temperature excursions to 105°C [221°F]
- Provides excellent strain relief and reduces noise
- Offers a low-profile installed product only marginally larger than the cable bundle itself
- RoHS compliant

Applications

Designed to provide consistent sealing for cable bundles and the back of connectors. The wires are placed within the channels of a specially formulated hot-melt adhesive profile, then covered by dual-wall, heat-shrinkable tubing with a flame-retardant, radiation-crosslinked outer wall and hot-melt-adhesive inner wall. When the tubing is heated, the hot-melt adhesive melts and the tubing shrinks, forcing the molten adhesive to fill all the voids within the wire bundle and tubing. The result is a solid plug of adhesive molded around each wire in the bundle, creating a moisture-resistant seal.

Installation

Minimum shrink temperature: 80°C [176°F]

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

Operating Temperature Range

-40°C to 85°C
[-40°F to 185°F]

Specifications/Approvals

Series	Raychem
RayBlock 85	RayBlock 85 SCD RW-2101

Available in:	Americas	Europe	Asia Pacific
	■	■	■

9-1773447-9
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Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-475-6222
Mexico: 52-55-1106-0800
L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

RayBlock 85 (Continued)

Product Dimensions

Part No.	No. of Channels	Profile			Tubing Inside Diameter		
		Outside Height	Length	Width	Minimum Expanded as Supplied	Maximum Recovered After Heating	Nominal Length
RayBlock 85 Kit 0102-A0	2	8.5 [0.335]	2.75 [0.108]	8.50 [0.335]	12.0 [0.472]	3.0 [0.118]	40 [1.57]
RayBlock 85 Kit 0203-A0	3	8.5 [0.335]	2.75 [0.108]	12.25 [0.482]	24.0 [0.945]	6.0 [0.236]	47 [1.85]
RayBlock 85 Kit 0504-A0	4	8.5 [0.335]	2.75 [0.108]	16.00 [0.630]	16.0 [0.630]	4.0 [0.158]	40 [1.57]
RayBlock 85 Kit 0405-A0	5	8.5 [0.335]	2.75 [0.108]	19.75 [0.778]	24.0 [0.945]	6.0 [0.236]	45 [1.77]
RayBlock 85 Kit 0107-A0	7	8.5 [0.335]	2.75 [0.108]	27.25 [1.070]	24.0 [0.945]	6.0 [0.236]	65 [2.56]
RayBlock 85 Kit 0510-A0	10	8.5 [0.335]	2.75 [0.108]	38.50 [1.520]	32.0 [1.260]	8.0 [0.315]	55 [2.17]

Ordering Information

Color	Standard Black (-0)
Size selection	For wire with an outside diameter smaller than 2.8 [0.110] , use a maximum of two wires per channel. For wire with an outside diameter of 2.8–3.5 [0.110 to 0.138], use a maximum of one wire per channel. Special order sizes are available upon request.
Standard packaging	One kit (contains 1000 pcs. of profile and 1000 pcs. of tubing).

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UK: 44-800-267-666

RayBlock 105

Heat-Shrinkable Water-Blocking System

Product Facts

- Environmentally seals wire bundles of up to 20 wires
- Withstands temperature excursions to 120°C [248°F]
- Provides excellent strain relief and reduces noise
- Offers a low-profile installed product only marginally larger than the cable bundle itself
- RoHS compliant

Applications

Designed to provide consistent sealing for cable bundles and the back of connectors. The wires in the bundle are placed within the channels of a specially formulated hot-melt adhesive profile, and then covered by dual wall, heat-shrinkable tubing with a flame-retardant radiation-crosslinked outer wall and hot-melt-adhesive inner wall. When the tubing is heated, the hot-melt adhesive melts and the tubing shrinks, forcing the molten adhesive to fill all the voids within the wire bundle and tubing. The result is a solid plug of adhesive molded around each wire in the bundle, creating a moisture-resistant seal.

Installation

Minimum shrink temperature: 80°C [176°F]

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

Operating Temperature Range

-40°C to 105°C
[-40°F to 221°F]

Specifications/Approvals

Series	Raychem
RayBlock 105	RayBlock 105 SCD RW-2102

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

RayBlock 105 (Continued)

Product Dimensions

Part No.	No. of Channels	Profile			Tubing Inside Diameter		
		Outside Height	Length	Width	Minimum Expanded as Supplied	Maximum Recovered After Heating	Nominal Length
RayBlock 105 Kit 0102-A0	2	8.5 [0.335]	2.75 [0.108]	8.50 [0.335]	12.0 [0.472]	3.0 [0.118]	40 [1.57]
RayBlock 105 Kit 0103-A0	3	8.5 [0.335]	2.75 [0.108]	12.25 [0.482]	16.0 [0.630]	4.0 [0.158]	40 [1.57]
RayBlock 105 Kit 0504-A0	4	8.5 [0.335]	2.75 [0.108]	16.00 [0.630]	16.0 [0.630]	4.0 [0.158]	45 [1.77]
RayBlock 105 Kit 0105-A0	5	8.5 [0.335]	2.75 [0.108]	19.75 [0.778]	24.0 [0.945]	6.0 [0.236]	45 [1.77]
RayBlock 105 Kit 0107-A0	7	8.5 [0.335]	2.75 [0.108]	27.20 [1.070]	24.0 [0.945]	6.0 [0.236]	65 [2.56]
RayBlock 105 Kit 0110-A0	10	8.5 [0.335]	2.75 [0.108]	38.50 [1.520]	32.0 [1.260]	8.0 [0.315]	65 [2.56]

Ordering Information

Color	Standard Black (-0)
Size selection	For wire with an outside diameter smaller than 2.8 [0.110], use a maximum of two wires per channel. For wire with an outside diameter of 2.8–3.5 [0.110–0.138], use a maximum of one wire per channel. Special order sizes are available upon request.
Standard packaging	One kit (contains 1000 pcs. of profile and 1000 pcs. of tubing).

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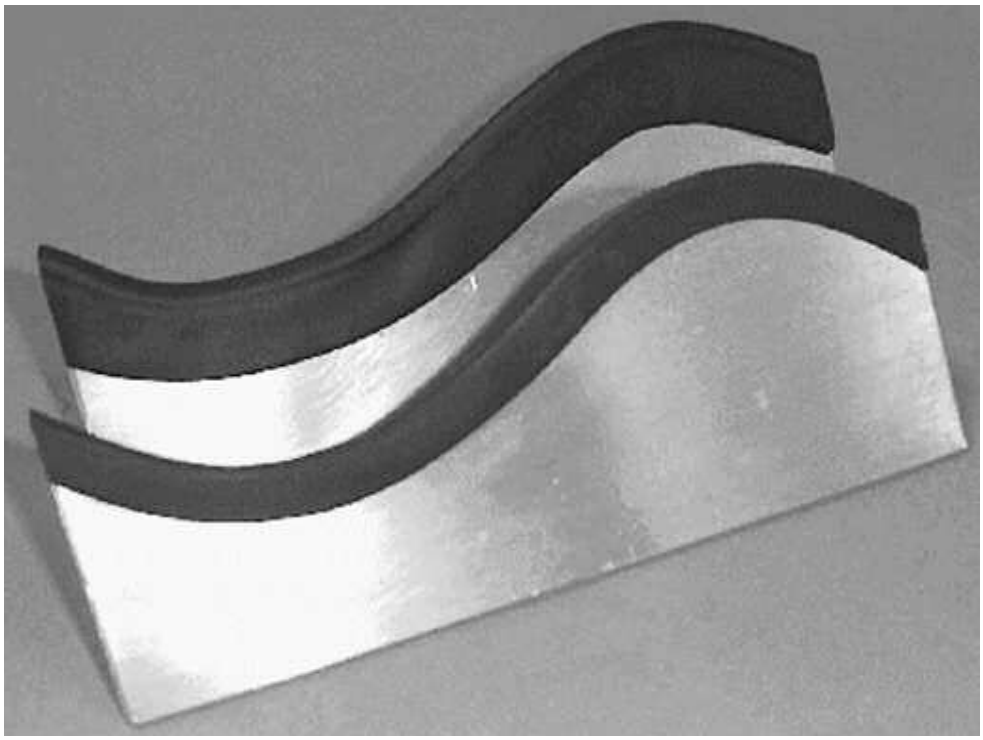
Rayrim Edging Material

Commercial Protective, Self-Adhering, Edging Material

Product Facts

- **Flexible to allow for protection of curved edges**
- **RoHS compliant**



Applications

Raychem Rayrim edging material is an extruded strip internally coated with a heat activated adhesive, so that on heating the profile changes from a "V" to a "U" section and the adhesive bonds to the substrate profile.

Manufactured from a Raychem radiation cross-linked polyolefin material, the profile offers a clean and rapid means of covering metal, wood and glass edges for all-round protection.

The flexible nature of the product allows application to both internal and external radii, as well as straight edges, and the continuous operating temperature of -55°C to +80°C [-67°F to 176°F] means that the product can give protection under the most testing circumstances.

Installation

Minimum shrink temperature: 120°C [248°F]

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

Operating Temperature Range

-55°C to 80°C [-67°F to 176°F]

Specifications/Approvals

Series	Raychem
Rayrim	RK-6182

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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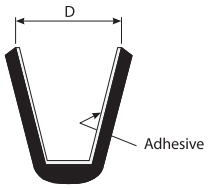
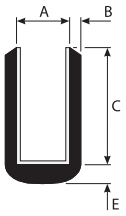
Japan: 81-44-844-8013
UK: 44-800-267-666

Edging Material (Continued)

Product Dimensions





Size	A (maximum)	B (minimum)	C (minimum)	D (minimum)	E (typical)
NR6	0.6 [0.024]	0.5 [0.020]	3.5 [0.138]	0.8 [0.032]	1.25 [0.049]
NR7	1.0 [0.039]	0.9 [0.035]	4.8 [0.189]	1.6 [0.063]	1.25 [0.049]
NR8	2.0 [0.079]	0.9 [0.035]	6.6 [0.260]	2.5 [0.098]	2.25 [0.089]
NR9	4.2 [0.165]	0.9 [0.035]	13.5 [0.532]	4.5 [0.177]	2.20 [0.087]

Application Range

Plate SWG	Thickness	Recommended minimum bend radius
30-24	0.31-0.56 [0.012-0.022]	10 [0.394]
23-16	0.61-1.63 [0.026-0.064]	15 [0.591]
15-10	1.83-3.25 [0.072-0.128]	20 [0.787]
9-5	3.66-5.38 [0.144-0.212]	25 [0.984]

Ordering Information

Color	Standard	Black (-0)
Size selection	Always order the largest size that will shrink snugly on edge of the panel.	
Standard packaging	1.2-meter [4-foot] lengths.	
Ordering description	Specify product name, size number and color (for example, Rayrim-NR6-0).	

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RaySpool

Convenient packaging and dispensing system for heat-shrinkable tubing

Product Facts

- Easy to store
- Easy to dispense
- Well-suited for repairs
- Single wall and adhesive-lined tubings
- Wide variety of colors, sizes and kits available
- Also available are RaySpool kits comprised of 6 sizes and supplied with a mounting rack
- Stand alone racks and packaging sets also available
- RoHS compliant

Applications

The RaySpool system offers a convenient packaging and dispensing option for a range of heat-shrinkable tubings. The tubing is supplied on small reels which are overboxed and feature a dispensing window allowing the tubing to be easily and readily accessed. The RaySpool system is a suitable method of storing and for use in the workshop, service vehicle or laboratory. A varied selection of tubings is offered which will cover a diverse range of applications including electrical insulation, strain relief, cable bundling and environmental protection. RaySpool packaging is available for CGPT, LSTT and CGAT.

Installation

See individual product pages.

Operating Temperature Range

See individual product pages.

Specifications/Approvals

See individual product pages.

Available in:	Americas	Europe	Asia Pacific
		■	

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Japan: 81-44-844-8013
UK: 44-800-267-666

RaySpool (Continued)

CGPT 2:1 Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness*	Spool Quantity - Black (meters)	Spool Quantity - Green/Yellow (meters)	Ordering Description
	Minimum Expanded as Supplied	Maximum Recovered After Heating	After Heating			
1.6/0.8	1.6 (0.062)	0.8 (0.031)	0.45 ± 0.12	10.0	-	CGPT-R-1.6-col code
2.4/1.2†	2.4 (0.093)	1.2 (0.046)	0.50 ± 0.12	10.0	-	CGPT-R-2.4-col code
3.2/1.6†•	3.2 (0.125)	1.6 (0.062)	0.50 ± 0.12	10.0	5.0	CGPT-R-3.2-col code
4.8/2.4†	4.8 (0.187)	2.4 (0.093)	0.50 ± 0.12	9.0	-	CGPT-R-4.8-col code
6.4/3.2†•	6.4 (0.250)	3.2 (0.125)	0.65 ± 0.15	8.0	3.5	CGPT-R-6.4-col code
9.5/4.8•	9.5 (0.375)	4.8 (0.187)	0.65 ± 0.15	6.0	3.0	CGPT-R-9.5-col code
12.7/6.4†•	12.7 (0.500)	6.4 (0.250)	0.65 ± 0.15	6.0	2.5	CGPT-R-12.7-col code
19/9.5•	19.0 (0.748)	9.5 (0.375)	0.75 ± 0.15	5.0	2.0	CGPT-R-19.0-col code
25.4/12.7†•	25.4(1.000)	12.7 (0.500)	0.90 ± 0.20	3.0	1.5	CGPT-R-25.4-col code
KIT CONTAINS SIZES INDICATED BY †						CGPT-R-KIT-2

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

Ordering Information

Color	Standard	Black (-0) Green/yellow (-45) available in sizes indicated by •
Size selection	Always order the largest size that will shrink snugly over the component to be covered.	
Standard packaging	On mini spools.	
Ordering description	See above for description.	

CGPT 3:1 Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness*	Spool Quantity (meters)	Ordering Description
	Minimum Expanded as Supplied	Maximum Recovered After Heating	After Heating		
3/1†	3.0 (0.118)	1.0 (0.040)	0.55 ± 0.12	10.0	CGPT-R-3/1-col code
6/2†	6.0 (0.236)	2.0 (0.079)	0.65 ± 0.12	7.0	CGPT-R-6/2-col code
9/3†	9.0 (0.354)	3.0 (0.118)	0.75 ± 0.15	5.0	CGPT-R-9/3-col code
12/4†	12.0 (0.472)	4.0 (0.157)	0.75 ± 0.15	4.0	CGPT-R-12/4-col code
18/6†	18.0 (0.709)	6.0 (0.236)	0.85 ± 0.15	3.0	CGPT-R-18/6-col code
24/8†	24.0 (0.945)	8.0 (0.315)	1.00 ± 0.20	3.0	CGPT-R-24/8-col code
KIT CONTAINS SIZES INDICATED BY † (black only)					CGPT-R-KIT-1

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

Ordering Information

Color	Standard	Black (-0) Red (-2) Yellow (-4) Blue (-6)
Size selection	Always order the largest size that will shrink snugly over the component to be covered.	
Standard packaging	On mini spools.	
Ordering description	See above for description	

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China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

RaySpool (Continued)

LSTT 2:1 Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness*	Spool Quantity - Black (meters)	Ordering Description
	Minimum Expanded as Supplied	Maximum Recovered After Heating	After Heating		
2.4/1.2†	2.4 (0.093)	1.2 (0.046)	0.55 ± 0.12	10.0	LSTT-R-2.4-0
3.2/1.6†	3.2 (0.125)	1.6 (0.062)	0.55 ± 0.12	10.0	LSTT-R-3.2-0
4.8/2.4†	4.8 (0.187)	2.4 (0.093)	0.55 ± 0.12	9.0	LSTT-R-4.8-0
6.4/3.2†	6.4 (0.250)	3.2 (0.125)	0.65 ± 0.15	8.0	LSTT-R-6.4-0
9.5/4.8	9.5 (0.375)	4.8 (0.187)	0.65 ± 0.15	6.0	LSTT-R-9.5-0
12.7/6.4†	12.7 (0.500)	6.4 (0.250)	0.65 ± 0.15	6.0	LSTT-R-12.7-0
19/9.5	19.0 (0.748)	9.5 (0.375)	0.80 ± 0.15	5.0	LSTT-R-19.0-0
25.4/12.7†	25.4(1.000)	12.7 (0.500)	0.95 ± 0.18	3.0	LSTT-R-25.4-0
KIT CONTAINS SIZES INDICATED BY † (black only)					LSTT-R-KIT-1

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

Ordering Information

Color	Standard Black (-0)
Size selection	Always order the largest size that will shrink snugly over the component to be covered.
Standard packaging	On mini spools.
Ordering description	See above for description

CGAT 3:1 Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness*	Spool Quantity (meters)	Ordering Description
	Minimum Expanded as Supplied	Maximum Recovered After Heating	After Heating		
3/1†	3.0 (0.118)	1.0 (0.040)	1.00 ± 0.25	5.0	CGAT-R-3/1-0
6/2†	6.0 (0.236)	2.0 (0.079)	1.00 ± 0.25	3.5	CGAT-R-6/2-0
9/3†	9.0 (0.354)	3.0 (0.118)	1.35 ± 0.25	3.0	CGAT-R-9/3-0
12/4†	12.0 (0.472)	4.0 (0.157)	1.50 ± 0.25	2.5	CGAT-R-12/4-0
18/6†	18.0 (0.709)	6.0 (0.236)	1.70 ± 0.25	2.0	CGAT-R-18/6-0
24/8†	24.0 (0.945)	8.0 (0.315)	1.90 ± 0.25	1.5	CGAT-R-24/8-0
KIT CONTAINS SIZES INDICATED BY † (black only)					CGAT-R-KIT-1

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

Ordering Information

Color	Standard Black (-0)
Size selection	Always order the largest size that will shrink snugly over the component to be covered.
Standard packaging	On mini spools.
Ordering description	See above for description

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Japan: 81-44-844-8013
UK: 44-800-267-666

RHW

Rugged, Heavy Wall, Adhesive-Lined, Polyolefin Heat-Shrinkable Tubing

Product Facts

- Withstands mechanical abuse for increased product reliability
- Highly resistant to impact and abrasion
- Provides high level of strain relief when installed on splices and joints
- Resistant to chemicals, moisture and oils
- Provides a complete moisture-proof seal preventing corrosion of underlying components
- RoHS compliant

Applications

Rugged, heavy wall RHW tubing is specifically designed for insulating, protecting and sealing electrical connections and joints in low-voltage cables. The material used is both halogen-free and UV resistant. It provides splice insulation thickness equal to or greater than standard wire insulation manufactured to common industry standards.

RHW is a suitable choice for applications where maximum reliability, product performance and simplified insulation are required. Because RHW is heat-shrinkable, a minimum number of sizes are needed to cover a wide range of cables and splice diameters. This product is only available with a co-extruded layer of hot melt adhesive coating.

Installation

Minimum shrink temperature: 110°C [230°F]

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

Operating Temperature Range

-55°C to 110°C
[-67°F to 230°F]

Specifications/Approvals

Series	UL* c(UL)us	Raychem
RHW	File E91151	RHW SCD

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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UK: 44-800-267-666

RHW (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness**
	Minimum Expanded as Supplied	Maximum Recovered After Heating	Minimum Jacket Wall
12/3	12 [0.472]	3 [0.118]	2.0 [0.079]
16/4	16 [0.630]	4 [0.158]	2.4 [0.095]
24/6	24 [0.945]	6 [0.236]	2.7 [0.106]
34/8	34 [1.339]	8 [0.315]	4.0 [0.157]
48/12	48 [1.890]	12 [0.472]	4.5 [0.177]
56/16	56 [2.205]	16 [0.630]	4.4 [0.173]
70/20	70 [2.756]	20 [0.787]	4.4 [0.173]
90/25	90 [3.543]	25 [0.984]	4.3 [0.169]
110/30	110 [7.331]	30 [1.181]	4.3 [0.169]
130/35	130 [5.118]	35 [1.378]	4.3 [0.169]
160/50	160 [6.229]	50 [1.968]	4.3 [0.169]
180/50	180 [7.087]	50 [1.968]	4.3 [0.169]
200/50	200 [7.874]	50 [1.968]	4.3 [0.169]
250/65	250 [9.842]	65 [2.559]	4.3 [0.169]
320/95	320 [12.598]	95 [3.740]	4.3 [0.169]
390/110	390 [15.354]	110 [4.331]	4.3 [0.169]

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

Ordering Information

Color	Standard Black (-0)
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Special order sizes available upon request.
Standard packaging	1200mm lengths.
Marking	Tubing will be marked with product name, size and batch number.
Ordering description	Specify product name, size, cut length (for example, RHW-12/3-1200/ADH-0).

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China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

RMW

Medium Wall, Polyolefin Heat-Shrinkable Tubing

Product Facts

- Withstands mechanical abuse for increased product reliability
- Highly resistant to impact and abrasion
- Installation is fast and easy
- Resistant to chemicals and moisture
- Adhesive-lined version provides a complete moisture-proof seal preventing corrosion of underlying components
- RoHS compliant

Applications

Medium wall, general purpose RMW tubing is specifically designed for use in a broad range of low-voltage applications. RMW is tough and flexible, making it particularly suited for the insulation and protection of cable joints as well as for cable repair. Uncoated RMW provides insulation and strain relief.

Adhesive-lined RMW also provides an environmental seal. RMW is a suitable choice for applications where maximum reliability and product performance, and simplified installation are required. Because RMW is heat-shrinkable, a minimum number of sizes are needed to cover a wide range of cables and splice diameters.

Installation

Minimum shrink temperature: 110°C [230°F]

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

Operating Temperature Range

-55°C to 110°C
[-67°F to 230°F]

Specifications/Approvals

Series	Raychem
RMW	RMW SCD

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-475-6222
Mexico: 52-55-1106-0800
L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

RMW (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness**
	Minimum Expanded as Supplied	Maximum Recovered After Heating	Minimum Jacket Wall
10/3	10 [0.394]	3 [0.118]	1.0 [0.039]
16/5	16 [0.630]	5 [0.197]	1.4 [0.055]
25/8	25 [0.984]	8 [0.315]	2.0 [0.079]
35/12	35 [1.378]	12 [0.472]	2.0 [0.079]
50/16	50 [1.968]	16 [0.630]	2.0 [0.079]
63/19	63 [2.480]	19 [0.748]	2.4 [0.095]
75/22	75 [2.953]	22 [0.866]	2.7 [0.106]
85/25	85 [3.346]	25 [0.984]	2.8 [0.110]
95/29	95 [3.740]	29 [1.142]	3.1 [0.122]
115/34	115 [4.528]	34 [1.339]	3.1 [0.122]
140/42	140 [5.112]	42 [1.654]	3.1 [0.122]
160/50	160 [6.299]	50 [1.968]	3.2 [0.126]
180/60	180 [7.087]	60 [2.362]	3.2 [0.126]
245/80*	245 [9.646]	80 [3.150]	2.4 [0.095]
285/135	285 [11.220]	135 [5.315]	1.4 [0.055]

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

Ordering Information

Color	Standard Black (-0)
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Special order sizes available upon request.
Standard packaging	1200mm lengths.
Marking	Tubing will be marked with product name, size and batch number.
Ordering description	Specify product name, size, cut length, coating option (for example, RMW-10/3-1200/U-0; ADH = Adhesive-line, U = Uncoated).

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L. & S. America: 54-11-4733-2200

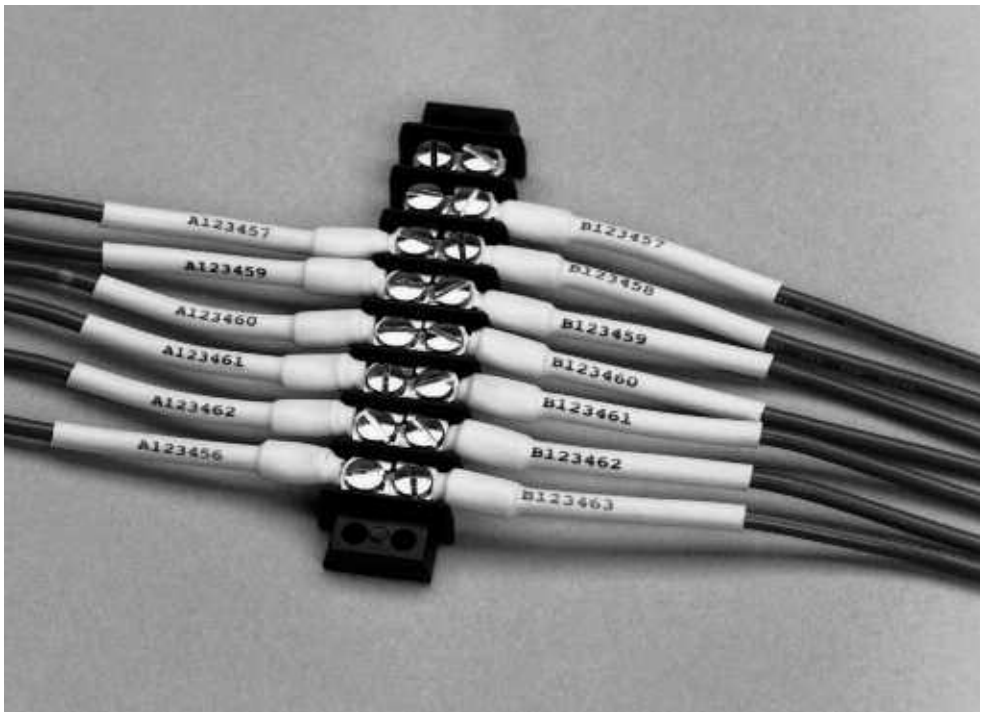
Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

RNF-100

Flexible, Flame-Retardant, General Purpose, Polyolefin Tubing

Product Facts

- 2:1 shrink ratio
- Superior abrasion and solvent resistance when compared with that of many flexible, general purpose polyolefin tubings
- Excellent physical, chemical, and electrical properties that meet or exceed industrial and military standards for highly reliable, general purpose tubing
- Flexible; conforms to irregular shapes
- Flame-retardant (colors only)
- Wide range of sizes and colors
- RoHS compliant



Applications

Designed to provide superior mechanical (abrasion, cut-through, and strain relief), thermal, and fluid-resistance performance in demanding environments. Widely used to provide insulation and strain relief of wire terminations and connections. Used for jacketing wire bundles and light-duty harnesses where superior abrasion resistance is a plus. Also used to identify and color-code electrical connections and wire bundles.

Installation

Minimum shrink temperature: 95°C [203°F]

Minimum full recovery temperature: 121°C [250°F]

Operating Temperature Range

-55°C to 135°C
[-67°F to 275°F]

Specifications/Approvals

Series	UL	CSA	Military	Industry	Raychem
RNF-100 Type 1 (colors)	E35586 600 V, 125°C	LR31929 600 V, 125°C	AMS-DTL-23053/5*, Class 1 Def. Stan. 59-97 Type 2B	VDE 0341 Pt 9005 Type A and B	RT-350, Type 1 RK-6001
RNF-100 Type 2 (clear)	—	—	AMS-DTL-23053/5*, Class 2 VG 95343 Pt 5 Type B	—	RT-350, Type 2 RK-6001

*Formerly MIL-I-23053/5 and MIL-DTL-23053/5.

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

RNF-100 (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]	0.40 ± 0.08 [0.016 ± 0.003]
1/16	1.6 [0.063]	0.8 [0.031]	0.43 ± 0.08 [0.017 ± 0.003]
3/32	2.4 [0.093]	1.2 [0.046]	0.51 ± 0.08 [0.020 ± 0.003]
1/8	3.2 [0.125]	1.6 [0.062]	0.51 ± 0.08 [0.020 ± 0.003]
3/16	4.8 [0.187]	2.4 [0.093]	0.51 ± 0.08 [0.020 ± 0.003]
1/4	6.4 [0.250]	3.2 [0.125]	0.64 ± 0.08 [0.025 ± 0.003]
3/8	9.5 [0.375]	4.8 [0.187]	0.64 ± 0.08 [0.025 ± 0.003]
1/2	12.7 [0.500]	6.4 [0.250]	0.64 ± 0.08 [0.025 ± 0.003]
3/4	19.1 [0.750]	9.5 [0.375]	0.76 ± 0.08 [0.030 ± 0.003]
1	25.4 [1.000]	12.7 [0.500]	0.89 ± 0.12 [0.035 ± 0.005]
1 1/4	31.8 [1.250]	15.9 [0.625]	1.02 ± 0.15 [0.040 ± 0.006]
1 1/2	38.1 [1.500]	19.1 [0.750]	1.02 ± 0.15 [0.040 ± 0.006]
2	50.8 [2.000]	25.4 [1.000]	1.14 ± 0.16 [0.045 ± 0.007]
3	76.2 [3.000]	38.1 [1.500]	1.27 ± 0.20 [0.050 ± 0.008]
4	101.6 [4.000]	50.8 [2.000]	1.40 ± 0.23 [0.055 ± 0.009]
5	127.0 [5.000]	63.5 [2.500]	1.52 ± 0.23 [0.060 ± 0.009]

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

Ordering Information

Color	Standard	Black (-0, BK), white (-9, WH), red (-2, RD), blue (-6, BU), yellow (-4, YO), clear (-X, CL)
	Nonstandard	Brown (-1, BN), orange (-3, OR), green (-5, GN), violet (-7, VT), gray (-8, GY)
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 or in 1.2-meter [4-foot] lengths.	
Ordering description****	Specify product name, size and color (for example, RNF-100 1/4-0 [Europe] or RNF-100 1/4-BK [Americas].	

***Available in the convenient Mini-Spool packaging/dispensing system, for sizes 3/64" up to 1".
****Europe only. For supply to MIL, Def Stan and BS add -MS, -DS or -BS to ordering description.

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L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

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
	■	■	■

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Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-475-6222
Mexico: 52-55-1106-0800
L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

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.

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Canada: 1-905-475-6222
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L. & S. America: 54-11-4733-2200

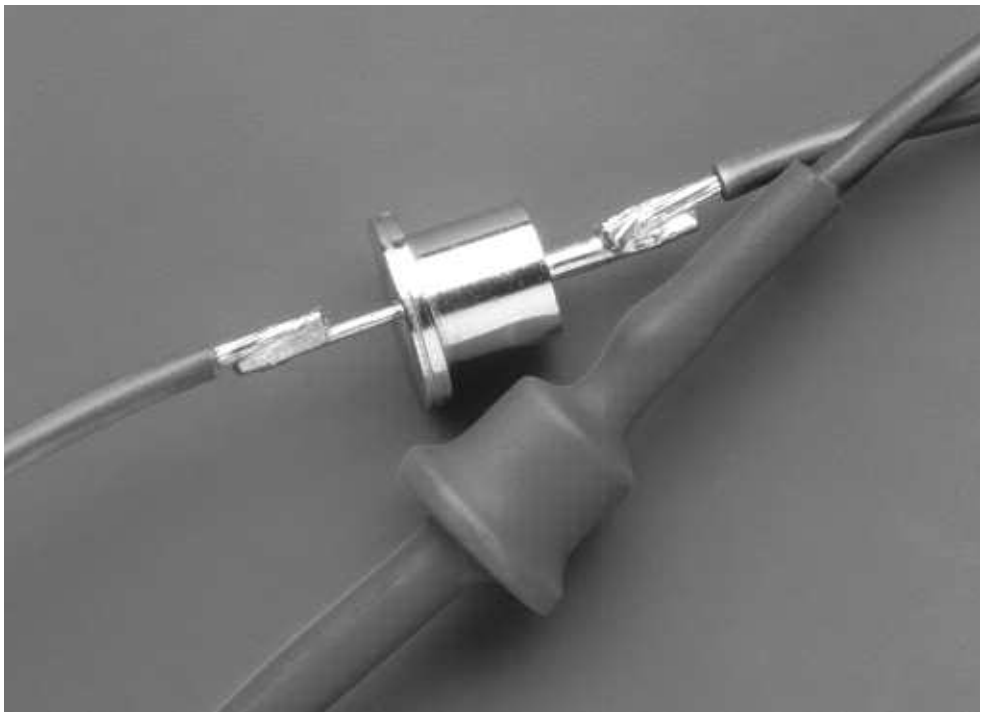
Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

RNF-3000

Flexible, High-Shrink-Ratio, Flame-Retardant, General Purpose, Polyolefin Tubing

Product Facts

- **3:1 shrink ratio easily accommodates awkward, irregular shapes**
- **Few sizes cover a wide range of diameters, allowing reduced inventory**
- **Excellent physical, chemical, and electrical properties meet industry standards for highly reliable, general purpose tubing**
- **Flame-retardant (colors only)**
- **RoHS compliant**



Applications

Used for insulation and strain relief of wire terminations and electrical connections. Also suitable for light-duty harnessing, jacketing, and identification of wires, cables, and electrical and electronic components.

Installation

Minimum shrink temperature: 80°C [176°F]

Minimum full recovery temperature: 120°C [248°F]

Operating Temperature Range

-55°C to 135°C [-67°F to 275°F]

Specifications/Approvals

Series	UL	CSA	Military	Industry	Raychem
RNF-3000	E35586 600 V, 125°C	LR31929 600 V, 125°C	Def. Stan. 59-97 Type 2B VG 95343 Pt 5 Type A (color) VG 95343 Pt 5 Type B (clear)	VDE 0341 Pt 9005 Type A and B	RW-2053

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-475-6222
Mexico: 52-55-1106-0800
L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

RNF-3000 (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness*
	Minimum Expanded as Supplied	Maximum Recovered After Heating	After Heating
1.5/0.5	1.5 [0.060]	0.5 [0.019]	0.45 ± 0.10 [0.018 ± 0.003]
3/1	3 [0.118]	1 [0.039]	0.55 ± 0.10 [0.022 ± 0.003]
4.5/1.5	4.5 [0.177]	1.5 [0.059]	0.55 ± 0.10 [0.022 ± 0.003]
6/2	6 [0.236]	2 [0.079]	0.65 ± 0.10 [0.026 ± 0.003]
9/3	9 [0.354]	3 [0.118]	0.75 ± 0.12 [0.030 ± 0.004]
12/4	12 [0.472]	4 [0.157]	0.75 ± 0.12 [0.030 ± 0.004]
18/6	18 [0.709]	6 [0.236]	0.85 ± 0.12 [0.033 ± 0.004]
24/8	24 [0.944]	8 [0.315]	1.00 ± 0.18 [0.039 ± 0.007]
39/13	39 [1.534]	13 [0.512]	1.15 ± 0.20 [0.045 ± 0.008]

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

Ordering Information

Color	Standard**	Black (-0), white (-9), red (-2), blue (-6), yellow (-4), clear (-X)
	Nonstandard	Brown (-1), orange (-3), green (-5), violet (-7), gray (-8)
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 or in 1.2-meter [4-foot] lengths.	
Ordering description****	Specify product name, size and color (for example, RNF-3000 6/2-0).	

**Black is the only standard color in the Americas. All other colors are nonstandard.
***Only spools are standard in the Americas. 1.2 meter [4-foot] lengths are nonstandard.
****Europe only. For supply to Def Stan and BS add -DS or -BS to ordering description.

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L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

RP-4800

High-Shrink-Ratio, Flame-Retardant, Polyolefin Tubing

Product Facts

- **4:1 shrink ratio**
- **Conforms well to highly variable substrate dimensions**
- **Has excellent physical, chemical, and electrical properties that meet or exceed industrial and military standards**
- **Shows no significant degradation when exposed to common solvents and chemicals, including aviation fuel and hydraulic fluid**
- **RoHS compliant**

Applications

Well-suited for repairing harnesses or cables; will pass over a large-diameter connector or transition, and then shrink down onto a smaller-diameter jacket. Can insulate or protect a substrate of varying dimensions. Also provides the abrasion and fluid resistance required in harnessing applications.

Installation

Minimum shrink temperature: 95°C [203°F]

Minimum full recovery temperature: 121°C [250°F]

Operating Temperature Range

-55°C to 135°C [-67°F to 275°F]

Specifications/Approvals

Series	UL	Military	Industry	Raychem
RP-4800	E35586 600V, 125°C (black only)	AMS-DTL-23053/5*, Class 1 Overexpanded VG 95343 Pt 5 Type A	VDE 0341 Pt 9005 Type A	RT-1122

*Formerly MIL-I-23053/5 and MIL-DTL-23053/5.

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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USA: 1-800-522-6752
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Mexico: 52-55-1106-0800
L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

RP-4800 (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness**
	Minimum Expanded as Supplied	Maximum Recovered After Heating	After Heating
No. 1	25.4 [1.000]	7.0 [0.275]	1.14 ± 0.18 [0.045 ± 0.007]
No. 2	50.8 [2.000]	14.0 [0.550]	1.14 ± 0.18 [0.045 ± 0.007]
No. 3	76.2 [3.000]	20.6 [0.810]	1.14 ± 0.18 [0.045 ± 0.007]
No. 4	101.6 [4.000]	26.7 [1.050]	1.14 ± 0.18 [0.045 ± 0.007]
No. 5	25.4 [1.000]	11.7 [0.462]	1.14 ± 0.18 [0.045 ± 0.007]
No. 6	60.3 [2.375]	17.3 [0.680]	1.14 ± 0.18 [0.045 ± 0.007]
No. 7	76.2 [3.000]	21.3 [0.840]	1.14 ± 0.18 [0.045 ± 0.007]
No. 8	95.3 [3.750]	23.6 [0.930]	1.14 ± 0.18 [0.045 ± 0.007]
No. 9	114.3 [4.500]	36.8 [1.450]	1.14 ± 0.18 [0.045 ± 0.007]
No. 10	38.1 [1.500]	9.5 [0.375]	1.14 ± 0.18 [0.045 ± 0.007]
No. 11	19.1 [0.750]	4.6 [0.180]	1.14 ± 0.18 [0.045 ± 0.007]

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

Ordering Information

Color	Standard	Black (-0)
	Nonstandard	White (-9), red (-2), blue (-6), yellow (-4), green (-5), brown (-1), orange (-3), violet (-7), gray (-8)
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 or in 1.2-meter [4-foot] lengths.	
Ordering description***	Specify product name, size and color (for example, RP-4800 NO.1-0).	

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

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Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

RPPM

Flexible, Dual Wall, Moisture-Proof, Heat-Shrinkable Tubing

Product Facts

- **Environmental sealing**
- **Excellent mechanical strength**
- **Abrasion resistance**
- **4:1 shrink ratio**
- **RoHS compliant**

Applications

RPPM is a flexible, heat-shrinkable, dual wall tubing with an integrally bonded meltable adhesive liner. Available in clear and black, the tough outer jacket offers excellent mechanical strength. RPPM is used for moisture-proof encapsulation of a wide variety of components. In particular, it adheres well to PVC. The high-shrink-ratio allows RPPM to be used with a range of dimensions. Clear RPPM offers excellent clarity for protection of substrates that may need to be inspected during service. Black RPPM has a high gloss finish suitable for cosmetic applications.

Installation

Minimum shrink temperature: 60°C [140°F]

Minimum full recovery temperature: 80°C [176°F]

Operating Temperature Range

-40°C to 85°C
[-40°F to 185°F]

Specifications/Approvals

Series	Raychem
RPPM	RK-6214

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
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Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

RPPM (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness*	
	Minimum Expanded as Supplied	Maximum Recovered After Heating	Nominal Total Wall After Heating	Nominal Adhesive Wall After Heating
4/1	4.0 [0.158]	1.0 [0.039]	0.8 [0.032]	0.3 [0.012]
8/2	8.0 [0.315]	2.0 [0.079]	0.9 [0.035]	0.3 [0.012]
12/3	12.0 [0.472]	3.0 [0.118]	1.2 [0.047]	0.4 [0.016]
16/4	16.0 [0.630]	4.0 [0.158]	1.5 [0.059]	0.5 [0.020]

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

Ordering Information

Color	Standard	Clear (-X)
	Nonstandard	Black (-0)
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, in 1.2 meter [4-foot] lengths or cut pieces.	
Ordering description	Specify product name, size and color (for example, RPPM 4/1-X).	

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USA: 1-800-522-6752
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Mexico: 52-55-1106-0800
L. & S. America: 54-11-4733-2200

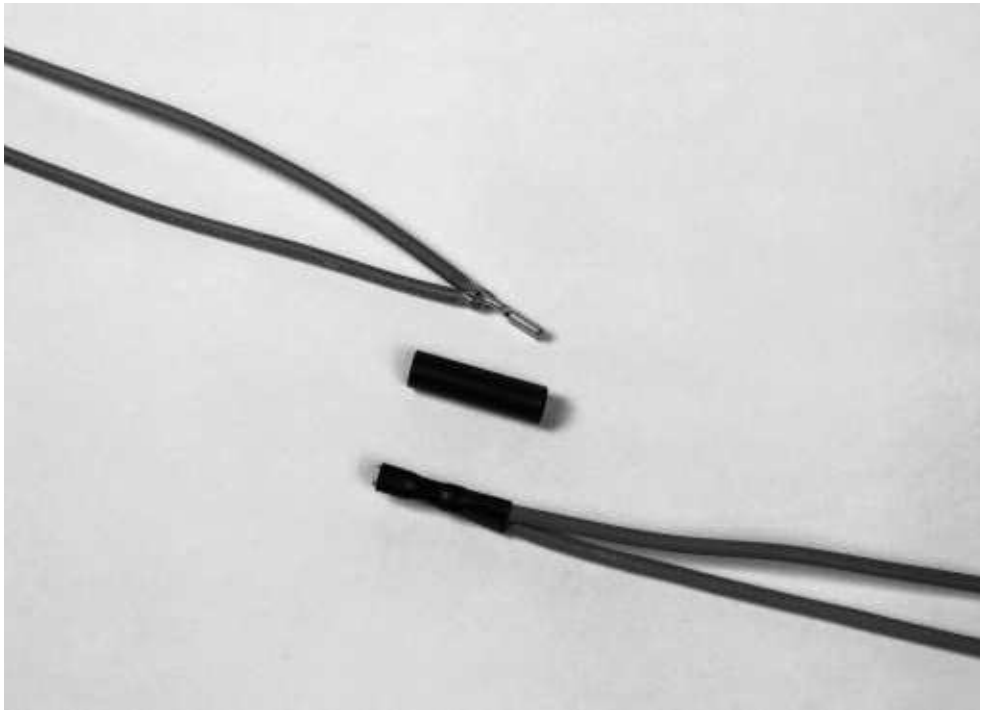
Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

RT-3

Semirigid, Flame-Retardant, Polyolefin Tubing

Product Facts

- 2.5:1 shrink ratio
- Tightly controlled expanded diameters
- High abrasion resistance
- Semirigidity that transfers flex stress away from typically weak points such as solder and crimp joints, helping to ensure a reliable connection
- Excellent chemical and solvent resistance
- Outstanding physical and electrical performance
- RoHS compliant



Applications

Suitable for wire strain-relief applications — soldered or crimped connections, wire splices, terminations. Well-suited for use with semiautomated production equipment requiring tubing with a tightly controlled expanded diameter. Acts as a tough covering for delicate components; provides mechanical protection.

Installation

Minimum shrink temperature: 110°C [230°F]

Minimum full recovery temperature: 135°C [275°F]

Operating Temperature Range

-55°C to 135°C [-67°F to 275°F]

Specifications/Approvals

Series	UL	CSA	Raychem
RT-3	E35586 600 V, 125°C	LR31929 (black only) 600 V, 125°C	RT-360*

*Except dimensions and longitudinal change.

Available in:	Americas	Europe	Asia Pacific
	■		■

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Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-475-6222
Mexico: 52-55-1106-0800
L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

RT-3 (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness**
	Minimum Expanded as Supplied	Maximum Recovered After Heating	After Heating
No. 1	6.1 ± 0.4 [0.240 ± 0.015]	2.4 [0.095]	0.79 ± 0.08 [0.031 ± 0.003]
No. 2	8.1 ± 0.4 [0.320 ± 0.015]	3.2 [0.125]	0.79 ± 0.08 [0.031 ± 0.003]
No. 3	9.5 ± 0.5 [0.375 ± 0.020]	3.8 [0.150]	0.79 ± 0.08 [0.031 ± 0.003]
No. 4	12.3 ± 0.5 [0.485 ± 0.020]	5.1 [0.200]	0.79 ± 0.08 [0.031 ± 0.003]

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

Ordering Information

Color	Black (-0) only
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	In 1-inch cut pieces or in 1.2-meter [4-foot] lengths.
Ordering description	Specify product name, size and color (for example, RT-3 No. 1-0).

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L. & S. America: 54-11-4733-2200

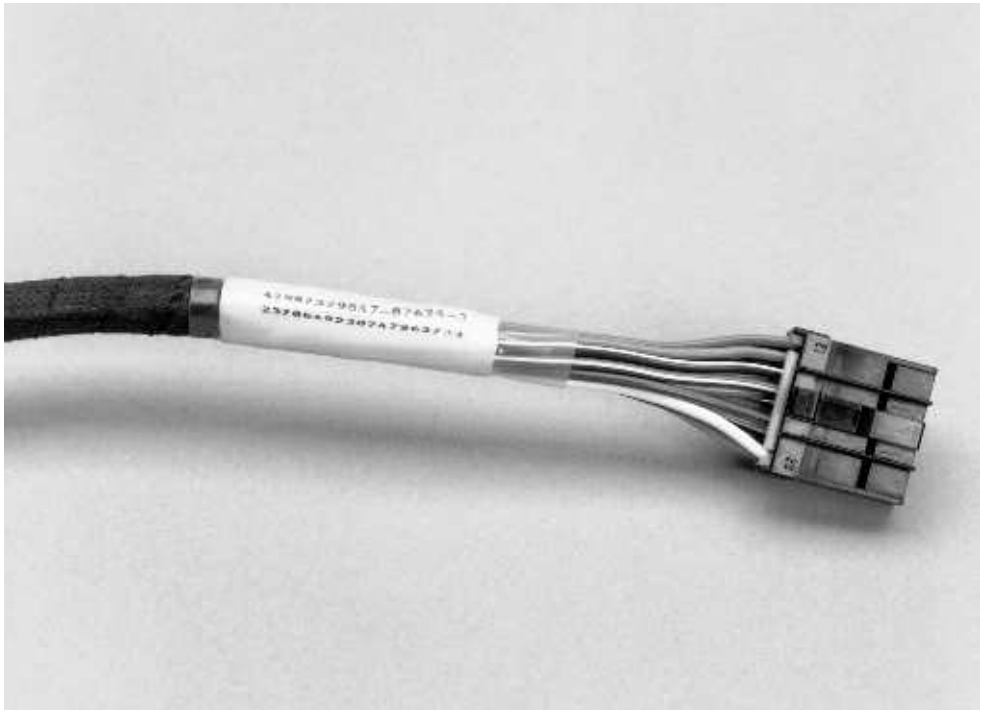
Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

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
	■	■	■

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Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

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.

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L. & S. America: 54-11-4733-2200

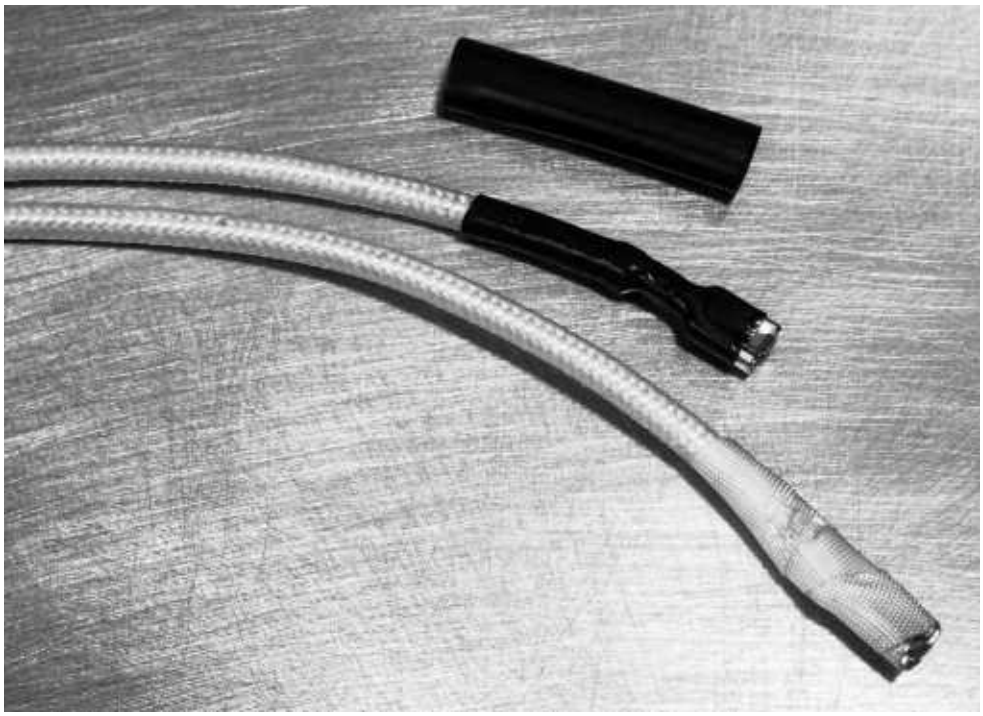
Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

RT555

Fluid-Resistant, Chemical-Resistant, Crosslinked Fluoropolymer Tubing with Extended Temperature Range

Product Facts

- **Resistance to high temperatures, solvents, corrosive chemicals, and radiation**
- **Extreme resistance to hydrocarbons**
- **Low outgassing (successfully tested for NASA outgassing requirements)**
- **Highly flame-retardant**
- **40 percent lighter weight than tubing made with Viton® fluoroelastomer**
- **System 300 tubing**
- **RoHS compliant**



Applications

Suitable for commercial applications requiring heat resistance (electrical and hydraulic systems near aircraft or automotive engines or in fuel tanks), applications in chemically exposed environments (industrial process equipment in the pulp and paper, steel, and chemical industries), and equipment for handling caustic or dangerous chemicals or inks. Use for insulation and strain relief on appliances (electric ranges, microwave ovens, gas grills, and industrial paint-drying equipment) and for protection of delicate electronic instruments in down-hole applications.

Installation

Minimum shrink temperature: 150°C [302°F]

Minimum full recovery temperature: 220°C [428°F]

Operating Temperature Range

-65°C to 200°C
[-85°F to 392°F]

Specifications/Approvals

Series	UL	Raychem
RT555	Listed for 185°C for 100,000-hr continuous use (File E85381) Listed for 200°C for 40,000-hr cumulative intermittent exposure	RT-555

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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Dimensions are shown for reference purposes only. Specifications subject to change.

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L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

RT555 (Continued)

Product Dimensions

Size	Inside diameter		Recovered wall thickness* After heating		
	Minimum expanded as supplied	Maximum recovered after heating	Minimum	Maximum	Nominal
1/8	3.18 [0.125]	1.57 [0.062]	0.25 [0.010]	0.41 [0.016]	0.30 [0.012]
3/16	4.75 [0.187]	2.36 [0.093]	0.28 [0.011]	0.46 [0.018]	0.36 [0.014]
1/4	6.35 [0.250]	3.18 [0.125]	0.33 [0.013]	0.51 [0.020]	0.41 [0.016]
3/8	9.53 [0.375]	4.75 [0.187]	0.41 [0.016]	0.58 [0.023]	0.48 [0.019]
1/2	12.70 [0.500]	6.35 [0.250]	0.41 [0.016]	0.58 [0.023]	0.48 [0.019]
5/8	15.88 [0.625]	7.95 [0.313]	0.48 [0.019]	0.66 [0.026]	0.56 [0.022]
3/4	19.05 [0.750]	9.53 [0.375]	0.61 [0.024]	0.79 [0.031]	0.69 [0.027]
1	25.40 [1.000]	12.70 [0.500]	0.71 [0.028]	0.89 [0.035]	0.79 [0.031]
1 1/4	31.75 [1.250]	15.88 [0.625]	0.76 [0.030]	0.94 [0.037]	0.84 [0.033]
1 1/2	38.10 [1.500]	19.05 [0.750]	0.86 [0.034]	1.04 [0.041]	0.94 [0.037]
2	50.80 [2.000]	25.40 [1.000]	0.94 [0.037]	1.12 [0.044]	1.02 [0.040]

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

Ordering Information

Color	Standard Black (-0)
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, RT555 1/8-0).

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L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

RW-175

High-temperature, Chemical-Resistant, Polyvinylidene Fluoride Tubing

Product Facts

- 2:1 shrink ratio
- Tough, semirigid, very-thin-wall insulation
- High flame-resistance, meeting the requirements of AMS-DTL-23053*, Test C, with UL and CSA VW-1 rating
- High-temperature performance that meets or exceeds military and industrial standards
- Protection from most industrial solvents, fuels, and chemicals
- Recommended maximum temperature for use as a primary insulator: 135°C [275°F]
- RoHS compliant

Applications

Especially suitable for applications requiring high-temperature performance, outstanding abrasion resistance and cut-through resistance, or superior chemical and solvent properties. Provides electrical insulation and strain relief of multipin connectors and solder joints. Well-suited for applications that require dense packing of components or visual inspection of covered components.

Installation

Minimum shrink temperature: 155°C [311°F]

Minimum full recovery temperature: 175°C [347°F]

Operating Temperature Range

-55°C to 175°C [-67°F to 347°F]

Specifications/Approvals

Series	UL	CSA	Military	Industry	Raychem
RW-175	E35586 VW-1 600 V, 150°C	LR31929 VW-1 600 V, 150°C	AMS-DTL-23053/8* Def. Stan. 59-97 Type 3 VG 95343 Pt 5 Type F BS 3G 198 Pt4	VDE 0341 Pt 9005	RW-3029/1 RW-3029/2

*Formerly MIL-I-23053 and MIL-DTL-23053/8.

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
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Mexico: 52-55-1106-0800
L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

RW-175 (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]	0.33 ± 0.05 [0.013 ± 0.002]
3/8	9.5 [0.375]	4.8 [0.187]	0.33 ± 0.05 [0.013 ± 0.002]
1/2	12.7 [0.500]	6.4 [0.250]	0.33 ± 0.05 [0.013 ± 0.002]
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]
1 1/2	38.1 [1.500]	19.1 [0.750]	0.51 ± 0.08 [0.020 ± 0.003]

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

Ordering Information

Color	Standard	Clear (-X)
	Nonstandard	Black (-0)
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	In 1.2-meter [4-foot] lengths.	
Ordering description***	Specify product name, size and color (for example, RW-175 3/64-X).	

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

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L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

RW-200/RW-200-E

Heat-Shrinkable, Chemical-Resistant, High-Temperature Tubing

Product Facts

- **High resistance to impact and abrasion**
- **Resistance to a wide variety of fuels, lubricants, acids, and solvents at elevated temperatures**
- **Flexibility at low temperatures without cracking**
- **RoHS compliant**

Applications

Raychem premium heat-shrinkable tubing is fabricated from Viton® fluoroelastomers – a crosslinked material designed for a wide range of applications. It is available in two configurations. RW-200-E is the thickest wall version. RW-200 has the thinnest wall for lighter weight applications.

Offering fluid resistance, RW-200 tubing can be used in applications up to 200°C [392°F].

Installation

Minimum shrink temperature: 100°C [212°F]

Minimum full recovery temperature: 175°C [347°F]

Operating Temperature Range

RW-200: -40°C* to 200°C [-40°F to 392°F]

RW-200-E: -55°C to 200°C [-67°F to 392°F]

Specifications/Approvals

Series	Military	Raychem
RW-200	AMS-DTL 23053/13*	RW-3037
RW-200-E	Def. Stan. 59-97 Issue 3 Type 4A VG 95343 Part 5 Type E VDE 0341/Pt9005 BS 4G-198 Part 3 12A	RW-3037

*Formerly MIL-I-23053/13 and MIL-DTL-23053/13.

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

RW-200/RW-200-E (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness**	
	Minimum Expanded as Supplied	Maximum Recovered After Heating	After Heating (Nominal) RW-200-E	RW-200
1/8	3.2 [0.125]	1.6 [0.062]	0.76 [0.030]	0.76 [0.030]
3/16	4.8 [0.187]	2.4 [0.093]	0.84 [0.033]	0.89 [0.035]
1/4	6.4 [0.250]	3.2 [0.125]	0.89 [0.035]	0.89 [0.035]
3/8	9.5 [0.375]	4.8 [0.187]	1.02 [0.040]	0.89 [0.035]
1/2	12.7 [0.500]	6.4 [0.250]	1.22 [0.048]	0.89 [0.035]
5/8	15.9 [0.625]	7.9 [0.312]	—	1.07 [0.042]
3/4	19.1 [0.750]	9.5 [0.375]	1.45 [0.057]	1.07 [0.042]
7/8	22.2 [0.875]	11.1 [0.437]	—	1.25 [0.049]
1	25.4 [1.000]	12.7 [0.500]	1.78 [0.070]	1.25 [0.049]
1 1/4	31.8 [1.250]	15.9 [0.625]	—	1.40 [0.055]
1 1/2	38.1 [1.500]	19.1 [0.750]	2.41 [0.095]	1.40 [0.055]
2	50.8 [2.000]	25.4 [1.000]	2.79 [0.110]	1.65 [0.065]

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

Ordering Information

Color	Standard Black (-0)
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, Viton 1/4-0).

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

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China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

SCL

Semirigid, Encapsulant-Lined, Polyolefin Tubing

Product Facts

- 3:1 shrink ratio
- Splash-resistant, moisture-resistant covering; not intended for use where immersion in fluids is required
- Rugged protection against abrasion, vibration, and flexing
- Excellent strain relief and insulation of weak points
- RoHS compliant

Applications

Encapsulates components, splices, and terminations where moisture resistance and mechanical protection are required. Encapsulant melts and flows to fill surface irregularities of the substrate. While still hot, the tubing can be blocked to form a wire breakout.

Installation

Minimum shrink temperature: 125°C [257°F]

Minimum full recovery temperature: 135°C [275°F]

Operating Temperature Range

-55°C to 110°C [-67°F to 230°F]

Specifications/Approvals

Series	UL	Military	Raychem
SCL	E85381 600 V, 125°C	AMS-DTL-23053/4*, Class 1	RT-1301

*Formerly MIL-I-23053/4 and MIL-DTL-23053/4.

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

SCL (Continued)

Product Dimensions

Size	Additional Standard Color	Inside Diameter		Recovered Wall Thickness**	
		Minimum Expanded as Supplied	Maximum Recovered After Heating	Total Wall After Heating	Meltable Wall After Heating (Nominal)
1/8	Brown	3.2 [0.125]	0.6 [0.023]	0.96 ± 0.15 [0.038 ± 0.006]	0.51 [0.020]
3/16	Gray	4.8 [0.187]	1.5 [0.060]	1.09 ± 0.15 [0.043 ± 0.006]	0.64 [0.025]
1/4	White	6.4 [0.250]	2.0 [0.080]	1.19 ± 0.15 [0.047 ± 0.006]	0.69 [0.027]
3/8	Red	9.5 [0.375]	3.4 [0.135]	1.27 ± 0.18 [0.050 ± 0.007]	0.76 [0.030]
1/2	Blue	12.7 [0.500]	5.0 [0.195]	1.39 ± 0.18 [0.055 ± 0.007]	0.89 [0.035]
3/4	Yellow	19.1 [0.750]	8.0 [0.313]	1.65 ± 0.18 [0.065 ± 0.007]	1.02 [0.040]
1	N/A	25.4 [1.000]	10.2 [0.400]	1.90 ± 0.18 [0.075 ± 0.007]	1.02 [0.040]

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

Ordering Information

Color	Standard	Black (-0) for all sizes, plus one additional color per size per Product Dimensions table.
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	In 1.2-meter [4-foot] lengths.	
Ordering description***	Specify product name, size and color (for example, SCL 1/4-0).	

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

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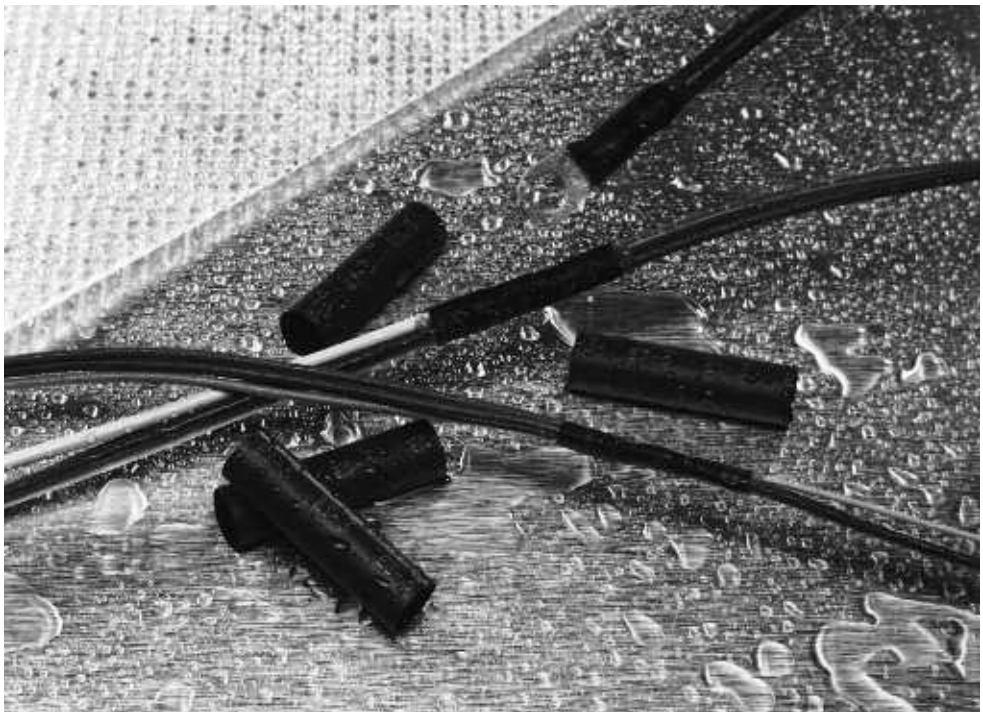
Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

SCT

Flame-Retardant, Adhesive-Lined, Semirigid Polyolefin Tubing (Extended Temperature Range)

Product Facts

- **4:1 shrink ratio allows a few sizes to cover a wide range of splice and component diameters**
- **Flame-retardant and mechanically tough, the tubing provides strain relief and abrasion protection of wire splices, terminals, and other components**
- **Thick adhesive liner forms an effective barrier against fluids and moisture and performs well at an extended temperature range**
- **RoHS compliant**



Applications

Specially designed to insulate and seal automotive wire splices and components in an under-the-hood automotive environment. Specially formulated to function at an extended temperature range.

Installation

Minimum shrink temperature: 110°C [230°F]

Minimum full recovery temperature: 135°C [266°F]

Operating Temperature Range

-40°C to 150°C [-40°F to 302°F]

Specifications/Approvals

Series	Raychem
SCT	SCT SCD

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-475-6222
Mexico: 52-55-1106-0800
L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

SCT (Continued)

Product Dimensions

Part Number	Inside Diameter		Recovered Wall Thickness*	
	Minimum Expanded as Supplied	Maximum Recovered After Heating	Total Wall After Heating	Meltable Wall After Heating (Nominal)
SCT No. 1	7.6 [0.300]	1.7 [0.065]	1.52 ± 0.30 [0.060 ± 0 .012]	0.76 [0.030]
SCT No. 2	9.0 [0.355]	2.3 [0.090]	1.52 ± 0.30 [0.060 ± 0 .012]	0.76 [0.030]
SCT No. 3	11.6 [0.455]	2.5 [0.100]	2.29 ± 0.30 [0.090 ± 0.012]	1.40 [0.055]
SCT No. 4	17.8 [0.700]	4.4 [0.175]	2.54 ± 0.30 [0.100 ± 0.012]	1.52 [0.060]

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

Ordering Information

Color	Black
Size selection	Always order the largest size that will shrink snugly over the component being covered. Special order sizes are available upon request.
Standard packaging	Cut pieces.
Marking	Tubing will be printed with its numbered size (such as SCT-1, SCT-2, SCT-3, SCT-4).
Ordering description	Specify product name, numbered size, color and cut length (for example, SCT-NO.3-E3-0-75MM).

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Japan: 81-44-844-8013
UK: 44-800-267-666

SFR

Very Flexible, Flame-Retardant, Silicone Elastomer Tubing

Product Facts

- **Outstanding low-temperature flexibility**
- **Resistance to hydraulic fluids, fuel, and lubricating oil**
- **Very good ablative characteristics: when exposed to flame, surface turns to insulative char or "ablates"**
- **RoHS compliant**

Applications

Provides cable jacketing, harness protection, and strain relief for electronic components, semi-conductor leads, and wire splices. Suitable for applications that require flexibility over a wide range of operating temperatures.

Installation

Minimum shrink temperature: 135°C [285°F]

Minimum full recovery temperature: 175°C [347°F]

Operating Temperature Range

-75°C to 180°C [-103°F to 356°F]

Specifications/Approvals

Series	Military	Raychem
SFR	AMS-DTL-23053/10* MIL-PRF-46846, Type II, Class 1	RT-1140

*Formerly MIL-I-23053/10 and MIL-DTL-23053/10.

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

SFR (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness**
	Minimum Expanded as Supplied	Maximum Recovered After Heating	After Heating
1/4	6.4 [0.250]	3.6 [0.143]	0.88 ± 0.25 [0.035 ± 0.010]
3/8	9.5 [0.375]	5.4 [0.214]	1.02 ± 0.25 [0.040 ± 0.010]
1/2	12.7 [0.500]	7.3 [0.286]	1.21 ± 0.38 [0.048 ± 0.015]
5/8	15.9 [0.625]	9.1 [0.357]	1.32 ± 0.38 [0.052 ± 0.015]
3/4	19.1 [0.750]	10.9 [0.428]	1.44 ± 0.38 [0.057 ± 0.015]
7/8	22.2 [0.875]	12.7 [0.500]	1.65 ± 0.38 [0.065 ± 0.015]
1	25.4 [1.000]	14.5 [0.570]	1.77 ± 0.51 [0.070 ± 0.020]
1 1/4	31.8 [1.250]	18.1 [0.714]	2.21 ± 0.51 [0.087 ± 0.020]
1 1/2	38.1 [1.500]	21.8 [0.857]	2.41 ± 0.51 [0.095 ± 0.020]
1 3/4	44.5 [1.750]	25.4 [1.000]	2.71 ± 0.51 [0.107 ± 0.020]
2	50.8 [2.000]	29.0 [1.140]	2.79 ± 0.51 [0.110 ± 0.020]

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

Ordering Information

Color	Standard Black (-0)
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, SFR 1/4-0).

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

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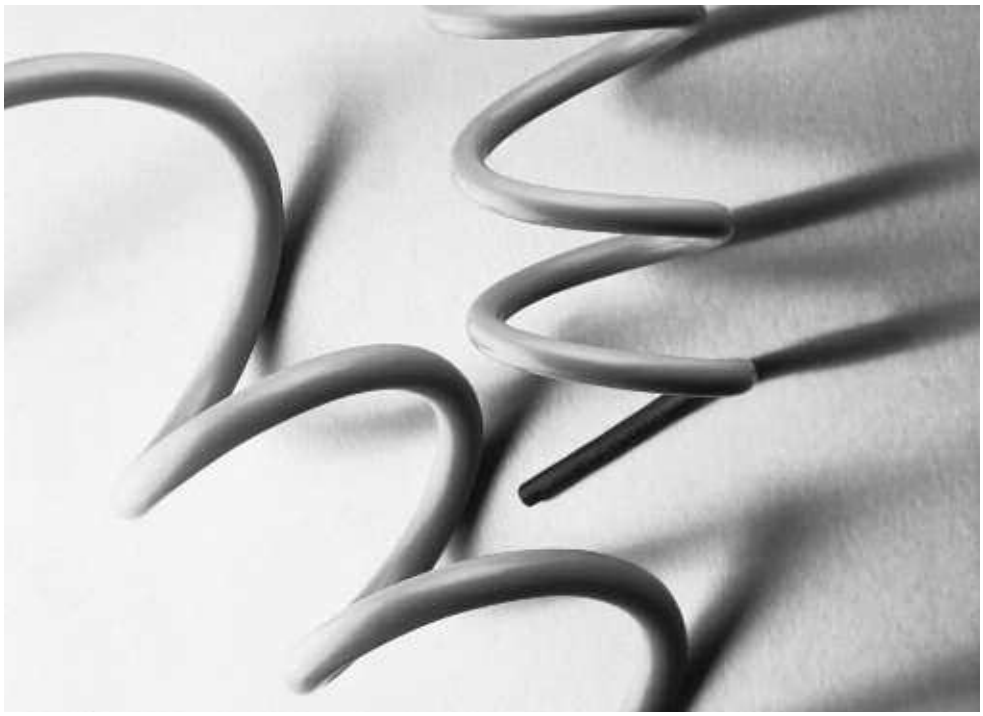
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

SRFR

Highly Flexible, Silicone Rubber Tubing

Product Facts

- Highly flame-retardant
- Extremely flexible at high and low temperatures
- Shrink ratio 1.5:1 minimum except sizes 4/2.9 and 29/20
- RoHS compliant



Applications

Highly flexible and resistant to high and low temperatures. Unlike other silicone materials, SRFR displays outstanding physical strength. It resists extreme heat shocks, and exhibits good thermal insulation. SRFR is non-burning and has outstanding ablative properties as well as excellent physical and electrical properties. SRFR is used in medical equipment where its key properties are outstanding flexibility and ability to withstand exposure to sterilization conditions. Other applications include thyristor power cable insulation, heating element and bus bar insulation, fiber optic bundle sheathing, and rocketry support cable protection.

Installation

Minimum shrink temperature: 135°C [275°F]

Minimum full recovery temperature: 175°C [347°F]

Operating Temperature Range

-75°C to 200°C
[-103°F to 392°F]

Specifications/Approvals

Series	UL	Raychem
SRFR	E85381 VW-1 600V, 200°C	RT-1142 RW-2057

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

SRFR (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness*
	Minimum Expanded as Supplied	Maximum Recovered After Heating	After Heating
2.9/1.7	2.9 [0.114]	1.7 [0.067]	1.0 ± 0.50 [0.039 ± 0.020]
4/2.9	4.0 [0.158]	2.9 [0.114]	1.0 ± 0.50 [0.039 ± 0.020]
7.8/4.6	7.8 [0.307]	4.6 [0.181]	1.0 ± 0.50 [0.039 ± 0.020]
10/6.5	10.0 [0.394]	6.5 [0.256]	1.5 ± 0.50 [0.059 ± 0.020]
15/9.6	15.0 [0.591]	9.6 [0.378]	1.5 ± 0.50 [0.059 ± 0.020]
21/13	21.0 [0.827]	13.0 [0.512]	2.0 ± 0.75 [0.079 ± 0.030]
29/20	29.0 [1.142]	20.0 [0.787]	2.0 ± 0.75 [0.079 ± 0.030]
41/27	41.0 [1.614]	27.0 [1.063]	3.0 ± 1.00 [0.118 ± 0.039]
51/33	51.0 [2.008]	33.0 [1.299]	3.0 ± 1.00 [0.118 ± 0.039]

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

Ordering Information

Color	Standard	Gray (-8)
Size selection	Always order the largest size that will shrink snugly over the component to be covered.	
Standard packaging	On spools.	
Ordering description	Specify product name, size and color (for example, SRFR 2.9/1.7-8).	

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L. & S. America: 54-11-4733-2200

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China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

SST/SST-FR

Self-Sealing, Heat-Shrinkable Tubing

Product Facts

- Thick adhesive liner forms an effective barrier against fluids and moisture
- Thick-wall insulation, strain relief and abrasion protection
- No need for greases, tape, or epoxy
- Expansion ratios as high as 3:1
- Available in flame-retardant material
- SST has the following agency approvals:
  - ABS (American Bureau of Shipping)
  - Lloyd's (Lloyd's Register of Shipping)
- RoHS compliant

Applications

SST provides a simple, positive splice-sealing method that offers protection under adverse environmental conditions. Tubing supplied with standard sealant provides water sealing and environmental protection in wet or underground applications. The thermoplastic adhesive not only seals, but also provides mechanical strain relief. The polymer tubing has excellent insulating, abrasion-resistance, and strain-relief properties.

Installation

Minimum shrink temperature: 90°C [195°F]

Minimum full recovery temperature: 121°C [250°F]

Operating Temperature Range

-55°C to 110°C
[-67°F to 230°F]

Specifications/Approvals

Series	Military	Industry	Agency	Raychem
SST	—	—		RW-2011
SST-FR	AMS-DTL-23053/15*, Classes 1 and 2	ASTM D 685, nonburning	ABS, Lloyd's	RW-2011

*Formerly MIL-I-23053/I5 and MIL-DTL-23053/15.

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

SST/SST-FR (Continued)

Product Dimensions

Size†	Standard Nominal Length	Inside Diameter		Wall Thickness		Recommended Cable Range for 600-Volt Cable
		Minimum Expanded as Supplied	Maximum Recovered After Heating	Expanded	Nominal Wall After Heating††	
SST*-03	30**, 48	0.300	0.100	0.025	0.070	18 through 14 AWG
SST*-04	30**, 48	0.400	0.150	0.025	0.070	14 through 10 AWG
SST*-07	48	0.750	0.220	0.030	0.095	8 through 1 AWG
SST*-11	48	1.100	0.375	0.040	0.120	2 through 4/0 AWG
SST*-13	48	1.300	0.375	0.035	0.120	2 through 4/0 AWG
SST*-15	48	1.500	0.500	0.050	0.140	2/0 AWG through 500 MCM
SST*-17	48	1.700	0.500	0.045	0.140	2/0 AWG through 500 MCM
SST*-20	48	2.000	0.750	0.050	0.160	350 MCM through 1000 MCM
SST*-27	48	2.700	0.900	0.050	0.160	500 MCM through 1250 MCM
SST*-30	48	3.000	1.250	0.050	0.160	900 MCM through 1500 MCM
SST*-40	48	4.000	1.750	0.050	0.160	1500 MCM through 2500 MCM
SST*-45	48	4.500	1.750	0.050	0.160	1500 MCM through 2500 MCM

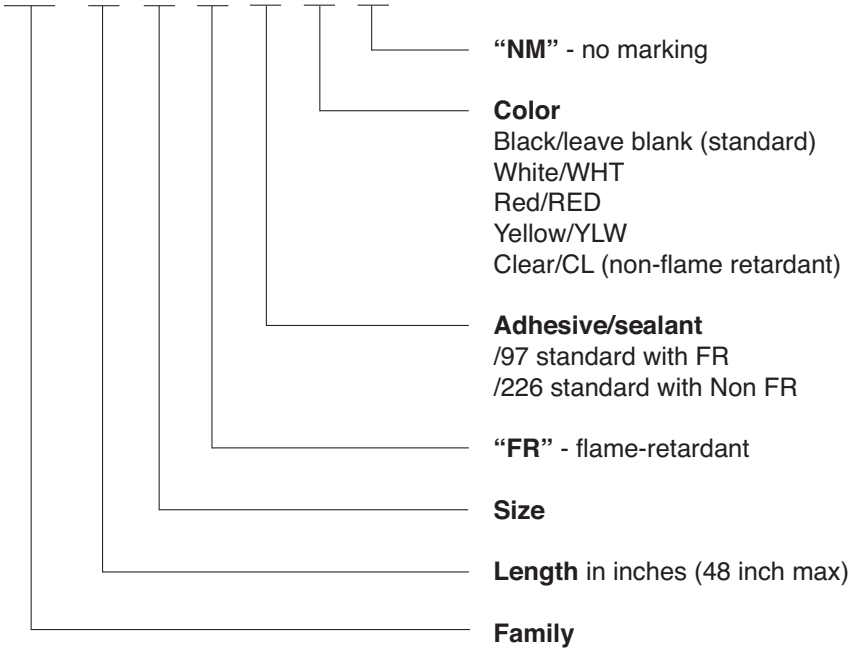
†In place of asterisk* substitute length of tubing to be ordered. For example, SST*-11, as the second column indicates, comes in 48-inch lengths, so a 48-inch cut piece of SST tubing would be SST 48-11.
††Wall thickness will be less if tubing recovery is restricted during shrinkage.
**30-inch length standard for /226 coating only.

Ordering Information

Color	Standard	Black
	Nonstandard	White, Red, Yellow and Clear (Clear is non-flame-retardant)
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	See Product Dimensions table.	
Ordering description	Specify product name, cut length, size and color (for example, SST 48-07/FR/97).	

Part Numbering System

SST - _ - _ / _ / _ / _ / _



Example: SST-48-07/FR/97/NM

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USA: 1-800-522-6752
Canada: 1-905-475-6222
Mexico: 52-55-1106-0800
L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

TAT-125

Adhesive-Lined, Flexible, Polyolefin Tubing

Product Facts

- **2:1 shrink ratio**
- **Thin adhesive lining that bonds to outer tubing and surface below, forming a positive environmental seal**
- **Flexibility of both tubing and adhesive**
- **Moisture seal that is resistant to bending of the substrate**
- **Good mechanical strength and cut-through resistance**
- **Adhesive that bonds to a wide variety of plastics, rubbers, and metals, including polyethylene, neoprene, lead, and steel**
- **RoHS compliant**

Applications

Seals and protects simple in-line splices, bimetallic joints, and components from fluids, moisture, and corrosion. Repairs damaged wire insulation, especially where flexibility is required. Provides one-step electrical insulation and moisture sealing.

Installation

Minimum shrink temperature: 95°C [203°F]

Minimum full recovery temperature: 121°C [250°F]

Operating Temperature Range

-55°C to 110°C [-67°F to 230°F]

Specifications/Approvals

Series	UL*	Military	Raychem
TAT-125 Type 1 (colors)	E85381 600 V, 125°C	AMS-DTL-23053/4*, Class 2	RW-3032
TAT-125 Type 2 (clear)	—	—	RW-3032

*Formerly MIL-I-23053/4 and MIL-DTL-23053/4. Sizes 1/4" through 1 1/2" only.

Available in:	Americas	Europe	Asia Pacific
	■		■

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China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

TAT-125 (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness**	
	Minimum Expanded as Supplied	Maximum Recovered After Heating	Total Wall After Heating (Nominal)	Adhesive Wall After Heating (Nominal)
1/8	3.2 [0.125]	1.6 [0.062]	0.69 [0.027]	0.23 [0.009]
3/16	4.8 [0.187]	2.4 [0.093]	0.71 [0.028]	0.25 [0.010]
1/4	6.4 [0.250]	3.2 [0.125]	0.74 [0.029]	0.13 [0.005]
3/8	9.5 [0.375]	4.8 [0.187]	0.74 [0.029]	0.13 [0.005]
1/2	12.7 [0.500]	6.4 [0.250]	0.76 [0.030]	0.15 [0.006]
3/4	19.1 [0.750]	9.5 [0.375]	0.89 [0.035]	0.15 [0.006]
1	25.4 [1.000]	12.7 [0.500]	1.07 [0.042]	0.20 [0.008]
1 1/2	38.1 [1.500]	19.1 [0.750]	1.19 [0.047]	0.28 [0.011]

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

Ordering Information

Color	Standard	Black (-0)
	Nonstandard	White (-9), red (-2), blue (-6), yellow (-4), green (-5), brown (-1), orange (-3), violet (-7), gray (-8), clear (-X , not flame-retardant)
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	In 1.2-meter [4-foot] lengths.	
Ordering description	Specify product name, size and color (for example, TAT-125 1/4-0).	

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TC Caps

Semirigid, Flame-Retardant Polyolefin Caps

Product Facts

- 2.5:1 shrink ratio
- Flame-retardant
- Permanent or temporary method to terminate wires
- Rapid, simple installation
- Rugged protection against abrasion, vibration, and flexing
- RoHS compliant

Applications

Widely used for wire terminations because of their light weight, small size and durability. Vibration-proof caps are used to insulate and terminate dead-end electrical cables, fixtures, connectors, and other electrical equipment. Also used to protect the ends of wire during storage.

Installation

Minimum shrink temperature: 110°C [230°F]

Minimum full recovery temperature: 135°C [275°F]

Operating Temperature Range

-55°C to 135°C
[-67°F to 275°F]

Specifications/Approvals

Series	UL	Raychem
TC Caps	E85381 600 V, 125°C	TC Caps SCD

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

TC Caps (Continued)

Product Dimensions

Size	Color	Length		Inside Diameter		Recovered Wall Thickness**
		Nominal Overall as Supplied	Minimum Open Barrel after Recovery*	Minimum Expanded as Supplied	Maximum Recovered After Heating	After Heating
TC 4001	White (-9)	19.1 (0.750)	10.2 (0.400)	1.6 (0.063)	0.8 (0.030)	0.51 ± 0.12 (0.020 ± 0.005)
TC 4003	Red (-2)	25.4 (1.000)	14.0 (0.550)	3.2 (0.125)	1.3 (0.050)	0.64 ± 0.12 (0.025 ± 0.005)
TC 4005	Gray (-8)	28.6 (1.125)	14.0 (0.550)	6.4 (0.250)	2.5 (0.100)	0.69 ± 0.12 (0.027 ± 0.005)

*See glossary for definition of “barrel”.
**Wall thickness will be less if tubing recovery is restricted during shrinkage.

Ordering Information

Color	Standard	One color per size per the Product Dimensions table.
Size selection	Always order the largest size that will shrink snugly over the component to be covered.	
Standard packaging	In pieces.	
Ordering description	Specify product name, size and color (for example, TC-CAPS-4003-2).	

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China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

TFE and TFER

High-Temperature, Chemically Inert, Modified Tubing made of PTFE

Product Facts

- **Shrink ratio: 1.8:1 (TFE)**
  3.2:1 (TFER)
- **High flame-resistance**
- **Excellent chemical resistance**
- **RoHS compliant**

Applications

Designed to provide insulation and mechanical protection in severe chemical and thermal environments. Used to cover hydraulic hose and couplings to prevent contamination and corrosion. The high mechanical strength and extremely low coefficient of friction make it good for reducing damage to bearing shafts and similar applications.

Installation

Minimum shrink temperature: 330°C [625°F]

Minimum full recovery temperature: 340°C [644°F]

Operating Temperature Range

-67°C to 250°C
[-88.6°F to 482°F]

Specifications/Approvals

Series	Military	Raychem
TFE, TFER	AMS-DTL-23053/12*, Classes 3 and 5 Def. Stan. 59-97 Type 5A (TFE) Def. Stan. 59-97 Type 5B (TFER)	RW-2055 (TFE) RW-2054 (TFER)

*Formerly MIL-I-23053/12 and MIL-DTL-23053/12.

Available in:	Americas	Europe	Asia Pacific
		■	■

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Japan: 81-44-844-8013
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TFE and TFER (Continued)

Product Dimensions

TFE

Size	Inside Diameter		Wall Thickness**
	Minimum Expanded as Supplied	Maximum Recovered After Heating	Nominal Recovered After Heating
30	0.8 [0.032]	0.38 [0.015]	0.23 [0.009]
28	0.9 [0.035]	0.46 [0.018]	0.23 [0.009]
26	1.1 [0.043]	0.56 [0.022]	0.25 [0.010]
24	1.2 [0.047]	0.68 [0.027]	0.25 [0.010]
22	1.4 [0.055]	0.81 [0.032]	0.30 [0.012]
20	1.5 [0.059]	0.99 [0.039]	0.30 [0.012]
18	1.9 [0.075]	1.24 [0.049]	0.30 [0.012]
16	2.3 [0.091]	1.55 [0.061]	0.30 [0.012]
14	3.0 [0.118]	1.83 [0.072]	0.30 [0.012]
12	3.8 [0.150]	2.26 [0.089]	0.30 [0.012]
10	4.8 [0.189]	2.84 [0.112]	0.30 [0.012]
8	6.1 [0.240]	3.58 [0.141]	0.38 [0.015]
6	7.6 [0.299]	4.52 [0.178]	0.38 [0.015]
4	9.4 [0.370]	5.69 [0.224]	0.38 [0.015]
2	10.9 [0.429]	7.06 [0.278]	0.38 [0.015]
0	11.9 [0.469]	8.81 [0.347]	0.38 [0.015]

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

TFER

Size	Inside Diameter		Wall Thickness**
	Minimum Expanded as Supplied	Maximum Recovered After Heating	Nominal Recovered After Heating
5/64	2.0 [0.079]	0.6 [0.024]	0.23 [0.009]
1/8	3.2 [0.126]	1.0 [0.039]	0.25 [0.010]
1/4	6.4 [0.252]	1.6 [0.063]	0.30 [0.012]
3/8	9.5 [0.374]	2.4 [0.095]	0.30 [0.012]
1/2	12.7 [0.500]	3.7 [0.146]	0.38 [0.015]
5/8	15.9 [0.626]	4.5 [0.177]	0.38 [0.015]
3/4	19.0 [0.748]	5.7 [0.224]	0.38 [0.015]
1	25.4 [1.000]	7.1 [0.230]	0.38 [0.015]
1-1/4	32.0 [1.260]	8.8 [0.347]	0.38 [0.015]

**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	In 1.2-meter [4-foot] lengths.
Ordering description***	Specify product name, size and color (for example,TFE 22-X).

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

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USA: 1-800-522-6752
Canada: 1-905-475-6222
Mexico: 52-55-1106-0800
L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

Tubing Kits and Mini-Spools

Smaller Packaging Options for Single Wall and Adhesive-Lined Tubing Products

Product Facts

- **VERSAFIT and RNF-100 tubing: 2:1 shrink ratio**
- **DWP-125: 3:1 shrink ratio**
- **ES1000: 4:1 shrink ratio**
- **VERSAFIT tubing's low full recovery temperature reduces installation time and the risk of damage to temperature-sensitive components**
- **RNF-100 offers excellent physical, chemical, and electrical properties that meet or exceed commercial, industrial and military standards for highly reliable, general purpose tubing**
- **DWP-125 and ES1000 have high-shrink-ratios to allow for insulation and sealing of irregular shapes; few sizes cover a wide range of diameters**
- **RoHS compliant**

Applications

Single wall VERSAFIT and RNF-100 tubing provide electrical insulation and strain relief of in-line components, electrical connections, wire terminations, and splices. They can be used to bundle wires for flexible light duty harnesses. Also to identify or color code wires, cables, terminals and electronic components.

Adhesive-lined DWP-125 and ES1000 environmentally seal and protect a wide variety of electrical applications, including wire splices, terminations, breakouts and connector-to-cable transitions.

Installation

Minimum full recovery temperature:

VERSAFIT: 90°C [194°F]

RNF-100: 121°C [250°F]

DWP-125: 125°C [257°F]

ES1000: 135°C [275°F]

Operating Temperature Range

VERSAFIT and RNF-100:
-55°C to 135°C
[-67°F to 275°F]

DWP-125:
-40°C to 110°C
[-40°F to 230°F]

ES1000:
-40°C to 130°C
[-40°F to 266°F]

Specifications/Approvals

Series	UL	CSA	Raychem
VERSAFIT	E35586 VW-1 600 V, 125°C	LR31929 VW-1 600 V, 125°C	RW-3009
RNF-100	E35586 600 V, 125°C	LR31929 600 V, 125°C	RT-350
DWP-125	E35586 600 V, 125°C	—	DWP-125 SCD
ES1000	E85381 600 V, 125°C	—	RT-1113

Available in:	Americas	Europe	Asia Pacific
	■		■

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Tubing Kits and Mini-Spools (Continued)

Single Wall Tubing

KIT 1 – 2 to 1 Shrink Ratio • Black • 600V, 125°C, UL/CSA VW-1

(KIT 1 PN: A55251-000)

Expanded I.D.	Quantity (6 Inch Pieces)	Fits Wire Gauge Size	Refill Part Number
VERSAFIT-3/16"	30	18 – 14 AWG	D76139-000
VERSAFIT-1/4"	28	12 – 10 AWG	F37063-000
VERSAFIT-3/8"	24	8 AWG	D27573-000
VERSAFIT-1/2"	20	6 –3 AWG	C02462-000
VERSAFIT-3/4"	14	2 – 1/0 AWG	A92664-000
VERSAFIT-1"	10	2/0 – 4/0 AWG	C21270-000

KIT 2 – 2 to 1 Shrink Ratio • 7 Colors • 600V, 125°C, UL/CSA VW-1 (except clear)**

(KIT 2 PN: D54859-000)

Expanded I.D.	Quantity (6 Inch Pieces)	Fits Wire Gauge Size	Refill Part Number
VERSAFIT-3/32"	35	18 AWG	E31091-000
VERSAFIT-1/8"	28	16 AWG	349256-000
VERSAFIT-3/16"	21	14 AWG	C53800-000
VERSAFIT-1/4"	21	12 – 10 AWG	C87605-000
VERSAFIT-3/8"	14	8 AWG	A82691-000
VERSAFIT-1/2"	14	6 – 3 AWG	E10896-000

**Clear tubing in Kit 2 and Kit 2 Refills is RNF-100.

Adhesive-Lined Tubing

KIT 3 – Black/White/Red/Clear • 600V, 125°C, UL

(KIT 3 PN: E42160-000)

Expanded I.D.	Quantity (6 Inch Pieces)	Fits Wire Gauge Size		Refill Part Number
DWP-125-1/8"	25	20 – 16 AWG	(3 to 1 Shrink Ratio)	D14889-000
DWP-125-3/16"	25	14 –10 AWG	(3 to 1 Shrink Ratio)	E87367-000
DWP-125-1/4"	24	12 –10 AWG	(3 to 1 Shrink Ratio)	F91864-000
DWP-125-1/2"	10	6 –3 AWG	(3 to 1 Shrink Ratio)	F41454-000
DWP-125-3/4"	5	2 – 1/0 AWG	(3 to 1 Shrink Ratio)	C67617-000
DWP-125-1"	3	2/0 – 4/0 AWG	(3 to 1 Shrink Ratio)	F66623-000
ES1000-NO.1	6	16 – 12 AWG	(4 to 1 Shrink Ratio)	
ES1000-NO.2	5	12 – 10 AWG	(4 to 1 Shrink Ratio)	
ES1000-NO.3	5	10 – 8 AWG	(4 to 1 Shrink Ratio)	
ES1000-NO.4	3	6 –3 AWG	(4 to 1 Shrink Ratio)	

KITS 1, 2 and 3 are comprised of a durable six section plastic box with hinged lid. Inside the lid are product selection guidelines. Ask your Sales Representative about KIT 4 and KIT 6, our Economy Tubing Kits in a reclosable plastic bag, also used on "point of sale" racks. Here are Part Numbers for those Kits and their content:
KIT 4: E32151-000 (Three pieces each of 3/16", 1/4", 3/8", 1/2", 3/4" and 1" Black tubing in 6 inch pieces)
KIT 6: C72402-000 (Three pieces each of 3/64", 1/16", 3/32" and 1/8" Black tubing in 6 inch pieces)

VERSAFIT MINI-SPOOLS

2 to 1 Shrink Ratio • Black • 600V, 125°C, UL/CSA VW-1

Expanded I.D.	Quantity (Feet)	Part Number
VERSAFIT-3/64"	100	C16404-000
VERSAFIT-1/16"	75	E40870-000
VERSAFIT-3/32	65	D70981-000
VERSAFIT-1/8"	60	C17600-000
VERSAFIT-3/16"	50	F27135-000
VERSAFIT-1/4"	40	F64479-000
VERSAFIT-3/8"	35	D57591-000
VERSAFIT-1/2"	30	E37316-000
VERSAFIT-3/4"	25	449582-000
VERSAFIT-1"	15	F27156-000

VERSAFIT is a very flexible, highly flame-retardant polyolefin tubing, 90°C full recovery temperature, good fluid resistance with a UL 224/CSA VW-1 flammability rating.

RNF-100 MINI-SPOOLS

2 to 1 Shrink Ratio • Black • 600V, 125°C, UL/CSA

Expanded I.D.	Quantity (Feet)	Part Number
RNF-100-3/64"	100	D00409-000
RNF-100-1/16"	75	A66551-000
RNF-100-3/32	65	D42391-000
RNF-100-1/8"	60	F56629-000
RNF-100-3/16"	50	E77288-000
RNF-100-1/4"	40	F75818-000
RNF-100-3/8"	35	D12330-000
RNF-100-1/2"	30	A81736-000
RNF-100-3/4"	25	E40866-000
RNF-100-1"	15	E62131-000

RNF-100 is a flexible, flame-retardant polyolefin tubing, 121°C full recovery temperature, excellent fluid resistance with a UL 224/CSA All Tubing flammability rating.

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Japan: 81-44-844-8013
UK: 44-800-267-666

TUGA-GP

Shiny, Non-Flame-Retardant, Polyolefin Tubing

Product Facts

- 2:1 shrink ratio
- Can be easily hot-stamped
- Bright, shiny surface
- Semiflexible, non-flame-retardant, halogen-free
- Conforms to substrates more uniformly and with less longitudinal change than most PVC-based materials
- RoHS compliant

Applications

TUGA-GP is a commercial grade tubing for general applications where a flame-retardant product is not needed but where electrical insulation and mechanical performance are important. TUGA-GP makes an attractive covering for many automotive, appliance, and consumer-goods applications.

Installation

Minimum shrink temperature: 85°C [85°F]

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

Operating Temperature Range

-55°C to 125°C
[-67°F to 257°F]

Specifications/Approvals

Series	Raychem
TUGA-GP	RW-2201

Available in:	Americas	Europe	Asia Pacific
		■	

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China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

TUGA-GP (Continued)

Product Dimensions

Size	Inside Diameter		Wall Thickness*
	Minimum Expanded as Supplied	Maximum Recovered After Heating	Nominal After Heating
1.2/0.6	1.2 [0.046]	0.6 [0.023]	0.4 [0.016]
1.6/0.8	1.6 [0.062]	0.8 [0.031]	0.4 [0.016]
2.4/1.2	2.4 [0.093]	1.2 [0.046]	0.5 [0.019]
3/1.5	3.0 [0.118]	1.5 [0.059]	0.5 [0.019]
5/2.5	5.0 [0.197]	2.5 [0.098]	0.5 [0.019]
6.4/32	6.4 [0.250]	3.2 [0.125]	0.6 [0.024]
8/4	8.0 [0.315]	4.0 [0.157]	0.6 [0.024]
9.5/4.8	9.5 [0.375]	4.8 [0.187]	0.6 [0.024]
11/5.5	11.0 [0.433]	5.5 [0.217]	0.6 [0.024]
12.7/6.4	12.7 [0.500]	6.4 [0.250]	0.6 [0.024]
15/7.5	15.0 [0.591]	7.5 [0.295]	0.8 [0.031]
20/10	20.0 [0.787]	10.0 [0.394]	0.8 [0.031]
25.4/12.7	25.4 [1.000]	12.7 [0.500]	0.9 [0.035]
38/19	38.0 [1.496]	19.0 [0.748]	1.0 [0.039]

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

Ordering Information

Color	Standard Black (-0)
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Special order sizes available upon request.
Standard packaging	On spools.
Ordering description	Specify product name, size and color (for example, TUGA 3/1.5-0).

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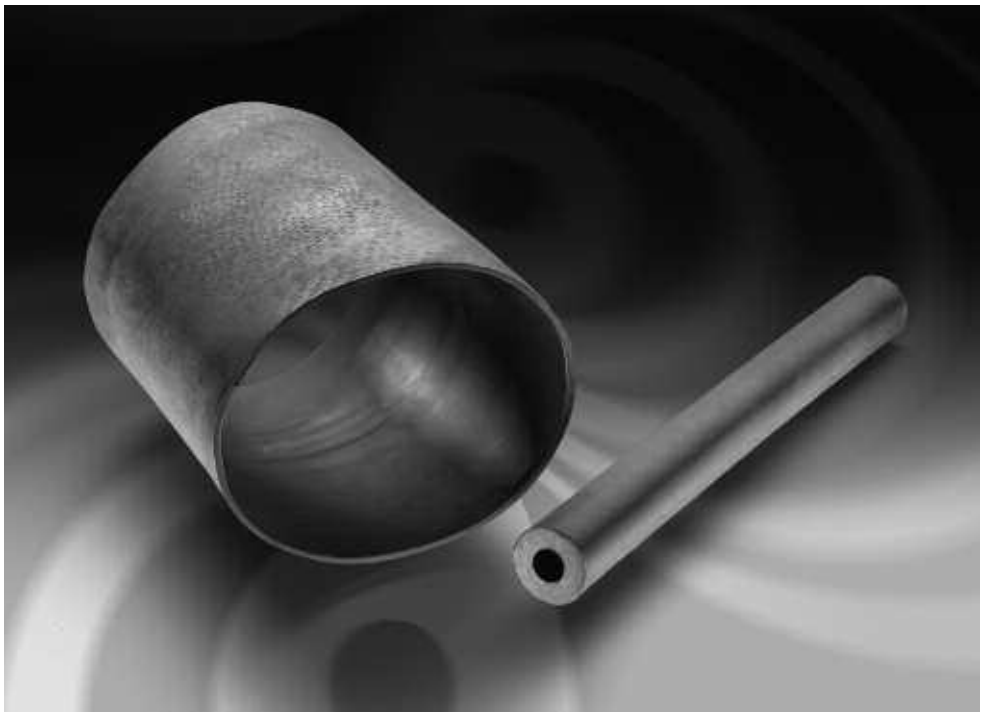
Japan: 81-44-844-8013
UK: 44-800-267-666

URHT

Ultra-High-Ratio, Flame-Retardant, Polyolefin Heat-Shrinkable Tubing

Product Facts

- Shrink ratios as high as 8:1
- Specially formulated for thick wall insulation, strain relief and abrasion protection
- Flame-retardant passing ASTM D 635
- Excellent performance in both hot and cold environments
- Optional factory applied adhesive provides watertight environmental sealing in wet and corrosive locations
- RoHS compliant



Applications

Ultra-high-shrink-ratio, heat-shrinkable tubing, with expansion ratios as high as 8-to-1, is designed to conform to odd shapes and shrink over large transitions, allowing for the repair and sealing of cable connectors and equipment. Cable harnesses can be repaired and released without disassembly. This product can be used to seal the back end of a connector or simply repair a damaged outer insulation of a cable or wire.

URHT tubing is available with or without a hot melt adhesive lining.

Installation

Minimum shrink temperature: 135°C [275°F]

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

Operating Temperature Range

-55°C to 135°C
[-67°F to 275°F]

Specifications/Approvals

Series	Military	Raychem
URHT	SAE-AS81765/1, Type II*	URHT SCD

*heat-shrinkable, crosslinked, flexible polyolefin

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

URHT (Continued)

Product Dimensions

Size	Inside Diameter		Wall Thickness	
	Minimum Expanded as Supplied	Maximum Recovered After Heating	Nominal Recovered After Heating	Unrestricted Full Recovered Length ± 6.35 (.250)
URHT-200	50.80 (2.000)	5.84 (0.230)	3.56 (0.140)	7.62, 101.60, 152.40, 254.00 (3, 4, 6, 10)
URHT-300	76.20 (3.000)	8.64 (0.340)	3.56 (0.140)	7.62, 101.60, 152.40, 254.00 (3, 4, 6, 10)

Ordering Information

Color	Standard Black (-0)
Size selection	Always order the largest size that will shrink snugly over the component to be covered.
Standard packaging	In pieces.
Ordering description	Specify product name, size, cut length and color (for example, URHT-200-10-0).

Part Numbering System

URHT - _ / _ / _

- 42 = Std Adhesive
  86 = High Performance Adhesive
- Unrestricted recovered length
- Expanded inside diameter - as supplied

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Japan: 81-44-844-8013
UK: 44-800-267-666

Versafit

Highly Flame-Retardant, Very Flexible, Low-Shrink-Temperature, Polyolefin Tubing

Product Facts

- 2:1 shrink ratio
- Low shrink temperature reduces installation time and the risk of damage to temperature-sensitive components
- Very flexible; doesn't easily wrinkle when bent
- Highly flame-retardant
- Hot stamps extremely well
- Higher temperature rating, better thermal stability, and higher resistance to physical abuse than noncrosslinked materials
- Free of polybrominated biphenyls (PBBs) and polybrominated biphenyl oxides and ethers (PBBOs and PBBEs), which are classified as environmentally hazardous substances
- RoHS compliant

Applications

Cost-effective choice for many commercial and military applications; electrically insulates and protects in-line components, disconnect terminals, and splices. Bundles wires for very flexible light-duty harnesses. Strain-relieves electrical wire connections for commercial applications. Identifies or color-codes wires, cables, terminals, and components.

Installation

Minimum shrink temperature: 70°C [158°F]

Minimum full recovery temperature: 90°C [194°F]

Operating Temperature Range

-55°C to 135°C
[-67°F to 275°F]

Specifications/Approvals

Series	UL	CSA	Military	Raychem
Versafit	E35586 VW-1 600 V, 125°C	LR31929 VW-1 600 V, 125°C	AMS-DTL-23053/5* Classes 1 & 3	RW-3009

*Formerly MIL-I-23053/5 and MIL-DTL-23053/5.

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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UK: 44-800-267-666

Versafit (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness**
	Expanded as Supplied	Maximum Recovered After Heating	After Heating
3/64	1.63 ± 0.2 [0.064 ± 0.008]	0.6 [0.023]	0.40 ± 0.08 [0.016 ± 0.003]
1/16	1.85 ± 0.2 [0.073 ± 0.008]	0.8 [0.031]	0.43 ± 0.08 [0.017 ± 0.003]
3/32	2.79 ± 0.2 [0.110 ± 0.008]	1.2 [0.046]	0.51 ± 0.08 [0.020 ± 0.003]
1/8	3.43 ± 0.2 [0.135 ± 0.008]	1.6 [0.062]	0.51 ± 0.08 [0.020 ± 0.003]
3/16	5.21 ± 0.3 [0.205 ± 0.010]	2.4 [0.093]	0.51 ± 0.08 [0.020 ± 0.003]
1/4	7.11 ± 0.3 [0.280 ± 0.010]	3.2 [0.125]	0.64 ± 0.08 [0.025 ± 0.003]
3/8	10.16 ± 0.4 [0.400 ± 0.015]	4.8 [0.187]	0.64 ± 0.08 [0.025 ± 0.003]
1/2	13.72 ± 0.4 [0.540 ± 0.015]	6.4 [0.250]	0.64 ± 0.08 [0.025 ± 0.003]
5/8***	16.90 ± 0.4 [0.665 ± 0.015]	8.0 [0.315]	0.76 ± 0.08 [0.030 ± 0.003]
3/4	20.45 ± 0.4 [0.805 ± 0.015]	9.5 [0.375]	0.76 ± 0.08 [0.030 ± 0.003]
1	26.80 ± 0.4 [1.055 ± 0.015]	12.7 [0.500]	0.89 ± 0.12 [0.035 ± 0.005]
1 1/4***	33.40 ± 0.7 [1.315 ± 0.025]	15.9 [0.625]	1.02 ± 0.15 [0.040 ± 0.006]
1 1/2	39.88 ± 0.8 [1.570 ± 0.030]	19.1 [0.750]	1.02 ± 0.15 [0.040 ± 0.006]
2	52.83 ± 1.0 [2.080 ± 0.040]	25.4 [1.000]	1.14 ± 0.16 [0.045 ± 0.007]
3	78.49 ± 1.0 [3.090 ± 0.040]	38.1 [1.500]	1.27 ± 0.20 [0.050 ± 0.008]
4	104.14 ± 1.3 [4.100 ± 0.050]	50.8 [2.000]	1.40 ± 0.23 [0.055 ± 0.009]

**Wall thickness will be less if tubing recovery is restricted during shrinkage.
***Nonstandard size; available by special order only.

Ordering Information

Color	Standard	Black (-0), white (-9), red (-2), blue (-6), yellow (-4)
	Nonstandard	Brown (-1), orange (-3), green (-5), violet (-7), gray (-8)
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, Versafit 1/4-0).	

****Available in the convenient Mini-Spool packaging/dispensing system, for sizes 3/64” up to 1” (black only).
*****Europe only. For supply to MIL, Def Stan and BS add -MS, -DS or -BS to ordering description.

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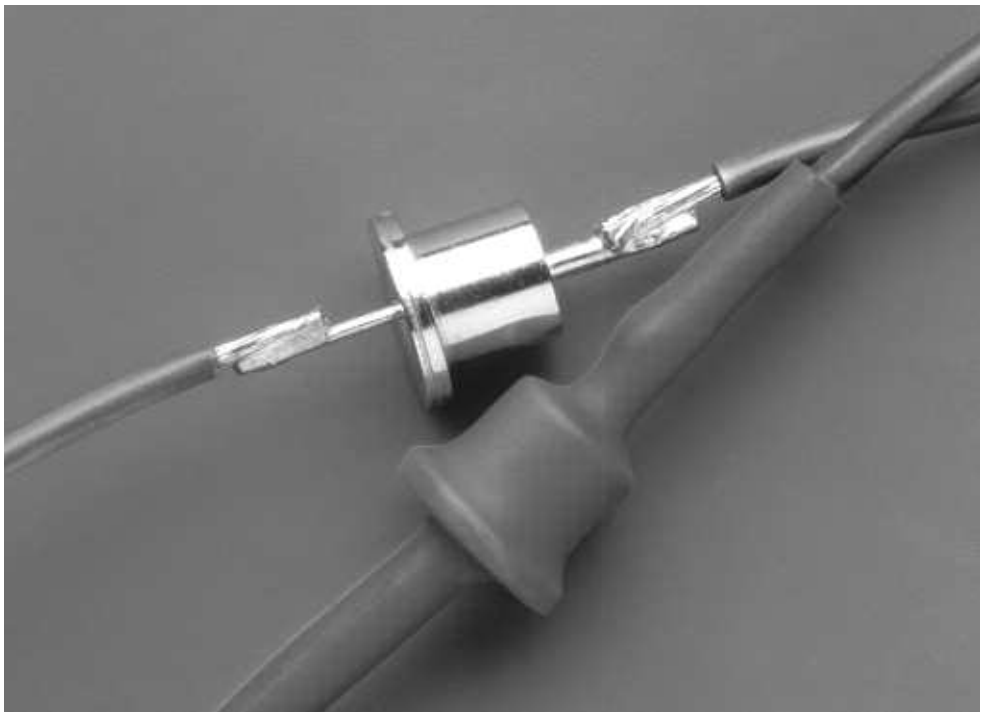
UK: 44-800-267-666

Versafit-3X

Very Flexible, High-Shrink-Ratio, Highly Flame-Retardant, Low-Shrink-Temperature, Polyolefin Tubing

Product Facts

- **Highly flame-retardant**
- **3:1 shrink ratio easily accommodates irregular shapes; few sizes cover a wide range of diameters**
- **Low shrink temperature reduces installation time and the risk of damage to temperature-sensitive components**
- **Free of polybrominated biphenyls (PBBs) and polybrominated biphenyl oxides and ethers (PBBOs and PBBEs) which are classified as environmentally hazardous substances**
- **RoHS compliant**



Applications

Provides electrical insulation and strain relief of in-line components, electrical connections, wire terminations, and splices. Bundles wires for flexible light duty harnesses. Identifies or color codes wires, cables, terminals and electrical and electronic components.

Installation

Minimum shrink temperature: 70°C [158°F]

Minimum full recovery temperature: 90°C [194°F]

Operating Temperature Range

-55°C to 135°C
[-67°F to 275°F]

Specifications/Approvals

Series	UL	CSA	Raychem
Versafit-3X	E35586 VW-1 600 V, 125°C	LR31929 VW-1 600 V, 125°C	RW-3009

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-475-6222
Mexico: 52-55-1106-0800
L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

Versafit-3X (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness*
	Minimum Expanded as Supplied	Maximum Recovered After Heating	After Heating
1/8	3.2 (0.125)	1.1 (0.042)	0.58 ± 0.08 (0.023 ± 0.003)
1/4	6.4 (0.250)	2.2 (0.083)	0.58 ± 0.08 (0.023 ± 0.003)
3/8	9.5 (0.375)	3.2 (0.125)	0.61 ± 0.08 (0.024 ± 0.003)
1/2	12.7 (0.500)	4.3 (0.166)	0.61 ± 0.08 (0.024 ± 0.003)
3/4	19.1 (0.750)	6.4 (0.250)	0.61 ± 0.08 (0.024 ± 0.003)
1	25.4 (1.000)	8.5 (0.333)	0.64 ± 0.08 (0.025 ± 0.003)

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

Ordering Information

Color	Standard	Black (-0)
	Nonstandard	White (-9), red (-2), blue (-6), yellow (-4), green (-5), brown (-1), orange (-3), violet (-7), gray (-8)
Size selection	Always order the largest size that will shrink snugly over the component to be covered.	
Standard packaging	On spools.	
Ordering description	Specify product name, size and color (for example, Versafit-3X-1/4-0).	

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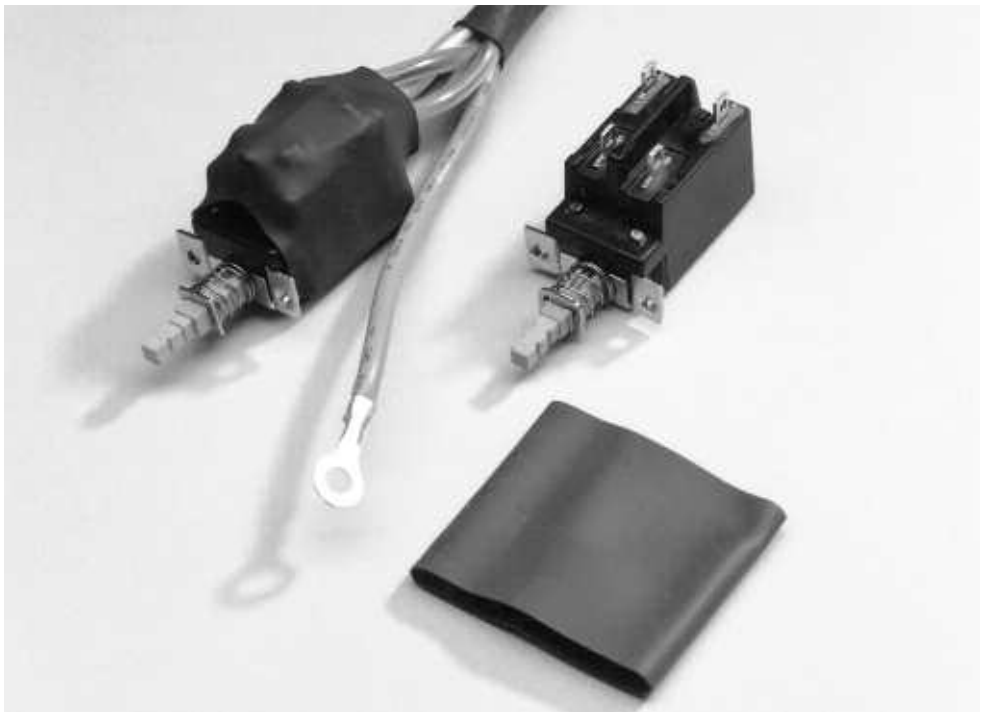
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

Versafit V2

Highly Flame-Retardant, Very Flexible, Low-Shrink-Temperature, Polyolefin Tubing

Product Facts

- **2:1 shrink ratio**
- **Low shrink temperature reduces installation time and the risk of damage to temperature-sensitive components**
- **Very flexible; doesn't easily wrinkle when bent**
- **Highly flame-retardant**
- **Hot stamps extremely well**
- **Higher temperature rating, better thermal stability, and higher resistance to physical abuse than noncrosslinked materials**
- **Free of polybrominated biphenyls (PBBs) and polybrominated biphenyl oxides and ethers (PBBOs and PBBEs), which are classified as environmentally hazardous substances**
- **RoHS compliant**



Applications

Cost-effective choice for many commercial applications; electrically insulates and protects in-line components, disconnect terminals, and splices. Bundles wires for very flexible light-duty harnesses. Strain-relieves electrical wire connections. Identifies or color-codes wires, cables, terminals, and components.

Installation

Minimum shrink temperature: 70°C [158°F]

Minimum full recovery temperature: 90°C [194°F]

Operating Temperature Range

-30°C to 125°C [-22°F to 257°F]

Specifications/Approvals

Series	UL	CSA	Raychem
Versafit V2	E35586 VW-1 600 V, 125°C	LR31929 VW-1 600 V, 125°C	RW-3023

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

Versafit V2 (Continued)

Product Dimensions

Size	Inside Diameter		Wall Thickness	
	Expanded as Supplied	Maximum Recovered After Heating	Expanded as Supplied (Nominal)	Recovered* After Heating (Minimum)
1.0	1.5 ± 0.2 [0.059 ± 0.008]	0.50 [0.020]	0.20 [0.008]	0.33 [0.013]
1.5	2.1 ± 0.2 [0.075 ± 0.008]	0.75 [0.030]	0.20 [0.008]	0.35 [0.014]
2.0	2.6 ± 0.2 [0.102 ± 0.008]	1.00 [0.039]	0.25 [0.010]	0.43 [0.017]
2.5	3.1 ± 0.2 [0.122 ± 0.008]	1.25 [0.049]	0.25 [0.010]	0.43 [0.017]
3.0	3.6 ± 0.2 [0.142 ± 0.008]	1.50 [0.059]	0.25 [0.010]	0.43 [0.017]
3.5	4.1 ± 0.3 [0.161 ± 0.012]	1.75 [0.069]	0.25 [0.010]	0.43 [0.017]
4.0	4.6 ± 0.3 [0.181 ± 0.012]	2.00 [0.079]	0.25 [0.010]	0.43 [0.017]
5.0	5.6 ± 0.3 [0.221 ± 0.012]	2.50 [0.098]	0.30 [0.012]	0.56 [0.022]
6.0	6.6 ± 0.3 [0.260 ± 0.012]	3.00 [0.118]	0.30 [0.012]	0.56 [0.022]
7.0	7.6 ± 0.3 [0.299 ± 0.012]	3.50 [0.138]	0.30 [0.012]	0.56 [0.022]
8.0	8.6 ± 0.3 [0.339 ± 0.012]	4.00 [0.158]	0.30 [0.012]	0.56 [0.022]
9.0	9.6 ± 0.3 [0.378 ± 0.012]	4.50 [0.177]	0.30 [0.012]	0.56 [0.022]
10.0	10.4 ± 0.3 [0.409 ± 0.012]	5.00 [0.197]	0.30 [0.012]	0.56 [0.022]
11.0	11.4 ± 0.3 [0.449 ± 0.012]	5.50 [0.217]	0.30 [0.012]	0.56 [0.022]
12.0	12.7 ± 0.3 [0.500 ± 0.012]	6.00 [0.236]	0.30 [0.012]	0.56 [0.022]
13.0	13.5 ± 0.3 [0.532 ± 0.012]	6.50 [0.256]	0.35 [0.014]	0.66 [0.026]
14.0	14.4 ± 0.4 [0.567 ± 0.016]	7.00 [0.276]	0.35 [0.014]	0.68 [0.027]
15.0	15.7 ± 0.4 [0.618 ± 0.016]	7.50 [0.295]	0.35 [0.014]	0.68 [0.027]
16.0	16.9 ± 0.4 [0.665 ± 0.016]	8.00 [0.315]	0.35 [0.014]	0.68 [0.027]
18.0	19.0 ± 0.4 [0.748 ± 0.016]	9.00 [0.354]	0.40 [0.016]	0.76 [0.030]
20.0	21.4 ± 0.4 [0.843 ± 0.016]	10.00 [0.394]	0.40 [0.016]	0.76 [0.030]
22.0	23.2 ± 0.4 [0.913 ± 0.016]	11.00 [0.433]	0.45 [0.018]	0.89 [0.035]
25.0	26.8 ± 0.4 [1.055 ± 0.016]	12.50 [0.492]	0.45 [0.018]	0.89 [0.035]
27.0	28.2 ± 0.5 [1.110 ± 0.020]	12.50 [0.492]	0.45 [0.018]	0.89 [0.035]
28.0	30.0 ± 0.5 [1.181 ± 0.020]	14.00 [0.551]	0.45 [0.018]	0.89 [0.035]
30.0	32.1 ± 0.5 [1.264 ± 0.020]	15.00 [0.591]	0.45 [0.018]	0.89 [0.035]

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

Ordering Information

Color	Standard	Black (-0)
	Nonstandard	White (-9), red (-2), blue (-6), yellow (-4), green (-5), orange (-3), violet (-7), brown (-1), gray (-8)
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, V2-3.0-0).	

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L. & S. America: 54-11-4733-2200

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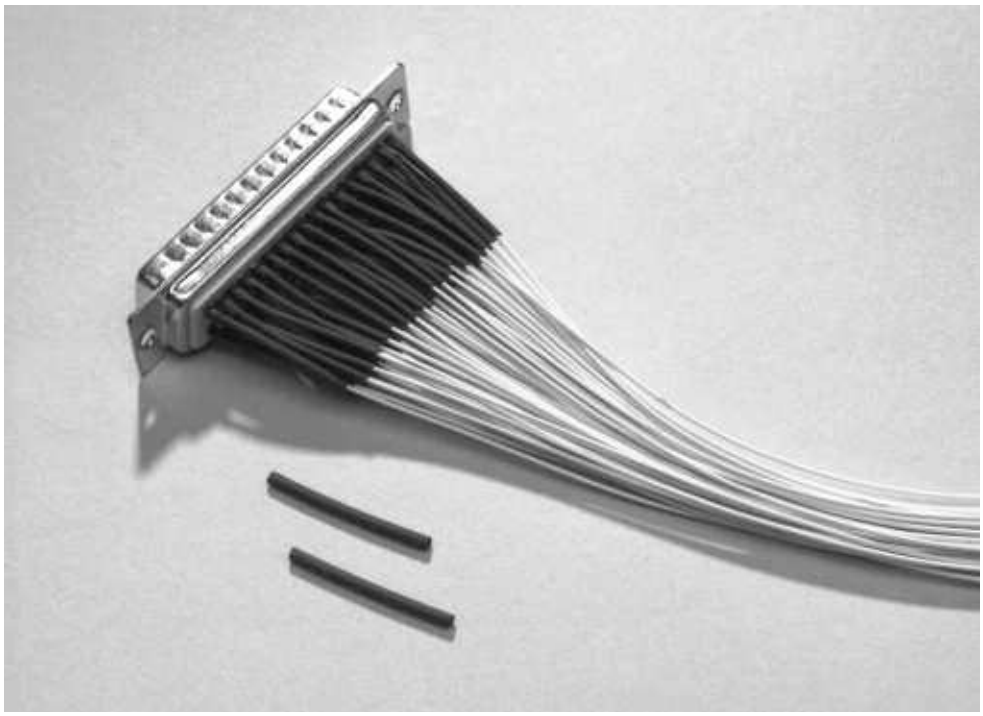
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

Versafit V4

Very-Thin-Wall, Very Flexible, Highly Flame-Retardant, Polyolefin Tubing

Product Facts

- **2:1 shrink ratio**
- **Very thin wall provides space savings and rapid shrinking**
- **Low shrink temperature further reduces installation time and risk of damage to temperature-sensitive components**
- **Very flexible; doesn't easily wrinkle when bent**
- **Free of polybrominated biphenyls (PBBs) and polybrominated biphenyl oxides and ethers (PBBOs and PBBEs), which are classified as environmentally hazardous substances**
- **RoHS compliant**



Applications

Typically used where space saving is important. Offers the ability to pack components more closely than is possible with standard tubings. Cost-effective choice for many commercial applications; electrically insulates and protects in-line components, disconnect terminals, and splices. Used for strain relief on high-density connectors.

Installation

Minimum shrink temperature: 70°C [158°F]

Minimum full recovery temperature: 90°C [194°F]

Operating Temperature Range

-30°C to 125°C
[-22°F to 257°F]

Specifications/Approvals

Series	UL	CSA	Raychem
Versafit V4	E85381 VW-1 300 V, 125°C	LR31929 VW-1 150 V, 125°C	RW-3023

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

Versafit V4 (Continued)

Product Dimensions

Size	Inside Diameter		Wall Thickness	
	Expanded as Supplied	Maximum Recovered After Heating	Expanded as Supplied (Nominal)	Recovered* After Heating (Minimum)
0.6	0.95 ± 0.25 [0.037 ± 0.010]	0.30 [0.012]	0.10 [0.004]	0.25 [0.010]
0.8	1.20 ± 0.25 [0.047 ± 0.010]	0.40 [0.016]	0.10 [0.004]	0.25 [0.010]
1.0	1.40 ± 0.25 [0.055 ± 0.010]	0.50 [0.020]	0.10 [0.004]	0.25 [0.010]
1.5	1.90 ± 0.25 [0.075 ± 0.010]	0.75 [0.030]	0.10 [0.004]	0.25 [0.010]
2.0	2.30 ± 0.25 [0.091 ± 0.010]	1.00 [0.039]	0.10 [0.004]	0.25 [0.010]
2.5	2.80 ± 0.25 [0.110 ± 0.010]	1.25 [0.049]	0.15 [0.006]	0.25 [0.010]
3.0	3.30 ± 0.25 [0.130 ± 0.010]	1.50 [0.059]	0.15 [0.006]	0.25 [0.010]
3.5	3.80 ± 0.25 [0.150 ± 0.010]	1.75 [0.069]	0.15 [0.006]	0.25 [0.010]
4.0	4.40 ± 0.25 [0.173 ± 0.010]	2.00 [0.079]	0.15 [0.006]	0.25 [0.010]
5.0	5.50 ± 0.25 [0.217 ± 0.010]	2.50 [0.098]	0.15 [0.006]	0.25 [0.010]
6.0	6.50 ± 0.40 [0.256 ± 0.016]	3.00 [0.118]	0.15 [0.006]	0.28 [0.011]
7.0	7.50 ± 0.40 [0.295 ± 0.016]	3.50 [0.138]	0.15 [0.006]	0.28 [0.011]
8.0	8.50 ± 0.40 [0.335 ± 0.016]	4.00 [0.158]	0.15 [0.006]	0.28 [0.011]
9.0	9.50 ± 0.40 [0.374 ± 0.016]	4.50 [0.177]	0.15 [0.006]	0.28 [0.011]
10.0	10.50 ± 0.50 [0.413 ± 0.020]	5.00 [0.197]	0.15 [0.006]	0.28 [0.011]

Inch 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]	0.30 ± 0.05 [0.012 ± 0.002]
1/16	1.6 [0.062]	0.8 [0.031]	0.30 ± 0.05 [0.012 ± 0.002]
3/32	2.4 [0.093]	1.2 [0.046]	0.30 ± 0.05 [0.012 ± 0.002]
1/8	3.2 [0.125]	1.6 [0.062]	0.33 ± 0.05 [0.013 ± 0.002]
3/16	4.8 [0.187]	2.4 [0.093]	0.33 ± 0.05 [0.013 ± 0.002]
1/4	6.4 [0.250]	3.2 [0.125]	0.36 ± 0.08 [0.014 ± 0.003]
3/8	9.5 [0.375]	4.8 [0.187]	0.36 ± 0.08 [0.014 ± 0.003]
1/2	12.7 [0.500]	6.4 [0.250]	0.36 ± 0.08 [0.014 ± 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]	0.51 ± 0.08 [0.020 ± 0.003]

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

Ordering Information

Color	Standard	Black (-0)
	Nonstandard	Other colors available upon request.
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.	
Marking	Marked with UL/CSA/-F- legends (metric sizes) or unmarked (inch sizes).	
Ordering description	Specify product name, size (mm or in.) and color (for example, V4-1.0-0).	

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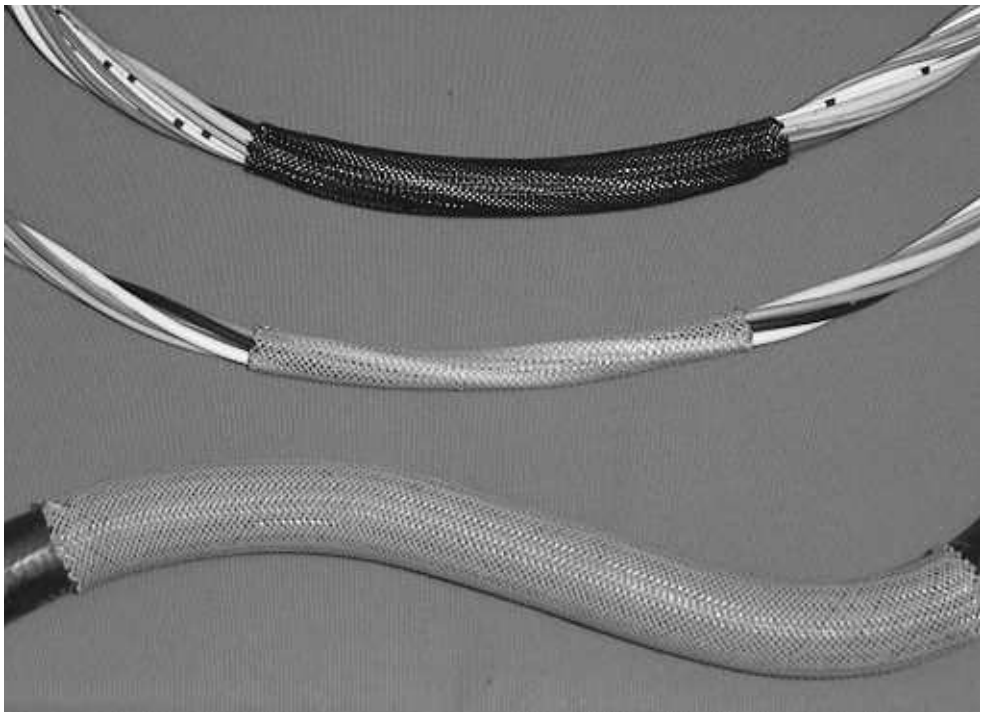
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

Versaflex

Expandable, Braided, Polyester Sleeving

Product Facts

- Excellent abrasion and cut-through resistance
- Lightweight
- Flexible (even at low temperatures)
- Fungus proof
- Not affected by most chemical and solvents, non-hygroscopic
- Versaflex-FR sleeving meets UL VW-1 and is self-extinguishing
- Wide range of sizes available
- RoHS compliant



Applications

Versaflex sleeving is suited for the mechanical protection of wire harnesses, hoses, and all other applications where exceptional flexibility combined with superior abrasion/cut resistance is required. It also serves as an economical means for wire bundling that will not trap heat or moisture; expanding easily to fit over irregular shapes, then contracting to conform and grip. To prevent fraying, these products should be cut to length using a hot knife.

Installation

This product is cold applied.

Operating Temperature Range

-50°C to 150°C
[-58°F to 302°F]

(220°C [-58°F to 302°F] for short periods)

Specifications/Approvals

Series	UL	Raychem
Versaflex-FR	E306976 VW-1, 125°C	
Versaflex	—	RK-6772

Available in:	Americas	Europe	Asia Pacific
		■	■

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China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

Versaflex (Continued)

Product Dimensions

Versaflex (metric)		
Nominal Size	Size Range	
	Minimum	Maximum
3 (0.118)	1 (0.039)	5 (0.197)
4 (0.158)	2 (0.079)	7 (0.276)
5 (0.197)	3 (0.118)	9 (0.354)
6 (0.236)	4 (0.158)	12 (0.472)
8 (0.315)	5 (0.197)	12 (0.472)
10 (0.394)	7 (0.276)	15 (0.591)
12 (0.472)	8 (0.315)	17 (0.669)
15 (0.591)	10 (0.394)	20 (0.787)
20 (0.787)	14 (0.551)	26 (1.024)
25 (0.984)	18 (0.709)	34 (1.339)
30 (1.181)	20 (0.787)	40 (1.575)
40 (1.575)	30 (1.181)	50 (1.969)
50 (1.969)	40 (1.575)	60 (2.362)

Versaflex (Imperial)		
Size	Nominal Size	Size Range
1/8	3 (0.118)	2.4 – 6.4 (0.094 – 0.252)
1/4	6 (0.236)	3.2 – 9.5 (0.125 – 0.375)
3/8	10 (0.394)	4.7 – 16 (0.185 – 0.630)
1/2	13 (0.512)	6.4 – 19 (0.252 – 0.748)
3/4	19 (0.748)	13 – 32 (0.512 – 1.260)
1-1/4	32 (1.256)	19 – 45 (0.748 – 1.772)
1-3/4	45 (1.772)	32 – 70 (1.260 – 2.756)
2	51 (2.008)	38 – 76 (1.496 – 2.992)

Versaflex-FR flame retardant, expandable polyester braid		
Size	Nominal Size	Size Range
1/8	3 (0.118)	2.4 – 6.4 (0.094 – 0.252)
1/4	6 (0.236)	3.2 – 9.5 (0.125 – 0.375)
3/8	10 (0.394)	4.7 – 16 (0.185 – 0.630)
1/2	13 (0.512)	6.4 – 19 (0.252 – 0.748)
3/4	19 (0.748)	13 – 32 (0.512 – 1.260)
1-1/4	32 (1.256)	19 – 45 (0.748 – 1.772)
1-3/4	45 (1.772)	32 – 70 (1.260 – 2.756)
2	51 (2.008)	38 – 76 (1.496 – 2.992)

Ordering Information

Color	Standard	Versaflex (metric) : Black (-0) Grey (-8) Versaflex (imperial) : Black (-0) Versaflex-FR : Black with a white X tracer (-09)
Standard packaging	On spools.	
Ordering description	Specify product name, size and color (for example, VERSAFLEX-FR-1/4-09-SP)	

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Japan: 81-44-844-8013
UK: 44-800-267-666

XFFR

Halogen-Free, Flame-Retardant, Heat-Shrinkable Tubing

Product Facts

- Emits minimal amounts of toxic or acid gasses during combustion
- Meets performance requirements of MIL-C-24640 and MIL-C-24643 cable jackets
- Resists moisture, fungus, and weathering
- Available in expansion ratios as high as 3:1
- XFFR has the following approvals:
  - ABS (American Bureau of Shipping)
  - Lloyd's (Lloyd's Register of Shipping)
- RoHS compliant

Applications

XFFR halogen-free tubing can be used for rejacketing and repairing halogen-free cables in any enclosed area where a flame-retardant, halogen-free environment is required. These environments include tunnels, buildings, mass transit vehicles, and ships. When installed with S-1305 tape, the tubing can also be used in applications requiring water sealing and protection from abrasion and corrosion.

Installation

Minimum shrink temperature: 70°C [158°F]

Minimum full recovery temperature: 121°C [250°F]

Operating Temperature Range

-55°C to 110°C [-67°F to 230°F]

Specifications/Approvals

Series	Military	Industry	Raychem
XFFR	MIL-C-24640 MIL-C-24643	NES 713 NES 711	RW-2016

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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Japan: 81-44-844-8013
UK: 44-800-267-666

XFFR (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness*
	Minimum Expanded as Supplied	Maximum Recovered After Heating	After Heating (Nominal)
XFFR-03	7.62 [0.300]	2.54 [0.100]	2.03 [0.080]
XFFR-04	10.16 [0.400]	3.81 [0.150]	2.03 [0.080]
XFFR-07	19.05 [0.750]	5.59 [0.220]	2.03 [0.080]
XFFR-11	27.94 [1.100]	9.52 [0.375]	2.67 [0.105]
XFFR-15	38.10 [1.500]	12.70 [0.500]	3.05 [0.120]
XFFR-20	50.80 [2.000]	19.05 [0.750]	3.05 [0.120]
XFFR-30	76.20 [3.000]	31.75 [1.250]	4.06 [0.160]

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

Ordering Information

Color	Standard	Black (-0)
Size selection	Always order the largest size that will shrink snugly over the component to be covered.	
Standard packaging	1.2-meter [4-foot] or 7.5-meter [25-foot] lengths.	

Part Numbering System

XFFR - 03 X 4 / NM

- **"NM"** - no mark
- **Length** in feet (4 feet standard)
- **Size**
- **Family**

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UK: 44-800-267-666

ZH2

Flexible, Highly Flame-Retardant, Low Recovery Temperature, ZEROHAL Polyolefin Tubing

Product Facts

- **2:1 shrink ratio**
- **Highly flame-retardant; UL/CSA VW-1 flammability rating**
- **Environmentally friendly tubing essentially free of halogens**
- **Emits minimal amounts of toxic or acid gasses when burned**
- **RoHS compliant**

Applications

Electrical insulation and strain relief of connections and terminations in computers, appliances, and other commercial electronic products. Jacketing and bundling of light duty harnesses in rail and mass transit vehicles, buildings, and other enclosed areas where emission of toxic gasses from burning materials containing halogens is very undesirable.

Installation

Minimum shrink temperature: 70°C [158°F]

Minimum full recovery temperature: 90°C [194°F]

Operating Temperature Range

-30°C to 125°C
[-22°F to 257°F]

Specifications/Approvals

Series	UL	CSA	Raychem
ZH2	E35586 VW-1 600 V, 125°C	LR31929 VW-1 600 V, 125°C	RW-3036

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-475-6222
Mexico: 52-55-1106-0800
L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

ZH2 (Continued)

Product Dimensions

Size	Inside Diameter		Wall Thickness	
	Expanded as Supplied	Maximum Recovered After Heating	Expanded as Supplied (Nominal)	Recovered* After Heating (Minimum)
0.8	1.2 ± 0.2 [0.047 ± 0.008]	0.40 [0.016]	0.20 [0.008]	0.33 [0.013]
1.0	1.5 ± 0.2 [0.059 ± 0.008]	0.50 [0.020]	0.20 [0.008]	0.33 [0.013]
1.5	2.1 ± 0.2 [0.075 ± 0.008]	0.75 [0.030]	0.20 [0.008]	0.34 [0.013]
2.0	2.6 ± 0.2 [0.102 ± 0.008]	1.00 [0.039]	0.25 [0.010]	0.43 [0.017]
2.5	3.1 ± 0.2 [0.122 ± 0.008]	1.25 [0.049]	0.25 [0.010]	0.43 [0.017]
3.0	3.6 ± 0.2 [0.142 ± 0.008]	1.50 [0.059]	0.25 [0.010]	0.43 [0.017]
3.5	4.1 ± 0.3 [0.161 ± 0.012]	1.75 [0.069]	0.25 [0.010]	0.43 [0.017]
4.0	4.6 ± 0.3 [0.181 ± 0.012]	2.00 [0.079]	0.25 [0.010]	0.43 [0.017]
5.0	5.6 ± 0.3 [0.221 ± 0.012]	2.50 [0.098]	0.30 [0.012]	0.56 [0.022]
6.0	6.6 ± 0.3 [0.260 ± 0.012]	3.00 [0.118]	0.30 [0.012]	0.56 [0.022]
7.0	7.6 ± 0.3 [0.299 ± 0.012]	3.50 [0.138]	0.30 [0.012]	0.56 [0.022]
8.0	8.6 ± 0.3 [0.339 ± 0.012]	4.00 [0.158]	0.30 [0.012]	0.56 [0.022]
9.0	9.6 ± 0.3 [0.378 ± 0.012]	4.50 [0.177]	0.30 [0.012]	0.56 [0.022]
10.0	10.4 ± 0.3 [0.409 ± 0.012]	5.00 [0.197]	0.30 [0.012]	0.56 [0.022]
11.0	11.4 ± 0.3 [0.449 ± 0.012]	5.50 [0.217]	0.30 [0.012]	0.56 [0.022]
12.0	12.7 ± 0.3 [0.500 ± 0.012]	6.00 [0.236]	0.30 [0.012]	0.56 [0.022]
13.0	13.5 ± 0.3 [0.532 ± 0.012]	6.50 [0.256]	0.35 [0.014]	0.66 [0.026]
14.0	14.4 ± 0.4 [0.567 ± 0.016]	7.00 [0.276]	0.35 [0.014]	0.68 [0.027]
15.0	15.7 ± 0.4 [0.618 ± 0.016]	7.50 [0.295]	0.35 [0.014]	0.68 [0.027]
16.0	16.9 ± 0.4 [0.665 ± 0.016]	8.00 [0.315]	0.35 [0.014]	0.68 [0.027]
18.0	19.0 ± 0.4 [0.748 ± 0.016]	9.00 [0.354]	0.40 [0.016]	0.76 [0.030]
20.0	21.4 ± 0.4 [0.843 ± 0.016]	10.00 [0.394]	0.40 [0.016]	0.76 [0.030]
22.0	23.2 ± 0.4 [0.913 ± 0.016]	11.00 [0.433]	0.45 [0.018]	0.89 [0.035]
25.0	26.8 ± 0.4 [1.055 ± 0.016]	12.50 [0.452]	0.45 [0.018]	0.89 [0.035]
27.0	28.2 ± 0.5 [1.110 ± 0.020]	12.50 [0.452]	0.45 [0.018]	0.89 [0.035]
28.0	30.0 ± 0.5 [1.181 ± 0.020]	14.00 [0.551]	0.45 [0.018]	0.89 [0.035]
30.0	32.1 ± 0.5 [1.264 ± 0.020]	15.00 [0.591]	0.45 [0.018]	0.89 [0.035]

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

Ordering Information

Color	Standard Black (-0)
Size selection	Always order the largest size that will shrink snugly over the component to be covered.
Standard packaging	On spools.
Ordering description	Specify product name, size and color (for example, ZH2-6.0-0).

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Canada: 1-905-475-6222
Mexico: 52-55-1106-0800
L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

ZH4

Very-Thin-Wall, Very Flexible, Highly Flame-Retardant, Low Recovery Temperature, ZEROHAL Polyolefin Tubing

Product Facts

- **2:1 shrink ratio**
- **Highly flame-retardant; UL/CSA VW-1 flammability rating**
- **Very thin wall provides space savings and rapid shrinking**
- **Low shrink temperature further reduces installation time and risk of damage to temperature-sensitive components**
- **Environmentally friendly tubing essentially free of halogens**
- **Emits minimal amounts of toxic or acid gasses when burned**
- **RoHS compliant**

Applications

Electrical insulation and protection of in-line components, disconnect terminals, and splices in computers, appliances, and other commercial electronic products. Typically used where space saving is important. Offers the ability to pack components more closely than is possible with standard tubings. Used for strain relief on high-density connectors. Suitable for use in rail and mass transit vehicles, buildings, and other enclosed areas where emission of toxic gasses from burning materials containing halogens is very undesirable.

Installation

Minimum shrink temperature: 70°C [158°F]

Minimum full recovery temperature: 90°C [194°F]

Operating Temperature Range

-30°C to 125°C
[-22°F to 257°F]

Specifications/Approvals

Series	UL	CSA	Raychem
ZH4	E85381 VW-1 300 V, 125ºC	LR31929 VW-1 150 V, 125ºC	RW-3036

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

ZH4 (Continued)

Product Dimensions

Size	Inside Diameter		Wall Thickness	
	Expanded as Supplied	Maximum Recovered After Heating	Expanded as Supplied (Nominal)	Recovered* After Heating (Minimum)
0.6	0.95 ± 0.25 [0.037 ± 0.010]	0.30 [0.012]	0.10 [0.004]	0.25 [0.010]
0.8	1.20 ± 0.25 [0.047 ± 0.010]	0.40 [0.016]	0.10 [0.004]	0.25 [0.010]
1.0	1.40 ± 0.25 [0.055 ± 0.010]	0.50 [0.020]	0.10 [0.004]	0.25 [0.010]
1.5	1.90 ± 0.25 [0.075 ± 0.010]	0.75 [0.030]	0.10 [0.004]	0.25 [0.010]
2.0	2.30 ± 0.25 [0.091 ± 0.010]	1.00 [0.039]	0.10 [0.004]	0.25 [0.010]
2.5	2.80 ± 0.25 [0.110 ± 0.010]	1.25 [0.049]	0.15 [0.006]	0.25 [0.010]
3.0	3.30 ± 0.25 [0.130 ± 0.010]	1.50 [0.059]	0.15 [0.006]	0.25 [0.010]
3.5	3.80 ± 0.25 [0.150 ± 0.010]	1.75 [0.069]	0.15 [0.006]	0.25 [0.010]
4.0	4.40 ± 0.25 [0.173 ± 0.010]	2.00 [0.079]	0.15 [0.006]	0.25 [0.010]
5.0	5.50 ± 0.25 [0.217 ± 0.010]	2.50 [0.098]	0.15 [0.006]	0.25 [0.010]
6.0	6.50 ± 0.40 [0.256 ± 0.016]	3.00 [0.118]	0.15 [0.006]	0.28 [0.011]
7.0	7.50 ± 0.40 [0.295 ± 0.016]	3.50 [0.138]	0.15 [0.006]	0.28 [0.011]
8.0	8.50 ± 0.40 [0.335 ± 0.016]	4.00 [0.158]	0.15 [0.006]	0.28 [0.011]
9.0	9.50 ± 0.40 [0.374 ± 0.016]	4.50 [0.177]	0.15 [0.006]	0.28 [0.011]
10.0	10.50 ± 0.50 [0.413 ± 0.020]	5.00 [0.197]	0.15 [0.006]	0.28 [0.011]

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

Ordering Information

Color	Standard Black (-0)
Size selection	Always order the largest size that will shrink snugly over the component to be covered.
Standard packaging	On spools.
Ordering description	Specify product name, size and color (for example, ZH4-2.0-0).

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L. & S. America: 54-11-4733-2200

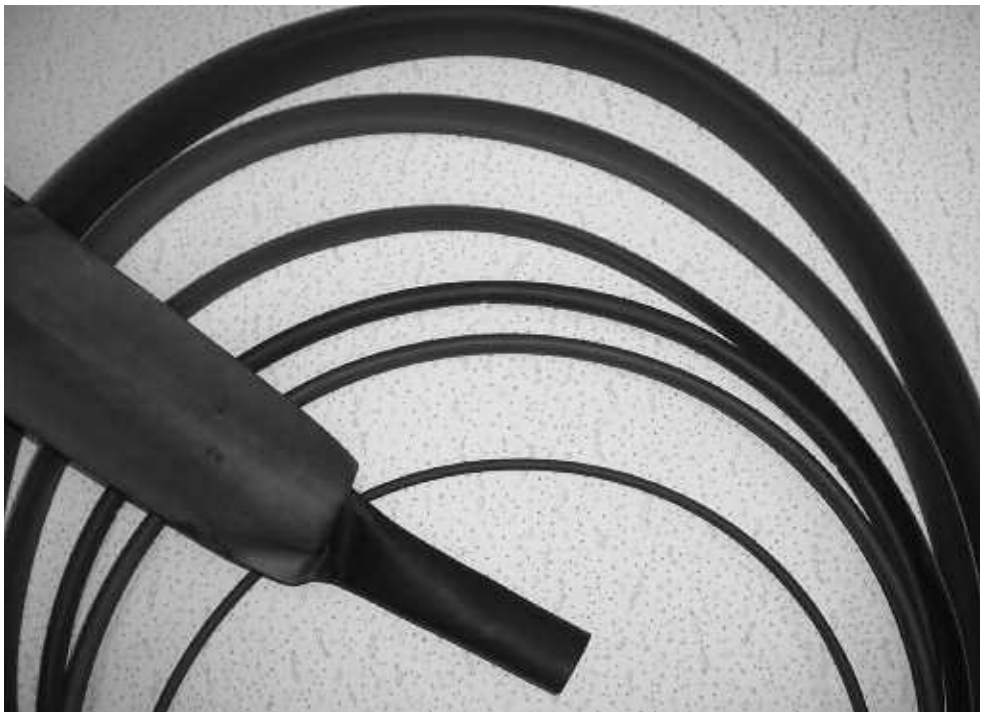
Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

ZH-100

Flexible, Thin-Wall, Low-Fire-Hazard Tubing

Product Facts

- 2:1 shrink ratio
- Low smoke emissions
- Flexible, flame-retardant
- No added halogens
- Low evolution of acid gases
- RoHS compliant



Applications

ZH-100 is a flexible, thin-wall, heat-shrinkable tubing designed for low-fire-hazard applications. ZH-100 contains no added halogens, and exhibits excellent fire safety characteristics combined with low evolution of acid gases, while retaining good mechanical and fluid resistance properties.

Installation

Minimum shrink temperature: 80°C [176°F]

Minimum full recovery temperature: 120°C [248°F]

Operating Temperature Range

-30°C to 105°C
[-22°F to 221°F]

Specifications/Approvals

Series	Industry	Raychem
ZH-100	BR 1326A	RW-2031

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

ZH-100 (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness*
	Minimum Expanded as Supplied	Maximum Recovered After Heating	After Heating
1/8	3.2 [0.125]	1.6 [0.062]	0.50 ± 0.10 [0.019 ± 0.004]
3/16	4.8 [0.187]	2.4 [0.093]	0.50 ± .0.10 [0.019 ± 0.004]
1/4	6.4 [0.250]	3.2 [0.125]	0.65 ± 0.15 [0.026 ± 0.006]
3/8	9.5 [0.375]	4.8 [0.187]	0.65 ± 0.15 [0.026 ± 0.006]
1/2	12.7 [0.500]	6.4 [0.250]	0.65 ± 0.15 [0.026 ± 0.006]
3/4	19.0 [0.750]	9.5 [0.375]	0.75 ± 0.15 [0.030 ± 0.006]
1	25.4 [1.000]	12.7 [0.500]	0.90 ± 0.15 [0.035 ± 0.006]
1 1/2	38.0 [1.500]	19.0 [0.750]	1.00 ± 0.20 [0.039 ± 0.008]
2	51.0 [2.000]	25.4 [1.000]	1.15 ± 0.25 [0.045 ± 0.010]

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

Ordering Information

Color	Standard Black (-0)
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, ZH-100 1/8-0).

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Canada: 1-905-475-6222
Mexico: 52-55-1106-0800
L. & S. America: 54-11-4733-2200

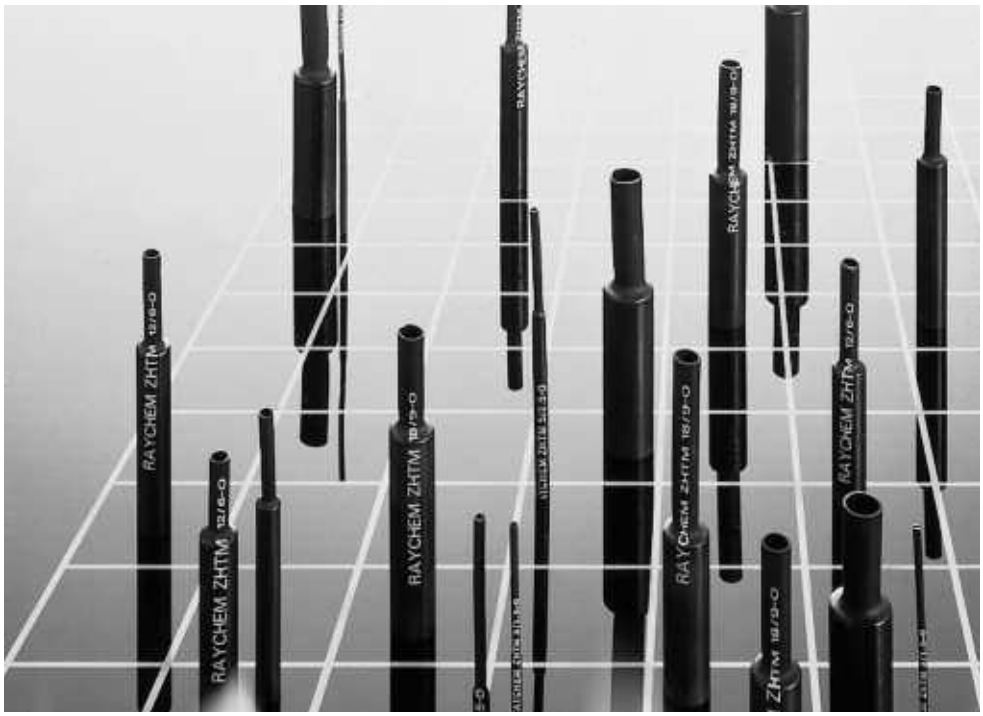
Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

ZHTM

Heat-Shrinkable, Flexible Tubing with Low Toxicity for Fire Safety Applications

Product Facts

- 2:1 shrink ratio
- Low smoke emission
- System 100 tubing
- RoHS compliant



Applications

A flexible, thick-wall, heat-shrinkable tubing to be used in conjunction with -100 molded parts and Zerohal cable to form Raychem System 100. This material exhibits excellent fire safety characteristics combined with low smoke emission and low evolution of acid gases while retaining good mechanical and fluid-resistance properties. Used for insulation and protection of cables, harnesses, and electrical and electronic components in enclosed spaces, such as in marine applications, mass transit systems, and offshore installations, to reduce toxicity risks, or where equipment would be irreparably damaged by corrosive products of combustion.

Installation

Minimum shrink temperature: 80°C [176°F]

Minimum full recovery temperature: 121°C [250°F]

Operating Temperature Range

-30°C to 105°C
[-22°F to 221°F]

Specifications/Approvals

Series	Military	Agency	Industry	Raychem
ZHTM	Def. Stan. 59-97 Issue 3 Type 8	BS 4G-198 Part 3 Type 15 VG 95343 Part 5 Type L VDE 0341/Pt 9005	BR 1326A	RW-2058

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
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L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

ZHTM (Continued)

Product Dimensions

Size	Inside Diameter		Recovered Wall Thickness*
	Minimum Expanded as Supplied	Maximum Recovered After Heating	After Heating
3/1.5	3.0 [0.118]	1.5 [0.059]	0.70 ± 0.10 [0.028 ± 0.004]
5/2.5	5.0 [0.197]	2.5 [0.098]	0.75 ± 0.12 [0.030 ± 0.005]
8/4	8.0 [0.315]	4.0 [0.157]	0.80 ± 0.15 [0.031 ± 0.006]
12/6	12.0 [0.472]	6.0 [0.236]	0.90 ± 0.15 [0.035 ± 0.006]
18/9	18.0 [0.709]	9.0 [0.354]	1.00 ± 0.18 [0.039 ± 0.007]
24/12	24.0 [0.945]	12.0 [0.472]	1.10 ± 0.20 [0.043 ± 0.008]
40/20	40.0 [1.575]	20.0 [0.789]	1.30 ± 0.23 [0.051 ± 0.009]
50/30	50.0 [1.969]	30.0 [1.181]	1.50 ± 0.28 [0.059 ± 0.011]

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

Ordering Information

Color	Standard Black (-0)
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, ZHTM 8/4-0).

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

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Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

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Application Equipment

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China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

HL1910E/HL2010E

Light Duty Heating Tool

Product Facts

- **Light duty, portable hot air heater**

The HL2010E and HL1910E hot air heat guns are designed to work with a standard line voltage (120V) on a wide variety of Raychem heat-shrinkable products. These tools are suitable for occasional use and are not recommended for applications requiring high duty cycles. Both tools supply forced hot air with an adjustable heat setting to meet the requirements of many different installation situations. A three position switch controls the air flow (150/300/500 l/min)

The HL2010E tool is switched on and off at the three-stage switch and the temperature can be continuously adjusted over a range of 50°C-630°C by the pushbuttons. The temperature can be increased or reduced by 10°C steps. An LCD display shows the actual temperature.

The HL1910E tool is switched on and off at the two-stage switch and the temperature can be continuously adjusted over a range of 50°C-600°C at the thumbwheel (the numbers on it serve as guide only, 1 means 50°C and max. temperature of 600°C is attained at 9).

A bench stand allowing use of both the HL2010E and the HL1910E as a bench tool is available as an option. Only two reflectors are required to cover most applications of heat-shrinkable tubing and SolderSleeve terminations.

There is an adaptor available, which allows the use of PR type reflectors.

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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Dimensions are shown for reference purposes only. Specifications subject to change.

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China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

HL1910E/HL2010E (Continued)

Technical Specifications

Voltage	120V AC
Power	2000W
Air flow	150 - 500 l/min
Weight	920g
Length	280 mm
Noise	<70dB

Ordering Information

	Description	Part Number
HL2010E-120V tool:	HL2010E-KIT-120V	CJ2087-000
HL1910E-120V tool:	HL1910E-KIT-120V	CJ2086-000
HL2010E/HL1910E Accessories:	HL1802E-074616 - SolderSleeve Terminators Reflector	832011-000
	HL1802E-070519 - Heat-Shrinkable Tubings Reflector	022611-000
	HL1802E-ADAPT-PR Adaptor for PR Series Reflector	444817-000
	PR-13C-REFLECTOR	991974-000
	PR-25D-REFLECTOR	989523-000
	HL2010E-BENCH-STD	CJ2085-000

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Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

ThermoGun HG

Medium Duty Heating Tool

Product Facts

- **Stand-mounted or handheld, rugged unit for heavy-duty use**
- **Built-in stand and turbo-fan-driven blower**
- **Adjustable side vents**
- **Adjustable temperature**
- **1680 to 2160 watts**
- **Large reflector size**
- **High heat output for fast installation**

Applications

Used for installing molded parts onto adapters or harnesses and installing a broad range of heat-shrinkable products, including boots and tubing up to three inches in diameter.

Specifications

Model	Power Requirements	Input Watts	Temperature Range	CFM*	RPM**
HG-501A	120 V, 60 Hz, 14 A	1680	260°C–399°C [500°F–750°F]	23	1700
HG-502A	230 V, 50/60 Hz, 7 A	1680	260°C–399°C [500°F–750°F]	23	1700
HG-751A-C	120 V, 60 Hz, 18 A	2160	399°C–538°C [750°F–1000°F]	23	1700
HG-752A	230 V, 50/60 Hz, 9 A	1740	399°C–538°C [750°F–1000°F]	23	1700

*CFM = Cubic feet per minute.
**RPM = Revolutions per minute.

Available in:	Americas	Europe	Asia Pacific
	■		■

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Dimensions are shown for reference purposes only. Specifications subject to change.

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Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

ThermoGun HG (Continued)

Accessories

A-160-HG reflector (P/N 991017) for short lengths of tubing up to 19.05 [.75] in diameter. Must be ordered separately.

A-170-HG reflector (P/N 991018) for short lengths of tubing 19.05–50.8 [.75–2] in diameter. Must be ordered separately.

TG-23 reflector (P/N 991026) for boots up to 44.45 [1.75] in diameter. Must be ordered separately.

Ordering Information

Model*	Housing Color	Part No.
HG-501A	Red	462047-000
HG-502A	Red	389363-000
HG-751A-C	Red	926935-000
HG-752A	Red	026239-000

Accessories	Tubing Application	Part No.
A-160-HG standard reflector	Diameters up to 19.05 [0.75]	991017-000
A-170-HG large tubing reflector	Diameters of 19.05–50.8 [0.75–2]	991018-000
TG-23 small boot reflector	Diameters up to 44.5 [1.75]	991026-000
TG-24 large boot reflector	—	991027-000

*Complete with bench stand.

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Mexico: 52-55-1106-0800
L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

CV-1981 and CV-1983

Heavy Duty Hot-Air Heating Tool

Product Facts

- **Robust, double-insulated, heavy-duty unit**
- **Highest-wattage unit (1600–2260 watts)**
- **Integral stand that allows use as bench tool**
- **Safe, quiet operation**
- **Precisely variable temperature**
- **Variety of reflectors available**
- **Easy fixturing for dual opposing heating**

Applications

Used for installing dual wall or single wall tubing up to three inches in diameter and for installing SolderSleeve devices. Closed loop version (PID) also available.

Specifications

Electrical Supply	
CV-1981-MK2	120 V and 230 V
CV-1983	120 V and 230 V
CV-1981 PID	120 V and 230 V
Power Consumption	
CV-1981-MK2	1600 W
CV-1983	2260 W/3060 W
CV-1981 PID	1600 W
Total System Noise	
CV-1981-MK2	65dB
CV-1983	65dB
CV-1981 PID	>70dB
Length	
CV-1981-MK2	340 mm [13.4 in]
CV-1983	320 mm [12.6 in]
CV-1981 PID	350 mm [13.8 in]
Weight	
CV-1981-MK2	1.3 Kg [2.90 lb]
CV-1983	1.5 Kg [3.30 lb]
CV-1981 PID	1.4 Kg [3.10 lb]
Air Flow	
CV-1981-MK2	Max 230 l/min
CV-1983	Max 500 l/min
CV-1981 PID	230 l/min

Product Range
All dual wall, single wall and molded part products.
Various devices products.
For other Raychem products , contact TE.

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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CV-1981 and CV-1983 (Continued)

Ordering Information

Equipment	Description	Part No.	Voltage	Hz
CV-1981-MK2	CV-1981-120V1600W-CANMK2	A42716-000*	120V	50/60 Hz
	CV-1981-120V1600W-UKMK2	E95798-000	120V	50/60 Hz
	CV-1981-230V1600WMK2	813914-000	230V	50/60 Hz
	CV-1981-230V1600W-SEVMK2	F25836-000	230V	50/60 Hz
	CV-1981-230V1600-UKMK2	340970-000*	230V	50/60 Hz
CV-1983	CV-1983-110V-2260W-UK	441753-000	120V	50/60 Hz
	CV-1983-220V-2260W	773898-000	230V	50/60 Hz
	CV-1983-220V-2260W-UK	985426-000	230V	50/60 Hz
	CV-1983-220V-3060W	538361-000	230V	50/60 Hz
	CV-1983-220V-3060W-UK	231866-000	230V	50/60 Hz
CV-1981-PID	CV-1981-120V-1600W-CANPIDF	839218-000	120V	50/60 Hz
	CV-1981-120V-1600W-UKPID	928826-000	120V	50/60 Hz
	CV-1981-230V-1600WPID	958770-000	230V	50/60 Hz
	CV-1981-230V-1600W-SEVPIDF	434366-000	230V	50/60 Hz
	CV-1981-230V-1600W-UKPIDF	385828-000	230V	50/60 Hz
CV-1983 Barrel Adapter	AD-1962	989172-000	—	—

Accessories

	Application	Part No.
PR-12 reflector	Tubing: 6.3–25.4 mm [0.25 in–1 in]	991973-000
PR-13 reflector	Tubing: Up to 6 mm [0.25 in]	991963-000
PR-13C reflector	Large SolderSleeve products	991974-000
PR-21 reflector	Tubing: Up to 25.4 mm [1 in]	991984-000
PR-24 reflector	Tubing/molded parts: 25.4–34.93 mm [1 in–1.38 in]	991964-000
PR-24A reflector	Tubing/molded parts: 34.93–60.33 mm [1.38 in–2.38 in]	991989-000
PR-25 reflector	SolderSleeve products: Up to 7 mm [0.28 in]	991965-000
PR-25D reflector	SolderSleeve products: 6.3–12.7 mm [0.25 in–0.50 in]	989523-000
PR-26 reflector	Small SolderSleeve products	991967-000
PR-33 reflector	SolderSleeve products: 19.05–25.4 mm [0.75 in–1 in]	997768-000
AD-1962 adapter for larger-barrel CV-1983	—	989172-000
PR-34 reflector	SolderSleeve products: 12.0–20.0 mm [0.47 in–0.79 in]	989111-000
PR-51	Special narrow reflector for molded part transitions [21.5 x 3.5 mm nozzle] [.85 in x .14 in]	113069-000

*Note: A42716 supersedes and replaces 538005
340970 supersedes and replaces 923002

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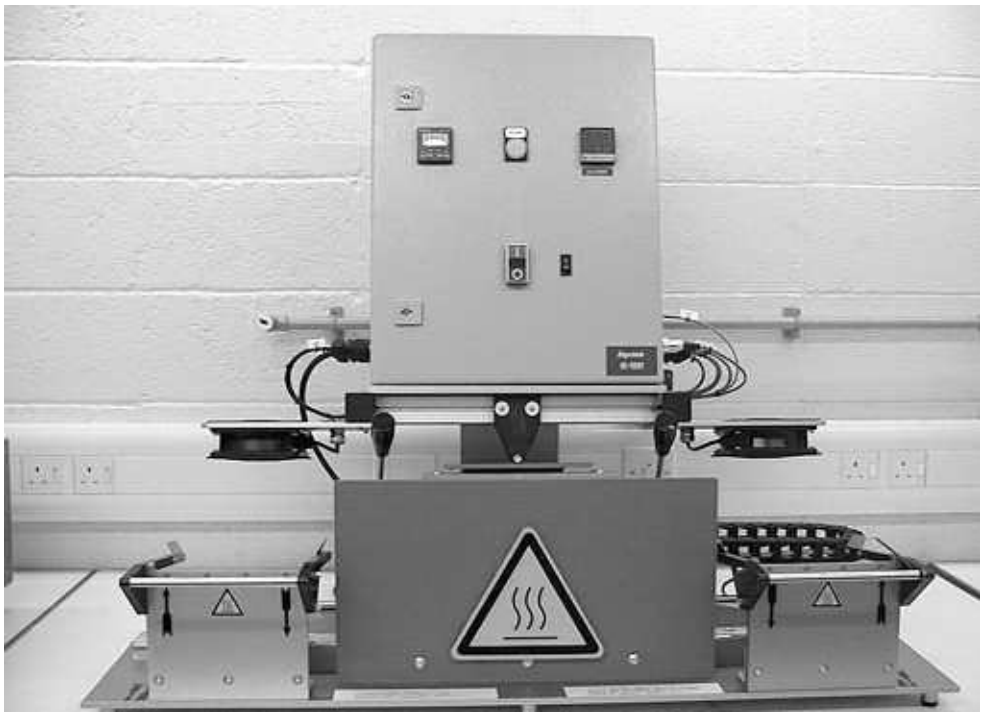
IR-1891

Heating Work Station for Short Length Tubing

Product Facts

- **Automatic cycle start once heater is manually positioned over product, which gives improved process control (recommended for adhesive-lined heat-shrinkable tubing e.g. sealing applications)**
- **Automatic heating head retraction at end of cycle prevents damage to components**
- **Multiple product fixture assemblies give increased process rates**
- **Cooling fan above each fixture assembly maintains holding fixture at an acceptable temperature**



Applications

The IR-1891 is suitable for the installation of a range of Raychem heat-shrinkable tubing products onto a variety of small components, e.g. ring terminals, Faston terminals and small connectors etc. The machine is provided with two work stations and a moveable heating head.

Each workstation is provided with supports for tooling fixtures (which must be specified and ordered separately). These support the workpieces and locate the tubing products. The operator loads the workpieces into the fixtures at one of the workstations, ensures that the tubing product is correctly positioned and then slides the heat head into position before initiating the heating cycle. The operator then continues with loading/unloading the other work station whilst the heating cycle is taking place.

The IR-1891-220V-Shuttle-Retn is provided with closed loop temperature control and in addition the heat head is 'locked' into position by use of an electromagnet during the heating cycle.

Once the other workstation has been loaded and the first installation is complete, the heat head is moved into position over the product and the next heating cycle initiated. Heating times vary typically from 3 to 30 seconds depending on the size and type of tubing product. Process rates up to 1200 pieces/hour can be achieved depending on the heating time and the time taken by the operator to load and unload the workpieces. The installation temperature/power can be varied according to product type/size and required cycle times.

The heating elements, which are continuously energized, are of the infrared medium wave length type and consist of a coiled resistance wire contained in quartz glass tubes. The closed loop temperature control uses similar elements but having integral thermocouple sensors.

Available in:	Americas	Europe	Asia Pacific
		■	

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IR-1891 (Continued)

Technical Specifications

Electrical Supply	230 V Single Phase
Power Consumption	1600 W
Operating Temperature	650°C max
Process Rate	1200 / hour maximum depending on application and operator
Heating Times	3 to 30 seconds depending on application
System Noise	< 70 dB
Dimensions – 508636-000	L1100 x H650 x D500 mm [L43 x H25 x D20 in]
Dimensions – 613148-000 / 167309-000 / 289588-000	L1100 x H900 x D500 mm [L43 x H35 x D20 in]
Base Plate Dimensions 289588-000 / 167309-000	L1040 x D450 mm [L41 x D18 in]
Base Plate Dimensions 613148-000	L1040 x D397 mm [L41 x D16 in]

Product Range

Wide range of Raychem tubing products in particular LSTT, RNF-3000, RNF-100, HTAT, ATUM.
Maximum diameter 20 mm [0.8 in] and maximum length 60 mm [2.0 in]

Ordering Information

	Description	Part No.
	*IR-1891-220V-Shuttle-Retn	289588-000
	*IR-1891-220V-Retn-Syl	613148-000

***Note:** The descriptions given here DO NOT include the supply of the necessary tooling fixtures.These are designed for each individual application.

Accessories

	Description	Part No.
Grippers:		
IR-1891-SI-GRP-165-RD-1mm	Red Gripper with 1mm hole	629602-000
IR-1891-SI-GRP-165-CL-2mm	Clear Gripper with 2mm hole	112676-000
IR-1891-SI-GRP-165-BK-3mm	Black Gripper with 3mm hole	F83221-000
IR-1891-SI-GRP-165-WT-6mm	White Gripper with 6mm hole	629602-000

Fixtures:		
IR-1891-Quick-Rel-ESS-6/1	ESS Cap (6/1) Fixture	096735-000
IR-1891-Quick-Rel-ESS-8/2	ESS Cap (8/2) Fixture	148597-000
IR-1891-Tool-Fixt-Bas-ESS	Base Unit for Fixtures	760221-000

Note: A wider range of tooling fixtures and grippers designed for previous applications are available. Please contact TE for details.

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Model 81CE

Discrete Heater for Heat-Shrinkable Tubing Products

Product Facts

- **Closed-loop time and temperature control**
- **Controlled process**
- **Adaptable for different applications**
- **Bench top design**
- **CE approved for worldwide use**
- **Heater operation and over temperature alarm lights**

Applications

The Model 81CE is a CE Certified discrete-type table top heater which provides a controlled process for recovering a wide variety of Raychem heat-shrinkable products onto wire assemblies or other suitable substrates.

Assemblies are loaded into spring loaded jaws on either side of the heating chamber which takes the assemblies into the oven for a pre-set number of seconds, then returns them to the home position for removal.

Controlled Heating Zone

The Model 81 CE processor has two stamped foil heating elements that are manufactured to a strict wattage specification. Consistent temperatures are controlled by a thermocouple embedded into the upper heating element connected to a closed loop temperature controller. An alarm light illuminates whenever the actual heating element temperature varies from the set point temperature.

Controlled Oven Dwell Time

The oven dwell time is selected using a 3-digit thumb wheel digital timer. The time can be set between 1 and 999 seconds for precise heating ensuring each assembly being processed sees the same precise amount of heat.

Minimal Skill Requirements

There are clearly marked guides for aligning the assembly as well as the tubing or device being processed. The operator only has to center the assembly, then the tubing, and load it into the spring loaded jaws on either side of the heating chamber. The jaws grip and carry the assembly into the heating chamber and back to the home position when the time has expired. A protection circuit prevents the cycle from being initiated if the oven is not at the desired set point, preventing assemblies from being processed incorrectly. The small footprint allows the processor to be placed in close proximity to a welder, allowing a single operator to accomplish two tasks.

Versatility

The processor is designed to process a broad range of Raychem heat-shrinkable tubing products up to 25 mm [1.0 in] in diameter and 127 mm [5.0 in] in length. The infrared energy source is well-suited to efficient processing of either single-wall or adhesive-lined tubing. Temperature and time can be controlled to accommodate a wide variety of products and substrates.

Safety Features:

- Circuit breaker for current surges
- Emergency Stop
- Pinch points eliminated by the housing design
- An over-temperature switch that shuts off all power in the event of an overheat condition
- Automatic cool-down circuit to prevent heat damage to integral components
- Circuit to prevent cycle initiation until the oven is up to temperature

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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Japan: 81-44-844-8013
UK: 44-800-267-666

Model 81CE (Continued)

Specifications and Dimensions

Electrical	Part No. 071965	Part No. 704393-000
Power Requirements	120 VAC, 1Ø, 50/60 Hz, 15 A	220 VAC, 1 Ø, 208-240 VAC, 15 A
Heating elements	2 ea. 400 watt stamped foil with quartz face infrared, one top & bottom	
Timing System	Eagle Digital Timer, 1 to 999 seconds	

Mechanical	
Pneumatic cylinder requirement	30 - 40 PSI clean shop air for jaw traversing

Dimensions cm [in.]	
Control box dimensions	43.2 cm [17 in] L x 21.6 cm [8.5 in] W x 16.5 cm [6.5 in] H
Control box weight	7.7 Kg [17 lb]
Heating chamber dimensions	38 cm [15 in] L x 24 cm [9.5 in] W x 34.3 cm [13.5 in] H
Heating chamber weight	18 Kg [40 lbs]
Shipping dimensions	61 cm [24 in] x 61 cm [24 in] x 53 cm [21 in]
Shipping weight	41 Kg [90 lbs]

Tubing sizes	
Inside diameter	Up to 25 mm [1 in]
Length	Up to 127 mm [5 in]

Version	Description	Part No.
Model 81CE -120 Volt	CLTEQ-M81CE-120V-HTR	071965-000
Model 81CE - 220 Volt	CLTEQ-M81CE-240V-HTR	704393-000

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RBK-ILS-Processor MkII

Installation of Splice Sealing Products Adjacent to Ultrasonic Welder

Product Facts

- **Increased heating element life**
- **Installation times, temperatures and product size information (individual selection)**
- **Sequenced installations**
- **Operator key lock/password protection levels**
- **Automatic heater retraction on mains failure**
- **Automatic calibration (single cycle)**
- **RS232 interface allows time, temperature and product sizes for the next installation to be transferred from a remote machine (e.g. an ultrasonic welding tool)**
- **Machine hours and installation cycle counters**
- **Software upgradeable to support special applications**
- **Air cooling can be provided to an optional stub splice fixture in the RBK-Proc-Mk2-Proc-Aircool version**

Applications

The RBK-ILS-Processor MkII is a semi-automatic unit designed specifically to install splice sealing products onto ultrasonically welded or crimped splice joints used in automotive harnesses.

The tool can operate in several modes:

- Stand-alone — operator sets time and temperature.
- Sequenced — preset times and temperatures can be sequenced automatically (and can also be randomly selected from sequence stored.)
- Automatic communication with upstream ultrasonic welder can allow time and temperature to be automatically set without operator intervention.

The operator is able to efficiently load both machines and so minimize 'dead time'. Installing Raychem splice sealing products immediately after welding gives reduced installation time and earliest possible mechanical protection for the welded joint. The operator positions the splice sealing product centrally over the splice joint and then locates the assembly into the gripper mechanism.

The wire assembly is automatically ejected, with the splice sealing product installed and the joint area sealed, insulated and strain relieved. In-line or stub-type splices can be installed.

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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RBK-ILS-Processor MkII (Continued)

Technical Specifications

Electrical Supply	220V-240V-50Hz
Power Consumption	1.7 Amps (Max)
Operating Temperature	550°C [1022°F] (Max) (500°C [932°F] recommended)
Machine Cycle Times for splice sealing products used on typical range of automotive splices	6 to 20 seconds depending on wire size and the number or wires used
Total System Noise	<80dB
Dimensions	390 x 365 x 225 mm [15 x 14 x 9 in]
Weight	18 Kg [40 lb]

Product Range

RBK-ILS-125 Products	Sizes 1 to 3A
RBK-ILS-85 Products	Sizes 6/1 to 12/3
For Other Raychem Products (eg RBK-VWS, RBK-ESS….)	Contact TE

Ordering Information

	Description	Part No.
Equipment	RBK-Proc-Mk2-Processor RBK-Proc-Mk2-Proc-Aircool	740331-000 A96930-000
Accessories	Stub splice fixture - RBK-ILS-Proc-Stub-Sp-Fix Air cooled stub splice fixture - RBK-ILS-Proc-Air-Cool-Kit 8 mm ring terminal fixture - RBK-ILS-Proc-Termfix-08mm	981721-000 843800-000 049857-000

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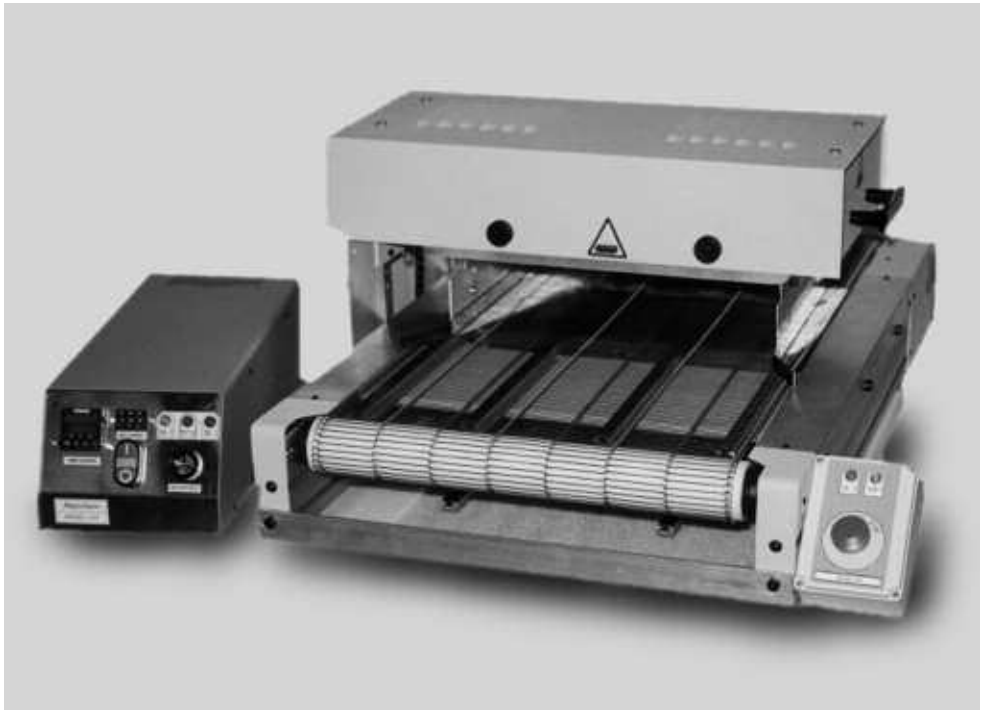
Model 105

Tabletop Tunnel Oven

Product Facts

- **Closed-loop speed and temperature control**
- **Continuous controlled process**
- **Adaptable for different applications**
- **CE approved for worldwide use**
- **Heater operation and over-temperature alarm lights**



Applications

The Model 105 Tunnel Oven is a reliable and versatile process heater which provides a controlled process for a wide variety of heat-shrinkable products.

The M105 is designed as an integrated modular unit. Assemblies are placed on the entry section of a mesh conveyor belt, transported through the heating chamber, across a bank of cooling fans then discharged from the rear of the conveyor.

The M105 has two upper heating chamber height positions, 54 mm [2.11 in] and 98 mm [3.86 in].The position is adjusted by removing the pivot pins and relocating them in the bearing stands.

The upper chamber is cantilevered to permit processing of assemblies that require only a portion of the assembly to pass through the heat zone. The upper chamber is equipped with adjustable heat shields to maximize the oven heating efficiency for various applications.

Controlled Heating Zone

The Model 105 Tunnel Oven has two stamped foil heating elements that are manufactured to a strict wattage specification. Consistent temperatures (ambient to 700°C) are controlled by a thermocouple embedded into the upper heating element connected to a closed-loop temperature controller. An alarm light illuminates whenever the actual heating element temperature varies from the set point temperature.

Conveyor Speed Control

The conveyor speed is precisely set by a 3-digit potentiometer. The SCR drive controller and DC drive motor ensure constant conveyor speed at any potentiometer setting from 100 to 999 [0.2 to 5.0 feet per minute], for precise heating of assemblies.

Minimal Skill Requirements

The open loading area of the entry section of the M105 requires that the operator simply place an assembly on the mesh conveyor belt within the effective width of the heat zone and collect it at the opposite end.

Versatility

The processor is designed to process a broad range of heat-shrinkable products up to 76.2 mm [3 in] in diameter and infinite length. The infrared energy source is well-suited to efficient processing of either single-wall or adhesive-lined tubing. Heat output and drive speed can be controlled to accommodate a wide variety of products and substrates.

Safety Features:

- Emergency Stop
- Automatic cool-down circuit to extend the life of the components
- Over-temperature switch that shuts off all power in the event of an overheat condition
- Lockout on temperature and speed controllers to prevent unauthorized changes
- Audible alarm indication of a heater failure
- Circuit breaker for current overload

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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Model 105 (Continued)

Specifications and Dimensions

Electrical	
Power requirements	210-240 VAC, 20A, 1Ø, 50/60 Hz
Heating elements	(2) 1500 watt infrared stamped foil with black quartz face, one top & bottom
Drive system	DC gear motor with closed loop motor controller, 3-digit thumbwheel
Air flow (cooling)	4 – 100 CFM fans, 2 - for upper heater housing, 2 – for product cooling
Operating temperature	Set Point (Heater Surface) - Ambient to 700°C, Throughput = 50° to 200°C

Mechanical	
Conveyor belt system	Wire mesh 70% open, with optional PTFE coating
Belt Speed	6.1 cm [0.2 ft] to 152 cm [5.0 ft] per minute

Dimensions cm [in]	
Processor dimensions	99 cm [39 in] L x 68.5 cm [27 in] W x 41.7 cm [16.5 in] H
Processor weight	68 Kg [150 lb]
Control box dimensions	51.5 cm [20.25 in] L x 21.0 cm [8.25 in] W x 17.8 cm [7.0 in] H
Control box weight	7.7 Kg [17 lb]
Shipping dimensions	134.6 cm [53 in] L x 116.8 cm [46 in] W x 63.5 cm [25 in] H
Shipping weight	146 Kg [320 lbs]

Tubing sizes	
Tubing diameter (max)	Up to 76.2 mm [3.0 in]
Tubing length (max)	356 mm [14 in] perpendicular to belt travel, unlimited length parallel to belt travel

Version	Description	Part No.
Model 105 Tunnel Oven	CLTEQ-M105-TUNNEL-OVEN	955018-000

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Model 16B

Tabletop Belt Heater

Product Facts

- **Closed-loop speed and temperature control**
- **Continuous controlled process**
- **Adaptable for different applications**
- **Bench top design**
- **Heater operation and over-temperature alarm lights**

Applications

The Model 16B is our smallest (tabletop) conveyor type processor which provides a controlled process for a wide variety of heat-shrinkable tubing products.

Double-sided timing belts on the top and bottom of the processing chamber draw the assemblies through a thermally controlled infrared heat zone and then through a fan-cooled cooling zone before depositing them into the unloading bin.

Controlled Heating Zone

The Model 16B processor has two stamped foil heating elements that are manufactured to a strict wattage specification. Consistent temperatures (ambient to 650° C) are controlled by a thermocouple embedded into the upper heating element connected to a closed-loop temperature controller. An alarm light illuminates whenever the actual heating element temperature varies from the set point temperature.

Speed Control

The belt speed is selected using a 3-digit thumbwheel via a closed-loop motor controller and DC gear motor.

Minimal skill requirements

There are clearly marked guides for aligning the assembly as well as the tubing or device being processed. The operator only has to center the assembly then the tubing and slide it into the belts. The belts grip and carry the assembly through the heating and cooling zone, depositing them into the unloading bin.

Labor costs are reduced significantly because once an operator loads an assembly, that operator can begin preparing another assembly. The throughput rate is usually limited by the rate at which the operator can load assemblies into the processor.

Versatility

The processor is designed to process a broad range of heat-shrinkable products up to 19 mm [0.75 in] in diameter and 90 mm [3.5 in] in length. The infrared energy source is well-suited to efficient processing of either single-wall or adhesive-lined tubing. Heat output can be controlled to accommodate a wide variety of products and substrates.

Safety Features:

- Circuit breaker for current surges
- Pinch points protected by the housing
- Belts that do not pinch with significant force
- An over-temperature switch that kills power in the event of an overheat condition
- Automatic cool-down circuit to prevent heat damage to components

Available in:	Americas	Europe	Asia Pacific
	■		■

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Dimensions are in inches and millimeters unless otherwise specified. Values in brackets are metric equivalents.

Dimensions are shown for reference purposes only. Specifications subject to change.

USA: 1-800-522-6752
Canada: 1-905-475-6222
Mexico: 52-55-1106-0800
L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

Model 16B (Continued)

Specifications and Dimensions

Electrical	Part No. 827429-000	Part No. 584313-000, 047143-000
Power Requirements	120 VAC, 1Ø, 50/60 Hz, 20 A	220 VAC, 1 Ø, 208-240 VAC, 15 A.
Heating elements	2 ea. 1000 watt stamped foil infrared with quartz face	
Drive system	DC gear motor with closed loop motor controller, 3-digit thumbwheel	
Air flow (cooling)	2 – 100 CFM fans in the upper heater housing	

Mechanical	
Conveyor belt system	Double sided timing belts; two on each side of the processor – pitch 9.5 mm [0.375 in]
Belt Speed	Up to 288 cm / min [7.5 ft / min]

Dimensions cm [in]	
Processor dimensions	48 cm [19 in] W x 109 cm [43 in] L x 33 cm [13 in] H
Processor weight	41 Kg [90 lbs]
Shipping dimensions	61 cm [24 in] W x 112 cm [43 in] L x 56 cm [22 in] H
Shipping weight	68 Kg [150 lbs]

Tubing sizes	
Tubing diameter (max)	Up to 19 mm [0.75 in]
Tubing length (max)	Up to 90 mm [3.5 in]

Version	Description	Part No.
Model 16B - 120 volt	CLTEQ-M16B-120V-3WIR	827429-000
Model 16B - 220 volt (4-wire)	CLTEQ-M16B-220V-4-WR	584313-000
Model 16B - 220 volt Mod. (3 wire with Transformer)	CLTEQ-M16B-220V-3W-M	047143-000

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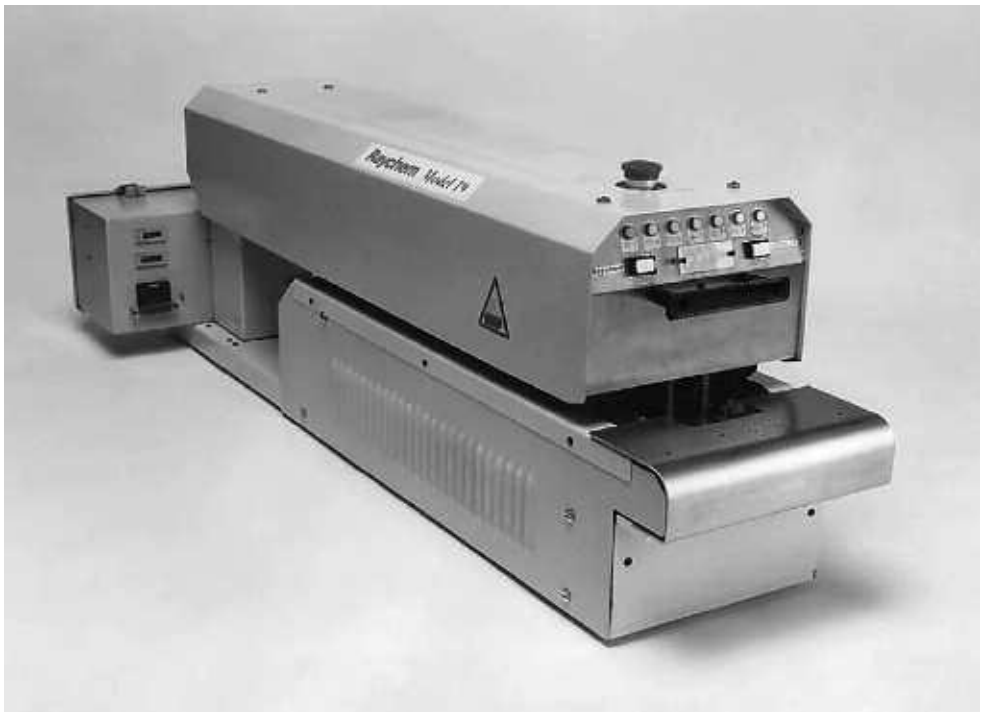
Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

Model 19

Belt Heater for Heat-Shrinkable Tubing Products

Product Facts

- **Closed-loop speed and temperature control**
- **Continuous controlled process**
- **Adaptable for different applications**
- **CE approved for worldwide use**
- **Self-diagnostic circuitry**
- **Parts counter and hour meter**



Applications

The Model 19 conveyor type processor is a reliable and versatile process heater which provides a controlled process for a wide variety of heat-shrinkable products.

Double-sided timing belts on either side of the upper and lower heating chambers draw the assemblies through a thermally controlled infrared heat zone, then through a fan-cooled zone before depositing them into the unloading bin.

The processor was designed to meet the requirements of the European Safety Directives and is CE approved, allowing for worldwide use.

Control Heating Zone

The Model 19 processor has two stamped foil heating elements that are manufactured to a strict wattage specification.

Consistent temperatures (ambient to 700°C) are controlled by a thermocouple embedded into the upper heating element connected to a closed loop temperature controller. An alarm light illuminates whenever the actual heating element temperature varies from the set point temperature.

Speed Control

The belt speed is selected using a 3-digit thumbwheel (on the front panel) via a closed loop motor controller and DC gear motor.

Minimal Skill Requirements

There are clearly marked guides for aligning the assemblies as well as the tubing or device being processed. The operator only has to center the assembly, then the tubing and slide it into the belts. The belts grip and carry the assemblies through the heating and cooling zones, depositing them into the unloading bin.

Versatility

The processor is designed to process a broad range of Raychem heat-shrinkable products up to 25 mm [1 in] in diameter and 178 mm [7 in] in length. The infrared energy source is well-suited to efficient processing of either single wall or adhesive-lined tubing. Temperature and speed can be controlled to accommodate a wide variety of products and substrates.

Safety Features:

- Emergency Stop
- Automatic cool-down circuit to extend the life of the components
- Over-temperature switch that shuts off all power in the event of an overheat condition
- Lockout on temperature and speed controllers to prevent unauthorized changes

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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Japan: 81-44-844-8013
UK: 44-800-267-666

Model 19 (Continued)

Specifications and Dimensions

Electrical	
Power requirements	210-240 VAC, 20A, 1Ø, 50/60 Hz
Heating elements	2 X Standard = 1580W, Wide = 1660W, Narrow = 880W
Drive system	DC gear motor with closed loop motor controller; 3-digit thumbwheel
Air flow (cooling)	2 – 100 CFM fans in the upper heater housing
Operating temperature	Set Point (Heater Surface) - Ambient to 700°C, Through-put = 50° to 200°C

Mechanical	
Conveyor belt system	Double sided timing belts; two on each side of the processor – pitch 9.5 mm [0.375 in]
Belt Speed	Up to 152 cm / min [5.0 ft / min]

Dimensions cm [in]	
Processor dimensions	53 cm [21 in] W x 135 cm [53 in] L x 45 cm [18 in] H
Shipping dimensions	66 cm [26 in] W x 147 cm [58 in] L x 58 cm [23 in] H
Processor weight	56 Kg [120 lbs]
Shipping weight	86 Kg [190 lbs]

Tubing sizes	
Tubing diameter (max)	Up to 2.5 cm [1.0 in]
Tubing length (max)	Up to 12.7 cm [4.0 in] Standard or 178 mm [7.0 in] with Model 19 - Wide

Version	Description	Part No.
Model 19 - Standard (3.75 in. Elements)	CLTEQ-M19-BELT-HTR	714529-000
Model 19 - Wide (6 in. Elements)	CLTEQ-M19-BELT-HTR-6IN	075135-000
Model 19 - Narrow (1.5 in. Elements)	CLTEQ-M19-BELTHTR-SS	D43037-000

Optional Attachments		
Floor Stand with wheels	IR-1900-FLOOR-STAND	889664-000

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L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

Model 20

Belt Heater for Heat-Shrinkable Tubing Products

Product Facts

- **Closed-loop speed and temperature control**
- **Continuous controlled process**
- **Adaptable for different applications**
- **CE approved for worldwide use**
- **Heater operation and over-temperature alarm lights**

Applications

The Model 20 conveyor type processor is a reliable and versatile process heater, which provides a controlled process for a wide variety of heat-shrinkable products.

Double-sided timing belts on either side of the upper and lower heating chambers draw the assemblies through a thermally controlled infrared heat zone, then through a fan-cooled zone before depositing them into the unloading bin.

Controlled Heating Zone

The Model 20 processor has two stamped foil heating elements that are manufactured to a strict wattage specification. Consistent temperatures (ambient to 700°C) are controlled by a thermocouple embedded into the upper heating element connected to a closed loop temperature controller. An alarm light illuminates whenever the actual heating element temperature varies from the set point temperature.

Speed Control

The belt speed is selected using a 3-digit thumbwheel (on the front panel) via a closed-loop motor controller and DC gear motor.

Minimal Skill Requirements

There are clearly marked guides for aligning the assemblies as well as the tubing or device being processed. The operator only has to center the substrate, then align the tubing and slide the assembly into the belts. The belts grip and carry the assemblies through the heating and cooling zones, depositing them into the unloading bin.

Versatility

The processor is designed to process a broad range of Raychem heat-shrinkable products up to 25 mm [1 in] in diameter and 127 mm [4 in] in length. The infrared energy source is well-suited to efficient processing of either single wall or adhesive-lined tubing. Temperature and speed can be controlled to accommodate a wide variety of products and substrates.

Safety Features:

- Emergency Stop
- Automatic cool-down circuit to extend the life of the components
- Over-temperature switch that shuts off all power in the event of an overheat condition
- Lockout on temperature and speed controllers to prevent unauthorized changes

New Features

- Self-locking support post in the upper heating chamber for servicing, maintenance and emergency cool down
- Reversing motor relay which runs the timing belts in reverse until the Set Point temperature has been reached, preventing the operator from loading assemblies into the machine
- Hinged lower side panels for access to components, making routine service and maintenance much easier

Available in:	Americas	Europe	Asia Pacific
	■		■

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USA: 1-800-522-6752
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L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

Model 20 (Continued)

Specifications and Dimensions

Electrical	
Power requirements	210-240 VAC, 20A, 1Ø, 50/60 Hz
Heating elements	2 X Standard = 1580W, Wide = 1660W, Narrow = 880W
Drive system	DC gear motor with closed loop motor controller; 3-digit thumbwheel
Air flow (cooling)	2 – 100 CFM fans in the upper heater housing
Operating temperature	Set Point (Heater Surface) - Ambient to 700°C, Through-put = 50° to 200°C

Mechanical	
Conveyor belt system	Double sided timing belts; two on each side of the processor – pitch 9.5 mm [0.375 in]
Belt Speed	Up to 152 cm / min [5.0 ft / min]

Dimensions cm [in]	
Processor dimensions	53 cm [21 in] W x 135 cm [53 in] L x 45 cm [18 in] H
Shipping dimensions	66 cm [26 in] W x 147 cm [58 in] L x 58 cm [23 in] H
Processor weight	56 Kg [120 lbs]
Shipping weight	86 Kg [190 lbs]

Tubing sizes	
Tubing diameter (max.)	Up to 25 mm [1.0 in]
Tubing length (max.)	Up to 104 mm [4.0 in] stand

Version	Description	Part No.
Model 20 - Standard (3.75 in. Elements)	MODEL20CE-BELT-HEATER	CB8546-000

Optional Attachments		
Floor Stand with wheels	IR-1900-FLOOR-STAND	889664-000

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China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

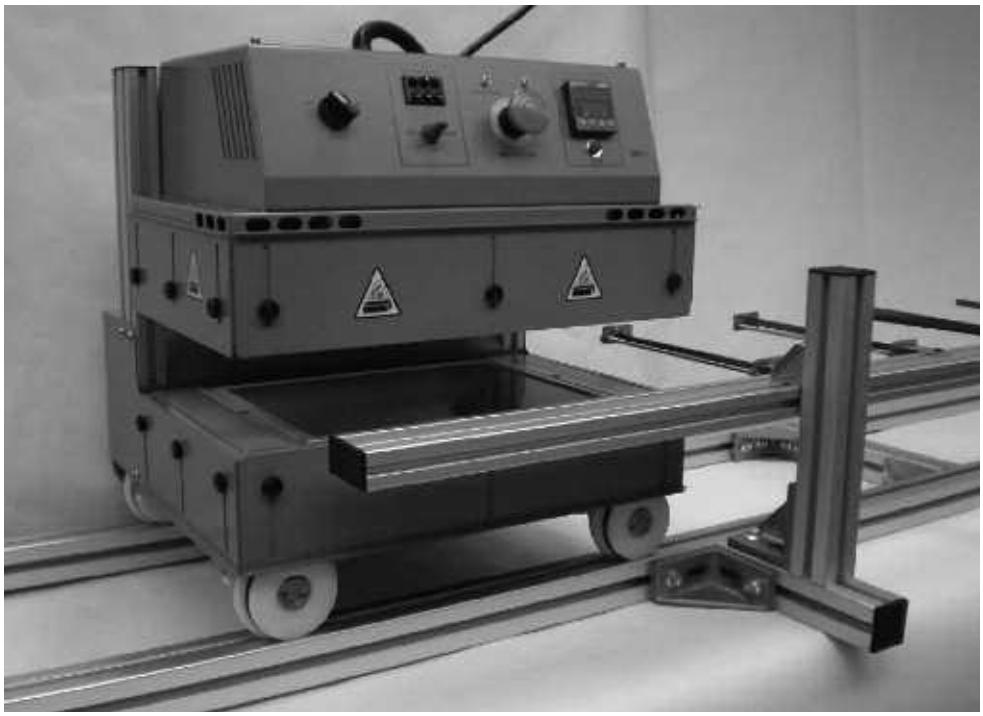
VBH-1

Versatile Bed Heater for Large Assemblies and Substrates

Product Facts

The Versatile Bed Heater (VBH-1) is the latest generation of reliable and versatile process heaters.

- **Closed-loop speed and temperature control**
- **Controlled process**
- **Adaptable for a large variety long length and heat sensitive applications**
- **Heater operation and over-temperature alarm lights**
- **Heater and track are sold seperately. See available track lengths on page 2-24.**



Applications

The VBH-1 is an integrated modular unit consisting of an upper and lower heater chamber with a transporter base and motorized wheels that are directed through an aluminum track. The heater transporter automatically stops when it reaches the parking station at either end of the process area.

It has been designed to accommodate a large variety of difficult to process applications. With an adjustable upper heating chamber the heater separation can be adjusted from 37 mm [1.5 in] to a 150 mm [6 in] gap enabling the unit to process heat-shrinkable tubing products up to 127 mm [5 in} in diameter. The upper and lower chambers are provided with adjustable heat shields to maximize the oven heating efficiency.

Speed Control

The belt speed is selected using a 3-digit thumbwheel (on the front panel) via a closed-loop motor controller and DC gear motor.

Controlled Heating Zone

The VBH-1 processor has two stamped foil heating elements that are manufactured to a strict size and wattage specification. Consistent temperatures (ambient to 650°C) are controlled by a thermocouple embedded into the upper heating element connected to a closed loop temperature controller. An alarm light illuminates whenever the actual heating element temperature varies from the set point temperature.

Minimal Skill Requirements

The open loading area of the holding fixtures on the VBH-1 requires that the operator simply place the assembly on the holding fixtures within the effective width of the heat zone. The assemblies can be removed once the heater transporter has passed over the assemblies and has come to a complete stop in either the right or left parking stations.

Versatility

The traveling heater is designed to process a broad range of heat-shrinkable products up to 127 mm [5 in] in diameter and infinite length.

The infrared energy source is well-suited for efficient processing of either single-wall or adhesive-lined tubing. Heat output and drive speed can be controlled to accommodate a wide variety of products and substrates.

Safety Features

- Emergency Stop
- Automatic cool-down circuit to extend the life of the components
- Over-temperature switch that shuts off all power in the event of an overheat condition
- Lockout on temperature and speed controllers to prevent unauthorized changes
- Safety guards to protect operator from moving parts and hot surfaces

Available in:	Americas	Europe	Asia Pacific
	■		■

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Dimensions are shown for reference purposes only. Specifications subject to change.

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Mexico: 52-55-1106-0800
L. & S. America: 54-11-4733-2200

Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
UK: 44-800-267-666

VBH-1 (Continued)

Specifications and Dimensions

Electrical	
Power Requirements	208/240 VAC, 1Ø, 50/60 Hz, 20 A
Heating elements	2 X From 600 to1600 watt infrared stamped foil with quartz face
Drive system	1/12 hp DC motor with SCR Drive controller with a 3 digit speed potentiometer
Air flow (Cooling)	2 X 100 CFM fans in the upper heater housing / control box and 1 in lower chamber
Operating temperature	Set Point (Heater Surface) - Ambient to 650°C, Through-put = 50° to 250°C

Mechanical	
Moving oven speed	12.7 cm [0.50 ft] to 254 cm [10.0 ft] / Minute
Heater separation	Adjustable from 37 mm [1.5 in] to 150 mm [6 In] Upper Position
Effective heating length	355 mm [14 in]
Effective heating width	254 mm [10 in]

Dimensions cm [in]	
Control box dimensions	407 mm [16 in] L x 305 mm [15 in] W x 125 mm [5 in] H
Heating Chamber dimensions	457 mm [18 in] L x 407 mm [16 in] W x 533 mm [21 in] H – Full extension
Heating System weight	30 Kg [66 lb]

Tubing sizes	
Tubing diameter	Up to 127 mm [5 in]
Tubing length	255 mm [10 in] perpendicular to heater travel, unlimited length parallel to heater

Heating unit	Description	Part No.
VBH-1 Bed Heater	VBH-1-BED-HTR-220V-3WR	CJ1047-000

Track	Description	Part No.
10 ft. Aluminum Track	VBH-1-BED-HTR-TRACK-10FT	CJ1494-000
15 ft. Aluminum Track	VBH-1-BED-HTR-TRACK-15FT	CM6819-000

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Table of Contents

Supporting Information

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Equivalents and Conversions

Decimal Equivalents

Fraction of Inch	Decimal of Inch	Decimal Millimeters	Fraction of Inch	Decimal of Inch	Decimal Millimeters
1/64	.0156	0.3969		.5118	13.0000
1/32	.0313	0.7938	33/64	.5156	13.0969
	.0394	1.0000	17/32	.5313	13.4938
3/64	.0469	1.1906	35/64	.5469	13.8906
1/16	.0625	1.5875		.5512	14.0000
5/64	.0781	1.9844	9/16	.5625	14.2875
	.0787	2.0000	37/64	.5781	14.6844
3/32	.0938	2.3813		.5906	15.0000
7/64	.1094	2.7781	19/32	.5938	15.0813
	.1181	3.0000	39/64	.6094	15.4781
1/8	.1250	3.1750	5/8	.6250	15.8750
9/64	.1406	3.5719		.6299	16.0000
5/32	.1563	3.9688	41/64	.6406	16.2719
	.1575	4.0000	21/32	.6563	16.6688
11/64	.1719	4.3656		.6693	17.0000
3/16	.1875	4.7625	43/64	.6719	17.0656
	.1969	5.0000	11/16	.6875	17.4625
13/64	.2031	5.1594	45/64	.7031	17.8594
7/32	.2188	5.5563		.7087	18.0000
15/64	.2344	5.9531	23/32	.7188	18.2563
	.2362	6.0000	47/64	.7344	18.6531
1/4	.2500	6.3500		.7480	19.0000
17/64	.2656	6.7469	3/4	.7500	19.0500
	.2756	7.0000	49/64	.7656	19.4469
9/32	.2813	7.1438	25/32	.7813	19.8438
19/64	.2969	7.5406		.7874	20.0000
5/16	.3125	7.9375	51/64	.7969	20.2406
	.3150	8.0000	13/16	.8125	20.6375
21/64	.3281	8.3344		.8268	21.0000
11/32	.3438	8.7313	53/64	.8281	21.0344
	.3543	9.0000	27/32	.8438	21.4313
23/64	.3594	9.1281	55/64	.8594	21.8281
3/8	.3750	9.5250		.8661	22.0000
25/64	.3906	9.9219	7/8	.8750	22.2250
	.3937	10.0000	57/64	.8906	22.6219
13/32	.4063	10.3188		.9055	23.0000
27/64	.4219	10.7156	29.32	.9063	23.0188
	.4331	11.0000	59/64	.9219	23.4156
7/16	.4375	11.1125	15/16	.9375	23.8125
29/64	.4531	11.5094		.9449	24.0000
15/32	.4688	11.9063	61/64	.9531	24.2094
	.4724	12.0000	31/32	.9688	24.6063
31/64	.4844	12.3031		.9843	25.0000
1/2	.5000	12.7000	63/64	.9844	25.0031
			1	1.0000	25.4000

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Equivalents and Conversions (Continued)

Conversion Factors

Length	Area	Volume	Mass
Inches x 25.40 = Millimeters	Sq. inches x 6.452 = Sq. centimeters	Cu. inches x 16.39 = Cu. centimeters	Ounces x 28.35 = Grams
Millimeters x 0.03937 = Inches	Sq. centimeters x 0.1550 = Sq. inches	Cu. cm. x 0.06102 = Cu. inches	Grams x 0.03527 = Ounces
Feet x 0.3048 = Meters	Sq. feet x 0.0929 = Sq. meters	Cu. feet x 0.02832 = Cu. meters	Pounds x 0.4536 = Kilograms
Meters x 3.281 = Feet	Sq. meters x 10.76 = Sq. feet	Cu. meters x 35.31 = Cu. feet	Kilograms x 2.205 = Pounds
Miles x 1.609 = Kilometers	Sq. miles x 2.59 = Sq. kilometers		Kilograms/km x 0.6214 = Pounds/kft
Kilometers x 0.6214 = Miles	Sq. kilometers x 0.3861 = Sq. miles		Pounds/kft x 1.4881 = Kilograms/km
Ohms/km x 0.3048 = Ohms/kft	Circular mils x 0.7854 = Sq. mil		

Prefixes (SI), Values, and Symbols

Prefix	Value	Symbol	Prefix	Value	Symbol
Tera	1012	T	Deci	10-1	d
Giga	109	G	Centi	10-2	c
Mega	106	M	Milli	10-3	m
Kilo	103	k	Micro	10-6	µ
Hecto	102	h	Nano	10-9	n
Deca	101	da	Pico	10-12	p

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Temperature Conversion Formula

°C = (°F -32) ÷ 1.8
°F = (°C x 1.8) + 32

°F	°C	°F	°C	°F	°C	°F	°C
-103	-75.00	-30	-34.44	25	-3.89	65	18.33
-101.2	-74.00	-28	-33.33	26	-3.33	66	18.89
-99.4	-73.00	-26	-32.22	27	-2.78	67	19.44
-97.6	-72.00	-24	-31.11	28	-2.22	68	20.00
-95.8	-71.00	-22	-30.00	29	-1.67	69	20.56
-94.0	-70.00	-20	-28.89	30	-1.11	70	21.11
-92.2	-69.00	-18	-27.78	31	-0.56	71	21.67
-90.4	-68.00	-16	-26.67	32	0.00	72	22.22
-88.6	-67.00	-14	25.56	33	0.56	73	22.78
-86.8	-66.00	-12	-24.44	34	1.11	74	23.33
-85.0	-65.00	-10	-23.33	35	1.67	75	23.89
-83.2	-64.00	-8	-22.22	36	2.22	77	25.00
-81.4	-63.00	-6	-21.11	37	2.78	77	25.00
-79.6	-62.00	-4	-20.00	38	3.33	78	25.56
-77.8	-61.00	-2	-18.89	39	3.89	79	26.11
-76.0	-60.00	0	-17.78	40	4.44	80	26.67
-74.2	-59.00	1	-17.22	41	5.00	81	27.72
-72.4	-58.00	2	-16.67	42	5.56	82	27.78
-70.6	-57.00	3	-16.11	43	6.11	83	28.33
-68.8	-56.00	4	-15.56	44	6.67	84	28.89
-67.0	-55.00	5	-15.00	45	7.22	85	29.44
-65.2	-54.00	6	-14.44	46	7.78	86	30.00
-63.4	-53.00	7	-13.89	47	8.33	87	30.56
-61.6	-52.00	8	-13.33	48	8.89	88	31.11
-59.8	-51.00	9	-12.78	49	9.44	89	31.67
-58.0	-50.00	10	-12.22	50	10.00	90	32.22
-56.2	-49.00	11	-11.67	51	10.56	91	32.78
-54.4	-48.00	12	-11.11	52	11.11	92	33.33
-52.6	-47.00	13	-10.56	53	11.67	93	33.89
-50.8	-46.00	14	-10.00	54	12.22	94	34.44
-49.0	-45.00	15	-0.44	55	12.78	95	35.00
-47.2	-44.00	16	-8.89	56	13.33	96	35.56
-45.4	-43.00	17	-8.33	57	13.89	97	36.11
-43.6	-42.00	18	-7.78	58	14.44	98	36.67
-41.8	-41.00	19	-7.22	59	15.00	99	37.22
-40	-40.00	22	-6.11	60	15.56	100	37.78
-38	-38.89	21	-6.11	61	16.11	101	38.33
-36	-37.78	22	-5.56	62	16.67	102	38.88
-34	-36.67	23	-5.00	63	17.22	103	39.44
-32	-35.56	24	-4.44	64	17.78	104	40.00

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Temperature Conversion Formula (Continued)

°C = (°F -32) ÷ 1.8
°F = (°C x 1.8) + 32
(Continued)

°F	°C	°F	°C	°F	°C	°F	°C
105	40.55	145	62.78	185	85.00	325	162.78
106	41.11	146	63.33	186	85.55	330	165.56
107	41.66	147	63.88	187	86.11	335	168.33
108	42.22	148	64.44	189	87.22	340	171.11
109	42.77	149	65.00	189	87.22	345	173.89
110	43.33	150	65.56	190	87.78	350	176.67
111	43.88	151	66.11	191	88.33	355	179.44
112	44.44	152	66.66	192	88.88	360	182.22
113	45.00	153	67.22	193	89.44	365	185.00
114	45.55	154	67.77	194	90.00	370	187.78
115	46.11	155	68.33	195	90.55	375	190.55
116	46.66	156	68.88	196	91.11	380	193.33
117	47.22	157	69.44	197	91.66	385	196.11
118	47.77	158	70.00	198	92.22	390	198.89
119	48.33	159	70.55	199	92.77	395	201.67
120	48.89	160	71.11	200	93.33	400	204.44
121	49.44	161	71.66	205	96.11	405	207.22
122	50.00	162	72.22	210	98.89	410	210.00
123	50.55	163	72.77	215	101.67	415	212.78
124	51.11	164	73.33	220	104.44	425	215.56
125	51.67	165	73.89	225	107.22	425	218.33
126	52.22	166	74.44	230	110.00	430	221.11
127	52.77	167	75.00	235	112.78	435	223.89
128	53.33	168	75.55	240	115.56	440	226.67
129	53.88	169	76.11	245	118.33	445	229.44
130	54.44	170	76.67	250	121.11	450	232.22
131	55.00	171	77.22	255	123.89	455	235.00
133	56.11	172	77.77	260	126.67	460	237.78
133	56.11	173	78.33	265	129.44	465	240.55
134	56.66	174	78.88	270	132.22	470	243.33
135	57.22	175	79.44	275	135.00	475	246.11
136	57.77	176	80.00	280	137.78	480	248.89
137	58.33	177	80.55	285	140.55	485	251.67
138	58.88	178	81.11	290	143.33	490	254.44
139	59.44	179	88.66	295	146.11	495	257.22
140	60.00	180	82.22	300	148.89		
141	60.55	181	82.77	305	151.67		
142	61.11	182	83.33	310	154.44		
143	61.66	183	83.88	315	157.22		
144	62.22	184	84.44	320	160.00		

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Glossary

Abrasion-resistance
A measure of the ability of a wire or wire covering to resist damage by mechanical means.

Accelerated Aging
A test in which voltage, temperature, or other test parameters are increased above normal operating values to obtain observable deterioration in a relatively short time. The plotted results give service life within the context of the test.

Adapter
A device usually attached to the rear of connectors that provides for the attachment of harnessing components, such as strain-relief clamps, heat-shrinkable boots, and braid.

Adhesive Liner
Lining that melts and flows inside a sleeve or molded part, filling any voids in between the substrate and the sleeve or molded part. DuraSeal has an adhesive liner.

Adhesive (Hot Melt)
Dual-wall tubing and precoated molded parts whose inner layer melts and flows when heated, fills voids in the areas being covered, and forms a mechanical bond to the substrate. Unlike an encapsulant, an adhesive forms a mechanical bond to the substrate.

Aging
Change in the properties of a material over time and under specific conditions. Generally refers to environmental stimulus such as heat and light.

Amnesia
The tendency over time for a heat-shrinkable elastomeric tubing or molded part to fail to recover completely to its specified recovered size.
See Shelf Life.

ASTM
(American Society for Testing and Materials)
A nonprofit industry wide organization that formulates test methods and material specifications, and publishes standards, testing methods, recommended practices, definitions, and other materials.

AWG
(American Wire Gauge)
The recognized method (in the United States) of specifying conductor size. The higher the gauge number, the smaller the conductor size.

Bare Conductor
A conductor not covered with insulating material.

Barrel
1.) Connector barrel: The section of the terminal, splice, or contact that accommodates the stripped conductor.
2.) Insulation barrel: The section of the terminal, splice, or contact that accommodates the conductor insulation.
3.) Open barrel: The section of a cap that accommodates the conductor.

Batch Number
See Lot Number.

Beaming
Crosslinking by means of high-energy electrons.

Bonding Temperature
Temperature above which adhesive melts and flows sufficiently to form an adhesive bond between substrates.

Breakdown Voltage
The voltage at which an insulator or dielectric fails to maintain the applied voltage.

Breakout
A region in a harness assembly where a wire or a group of wires is detached to form a separate, terminated branch. Also known as a transition.

Brittle Temperature
The temperature below which a material becomes brittle, often measured by a cold impact test.

Cable Clamp
A mechanical clamp attached to the cable side of a termination assembly to support the cable or wire bundle. It provides strain relief and absorbs vibration and shock that would otherwise be transmitted by the cable terminations.

Cable Clamp Adapter
A mechanical adapter that attaches to the rear of a termination assembly to allow the attachment of a cable clamp.

Cable Sealing Clamp
A device consisting of a gland nut designed to seal around the jacket of a cable.

Chemical Resistance
The ability of an insulation to withstand the presence of materials—such as acids, bases, water, salt water, and fuels—that can deteriorate the insulation, or that, if penetrable to the conductor, can cause dielectric loss of insulating qualities.

Cold Bend
A test conducted by wrapping tubing or cable around a mandrel or by bending it in an arc while at a low temperature.

Cold Flow
Permanent deformation of polymeric materials (insulation) at ambient temperature due to mechanical force or pressure (not due to heat softening).

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Glossary (Continued)

Cold Impact
A test performed by subjecting a component to a specified impact during exposure to low temperature. It measures the brittleness of the material.

Color Code
A means of identifying cable components using solid colors or stripes. Also, the scheme that assigns a number from 0 to 9 for each of 10 colors.

Color Stability
The time and temperature ranges within which the color of a material will remain within the specified color limit.

Compound
An insulating or jacketing material made by formulating polymeric materials and additives.

Concentricity
Ratio (expressed as a percentage) of the thinnest to the heaviest wall thickness. Measured on expanded or recovered tubing, or wire insulation, or jacketing.

Conduit
A tubular raceway for holding wires or cables.

Connector
A device used to physically and electrically connect two or more conductors.

Connector Classes
Categories based on shape, function, and smallest-size contact in a series.

Connector Insert
In connectors with metal shells, the part that holds contacts in proper arrangement while electrically insulating them from each other and from the shell.

Contact
The element in a connector that makes the actual electrical connection. Also the parts of a connector that actually carry the electrical current, and are touched together or separated to control the flow.

Contact Crimp
A contact whose rear portion is a hollow cylinder that accepts the conductor. A crimping tool is applied to swage or form the contact metal firmly against the conductor. Sometimes referred to as a solderless contact.

Contact Resistance
The direct-current resistance of a pair of mated contacts.

Contact Size
The diameter of the engagement end of a pin contact; also related to the current-carrying capacity of a contact.

Continuity
A continuous path for the flow of current in an electrical circuit.

Continuous Operating Temperature
Maximum temperature at which a component will maintain an acceptable lifetime performance, based on accelerated aging prediction.

Continuous Service
Conditions (time, temperature, environment) that describe the lifetime requirements of a component.

Core
1.) In cables, a component or assembly of components over which additional components, such as a shield or a sheath, are applied.
2.) Inner wall of dual-wall heat-shrinkable tubing.

Coupling Ring
The portion of a plug that aids in the mating and demating of a plug and receptacle and holds the plug to the receptacle.

Cover, Electrical Connector
An item specifically designed to cover the mating end of a connector for mechanical and/or environmental protection. Also known as a dust cover.

Crimp
Final configuration of a terminal barrel formed by the compression of the terminal barrel and conductor.

Crimping Die
Portion of the crimping tool that shapes the crimp.

Crimping Tool
Mechanism used for crimping.

Crosslinking
The formation of bonds between molecular chains in a polymer by means of chemical catalyzation or electron bombardment. The properties of the resulting thermosetting material are usually improved.

Crosslinking by Irradiation
A method of crosslinking polymers that makes a nonflowing material. This generally improves the properties of the polymer.

Crystallinity
The portion of polymer chains that are ordered in a regular (as opposed to amorphous) structure or a crystal lattice. Crystallinity tends to improve mechanical properties and fluid resistance. Crystalline or semicrystalline materials have a well-defined melting point (shrink temperature) at which the structure becomes disordered and the polymer flows.

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Glossary (Continued)

CSA (Canadian Standards Association)
An agency that has developed standard specifications for products with particular emphasis on safety in the end use.

Current
A movement or flow of electrons. Also, the measure of this flow, expressed in amperes.

Current Rating
The maximum continuous electrical flow of current for which a device is designed to conduct for a specified time at a specified operation temperature. Usually expressed in amperes.

Cut-through Resistance
Resistance of solid material to penetration by an object (typically a closely controlled knife edge) under conditions of pressure, temperature, and other elements.

Dielectric
Any insulating material between two conductors that permits electrostatic attraction and repulsion to take place across it. A material having electrical insulating properties.

Dielectric Breakdown
The voltage required to cause an electrical failure or breakthrough of the insulation. Determined by a destructive test. See also Breakdown Voltage.

Dielectric Constant (also K)
The ratio of the capacitance between two electrodes with a solid, liquid, or gaseous dielectric, to the capacitance with air between the electrodes. Also called permittivity and specific inductive capacity. Generally low values are desirable for insulation.

Dielectric Strength
The maximum voltage a dielectric can withstand without rupture. Usually expressed as volts per mil.

Dielectric Withstand Voltage (DWV)
A test voltage for a wire, cable, or insulation.

Dissipation Factor
The ratio between the permittivity and the conductivity of a dielectric.

Drain Wire
In a cable, an uninsulated conductor laid over the component, or components, in a foil-shield cable. Used as a ground connection.

Dust Cover
See Cover, Electrical Connector.

EID
See See Expanded ID.

Elastic Memory
The ability of a crosslinked polymer to be deformed to some predetermined shape, hold that shape for a period, and then return to its original shape upon the application of heat.

Elastomer
A material that exhibits very low or zero crystallinity and a high degree of flexibility (rubber is a synonym).

Elongation
The ultimate elongation, or elongation at rupture. Expressed as a percentage of original length.

EMI
Abbreviation for electromagnetic interference.

Encapsulant
Description related to the way dual-wall tubing products and precoated molded parts melt and flow when heated, filling any void in the area being covered. Unlike an adhesive, an encapsulant does not form a mechanical bond to the substrate.

Encapsulation
Covering and sealing.

Environmentally Sealed
Description of a system to keep out moisture, dirt, air, or dust that might reduce performance.

Epoxy
A family of thermosetting resins usually used as adhesives or encapsulants.

ETFE (Ethylenetetrafluoroethylene)
A fluoropolymer used as base resin for SPEC 55 wire and HCTE.

Expanded ID (EID)
The specified minimum (as supplied) internal diameter of tubing.

Expansion Ratio
An expression of how much larger the inside diameter of a tubing is before shrinking. Specifically, the relationship of the minimum (expanded) inside diameter of tubing to the maximum (recovered) inside diameter, expressed as a ratio. See also Shrink Ratio.

Extraction Tool
A tool used for removing contacts from a connector body.

Extrusion
A process that conveys plastic insulation material, generally via a screw, through forming dies and subsequently cools the insulation material to form a predetermined shape.

Feedthru (feedthrough)
A bushing in a wall or bulkhead with terminations on one or both sides.

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Glossary (Continued)

Flame-resistant
A descriptor applied to a material that is inherently resistant to burning.

Flame Retardant
A descriptor applied to a material that has been made or treated so as to resist burning.

Fluoropolymer
A polymer that contains atoms of fluorine.

Full Recovery Temperature, Minimum
See Recovery Temperature.

Gauge
A term used to denote the physical size of a wire. See also AWG.

Grounding Conductor
A conductor that provides a current return path from an electrical device to ground.

Hardness
A general term that correlates with strength, rigidity, and resistance to abrasion or penetration. Measured on Shore or Rockwell scales. See also Shore.

Harness
A system providing electrical connection between two or more points.

Heat Aging
A test that subjects components or materials to temperatures above normal operating values to evaluate changes in performance in order to predict service life. See also Accelerated Aging.

Heat Shock
A test to determine the stability of a material by continuously exposing it to an extremely high temperature for a short period of time. The test was developed both to demonstrate that the material is crosslinked and to observe any problems in dripping, cracking, or flowing.

Heat-Shrinkable Material
A polymeric material capable of being reduced in size when exposed to heat.

Hookup Wire and Cable
Wiring used to connect various points in electronic assemblies.

Hot-Melt Adhesive
An adhesive that becomes activated by heating. When heated, it melts, flows over the substrate surface, and forms an adhesive bond. Reheating causes the adhesive to remelt.

ID (Internal Diameter)
The inside or internal diameter of a tubing.

Insulated Terminal
A solderless terminal with an insulated sleeve over the barrel to prevent a short circuit in certain installations.

Insulation, Electrical
A nonconductive material usually surrounding or separating two conductive materials. Often called the dielectric in cables designed for high-frequency use.

Insulation, Thermal
A nonconductive material that prevents the passage of heat.

Insulation Resistance
Minimum electrical resistance permitted between any pair of contacts and between conductors and grounding devices of the same connectors in various combinations. An indication of the insulating properties of a material.

Interconnection
The joining of one individual device with another.

Irradiation
In insulations, the exposure of the material to high-energy emissions for the purpose of favorably altering the molecular structure via crosslinking.

Jacket
1.) A material covering over a wire or cable assembly.
2.) Outer covering of a dual-wall heat-shrinkable tubing.

kV (Kilovolt)
A unit equal to 1000 volts.

Kynar
Trade name (of Atofina Chemicals, Inc.) for polyvinylidene fluoride and its copolymers.

Life Cycle
A test to determine the length of time before failure in a controlled, usually accelerated environment.

Liner
See Core.

Longitudinal Change (Shrink Tubing)
The change in length of tubing when recovered. Expressed in the percent of change from the original length.

Loss
Electrical energy that is dissipated as heat.

Loss Factor
The product of the power factor and dielectric constant of an insulating material.

Lot Number
The number that identifies one production run of material. Also known as a batch number.

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Glossary (Continued)

Lug
A termination, usually crimped or soldered to a conductor, that allows connection to be made with a retaining screw.

Marking
A printed identification number or symbol applied to the surface of a wire or cable.

Megarad
A unit for measuring radiation dosage.

Melt/Flow Index
Measurement of the flow of thermoplastic material under given conditions of temperature and pressure. Expressed as grams per unit of time.

Melting Point
The temperature at which crystallinity disappears when crystalline material is heated.

Mil
A unit equal to one one-thousandth of an inch (.001"); used in measuring the diameter of a conductor or thickness of insulation over a conductor.

MIL-SPEC
Abbreviation for Military Specification, which is a document the U.S. Government issues to define a product that will be used in military end-use applications.

Milking Off
Action that occurs when the inner layer (the encapsulant or adhesive) of the tubing or molded part acts as a lubricant, allowing the tubing to slip off the substrate (because the tubing wants to recover to a smaller diameter).

Minimum Full Recovery Temperature
See Recovery Temperature.

MO (Manufacturing Order)
A series of operation-work-order cards identifying materials to be used and the type and quantity of products to be manufactured. An MO is controlled and issued by Production Control to the manufacturing operation.

MOD Code (Material Modification Code)
A code designating a particular stage in the production process. Most MOD codes describe the way the product is packaged.

MS (Manufacturing Specification)
A set of process instructions used in the manufacturing of tubing products. Customer Logistics, Product Management, or Manufacturing Engineering initiate the MS; Manufacturing Engineering controls it. The product design and quality parameters are provided to Manufacturing Engineering by Product Development and Quality Assurance. Successful trial runs of a new product or design usually precede the initiation of an MS (see SMO). A proprietary Raychem document, an MS is not available to customers.

Nick
A small cut or notch in conductor strands or insulation.

Nominal
A descriptor applied to a dimension representing the center of the range of tolerance or a value if no tolerance is applied.

OFT (Optional Flame Test)
Canadian Standards Association's test for flame-retardance. Tubing with an OFT rating is highly flame-retardant.

Ohm
The unit of electrical resistance.

Operating Temperature
The maximum internal temperature at which a system, harness, or connector may operate in continuous service; generally expressed as a time and temperature.

Operating Temperature Range
The range between the maximum and the minimum internal temperature of insulation in a system, harness, or connector in continuous service. The lower limit is determined by low-temperature flex test.

Optional Flame Test
See OFT.

Packaging
The process of physically locating, connecting, and protecting devices or components.

PC (Production Control)
Group responsible for directing and regulating the movement of goods through the entire manufacturing cycle, from the requisitioning of raw materials to the delivery of the finished products.

PCN
See RPN.

Permittivity
See Dielectric Constant.

Pigtail
A short conductor or wire extending from an electrical or electronic device to serve as a jumper or ground connection.

Pin Contact
An electrical terminal, usually in a connector. Normally a smaller termination than a lug.

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Glossary (Continued)

Plastic Deformation
Change in dimensions under a load that does not recover when the load is removed.

Plasticizer
A softener or lubricant added to a compound to make it easier to process or more flexible in use.

Poke Through
A term describing stray wires in a solder joint that poke through the insulation.

Polyamide
A polymer formed by the reaction of a diamine and a diacid. Nylons are commercial polyamides characterized by toughness, solvent resistance, and sharp melting point.

Polymer
A material of high molecular weight formed by the chemical union of monomers.

Polyolefin
A family of polymers (such as polyethylene and polypropylene) made from olefin monomers.

Potting
The permanent sealing of the cable end of a connector with a compound or material that thermosets into an elastomer, to exclude moisture and/or to provide strain relief.

Pre-etching
The act of surface preparation before encapsulating.

Primary Insulation
The inner member of a dual-wall wire insulation. The insulation applied directly on the conductor. Also referred to as the core. See also Core.

PVC (Polyvinyl chloride)
A polymer compound used as wire insulation.

PVDF
Polyvinylidene fluoride.

Quality Assurance
Systematic, planned, and documented activities designed to provide confidence that a product will meet specifications.

Quality Control
Activities that monitor, measure, and control the characteristics of a material, component, or product to documented specifications.

Quick Disconnect
A type of connector shell that permits rapid locking and unlocking of two connector halves.

Radiation Crosslinking
The act of crosslinking a material with ionizing radiation. (Most Raychem products are radiation crosslinked, with an electron beam as the form of ionizing radiation.) See also Crosslinking by Irradiation.

Rated Temperature
The maximum temperature at which a component can operate for extended periods with acceptable changes in its basic properties.

Rated Voltage
The maximum voltage at which an electric component can operate for extended periods without undue degradation.

Recover (Heat-shrinkable Components)
Activation of the elastic memory principle (usually with heat) to cause a tubing or molded part to return to its original size.

Recovered ID (RID)
In heat-shrink tubing, the guaranteed maximum internal diameter of tubing after being freely recovered.

Recovery Temperature
The minimum temperature required to fully shrink a product, that is, for the product to recover completely.

Resistance
A measure of the difficulty in moving electrical current through a conductor or insulation when a voltage is applied. It is measured in ohms.

RID
See Recovered ID.

RPN (Raychem Product Number)
A 10-digit number (such as 123456-4-001) assigned to every standard product and every product manufactured on a special manufacturing order (SMO). The first 6 digits represent the PCN (Product Control Number), followed by a 1-digit MOD Code, and finally a 3-digit suffix. See also MOD Code and SMO.

RT and RW specifications
Specification that describes standard product properties. Qualification and acceptance inspection criteria are incorporated into RT and RW specifications. RT and RW specifications are issued and controlled by the Specifications Group.

SCD (Specification Control Drawing)
Drawing that defines configuration and material parameters. Issued and controlled by the specifications group, SCDs are frequently used in conjunction with RT Specifications for Thermofit products.

Sealant
Soft, tacky, pliable material that seals where mechanical strength is not required.

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Glossary (Continued)

Sealed
Environmentally protected by the thermoplastic inserts or core of encapsulant/ adhesive that has melted down around the substrate.

Secant Modulus
A measure of material stiffness; stiffer material has a higher secant modulus. More specifically, the secant modulus is the ratio of stress (nominal) to corresponding strain at any specified point on the stress-strain curve.It is expressed in force per unit area (usually kilograms per square centimeters or pounds per square inch), and reported together with the specified stress or strain.

Service Life
Period of time during which the product is expected to perform satisfactorily.

Service Rating
The maximum voltage or current that a termination is designed to carry continuously.

Shelf Life
Generally, the length of time a product or material may be stored without deterioration. Specifically, the length of time during which shrink tubing will retain its expanded ID and return to its recovered ID. Usually not a concern—except for some “amnesic” materials. See Amnesia.

Shore
A scale for comparing hardness. Higher Shore values represent harder materials. The hardness of a polymer, for example, is usually represented as Shore A or Shore D, with D being harder.

Shrink Ratio
An expression of how much the inside diameter of shrink tubing will reduce in size when recovered. The inverse of the expansion ratio. See also Expansion Ratio.

Shrink Temperature, Minimum
The minimum temperature at which a product begins to recover.

Skew
Any out-of-squareness of the cut end of a piece of tubing after shrinking.

SMO (Special Manufacturing Order)
An order to evaluate manufacturing and production capability for a new or changed design for a customer and to provide development samples of potential products for customers. SMO products are separate and distinct from standard products. New, potential products are usually run as SMO products for a minimum of three times before being considered for manufacture as a standard product.

Solid Conductor
A conductor composed of one single strand.

Solvent Resistance
The ability of a material to retain physical and electrical properties after being immersed in specific solvents.

SPC (Statistical Process Control)
The use of statistical techniques such as control charts to analyze a process or its output so as to take appropriate actions to achieve and maintain a state of control and to improve the capability of the process.

Specific Gravity
The ratio of the density (mass per unit volume) of a material to that of water.

Specific Inductive Capacity
See Dielectric Constant.

Splice
A joint connecting conductors with good mechanical strength and conductivity; a terminal that permanently joins two or more wires.

Strain Relief
The technique for or act of removing or lessening the strain or stress on a joint, splice, or termination. SolderSleeve devices provide strain relief.

Strip
To remove insulation from a wire or cable.

Stripe
A continuous longitudinal or spiral color strip applied on the surface of a wire, cable, or tubing for identification.

Substrate
The material—such as a wire, post, or tab—over which an interconnection device is used.

Tear Test
A test to determine the tear strength of an insulating material. Usually includes exposure to given thermal conditions or a programmed series of conditions for prescribed periods of time.

Temperature Rating
The maximum temperature at which the insulating material may be used in continuous operation without loss of its basic properties. Usually time dependent.

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Germany: 49-6251-133-1999
China: 86-400-820-6015
Japan: 81-44-844-8013
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Glossary (Continued)

Tensile Strength
The pull stress (in force per unit area) required to break a given specimen.

Thermal Rating
The effect of heat or cold applied at such a rate that nonuniform thermal expansion or contraction occurs within a given material or combination of materials. In electrical terminations, the effect can cause inserts and other insulation material to pull away from the metal parts.

Thermal Shock
The effect of high and low temperatures applied at a rapid rate such that nonuniform thermal expansion or contraction occurs within a given material or combination of materials. The result could be stress-cracking or -shattering of material.

Thermoplastic
A material that softens (melts and flows) when heated and becomes firm when cooled. A type of plastic that can be remelted a number of times without any important change in properties. Nylon, GE's Lexan, and PVC—examples of this type of plastic—are resilient after molding.

Thermoset
A material that hardens or sets when heated and, once set, cannot be resoftened by heating. This application of heat is called "curing."

Thermosetting Plastic
A type of plastic in which an irreversible chemical reaction takes place while the plastic is being molded under heat and pressure.

Thermosetting Adhesive
A curing adhesive that requires heat to promote curing. This type of plastic will not soften when reheated. See Epoxy.

Tolerance
The total amount by which a quantity is allowed to vary from nominal; thus, the tolerance is half the algebraic difference between the maximum and minimum limits.

Traceability
The ability to trace the history, application, or location of an item and like items or activities by means of recorded identification. The lot number/manufacturing order (MO) number, or SMO number used to identify items or groups of items is traceable back to inspection and procurement records.

UL (Underwriters' Laboratories)
A nonprofit independent testing organization that operates a listing service for electrical and electronic materials and equipment.

Ultraviolet Degradation
The degradation caused by long-time exposure of a material to sunlight or other ultraviolet rays.

Voltage
The term most often used in place of electromotive force, potential, potential difference, or voltage drop to designate the electric pressure that exists between two points and that is capable of producing a current when a closed circuit is connected between the two points.

Voltage Breakdown
The voltage necessary to cause insulation failure.

Voltage Rating
The voltage that may be continuously applied to wire.

Volume Resistivity
Reciprocal of conductivity; the resistance of a material to the flow of electrical current, usually expressed in ohm-cm.

VW-1
A rating determined by the Underwriters' Laboratories' (UL) optional Vertical Wire Flame Test—the most difficult flame test for tubing. Tubings with a VW-1 rating are highly flame-retardant.

Wall Thickness
The thickness of the applied insulation or jacket.

Water Absorption Test
A method to determine the water uptake of a material. It is time and temperature dependent.

Water Blocking
The sticking together of insulated wires; usually caused by heat.

Wicking
The longitudinal flow of a liquid in a wire or cable construction due to capillary action. (This may also apply to solder.)

Withstanding Voltage
The test voltage an electrical connector can withstand for one minute without showing evidence of electrical breakdown when the voltage is applied between conductors and grounding devices of the connectors in various combinations.

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Part Index

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FOR MORE INFORMATION

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TE Technical Support Center

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TE connectivity

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