

Part Numbering System

2 0 2D 1 21 - 3 01 / 42 - 0

Color (TD-0 = Black). Other colors factory quote

Optional Adhesive* Coating (precoated in factory)

Modification (available on request)

- Over expansion
- Cutoff
- Molding ports (injection and vent)

Material**

Size of Part in Family: From 11 (= smallest) to 99 (= largest)

Family Number

Type of Part:

- A = Nonlipped boots/transitions
- C = Lipped boot
- D = Lipped boot
- F = Lipped boot
- K = Lipped boot
- S = Rayaten
- G = Lipped boot
- W, P = Other shapes

Angle of Part:

All openings	One opening
Circular	Noncircular
0 = Straight	0 = Straight
2 = 90°	3 = 90°
4 = 45°	5 = 45°
6 = 30°	7 = 30°

Number of openings in the part

4

Molded Parts

*See section 5 for details on adhesives.

**See page 4-24 for details on materials.

Material Selection Table

Applications

Tyco Electronics offers Raychem products in a variety of materials to enable designers and material specifiers to obtain optimum performance.

Material*	Characteristics
-3 Molded Part Material	A general purpose, heat-shrinkable semi rigid and flame retarded polyolefin molding compound with good resistance to fluids and heat. -3 molded parts are ideal for use in applications where toughness combined with resistance to occasional exposure to fluids or heat is required. -3 molded parts are recommended for use in System 10 and System 20.
-3S Molded Part Material	A general purpose, heat-shrinkable flame retarded, polyolefin compound used to make shielded molded parts. -3S molded parts form part of the Rayaten shielding system and are ideal for use in applications where toughness combined with resistance to occasional exposure to fluids or heat is required. -3S molded parts are recommended for use in System 10.
-4 Molded Part Material	A general purpose, heat-shrinkable flexible and flame retarded polyolefin molding compound with good resistance to fluids and heat. -4 molded parts are ideal for use in applications where toughness combined with resistance to occasional exposure to fluids or heat is required. -4 molded parts are recommended for use in System 10 and System 20.
-6 Molded Part Material	Designed for use in applications where extreme flexibility is required. The parts provide excellent strain relief and sealing over a broad temperature range and remain flexible at very low temperatures. The standard colour is black.
-8 Molded Part Material	For use in outer space, where use of low outgassing components is required. The parts provide excellent strain relief at connector cable terminations. Please contact Raychem for available shapes. The standard colour is black.
-12 Molded Part Material	A high temperature, heat-shrinkable, flexible, flame retarded, fluoroelastomeric molding compound with excellent resistance to long term fluid immersion and heat exposure. A wide range of shapes are available in this material. -12 molded parts are recommended for use in System 200.
-25 Molded Part Material	A heat-shrinkable, semi rigid, fluid and temperature resistant, elastomeric molding compound, designed to offer excellent performance in harsh environments. Ideal for use in military vehicles where high temperatures and long term exposure to hot fluids is expected. A wide range of shapes are available in this material. -25 molded parts are recommended for use in System 25.
-25S Molded Part Material	A heat-shrinkable, semi rigid, fluid and temperature resistant, elastomeric compound, used to make shielded molded parts. -25S molded parts form part of the Rayaten shielding system and are ideal for use in military vehicles where high temperatures and long term exposure to hot fluids is expected. -25S molded parts are recommended for use in System 25.
-50 Molded Part Material	A heat-shrinkable, highly flexible, fluid and temperature resistant, VPB molding compound, ideal for use in general purpose and high temperature military applications where exposure to petroleum based solvents is expected. Uniboosts and a wide range of low profile shapes are available in this material. -50 molded parts are recommended for use in System 30 and are compatible with System 25 components.
-51 Molded Part Material	A heat-shrinkable, rugged, flexible, fluid and temperature resistant, EPB molding compound, ideal for use in general purpose applications where exposure to petroleum based solvents is expected. Uniboosts and a wide range of low profile shapes are available in this material. -51 molded parts are recommended for use in System 20.
-55 Molded Part Material	A heat-shrinkable, flexible, flame retarded, fluid and high temperature resistant, modified fluoropolymer molding compound. -55 molded parts are ideal for use in applications where resistance to the effects of N.B.C. agent exposure and decontamination, combined with excellent abrasion resistance is required. A wide range of shapes is available. -55 molded parts are recommended for use in System 300.
-71 Molded Part Material	A heat-shrinkable, flexible, fluid and temperature resistant, polyolefin molding compound, ideal for use in general purpose applications where a good balance of fluid and heat resistance properties is required. Uniboosts and a wide range of low profile shapes are available. -71 molded parts are suitable for use in System 10.
-100 Molded Part Material	A heat-shrinkable, semi flexible, low fire hazard molding compound designed to offer excellent fire safety characteristics combined with low smoke and low acid gas emission. -100 also exhibits good mechanical and fluid resistance properties. A wide range of shapes are available in this material. -100 molded parts are recommended for use in System 100.
-100S Molded Part Material	A heat-shrinkable, semi flexible, low fire hazard compound used to make shielded molded parts. 100S molded parts form part of the Rayaten shielding system and are designed to offer excellent fire safety characteristics combined with low smoke and low acid gas emission. -100S also exhibits good mechanical and fluid resistance properties. -100S molded parts are recommended for use in System 100.
-125 Molded Part Material	A heat-shrinkable, flame retarded, fluid and high temperature resistant, modified fluoropolymer molding compound. 125 molded parts are ideal for use in applications where resistance to the effects of N.B.C. agent exposure and decontamination, combined with excellent abrasion resistance is required. A range of shapes are available. -125 molded parts are recommended for use in System 300.
-130 Molded Part Material	Non flame-retarded molded material.
-146 Molded Part Material	Flame retarded, ultra-high ratio heat-shrinkable material.
-152 Molded Part Material	Flame retarded, high ratio heat-shrinkable material.

*Check with specific part page for applicable materials.

Tyco Electronics manufacturers Raychem adhesives and sealants to accommodate a wide range of applications, materials, and environmental conditions.

Raychem adhesives include both thermosets and thermoplastics.

Thermosets are curable two-part epoxies or crosslinked elastomers.

Thermoplastics are hot-melt adhesives that flow when heated and set when cooled. They reflow when reheated to simplify component repair.

Tyco Electronics also manufactures Raychem products that include a thermoplastic adhesive or a mastic-type sealant for water holdout applications. The sealants adhere to non-oily substrates and can be removed where reentry is necessary.

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Selection Guide

To determine the adhesive or sealant most compatible with a Raychem part, you must know the part's product type.

Use the Adhesive/Sealant Selection Table below to determine a Raychem part's product type and the adhesive/sealant compatible with that type.

Use the Adhesive/Sealant Product Characteristics Table (pages 5-3 and 5-4) to be sure the adhesive or sealant has the product characteristics your application requires.

To use the Selection Table, follow these four steps:

1. Under "Substrate Category," find the product material and product name/part number for the Raychem part.
2. Across the top of the table, find the part's product type and dash number.
3. At the intersection of the substrate category (product material/name/part number) and the product type (by designated dash number) you will find the part number for the most compatible adhesive for the Raychem part.
4. See the Adhesive/Sealant Product Characteristics Table below to verify the characteristics of the adhesive/sealant you selected.

Adhesive/Sealant Selection Table

Substrate Category	Product Name Examples	Molded Part Material Dash Number												
		-3	-4	-6	-8	-12	-25	-50	-51	-55	-71	-100	-125	-130
Polyolefin	RNF-100	S-1006	S-1006	—	—	—	—	—	—	—	S-1006	—	—	S-1006
	Versafit	S-1009	S-1009	—	—	—	—	—	—	—	S-1009	—	—	S-1009
	CRN	S-1017	S-1017	—	—	—	—	—	—	—	S-1017	—	—	S-1017
	BSTS	S-1030	S-1030	—	—	—	—	—	—	—	S-1030	—	—	—
	SST	S-1048	S-1048	—	—	—	—	—	—	—	S-1048	—	—	—
	HR	S-1298	S-1297	—	—	—	—	—	—	—	S-1297	—	—	—
Fluoro-polymer	Kynar	S-1009	S-1009	—	S-1009	—	S-1125	—	—	—	S-1009	—	S-1009	—
		S-1048	S-1048	—	—	—	—	—	—	—	S-1048	—	S-1048	—
		S-1125	S-1125	—	—	—	—	—	—	—	S-1125	—	S-1125	—
	RT555	—	—	—	—	S-1255	—	—	—	S-1255	—	—	S-1255	—
	HCTE	—	—	—	—	S-1255	S-1125	—	—	S-1255	—	—	—	—
	CONVOLEX	—	—	—	—	S-1125	—	—	—	S-1125	—	—	—	—
Vinyl	PVC	S-1006	S-1006	—	—	—	—	—	—	—	S-1006	—	—	—
		S-1009	S-1009	—	—	—	—	—	—	—	S-1009	—	—	—
		S-1017	S-1017	—	—	—	—	—	—	—	S-1017	—	—	—
Elastomer	DR-25	—	—	—	—	—	S-1125	S-1125	S-1125	—	—	—	—	—
	NT	S-1006	S-1006	—	—	—	—	—	S-1124	—	S-1006	—	—	—
		S-1009	S-1009	—	—	—	—	—	—	—	S-1009	—	—	—
		S-1017	S-1017	—	—	—	—	—	—	—	S-1017	—	—	—
	NT-FR	—	—	—	—	—	S-1125	—	S-1124	—	—	—	—	—
	SFR	—	—	*	—	—	—	—	—	—	—	—	—	—
	SRFR	—	—	*	—	—	—	—	—	—	—	—	—	—
	VITON	—	—	—	—	S-1255	—	—	—	S-1255	—	—	S-1255	—
	VPB	—	—	—	—	—	—	S-1125	—	—	—	—	—	—
		—	—	—	—	—	—	S-1255	—	—	—	—	—	—
Zerohal	XFFR	—	—	—	—	—	—	—	—	—	—	S-1030	—	—
	ZHTM	—	—	—	—	—	—	—	—	—	—	S-1030	—	—

*GE RTV 108 used with SFR SRFR and -6 (silicone) molded parts.

Adhesive/Sealant Product Characteristics Tables

Product Type	Precoat Designation	Type	Operating Temperature Range	Product Designation	Available Form/ Packaging
Thermosets					
S-1006	—	Epoxy/ polyamide two-part paste	-55°C to 135°C [-67°F to 275°F]	S-1006 Kit 1	Two x 15-gram packs
				S-1006 Kit 2	Four x 7.5-gram packs
				S-1006 Kit A	Ten 3-gram packs
S-1009	—	Epoxy/ polymercaptan two-part paste	-55°C to 135°C [-67°F to 275°F]	S-1009 Kit A	Ten 3-gram packs
S-1255-04	—	One-part epoxy tape adhesive	-55°C to 200°C [-67°F to 392°F]	S-1255-04	Tape [3/4 in. x .020 x 100 ft.]
S-1125	—	Epoxy/polyamide two-part paste	-55°C to 150°C [-67°F to 302°F]	S-1125 Kit 1	Five 10-gram packs
				S-1125 Kit 2	Two 10-gram packs
				S-1125 Kit 3	One 100-gram pack
				S-1125 Kit 4	Five 10-gram packs
				S-1125 Kit 5	One 10-gram pack
				S-1125 Kit 8	Two 50-ml syringes
	/225	Precoated latent-curing epoxy/polyamide	-75°C to 150°C [-103°F to 302°F]	Precoat only on -25 molded parts	—
Thermoplastics					
S-1017	/42	Hot-melt/ polyamide	-20°C to 60°C*** [-4°F to 140°F]	S-1017	Tape [1 in. x .010 in. x 50 ft.]
S-1030	/180	Hot-melt/ polyolefin	-80°C to 80°C [-112°F to 176°F]	S-1030	Tape [3/4 in. x .010 in. x 33 ft.]
S-1048	/86	Hot-melt, high performance	-55°C to 120°C [-67°F to 248°F]	S-1048	Tape [1 in. x .026 in. x 100 ft.]
S-1124	/164	Hot-melt/ elastomeric polymer	-55°C to 105°C [-67°F to 221°F]	S-1124	Tape [3/4 in. x .018 in. x 10 ft.]
S-1297	/97	Hot-melt/ polyamide adhesive	-20°C to 90°C [-4°F to 194°F]	S-1297	Tape [1 in. x .010 in. x 10 ft.]
Sealants					
S-1278	—	Hot-melt grey butyl sealant	-40°C to 90°C [-40°F to 194°F]	S-1278-01	Tape [1 in. x .062 in. x 25 ft.]
				S-1278-02	Tape [3/4 in. x .125 in. x 10 ft.]
S-1305	—	Hot-melt grey butyl sealant	-40°C to 90°C [-40°F to 194°F]	S-1305-01	Tape [1 in. x .062 in. x 25 ft.]

*Shelf life from date of manufacture.

**For specific adhesion properties, see product specification sheets.

***Passes cold bend at -40°C [-40°F] per RT-4204.

****Only S-1006 Kit A conforms to MIL-A-46864.

Adhesive/Sealant Product Characteristics Tables (Continued)

Pot Life at 23°C	Curing Conditions	Shelf life* at or below 25°C	Specifications**	Comments
1 h	96 h at 20°C [68°F] min. or 1 hr at 120°C [248°F]	2 years	RT-1006 RK-6612 MIL-A-46864****	General purpose harnessing adhesive. Not used on Viton, silicone or Kynar; 20-minute pot life
20 min	24 h at 20°C [68°F] min. or 1 hr at 95°C [203°F]	2 years	RT-1009	General purpose harnessing adhesive. Not used on Viton or silicone; 20-minute pot life
	45 min at 120°C [248°F] 2 h at 155°C [311°F] min. or 15 min at 240°C [464°F]	1 year	RT-1014	One-part epoxy tape used with Viton harness systems. Heat cure required (2 hours at 155°C [311°F])
90 min	24 h at 20°C min. or 1 hr at 85°C [185°F]	18 months	RT-1011 RK-6619 VG-95343	Good fluid-resistant epoxy used with System 25
	Cure during installation of molded parts	1 year	VG-95343 RK-6630	Precoated epoxy system for System 25
—	120°C [248°F]	Unlimited	RT-1050/1	General purpose harnessing adhesive. Standard precoated adhesive for -3 and -4 molded parts
—	120°C [248°F]	Unlimited	RT-1050/6 RK-6017	Good low-temperature flexibility. Available as a preinstalled tape for molded parts
—	160°C [320°F]	Unlimited	RT-1050/3 RK-6626	Requires high temperature to achieve bonding. Highest service temperature for hot melt
—	135°C [275°F]	Unlimited	RT-1050/13	Requires reflowing in an oven at 150°C [302°F] for 90 minutes. Designed to bond to -51 molded parts.
—	120°C [248°F]	Unlimited	RW-2019	General purpose harnessing adhesive. Standard precoated adhesive in Sigmaform molded parts, CES and CSGA cable entry seals, and SST-FR heat-shrinkable tubing
—	110°C [230°F]	Unlimited	RW-2020	General purpose sealant and cable breakout area filler
—	110°C [230°F]	Unlimited	RW-2021	Halogen-free, flame-retardant sealant and cable breakout area filler

*Shelf life from date of manufacture.

**For specific adhesion properties, see product specification sheets.

***Passes cold bend at -40°C [-40°F] per RT-4204.

****Only S-1006 Kit A conforms to MIL-A-46864.

Installation Guide

Substrate Preparation Procedures

Preparation of the substrate depends on the part to be bonded. Following are two preparation procedures. The first applies to plated metals and adapters; the second applies to polymer molded parts, cable jackets, and tubing materials.

Plated Metals and Adapters

Thoroughly degrease the surface with a clean cloth or paper wipe dampened with a solvent. The cloth or paper should not be saturated with the solvent.

Allow the part to stand for a minute or two to allow complete evaporation of the solvent.

Molded Parts, Cable Jackets, and Tubing Materials

Carefully and evenly abrade the surface with #320 emery cloth. Wipe contaminants and abraded particles away with a clean cloth or paper wipe dampened with a solvent. The cloth or paper should not be saturated with the solvent. Allow the part to stand for a minute or two to allow complete evaporation of the solvent.

Note:

- Avoid contamination of the prepared surface. If using primer, apply it according to the manufacturer's instructions and allow it to dry.
- Epoxy adhesives may cause skin and eye irritation. Be sure to observe the handling instructions.
- When using hot-melt adhesives on substrates with high heat-sink capacity (such as connector backshells), preheat the substrate until it is hot to touch, then apply the adhesive tape and shrink the molded part in place.

Caution:

The use of cleaning solvent is described in the preparation of various components for adhesive bonding. Please observe the solvent manufacturer's safety recommendations. Several Raychem epoxy adhesives and solvent base primers are also described in some cases. For specific handling precautions, please consult the appropriate Raychem material safety data sheet for the adhesive being used.

Installation Procedures

The three sets of installation instructions that follow are based on the type and/or form of adhesive or sealant to be used.

Select the set of instructions that applies to your application.

Tape Adhesives and Sealants Connector Boot

1. Degrease the area of the adapter to which the boot will be bonded, using appropriate solvent on a paper tissue or clean cloth. Do not abrade the adapter.
2. Lightly abrade the bonding area of the cable jacket with #320 emery cloth, then wipe off loose particles with a tissue or clean cloth dampened with a solvent.
3. Lightly abrade and wipe 25.4 [1.0] back inside each end of the boot.
4. When using primer, apply a thin, uniform coating to the bonding surface and let it air dry (15–20 minutes).
5. Double-wrap the adhesive tape around the cleaned area of the adapter, placing slight tension on the tape as you wrap. Tack the ends in place with a soldering iron or hot tool.

6. Double-wrap adhesive tape around the cable jacket where the end of the boot is to be located.
7. Position the boot on the adapter and the cable. Apply heat, starting at the connector end.
8. Recover the connector end of the boot onto the adapter and continue heating until the area is fully recovered and the adhesive tape is properly melted.
9. Complete the recovery of the boot, continuing toward the cable end. Heat the cable end of the boot where the adhesive is placed, until the part is fully recovered and the tape has properly melted or flowed. The tape should appear wet, form a bead or fillet between the cable and boot, and show no definition between the layers of tape.
10. Where oven curing is required to complete adhesive bonding, heat the assembled harness in a preheated oven according to the following schedule:
 - S-1255-02:
2 hours at 155°C [311°F]
 - S-1124:
90 minutes at 150°C [302°F]

Transition

1. Lightly abrade the bonding area of the cable jacket with #320 emery cloth, then wipe off loose particles with a tissue or clean cloth dampened with a solvent.
2. Abrade and wipe the inside of each transition opening.
3. When using primer, apply a thin, uniform coating to the bonding surface and let it air dry (15–20 minutes).

Installation Guide (Continued)

4. Double-wrap the tape around the abraded areas of the cable, placing slight tension on the tape as you wrap. Tack the ends in place with a soldering iron or hot tool.
5. Center the molded part over the transition area. When properly positioned, the part should not fit tightly in the "branched" area of the breakout. A tight fit may cause the part to crease or wrinkle as it recovers. The tape should extend slightly beyond the end of the transition.
6. Apply heat to the center of the transition. Recover one leg of the transition, moving heat from the center of the transition to the adhesive opening of the leg. Repeat the procedure on each leg of the transition.
7. Continue heating each end of the transition until the part is fully recovered and the adhesive tape has properly melted or flowed. The tape should now appear wet, form a bead or fillet between the cable and transition, and show no definition between the layers of tape.
8. Where oven curing is required to complete adhesive bonding, heat the assembled harness in a preheated oven according to the following schedule:
S-1255-02:
2 hours at 155°C [311°F]
S-1124:
90 minutes at 150°C [302°F]

Thermosets**Connector Boot**

1. Thoroughly mix the two parts according to the instructions provided with the kit.
2. Degrease the area of the adapter to which the boot will be bonded, using appropriate solvent on a paper tissue or clean cloth. Do not abrade the adapter.
3. Lightly abrade the bonding area of the cable jacket with #320 emery cloth, then wipe off loose particles with a tissue or clean cloth.
4. Lightly abrade back 25.4 mm [1.0] inside each end of the boot.
5. Using a spatula, apply the mixed adhesive to the adapter and shrink the adapter to the end of the boot.
6. Apply adhesive to the cable jacket and complete the shrinking process.
7. With a clean cloth, remove excess adhesive from all areas immediately.
8. Follow the curing conditions outlined in this guide.

Transition

1. Thoroughly mix the two parts according to the instructions provided with the kit.
2. Lightly abrade the bonding area of the cable jacket with #320 emery cloth, then wipe off loose particles with a tissue or clean cloth.
3. Abrade and wipe inside each opening of the transition.
4. Using a spatula, apply the mixed adhesive to the cable jacket.
5. Apply heat to the center of the transition. Recover one leg of the transition, moving heat from the center of the transition to the adhesive opening of the leg. Repeat the procedure on each leg.
6. Remove excess adhesive from all areas immediately with a clean cloth.
7. Follow the curing conditions specified for "thermosets" in the "Adhesive/Sealant Product Characteristics Table" on pages 5-3 and 5-4.

Installation Guide (Continued)

**Molded Parts Pre-coated
with Thermoplastic
Adhesive**

Connector Boot

1. Degrease the area of the adapter to which the boot will be bonded, using appropriate solvent on a paper tissue or clean cloth. Do not abrade the adapter or inside surface of the boot.
2. Lightly abrade the bonding area of the cable jacket with #320 emery cloth, then wipe off loose particles with a tissue or clean cloth dampened with solvent.
3. Position the boot on the adapter and cable. Apply heat starting at the connector end.
4. Recover the connector end of the boot onto the adapter and continue heating until the area is fully recovered and the adhesive is properly melted.
5. Complete the recovery of the boot, continuing toward the cable end of the boot until the part is fully recovered and the adhesive is properly melted. The adhesive should form a bead or fillet between the cable and boot when fully melted.
6. With a clean cloth, remove excess adhesive from all areas immediately.
7. Follow the curing conditions outlined in this guide.

Transition

1. Lightly abrade the bonding area of the cable jacket with #320 emery cloth, then wipe off loose particles with a tissue or clean cloth dampened with solvent.
2. Center the molded part over the transition area.
3. Apply heat to the center of the transition. Recover one leg of the transition, moving heat from the center of the transition to the adhesive opening of the leg. Repeat the procedure on each leg of the transition.
4. Continue heating each end until the part is fully recovered and the adhesive has properly melted. The adhesive should form a bead or fillet between the cable and transition when fully melted.
5. Follow the curing conditions specified for "thermosets" in the "Adhesive/Sealant Product Characteristics Table" on pages 5-3 and 5-4.

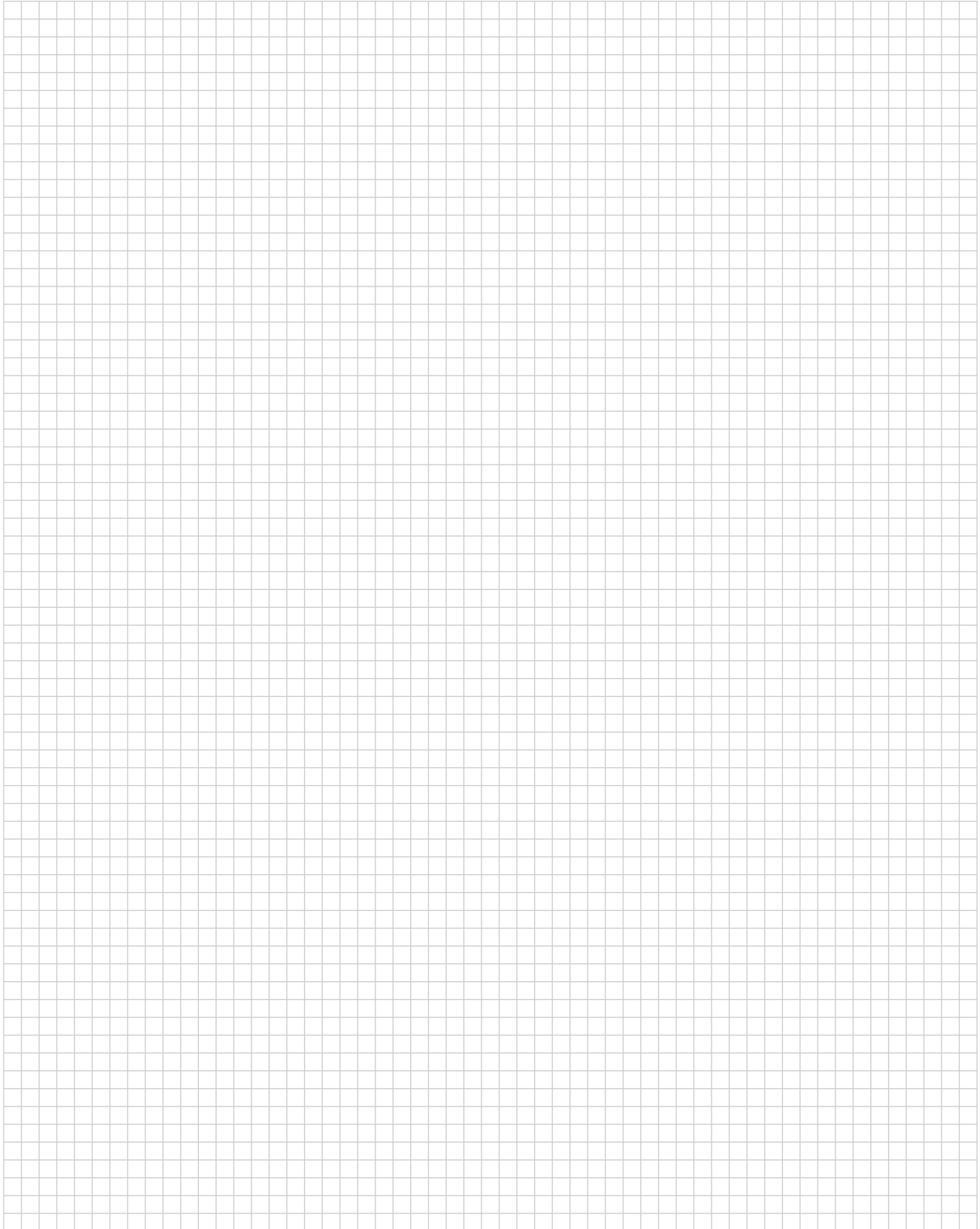


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RW-175	High temperature and fluid resistant, extra tough, semi-rigid, heat-shrinkable tubing	10030, 10031
SFR	Very flexible, flame-retardant, silicone elastomer tubing . .	10032, 10033
SRFR	Silicone rubber, highly flexible, heat-shrinkable tubing . .	10034, 10035
Versafit	Highly, flame-retardant, very flexible, low-shrink-temperature, polyolefin tubing	10036, 10037
Versafit V4	Very-thin-wall, very flexible, highly flame-retardant, polyolefin tubing	10038, 10039
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ZH-100	Flexible, thin-wall, low-fire-hazard tubing	10042, 10043
ZHTM	Heat-shrinkable, flexible tubing with low toxicity for fire safety applications	10044, 10045

METRIC

Dimensions in this section are millimeters over inches

Adhesive Lined Tubing

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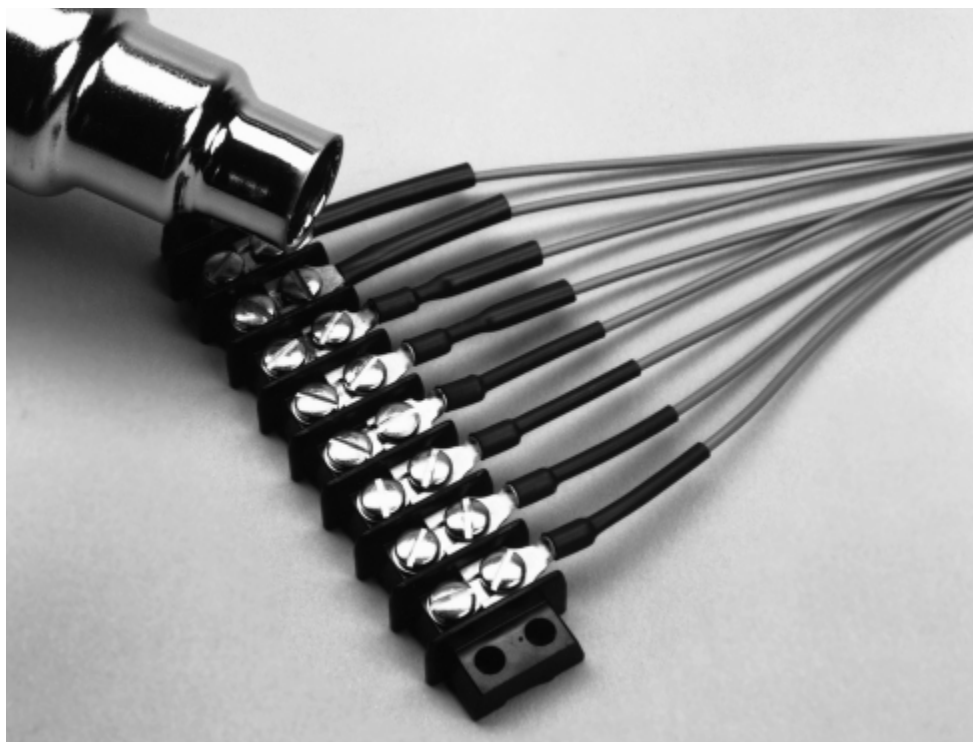
Semi-rigid,
Flame-Retardant,
Polyolefin Tubing

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 (colors only)
- Outstanding physical and electrical performance
- Excellent chemical and solvent-resistance properties

Single-Wall Tubing

CRN



Applications

Ideally 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			Military	Raychem
CRN Type 1 (colors)	E35586 600 V, 125°C [257°F]	LR31929 (black only) 600 V, 125°C [257°F]	AMS-DTL-23053/6*, Class I Def. Stan. 59-97 Type 2C (not red)	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.

Product Dimensions

Single-Wall Tubing

CRN (Continued)

Size	Inside Diameter		Recovered Wall Thickness** After Heating
	Minimum Expanded as Supplied	Maximum Recovered 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	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, CRN 1/4-0).	

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

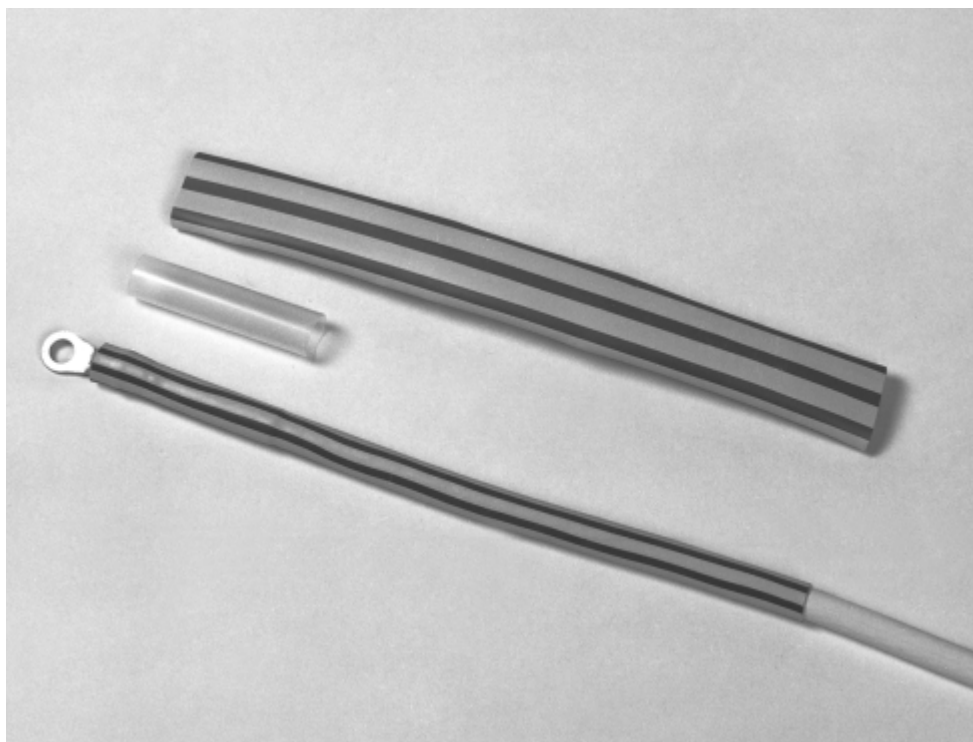
**Flexible, Flame-Retardant,
Dual-Color, Polyolefin
Tubing**

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

Single-Wall Tubing

DCPT



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 wire and cable.

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			Military	Agency	Raychem
DCPT	E35586 600 V, 125°C [257°F]	LR31929 600 V, 125°C [257°F]	Def Stan 59-97 Issue 3 Type 2B VG 95343 Pt 5 Type A	AFS 2270 DIN 29807 VDE 0341 Pt 9005 Type A	RW-2056

Product Dimensions

Single-Wall Tubing

DCPT (Continued)

Size	Inside Diameter		Recovered Wall Thickness** After Heating
	Minimum Expanded as Supplied	Maximum Recovered After Heating	
2:1			
3/1.5	3 [0.118]	1.5 [0.059]	0.51 ± 0.10 [0.020 ± 0.004]
6/3	6 [0.236]	3.0 [0.118]	0.58 ± 0.10 [0.025 ± 0.004]
8/4	8 [0.315]	4.0 [0.158]	0.64 ± 0.10 [0.025 ± 0.004]
10/5	10 [0.394]	5.0 [0.197]	0.64 ± 0.10 [0.025 ± 0.004]
12/6	12 [0.472]	6.0 [0.236]	0.64 ± 0.10 [0.025 ± 0.004]
19/9	19 [0.748]	9.0 [0.354]	0.76 ± 0.12 [0.030 ± 0.005]
26/13	26 [1.024]	13.0 [0.512]	0.89 ± 0.12 [0.035 ± 0.005]
38/19	38 [1.500]	19.0 [0.748]	1.00 ± 0.12 [0.039 ± 0.005]
51/19	51 [2.000]	19.0 [0.748]	1.02 ± 0.15 [0.040 ± 0.006]
3:1 (Europe only)			
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]

*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).	

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

**Heat-Shrinkable, Flexible,
Chemical and Abrasion
Resistant Tubing**

Product Facts

- Flame-retardant
- System-25 tubing
- Shrink ratio 2:1

Single-Wall Tubing

DR-25



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 ideally 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 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*	RT-1116
	VG95343 Part 5 Type D	RK 6008/1
	VDE 0341/Pt 9005	
	Def Stan 59-97 Issue 3 Type 6B	
	BS 4G-198 Part 3 10A	

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

Product Dimensions
DR-25 (Continued)

Size	Inside Diameter		Recovered Wall Thickness** After Heating
	Minimum Expanded as Supplied	Maximum Recovered After Heating	
1/8	3.2 [0.125]	1.6 [0.063]	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]	19.0 [0.748]	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.

Small-diameter,
high-shrink-ratio tubing

Product Facts

- Small diameter
- High shrink ratio
- Thin wall
- Polyolefin and fluoropolymer materials

MicroFit



Applications

The MicroFit family of small-diameter, high-shrink-ratio tubing is ideal for electrical insulation, mechanical protection, and strain relief in smaller, more compact medical devices and commercial electronics products. Offered in a variety of materials. The RW-175 version of MicroFit tubing is suitable for use in space applications.

Installation

Minimum full recovery temperature:
175°C [347°F] (MT1000)
140°C [284°F] (MT2000)
175°C [347°F] (RW-175)

Operating Temperature Range

MT1000: -55°C to 125°C
[-67°F to 257°F]
MT2000: -40°C to 105°C
[-40°F to 221°F]
RW-175: -55°C to 175°C
[-67°F to 347°F]

Specifications/Approvals

Series	Material	Master File Number	Raychem
Altera MicroFit	USP Class VI (MT1000) USP Class VI (MT2000)	MAF-444 (MT1000) MAF-727 (MT2000)	Altera MicroFit SCD
RW-175 MicroFit	—	—	RW-175 MicroFit SCD

Product Dimensions

Single-Wall Tubing

MicroFit (Continued)

Size	Inside Diameter		Wall Thickness	
	Minimum Expanded as Supplied	Maximum Recovered After Heating	As Supplied (Nominal)	Recovered*** (Maximum)
MFT-*-No. 1-*	0.356 [0.014]	0.178 [0.007]	0.076 [0.003]	0.127 [0.005]
MFT-*-No. 2-*	0.610 [0.024]	0.305 [0.012]	0.064 [0.0025]	0.152 [0.006]
MFT-*-No. 33-*	1.143 [0.045]	0.432 [0.017]	0.064 [0.0025]	0.178 [0.007]
MFT-*-No. 65-*	0.635 [0.025]	0.254 [0.010]	0.127 [0.005]	0.330 [0.013]

*Replace single asterisk with material type: MT1000, MT2000, or RW-175.

**Replace double asterisk with color-code number.

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

Ordering Information

	MT1000	MT2000	RW-175
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. Special order sizes are available upon request.		
Standard packaging	On plastic spools****		
Ordering description	Specify product name, material, size and color (for example, MFT-MT2000-No. 1-0).		

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

**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, RT-510)
- System 20



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
NT	UL E35586 600V, 90°C [194°F]	CSA LR31929 600V, 90°C [194°F]	—	—	RT-510
NTFR	—	—	SC-X-15112	AMS 3623	RT-511

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

Product Dimensions

NT/NTFR (Continued)

Size	Inside Diameter		Recovered Wall Thickness** After Heating
	Minimum Expanded as Supplied	Maximum Recovered 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]	2.6 [0.100]	0.84 ± 0.25 [0.033 ± 0.010]
1/4	6.4 [0.250]	3.6 [0.143]	0.88 ± 0.25 [0.035 ± 0.010]
3/8	9.5 [0.375]	5.5 [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 ± 0.50 [0.070 ± 0.020]
1 1/4	31.8 [1.250]	18.1 [0.714]	2.20 ± 0.50 [0.087 ± 0.020]
1 1/2	38.1 [1.500]	21.8 [0.857]	2.41 ± 0.50 [0.095 ± 0.020]
1 3/4	44.5 [1.750]	25.4 [1.000]	2.71 ± 0.50 [0.107 ± 0.020]
2	50.8 [2.000]	29.0 [1.140]	2.79 ± 0.50 [0.110 ± 0.020]
3	76.2 [3.000]	43.4 [1.710]	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, NTFR 1/4-0).	

Flexible, Rugged, Modified Elastomeric Heat-Shrinkable Tubing

Product Facts

- Offers outstanding resistance to abrasion and physical abuse while providing flexibility and strain relief needed in many harnessing applications
- Remains flexible at low temperatures without cracking
- Withstands heat shock at 200°C [392°F] without dripping, flowing or cracking
- Resistant to common fluids and solvents, including aviation and ground vehicle fuels, lubricating oil, and hydraulic fluids
- Retains physical and electrical properties following exposure



Applications

Widely used for insulation, strain relief and abrasion protection on cable harnesses and wire bundles in the military and aerospace industries.

Installation

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, Class 1 & 2	RW-3030

Product Dimensions

Single-Wall Tubing

NT-MIL (Continued)

Size	Inside Diameter		Recovered Wall Thickness* After Heating
	Minimum Expanded as Supplied	Maximum Recovered After Heating	
1/8	3.2 [0.125]	1.6 [0.062]	0.66 ± 0.20 [0.026 ± 0.008]
3/16	4.8 [0.187]	2.4 [0.093]	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

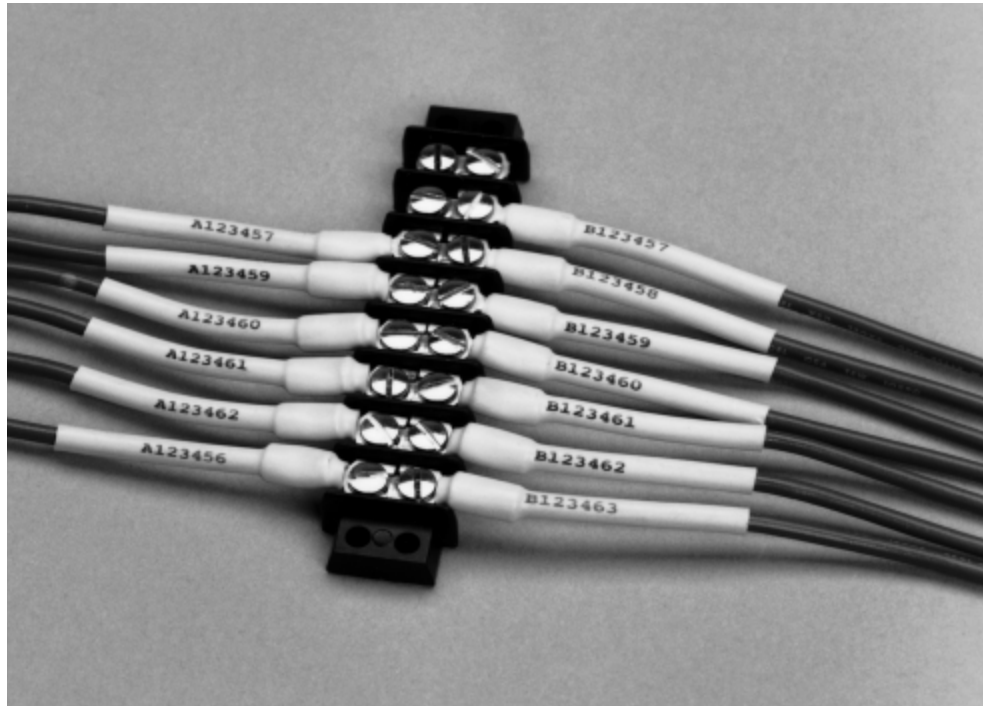
Color	Standard	Black (-0)
Size selection	Always order the largest size that will shrink snugly over the component to be covered.	
Standard packaging	On spools.	
Ordering description	Specify product name, size and color (for example, NT-MIL 1/4-0 (0 = Black)).	

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

RNF-100



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			Military	Industry	Raychem
RNF-100 Type 1 (colors)	E35586 600 V, 125°C [257°F]	LR31929 600 V, 125°C [257°F]	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.

Product Dimensions

RNF-100 (Continued)

Size	Inside Diameter		Recovered Wall Thickness** After Heating
	Minimum Expanded as Supplied	Maximum Recovered 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 [0.020 ± 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), green (-5, GN), clear (-X, CL)
	Nonstandard	Brown (-1, BN), orange (-3, OR), 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]).	

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

**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 (but not recommended for use in direct contact with ketones)
- Recommended maximum temperature for use as a primary insulator: 135°C

RNF-150



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		Military	Raychem
RNF-150	E85381 VW-1 600 V, 150°C	AMS-DTL-23053/18*, Class 2	RT-370

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

Product Dimensions

RNF-150 (Continued)

Size	Inside Diameter		Recovered Wall Thickness** After Heating
	Minimum Expanded as Supplied	Maximum Recovered 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

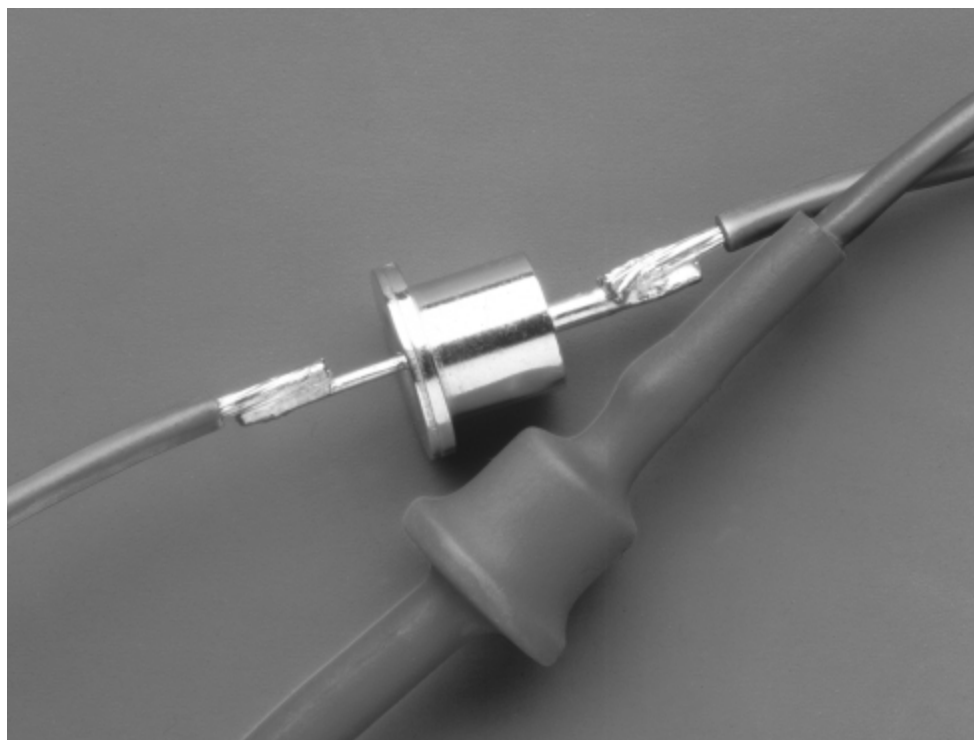
Color	Standard	Black (-0)
	Nonstandard	White (-9)
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Special order sizes are available upon request.	
Standard packaging	On spools.	
Ordering description***	Specify product name, size and color (for example,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

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

**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)



Applications

Used for insulation and strain relief of wire terminations and electrical connections. Also ideal 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			Military	Industry	Raychem
RNF-3000	E35586 600 V, 125°C [257°F]	LR31929 600 V, 125°C [257°F]	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

Product Dimensions

RNF-3000 (Continued)

Size	Inside Diameter		Recovered Wall Thickness** After Heating
	Minimum Expanded as Supplied	Maximum Recovered 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), green (-5), clear (-X)
	Nonstandard	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, 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 MIL, Def Stan and BS add -MS, -DS or -BS to ordering description.

**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

Single Wall Tubing

RP-4800



Applications

Ideal 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		Military	Industry	Raychem
RP-4800	E35586 600V, 125°C [257°F]	AMS-DTL-23053/5*, Class 1 Overexpanded	VDE 0341 Pt 9005 Type A	RT-1122
—	—	VG 95343 Pt 5 Type A	—	—

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

Product Dimensions

RP-4800 (Continued)

Size	Inside Diameter		Recovered Wall Thickness** After Heating
	Minimum Expanded as Supplied	Maximum Recovered 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.

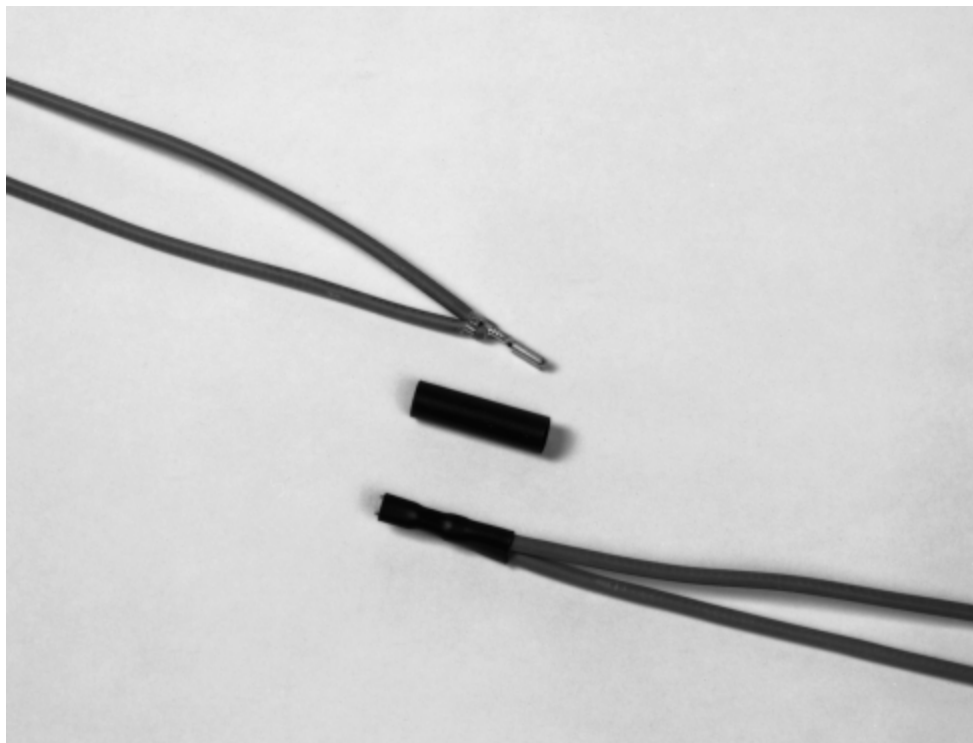
Semirigid, Flame-Retardant, Polyolefin Tubing

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

Single Wall Tubing

RT-3



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			Raychem
RT-3	E35586 600 V, 125°C [257°F]	LR31929 (black only) 600 V, 125°C [257°F]	RT-360*

*Except dimensions and longitudinal change.

Product Dimensions

RT-3 (Continued)

Size	Inside Diameter		Recovered Wall Thickness** After Heating
	Minimum Expanded as Supplied	Maximum Recovered After Heating	
No. 1	6.1 ± 4 [0.240 ± 0.015]	2.4 [0.095]	0.79 ± 0.08 [0.031 ± 0.003]
No. 2	8.1 ± 4 [0.320 ± 0.015]	3.2 [0.125]	0.79 ± 0.08 [0.031 ± 0.003]
No. 3	9.5 ± 5 [0.375 ± 0.020]	3.8 [0.150]	0.79 ± 0.08 [0.031 ± 0.003]
No. 4	12.3 ± 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	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-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).	

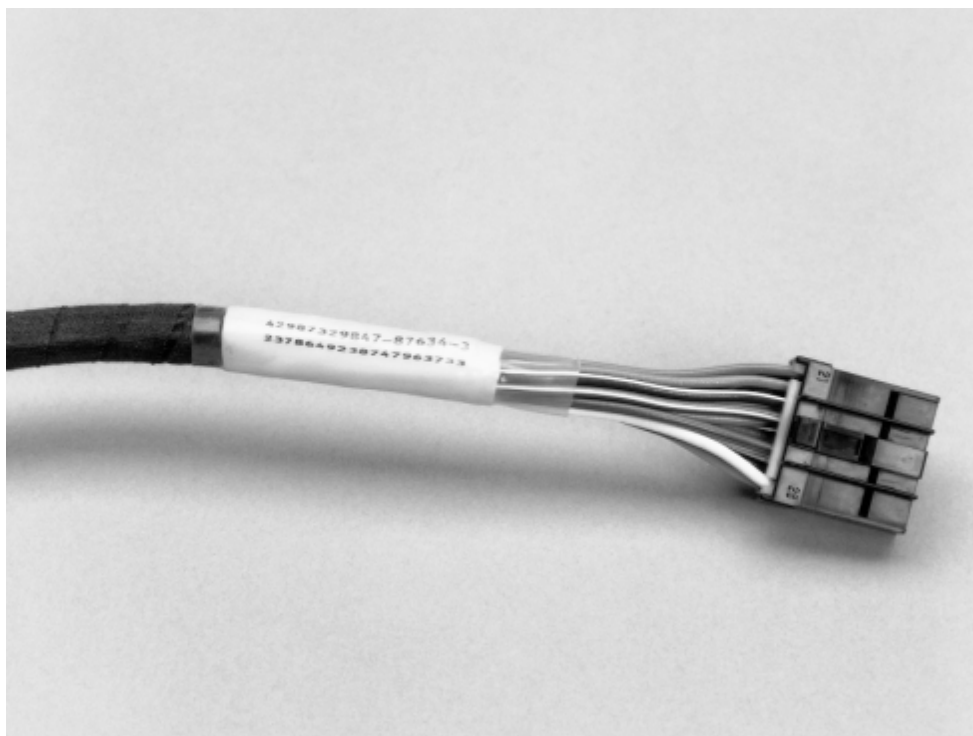
**Clear, Flame-Resistant,
Flexible, Fluoropolymer
Tubing**

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]

Single Wall Tubing

RT-375



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			Military	Raychem
RT-375	E85381 VW-1 600 V, 150°C [302°F]	LR31929 VW-1 600 V, 150°C [302°F]	AMS-DTL-23053/18*, Class 2	RT-375

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

Product Dimensions

RT-375 (Continued)

Size	Inside Diameter		Recovered Wall Thickness** After Heating
	Minimum Expanded as Supplied	Maximum Recovered 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

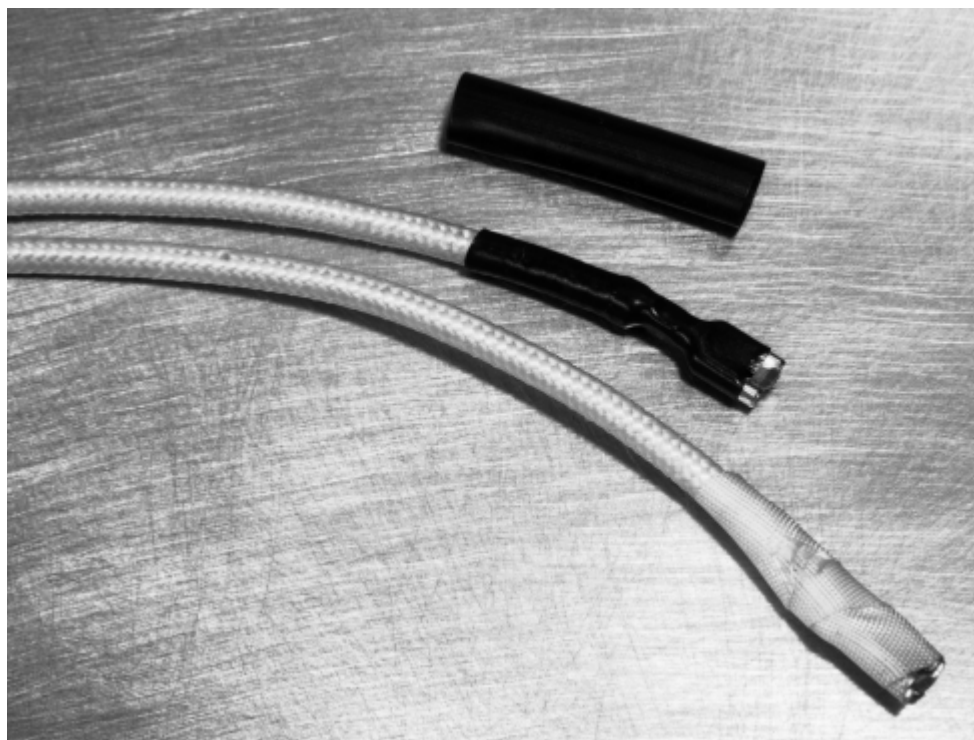
Color	Standard	Clear (-X)
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Special order sizes are available upon request.	
Standard packaging	On spools.	
Ordering description***	Specify product name, size and color (for example, RT-375 1/4-X).	

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

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 Viton tubing
- Meets requirements of RT-700
- System 300 tubing



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 382°F]

Specifications/Approvals

Series		Military	Raychem
RT555	Listed for 185°C [365°F] for 100,000-hr continuous use (File E85381) Listed for 200°C [392°F] for 40,000-hr cumulative intermittent exposure	AR70-75	RT-555

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).	

RW-175

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]



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 multi-pin connectors and solder joints. Ideal 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			Military	Industry	Raychem
RW-175	E35586 VW-1 600 V, 150°C [302°F]	LR31929 VW-1 600 V, 150°C [302°F]	AMS-DTL-23053/8* Def. Stan. 59-97 Type 3 VG 95343 Pt 5 Type F BS 3G 198 Pt4	RW-3029/2 VDE 0341 Pt 9005	RW-3029/1

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

Product Dimensions

RW-175 (Continued)

Size	Inside Diameter		Recovered Wall Thickness** After Heating
	Minimum Expanded as Supplied	Maximum Recovered 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, Def Stan and BS add -MS, -DS or -BS to ordering description.

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"

SFR



Applications

Provides cable jacketing, harness protection, and strain relief for electronic components, semiconductor leads, and wire splices. Ideal 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.

Product Dimensions

Single Wall Tubing

SFR (Continued)

Size	Inside Diameter		Recovered Wall Thickness** After Heating
	Minimum Expanded as Supplied	Maximum Recovered 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, Def Stan and BS add -MS, -DS or -BS to ordering description.

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

SRFR



Applications

Highly flexible and resistant to high and low temperatures. Unlike other silicone materials, SRFR tubing displays outstanding physical strength. The tubing resists extreme heat shocks, and exhibits good thermal insulation.

SRFR tubing is non-burning and has outstanding ablative properties as well as an excellent balance of physical and electrical properties. SRFR tubing is used in medical equipment where its key properties are outstanding flexibility and its 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		Raychem
SRFR	E85381 VW-1	RW 2057

Product Dimensions

Single Wall Tubing

SRFR (Continued)

Size	Inside Diameter		Recovered Wall Thickness** After Heating (Nominal)
	Minimum Expanded as Supplied	Maximum Recovered 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	The largest size which will recover snugly over the component to be covered should be ordered.	
Standard packaging	On spools.	
Ordering description	Specify product name, size and color (for example, SRFR -2.9/1.7-8).	

**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

Single Wall Tubing

Versafit



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			Military	Raychem
Versafit	E35586 VW-1 600 V, 125°C [257°F]	LR31929 VW-1 600 V, 125°C [257°F]	AMS-DTL-23053/5*, Classes 1 & 3	RW-3009

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

Product Dimensions

Single Wall Tubing

Versafit (Continued)

Size	Inside Diameter		Recovered Wall Thickness** After Heating
	Minimum Expanded as Supplied	Maximum Recovered 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 ± 0.007]	0.8 [0.031]	0.43 ± 0.08 [0.017 ± 0.003]
3/32	2.79 ± 0.2 [0.110 ± 0.007]	1.2 [0.046]	0.51 ± 0.08 [0.020 ± 0.003]
1/8	3.43 ± 0.2 [0.135 ± 0.007]	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	25.53 ± 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.

Ordering Information

Color	Standard	Black (-0), white (-9), red (-2), blue (-6), yellow (-4), green (-5)
	Nonstandard	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.	
Ordering description****	Specify product name, size and color (for example, Versafit 1/4-0).	

***Available in the convenient RaySpool packaging/dispensing system, for sizes 1/16" up to 1".

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

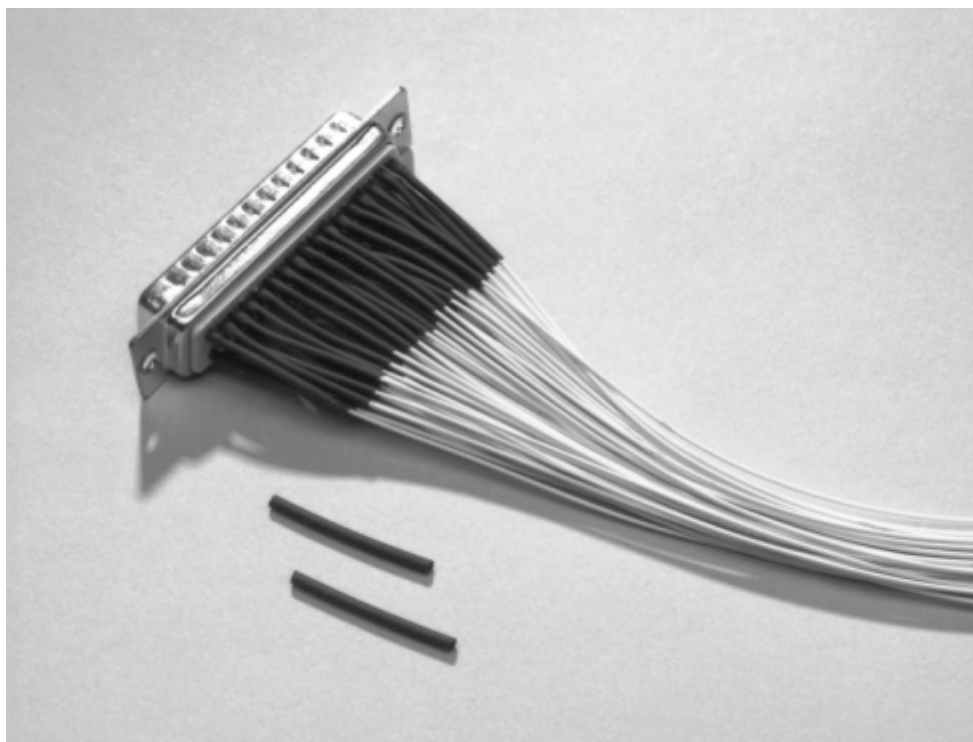
Very-Thin-Wall, Very Flexible, Highly Flame-Retardant, Polyolefin Tubing

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

Single Wall Tubing

Versafit V4



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			Raychem
Versafit V4	E35586 VW-1 300 V, 125°C [257°F]	LR31929 VW-1 150 V, 125°C [257°F]	RW-3023

Product Dimensions

Versafit V4 (Continued)

Metric Size	Inside Diameter		Wall Thickness	
	Expanded as Supplied	Maximum Recovered After Heating	Expanded as Supplied (Nominal)	Recovered* After Heating (Minimum)
1.0/0.5	1.4 ± 0.25 [0.055 ± 0.010]	0.50 [0.020]	0.10 [0.004]	0.25 [0.010]
1.5/0.75	1.9 ± 0.25 [0.075 ± 0.010]	0.75 [0.030]	0.10 [0.004]	0.25 [0.010]
2.0/1.0	2.3 ± 0.25 [0.091 ± 0.010]	1.00 [0.039]	0.10 [0.004]	0.25 [0.010]
2.5/1.25	2.8 ± 0.25 [0.110 ± 0.010]	1.25 [0.049]	0.15 [0.006]	0.25 [0.010]
3.0/1.5	3.3 ± 0.25 [0.130 ± 0.010]	1.50 [0.059]	0.15 [0.006]	0.25 [0.010]
3.5/1.75	3.8 ± 0.25 [0.150 ± 0.010]	1.75 [0.069]	0.15 [0.006]	0.25 [0.010]
4.0/2.0	4.4 ± 0.25 [0.173 ± 0.010]	2.00 [0.079]	0.15 [0.006]	0.25 [0.010]
5.0/2.5	5.5 ± 0.25 [0.217 ± 0.010]	2.50 [0.098]	0.15 [0.006]	0.25 [0.010]
6.0/3.0	6.5 ± 0.40 [0.256 ± 0.016]	3.00 [0.118]	0.15 [0.006]	0.28 [0.011]
7.0/3.5	7.5 ± 0.40 [0.295 ± 0.016]	3.50 [0.138]	0.15 [0.006]	0.28 [0.011]
8.0/4.0	8.5 ± 0.40 [0.335 ± 0.016]	4.00 [0.158]	0.15 [0.006]	0.28 [0.011]
9.0/4.5	9.5 ± 0.40 [0.374 ± 0.016]	4.50 [0.177]	0.15 [0.006]	0.28 [0.011]
10.0/5.0	10.5 ± 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* After Heating
	Minimum Expanded as Supplied	Maximum Recovered After Heating	
3/64	1.2 [0.046]	0.6 [0.023]	0.30 ± 0.05 [0.012 ± 0.002]
1/16	1.6 [0.063]	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, Versafit V4-1.0-0).	

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

Single Wall Tubing

Viton/Viton-HW/Viton-E/Viton-TW



Applications

Raychem Viton premium heat-shrinkable tubing is fabricated from a crosslinked fluoroelastomer material designed for a wide range of applications. It is available in three configurations. Viton-E is the thickest wall version, Viton-HW has a thinner wall and Viton-TW has the thinnest wall for lighter weight applications. Offering fluid resistance, Viton tubing can be used in applications up to 200°C.

Installation

Minimum shrink temperature: 100°C [212°F]
Minimum full recovery temperature: 175°C [347°F]

Operating Temperature Range

Viton, Viton-HW, and Viton-TW: -40°C* to 200°C [-40°F to 392°F]
Viton-E: -55°C to 200°C [-67°F to 392°F]

Specifications/Approvals

Series	Military	Raychem
Viton, Viton-TW	AMS-DTL 23053/13**	RT-1146 RK-6014/2
Viton-E	Def. Stan. 59-97 Issue 3 Type 4A VG 95343 Part 5 Type E VDE 0341/Pt9005 BS 4G-198 Part 3 12A	RK-6014
Viton-HW	MIL-PRF-46846 Type III, Class I	RT-1145

*Viton-TW is rated for -5°C when tested in accordance with RK-6014/2.

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

Product Dimensions

Single Wall Tubing

Viton/Viton-HW/Viton-E/Viton-TW (Continued)

Size	Inside Diameter		Recovered Wall Thickness***		
	Minimum Expanded as Supplied	Maximum Recovered After Heating	After Heating (Nominal)		
			Viton-E	Viton-HW	Viton/Viton-TW
3.2 [1/8]	3.2 [0.125]	1.6 [0.062]	0.76 [0.030]	—	0.76 [0.030]
4.8 [3/16]	4.8 [0.188]	2.4 [0.093]	0.84 [0.033]	—	0.89 [0.035]
6.4 [1/4]	6.4 [0.250]	3.2 [0.125]	0.89 [0.035]	0.76 [0.030]	0.89 [0.035]
9.5 [3/8]	9.5 [0.375]	4.8 [0.187]	1.02 [0.040]	0.89 [0.035]	0.89 [0.035]
12.7 [1/2]	12.7 [0.500]	6.4 [0.250]	1.22 [0.048]	1.09 [0.043]	0.89 [0.035]
15.9 [5/8]	15.9 [0.625]	7.9 [0.312]	—	1.19 [0.047]	1.07 [0.042]
19 [3/4]	19.1 [0.750]	9.5 [0.375]	1.45 [0.057]	1.32 [0.057]	1.07 [0.042]
22 [7/8]	22.2 [0.875]	11.1 [0.437]	—	1.53 [0.060]	1.25 [0.049]
25.4 [1]	25.4 [1.000]	12.7 [0.500]	1.78 [0.070]	1.65 [0.065]	1.25 [0.049]
31.8 [1 1/4]	31.8 [1.250]	15.9 [0.625]	—	1.78 [0.070]	1.40 [0.055]
38 [1 1/2]	38.1 [1.500]	19.1 [0.750]	2.41 [0.095]	1.91 [0.075]	1.40 [0.055]
51 [2]	50.8 [2.000]	25.4 [1.000]	2.79 [0.110]	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).	

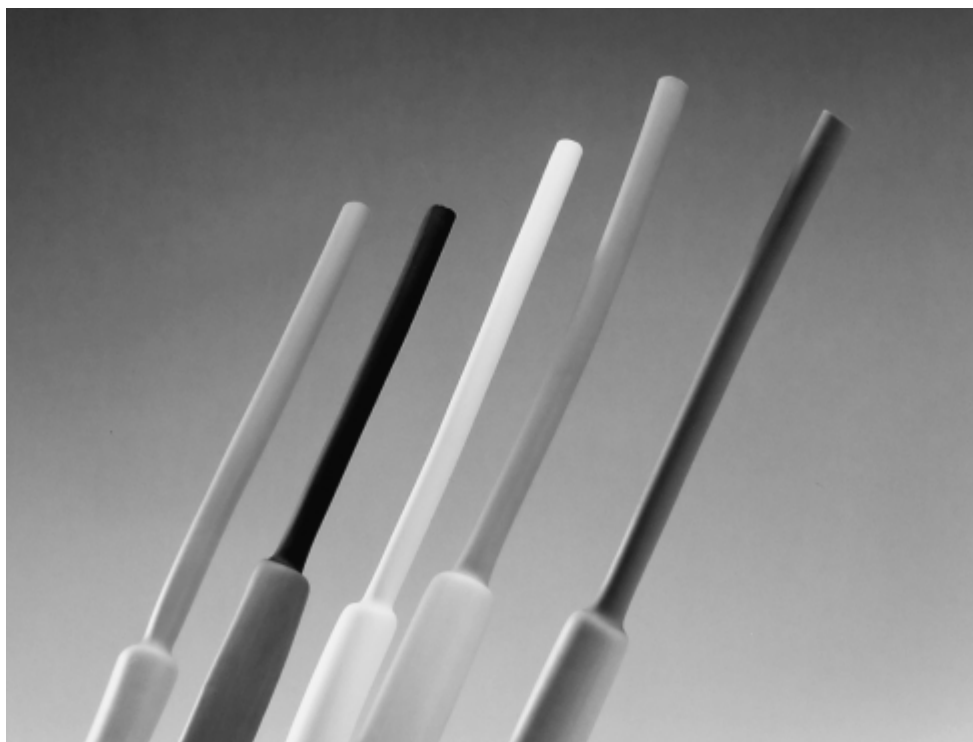
****Europe only. For supply to MIL, Def Stan and BS add -MS, -DS or -BS to ordering description.

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

ZH-100



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	Military	Agency	Raychem
ZH-100	Def. Stan. 59-97 Issue 3 Type 8	BR 1326A BS 3G-198 Part 3 Type 15	RW-2031

Product Dimensions

ZH-100 (Continued)

Size	Inside Diameter		Recovered Wall Thickness* After Heating
	Minimum Expanded as Supplied	Maximum Recovered 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)
	Nonstandard	White (-9), red (-2), blue (-6), 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 spools.	
Ordering description**	Specify product name, size and color (for example, ZH-100 1/8-0).	

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

Heat-Shrinkable, Flexible
Tubing with Low Toxicity for
Fire Safety Applications

Product Facts

- 2:1 shrink ratio
- Low smoke emission
- System 100 tubing

ZHTM



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

Product Dimensions

Single Wall Tubing

ZHTM (Continued)

Size	Inside Diameter		Recovered Wall Thickness* After Heating
	Minimum Expanded as Supplied	Maximum Recovered 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.

**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
- ATUM adhesive bonds to a wide variety of plastics, rubbers, and metals, including polyethylene, aluminum, steel, and copper

Adhesive Lined Tubing

ATUM



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	 **	Military	Raychem
ATUM	600V, 110°C [230°F]	AMS-DTL-23053/4,* Class 3	RW-2063 - Black RK-6024 - Colors and clear

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

**Black only, except sizes 3/1 and 4/1.

Product Dimensions

Adhesive Lined Tubing

ATUM (Continued)

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 ± 0.020]	0.76 [0.030]
24/8	24.0 [0.940]	8.0 [0.315]	2.54 ± 0.55 [0.100 ± 0.020]	1.02 [0.040]
40/13	40.0 [1.570]	13.0 [0.512]	2.54 ± 0.55 [0.100 ± 0.020]	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 ± 0.020]	0.76 [0.030]
32/8	32.0 [1.260]	8.0 [0.315]	2.54 ± 0.55 [0.100 ± 0.020]	1.02 [0.040]
52/13	52.0 [2.050]	13.0 [0.512]	2.54 ± 0.55 [0.100 ± 0.020]	1.02 [0.040]

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

Ordering Information

Color	Standard	Black (-0)
	Nonstandard	Special order colors may be made 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.	
Ordering description***	Specify product name, size and color (for example, ATUM 8/2-0).	

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

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

Adhesive Lined Tubing

DWP-125



Applications

Environmentally seals and protects a wide variety of electrical applications, including wire splices, breakouts, and connector-to-cable transitions. Ideal 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			Raychem
DWP-125	E35586 600 V, 125°C [257°F]	LR31929 600 V, 125°C [257°F]	DWP-125 SCD

Product Dimensions

DWP-125 (Continued)

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]	0.25 [0.010]
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]	3.0 [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]	6.0 [0.230]	2.03 [0.080]	0.76 [0.030]
1	25.4 [1.000]	8.0 [0.320]	2.50 [0.100]	0.76 [0.030]

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

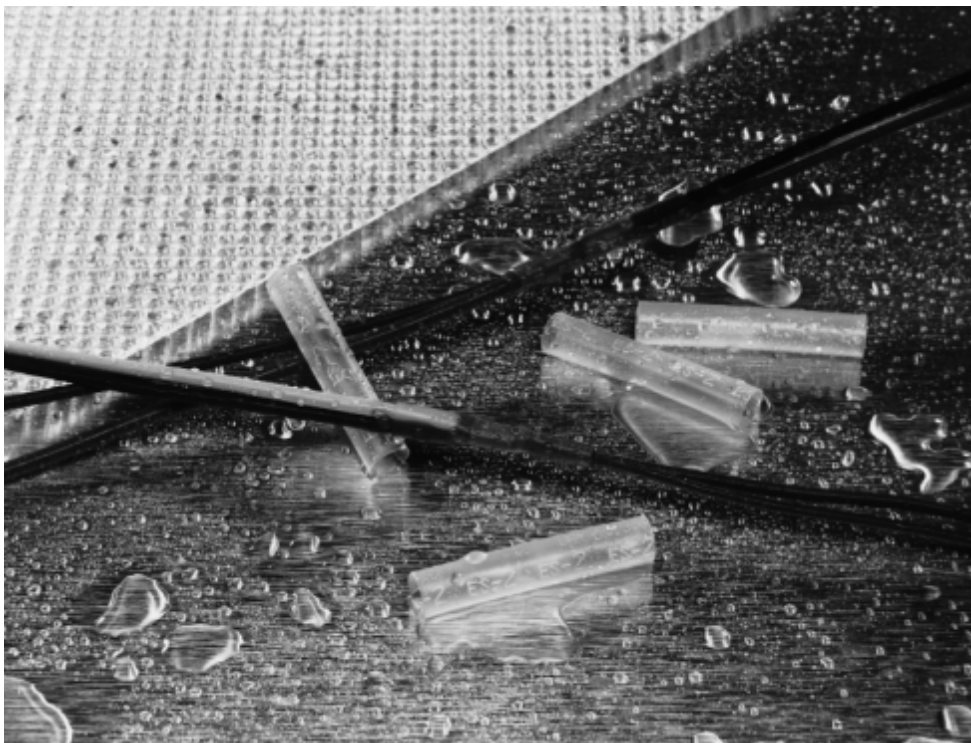
Ordering Information

Color	Standard	Black (-0)
	Nonstandard	White (-9), red (-2), blue (-6), yellow (-4), green (-5). 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).	

**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



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		Raychem
ES1000	E85381 600 V, 125°C [257°F]	RT-1113

Product Dimensions

ES1000 (Continued)

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.

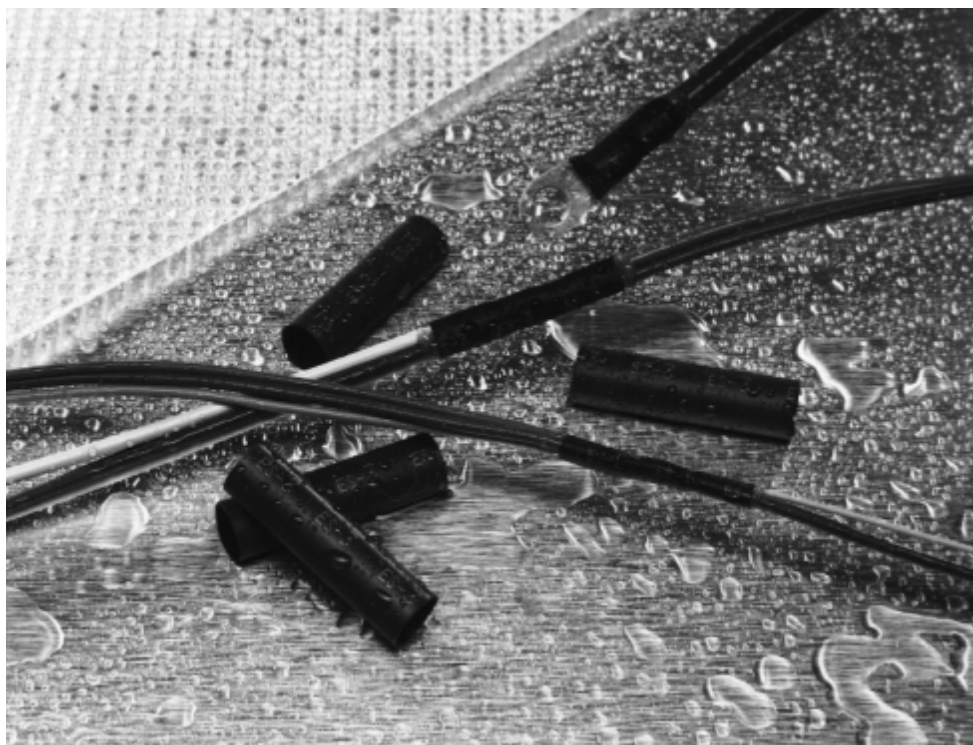
Ordering Information

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-X-50mm).	

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



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		Raychem
ES2000	E85381 600 V, 125°C [257°F]	RT-1112

Product Dimensions

Adhesive Lined Tubing

ES2000 (Continued)

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. 2-0-50mm).	

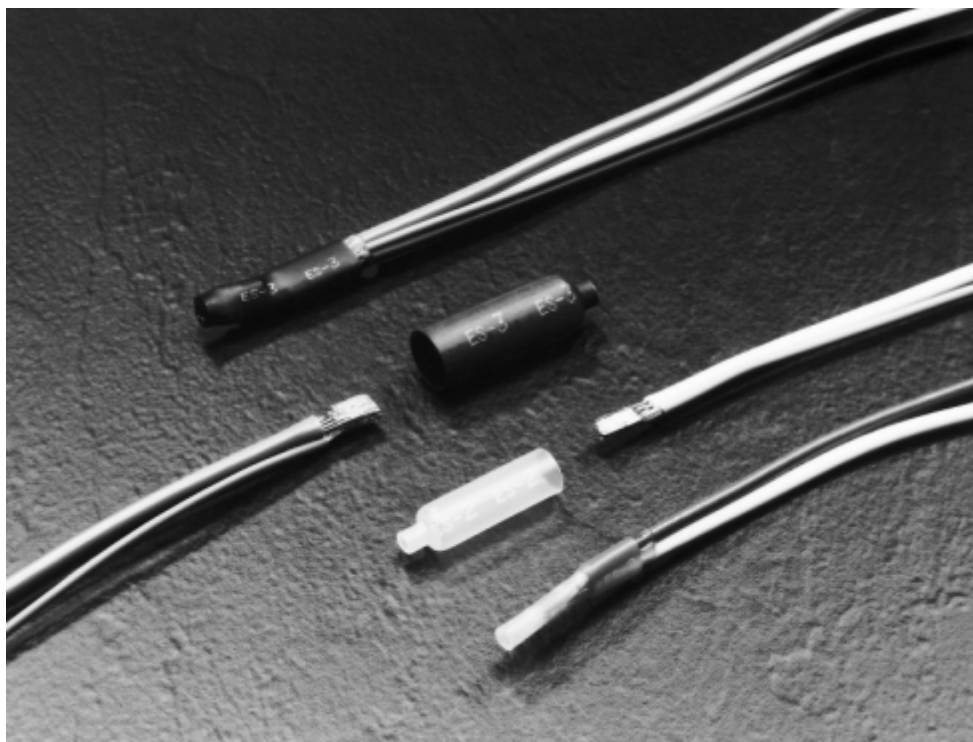
**High-Shrink-Ratio,
Adhesive-Lined, Semirigid
Polyolefin Caps**

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

Adhesive Lined Tubing

ES Caps



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		Raychem
ES Caps	E85381 600 V, 125°C [257°F]	RW-3006

Product Dimensions

Adhesive Lined Tubing

ES Caps (Continued)

Part Number	Inside Diameter (Including Core)			Recovered Wall Thickness**		
	Standard Length* as Supplied (Millimetres)	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 the numbered sizes (such as ES-1, ES-2, or ES-3).	
Ordering description	Specify product name, size, color, and length (for example, ES CAP-No. 2-X-35mm).	

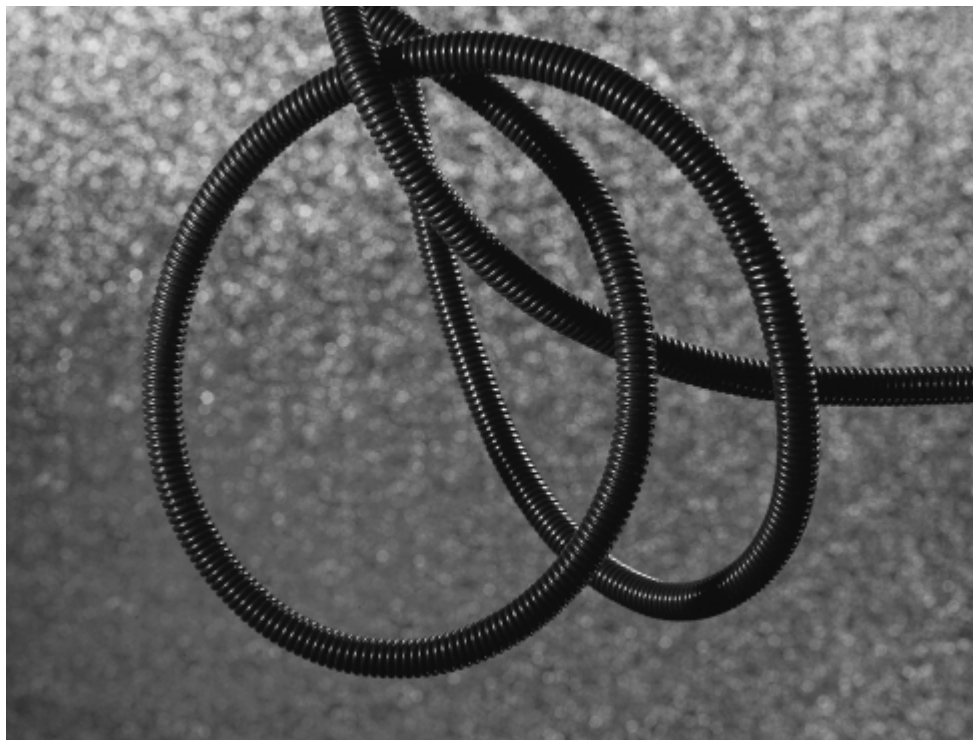
**Helical Convolex Tubing
with a High Crush
Resistance**

Product Facts

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

Adhesive Lined Tubing

HCTE



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

Product Dimensions

Adhesive Lined Tubing

HCTE (Continued)

Size	Minimum ID	Maximum OD	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).	

Semi-rigid, 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)

Adhesive Lined Tubing

PD Caps



Applications

PD Caps offer an improved, inexpensive way to encapsulate crimped electrical connections, including those on motor coils. Encapsulant 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 equipment.

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		Raychem
PD Caps	E85381 600 V, 125°C [257°F]	PD Caps SCD

Product Dimensions

Adhesive Lined Tubing

PD Caps (Continued)

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	22.0 [0.87]	12.7 [0.50]	3.2 [0.125]	0.58 [0.023]	1.22 ± 0.15 [0.048 ± 0.006]
3/16	25.4 [1.00]	15.2 [0.60]	4.8 [0.187]	1.52 [0.060]	1.57 ± 0.20 [0.062 ± 0.008]
1/4	28.4 [1.12]	15.2 [0.60]	6.4 [0.250]	2.03 [0.080]	1.98 ± 0.20 [0.078 ± 0.008]
3/8	31.8 [1.25]	18.3 [0.72]	9.5 [0.375]	2.29 [0.090]	2.08 ± 0.25 [0.082 ± 0.010]
1/2	38.1 [1.50]	21.6 [0.85]	12.7 [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.

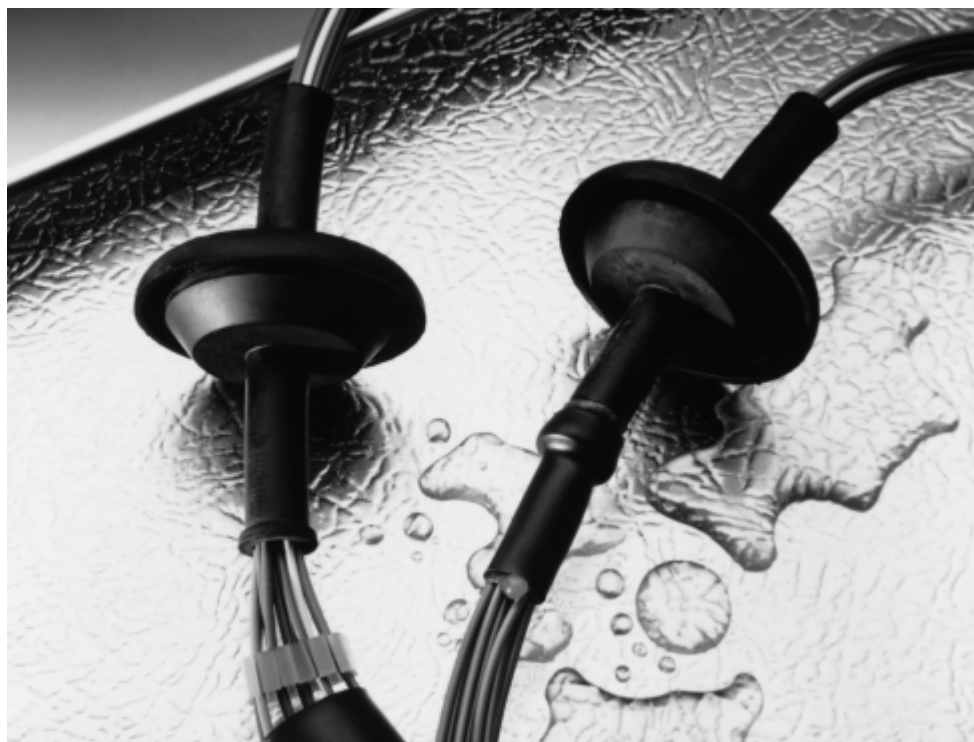
Ordering Information

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).	

**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



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

Product Dimensions

Adhesive Lined Tubing

RayBlock 85 (Continued)

Part No.	No. of Channels	Profile			Tubing Inside Diameter		
		Height	Length	Width	Minimum Expanded as Supplied	Maximum Recovered After Heating	Nominal Length
RayBlock 85 Kit 0102-A0	2	6.5 [0.256]	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	6.5 [0.256]	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	6.5 [0.256]	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	6.5 [0.256]	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	6.5 [0.256]	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	6.5 [0.256]	2.75 [0.108]	38.50 [1.520]	32.0 [1.260]	8.0 [0.315]	55 [2.17]

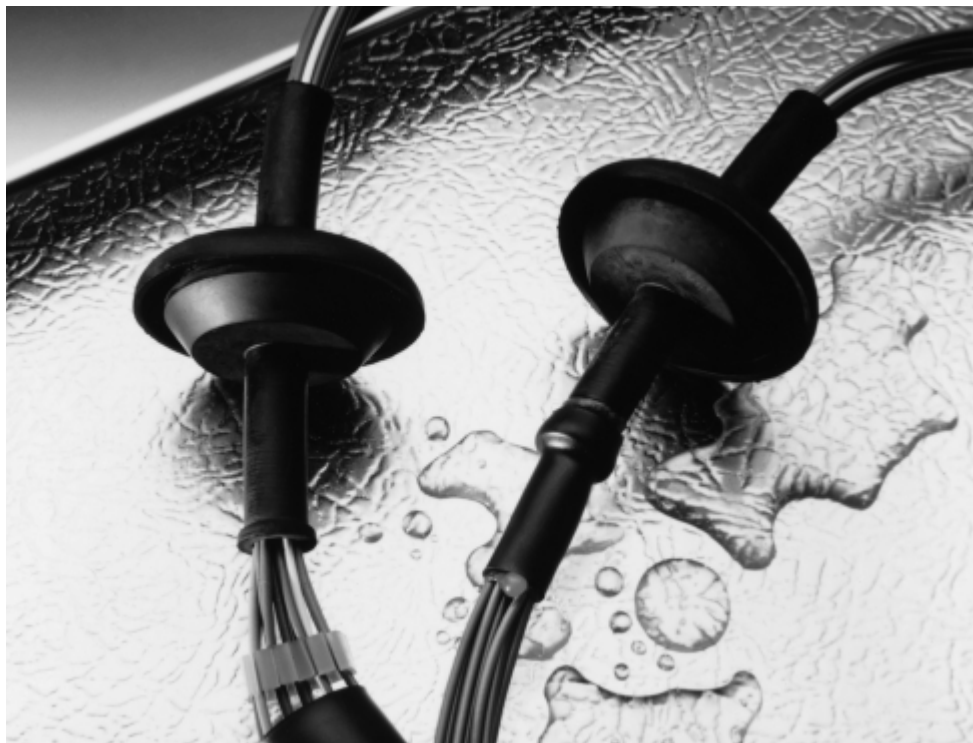
Ordering Information

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).	

**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



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

Product Dimensions

RayBlock 105 (Continued)

Part No.	No. of Channels	Profile			Tubing Inside Diameter		
		Height	Length	Width	Minimum Expanded as Supplied	Maximum Recovered After Heating	Nominal Length
RayBlock 105 Kit 0102-A0	2	6.5 [0.256]	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	6.5 [0.256]	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	6.5 [0.256]	2.75 [0.108]	16.0 [0.630]	16.0 [0.630]	4.0 [0.158]	45 [1.77]
RayBlock 105 Kit 0105-A0	5	6.5 [0.256]	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	6.5 [0.256]	2.75 [0.108]	27.2 [1.07]	24.0 [0.945]	6.0 [0.236]	65 [2.56]
RayBlock 105 Kit 0110-A0	10	6.5 [0.256]	2.75 [0.108]	38.50 [1.52]	32.0 [1.26]	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).	

**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

Adhesive Lined Tubing

SCL



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		Military	Raychem
SCL	E85381 600 V, 125°C [257°F]	AMS-DTL-23053/4*, Class 1	RT-1301

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

Product Dimensions

SCL (Continued)

Size	Additional Standard Color	Inside Diameter		Recovered Wall Thickness**	
		Minimum Expanded as Supplied	Maximum Recovered After Heating	Total Wall After Heating	Melttable 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 [0.050 ± 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

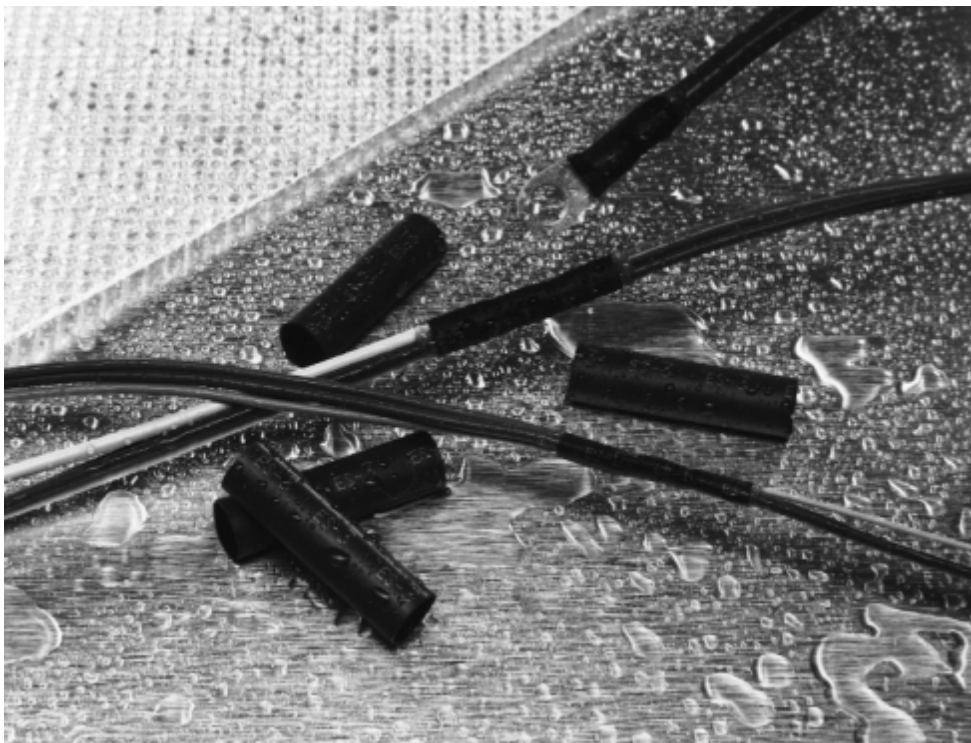
Color	Standard	Black (-0) for all sizes, plus one additional color per size per Product dimensions table.
Size selection	Always order the largest size that will shrink snugly over the component to be covered. Special order sizes are available upon request.	
Standard packaging	In 1.2-meter [4-foot] lengths.	
Ordering description***	Specify product name, size and color (for example, SCL 1/4-0).	

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

**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



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

Product Dimensions

Adhesive Lined Tubing

SCT (Continued)

Size	Inside Diameter		Recovered Wall Thickness*	
	Minimum Expanded as Supplied	Maximum Recovered After Heating	Total Wall After Heating	Melttable 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.

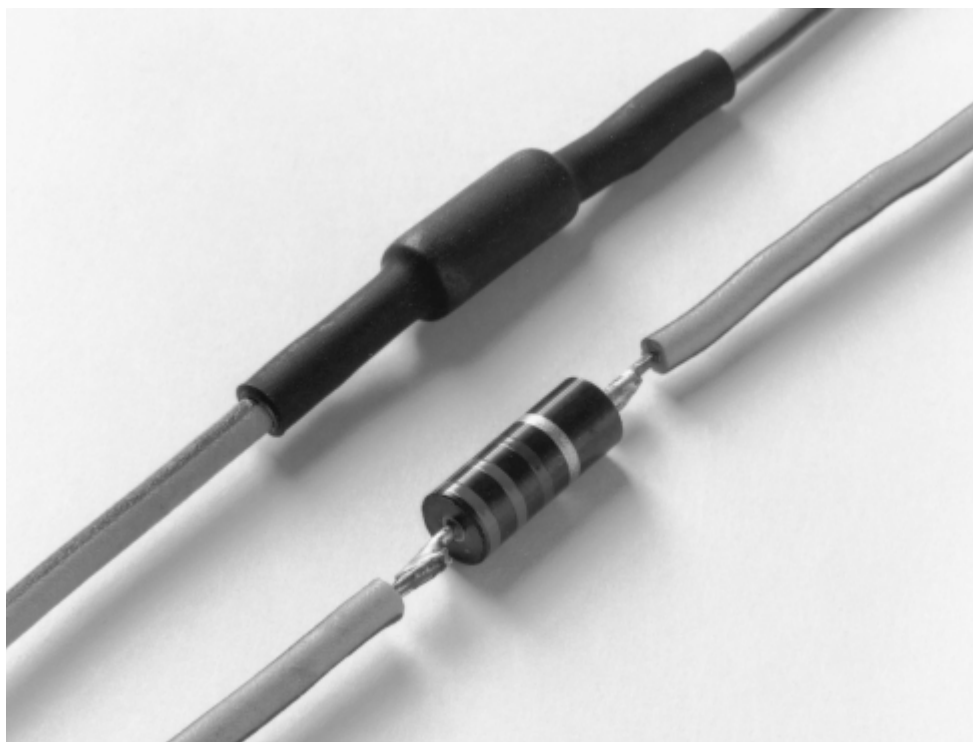
Ordering Information

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.3-0-75mm).

**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



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		Military	Raychem
TAT-125 Type 1 (colors)	E85381 600 V, 125°C [257°F]	AMS-DTL-23053/4*, Class 2	TAT-125 SCD
TAT-125 Type 2 (clear)	—	—	TAT-125 SCD

*Formerly MIL-I-23053/4 and MIL-DTL-23053/4. Sizes 6.35 [.25] through 38.1 [1.5] only.

Product Dimensions

TAT-125 (Continued)

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).	

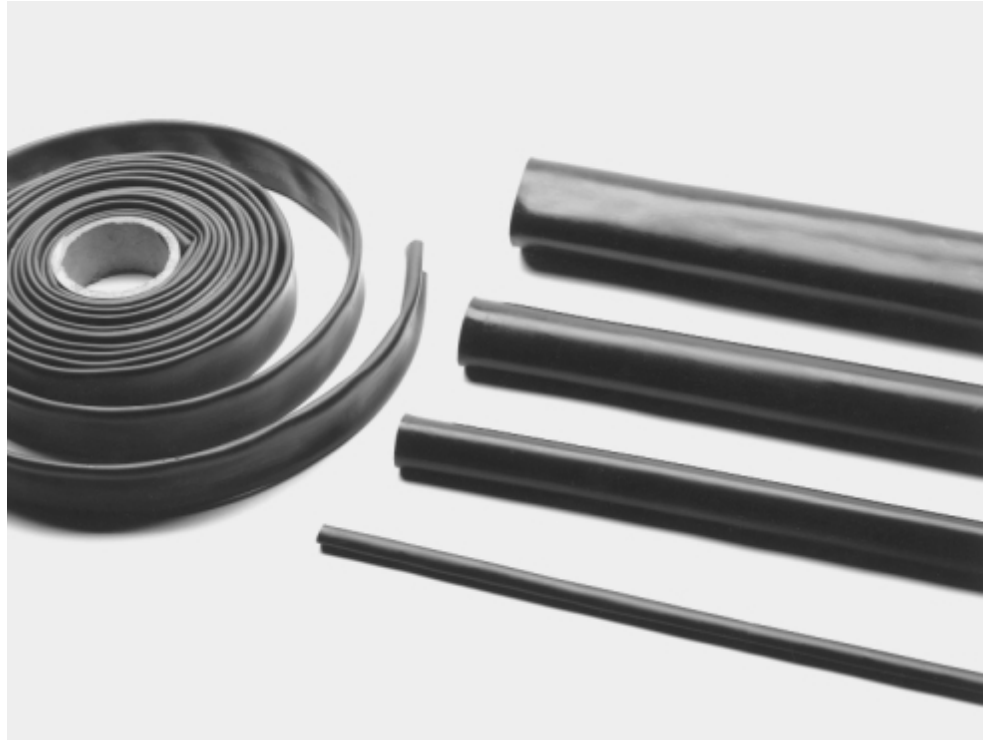
**General Purpose,
Heat-Shrinkable Tubing**

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)
 - DNV (Det Norske Veritas)
 - Lloyd's (Lloyd's Register of Shipping)

Heavy-Walled Tubing

BSTS/BSTS-FR



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 SFTS tape sealant, it can provide a watertight system in non-pressurized applications.

Installation

Minimum shrink temperature: 90°C [194°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	Industry	Raychem
BSTS	—	—	—
BSTS-FR	AMS-DTL-23053/15*, Class 1 and Class 2**	ASTM D 685, nonburning ASTM D 2863, oxygen index IPCEA S-19-81, cable insulation and jackets	RW-2017

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

**Except for coatings requirement. Refer to SST-FR when coating is required.

Product Dimensions

BSTS/BSTS-FR (Continued)

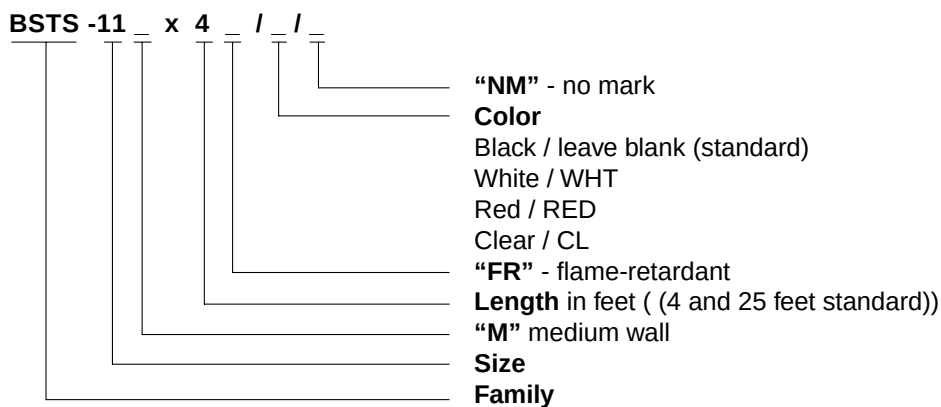
Size	Inside Diameter		Wall Thickness (Nominal)	
	Minimum Expanded as Supplied	Maximum recovered After Heating	Expanded as Supplied	Recovered After Heating****
BSTS-03	7.62 [0.300]	2.54 [0.100]	0.63 [0.025]	1.52 [0.060]
BSTS-04	10.16 [0.400]	3.81 [0.150]	0.63 [0.025]	1.52 [0.060]
BSTS-07M***	19.05 [0.750]	5.59 [0.220]	0.51 [0.020]	1.52 [0.060]
BSTS-07	19.05 [0.750]	5.59 [0.220]	0.76 [0.030]	2.41 [0.010]
BSTS-11M	27.94 [1.100]	9.52 [0.375]	0.76 [0.030]	2.67 [0.110]
BSTS-11	27.94 [1.100]	9.52 [0.375]	1.02 [0.040]	3.05 [0.120]
BSTS-13M	33.02 [1.300]	9.52 [0.375]	0.63 [0.025]	2.67 [0.110]
BSTS-13	33.02 [1.300]	9.52 [0.375]	0.89 [0.035]	3.05 [0.120]
BSTS-15M	38.10 [1.500]	12.70 [0.500]	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-17M	43.18 [1.700]	12.70 [0.500]	1.02 [0.040]	3.05 [0.120]
BSTS-17	43.18 [1.700]	12.70 [0.500]	1.14 [0.045]	3.56 [0.140]
BSTS-20M	50.80 [2.000]	19.05 [0.750]	1.27 [0.050]	3.05 [0.120]
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]

M = Medium wall tubing. *Wall thickness will be less if tubing recovery is restricted during shrinkage.

Ordering Information

Color	Standard	Black (-0)
	Nonstandard	Red (-2), white (-9), 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	1.2-meter [4-foot] or 7.5-meter [25-foot] lengths.	

Part Numbering System



**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)
 - DNV (Det Norske Veritas)
 - Lloyd's (Lloyd's Register of Shipping)

Heavy-Walled Tubing

HF



Applications

Developed for cable jacketing applications where cable flexibility is important, high-flex (HF) tubing is ideal for jacketing cables where sharp bends or turns are required. Also ideal 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	Raychem
HF	AMS-DTL-23053/15* Class 1**	RW-2023

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

**Except for coatings requirement.

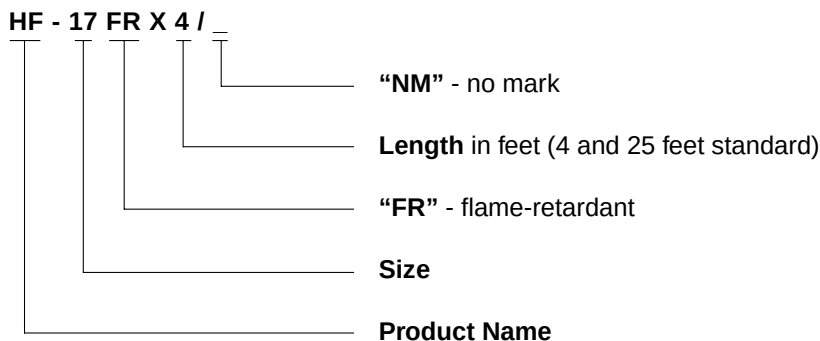
Product Dimensions

HF (Continued)

Size	Inside Diameter		Recovered Wall Thickness**	
	Standard Nominal Length (m/ft)	Minimum Expanded as Supplied	Maximum Recovered After Heating	Nominal After Heating
HF04	1.2, 7.5 [4, 25]	10.16 [0.40]	3.81 [0.150]	1.52 [0.060]
HF07	1.2, 7.5 [4, 25]	19.05 [0.75]	5.59 [0.220]	1.52 [0.060]
HF11	1.2, 7.5 [4, 25]	27.94 [1.10]	9.52 [0.375]	2.67 [0.105]
HF13	1.2, 7.5 [4, 25]	33.02 [1.30]	9.52 [0.375]	2.67 [0.105]
HF15	1.2, 7.5 [4, 25]	38.10 [1.50]	12.70 [0.500]	3.05 [0.120]
HF17	1.2, 7.5 [4, 25]	43.14 [1.70]	12.70 [0.500]	3.05 [0.120]
HF20	1.2, 7.5 [4, 25]	50.80 [2.00]	19.05 [0.750]	3.56 [0.140]
HF27	1.2, 7.5 [4, 25]	68.58 [2.70]	22.86 [0.900]	3.94 [0.155]

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

Ordering Information and Part Numbering System



Contact Tyco Electronics for other than standard lengths.
Standard color is black.

**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 the flame-retardant-material requirements of AMS-DTL-23053/15*
- HRHF and HRSR have the following agency approvals:
 - ABS (American Bureau of Shipping)
 - DNV (Det Norske Veritas)
 - Lloyd's (Lloyd's Register of Shipping)

HRHF/HRNF/HRSR



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 semi-rigid flame-retardant (SR), standard (NF), or high-flex

flame-retardant (HF) material and with or without factory-applied sealants and adhesives. The waterproofing sealant provides environmental sealing and is watertight in wet and corrosive locations per USCG CGHQ-3774. 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 90°C
[-67°F to 194°F]

Specifications/Approvals

Series	Military	Agency	Raychem
HRSR	AMS-DTL-23053/15*	ABS, DNV, Lloyd's	RW-2013
HRHF	AMS-DTL-23053/15*	ABS, DNV, Lloyd's	RW-2013
HRNF	—	—	—

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

Product Dimensions

Size†	Inside Diameter		Recovered Wall Thickness††
	Minimum Expanded as Supplied	Maximum Recovered After Heating	
HR**060	15.24 [0.60]	3.81 [0.150]	1.52 [0.060]
HR**125	31.75 [1.25]	5.59 [0.220]	1.52 [0.060]
HR**175	44.45 [1.75]	8.00 [0.315]	2.41 [0.095]
HR**200	50.80 [2.00]	9.52 [0.375]	2.67 [0.105]
HR**250	63.50 [2.50]	12.70 [0.500]	3.05 [0.120]
HR**300	76.20 [3.00]	19.05 [0.750]	3.05 [0.120]
HR**400	101.60 [4.00]	22.86 [0.900]	3.56 [0.140]

†For ** substitute HF, NF or SR for material required. Add FR to end of number for flame-retardant material.

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

Ordering Information

Heavy-Walled Tubing

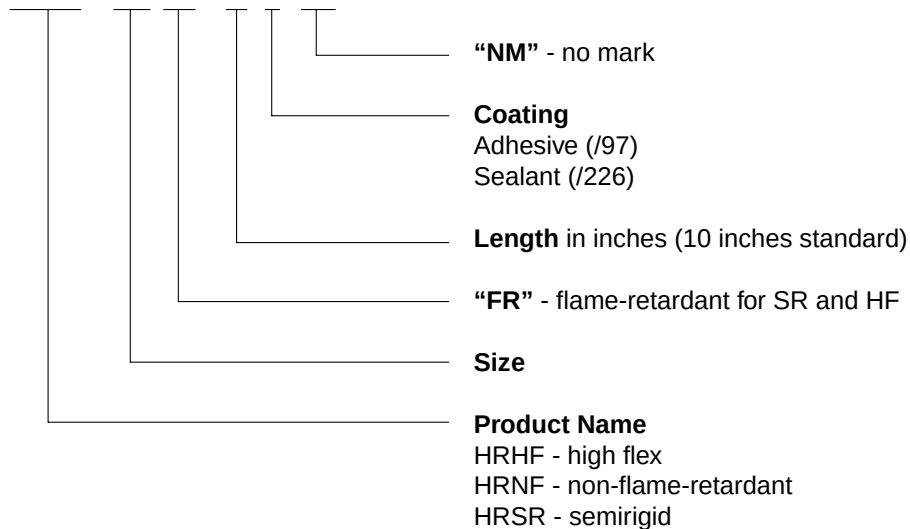
HRHF/HRNF/HRSR (Continued)

Color	Standard	Black (-0)
	Nonstandard	Clear (-X) available on request (not flame-retardant)
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	10-inch-maximum* lengths.	

*Cutting tolerance is $\pm 1/8$ inch.

**Part Numbering System –
Military Approved Part
Numbers**

HRHF - 125 FR - 10/97 NM



10

Heat-Shrink Tubing,
Molded Parts and Adhesives

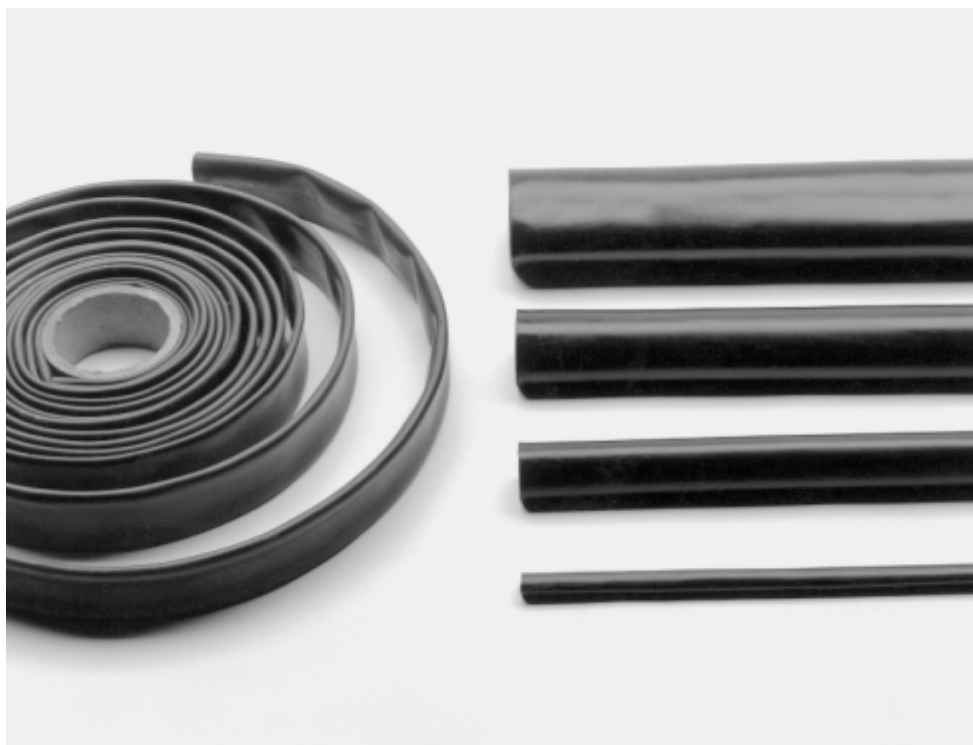
**Self-Sealing,
Heat-Shrinkable Tubing**

Product Facts

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

Heavy-Walled Tubing

SST/SST-FR



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-resisting, 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 90°C
[-67°F to 194°F]

Specifications/Approvals

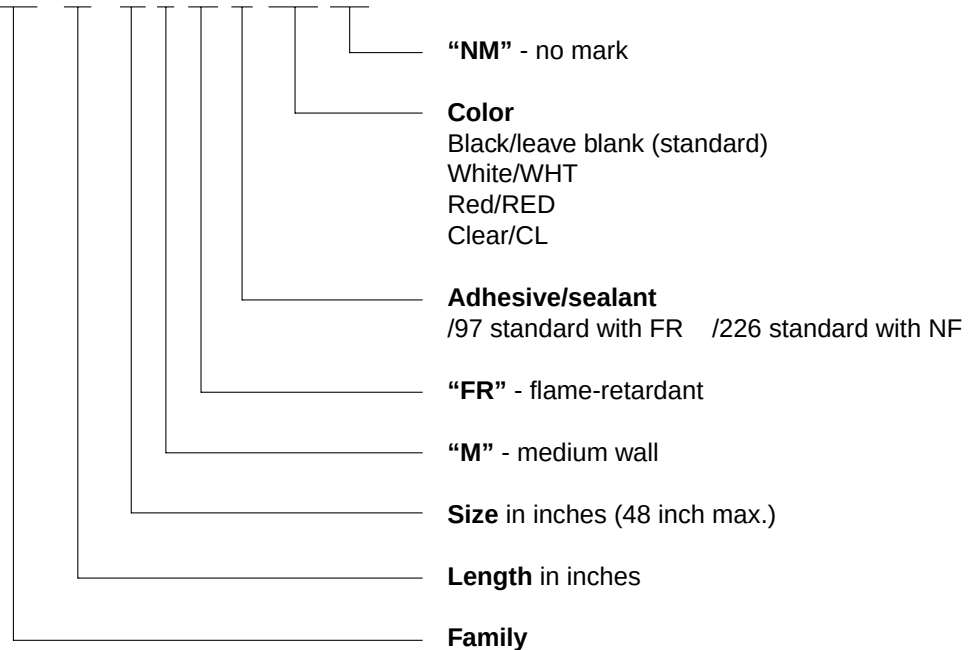
Series	Military	Industry	Raychem
SST	—	—	RW 2017
SST-FR	AMS-DTL-23053/15*, Class 1 and Class 2	ASTM D 685, nonburning ASTM D 2863, oxygen index	RW 2011
—	—	IPCEA S-19-81, cable insulation and jackets	—
—	—	IEEE-383 Section 2.5 massive flame vertical tray	—
—	—	ABS, DNV, Lloyd's Register	—

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

Part Numbering System

SST/SST-FR (Continued)

SST - 48 - 07 M/FR/97/RED/NM



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	6, 30	0.300	0.100	0.025	0.060	18 through 14 AWG
SST*-04	6, 30	0.400	0.150	0.025	0.060	14 through 10 AWG
SST*-07M	6, 9, 12, 48	0.750	0.220	0.020	0.060	8 through 1 AWG
SST*-07	6, 9, 12, 48	0.750	0.220	0.030	0.095	8 through 1 AWG
SST*-11M	6, 9, 12, 48	1.100	0.375	0.030	0.105	2 through 4/0 AWG
SST*-11	6, 9, 12, 48	1.100	0.375	0.040	0.120	2 through 4/0 AWG
SST*-13M	6, 9, 12, 48	1.300	0.375	0.025	0.105	2 through 4/0 AWG
SST*-13	6, 9, 12, 48	1.300	0.375	0.035	0.120	2 through 4/0 AWG
SST*-15M	6, 9, 12, 48	1.500	0.500	0.035	0.120	2/0 AWG through 500 MCM
SST*-15	6, 9, 12, 48	1.500	0.500	0.050	0.140	2/0 AWG through 500 MCM
SST*-17M	6, 9, 12, 48	1.700	0.500	0.030	0.120	2/0 AWG through 500 MCM
SST*-17	6, 9, 12, 48	1.700	0.500	0.045	0.140	2/0 AWG through 500 MCM
SST*-20M	6, 9, 12, 48	2.000	0.750	0.040	0.120	350 MCM through 1000 MCM
SST*-20	6, 9, 12, 48	2.000	0.750	0.050	0.155	350 MCM through 1000 MCM
SST*-27	12, 18, 24	2.700	0.900	0.050	0.155	500 MCM through 1250 MCM
SST*-30	12, 18, 24	3.000	1.250	0.050	0.155	900 MCM through 1500 MCM
SST*-40	12, 18, 24	4.000	1.750	0.050	0.155	1500 MCM through 2500 MCM
SST*-45	12, 18, 24	4.500	1.750	0.050	0.155	1500 MCM through 2500 MCM

†In place of asterisk* substitute length of tubing to be ordered. For example, SST*-11, as the third column indicates, comes in 6-, 9-, and 12-inch lengths, so 9-inch SST tubing would be SST 9-11. The suffix M = medium-wall tubing. ††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	See Product dimensions table.	
Ordering description	Specify product name, size and color (for example, SST-48-07/FR/RS).	

**Halogen-Free,
Flame-Retardant,
Heat-Shrinkable Tubing**

Product Facts

- Emits minimal amounts of toxic or acid gases 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)
 - DNV (Det Norske Veritas)
 - Lloyd's (Lloyd's Register of Shipping)

Heavy-Walled Tubing

XFFR



Applications

XFFR halogen-free tubing can be used for re-jacketing 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 SFTS-FR1 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 105°C
[-67°F to 221°F]

Specifications/Approvals

Series	Military	Industry	Raychem
XFFR	MIL-C-24643	NES 713 NES 711	RW-2016

Product Dimensions

XFFR (Continued)

Size	Inside Diameter		Recovered Wall Thickness* After Heating (Nominal)
	Minimum Expanded as Supplied	Maximum Recovered After Heating	
XFFR-03	7.62 [0.300]	2.54 [0.100]	1.52 [0.060]
XFFR-04	10.16 [0.400]	3.81 [0.150]	1.52 [0.060]
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]	3.94 [0.155]

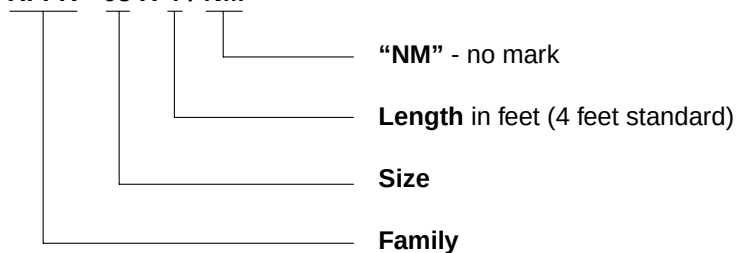
*Wall thickness will be less if tubing recovery is restricted during shrinkage.

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



No adhesive.

10

Heat-Shrink Tubing,
Molded Parts and Adhesives

Shapes**Introduction**

Raychem heat-shrinkable molded parts, with adhesive coating, form a watertight seal, protecting cables and equipment from corrosion and mechanical abuse while providing excellent electrical insulating properties. Meeting requirements for most mass-transit, military, and commercial marine applications, Raychem molded parts include:

- Raychem SSC end caps (see page 10126)
- Raychem heat-shrinkable boots (see page 10130) and transitions (see page 10154)

All of these molded parts fit a wide variety of applications. To select the right part for your application, follow these steps:

- Select the necessary shape
- Match the shape with the appropriate material
- Select a compatible adhesive, if needed, to provide additional environmental protection. Adhesives come either preinstalled or as a separate component.

Also available is an extensive line of adapters (see Section 14) and heat-shrinkable tubings (Section 10) to further integrate and strengthen harness assemblies.

Whatever your application, Raychem molded parts almost always meets the performance characteristics you require, including operation in low- and high-temperature environments; mechanical strength; resistance to fluids, flame, and mechanical abuse; environmental sealing; and strain relief.

**Bulbous Shapes**

Raychem bulbous-shaped molded parts provide rugged mechanical and environmental protection, meet numerous specifications, and have been used successfully in military wire and cable harnesses for more than 30 years.

Most connector strain relief boots come in two versions:

- With an adapter lip molded into the "H" end, which locks into the groove on the backshell adapter (part number is identified with a "D" or "K").
- Without the adapter lip (the boot may be installed directly on the rear of connector threads 12 mm [.472] long or longer). This part number is identified with an "A."

Many other optional features are available, such as molding ports and drain holes. For other modifications and custom shapes, please contact Tyco Electronics.

Modifications

Certain variations of the standard shapes, such as shorter leg lengths or specific over expansions, are possible. Modifications must be requested prior to your order, for feasibility.

Molding Port Modifications (-00)

Some specifications call for potting the molded shape with sealant to provide additional protection from moisture. Most of the bulbous boots and transitions can be ordered with molding ports for this purpose.

Drain Hole Modification (-88)

Some specifications require drain holes in the molded part to provide an exit for condensation. Drain holes must be requested when you place your order.

Specials

Complete design, tooling, and production of custom molded shapes and special adaptations are also possible. Estimates are made upon request.

Shapes (Continued)
Chem-X Heavy-Duty Cable
Breakouts

Heavy-duty breakouts provide mechanical strain relief and environmental sealing for power cables where the cable jacket is cut back and conductors broken out.

These boots are used widely in ship building and meet the requirements of the following:

- Lloyd's Register of Shipping
- Det Norske Veritas (DNV)
- American Bureau of Shipping (ABS)
- DOD-STD-2003
- MIL-I-81765/1A


Cable End Caps

Heat-shrinkable end caps provide a reliable method of sealing power cables, pipes, conduit, and other cylindrical objects against corrosion and moisture penetration.

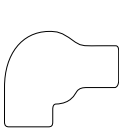
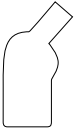
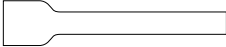
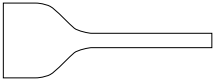
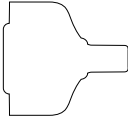

Slim-Line Shapes

With their low profile, these flexible shapes conform to cables better and create less bulk at transition points and connectors than bulbous shapes.

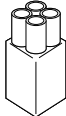
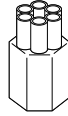
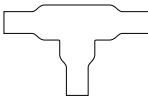
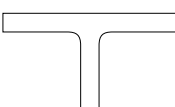
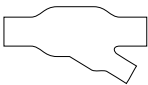
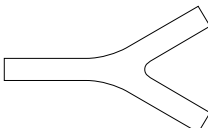
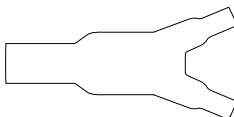
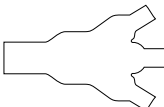
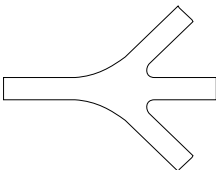
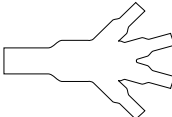
Raychem molded parts are available in a variety of slim-line shapes, including straight and right-angle boots as well as transitions. A small family of parts can provide a wide variety of expansions (under expansion, over expansion, cut-off). Modifications are easily provided.



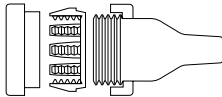
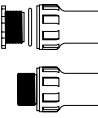
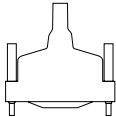
Shape Selection: Boots

Application	Family Description	Typical Shapes	
Lipped boots for use with a circular adapter	202D121 to 196 222D121 to 196 202K121 to 185 222K121 to 185 242W042 to 063		 
Nonlipped boots for use directly on a circular connector	202A111 to 196 222A111 to 196		
Low-profile lipped boots for use with a circular adapter	202D211 to 299 222D211 to 299 202F211 to 274 222F211 to 285 202G211 to 253		
Low-profile lipped boots for use with a circular adapter on an open harness	202D921 to 963 222D921 to 963		
Lipped boots with compressible design for use with a circular adapter	202C611 to 663 202G611 to 653		
Adapter boots for use with D-subminiature connectors	214A011 to 052 234A011 to 071 214A311 to 352 234A111 to 152 234A611 to 671		

**Shape Selection:
Transitions**

Application	Family Description	Typical Shapes			
Breakout Boots	SSB, T, F, 6S				
"T" Transitions	301A011 to 048 301A511 to 514 322A112 to 158				
45° Transitions	342A012 to 058				
30° Transitions	362A014 to 114				
"Y" Transitions	381A301 to 304 382A012 to 046				
3:1 Transitions	462A011 to 060 462A421 to 424				
4:1 Transitions	562A011 to 067				

**Shape Selection:
Other Products**

Application	Family Description	Typical Shapes	
Feedthroughs	207W213 to 256 CES		
D-Subminiatures	214P009 to 037		
End Caps	101A011 to 094		

10

Heat-Shrink Tubing,
Molded Parts and Adhesives

Part Numbering System

2 0 2D 1 21 - 3 01 / 42 - 0

Color (TD-0 = Black). Other colors factory quote

Optional Adhesive* Coating (precoated in factory)

Modification (available on request)

- Over expansion
- Cutoff
- Molding ports (injection and vent)

Material**

Size of Part in Family: From 11 (= smallest) to 99 (= largest)

Family Number

Type of Part:

- A = Nonlipped boots/transitions
- C = Lipped boot
- D = Lipped boot
- F = Lipped boot
- K = Lipped boot
- S = Rayaten
- G = Lipped boot
- W, P = Other shapes

Angle of Part:

All openings	One opening
Circular	Noncircular
0 = Straight	0 = Straight
2 = 90°	3 = 90°
4 = 45°	5 = 45°
6 = 30°	7 = 30°

Number of openings in the part

*See pages 10183-10188 for details on adhesives.

**See page 10101 for details on materials.

**Boots:
Circular Connectors —
Lipped**

**Lipped Boots for Use
With an Adapter**

As supplied				
After recovery				
	202D121 through 196	202D211 through 299	202D921 through 963	202K121 through 185
As supplied				
After recovery				
	222B012 through 063	222B112 and 123	222D121 through 196	222D211 through 299
As supplied				
After recovery				
	222D921 through 963 222K121	202K121 through 185	242 A312 and 322	

**Boots:
Circular Connectors —
Nonlipped**

**Nonlipped Boots for Direct
Attachment on Connectors**

As supplied					
After recovery					
	202A011 through 096	202A111 through 196	202A212 through 264	202A312 through 364	202A512
As supplied					
After recovery					
	202A915	202A921	202B422 and 433	203A021	
As supplied					
After recovery					
	203A211	203A312	204A011	204A311	
As supplied					
After recovery					
	204A411	204A511	204A612	208A011 through 098	222A011 through 096

Boots:
Circular Connectors —
Nonlipped (Continued)

Nonlipped Boots for Direct
Attachment on Connectors

As supplied					
After recovery					
	222A111 through 196	222A213 through 255	222A313 through 355	223A213 through 233	224A012

As supplied					
After recovery					
	226A045 & 075	228A011 through 097	242A142	243A012 & 022	246A166

As supplied	
After recovery	
	202B521 through 598

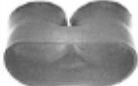
Boots: Circular
Connectors—Slim-Line

As supplied				
After recovery				
	202C611 through 633 202G621 through 653	202E334 through 346	202F211 through 274 202G211 through 253	222F211 through 285

Boots: Rectangular Connectors

As supplied					
After recovery					
	211A012	214A011 through 052	214A124 and 133	214A311 through 352	214A452
As supplied					
After recovery					
	214A511 thru 552	214A613	214A814	214A923	214B623
As supplied					
After recovery					
	234B713	234A011 through 071	234A111 through 152	234A313 through 333	234A413 through 434
As supplied					
After recovery					
	234A611 through 671	234A711 through 752	234A911 through 971	234B011 through 052	

Transitions: Bulbous

As supplied					
After recovery					
	301A011 through 048	302A012 through 037	302A214	322A012 through 037	322A112 through 158
As supplied					
After recovery					
	322A315	322A412 through 434	322A514	322B813	
As supplied					
After recovery					
	323A211	323A222	341A015	342A012 through 058	
As supplied					
After recovery					
	342A112 through 138	342A215	342A313 and 323	343A014 through 027	362A014 through 114

Transitions: Bulbous

(Continued)

As supplied					
After recovery					
	363A018 and 020	381A015	381A115	382A012 through 046	402A013
As supplied					
After recovery					
	403A123 through 155	413A013 and 024	422A011	422A114	422A414
As supplied					
After recovery					
	422A616	422A716	422A813	423A014	423A117
As supplied					
After recovery					
	453A017	453A215 and 225	462A011 through 060	462A214	

Transitions: Bulbous

(Continued)

As supplied



After recovery



502A516

502A812 through 845

522A013

561A017

As supplied



After recovery



562A011 through 067

602A012

602A022

602A114

602A212

As supplied



After recovery



622A014

703A155

704A011 and 012

902A014

Transitions: Slim-Line

As supplied



After recovery

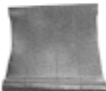


301A511 through 514

381A301 through 304

462A421 through 424

Covers

As supplied					
After recovery					
	102A911	102A951	102A961	102A962	102A981
As supplied					
After recovery					
	102A992	102A993	102A994	202A817	
As supplied					
After recovery					
	220A012 through 023	234A211	234B111 and 122	301A212 254A015	301A222, 301A312
As supplied					
After recovery					
	302A734	401A112 and 402A212			

Covers (Continued)

As supplied



After recovery



401A212 and 403A312

401A414

402A222

403A016

501A012 and 502A212

As supplied



After recovery



501A112

601A012

Sleeves

As supplied



After recovery



200A413 and 200A426

200D944 thru 988

As supplied



After recovery



201A711 through 792

202B211 through 302
(Not heat-shrinkable)

202B811 through 832

As supplied



After recovery



207W213 through 264
with A-type nut

207W213-x-01 through
264-x-01 with B-type nut

Caps

As supplied



After recovery



101A011 thru 094

102A811 through 865

Miscellaneous



204A711 and 002A011
Riser and Plug
(Not heat-shrinkable)

Selected Molded Parts Families

As supplied

After recovery

202A111 through 196 Nonlipped boot

As supplied

After recovery

202D121 through 196 Lipped boot

Selected Molded Parts Families (Continued)

As supplied



After recovery



202A212 through 264 Nonlipped boot



202D211 through 299 Lipped boot

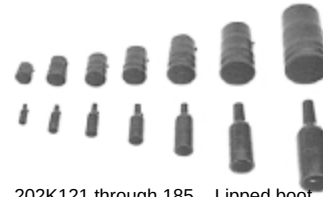
As supplied



After recovery



202D921 through 963 Lipped boot



202K121 through 185 Lipped boot

As supplied



After recovery



207W213 through 264 Feedthrough



214A011 through 052 Rectangular boot

As supplied



After recovery



222A111 through 196 90° boot nonlipped



222A213 through 255 90° boot nonlipped

Selected Molded Parts Families (Continued)

As supplied



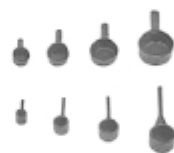
After recovery



222A313 through 355 90° boot nonlipped

222D121 through 196 90° boot lipped

As supplied



After recovery



222D211 through 299 90° boot lipped

222D921 through 963 90° boot lipped

As supplied



After recovery



222K121 through 185 90° boot lipped

301A011 through 048 T transition

Boot Adapter Selection Tables

Table 1. Boots

Boot Type	Material Dash Number	Part No.	Dimensions		Fits Adapter Order Number			
			Cable Diameter Range	Length	Solid	Spin Coupling	Entry Size Shielded	Tinel-Lock
Uni-boot	50, 51 71	202C611	4.83-9.65 [.19-.38]	120.65 [4.75]	—	—	04	04
		202C621	8.13-16.26 [.32-.64]	133.35 [5.25]	12	12—14	06-08	04-07
		202C632	12.70-25.40 [.50-1.00]	146.05 [5.75]	14-16	16-18	10-14	10-16
		202C642	17.53-35.05 [.69-1.38]	158.75 [6.25]	18-20	20	12-18	12-18
		202C653	22.35-44.20 [.88-1.74]	171.45 [6.75]	22-32	22-32	18-20	16-20
		202C663	22.86-55.63 [.90-2.19]	236.22 [9.30]	24, 28, 31	32, 36	—	—
	55	202G621	8.13-16.26 [.32-.64]	133.86 [5.27]	12-14	12-14	06-08	04-07
		202G632	12.70-25.40 [.50-1.00]	151.13 [5.95]	16	16-18	10-14	08-12
		202G642	17.53-35.05 [.69-1.38]	157.23 [6.19]	18-20	20	12-18	12-18
		202G653	22.35-44.20 [.88-1.74]	170.18 [6.70]	22-32	22-32	18-20	16-22
		—	—	—	16-24, 61	22-28, 61	—	—
Low-profile, Straight	50, 51 71	202F211	6.60-15.75 [.26-.62]	105.16 [4.14]	10	08-10	04-07	04-07
		202F221	7.62-19.30 [.30-.76]	123.95 [4.88]	12-14	12-14	07-10	05-08
		202F232	8.89-22.86 [.35-.90]	146.30 [5.76]	16	16-18	10-14	08-12
		202F242	10.16-27.18 [.40-1.07]	172.21 [6.78]	18-20	20	12-18	12-16
		202F253	10.92-29.97 [.43-1.18]	185.16 [7.29]	22	22	18-20	16-18
		202F263	12.70-36.83 [.50-1.45]	213.61 [8.41]	24-28	24-28	20	18-20
	55	202F274	14.99-42.93 [.59-1.69]	203.20 [8.00]	24	32	—	—
		202G221	7.62-19.30 [.30-.76]	121.16 [4.77]	12-14	12-14	07-10	05-08
		202G232	8.89-22.86 [.35-.90]	138.68 [5.46]	16	16-18	10-14	10-12
		202G242	10.16-27.18 [.40-1.07]	159.51 [6.28]	18-20	20	14-18	12-16
		202G253	10.92-29.97 [.43-1.18]	177.80 [7.00]	22-28	22-24	16-20	16-18
		—	—	—	16-20	20-24	—	—
Low-profile, 90°	50, 51 71	222F211	6.60-15.75 [.26-.62]	105.16 [4.14]	10	08-10	04-07	04-07
		222F221	7.62-20.83 [.30-.82]	123.95 [4.88]	12-14	12-14	07-10	05-10
		222F232	8.89-22.86 [.35-.90]	146.30 [5.76]	16	16-18	10-14	08-12
		222F242	10.16-27.18 [.40-1.07]	172.21 [6.78]	18-20	20	12-18	12-16
		222F253	10.92-29.97 [.43-1.18]	185.16 [7.29]	22	22	18, 20	16-18
		222F263	12.70-36.83 [.50-1.45]	213.61 [8.41]	24-28	24-28	20	18, 20
		222F274	14.99-42.43 [.59-1.69]	224.54 [8.84]	24	32	—	—
		222F285	17.53-61.21 [.69-2.41]	227.33 [8.95]	24-32	32-40	—	—

Boot Adapter Selection Tables (Continued)

Table 1. Boots (Continued)

Boot Type	Material Dash Number	Part No.	Dimensions		Fits Adapter Order Number			
			Cable Diameter Range	Length	Solid	Spin Coupling	Entry Size Shielded	Tinel-Lock
Low-profile, Straight	3,4,25	202D211	6.60-15.75 [.26-.62]	105.92 [4.17]	08	08-10	08	04-07
		202D221	7.62-19.30 [.30-.76]	121.16 [4.77]	08-10	08-10	06-07	06-07
		202D232	8.89-22.86 [.35-.90]	138.68 [5.46]	10-12	10-12	10-12	08-10
		202D242	10.16-27.18 [.40-1.07]	159.51 [6.28]	12-14	12-14	12-14	10-12
		202D253	10.92-29.97 [.43-1.18]	177.80 [7.00]	16-18	16-18	16-18	14-16
		202D263	12.70-36.83 [.50-1.45]	203.20 [8.00]	20-22	20-22	18-20	18-20
		202D274	14.99-42.93 [.59-1.69]	203.20 [8.00]	24	28	22-24	22-24
		202D285	18.29-55.88 [.72-2.20]	203.20 [8.00]	28	32-34	28	—
		202D296	20.07-59.69 [.79-2.35]	203.20 [8.00]	—	40	—	—
		202D299	23.37-72.39 [.92-2.85]	203.20 [8.00]	—	44	—	—
Low-profile, 90°	3,4,25	222D211	6.60-15.75 [.26-.62]	105.16 [4.14]	08	08-10	08	04-07
		222D221	7.62-19.30 [.30-.76]	123.95 [4.88]	08-10	08-10	06-07	06-08
		222D232	8.89-22.86 [.35-.90]	146.30 [5.76]	10-12	10-12	10-12	08-10
		222D242	10.16-27.18 [.40-1.07]	172.21 [6.78]	12-14	12-14	12-14	10-12
		222D253	10.92-29.97 [.43-1.18]	185.16 [7.29]	16-18	16-18	16-18	14-16
		222D263	12.70-36.83 [.50-1.45]	213.61 [8.41]	20-22	20-22	18-20	18-20
		222D274	14.99-42.93 [.59-1.69]	224.54 [8.84]	24	28	22-24	22-24
		222D285	18.29-55.88 [.72-2.20]	227.33 [8.95]	28	32-34	28	—
		222D296	20.07-59.69 [.79-2.35]	233.43 [9.19]	—	40	—	—
		222D299	23.37-72.39 [.92-2.85]	203.20 [8.00]	—	44	—	—
Bulbous, Straight	3,4,25	202D121	6.10-19.05 [.24-.75]	38.10 [1.50]	—	08	04-05	04-07
		202D132	7.11-23.37 [.28-.92]	54.86 [2.16]	08	10	06-07	06-08
		202D142	7.62-25.15 [.30-.99]	66.80 [2.63]	10	12-14	09-10	07-10
		202D153	8.89-30.48 [.35-1.20]	80.10 [3.15]	12-14	16-18	11-14	10-12
		202D163	10.41-34.29 [.41-1.35]	103.63 [4.08]	16-18	20-22	15-16	14-16
		202D174	16.26-44.96 [.64-1.77]	130.30 [5.13]	20-24	24	18-22	18-22
		202D185	20.83-53.34 [.82-2.10]	165.10 [6.50]	—	—	24	24
		202D196	25.91-69.85 [1.02-2.75]	177.80 [7.00]	—	—	—	—
Bulbous, 90°	3,4,25	222D121	6.10-19.05 [.24-.75]	21.34 [0.84]	—	08	04-05	04-07
		222D132	7.11-23.37 [.28-.92]	33.78 [1.33]	08	10	06-07	05-08
		222D142	7.62-25.15 [.30-.99]	36.58 [1.44]	10	12-14	09-10	08-10
		222D152	8.89-30.48 [.35-1.20]	43.69 [1.72]	12-14	16-18	11-14	10-14
		222D163	10.41-34.29 [.41-1.35]	53.59 [2.11]	16-18	20-22	15-16	14-18
		222D174	16.26-44.96 [.64-1.77]	77.98 [3.07]	20-24	24	18-22	18-22
		222D185	20.83-53.34 [.82-2.10]	97.54 [3.84]	—	—	24	24
		222D196	25.91-69.85 [1.02-2.75]	117.86 [4.64]	—	—	—	—

Boot Adapter Selection Tables (Continued)

Table 2. Shims

Part No.	Cable Diameter Range	Shim Boot or Tubing
202C611	3.81-4.83 [.15-.19]	Tubing
202C621	6.35-8.13 [.25-.32]	Tubing
202C632	9.65-12.70 [.38-.50]	Tubing
202C632	3.30-9.65 [.13-.38]	202E334
202C632	14.48-17.53 [.57-.69]	Tubing
202C642	9.91-14.48 [.39-.57]	202E346
202C642	3.30-9.65 [.13-.38]	202E344
202C642	19.30-22.35 [.76-.88]	Tubing
202C653	9.91-19.30 [.39-.76]	202E346
202C653	3.30-9.65 [.13-.38]	202E344
202C658	17.53-22.86 [.69-.90]	Tubing
202C663	17.53-22.86 [.69-.90]	Tubing
202D211/202F211	5.08-6.60 [.20-.26]	Tubing
222D211/222F211	5.08-6.60 [.20-.26]	Tubing
202D221/202F221	5.84-7.62 [.23-.30]	Tubing
222D221/222F221	5.84-7.62 [.23-.30]	Tubing
202D221/202F221	5.92 [.233]	Tubing
222D221/222F221	5.92 [.233]	Tubing
202D232/202F232	6.86-8.89 [.27-.35]	Tubing
222D232/222F232	6.86-8.89 [.27-.35]	Tubing
202D242/202F242	7.87-10.16 [.31-.40]	Tubing
222D242/222F242	3.30-7.87 [.13-.31]	202E334
202D253/202F253	8.38-10.92 [.33-.43]	Tubing
222D253/222F253	3.30-8.38 [.13-.33]	202E334
202D263/202F263	9.65-12.70 [.38-.50]	Tubing
222D263/222F263	3.30-9.65 [.13-.38]	202E334
202D274/202F274	11.43-14.99 [.45-.59]	Tubing
222D274/222F274	9.91-11.43 [.39-.45]	202E346
222D274/222F274	3.30-9.65 [.13-.38]	202E344
222D274/222F274	13.46-17.53 [.53-.69]	Tubing
222D285/222F285	9.91-13.46 [.39-.53]	202E346
222D285/222F285	3.30-9.65 [.13-.38]	202E344
222D1XDU222D1XX	—	Use tubing as a shim if necessary

Material Selection Table

Applications

Tyco Electronics offers Raychem products in a variety of materials to enable designers and material specifiers to obtain optimum performance.

Material*	Characteristics
-3 Molded Part Material	A general purpose, heat-shrinkable semi rigid and flame retarded polyolefin molding compound with good resistance to fluids and heat. -3 molded parts are ideal for use in applications where toughness combined with resistance to occasional exposure to fluids or heat is required. -3 molded parts are recommended for use in System 10 and System 20.
-3S Molded Part Material	A general purpose, heat-shrinkable flame retarded, polyolefin compound used to make shielded molded parts. -3S molded parts form part of the Rayaten shielding system and are ideal for use in applications where toughness combined with resistance to occasional exposure to fluids or heat is required. -3S molded parts are recommended for use in System 10.
-4 Molded Part Material	A general purpose, heat-shrinkable flexible and flame retarded polyolefin molding compound with good resistance to fluids and heat. -4 molded parts are ideal for use in applications where toughness combined with resistance to occasional exposure to fluids or heat is required. -4 molded parts are recommended for use in System 10 and System 20.
-6 Molded Part Material	Designed for use in applications where extreme flexibility is required. The parts provide excellent strain relief and sealing over a broad temperature range and remain flexible at very low temperatures. The standard colour is black.
-8 Molded Part Material	For use in outer space, where use of low outgassing components is required. The parts provide excellent strain relief at connector cable terminations. Please contact Raychem for available shapes. The standard colour is black.
-12 Molded Part Material	A high temperature, heat-shrinkable, flexible, flame retarded, fluoroelastomeric molding compound with excellent resistance to long term fluid immersion and heat exposure. A wide range of shapes are available in this material. -12 molded parts are recommended for use in System 200.
-25 Molded Part Material	A heat-shrinkable, semi rigid, fluid and temperature resistant, elastomeric molding compound, designed to offer excellent performance in harsh environments. Ideal for use in military vehicles where high temperatures and long term exposure to hot fluids is expected. A wide range of shapes are available in this material. -25 molded parts are recommended for use in System 25.
-25S Molded Part Material	A heat-shrinkable, semi rigid, fluid and temperature resistant, elastomeric compound, used to make shielded molded parts. -25S molded parts form part of the Rayaten shielding system and are ideal for use in military vehicles where high temperatures and long term exposure to hot fluids is expected. -25S molded parts are recommended for use in System 25.
-50 Molded Part Material	A heat-shrinkable, highly flexible, fluid and temperature resistant, VPB molding compound, ideal for use in general purpose and high temperature military applications where exposure to petroleum based solvents is expected. Uniboosts and a wide range of low profile shapes are available in this material. -50 molded parts are recommended for use in System 30 and are compatible with System 25 components.
-51 Molded Part Material	A heat-shrinkable, rugged, flexible, fluid and temperature resistant, EPB molding compound, ideal for use in general purpose applications where exposure to petroleum based solvents is expected. Uniboosts and a wide range of low profile shapes are available in this material. -51 molded parts are recommended for use in System 20.
-55 Molded Part Material	A heat-shrinkable, flexible, flame retarded, fluid and high temperature resistant, modified fluoropolymer molding compound. -55 molded parts are ideal for use in applications where resistance to the effects of N.B.C. agent exposure and decontamination, combined with excellent abrasion resistance is required. A wide range of shapes is available. -55 molded parts are recommended for use in System 300.
-71 Molded Part Material	A heat-shrinkable, flexible, fluid and temperature resistant, polyolefin molding compound, ideal for use in general purpose applications where a good balance of fluid and heat resistance properties is required. Uniboosts and a wide range of low profile shapes are available. -71 molded parts are suitable for use in System 10.
-100 Molded Part Material	A heat-shrinkable, semi flexible, low fire hazard molding compound designed to offer excellent fire safety characteristics combined with low smoke and low acid gas emission. -100 also exhibits good mechanical and fluid resistance properties. A wide range of shapes are available in this material. -100 molded parts are recommended for use in System 100.
-100S Molded Part Material	A heat-shrinkable, semi flexible, low fire hazard compound used to make shielded molded parts. 100S molded parts form part of the Rayaten shielding system and are designed to offer excellent fire safety characteristics combined with low smoke and low acid gas emission. -100S also exhibits good mechanical and fluid resistance properties. -100S molded parts are recommended for use in System 100.
-125 Molded Part Material	A heat-shrinkable, flame retarded, fluid and high temperature resistant, modified fluoropolymer molding compound. 125 molded parts are ideal for use in applications where resistance to the effects of N.B.C. agent exposure and decontamination, combined with excellent abrasion resistance is required. A range of shapes are available. -125 molded parts are recommended for use in System 300.
-130 Molded Part Material	Non flame-retarded molded material.
-146 Molded Part Material	Flame retarded, ultra-high ratio heat-shrinkable material.
-152 Molded Part Material	Flame retarded, high ratio heat-shrinkable material.

*Check with specific part page for applicable materials.

Semi-Rigid Modified Polyolefin

Product Facts

- Heat-shrinkable, semi-rigid flame-retardant molded parts
- Good resistance to fluids and heat



Applications

Raychem molded parts in -3 material are designed for use in general harnessing applications where toughness is required and systems are occasionally exposed to fluids or heat. The adhesive-lined parts provide excellent sealing and strain relief at connector-cable terminations and transitions. A wide range of shapes are available in this material. The standard color is black.

Installation

Raychem -3 molded parts will shrink on the application of heat above 125°C [257°F].

Recommended installation temperature: 150°C [302°F]

Operating Temperature Range

-55°C to 135°C
[-67°F to 275°F]

-3 (Continued)

Specifications/Approvals

	Military	Raychem
224, File E85381	MIL-I-81765/1, Type I (U.S.) Def. Stan. 59-97 Issue 3 Type DA (Europe) BS-G-198-5-DA (Europe)	RT-301 RK-6703

Product Characteristics

		Specification Requirements	Test Method
Physical	Tensile strength	10.5 MPa (min.)	ISO 37; ASTM D 412
	Ultimate elongation	250% (min.)	ISO 37; ASTM D 412
	2% secant modulus	80–160 MPa	ASTM D 882
	Specific gravity	1.4 (max.)	ISO 1183; ASTM D 792
Thermal	Heat aging for 168 h at 175°C [347°F]	Ultimate elongation 150% (min.)	ISO 188, ISO 37
	Heat shock for 4 h at 225°C [437°F]	No dripping, cracking, or flowing	ASTM D 2671
	Low-temperature flex at -55°C [-67°F]	No cracking during mandrel bend	RK-6703, CL 2.7: RT-301 Sec. 4.3.4
	Flammability	Self-extinguishing	RK-6703, CL 2.8: ASTM D 635
Electrical	Electric strength	8 MV/m (min.)	IEC 243
Water absorption	—	0.5% (max.)	ISO 62
Fluid resistance	Aviation fuel F40	Tensile strength 8.5 MPa (min.) Ultimate elongation 200% (min.)	ISO 1817 and ISO 37 after immersion for 24 h at 23°C [73°F]
	Lubricating oil O-149	Tensile strength 8.5 MPa (min.) Ultimate elongation 200% (min.)	ISO 1817 and ISO 37 after immersion for 24 h at 23°C [73°F]
	Phosphate ester hydraulic fluid (DTD 900/4881A)	Tensile strength 8.5 MPa (min.) Ultimate elongation 200% (min.)	ISO 1817 and ISO 37 after immersion for 24 h at 23°C [73°F]

10

Heat-Shrink Tubing,
Molded Parts and Adhesives

Flexible Polyolefin

Product Facts

- Heat-shrinkable, flexible, flame-retardant molded parts
- Good resistance to fluids and heat



Applications

Raychem molded parts in -4 material are designed for use in general harnessing applications where toughness is required and systems are occasionally exposed to fluids or heat. The adhesive-lined parts provide excellent sealing and strain relief at connector-cable terminations and transitions.

A wide range of shapes are available in this material. The standard color is black.

Installation

Raychem -4 molded parts will shrink on the application of heat above 100°C [212°F].

Recommended installation temperature: 150°C [302°F]

Operating Temperature Range

-55°C to 135°C
[-67°F to 275°F]

Specifications/Approvals

Molded Parts — Materials

-4 (Continued)

	Military	Raychem
224, File E85381	MIL-I-81765/1 (U.S.), Type II (U.S.)	RT-1304

Product Characteristics

		Specification Requirements	Test Method
Physical	Tensile strength	1800 psi (min.)	ASTM D 412
	Ultimate elongation	400% (min.)	ASTM D 412
	Specific gravity	1.3 (max.)	ASTM D 792
Thermal	Heat aging for 168 h at 175°C [347°F]	Ultimate elongation 300% (min.)	RT 1304 Sec. 4.3.3
	Heat shock for 4 h at 225°C [437°F]	No dripping, flowing, or cracking	RT 1304 Sec. 4.3.5
	Low-temperature flex at -55°C [-67°F]	No cracking	RT 1304 Sec. 4.3.4
	Flammability (burn time)	Average flame time: 120 s (max.)	ASTM D 635
Electrical	Dielectric strength	350 V/mil (min.)	ASTM D 149
Water absorption	—	0.3% (max.)	ASTM D 570
Fluid resistance	JP-4 fuel, aviation gasoline, water, hydraulic fluid	Tensile strength 8.5 MPa psi (min.)	RT-1304 Sec. 4.3.3
		Ultimate elongation 200% (min.)	

Modified Fluoroelastomer

Product Facts

- Heat-shrinkable, flexible, fluid-resistant modified fluoro-elastomer
- Excellent resistance to long-term fuel immersion



Applications

Raychem -12 Viton molded parts are designed to be used in conjunction with Viton tubing or multiconductor cable jackets and a suitable adhesive in Raychem's System 200. This system provides excellent resistance to elevated temperatures and continuous fuel immersion. Available in a wide range of configurations, -12 molded parts will operate from -55°C [-67°F] to 200°C [392°F]. The standard color is black.

Installation

Raychem -12 molded parts will shrink on the application of heat above 175°C [347°F].

Recommended installation temperature: 220°C [428°F]

Operating Temperature Range

-55°C to 200°C
[-67°F to 392°F]

Specifications/Approvals

-12 (Continued)

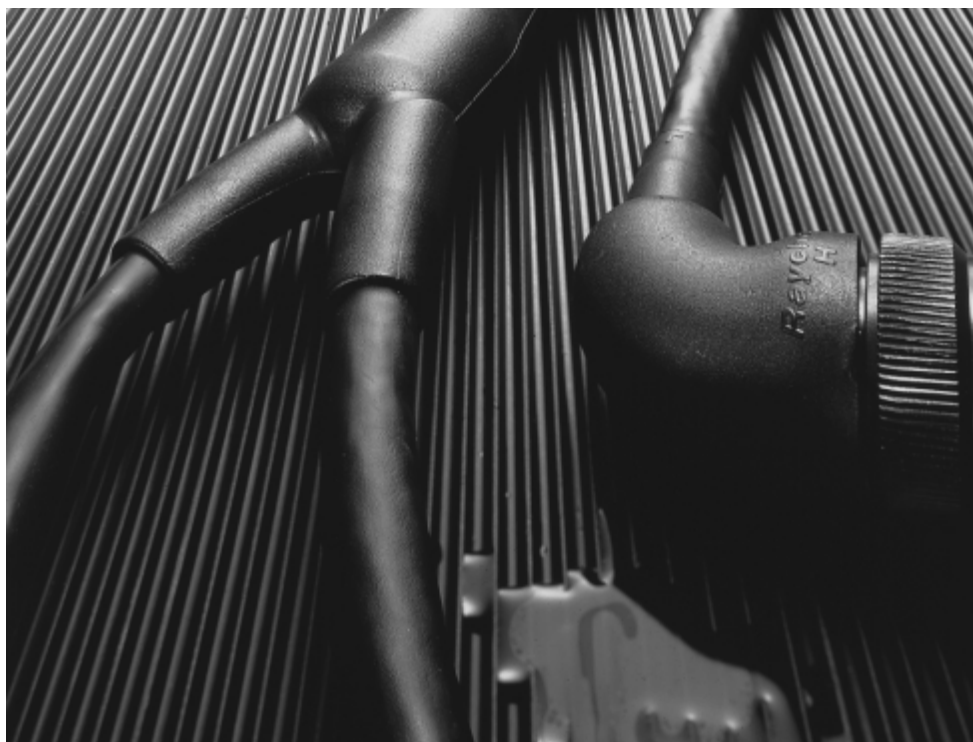
Military	Raychem
MIL-I-81765/4 (U.S.)	RT-1312
Def. Stan. 59-97 Issue 3 Type DD (Europe)	RK-6712
BS-G-198-5-DD-P (Europe)	—

Product Characteristics

		Specification Requirements	Test Method
Physical	Tensile strength	12.4 MPa (min.)	ISO 37
	Ultimate elongation	300% (min.)	ISO 37
	2% secant modulus	70 MPa (max.)	ASTM D 882
	Specific gravity	1.95 (max.)	ISO 1183
Thermal	Heat aging for 168 h at 250°C [482°F]	Ultimate elongation 250% (min.)	ISO 188, ISO 37
	Heat shock for 4 h at 300°C [572°F]	No dripping, cracking, or flowing	ASTM D 2671
	Low temperature flex at -55°C [-67°F]	No cracking	ASTM D 2671
	Flammability (burn time)	30 s (max.)	ASTM D 635
Electrical	Electric strength	8 MV/m (min.)	IEC 243
Water absorption	—	0.5% (max.)	ISO 62
Fluid resistance	Aviation fuel F40	Tensile strength 11 MPa (min.) Ultimate elongation 200% (min.)	ISO 1817 after immersion for 24 h at 23 hrs
	Lubricating oil O-149	Tensile strength 11 MPa (min.) Ultimate elongation 200% (min.)	ISO 1817 after immersion for 24 h at 93°C [200°F]
	Hydraulic fluid H515	Tensile strength 11 MPa (min.)	ISO 1817
		Ultimate elongation 200% (min.)	after immersion for 24 h at 93°C [200°F]

Fluid-Resistant Modified Elastomer
Product Facts

- Heat-shrinkable, semi-rigid, chemical- and abrasion-resistant molded shapes
- Excellent resistance to high-temperature fluids
- Resistance to long-term exposure at elevated temperatures


Applications

Raychem heat-shrinkable molded parts in -25 material are designed to be used in conjunction with other System 25 such as DR-25 and S-1125 components, providing a complete cable harness system capability.

-25 parts have been specifically formulated and designed to provide optimum high-temperature fluid resistance and long-term heat resistance. This unique balance of properties makes -25 parts particularly suitable for sealing and strain relief at connector-cable terminations and cable-to-cable transitions on military vehicle cables and harnesses. Available in a wide range of configurations, -25 parts will operate from -75°C to 150°C [-103°F to 302°F] for long periods. The standard color is black.

Installation

Raychem -25 molded parts will shrink on the application of heat above 135°C [275°F].

Recommended installation temperature: 175°C [347°F]

Operating Temperature Range

-75°C to 150°C
[-103°F to 302°F]

-25 (Continued)

Specifications/Approvals

Military	Raychem
SC-X-15111 (U.S.)	RT-1325
MIS-34867 (US)	—
VG95343 Parts 6, 7, 8 and 9 (Europe)	—
Def Stan 59-97, Issue 3, Type DE (Europe)	—
BSG-198-5-DE-P	—

Product Characteristics

		Specification Requirements	Test Method
Physical	Tensile strength	15 MPa (min.)	ASTM D 412
	Ultimate elongation	350% (min.)	ASTM D 412
	Specific gravity	1.5 (max.)	ASTM D 792
Thermal	Heat aging for 168 h at 150°C [302°F]	Ultimate elongation 300% (min.)	ASTM D 412
	Heat shock for 4 h at 225°C [437°F]	No dripping, cracking, or flowing	ASTM D 2671
	Low-temperature flex for 4 h at -70°C [-94°F]	No cracking during mandrel bend	ASTM D 2671
	Flammability (burn time)	120 s (max.)	ASTM D 635
Electrical	Electric strength	8 MV/m	ASTM D 149
Fluid resistance	Aviation fuel JP-4 (MIL-T-5624)	Tensile strength 12 MPa (min.) Ultimate elongation 300% (min.)	ASTM D 412 after immersion for 24 h at 25°C [77°F]
	Hydraulic fluid (MIL-H-6083)	Tensile strength 12 MPa (min.) Ultimate elongation 300% (min.)	ASTM D 412 after immersion for 24 h at 25°C [77°F]
	Diesel fuel (VV-F-800 No 2)	Tensile strength 12 MPa (min.) Ultimate elongation 300% (min.)	ASTM D 412 after immersion for 24 h at 50°C [122°F]
	Automotive gasoline (MIL-G-3056)	Tensile strength 12 MPa (min.) Ultimate elongation 300% (min.)	ASTM D 412 after immersion for 24 h at 25°C [77°F]

Fluid-Resistant Screened Elastomer**Product Facts**

- Fuel and heat resistance
- RFI, EMI protection

-25S**Applications**

Rayaten screened molded parts in -25S material are designed for use with FDR-25 or DR-25 jacketed screened multiconductor cable and S1125 adhesive to provide a complete high-performance harness system offering high levels of RFI and EMI protection. This -25 material provides optimum high-temperature fluid-resistance and long-term heat-aging properties. The material is particularly suitable for providing encapsulation, mechanical protection, and strain relief on terminations and cable transitions in harsh environments. The standard color is black. Products made from this material are normally used in an assembly (see pages 14003 to 14013).

Operating Temperature Range

-55°C to 150°C
[-67°F to 302°F]

Specifications/Approvals

-25S (Continued)

Military	Raychem
VG 95343 Pt. 20, Pt. 22	RK-6719

Product Characteristics

		Specification Requirements*	Screening effectiveness in dB at	
			3 KHz to 30 MHz (min.)	>30 MHz to 100 MHz (min.)
Initial values		Tensile strength: 12 MPa (min.)	—	—
		Ultimate elongation: 400% (min.)	—	—
		Metal adhesion: 15 N/cm (min.)	—	—
		Shielding effectiveness	75	70
Thermal	Heat shock (1/2 h at 200°C [392°F])	Tensile strength: 12 MPa (min.)	—	—
		Ultimate elongation: 400% (min.)	—	—
		Shielding effectiveness	75	70
	Heat aging (168 h at 160°C [320°F])	Tensile strength: 12 MPa (min.)	—	—
		Ultimate elongation: 400% (min.)	—	—
		Shielding effectiveness	75	70
	3 thermal cycles of -75°C to 150°C [-103°F to 302°F]	Shielding effectiveness	75	70
Immersion in the following fluids for 24 h:				
Chemical	Lubricating oil (O-156, at 100°C [212°F])	Tensile strength: 10 MPa (min.)	—	—
		Ultimate elongation: 300% (min.)	—	—
		Shielding effectiveness	75	70
	Hydraulic fluid H515, at 50°C [122°F]	Tensile strength: 10 MPa (min.)	—	—
		Ultimate elongation: 300% (min.)	—	—
		Shielding effectiveness	75	70
	Aviation fuel JP4 F40, at 23°C [73°F]	Tensile strength: 10 MPa (min.)	—	—
		Ultimate elongation: 300% (min.)	—	—
		Shielding effectiveness	75	70
	Diesel fuel F54, at 23°C [73°F]	Tensile strength: 10 MPa (min.)	—	—
		Ultimate elongation: 300% (min.)	—	—
		Shielding effectiveness	75	70
	1, 1, 1, trichloroethane (1 h, at 23°C [73°F])	Tensile strength: 10 MPa (min.)	—	—
		Ultimate elongation: 300% (min.)	—	—
		Shielding effectiveness	75	70

*Values quoted are for the polymer/metal composite in all cases when terminated using epoxy adhesives.

Fluid-Resistant Modified Elastomer

Product Facts

- Excellent heat and fluid resistance
- Low profile
- Rugged
- Lightweight



Applications

A high-performance blend of Viton and other polymers, Raychem -50 offers excellent fluid and temperature resistance. It is suitable for use in most areas of military vehicle harnessing. This material is available in the Uniboot range and should be chosen in applications that use System 25 components. The standard color is black.

Installation

Raychem -50 molded parts will shrink on the application of heat above 125°C [257°F].

Recommended installation temperature is 175°C [347°F]

Operating Temperature Range

-55°C to 150°C
[-67°F to 302°F]

Specifications/Approvals

Molded Parts — Materials

-50 (Continued)

Military	Raychem
SC-X-15111 (U.S.)	RT-1313

Product Characteristics

		Specification Requirements	Test Method
Physical	Tensile strength	15 MPa (min.)	ASTM D 412
	Ultimate elongation	350% (min.)	ASTM D 412
	Specific gravity	1.5 (max.)	ASTM D 792
Thermal	Heat aging for 168 h at 150°C [302°F]	Ultimate elongation 300% (min.)	ASTM D 412
	Heat shock for 4 h at 225°C [437°F]	No dripping, cracking, or flowing	ASTM D 2671
	Low-temperature flex for 4 h at -70°C [-94°F]	No cracking during mandrel bend	ASTM D 2671
	Flammability (burn time)	120 s (max.)	ASTM D 635
Electrical	Electric strength	8 MV/m	ASTM D 149
Fluid resistance	Aviation fuel JP-4 (MIL-T-5624)	Tensile strength 12 MPa (min.) Ultimate elongation 300% (min.)	ASTM D 412 after immersion for 24 h at 25°C [77°F]
	Hydraulic fluid (MIL-H-6083)	Tensile strength 12 MPa (min.) Ultimate elongation 300% (min.)	ASTM D 412 after immersion for 24 h at 25°C [77°F]
	Diesel fuel (VV-F-800 No 2)	Tensile strength 12 MPa (min.) Ultimate elongation 300% (min.)	ASTM D 412 after immersion for 24 h at 50°C [122°F]
	Automotive gasoline (MIL-G-3056)	Tensile strength 12 MPa (min.) Ultimate elongation 300% (min.)	ASTM D 412 after immersion for 24 h at 25°C [77°F]

**Chemical-Resistant
Fluoroelastomer**

Product Facts

- Excellent fuel resistance
- Low profile
- Rugged
- Lightweight



Applications

A high-performance elastomeric blend of polymers, Raychem -51 offers excellent fluid resistance.

It is suitable for use in most areas of military vehicle harnessing. This material is available in the Uniboot range and other slimline boots and transitions. The standard color is black.

Installation

Raychem -51 molded parts will shrink on the application of heat above 125°C [257°F].

Recommended installation temperature is 150°C [302°F]

Operating Temperature Range

-55°C to 130°C
[-67°F to 266°F]

Specifications/Approvals

Molded Parts — Materials

-51 (Continued)

Military	Raychem
SC-X-15112 (U.S.)	RT-1321

Product Characteristics

		Specification Requirements	Test Method
Physical	Tensile strength	1500 psi (min.)	ASTM D 412
	Ultimate elongation	300% (min.)	ASTM D 412
	Specific gravity	1.6 (max.)	ASTM D 792
Thermal	Heat aging for 168 h at 121°C [250°F]	Tensile strength 1200 psi. (min.) Elongation 250% (min.)	RT-1321 Sec. 4.3.3 RT-1321 Sec. 4.3.3
	Heat shock for 4 h at 200°C [392°F]	No dripping, flowing, or cracking	RT-1321 Sec. 4.3.5
	Low-temperature flex for 4 h at -55°C [-67°F]	No cracking	RT-1321 Sec. 4.3.4
	Flammability (burn time)	120 seconds, 1 inch (max.)	ASTM D 635
Electrical	Dielectric strength	200 V/mil (min.)	ASTM D 149
Fluid resistance	Lubricating oil, diesel oil, water for 24 h at 25°C [77°F]	Tensile strength 1000 psi (min.) Elongation 225% (min.) Weight increase 10% (max.)	RT-1321 Sec. 4.3.3 and 4.3.7
	Gasoline for 24 h at 25°C [77°F]	Tensile strength 800 psi (min.) Elongation 225% (min.) Weight increase 25% (max.)	RT-1321 Sec. 4.3.3 and 4.3.7
	Isopropyl alcohol, cleaning fluid for 24 h at 25°C [77°F]	Tensile strength 1400 psi (min.) Elongation 225% (min.) Weight increase 10% (max.)	RT-1321 Sec. 4.3.3 and 4.3.7
	Hydraulic fluid for 24 h at 71°C [160°F]	Tensile strength 1000 psi (min.) Elongation 225% (min.) Weight increase 25% (max.)	RT-1321 Sec. 4.3.3 and 4.3.7

Flexible Fluoropolymer

Product Facts

- Flame retardant
- Abrasion and cut through resistance
- Flexible
- High temperature resistance
- High fluid resistance
- Environmentally sealed

Applications

A heat-shrinkable, flexible, flame retardant, fluid and high temperature resistant, modified fluoropolymer molding compound. -55 molded parts are ideal for use in applications where chemical resistance and abrasion resistance is required. A wide range of shapes is available. -55 molded parts are recommended for use in System 300.

Use the System 300 family of parts in military applications where excellent high temperature performance, coupled with resistance to the effects of N.B.C. agent exposure and decontamination, and good physical and chemical properties are a requirement.

System 300 jacketing is based on a modified fluoropolymer and features a one part epoxy adhesive in tape form.

Installation

This specification covers the requirements for one type of flexible, electrical insulating molded component whose expanded dimensions will reduce to a predetermined size upon the application of heat in excess of 220°C [428°F].

Operating Temperature Range

-65°C to 200°C
[-85°F to 392°F]

Specifications/Approvals

RT-1330

Product Characteristics

Physical	Tensile Strength	psi (MPa)	3500 minimum (24.1)	Section 4.3.3
	Ultimate Elongation	percent	200 minimum	ASTM D 2671
	Specific Gravity	—	2.0 maximum	ASTM D 792
	Low Temperature Flexibility 4 hours at -65 ± 2°C [-85 ± 4°F]	—	No cracking	Section 4.3.4
	Heat Shock 4 hours at 300°C [572°F]	—	No dripping, flowing or cracking	Section 4.3.5
	Heat Resistance 336 hours at 250°C [482°F] Followed by tests for:	—	—	Section 4.3.6
	Tensile Strength Elongation	psi (MPa) percent	2000 minimum (13.8) 150 minimum	Section 4.3.3 ASTM D 2671

-55 (Continued)

Electrical			
Dielectric Strength	volts/mil	200 minimum	ASTM D 149
Volume Resistivity	ohm-cm	1011 minimum	ASTM D 257
Chemical			
Corrosive Effect 16 hours at 200 ± 3°C [392 ± 5°F]	—	Noncorrosive	Section 4.3.7 ASTM D 2671 Procedure A
Flammability Average Time of Burning Average Extent of Burning	seconds inches (mm)	15 maximum 0.5 maximum (12.5)	ASTM D 635
Fungus Resistance	—	Rating of 1 or less	ASTM G 21
Water Absorption 24 hours at 23 ± 3°C [73 ± 5°F]]	percent	0.5 maximum	ASTM D 570
Fluid Resistance 24 hours at 23 ± 3°C [73 ± 5°F] in: Gasoline, Aviation Grade 100 (ASTM D 910) 1,1,1 Trichloroethane (MIL-T-81533) Coolanol 25 Followed by tests for:	—	—	Section 4.3.8
Tensile Strength Ultimate Elongation 24 hours at 50 ± 3°C [122 ± 5°F] in: JP-5 (MIL-T-5624) Deicing Fluid (MIL-A-8243) Cleaning Compound (MIL-C-43616) 5% Salt Solution (O-S-1926) Fuel Oil, Diesel (VV-F-800, DF-2) Followed by tests for:	psi (MPa) percent	3000 minimum (20.7) 150 minimum	Section 4.3.3 ASTM D 2671
Tensile Strength Ultimate Elongation 24 hours at 75 ± 3°C [167 ± 5°F] in: Hydraulic Fluid (MIL-H-5606) Skydrol 500 Lubricating Oil (MIL-L-2104) Lubricating Oil (MIL-L-7808) Followed by tests for:	psi (MPa) percent	3000 minimum (20.7) 150 minimum	Section 4.3.3 ASTM D 2671 Section 4.3.8
Tensile Strength Ultimate Elongation	psi (MPa) percent	3000 minimum (20.7) 150 minimum	Section 4.3.3 ASTM D 2671
Fluid Resistance 5 hours at 23 ± 3°C [73± 5°F]	—	—	Section 4.3.8
Tensile Strength Ultimate Elongation	psi (MPa) Percent	3500 minimum (24.1) 150 minimum	Section 4.3.3 ASTM D 2671
Nuclear			Section 4.3.9
Radiation Resistance Followed by tests for:			
Tensile Strength Ultimate Elongation	psi (MPa) percent	3500 minimum (24.1) 150 minimum	—

Semirigid Modified Polyolefin

Product Facts

- Flexible
- Flame-retardant



Applications

Raychem -71 is a flexible, flame-retardant polyolefin suitable for use in general harnessing applications. The material is very flexible and offers a good balance of fluid and heat resistance. If Uniboot molded parts are required, -71 should be chosen as a replacement for -3. The standard color is black.

Installation

Raychem -71 molded parts will shrink on the application of heat above 100°C [212°F].

Recommended installation temperature is 150°C [302°F]

Operating Temperature Range

-55°C to 135°C
-67°F to 275°F]

Specifications/Approvals

Molded Parts — Materials

-71 (Continued)

Military	Raychem
MIL-I-81765, Type I, Class I (U.S.)	RT-1316

Product Characteristics

		Specification Requirements	Test Method
Physical	Tensile strength	10 MPa (min.)	ASTM D 412
	Ultimate elongation	250% (min.)	ASTM D 412
	Specific gravity	1.40 (max.)	ASTM D 792
Thermal	Heat aging for 168 hr at 175°C [347°F]	Ultimate elongation 200% (min.)	ASTM D 412
	Heat shock for 4 h at 250°C [482°F]	No dripping, cracking, or flowing	ASTM D 2671
	Low-temperature flex for 4 h at -55°C [-67°F]	No cracking during mandrel bend	ASTM D 2671
	Flammability (burn time)	90 s (max.)	ASTM D 635
Electrical	Electric strength	8 MV/m	ASTM D 149
Water absorption	—	0.5% (max.)	ASTM D 570
Fluid resistance	Aviation fuel JP-4 (MIL-T-5624)	Tensile strength 5 MPa (min.) Ultimate elongation 200% (min.)	ASTM D 412 after immersion for 24 h at 25°C [77°F]
	Lubricating oil O-149 (MIL-L-7808)	Tensile strength 5 MPa (min.) Ultimate elongation 200% (min.)	ASTM D 412 after immersion for 24 h at 25°C [77°F]
	Hydraulic fluid (MIL-H-5606)	Tensile strength 5 MPa (min.) Ultimate elongation 200% (min.)	ASTM D 412 after immersion for 24 h at 25°C [77°F]
	Skydrol 500	Tensile strength 5 MPa (min.) Ultimate elongation 200% (min.)	ASTM D 412 after immersion for 24 h at 25°C [77°F]

Low-Fire-Hazard Material**Product Facts**

- Heat-shrinkable, semiflexible molded shapes for low fire hazard applications
- Low-smoke index as defined by BS G 198 Part 5
- Low-toxicity index as defined by NES 713
- High-temperature index as defined by ISO 4589-3

**Applications**

Raychem heat-shrinkable molded parts in -100 material form part of Raychem's System 100. The molded parts are designed for use in conjunction with Raychem's Zerohal cable and tubing for applications where hazard reduction in the event of fire is crucial. The material exhibits excellent fire safety characteristics combined with low-smoke and low-acid-gas emission while retaining good mechanical and fluid-resistant properties. -100 parts with adhesive lining provide location, sealing, and strain relief of cable-connector terminations and cable-cable transitions on harnesses used where there is a need to lower the risk (such as in marine applica-

tions, mass transit systems, and offshore installations), or where equipment would be irreparably damaged by the corrosive products of combustion. Available in a wide range of configurations, -100 parts will operate continuously from -30°C to 105°C [-22°F to 221°F]. The standard color is black.

Installation

Raychem -100 molded parts will shrink on the application of heat above 120°C [248°F].

Recommended installation temperature: 150°C [302°F]

Operating Temperature Range

-30°C to 105°C
[-22°F to 221°F]

Specifications/Approvals

-100 (Continued)

Military/NAVSEA	Raychem
5617649 (U.S.)	RT-1323
	RK-6717
Def. Stan 59-97, Issue 3, Type DF (Europe)	—
BSG 198 Part 5 Type DF (Europe)	—
BR1326 listed Class C	—

Product Characteristics

		Specification Requirements	Test Method
Physical	Tensile strength	8 MPa (min.)	ISO 37
	Ultimate elongation	200% (min.)	ISO 37
	2% secant modulus	130 MPa (max.)	ASTM D 882
	Specific gravity	1.5 (max.)	ISO 1183
Thermal	Heat aging for 168 h at 150°C [302°F]	Ultimate elongation 100% (min.)	ISO 188, ISO 37
	Heat shock for 4 h at 225°C [437°F]	No dripping, cracking, or flowing	ASTM D 2671
	Low-temperature flex at -30°C [-22°F]	No cracking during mandrel bend	ASTM D 2671
Fire safety properties	Limiting oxygen index	29 min.	ISO 4589-2
	Temperature index	250FC (min.)	ISO 4589-3
	Flammability (burn time)	100 s (max.)	ASTM D 635
	Smoke index	20 (max.)	BSG 198 Part 5
	Toxicity index	5 (max.) per 100 g	NES 713
Electrical	Electric strength	15 MV/m (min.)	IEC 243
Water absorption	—	0.75% (max.) at 23°C [73°F] 3.5% (max.) at 70°C [158°F]	ISO 62
Fluid resistance	ISO 1817 Gasoline fuel	Tensile strength 5 MPa (min.) Ultimate elongation 150% (min.)	ISO 1817 and ISO 37 after immersion for 24 h at 23°C [73°F]
	Lubricating oil O-149	Tensile strength 5 MPa (min.) Ultimate elongation 150% (min.)	ISO 1817 and ISO 37 after immersion for 24 h at 50°C [122°F]
	Hydraulic fluid H515	Tensile strength 5 MPa (min.) Ultimate elongation 150% (min.)	ISO 1817 and ISO 37 after immersion for 24 h at 23°C [73°F]

Low-Fire-Hazard Screened Material**Product Facts**

- Screened Zerohal material
- Low smoke index as defined by NES 711
- Low toxicity index as defined by NES 713
- High temperature index as defined by NES 715

**Applications**

-100S is the Zerohal material option in Raychem's Rayaten shield (screen) termination system. This material combines the fire safety properties of -100 with the excellent EMI and RFI screening of Rayaten screened molded parts where there is a need to lower the risk. -100S is suitable for high-performance

screen terminations in areas where Raychem Zerohal materials are required. The standard color is black. Products made from these materials are normally used in an assembly (see pages 14003 to 14013).

Operating Temperature Range

-30°C to 105°C
[-22°F to 221°F]

-100S (Continued)

Military	Raychem
VG 95343 Pt. 20, Pt. 22	RK-6724

Product Characteristics

		Specification Requirements*	Screening Effectiveness in dB at	
			3 KHz to 30 MHz (min.)	>30 MHz to 100 MHz (min.)
Initial values		Tensile strength: 7 MPa (min.) Metal adhesion: 15 N/cm (min.) Shielding effectiveness	75	70
Thermal	Heat shock (1/2 h at 200°C [392°F])	Metal adhesion: 15 N/cm (min.) Shielding effectiveness	75	70
	Heat aging (168 h at 150°C [302°F])	Metal adhesion: 15 N/cm (min.) Shielding effectiveness	75	70
Fluids	Immersion in the following fluids for 24 h:			
	Phosphate ester hydraulic fluid DTD900/4881 at 23°C [73°F]	Tensile strength: 5 MPa (min.) Shielding effectiveness	75	70
	Water at 23°C [73°F]	Tensile strength: 5 MPa (min.) Shielding effectiveness	75	70
	Lubricating oil O-149 at 50°C [122°F]	Tensile strength: 5 MPa (min.) Shielding effectiveness	75	70
	Transformer oil S-756 at 50°C [122°F]	Tensile strength: 5 MPa (min.) Shielding effectiveness	75	70

*Values quoted are for the polymer/metal composite in all cases when terminated using epoxy adhesives. (Refer to pages 10189-10194.)

-125

Flexible Fluoropolymer

Product Facts

- Flame retardant
- Abrasion and cut through resistance
- High temperature resistance
- High fluid resistance
- Environmentally sealed

Applications

A heat-shrinkable, flame retardant, fluid and high temperature resistant, modified fluoropolymer molding compound. -125 molded parts are ideal for use in applications where resistance to the effects of N.B.C. agent exposure and decontamination, combined with excellent abrasion resistance is required. A range of shapes is available. -125 molded parts are recommended for use in System 300.

Use the System 300 family of parts in military applications where excellent high temperature performance, coupled with resistance to the effects of N.B.C. agent exposure and decontamination, and good physical and chemical properties are a requirement.

System 300 jacketing is based on a modified fluoropolymer and features a one part epoxy adhesive in tape form.

Installation

This specification covers the requirements for one type of electrically insulating molded component whose dimensions will reduce to a predetermined size upon the application of heat in excess of 160°C ± 3°C [320°F ± 5°F].

Operating Temperature Range

-65°C to 200°C
[-85°F to 392°F]

Specifications/Approvals

RT-1334

Product Characteristics

Physical	Elastic Memory	Percent	275 minimum expansion 90 minimum retraction	Section 4.3.2
	Tensile Strength	psi (MPa)	4000 minimum (27.5)	Section 4.3.3
	Ultimate Elongation	Percent	300 minimum	ASTM D 412
	Secant Modulus	psi (MPa)	100,000 maximum (689)	Section 4.3.4 ASTM D 882
	Specific Gravity	—	1.85 maximum	ASTM D 792
	Low Temperature Flexibility 4 hours at -57 ± 3°C [-70 ± 5°F]	—	No cracking	Section 4.3.5
	Heat Shock 4 hours at 300 ± 5°C [572 ± 9°F]	—	No dripping, flowing or cracking	Section 4.3.6
	Heat Resistance 168 hours at 250 ± 5°C [482 ± 9°F] Followed by tests for:	—	—	Section 4.3.7.1
	Tensile Strength	psi (MPa)	3500 minimum (24.1)	Section 4.3.3
	Ultimate Elongation	Percent	250 minimum	Section 4.3.3
	2000 hours at 150 ± 3°C [302 ± 5°F] Followed by tests for:	—	—	Section 4.3.7.2
	Tensile Strength	psi (MPa)	3500 minimum (24.1)	Section 4.3.3
	Ultimate Elongation	Percent	250 minimum	Section 4.3.3

Product Characteristics
(Continued)

Molded Parts — Materials

-125 (Continued)

Electrical			
Dielectric Strength	Volts/mil (kV/mm)	300 minimum (11.9)	ASTM D 149
Volume Resistivity	ohm-cm	1013 minimum	ASTM D 257
Chemical			
Corrosive Effect 16 hours at 175 ± 3°C [347 ± 5°F]	—	Noncorrosive	Section 4.3.8 ASTM D 2671 Procedure A
Flammability Initial			
Average Time of Burning	Seconds	15 maximum	ASTM D 635
Average Extent of Burning	Inches (mm)	1 maximum (25)	
After Fluid Immersion			
24 hours at 23 ± 3°C [73 ± 5°F]			
Gasoline, Automotive, Combat MIL-G-3056			Section 4.3.10
Fuel Oil, Diesel VV-F-800 DF-2			
Turbine Fuel, Aviation, JP-4			
MIL-T-5624			
Average Time of Burning	Seconds	30 maximum	ASTM D 635
Average Extent of Burning	Inches (mm)	1 maximum (25)	
Fungus Resistance	—	Rating of 1 or less	ASTM G 21
Water Absorption	Percent	0.5 maximum	ASTM D 570
24 hours at 23 ± 3°C [73 ± 5°F]			
Fluid Resistance	—	—	Section 4.3.9
24 hours at 23 ± 3°C [73 ± 5°F]			
Gasoline, Automotive, Combat MIL-G-3056			
24 hours at 50 ± 3°C [122 ± 5°F]			
Fuel Oil Diesel VV-F-800 DF-2			
Turbine Fuel, Aviation, JP-4			
MIL-T-5624			
Electrolyte 10873919			
5% Salt Solution O-S-1926			
Anti-Icing & Defrosting Fluid MIL-A-8243			
Lube Oil, Aircraft, Synthetic MIL-L-23699			
Lube Oil MIL-L-2104			
Lube Oil, Aircraft, Synthetic MIL-L-7808			
24 hours at 100 ± 3°C [212 ± 5°F]			
Hydraulic Fluid, Synthetic MIL-H-46170			
4 hours at 50 ± 3°C [122 ± 5°F]			
Cleaning Compound PC-437			
5 hours at 23 ± 3°C [73 ± 5°F]			
Decontaminating Agent, DS-2 MIL-D-50030			
Decontaminating Agent STB MIL-D-12468			
Followed by tests for:			
Tensile Strength	psi (MPa)	3000 minimum (20.7)	Section 4.3.3
Ultimate Elongation	Percent	250 minimum	Section 4.3.3
Weight Increase	Percent	3 maximum	Section 4.3.9
Adhesive Compatibility			
Lap Shear Strength	psi (kPa)	100 minimum (689)	Section 4.3.11
NSM to S-1264 to DCNS			
Nuclear			
Radiation Resistance			Section 4.3.12
Followed by tests for:			
Tensile Strength	psi (MPa)	4000 (27.6)	Section 4.3.3
Ultimate Elongation	Percent	250	

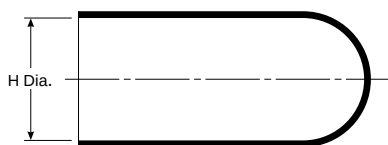
End Caps, 101A011 to 094

Raychem SSC end caps provide optimum water-proofing and environmental protection for underwater, underground, or outdoor applications. The end caps are highly resistant to moisture, fungus, and weathering.

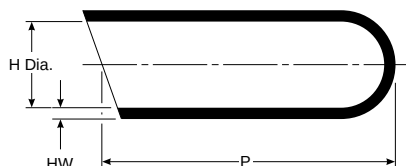
Applications

Use for protecting cables and pipes or capping unused outlets in transitions. Provides an environmental seal when used with adhesive.

As Supplied (a)



After Unrestricted Recovery (b)



Materials Available

Material*	Material Description	Precoating No.	Adhesive Part No.**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-12	Viton	N/A	S-1255-04
-25	Fluid-resistant elastomer	/42 or /86	S-1017 or S-1048 or S-1125
-100	Polyolefin, Zerohal	/180	S-1030

*For more information, please see the appropriate material page in this section.

**For more information, please see pages 10183-10188.

Product Dimensions

Molded Parts — Caps

End Caps, 101A011 to 094 (Continued)

Part No.	H		P Min. b	HW ±20% b
	Min. a	Max. b		
101A011	5.10 [.20]	2.00 [.08]	22.90 [.90]	1.02 [.04]
101A021	7.40 [.29]	3.30 [.13]	25.40 [1.00]	1.27 [.05]
101A031	10.20 [.40]	4.80 [.18]	30.50 [1.20]	1.52 [.06]
101A041	15.20 [.60]	6.40 [.25]	40.60 [1.60]	1.78 [.07]
101A052	20.60 [.81]	9.40 [.37]	61.00 [2.40]	2.03 [.08]
101A062	25.40 [1.00]	11.40 [.45]	68.80 [2.70]	2.29 [.09]
101A073	39.40 [1.56]	18.00 [.71]	91.40 [3.60]	2.54 [.10]
101A083	50.80 [2.00]	22.90 [.90]	101.60 [4.00]	2.79 [.11]
101A094	83.80 [3.30]	38.10 [1.50]	114.30 [4.50]	3.05 [.12]

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

Heat-Shrinkable End Caps**Product Facts**

- Self-sealing for waterproofing (sealant-coated parts only)
- Electrical insulation to 1000 V
- Abrasion-resistance
- Mechanical protection
- Easy installation, requiring no special skills
- Operating temperature range of -40°C to 85°C [-40°F to 185°F]
- Minimum shrink temperature of 121°C [250°F]

**Applications**

These SSC heat-shrinkable end caps (also sold as SSC end caps) are made from a thermally stabilized, modified polyolefin, which makes them highly resistant to moisture, fungus, and weathering. The end caps also have excellent electri-

cal properties. End caps coated with sealant are available for underwater or underground applications with a pressure differential up to 20 psi between the inside of the cable and the outside environment. End caps may be used over lead, steel, aluminum,

copper, polyethylene, polyolefin, EPR, and PVC jacketing materials.

Specifications/Approvals

Molded Parts — Caps

SSC (Continued)

Type	Raychem	Military/Commercial
SSC-XXX-FR	RWXXXX SSC-XX-FR specification control drawing	MIL-I-81765/1A
SSC-X and SSC-XTV	SSC specification control drawing	PPS-3011/6
S-1017	RT-1050/1	—
S-1297	RW-2019	—
102L0XX	RW-2024	—

Product Dimensions

Part No.	Inner Diameter* As Supplied (min.)	Part Length Recovered (max.)	Wall Thickness (nom.) Recovered ± 10 %	Recovered ± 20 %
SSC-1	10.00 [.390]	4.00 [.160]	33.50 [1.320]	2.00 [.080]
SSC-2	20.00 [.790]	7.50 [.300]	55.30 [2.180]	2.30 [.090]
SSC-3	35.00 [1.380]	15.00 [.590]	89.90 [3.540]	3.00 [.120]
SSC-4	55.00 [2.170]	25.00 [.980]	143.20 [5.640]	3.30 [.130]
SSC-5	75.00 [2.950]	32.00 [1.250]	150.10 [5.910]	3.30 [.130]
SSC-5M1	75.00 [2.950]	32.00 [1.250]	79.25 [3.120]	3.30 [.130]
SSC-6	100.00 [3.940]	45.00 [1.770]	162.50 [6.400]	4.00 [.160]
SSC-7	120.00 [4.720]	70.00 [2.760]	145.00 [5.710]	3.80 [.150]
			± .25	± .010
SSC-075-FR	19.05 [.750]	9.90 [.390]	76.20 [3.000]	2.03 [.080]
SSC-150-FR	38.10 [1.500]	20.06 [.790]	79.50 [3.130]	2.54 [.100]

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

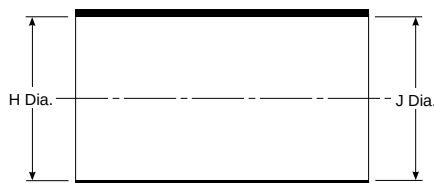
*Adhesive is optional. As-supplied dimensions appearing in table are for uncoated parts. When adhesive is added, entry diameters will be reduced by 1.5 [.06] maximum.

Ordering Information

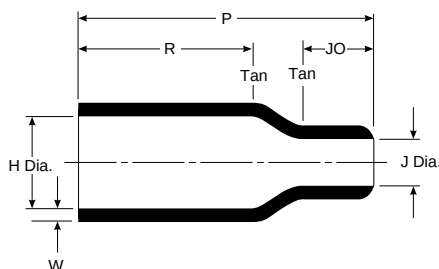
Military	
SSC-XTV	Sealing end cap with adhesive S-1017 and valve
SSC-X	Sealing end cap with adhesive S-1017
SSC-XU	End cap, uncoated
SSC-XXX-FR U	End cap, uncoated, round end
SSC-XXX-FR	Sealing end cap with adhesive S-1297, round end

Straight Boot

As Supplied (a)



After Unrestricted Recovery (b)



Applications

Use for mechanical protection and connector/cable strain relief. This family of boots has no lip, so that a boot can be installed directly onto the connector accessory thread.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part No.**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-12	Viton	N/A	S-1255-04
-25	Fluid-resistant elastomer	/42 or /86 or /225	S-1017 or S-1048 or S-1125
-100	Polyolefin, Zerohal	/86 or /180	S-1030 or S-1048

*For more information, please see the appropriate material page in this section.

**For more information, please see pages 10183-10188.

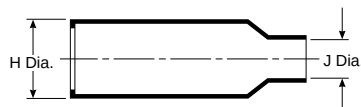
Product Dimensions

Part No.	H			J			P ±10% b	R ±10% b	JO Ref. b	W ±20% b
	Min.		Max. b	Min.		Max. b				
	-3, -4, -25 a	-12, -100 a		-3, -4, -25 a	-12, -100 a					
202A111	16.5 [65]	16.5 [65]	7.9 [31]	16.5 [65]	11.9 [47]	3.8 [15]	25.4 [100]	14.2 [56]	5.8 [23]	1.27 [05]
202A121	24.6 [97]	22.6 [89]	9.9 [39]	24.6 [97]	17.8 [70]	5.3 [21]	38.1 [150]	21.8 [86]	9.1 [36]	1.52 [06]
202A132	28.4 [112]	26.2 [103]	14.2 [56]	28.4 [112]	20.3 [80]	6.6 [26]	51.3 [202]	27.9 [110]	13.0 [51]	1.78 [07]
202A142	31.0 [122]	31.0 [122]	17.8 [70]	31.0 [122]	25.4 [100]	7.4 [29]	66.8 [263]	35.6 [140]	17.8 [70]	1.78 [07]
202A153	36.1 [142]	36.1 [142]	21.9 [86]	36.1 [142]	26.2 [103]	8.6 [34]	73.7 [290]	41.4 [163]	16.0 [63]	1.78 [07]
202A163	42.7 [168]	42.7 [168]	27.4 [108]	42.7 [168]	27.2 [107]	9.4 [37]	99.1 [390]	62.7 [247]	18.0 [71]	2.03 [08]
202A174	51.8 [204]	48.3 [190]	35.3 [139]	51.8 [204]	48.3 [190]	16.0 [63]	130.0 [513]	64.8 [255]	41.9 [165]	3.30 [13]
202A185	66.0 [260]	66.0 [260]	43.7 [172]	66.0 [260]	54.1 [213]	19.6 [77]	161.3 [635]	90.2 [355]	47.8 [188]	3.81 [15]
202A196	86.4 [340]	86.4 [340]	57.2 [225]	86.4 [340]	71.4 [281]	26.9 [106]	212.6 [837]	113.0 [445]	62.2 [245]	4.06 [16]

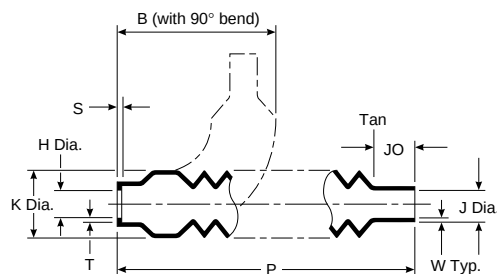
Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

Uniboot

As Supplied (a)



After Unrestricted Recovery (b)



Applications

Use to provide abrasion protection for connectors. The flexibility of design allows a variety of cable outlet angles. When installed on a spin-coupling adapter, cold reentry to the

connector is possible by compressing the molded part. When used with adhesive it provides environmental sealing.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part No.**
-50	Viton polymer blend	N/A	S-1125
-51	Elastomer polymer blend	/164	S-1124
-71	Flexible polyolefin	/42 or /86	S-1017 or S-1048

*For more information, please see the appropriate material page in this section.

**For more information, please see pages 10183-10188.

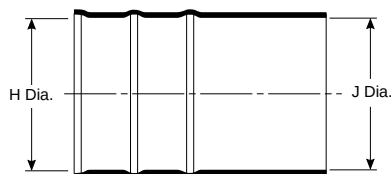
Product Dimensions

Part No.	H			Max. b	J			Max. b	K Max. b	P ±10% b	JO ±10% b	S ±.03[0.76] b		T ±.03[0.76] b		W Min. b	B Nom. b
	Min. a -50, -51	Min. a -71			Min. a -50, -51	Min. a -71											
202C611	14.2 [.56]	17.5 [.69]		6.9 [.27]	11.2 [.44]	14.2 [.56]		4.8 [.19]	21.1 [.83]	120.7 [4.75]	17.5 [.69]	1.52 [.06]	1.27 [.05]	0.33 [.013]		62.5 [2.46]	
202C621	22.4 [.88]	26.4 [1.04]		11.7 [.46]	17.8 [.70]	26.4 [1.04]		8.1 [.32]	26.7 [1.05]	133.4 [5.25]	19.0 [.78]	1.52 [.06]	1.27 [.05]	0.46 [.018]		67.8 [2.67]	
202C632	34.0 [1.34]	38.1 [1.50]		17.5 [.69]	26.9 [1.06]	38.1 [1.50]		12.7 [.50]	32.8 [1.29]	146.1 [5.75]	22.4 [.88]	1.78 [.07]	1.27 [.05]	0.51 [.020]		73.4 [2.89]	
202C642	44.2 [1.74]	47.8 [1.88]		22.4 [.88]	36.6 [1.44]	47.8 [1.88]		17.5 [.69]	37.8 [1.49]	158.8 [6.25]	25.4 [1.00]	1.78 [.07]	1.27 [.05]	0.61 [.024]		78.2 [3.08]	
202C653	21.2 [53.8]	54.9 [2.16]		27.9 [1.10]	45.7 [1.80]	54.9 [2.16]		22.4 [.88]	42.9 [1.69]	171.5 [6.75]	28.4 [1.12]	1.78 [.07]	2.03 [.08]	0.61 [.024]		82.8 [3.26]	
202C663	22.5 [57.2]	77.2 [3.04]		40.6 [1.60]	57.2 [2.25]	54.6 [2.15]		22.9 [.90]	62.2 [2.45]	236.2 [9.30]	35.1 [1.38]	2.03 [.08]	2.03 [.08]	0.66 [.026]		138.4 [5.45]	

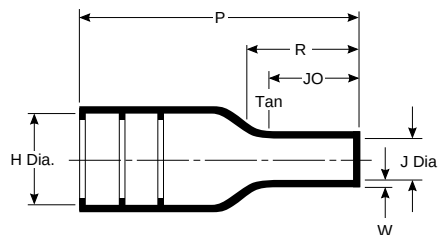
Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

Straight, Lipped Boot

As Supplied (a)



After Unrestricted Recovery (b)



Applications

Use in conjunction with Raychem adapters to provide strain relief for harness systems using circular connectors. Boot is compatible with all Raychem grooved adapters of appropriate shell size.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part No.**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-12	Viton	N/A	S-1255-04
-25	Fluid-resistant elastomer	/42 or /86 or /225	S-1017 or S-1048 or S-1125
-100	Polyolefin, Zerohal	/180	S-1030

*For more information, please see the appropriate material page in this section.

**For more information, please see pages 10183-10188.

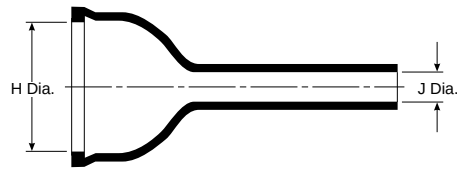
Product Dimensions

Part No.	H		J			P ±10% b	JO ±10% b	W ±20% b	RR ±10% b
	Min. a	Max. b	Min.		Max. b				
			-3, -4, -25 a	-12, -100 a					
202D121	23.3 [92]	10.5 [41]	23.3 [92]	12.4 [49]	5.6 [22]	38.1 [150]	10.2 [40]	1.78 [07]	—
202D132	28.4 [1.12]	14.3 [56]	28.4 [1.12]	14.7 [58]	6.6 [26]	54.9 [2.16]	16.5 [65]	1.78 [07]	21.6 [85]
202D142	31.0 [1.22]	17.8 [70]	31.0 [1.22]	16.0 [63]	7.2 [28]	66.8 [2.63]	17.8 [70]	2.03 [08]	24.5 [96]
202D153	36.0 [1.42]	22.4 [88]	36.0 [1.42]	18.5 [73]	8.4 [33]	80.0 [3.15]	20.8 [82]	2.03 [08]	29.7 [1.17]
202D163	42.7 [1.68]	28.2 [1.11]	42.7 [1.68]	22.0 [87]	9.9 [39]	103.6 [4.08]	24.6 [97]	2.29 [09]	36.7 [1.44]
202D174	51.8 [2.04]	35.1 [1.38]	51.8 [2.04]	35.3 [1.39]	15.8 [62]	130.3 [5.13]	39.6 [1.56]	3.30 [13]	53.8 [2.12]
202D185	66.0 [2.60]	44.5 [1.75]	66.0 [2.60]	45.7 [1.80]	20.4 [80]	165.1 [6.50]	48.3 [1.90]	4.06 [16]	65.6 [2.59]
202D196	81.7 [3.22]	57.6 [2.27]	81.7 [3.22]	57.1 [2.25]	25.4 [1.00]	177.8 [7.00]	47.8 [1.88]	4.06 [16]	67.1 [2.64]

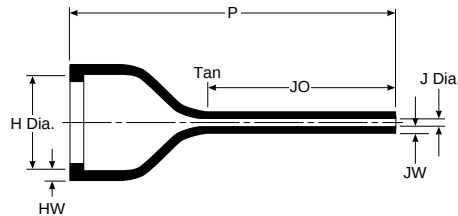
Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

Straight, Lipped Boot

As Supplied (a)



After Unrestricted Recovery (b)



Applications

Use with circular connectors and the appropriate Raychem backshell adapter to provide connector/cable strain relief. Boot is used in applications where only a small number of the avail-

able contacts are utilized, thus resulting in a high ratio between the adapter and cable diameters.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part No.**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-12	Viton	N/A	S-1255-04
-25	Fluid-resistant elastomer	/42 or /86 or /225	S-1017 or S-1048 or S-1125
-100	Polyolefin, Zerohal	/86 or /180	S-1030 or S-1048

*For more information, please see the appropriate material page in this section.**For more information, please see pages 10183-10188.

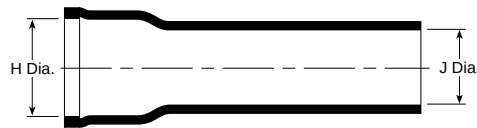
Product Dimensions

Part No.	H		J			P ±10% b	JO ±10% b	HW ±20% b	JW ±20% b
	Min. a	Max. b	Min.		Max. b				
			-3, -4, -25 a	-12, -100 a					
202D921	19.3 [.76]	13.0 [.51]	6.3 [.25]	4.5 [.18]	2.1 [.08]	60.2 [2.37]	37.6 [1.48]	1.52 [.06]	1.14 [.045]
202D932	26.1 [1.03]	19.1 [.75]	7.6 [.30]	5.5 [.22]	2.6 [.10]	74.2 [2.92]	45.0 [1.77]	1.78 [.07]	1.14 [.045]
202D953	34.2 [1.35]	26.0 [1.02]	9.6 [.38]	6.6 [.26]	3.1 [.12]	84.3 [3.32]	51.1 [2.01]	1.78 [.07]	1.14 [.045]
202D963	43.6 [1.72]	34.1 [1.34]	11.4 [.45]	7.8 [.31]	3.6 [.14]	99.6 [3.92]	57.7 [2.27]	1.78 [.07]	1.14 [.045]

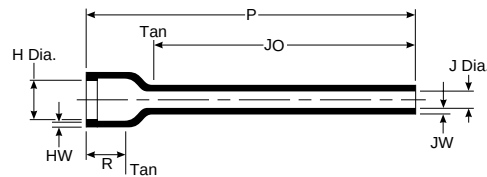
Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

Straight, Lipped Boot

As Supplied (a)



After Unrestricted Recovery (b)



Applications

Use in conjunction with Raychem adapters to provide strain relief for harness systems using circular connectors. Boot is compatible with all Raychem grooved adapters of the appropriate shell size.

Materials Available

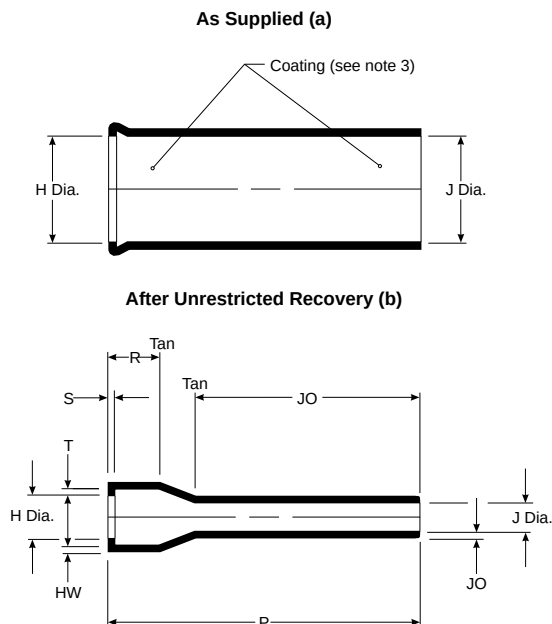
Material*	Material Description	Precoating No.	Adhesive Part No.**
-50	Flexible Viton polymer blend	N/A	S-1125
-51	Flexible elastomer polymer blend	/164	S-1124
-71	Flexible polyolefin	/42 or /86	S-1017 or S-1048

Product Dimensions

Part No.	H		J			P ±10% b	JO ±10% b	HW ±20% b	JW ±20% b
	Min. a	Max. b	Min.		Max. b				
			-3, -4, -25 a	-12, -100 a					
202F211	23.9 [.94]	9.9 [.39]	17.3 [.68]	6.6 [.26]	105.9 [4.17]	11.7 [.46]	86.4 [3.40]	1.5 [.06]	1.5 [.06]
202F221	27.2 [1.07]	13.2 [.52]	20.8 [.82]	7.6 [.30]	121.2 [4.77]	12.2 [.48]	98.6 [3.88]	1.5 [.06]	1.5 [.06]
202F232	31.0 [1.22]	18.5 [.73]	24.4 [.96]	8.9 [.35]	138.7 [5.46]	12.2 [.48]	112.8 [4.44]	1.8 [.07]	1.5 [.06]
202F242	35.6 [1.40]	22.1 [.87]	28.7 [1.13]	10.2 [.40]	159.5 [6.28]	12.2 [.48]	130.8 [5.15]	1.8 [.07]	1.5 [.06]
202F253	38.9 [1.53]	28.2 [1.11]	31.5 [1.24]	10.9 [.43]	177.8 [7.00]	14.0 [.55]	142.2 [5.60]	1.8 [.07]	1.5 [.06]
202F263	45.2 [1.78]	32.3 [1.27]	38.4 [1.51]	12.7 [.50]	203.2 [8.00]	15.2 [.60]	163.1 [6.42]	1.8 [.07]	1.5 [.06]
202F274	51.6 [2.03]	41.1 [1.62]	45.5 [1.79]	15.0 [.59]	203.2 [8.00]	15.2 [.60]	157.7 [6.21]	1.8 [.07]	1.8 [.07]

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

**Straight, Low Profile
Lipped Boot**



Applications

Use in conjunction with Raychem adapters to provide strain relief for harness systems using circular connectors. This range of parts is compatible with all Raychem grooved adapters of appropriate shell or entry size. When used with adhesive it provides environmental sealing.

Materials Available

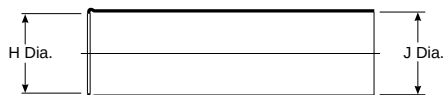
Material Dash No.	Material Description	Adhesive
-55	Fluoropolymer	S-1255-04

Product Dimensions

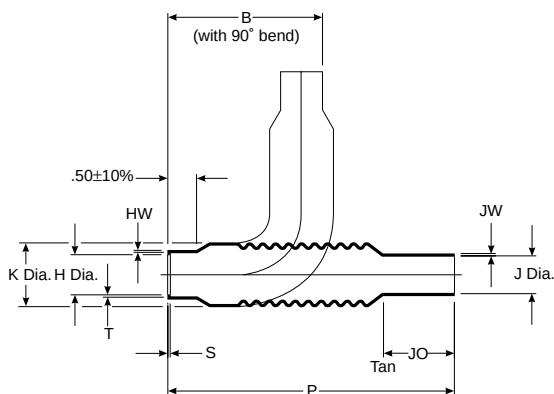
Part No.	H		J		P ±10% b	R ±10% b	S Ref. b	T Ref. b	JO ±10% b	HW Ref. b	JW Ref. b
	Min. a	Max. b	Min. a	Max. b							
202G211	23.9 [.94]	9.9 [.39]	23.9 [.94]	7.4 [.29]	105.9 [4.17]	11.7 [.46]	1.0 [.04]	1.3 [.05]	86.4 [3.40]	1.0 [.04]	0.7 [.03]
202G221	27.2 [1.07]	13.2 [.52]	27.2 [1.07]	8.4 [.33]	121.2 [4.77]	12.2 [.48]	1.0 [.04]	1.3 [.05]	87.4 [3.44]	1.0 [.04]	0.7 [.03]
202G232	31.0 [1.22]	18.5 [.73]	31.0 [1.22]	9.4 [.37]	138.7 [5.46]	12.2 [.48]	1.0 [.04]	1.3 [.05]	104.4 [4.11]	1.0 [.04]	0.7 [.03]
202G242	31.7 [1.25]	22.1 [.87]	31.7 [1.25]	10.7 [.42]	159.5 [6.28]	12.2 [.48]	1.0 [.04]	1.5 [.06]	124.5 [4.90]	1.0 [.04]	0.7 [.03]
202G253	38.9 [1.53]	28.2 [1.11]	38.9 [1.53]	11.9 [.47]	177.8 [7.00]	10.6 [.42]	1.3 [.05]	1.8 [.07]	143.5 [5.65]	1.3 [.05]	1.0 [.04]

Uniboot

As Supplied (a)



After Unrestricted Recovery (b)



Applications

Use to provide abrasion protection for connectors. The flexibility of design allows a variety of cable outlet angles. When installed on a spin-coupling adapter, cold re-entry to the

connector is possible by unscrewing the adapter and compressing the molded part. When used with adhesive it provides environmental sealing.

Materials Available

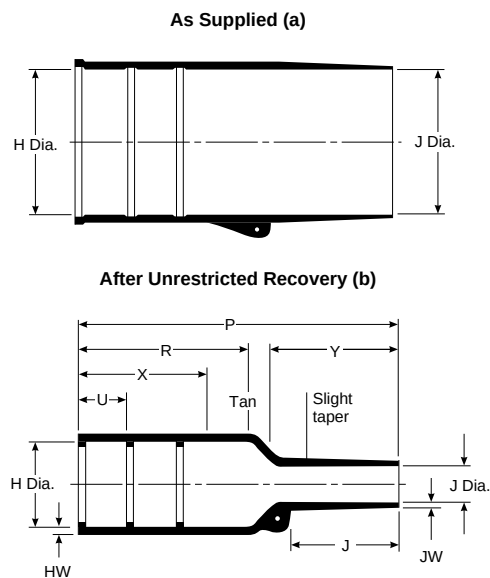
Material Dash No.	Material Description	Adhesive
-55	Fluoropolymer	S-1255-04

Product Dimensions

Part No.	H		J		K Max. b	P ±10% b	JO ±10% b	HW Ref. b	JW Ref. b	S Ref. b	T Ref. b	B Nom. b
	Min. a	Max. b	Min. a	Max. b								
202G611	14.2 [.56]	6.9 [.27]	11.2 [.44]	4.8 [.19]	21.1 [.83]	120.7 [4.75]	17.5 [.69]	1.0 [.04]	0.7 [.03]	1.0 [.04]	1.3 [.05]	62.5 [2.46]
202G621	26.6 [1.05]	11.7 [.46]	26.6 [1.05]	8.1 [.32]	26.6 [1.05]	133.8 [5.27]	19.9 [.78]	1.0 [.04]	0.7 [.03]	1.0 [.04]	1.3 [.05]	67.8 [2.67]
202G632	33.0 [1.30]	17.5 [.69]	33.0 [1.30]	12.7 [.50]	32.7 [1.29]	151.1 [5.95]	22.4 [.88]	1.0 [.04]	0.7 [.03]	1.0 [.04]	1.3 [.05]	73.4 [2.89]
202G642	35.5 [1.40]	22.3 [.88]	35.5 [1.40]	17.5 [.69]	37.8 [1.49]	157.2 [6.19]	25.4 [1.00]	1.3 [.05]	1.0 [.04]	1.3 [.05]	1.3 [.05]	78.2 [3.08]
202G653	42.6 [1.68]	27.9 [1.10]	42.6 [1.68]	22.4 [.88]	42.9 [1.69]	170.2 [6.70]	28.4 [1.12]	1.3 [.05]	1.0 [.04]	1.3 [.05]	1.5 [.06]	82.8 [3.26]

202K121 to 185

Straight, Lipped Boot



202K121 - 153 = 2 lips
 202K163 - 185 = 3 lips
 Mod 01 = 1 lip removed
 Mod 02 = 2 lips removed
 (only available in sizes 163, 174, 185).

Applications

Use in conjunction with Raychem adapters to provide strain relief for harness systems using circular connectors.

Boot is compatible with all Raychem grooved adapters of the appropriate shell size.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part No.**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-12	Viton	N/A	S-1255-04
-25	Fluid-resistant elastomer	/42 or /86 or /225	S-1017 or S-1048 or S-1125
-100	Polyolefin, Zerohal	/86 or /180	S-1030 or S-1048

*For more information, please see the appropriate material page in this section.

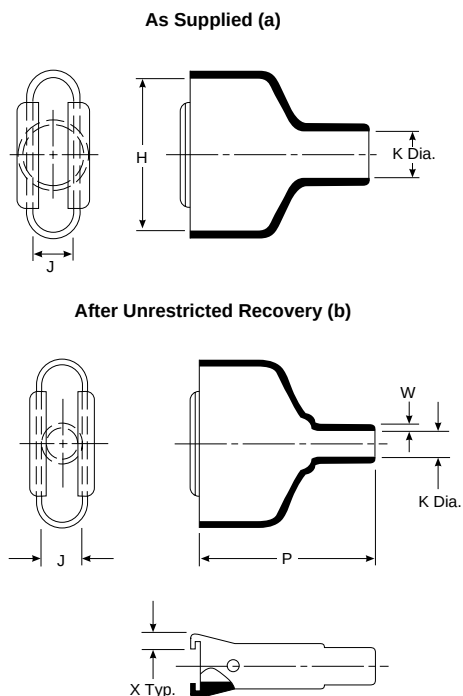
**For more information, please see pages 10183-10188.

Product Dimensions

Part No.	H			J				P ±10% b	R ±10% b	U ±10% b	JO ±10% b	HW ±20% b	JW Min. b	X ±20% b	Y ±20% b
	Min. -3, -4, -12, -25 a	Max. b		Min. -3, -4, -25 a	-12 a	-100 a	Max. b								
202K121	24.0 [.95]	10.4 [.41]		24.0 [.95]	13.0 [.51]	14.0 [.55]	5.6 [.22]	38.0 [1.50]	21.0 [.83]	12.0 [.47]	8.5 [.33]	1.6 [.06]	.41 [.016]	24.0 [.94]	13.0 [.51]
202K132	30.0 [1.18]	14.2 [.56]		30.0 [1.18]	14.0 [.55]	15.0 [.59]	5.9 [.23]	55.0 [2.17]	32.0 [1.26]	12.0 [.47]	11.5 [.45]	1.8 [.07]	.81 [.032]	24.0 [.94]	18.0 [.71]
202K142	31.0 [1.22]	18.0 [.71]		31.0 [1.22]	16.0 [.63]	18.0 [.71]	7.1 [.28]	67.0 [2.64]	35.0 [1.38]	20.0 [.79]	17.0 [.67]	1.8 [.07]	.81 [.032]	32.0 [1.26]	25.0 [.98]
202K153	36.0 [1.42]	22.4 [.88]		36.0 [1.42]	19.0 [.75]	21.0 [.83]	8.4 [.33]	80.0 [3.15]	42.0 [1.65]	20.0 [.79]	19.5 [.76]	2.0 [.08]	.81 [.032]	32.0 [1.26]	30.0 [1.18]
202K163	43.0 [1.69]	28.2 [1.11]		43.0 [1.69]	22.0 [.87]	25.0 [.98]	9.9 [.39]	99.0 [3.90]	61.0 [2.40]	20.0 [.79]	21.0 [.82]	2.2 [.08]	.81 [.032]	52.0 [2.05]	30.0 [1.18]
202K174	60.0 [2.36]	35.1 [1.38]		60.0 [2.36]	35.0 [1.38]	39.0 [1.54]	15.7 [.62]	130.0 [5.12]	72.0 [2.83]	20.0 [.79]	39.0 [1.53]	3.3 [.13]	1.02 [.040]	52.0 [2.05]	50.0 [1.97]
202K185	66.0 [2.60]	44.5 [1.75]		66.0 [2.60]	38.0 [1.50]	42.0 [1.65]	16.8 [.66]	170.0 [6.69]	90.0 [3.54]	20.0 [.79]	51.5 [2.02]	3.8 [.15]	1.63 [.064]	52.0 [2.05]	70.0 [2.76]

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

D-Subminiature, Straight Boot



Applications

Provides strain relief and mechanical protection on D-subminiature connector terminations.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part No.**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-12	Viton	N/A	S-1255-04
-25	Fluid-resistant elastomer	/42 or /86 or /225	S-1017 or S-1048 or S-1125
-100	Polyolefin, Zerohal	/86 or /180	S-1030 or S-1048

*For more information, please see the appropriate material page in this section.

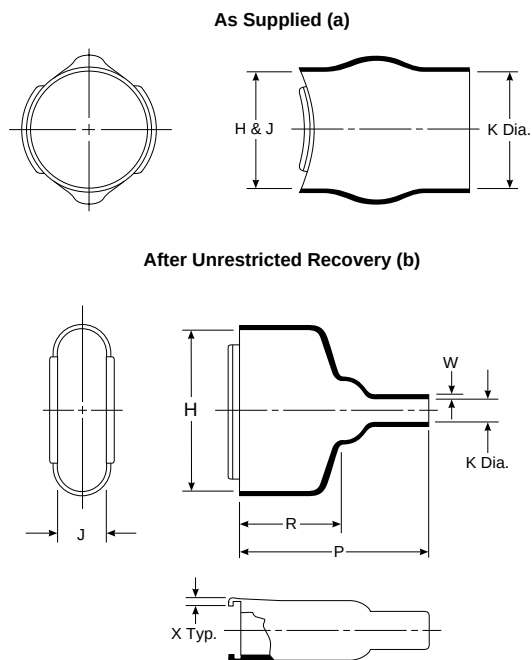
**For more information, please see pages 10183-10188.

Product Dimensions

Part No.	H		J		K		P	W	X	This Boot Fits	
	±5% a	±5% b	±5% a	±5% b	Min. a	Max. b				Cannon/ Cinch	Amphenol Series 17
214A011	20.3 [.80]	20.3 [.80]	10.7 [.42]	10.7 [.42]	7.9 [.31]	4.1 [.16]	33.3 [1.31]	1.0 [.04]	3.0 [.12]	DE-9	XX09X
214A021	28.2 [1.11]	28.2 [1.11]	10.7 [.42]	10.7 [.42]	10.2 [.40]	5.3 [.21]	38.9 [1.53]	1.0 [.04]	3.0 [.12]	DA-15	XX15X
214A032	42.2 [1.66]	42.2 [1.66]	10.7 [.42]	10.7 [.42]	14.0 [.55]	8.1 [.32]	45.0 [1.77]	1.0 [.04]	3.0 [.12]	DB-25	XX25X
214A042	58.7 [2.31]	58.7 [2.31]	10.7 [.42]	10.7 [.42]	17.3 [.68]	8.6 [.34]	53.3 [2.10]	1.0 [.04]	3.0 [.12]	DC-37	XX37X
214A052	57.9 [2.28]	57.9 [2.28]	13.7 [.54]	13.7 [.54]	19.1 [.75]	10.7 [.42]	61.0 [2.40]	1.0 [.04]	3.0 [.12]	DD-50	XX50X

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

D-Subminiature, Straight Boot



Applications

Provides strain relief and mechanical protection on D-subminiature connector terminations.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part No.**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-25	Fluid-resistant elastomer	/42 or /86	S-1017 or S-1048 or S-1125

*For more information, please see the appropriate material page in this section.

**For more information, please see pages 10183-10188.

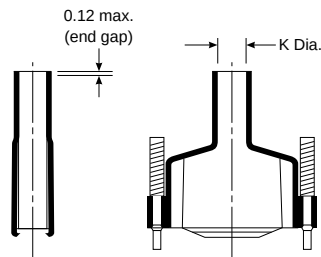
Product Dimensions

Part No.	H		J		K		P ±10% b	R ±10% b	W ±20% b	X ±20% b	This Boot Fits	
	±5% a	±5% b	±5% a	±5% b	Min. a	Max. b					Cannon/ Cinch	Amphenol Series 17
214A311	16.0 [.63]	20.3 [.80]	16.0 [.63]	10.7 [.42]	16.0 [.63]	4.1 [.16]	33.3 [1.31]	19.1 [.75]	1.02 [.04]	3.05 [.12]	DE-9	XX09X
214A321	19.1 [.75]	28.2 [1.11]	19.1 [.75]	10.7 [.42]	19.1 [.75]	5.3 [.21]	38.9 [1.53]	22.1 [.87]	1.02 [.04]	3.05 [.12]	DA-15	XX15X
214A332	29.2 [1.15]	42.2 [1.66]	29.2 [1.15]	10.7 [.42]	29.2 [1.15]	8.1 [.32]	45.0 [1.77]	25.4 [1.00]	1.02 [.04]	3.05 [.12]	DB-25	XX25X
214A342	34.3 [1.35]	58.7 [2.31]	34.3 [1.35]	10.7 [.42]	34.3 [1.35]	8.6 [.34]	53.3 [2.10]	28.4 [1.12]	1.02 [.04]	3.05 [.12]	DC-37	XX37X
214A352	37.6 [1.48]	57.9 [2.28]	37.6 [1.48]	13.7 [.54]	37.6 [1.48]	10.7 [.42]	61.0 [2.40]	31.8 [1.25]	1.02 [.04]	3.05 [.12]	DD-50	XX50X

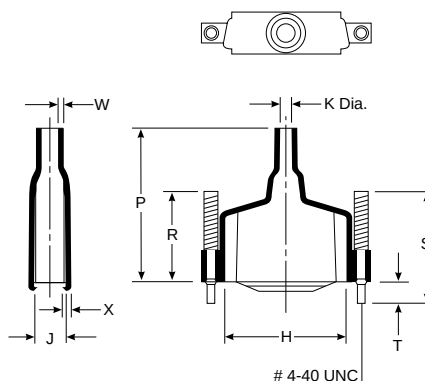
Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

**D-Subminiature, Straight
Boot with Jack Screws**

As Supplied (a)



After Unrestricted Recovery (b)



Applications

Provides strain relief and mechanical protection on D-subminiature connector terminations.

Materials Available

Material*	Material Description
-111-0	Semirigid polyolefin (black)
-111-8	Semirigid polyolefin (gray)

*Contact Tyco Electronics for information on material properties.

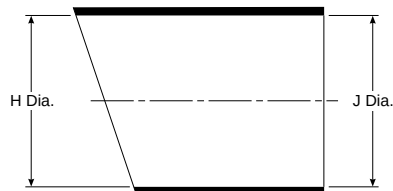
Product Dimensions

Part No.	H ±5% b	J ±10% b	K		P ±10% b	R Ref. b	S Nom. b	T Nom. b	X ±20% b	W ±20% b	Fits Connector Size
			Min. a	Max. b							
214P009-XXX	17.3 [.68]	12.0 [.47]	9.0 [.35]	3.8 [.15]	43.0 [1.69]	22.0 [.87]	29.0 [1.14]	6.4 [.25]	1.80 [.07]	1.5 [.06]	9 pin
214P015-XXX	25.2 [.99]	12.0 [.47]	10.5 [.41]	3.8 [.15]	44.0 [1.73]	23.0 [.90]	29.0 [1.14]	6.4 [.25]	2.03 [.08]	1.5 [.06]	15 pin
214P025-XXX	38.4 [1.51]	12.0 [.47]	12.0 [.47]	5.1 [.20]	49.0 [1.87]	25.0 [.98]	29.0 [1.14]	6.4 [.25]	2.16 [.085]	1.5 [.06]	25 pin
214P037-XXX	54.2 [2.13]	12.0 [.47]	12.0 [.47]	5.8 [.22]	55.0 [2.16]	25.0 [.98]	29.0 [1.14]	6.4 [.25]	2.26 [.089]	1.5 [.06]	37 pin

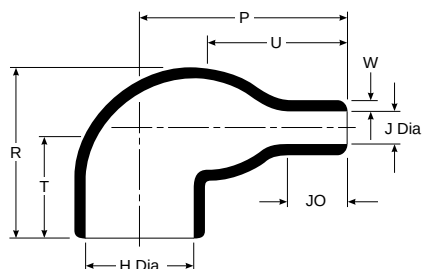
Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

Right-Angled Boot

As Supplied (a)



After Unrestricted Recovery (b)



Applications

Use for mechanical protection and connector-cable strain relief. This family of boots has no lip, so a boot can be installed directly onto the connector accessory thread.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part No.**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-12	Viton	N/A	S-1255-04
-25	Fluid-resistant elastomer	/42 or /86 or /225	S-1017 or S-1048 or S-1125
-100	Polyolefin, Zerohal	/180 J end coated only, S1030 tape supplied in bag for H end	S-1030

*For more information, please see the appropriate material page in this section.

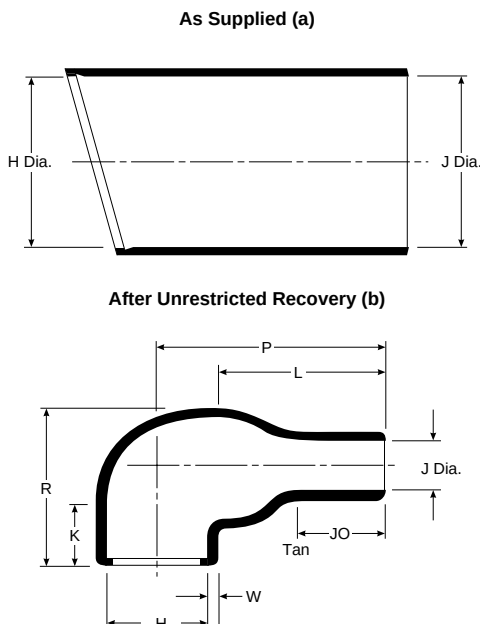
**For more information, please see pages 10183-10188.

Product Dimensions

Part No.	H		J				P ±10% b	R ±10% b	T ±10% b	U ±10% b	JO ±10% b	W ±20% b
	Min. a	Max. b	-3, -4, -25 a	Min. -100 a	-12 a	Max. b						
222A111	17.8 [.70]	7.9 [.31]	17.8 [.70]	10.9 [.43]	9.9 [.39]	3.8 [.15]	17.3 [.68]	20.1 [.79]	—	11.4 [.45]	4.3 [.17]	1.02 [.04]
222A121	24.9 [.98]	10.2 [.40]	24.9 [.98]	16.0 [.63]	18.0 [.71]	5.3 [.21]	21.3 [.84]	22.6 [.89]	—	14.7 [.58]	5.8 [.23]	1.27 [.05]
222A132	30.0 [1.18]	14.2 [.56]	30.0 [1.18]	21.1 [.83]	20.6 [.81]	6.4 [.25]	26.9 [1.06]	26.7 [1.05]	19.1 [.75]	17.8 [.70]	7.1 [.28]	1.52 [.06]
222A142	32.5 [1.28]	17.3 [.68]	32.5 [1.28]	22.9 [.90]	22.9 [.90]	6.9 [.27]	36.6 [1.44]	30.5 [1.20]	19.1 [.75]	24.9 [.98]	10.2 [.40]	1.78 [.07]
222A152	36.1 [1.42]	21.8 [.86]	36.1 [1.42]	27.4 [1.08]	26.4 [1.04]	8.4 [.33]	43.7 [1.72]	35.1 [1.38]	19.1 [.75]	30.0 [1.18]	12.7 [.50]	1.78 [.07]
222A163	43.9 [1.73]	27.4 [1.08]	43.9 [1.73]	28.4 [1.12]	27.4 [1.08]	9.4 [.37]	53.6 [2.11]	43.9 [1.73]	19.1 [.75]	34.0 [1.34]	17.3 [.68]	2.03 [.08]
222A174	53.1 [2.09]	33.8 [1.33]	53.1 [2.09]	48.3 [1.90]	46.7 [1.84]	15.0 [.59]	75.7 [2.98]	52.8 [2.08]	25.4 [1.00]	53.3 [2.10]	32.0 [1.26]	3.30 [.13]
222A185	67.6 [2.66]	44.2 [1.74]	67.6 [2.66]	58.4 [2.30]	54.4 [2.14]	20.3 [.80]	97.5 [3.84]	66.0 [2.60]	25.4 [1.00]	71.1 [2.80]	40.6 [1.60]	3.81 [.15]
222A196	87.6 [3.45]	55.4 [2.18]	87.6 [3.45]	68.8 [2.71]	63.0 [2.48]	23.4 [.92]	128.0 [5.04]	79.2 [3.12]	25.4 [1.00]	87.6 [3.45]	56.4 [2.22]	4.57 [.18]

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

Right-Angled, Lipped Boot



Applications

Use in conjunction with Raychem adapters to provide strain relief for harness systems using circular connectors. Boot is compatible with all Raychem grooved adapters of the appropriate shell size.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part No.**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-12	Viton	N/A	S-1255-04
-25	Fluid-resistant elastomer	/42 or /86 or /225	S-1017 or S-1048 or S-1125
-100	Polyolefin, Zerohal	/180 J end coated only, S1030 tape supplied in bag for H end	S-1030

*For more information, please see the appropriate material page in this section.

**For more information, please see pages 10183-10188

Product Dimensions

Part No.	H		J				P ±10% b	R Ref. b	JO ±10%	W ±20%	K ±10% b	L ±10% b
	Min. a	Max. a	-3, -4, -25 b	Min. -100 b	-12 b	Max. b						
222D121	23.4 [.92]	10.4 [.41]	23.4 [.92]	14.0 [.55]	12.4 [.49]	5.6 [.22]	21.3 [.84]	22.6 [.89]	5.8 [.23]	1.27 [.05]	15.2 [.60]	14.7 [.58]
222D132	28.4 [1.12]	14.2 [.56]	28.4 [1.12]	15.0 [.59]	14.7 [.58]	6.6 [.26]	33.8 [1.33]	27.2 [1.07]	15.5 [.65]	1.52 [.06]	19.1 [.75]	24.9 [.98]
222D142	31.0 [1.22]	17.8 [.70]	31.0 [1.22]	18.0 [.71]	16.0 [.63]	7.1 [.28]	36.6 [1.44]	31.0 [1.22]	12.7 [.50]	1.78 [.07]	19.1 [.75]	24.9 [.98]
222D152	36.0 [1.42]	22.4 [.88]	36.0 [1.42]	21.0 [.83]	18.5 [.73]	8.4 [.33]	43.7 [1.72]	35.1 [1.38]	14.5 [.57]	1.78 [.07]	19.1 [.75]	30.0 [1.18]
222D163	42.7 [1.68]	28.2 [1.11]	42.7 [1.68]	25.0 [.98]	22.1 [.87]	9.9 [.39]	53.6 [2.11]	43.9 [1.73]	17.5 [.69]	2.03 [.08]	19.3 [.76]	33.0 [1.30]
222D174	51.8 [2.04]	35.1 [1.38]	51.8 [2.04]	39.0 [1.54]	35.3 [1.39]	15.7 [.62]	78.0 [3.07]	52.8 [2.08]	33.5 [1.32]	3.30 [.13]	25.4 [1.00]	53.8 [2.12]
222D185	66.0 [2.60]	44.5 [1.75]	66.0 [2.60]	42.0 [1.65]	45.7 [1.80]	20.3 [.80]	97.5 [3.84]	66.0 [2.60]	40.1 [1.58]	3.81 [.15]	25.4 [1.00]	71.1 [2.80]
222D196	81.8 [3.22]	60.5 [2.38]	81.8 [3.22]	57.2 [2.25]	57.2 [2.25]	25.4 [1.00]	117.9 [4.64]	83.8 [3.30]	38.1 [1.50]	4.06 [.16]	25.4 [1.00]	80.0 [3.15]

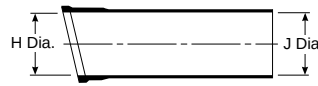
Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 (.06) max.

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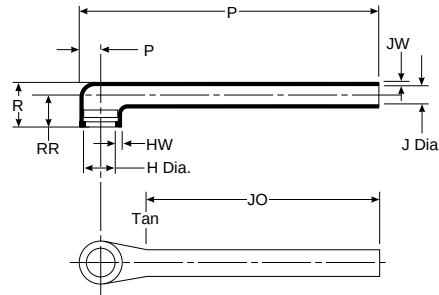
Heat-Shrink Tubing,
Molded Parts and Adhesives

Right-Angled, Lipped Boot

As Supplied (a)



After Unrestricted Recovery (b)



Applications

Provides strain relief and mechanical protection between cable and connector. Boot is usually used on open-wire-bundle airborne harnesses, or applications where the long tail replaces cable jacketing removed during termination.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part No.**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-12	Viton	N/A	S-1255-04
-25	Fluid-resistant elastomer	/42 or /86 or /225	S-1017 or S-1048 or S-1125
-100	Polyolefin, Zerohal	/86 or /180 J end coated only, S1030 tape supplied in bag for H end	S-1030 or S-1048

*For more information, please see the appropriate material page in this section.

**For more information, please see pages 10183-10188.

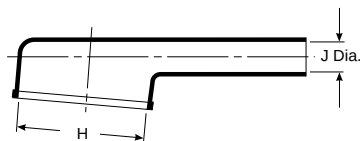
Product Dimensions

Part No.	H		J			P ±10% b	R Ref b	JO ±10% b	PP ±10% b	RR 10% b	HW ±20%	JW ±20%
	Min. a	Max. b	Min. -3, -4, -25 a	Min. -12, -100 b	Max. b							
222D211	22.4 [.88]	11.4 [.45]	22.4 [.88]	14.0 [.55]	6.4 [.25]	105.2 [4.14]	18.5 [.73]	87.6 [3.45]	6.9 [.27]	12.4 [.49]	1.52 [.06]	1.14 [.045]
222D221	25.7 [1.01]	15.0 [.59]	25.7 [1.01]	16.0 [.63]	7.4 [.29]	124.0 [4.88]	19.8 [.78]	99.1 [3.90]	8.4 [.33]	15.0 [.59]	1.52 [.06]	1.14 [.045]
222D232	29.5 [1.16]	18.8 [.74]	29.5 [1.16]	18.3 [.72]	8.4 [.33]	146.3 [5.76]	20.8 [.82]	114.3 [4.50]	10.4 [.41]	15.5 [.61]	1.78 [.07]	1.14 [.045]
222D242	34.0 [1.34]	22.9 [.90]	34.0 [1.34]	21.3 [.84]	9.7 [.38]	172.2 [6.78]	21.8 [.86]	132.6 [5.22]	12.2 [.48]	15.7 [.62]	1.78 [.07]	1.14 [.045]
222D253	37.3 [1.47]	29.5 [1.16]	37.3 [1.47]	23.1 [.91]	10.4 [.41]	185.2 [7.29]	24.4 [.96]	143.8 [5.66]	15.5 [.61]	17.8 [.70]	2.03 [.08]	1.14 [.045]
222D263	43.7 [1.72]	34.0 [1.34]	43.7 [1.72]	27.2 [1.07]	12.2 [.48]	231.6 [8.41]	27.4 [1.08]	169.2 [6.66]	18.3 [.72]	19.8 [.78]	2.03 [.08]	1.14 [.045]
222D274	50.0 [1.97]	41.1 [1.62]	50.0 [1.97]	31.5 [1.24]	14.2 [.56]	224.5 [8.84]	29.5 [1.16]	173.2 [6.82]	21.1 [.83]	20.8 [.82]	2.29 [.09]	1.40 [.055]
222D285	62.7 [2.47]	47.0 [1.85]	62.7 [2.47]	39.1 [1.54]	17.5 [.69]	227.3 [8.95]	33.3 [1.31]	168.1 [6.62]	24.1 [.95]	23.4 [.92]	2.54 [.10]	1.40 [.055]
222D296	69.3 [2.73]	59.7 [2.35]	69.3 [2.73]	43.2 [1.70]	19.6 [.77]	233.4 [9.19]	35.1 [1.38]	157.2 [6.19]	30.0 [1.18]	23.6 [.93]	2.54 [.10]	1.40 [.055]
222D299	81.8 [3.22]	67.1 [2.64]	81.8 [3.22]	51.1 [2.01]	22.9 [.90]	237.0 [9.33]	44.5 [1.75]	151.1 [5.95]	33.3 [1.31]	31.2 [1.23]	2.54 [.10]	1.40 [.055]

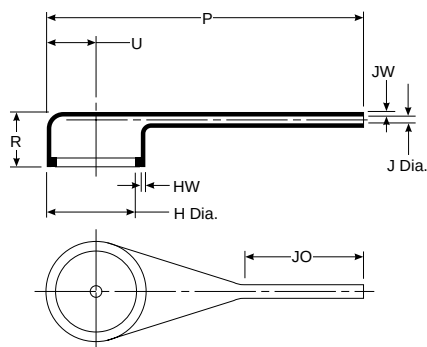
Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

Right-Angled, Lipped Boot

As Supplied (a)



After Unrestricted Recovery (b)



Applications

Provides strain relief and mechanical protection between cable and connector. It is used in applications where only a small number of the available contacts are utilized, resulting in a high ratio between the adapter and cable diameters.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part No.**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-12	Viton	N/A	S-1255-04
-25	Fluid-resistant elastomer	/42 or /86 or /225	S-1017 or S-1048 or S-1125
-100	Polyolefin, Zerohal	/86 or /180 J end coated only, S1030 tape supplied in bag for H end	S-1030 or S-1048

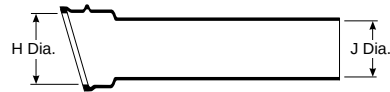
Product Dimensions

Part No.	H		J			P ±10% b	R Ref. b	U ±10% b	JO ±10% b	HW ±20% b	JW ±20% b
	Min. a	Max. b	Min.		Max. b						
			-3, -4, -25 a	-12, -100 a							
222D921	19.3 [.76]	13.0 [.51]	6.3 [.25]	4.5 [.18]	2.1 [.08]	44.5 [1.75]	16.3 [.64]	5.6 [.22]	21.8 [.86]	1.52 [.06]	1.14 [.045]
222D932	26.1 [1.03]	19.1 [.75]	7.6 [.30]	5.6 [.22]	2.6 [.10]	67.3 [2.65]	18.0 [.71]	8.4 [.33]	29.2 [1.15]	1.78 [.07]	1.14 [.045]
222D953	34.2 [1.35]	26.0 [1.02]	9.6 [.38]	6.6 [.26]	3.0 [.12]	81.3 [3.20]	18.8 [.74]	11.4 [.45]	36.3 [1.39]	1.78 [.07]	1.14 [.045]
222D963	43.6 [1.72]	34.1 [1.34]	11.4 [.45]	7.8 [.31]	3.6 [.14]	115.6 [4.55]	21.3 [.84]	15.5 [.61]	47.0 [1.85]	1.78 [.07]	1.14 [.045]

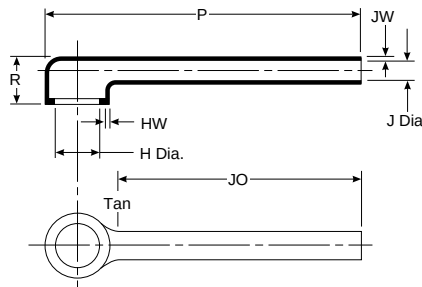
Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 mm [.06"] max.

Right-Angled, Lipped Boot

As Supplied (a)



After Unrestricted Recovery (b)



Applications

Use in conjunction with Raychem adapters to provide strain relief for harness systems using circular connectors. Boot is compatible with all Raychem grooved adapters of the appropriate shell size.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part No.**
-50	Viton polymer blend	N/A	S-1125
-51	Elastomer polymer blend	/164	S-1124
-71	Flexible polyolefin	/42 or /86	S-1017 or S-1048

*For more information, please see the appropriate material page in this section.

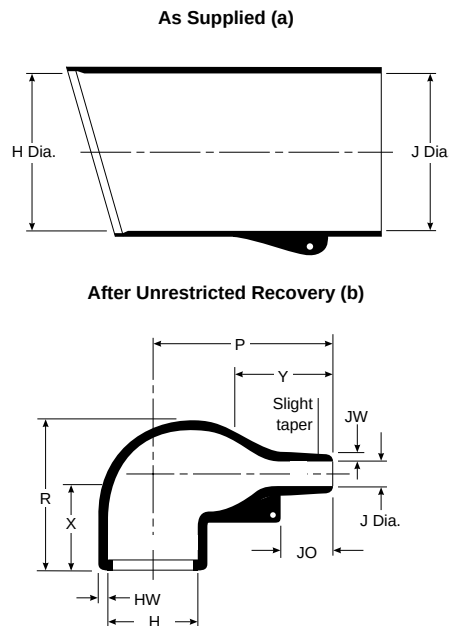
**For more information, please see pages 10183-10188.

Product Dimensions

Part No.	H		J		P ±10% b	R ±10% b	JO ±10% b	HW +.06 to -.03 b	JW ±.03 b
	Min. a	Max. b	Min. a	Max. b					
222F211	23.9 [.94]	9.9 [.39]	17.3 [.68]	6.6 [.26]	105.2 [4.14]	18.5 [.73]	87.6 [3.45]	1.52 [.06]	1.52 [.06]
222F221	27.2 [1.07]	13.2 [.52]	20.8 [.82]	7.6 [.30]	124.0 [4.88]	19.8 [.78]	99.1 [3.90]	1.52 [.06]	1.52 [.06]
222F232	31.0 [1.22]	18.5 [.73]	24.4 [.96]	8.9 [.35]	146.3 [5.76]	20.8 [.82]	114.3 [4.50]	1.78 [.07]	1.52 [.06]
222F242	35.6 [1.40]	22.1 [.87]	28.7 [1.13]	10.2 [.40]	172.2 [6.78]	21.8 [.86]	132.6 [5.22]	1.78 [.07]	1.52 [.06]
222F253	38.9 [1.53]	28.2 [1.11]	31.5 [1.24]	10.9 [.43]	185.2 [7.29]	24.4 [.96]	143.8 [5.66]	1.78 [.07]	1.52 [.06]
222F263	45.2 [1.78]	32.3 [1.27]	38.4 [1.51]	12.7 [.50]	213.6 [8.41]	27.4 [1.08]	169.2 [6.66]	1.78 [.07]	1.52 [.06]
222F274	51.6 [2.03]	41.1 [1.62]	44.5 [1.75]	15.0 [.59]	224.5 [8.84]	29.5 [1.16]	173.2 [6.82]	1.78 [.07]	1.78 [.07]
222F285	62.7 [2.47]	42.9 [1.69]	47.2 [1.86]	17.5 [.69]	227.3 [8.95]	33.3 [1.31]	168.1 [6.62]	2.03 [.08]	1.78 [.07]

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

Right-Angled, Lipped Boot



Applications

Use in conjunction with Raychem adapters to provide strain relief for harness systems using circular connectors. Boot is compatible with all Raychem grooved adapters of the appropriate shell size.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part No.**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-12	Viton	N/A	S-1255-04
-25	Fluid-resistant elastomer	/42 or /86 or /225	S-1017 or S-1048 or S-1125
-100	Polyolefin, Zerohal	/180 J end coated only, S1030 tape supplied in bag for H end	S-1030

*For more information, please see the appropriate material page in this section.

**For more information, please see pages 10183-10188.

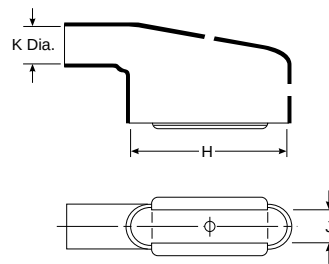
Product Dimensions

Part No.	H			J			P ±10% b	R ±10% b	JO ±10% b	HW ±20% b	JW ±20% b	X ±20% b	Y ±20% b
	Min.		Max. b	Min.		Max. b							
	-3, -4, -25 a	-100 a		-3, -4, -25 a	-100 a								
222K121	24.0 [.95]	24.0 [.95]	10.4 [.41]	24.0 [.95]	14.0 [.55]	5.6 [.22]	25.0 [.98]	25.0 [.98]	8.5 [.33]	1.3 [.05]	.41 [.016]	18.0 [.71]	16.0 [.63]
222K132	30.0 [1.18]	30.0 [1.18]	14.2 [.56]	30.0 [1.18]	15.0 [.59]	5.9 [.23]	32.0 [1.26]	27.0 [1.06]	8.5 [.33]	1.5 [.06]	.61 [.024]	18.0 [.71]	20.0 [.79]
222K142	31.0 [1.22]	31.0 [1.22]	18.0 [.71]	31.0 [1.22]	18.0 [.71]	7.1 [.28]	39.0 [1.54]	31.0 [1.22]	15.0 [.59]	1.8 [.07]	.81 [.032]	18.0 [.71]	20.0 [.79]
222K152	36.0 [1.42]	36.0 [1.42]	22.4 [.88]	36.0 [1.42]	21.0 [.83]	8.4 [.33]	46.0 [1.81]	38.0 [1.50]	18.0 [.63]	1.8 [.07]	.81 [.032]	25.0 [.98]	25.0 [.98]
222K163	43.0 [1.69]	43.0 [1.69]	28.2 [1.11]	43.0 [1.69]	25.0 [.98]	9.9 [.39]	55.0 [2.17]	45.0 [1.77]	17.5 [.69]	2.0 [.08]	.81 [.032]	25.0 [.98]	30.0 [1.18]
222K174	60.0 [2.36]	52.0 [2.05]	35.1 [1.38]	60.0 [2.36]	39.0 [1.54]	15.7 [.62]	80.0 [3.15]	54.0 [2.13]	32.0 [1.26]	3.3 [.13]	1.02 [.040]	25.0 [.98]	45.0 [1.77]
222K185	66.0 [2.60]	66.0 [2.60]	44.5 [1.75]	66.0 [2.60]	42.0 [1.65]	16.8 [.66]	108.0 [4.25]	68.0 [2.68]	48.0 [1.89]	3.8 [.15]	1.63 [.064]	35.0 [1.38]	70.0 [2.76]

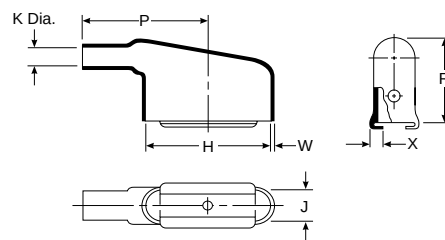
Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

**D-Subminiature,
Right-Angled Boot**

As Supplied (a)



After Unrestricted Recovery (b)



Applications

Provides strain relief and mechanical protection on D-subminiature connector terminations.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part No.**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-12	Viton	N/A	S-1255-04
-25	Fluid-resistant elastomer	/42 or /86 or /225	S-1017 or S-1048 or S-1125
-100	Polyolefin, Zerohal	/180 J end coated only, S1030 tape supplied in bag for H end	S-1030

*For more information, please see the appropriate material page in this section.

**For more information, please see pages 10183-10188.

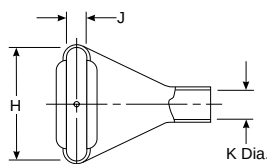
Product Dimensions

Part No.	H		J		K		P ±10% b	R ±10% b	W ±20% b	X ±20% b	This Boot Fits Cannon/ Cinch
	±5% a	±5% b	±5% a	±5% b	Min. a	Max. b					
234A011	20.3 [.80]	20.3 [.80]	10.7 [.42]	10.7 [.42]	7.9 [.31]	4.1 [.16]	25.9 [1.02]	21.6 [.85]	1.02 [.04]	3.05 [.12]	DE-9
234A021	28.2 [1.11]	28.2 [1.11]	10.7 [.42]	10.7 [.42]	10.2 [.40]	5.3 [.21]	30.7 [1.21]	24.6 [.97]	1.02 [.04]	3.05 [.12]	DA-15
234A032	42.2 [1.66]	42.2 [1.66]	10.7 [.42]	10.7 [.42]	14.0 [.55]	7.4 [.29]	42.9 [1.69]	27.9 [1.10]	1.02 [.04]	3.05 [.12]	DB-25
234A042	58.7 [2.31]	58.7 [2.31]	10.7 [.42]	10.7 [.42]	17.3 [.68]	8.6 [.34]	53.3 [2.10]	30.5 [1.20]	1.02 [.04]	3.05 [.12]	DC-37
234A052	57.9 [2.28]	57.9 [2.28]	13.7 [.54]	13.7 [.54]	19.1 [.75]	10.7 [.42]	55.9 [2.20]	32.3 [1.27]	1.02 [.04]	3.05 [.12]	DD-50
234A061	20.3 [.80]	20.3 [.80]	10.7 [.42]	10.7 [.42]	7.9 [.31]	3.8 [.15]	25.9 [1.02]	18.5 [.73]	1.02 [.04]	3.05 [.12]	DE-9
234A071	28.2 [1.11]	28.2 [1.11]	10.7 [.42]	10.7 [.42]	10.2 [.40]	5.1 [.20]	30.7 [1.21]	19.8 [.78]	1.02 [.04]	3.05 [.12]	DA-15

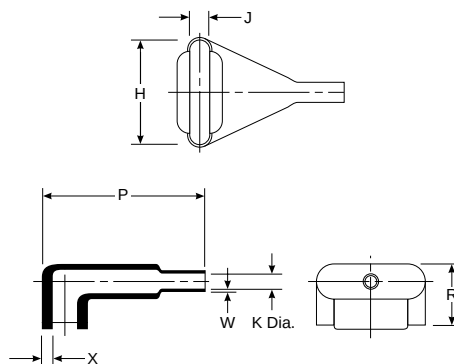
Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 (.06) max.

**D-Subminiature, Side-Entry
Boot**

As Supplied (a)



After Unrestricted Recovery (b)



Applications

Provides strain relief and mechanical protection on D-subminiature connector terminations.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part No.**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-25	Fluid-resistant elastomer	/42 or /86 or /225	S-1017 or S-1048 or S-1125

*For more information, please see the appropriate material page in this section.

**For more information, please see pages 10183-10188.

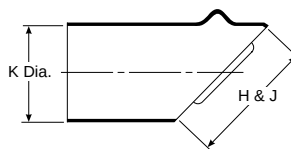
Product Dimensions

Part No.	H		J		K		P ±10% b	R ±10% b	W ±20% b	X ±20% b	This Boot Fits Cannon/Cinch
	±5% a	±5% b	±5% a	±5% b	Min. a	Max. b					
234A111	20.3 [.80]	20.3 [.80]	10.7 [.42]	10.7 [.42]	7.9 [.31]	4.1 [.16]	27.9 [1.10]	18.5 [.73]	1.02 [.04]	3.05 [.12]	DE-9
234A121	28.2 [1.11]	28.2 [1.11]	10.7 [.42]	10.7 [.42]	10.2 [.40]	5.3 [.21]	35.1 [1.38]	18.8 [.74]	1.02 [.04]	3.05 [.12]	DA-15
234A132	42.2 [1.66]	42.2 [1.66]	10.7 [.42]	10.7 [.42]	14.0 [.55]	6.4 [.25]	47.5 [1.87]	20.1 [.79]	1.02 [.04]	3.05 [.12]	DB-25
234A142	58.7 [2.31]	58.7 [2.31]	10.7 [.42]	10.7 [.42]	17.3 [.68]	7.9 [.31]	59.7 [2.35]	20.1 [.79]	1.02 [.04]	3.05 [.12]	DC-37
234A152	57.9 [2.28]	57.9 [2.28]	13.7 [.54]	13.7 [.54]	19.1 [.75]	9.1 [.36]	63.2 [2.49]	26.4 [1.04]	1.02 [.04]	3.05 [.12]	DD-50

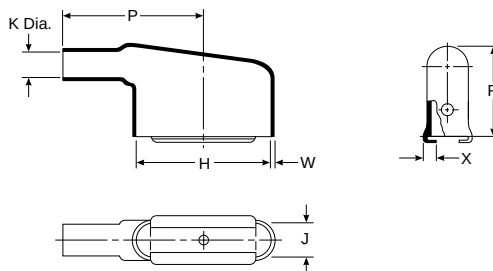
Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

**D-Subminiature,
90° End-Entry Boot**

As Supplied (a)



After Unrestricted Recovery (b)



Applications

Provides strain relief and mechanical protection on D-subminiature connector terminations.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part No.**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-25	Fluid-resistant elastomer	/42 or /86	S-1017 or S-1048 or S-1125

*For more information, please see the appropriate material page in this section.

**For more information, please see pages 10183-10188.

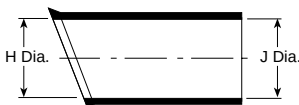
Product Dimensions

Part No.	H		J		K		P ±10% b	R ±10% b	W ±20% b	X ±20% b	This Boot Fits Cannon/Cinch
	±5% a	±5% b	±5% a	±5% b	Min. a	Max. b					
234A611	16.0 [.63]	20.3 [.80]	16.0 [.63]	10.7 [.42]	16.0 [.63]	4.1 [.16]	25.9 [1.02]	21.6 [.85]	1.02 [.04]	3.05 [.12]	DE-9
234A621	19.1 [.75]	28.2 [1.11]	19.1 [.75]	10.7 [.42]	19.1 [.75]	5.3 [.21]	30.7 [1.21]	24.6 [.97]	1.02 [.04]	3.05 [.12]	DA-15
234A632	29.2 [1.15]	42.2 [1.66]	29.2 [1.15]	10.7 [.42]	29.2 [1.15]	7.4 [.29]	42.9 [1.69]	27.9 [1.10]	1.02 [.04]	3.05 [.12]	DB-25
234A642	34.3 [1.35]	58.7 [2.31]	34.3 [1.35]	10.7 [.42]	34.3 [1.35]	8.6 [.34]	53.3 [2.10]	30.5 [1.20]	1.02 [.04]	3.05 [.12]	DC-37
234A652	37.6 [1.48]	57.9 [2.28]	37.6 [1.48]	13.7 [.54]	37.6 [1.48]	10.7 [.42]	55.9 [2.20]	32.3 [1.27]	1.02 [.04]	3.05 [.12]	DD-50
234A661	16.0 [.63]	20.3 [.80]	16.0 [.63]	10.7 [.42]	16.0 [.63]	3.8 [.15]	25.9 [1.02]	18.5 [.73]	1.02 [.04]	3.05 [.12]	DE-9
234A671	19.1 [.75]	28.2 [1.11]	19.1 [.75]	10.7 [.42]	19.1 [.75]	5.1 [.20]	30.7 [1.21]	19.8 [.78]	1.02 [.04]	3.05 [.12]	DA-15

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

45° Angled Boot

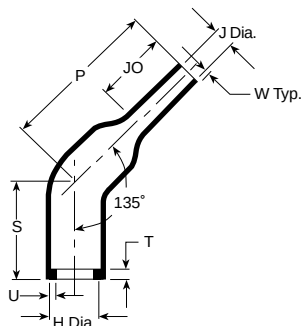
As Supplied (a)



Applications

Designed for use in the aggressive environments found adjacent to engines in automotive, aerospace and military applications, heat-shrinkable molded parts provide rugged protection, strain relief and a full 360° environmental seal. The introduction of the 45° option means there is now a choice of three routes to the connector for closer positioning and greater design freedom.

After Unrestricted Recovery (b)



Compatibility Chart

Material Dash Number	Material Description	Precoating No.	Adhesive Part No.
-3	Polyolefin, semirigid	/42, /86	S-1017 or S-1048
-4	Polyolefin, flexible	/42, /86	S-1017 or S-1048
-25	Elastomer, fluid-resistant	/42, /86, /225	S-1017 or S-1125
-130	Polyolefin, commercial flexible	/42, /86	S-1017 or S-1048
-12	Viton	N/A	S-1255-04
-100	Polyolefin, Zerohal	/180 J end coated only, S1030 tape supplied in bag for H end	—

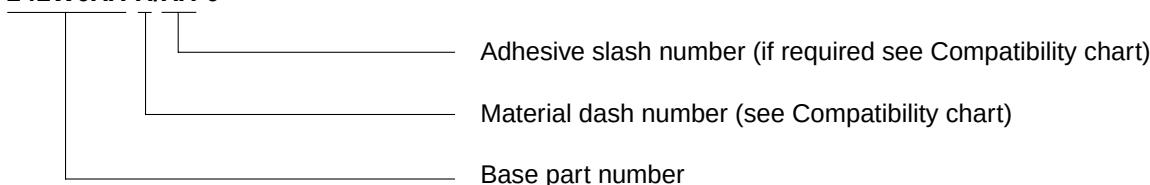
Product Dimensions

Part No.	H		J			P ± 10% b	S ± 10% b	T ± 10% b	U ± 10% b	JO ± 10% b	W ± 20% b
	Min. a -12, -10	Max. b 3, -25	Min. a -12, -100	Max. b -3, -25	Max. b -12, -100, -3, -25						
242W042	31.0 [1.22]	7.9 [.31]	18.0 [.71]	31.0 [1.22]	7.0 [.28]	55.0 [2.17]	35.0 [1.38]	3.5 [.14]	2.0 [.08]	25.0 [.98]	1.8 [.07]
242W053	36.0 [1.42]	2.1 [.08]	21.0 [.83]	36.0 [1.42]	8.4 [.33]	60.0 [2.36]	40.0 [1.58]	3.5 [.14]	2.0 [.08]	30.0 [1.18]	2.0 [.08]
242W063	43.0 [1.69]	7.9 [.31]	25.0 [.99]	43.0 [1.69]	9.9 [.39]	65.0 [2.56]	45.0 [1.77]	3.5 [.14]	2.0 [.08]	35.0 [1.38]	2.2 [.09]

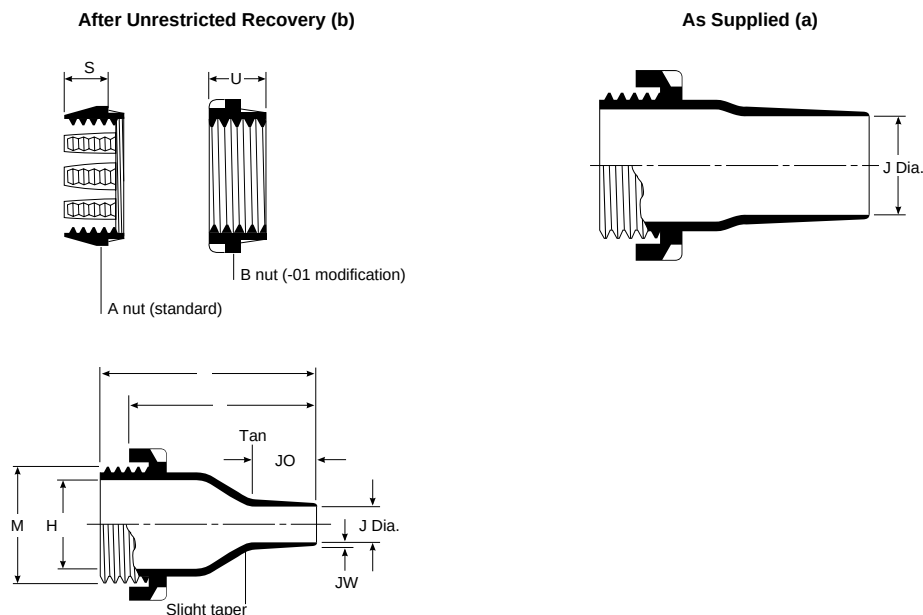
As supplied dimensions are for uncoated parts, when coating is added, entry diameters will reduce by 1.5 [.06] max.

Ordering Information

242W0XX-X/XX-0



Two-Part Feedthrough



Applications

Use for strain relief and abrasion protection when cables pass through equipment boxes or panels.

Materials Available

Material Dash Number	Material Description	Precoating No.	Adhesive Part No.
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-25	Fluid-resistant elastomer	/42 or /86 or /225	S-1017 or S-1048 or S-1125
-100	Polyolefin, Zerohal	/180	S-1030

*For more information, please see the appropriate material page in this section.

**For more information, please see pages 10183-10188.

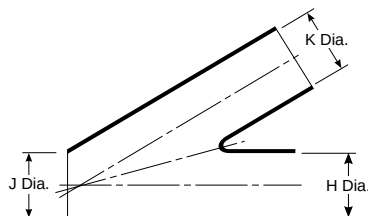
Product Dimensions

Part No.	H Ref. b	J				JO Max. b	M Thread b	P ±10% b	R ±10% b	S ±10% b	U ±10% b	JW ±20% b	Hole Dia. ±.51 [.02]
		Min.		Max. b									
		-3, -4, -12, -25 a	-100 a										
207W213	11.9 [.47]	9.9 [.39]	8.5 [.33]	4.1 [.16]	15.2 [.60]	20.1 [.79]	62.0 [2.44]	49.0 [1.93]	13.0 [.51]	9.9 [.39]	1.3 [.05]	23.9 [.94]	
207W223	20.1 [.79]	18.0 [.71]	16.5 [.65]	7.1 [.28]	19.3 [.76]	30.0 [1.18]	71.9 [2.83]	58.9 [2.32]	16.0 [.63]	9.9 [.39]	1.8 [.07]	34.0 [1.34]	
207W234	30.1 [1.22]	27.9 [1.10]	26.5 [1.04]	11.9 [.47]	26.9 [1.06]	41.9 [1.65]	87.1 [3.43]	73.9 [2.91]	18.0 [.71]	9.9 [.39]	2.03 [.08]	47.0 [1.85]	
207W245	45.0 [1.77]	41.9 [1.65]	40.5 [1.59]	18.0 [.71]	32.0 [1.26]	55.9 [2.20]	102.1 [4.02]	88.9 [3.50]	18.0 [.71]	9.9 [.39]	3.05 [.12]	60.5 [2.38]	
207W256	68.1 [2.68]	64.0 [2.52]	64.5 [2.54]	30.0 [1.18]	39.1 [1.54]	80.0 [3.15]	121.9 [4.80]	109.0 [4.29]	18.0 [.71]	9.9 [.39]	3.05 [.12]	85.1 [3.35]	

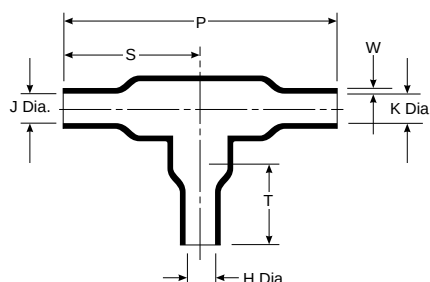
Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

T Transition

As Supplied (a)



After Unrestricted Recovery (b)



Applications

Provides strain relief and mechanical protection on cable harness assemblies.

Materials Available

Material Dash Number	Material Description	Precoating No.	Adhesive Part No.
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-12	Viton	N/A	S-1255-04
-25	Fluid-resistant elastomer	/42 or /86 or /225	S-1017 or S-1048 or S-1125

*For more information, please see the appropriate material page in this section.

**For more information, please see pages 10183-10188.

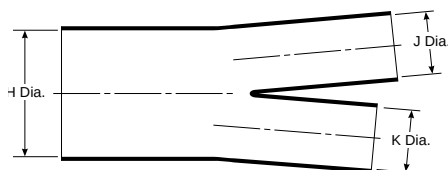
Product Dimensions

Part No.	H, J & K		P ±10% b	S ±10% b	T ±10% b	W ±30% b
	Min. a	Max. b				
301A011	6.6 [.26]	3.6 [.14]	29.7 [1.17]	15.1 [.59]	—	1.02 [.04]
301A022	13.2 [.52]	6.9 [.27]	58.7 [2.31]	29.5 [1.16]	17.5 [.69]	1.52 [.06]
301A034	26.9 [1.06]	13.5 [.53]	120.1 [4.73]	60.2 [2.37]	35.6 [1.40]	2.29 [.09]
301A048	55.6 [2.19]	30.2 [1.19]	246.4 [9.70]	123.2 [4.85]	70.9 [2.79]	3.05 [.12]

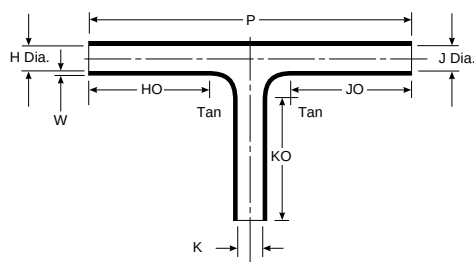
Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

Slimline T Transition

As Supplied (a)



After Unrestricted Recovery (b)



Applications

Provides strain relief and mechanical protection on cable harness assemblies.

Materials Available

Material Dash Number	Material Description	Precoating No.	Adhesive Part No.
-50	Viton polymer blend	N/A	S-1125
-51	Elastomer polymer blend	/164	S-1124
-71	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-125	Fluoropolymer	N/A	S-1255-04

*For more information, please see the appropriate material page in this section.

**For more information, please see pages 10183-10188.

Product Dimensions

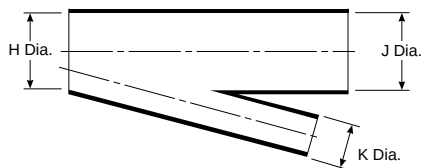
Part No.	H		J & K		HO, JO, & KO ±10% b	W Nom. b	P Nom. b
	Min. a	Max. b	Min. a	Max. b			
301A511	19.8 [.78]	6.6 [.26]	13.2 [.52]	6.6 [.26]	25.4 [1.00]	1.02 [.04]	80.8 [3.18]
301A512	34.3 [1.35]	11.4 [.45]	22.9 [.90]	11.4 [.45]	41.1 [1.62]	1.27 [.05]	120.4 [4.74]
301A513	60.2 [2.37]	20.1 [.79]	40.1 [1.58]	20.1 [.79]	63.5 [2.50]	1.52 [.06]	175.8 [6.92]
301A514*	83.3 [3.28]	33.3 [1.31]	54.9 [2.16]	33.3 [1.31]	88.9 [3.50]	1.78 [.07]	242.3 [9.54]

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

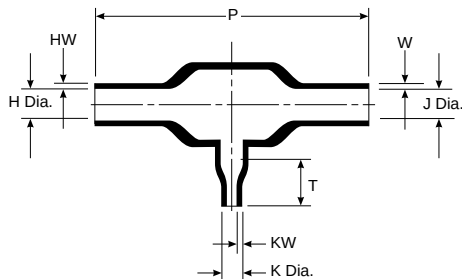
*301A514 is not available in -125 Fluoropolymer material.

T Transition

As Supplied (a)



After Unrestricted Recovery (b)



Applications

Provides strain relief and mechanical protection on cable harness assemblies.

Materials Available

Material Dash Number	Material Description	Precoating No.	Adhesive Part No.
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-12	Viton	N/A	S-1255-04
-25	Modified elastomer	/42 or /86 or /225	S-1017 or S-1048 or S-1125
-100	Polyolefin, Zerohal	-100-CS1972 (S1030 tape supplied in bag)	S-1030

*For more information, please see the appropriate material page in this section.

**For more information, please see pages 10183-10188

Product Dimensions

Part No.	H & J		K		P ±10% b	T ±10% b	HW & W ±20% b	KW ±20% b
	Min. a	Max. b	Min. a	Max. b				
322A112	13.2 [.52]	5.8 [.23]	6.6 [.26]	3.0 [.12]	52.3 [2.06]	—	1.52 [.06]	1.02 [.04]
322A123	26.9 [1.06]	12.4 [.49]	6.6 [.26]	3.0 [.12]	83.3 [3.28]	10.7 [.42]	2.54 [.10]	1.02 [.04]
322A134	26.9 [1.06]	12.7 [.50]	13.2 [.52]	5.8 [.23]	107.7 [4.24]	20.3 [.80]	2.54 [.10]	1.52 [.06]
322A148	55.6 [2.19]	25.4 [1.00]	13.2 [.52]	5.8 [.23]	180.6 [7.11]	25.4 [1.00]	4.57 [.18]	1.52 [.06]
322A158	55.6 [2.19]	25.4 [1.00]	26.9 [1.06]	12.4 [.49]	222.3 [8.75]	38.1 [1.50]	4.57 [.18]	2.54 [.10]

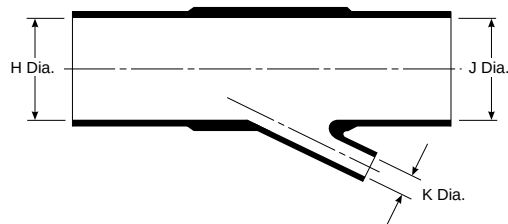
Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

10

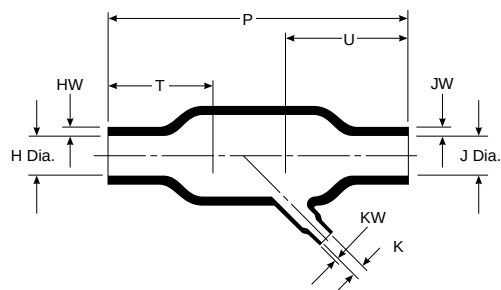
Heat-Shrink Tubing,
Molded Parts and Adhesives

**45° Side-Breakout
Transition**

As Supplied (a)



After Unrestricted Recovery (b)



Applications

Provides strain relief and mechanical protection on cable harness assemblies.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part No.**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-12	Viton	N/A	S-1255-04
-25	Fluid-resistant elastomer	/42 or /86 or /225	S-1017 or S-1048 or S-1125
-100	Polyolefin, Zerohal	-100-CS1972 (S1030 tape supplied in bag)	S-1030

*For more information, please see the appropriate material page in this section.

**For more information, please see pages 10183-10188.

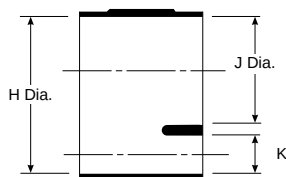
Product Dimensions

Part No.	H & J		K		P ±10% b	T ±10% b	U ±10% b	HW & JW ±20% b	KW ±20% b
	Min. a	Max. b	Min. a	Max. b					
342A012	13.2 [.52]	6.9 [.27]	6.6 [.26]	3.6 [.14]	49.3 [1.94]	19.6 [.77]	19.6 [.77]	1.52 [.06]	1.02 [.04]
342A024	26.9 [1.06]	12.7 [.50]	6.6 [.26]	3.6 [.14]	92.5 [3.64]	31.8 [1.25]	39.6 [1.56]	2.54 [.10]	1.02 [.04]
342A034	26.9 [1.06]	13.7 [.54]	13.2 [.52]	6.1 [.24]	144.8 [5.70]	50.8 [2.00]	50.8 [2.00]	2.54 [.10]	1.52 [.06]
342A048	55.6 [2.19]	26.9 [1.06]	13.2 [.52]	6.9 [.27]	184.9 [7.28]	63.5 [2.50]	63.5 [2.50]	4.57 [.18]	1.52 [.06]
342A058	55.6 [2.19]	26.9 [1.06]	26.9 [1.06]	13.7 [.54]	203.5 [8.01]	66.0 [2.60]	66.0 [2.60]	4.57 [.18]	2.54 [.10]

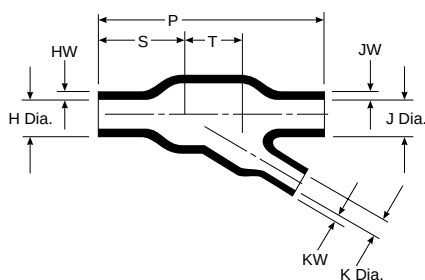
Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

**30° Side-Breakout
Transition**

As Supplied (a)



After Unrestricted Recovery (b)



Applications

Provides strain relief and mechanical protection on cable harness assemblies.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part No.**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-12	Viton	N/A	S-1255-04
-25	Fluid-resistant elastomer	/42 or /86 or /225	S-1017 or S-1048 or S-1125
-100	Polyolefin, Zerohal	/86 or /180	S-1030 or S-1048

*For more information, please see the appropriate material page in this section.

**For more information, please see see pages 10183-10188.

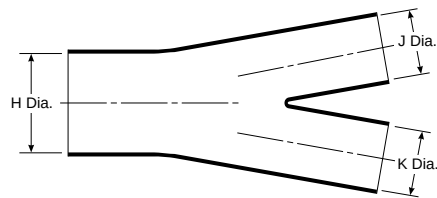
Product Dimensions

Part No.	H & J		K		P	S	T	HW & JW	KW
	Min. a	Max. b	Min. a	Max. b					
362A014	30.5 [1.20]	15.7 [.62]	20.3 [.80]	10.7 [.42]	82.6 [3.25]	31.8 [1.25]	21.1 [.63]	2.54 [.10]	1.78 [.07]
362A024	35.6 [1.40]	18.3 [.72]	15.2 [.60]	8.6 [.34]	63.5 [2.50]	19.1 [.75]	22.4 [.88]	2.54 [.10]	1.52 [.06]
362A114	35.6 [1.40]	18.8 [.74]	10.2 [.40]	5.3 [.21]	61.0 [2.40]	19.1 [.75]	21.3 [.84]	2.79 [.11]	1.52 [.06]

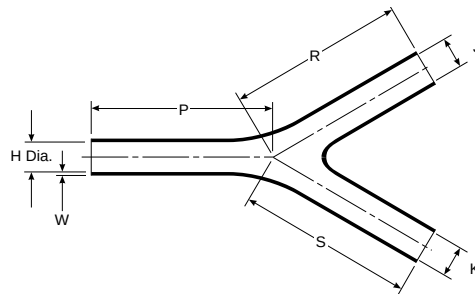
Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

Slimline Y Transition

As Supplied (a)



After Unrestricted Recovery (b)



Applications

Provides strain relief and mechanical protection on cable harness assemblies.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part No.**
-50	Viton polymer blend	N/A	S-1125
-51	Elastomer polymer blend	/164	S-1124
-71	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-125	Fluoropolymer	—	S-1255-04

*For more information, please see the appropriate material page in this section.

**For more information, please see pages 10183-10188.

Product Dimensions

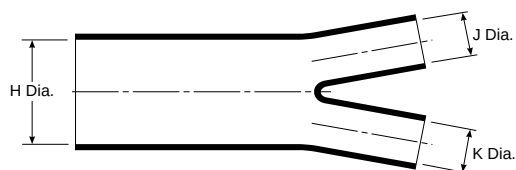
Part No.	H		J & K		W Nom. b	P Nom. b	R & S Nom. b
	Min. a	Max. b	Min. a	Max. b			
381A301	19.8 [.78]	6.6 [.26]	13.2 [.52]	6.6 [.26]	1.0 [.04]	40.6 [1.60]	40.6 [1.60]
381A302	34.3 [1.35]	11.4 [.45]	22.9 [.90]	11.4 [.45]	1.3 [.05]	63.0 [2.48]	63.0 [2.48]
381A303	60.2 [2.37]	20.1 [.79]	40.1 [1.58]	20.1 [.79]	1.5 [.06]	94.7 [3.73]	94.7 [3.73]
381A304*	83.3 [3.28]	33.3 [1.31]	54.9 [2.16]	33.3 [1.31]	1.8 [.07]	133.9 [5.27]	133.9 [5.27]

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

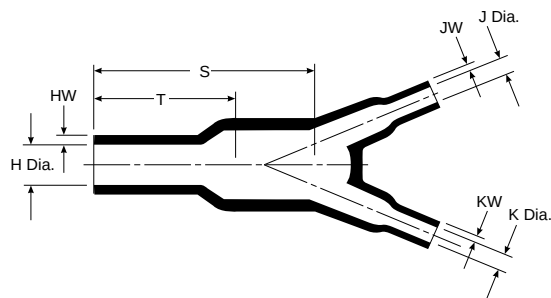
*381A304 is not available in -125 Fluoropolymer material.

Y Transition

As Supplied (a)



After Unrestricted Recovery (b)



Applications

Provides strain relief and mechanical protection on cable harness assemblies.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part No.**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-12	Viton	N/A	S-1255-04
-25	Fluid-resistant elastomer	/42 or /86 or /225	S-1017 or S-1048 or S-1125
-100	Polyolefin, Zerohal	-100-CS1972 (S1030 tape supplied in bag)	S-1030

*For more information, please see the appropriate material page in this section.

**For more information, please see see pages 10183-10188.

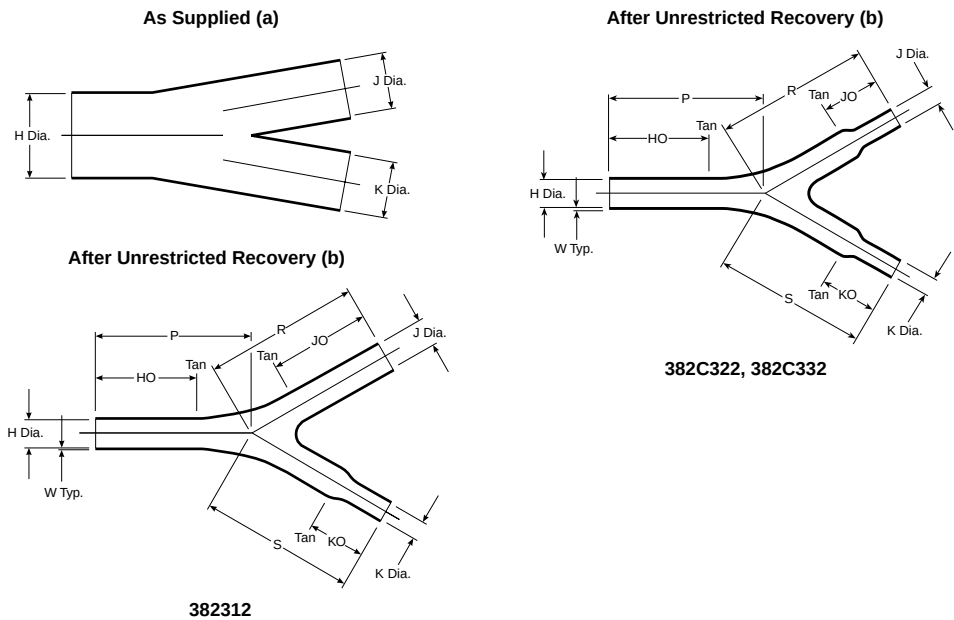
Product Dimensions

Part No.	H		J & K		S ±10% b	T ±10% b	HW ±20% b	JW & KW ±20% b
	Min. a	Max. b	Min. a	Max. b				
382A012	13.2 [.52]	6.1 [.24]	6.6 [.26]	3.3 [.13]	23.9 [.94]	15.5 [.61]	1.52 [.06]	1.02 [.04]
382A023	26.9 [1.06]	12.4 [.49]	13.2 [.52]	6.1 [.24]	53.3 [2.10]	33.0 [1.30]	2.54 [.10]	1.52 [.06]
382A034	38.6 [1.52]	18.0 [.71]	26.9 [1.06]	12.4 [.49]	78.7 [3.10]	55.9 [2.20]	3.05 [.12]	2.54 [.10]
382A046	55.6 [2.19]	25.9 [1.02]	26.9 [1.06]	12.7 [.50]	111.8 [4.40]	71.1 [2.80]	4.57 [.18]	2.54 [.10]

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

382C312, 322 and 332

Slimline Y Transition



Applications

Provides strain relief and mechanical protection at two into one Y junctions in cable harness assemblies. When used with adhesive

it provides environmental sealing. These parts are based on the 382A3 range. They have the branched outlet(s) reduced in size to

accommodate smaller cable diameters without the need for packing or shimming.

Materials Available

Material	Material Description	Precoating No.	Adhesive Part No.
-50	Viton polymer blend	N/A	S-1125
-51	Elastomer polymer blend	/164	S-1124
-71	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-125	Fluoropolymer	N/A	S-1255-04

Product Dimensions

Part No.	H		J		K		P, R & S Nom. b	KO ±15% b	HO & JO ±15% b	W Nom b
	Min. a	Max. b	Min. a	Max. b	Min. a	Max. b				
382C312	1.20 [30.5]	.45 [11.4]	.90 [22.9]	.45 [11.4]	.60 [15.2]	.30 [7.6]	2.48 [63.0]	.85 [21.6]	1.62 [41.1]	.04 [1.0]

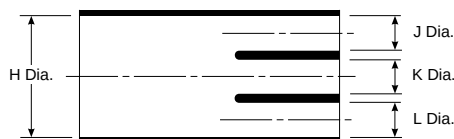
Part No.	H		J & K		P, R & S Nom. b	HO ±15% b	JO & KO ±15% b	W Nom. b
	Min. a	Max. b	Min. a	Max. b				
382C322	.90 [22.9]	.45 [11.4]	.40 [10.2]	.20 [5.1]	2.48 [63.0]	1.62 [41.1]	.85 [21.6]	.04 [1.0]

Part No.	H		J & K		P, R & S Nom. b	HO ±15% b	JO & KO ±15% b	W Nom. b
	Min. a	Max. b	Min. a	Max. b				
382C332	1.00 [25.4]	.45 [11.4]	.60 [15.2]	.30 [7.5]	2.48 [63.0]	1.62 [41.1]	.85 [21.6]	.04 [1.0]

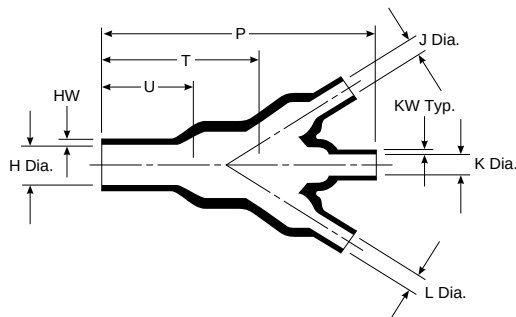
Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

Transition, One to Three
Cables

As Supplied (a)



After Unrestricted Recovery (b)



Applications

Provides strain relief and mechanical protection on cable harness assemblies.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part No.**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-12	Viton	N/A	S-1255-04
-25	Fluid-resistant elastomer	/42 or /86 or /225	S-1017 or S-1048 or S-1125
-100	Polyolefin, Zerohal	-100-CS1972 (S1030 tape supplied in bag)	S-1030

*For more information, please see the appropriate material page in this section.

**For more information, please see see pages 10183-10188.

Product Dimensions

Part No.	H		J, K & L		P ±10% b
	Min. a	Max. b	Min. a	Max. b	
462A011	13.2 [.52]	6.6 [.26]	6.6 [.26]	3.6 [.14]	46.2 [1.82]
462A023	26.9 [1.06]	13.2 [.52]	13.2 [.52]	6.9 [.27]	93.2 [3.67]
462A034	38.6 [1.52]	18.8 [.74]	19.3 [.76]	9.7 [.38]	135.1 [5.32]
462A046	55.6 [2.19]	25.4 [1.00]	26.9 [1.06]	12.4 [.49]	192.0 [7.56]
462A060	91.4 [3.60]	54.6 [2.15]	45.7 [1.80]	27.4 [1.08]	390.4 [15.37]

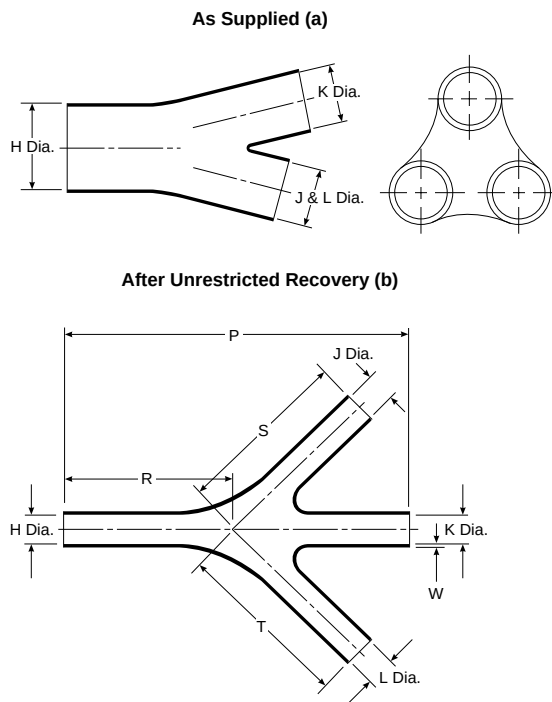
Part No.	T ±10% b	U ±10% b	HW ±20% b	KW ±10% b
462A011	30.5 [1.20]	15.7 [.62]	1.52 [.06]	1.02 [.04]
462A023	57.2 [2.25]	33.0 [1.30]	2.54 [.10]	1.52 [.06]
462A034	88.9 [3.50]	45.7 [1.80]	3.05 [.12]	1.78 [.07]
462A046	121.9 [4.80]	71.1 [2.80]	4.57 [.18]	3.05 [.12]
462A060	254.0 [10.00]	127.0 [5.00]	7.11 [.28]	4.57 [.18]

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

10

Heat-Shrink Tubing,
Molded Parts and Adhesives

Slimline Transition, One to Three Cables



Applications

Provides strain relief and mechanical protection on cable harness assemblies.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part No.**
-50	Viton polymer blend	N/A	S-1125
-51	Elastomer polymer blend	/164	S-1124
-71	Flexible polyolefin	/42 or /86	S-1017 or S-1048

Product Dimensions

Part No.	H		J, K & L		W Nom. b	P Nom. b	R, S & T Nom. b
	Min. a	Max. b	Min. a	Max. b			
462A421	19.8 [.78]	6.6 [.26]	13.2 [.52]	6.6 [.26]	1.0 [.04]	85.9 [3.38]	42.9 [1.69]
462A422	34.3 [1.35]	11.4 [.45]	20.6 [.81]	11.4 [.45]	1.3 [.05]	135.6 [5.34]	67.8 [2.67]
462A423	60.2 [2.37]	20.1 [.79]	36.1 [1.42]	20.1 [.79]	1.5 [.06]	207.3 [8.16]	103.6 [4.08]

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part No.**
-125	Fluoropolymer	—	S-1255-04

*For more information, please see the appropriate material page in this section.

**For more information, please see see pages 10183-10188.

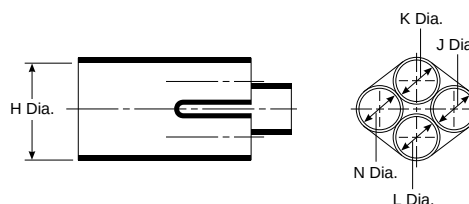
Product Dimensions

Part No.	H		J, K & L		W Nom. b	P Nom. b	R, S & T Nom. b
	Min. a	Max. b	Min. a	Max. b			
462A421	19.8 [.78]	6.6 [.26]	13.2 [.52]	6.6 [.26]	1.0 [.04]	85.9 [3.38]	42.9 [1.69]
462A422	34.3 [1.35]	11.4 [.45]	20.6 [.81]	11.4 [.45]	1.3 [.05]	135.6 [5.34]	67.8 [2.67]
462A423	60.2 [2.37]	20.1 [.79]	36.1 [1.42]	20.1 [.79]	1.5 [.06]	207.3 [8.16]	103.6 [4.08]

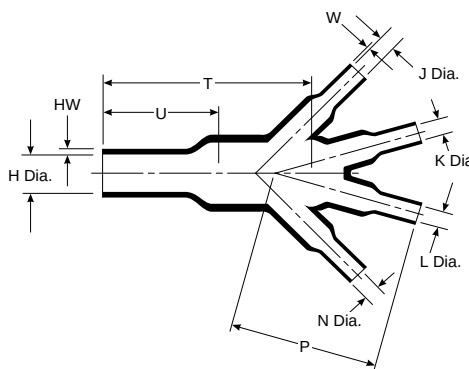
Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

Transition, One to Four Cables

As Supplied (a)



After Unrestricted Recovery (b)



Applications

Provides strain relief and mechanical protection on cable harness assemblies.

Materials Available

Material*	Material Description	Precoating No.	Adhesive Part No.**
-3	Semirigid polyolefin	/42 or /86	S-1017 or S-1048
-4	Flexible polyolefin	/42 or /86	S-1017 or S-1048
-12	Viton	N/A	S-1255-04
-25	Fluid-resistant elastomer	/42 or /86 or /225	S-1017 or S-1048 or S-1125
-100	Polyolefin, Zerohal	-100-CS1972 (S1030 tape supplied in bag)	S-1030

*For more information, please see the appropriate material page in this section.

**For more information, please see see pages 10183-10188.

Product Dimensions

Part No.	H		J, K, L & N		P ±10% b	T ±10% b	U ±10% b	HW ±20% b	W ±20% b
	Min. a	Max. b	Min. a	Max. b					
562A011	13.2 [.52]	6.9 [.27]	6.6 [.26]	3.4 [.14]	24.1 [.95]	43.9 [1.73]	18.0 [.71]	1.52 [.06]	1.02 [.04]
562A022	19.3 [.76]	9.7 [.38]	9.4 [.37]	5.3 [.21]	35.6 [1.40]	43.2 [1.70]	23.1 [.91]	1.78 [.07]	1.02 [.04]
562A032	19.3 [.76]	9.7 [.38]	13.2 [.52]	6.9 [.27]	49.3 [1.94]	50.5 [1.99]	25.4 [1.00]	1.78 [.07]	1.52 [.06]
562A043	26.9 [1.06]	13.0 [.51]	13.2 [.52]	6.9 [.27]	49.3 [1.94]	65.8 [2.59]	33.5 [1.32]	2.54 [.10]	1.52 [.06]
562A054	38.6 [1.52]	18.5 [.73]	19.3 [.76]	9.7 [.38]	71.9 [2.83]	95.3 [3.75]	46.5 [1.83]	3.05 [.12]	1.78 [.07]
562A067	55.6 [2.19]	26.7 [1.05]	26.9 [1.06]	13.0 [.51]	101.6 [4.00]	135.1 [5.32]	65.5 [2.58]	4.57 [.18]	2.54 [.10]

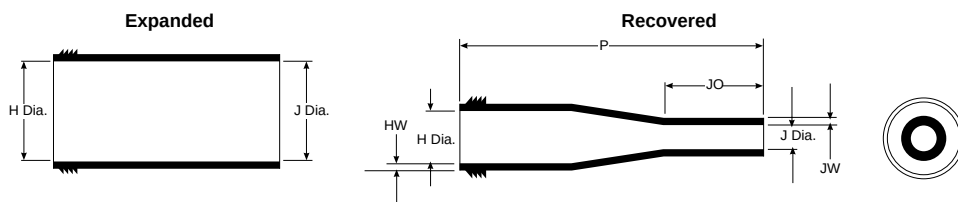
Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

Configurable Heat-Shrink Transition

Product Facts

- Configurable heat-shrink transition
- Low cost commercial polyolefin
- 60°C shrink temperature
- High shrink ratio
- Specially engineered easy-to-use crimp tool

QFT™



Applications

QFT heat-shrinkable transitions form a watertight seal protecting cable splices from corrosion and mechanical abuse while providing excellent electrical insulating properties. QFT products use special crimps that allow

them to be employed as 1:2, 1:3, and even 1:4 transitions. With their high shrink ratio and crimps the configurable QFT product line can accommodate almost all of your transition needs with only 3 product sizes.

Operating Temperature Range

-20°C to 70°C
[-4°F to 158°F]

Specifications/Approvals

Raychem RW 2008

Temperature Ratings

Operating temperature range	-20°C to 70°C [-4°F to 158°F] (125°C [257°F] without sealant)
Minimum recovery temperature	55°C [131°F]
Maximum storage temperature	40°C [104°F]

Dimensions Table

	H		J		P +/- 10%	JO +/- 10%	HW +/- 20%	JW +/- 20%
	Min.	Max.	Min.	Max.				
QFT1	31.0 [1.22]	9.0 [.35]	31.0 [1.22]	4.4 [.17]	60.0 [2.36]	12.0 [.47]	1.5 [.06]	1.0 [.039]
QFT2	43.0 [1.69]	14.0 [.55]	43.0 [1.69]	7.0 [.28]	75.0 [2.95]	18.0 [.71]	1.8 [.07]	1.0 [.039]
QFT3	57.0 [2.24]	24.0 [.95]	57.0 [2.24]	12.0 [.47]	90.0 [3.53]	25.0 [.98]	1.8 [.07]	1.0 [.039]

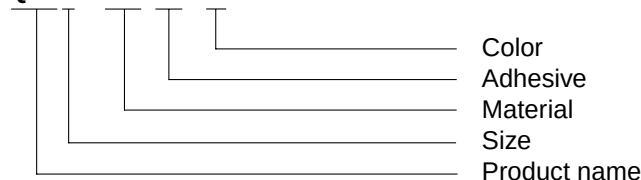
Typical QFT Performance

QFT™ (Continued)

	Property	Performance	Test method
Physical	Tensile strength	10 MPa (1500psi) minimum	ISO 37
	Ultimate elongation	250% minimum	ISO 37
	Longitudinal change	0 to -20% maximum	ISO 1183
	Specific gravity	1.4 maximum	ISO 1183
	Heat aging	Minimum 200% ultimate elongation	ISO 188
	168 hours at 120°C [248°F]	Tensile Strength 10 MPa min.	ISO 37
	Heat shock 4 hours at 105°C	No cracking, dripping or flowing	ASTM D 2671
Electrical	Dielectric strength	8MV/m minimum	IEC 243-1
	Fluid resistance 1	(24 +/- 2h immersion at 23C+/- 2C)	ISO 1817
	Engine Oil	(SAE 20W/50)	—
Chemical	Hydraulic Fluid		
	Tensile Strength	10 MPa minimum	ISO 37
	Ultimate Elongation	200% minimum	—
	Fluid resistance 2	(30 +/- 3m immersion at 23C+/- 2C)	ISO 1817
	Automotive gasoline	(BS 4040)	—
	Diesel fuel	(BS 2869)	—
	Cleaning fluid	(TL 6850-07)	—
	Antifreeze	(Ethylene Glycol/Water 50/50 v/v)	—
	Engine cleaning fluid	(Gunk)	
	Tensile strength	10 MPa minimum	ISO 37
	Ultimate elongation	200% minimum	—

Part Numbering System

QFT3 - 130/42 - 0*



*Available in bulk pack, part number QFT3-130/42-0-B500 (US and UK).

Ordering Information

Color	Standard Code	Black (-0)
		0
Packaging	Standard	10 pieces per bag, 30 clips
	Bulk pack	500 pieces per box and 500 clips per bag (clips ordered separately) - contact factory for details
Crimp tool	QFT-Crimp-Tool-Manual (069172-000)	—

**Chem-X Heavy Duty
Breakout Boots****Product Facts**

- Watertight
- Easy installation, requiring no special skills
- Compatibility with polyethylene, PVC, lead, steel, aluminum, standard Navy cable jackets, and copper wire and cable
- Four configurations and twelve sizes
- Minimum shrink temperature of 121°C [250°F]
- Type approval by:
 - ABS (American Bureau of Shipping)
 - DNV (Det Norske Veritas)
 - Lloyd's (Lloyd's Register of Shipping)

**Applications**

These flame-retardant heat-shrinkable transitions are especially designed for shipboard applications and meet or exceed all of the U.S. Navy specifications described in MIL-I-81765/1A (as of 5/02). The transitions are made of a rugged, thermally stabilized, modified polyolefin and factory-

coated with a thermoplastic adhesive sealant. As a result, they offer excellent water sealing, mechanical abrasion-protection, corrosion-resistance, weatherproofing, and electrical insulation. The transitions replace tapes, epoxies, and grease in applications involving cable breakouts, transitions, and terminations.

Specifications/Approvals

Molded Parts — Transition

SSB, T, F to 8S (Continued)

Commercial	Military
RW-2024	MIL-STD-2003
	MIL-I-81765/1A

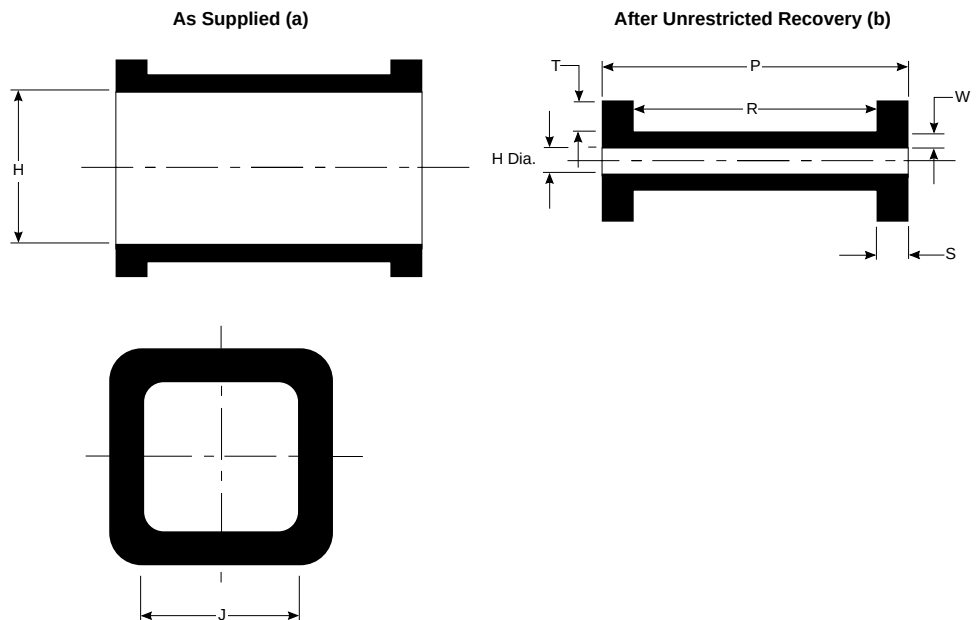
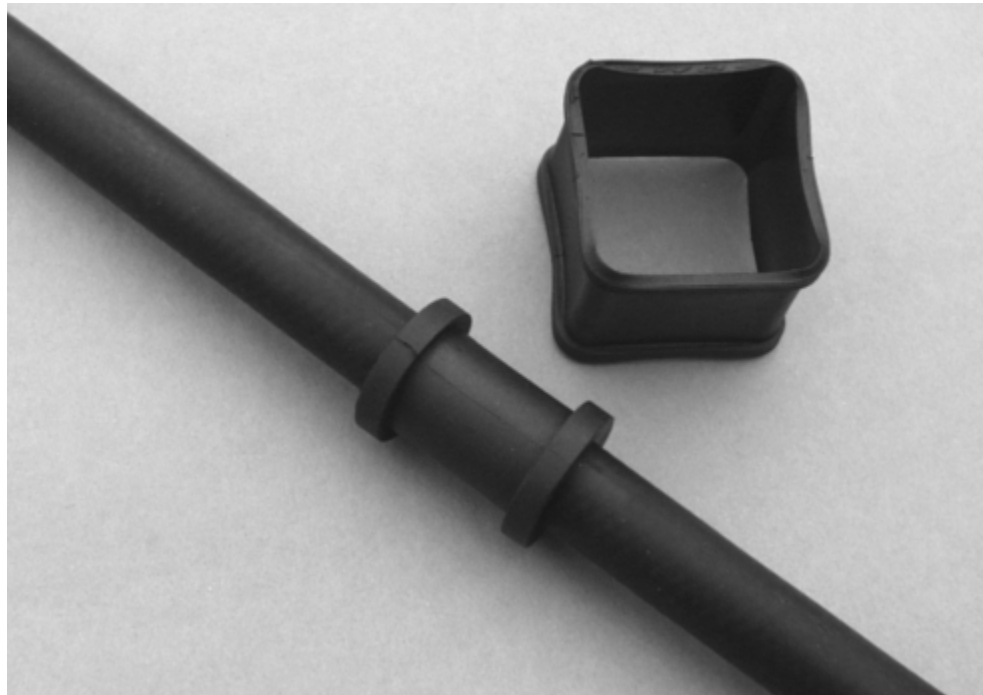
Product Dimensions

Description	Number of Legs	ID Base		ID legs		Leg	Length Body
		Min. Exp.	Max. Rec.	Min. Exp.	Min. Rec.		
SSB-1202 FR	2	40.64[1.60]	11.43 [0.45]	13.97[0.55]	3.81[0.15]	36.83[1.45]	62.23[2.45]
SSB-2002 FR	2	50.8[2.00]	35.56[1.40]	19.05[0.75]	8.89[0.35]	69.85[2.75]	88.90[3.50]
D3-9 FR	2	20.32[0.80]	9.39[0.37]	8.38[0.33]	2.79[0.11]	17.78[0.7]	50.8[2]
D14-30 FR	2	30.48[1.2]	15.24[0.6]	12.7[0.5]	4.32[0.17]	25.4[1]	63.5[2.5]
D50-100 FR	2	48.26[1.9]	22.86[0.9]	19.05[0.75]	7.62[0.3]	30.48[1.2]	76.2[3]
D200-400 FR	2	76.2[3]	38.1[1.5]	36.83[1.45]	12.7[0.5]	38.1[1.5]	88.9[3.5]
T3-9 FR	3	22.86[0.9]	9.14[0.36]	8.38[0.33]	2.29[0.09]	19.05[0.75]	50.80[2.0]
T14-23 FR	3	30.48[1.2]	17.78[0.70]	12.70[0.5]	4.57[0.18]	25.4[1]	60.96[2.40]
T14-50 FR	3	38.1[1.5]	12.7[0.5]	16.51[0.65]	4.06[0.16]	30.48[1.2]	76.2[2.3]
T42-100 FR	3	43.18[1.7]	22.86[0.9]	20.32[0.8]	4.83[0.19]	30.48[1.25]	57.15[2.25]
T150-300 FR	3	60.96[2.4]	35.56[1.4]	30.48[1.25]	12.70[0.5]	40.6[1.6]	88.90[3.50]
T400 FR	3	81.28[3.2]	50.8[2]	35.56[1.4]	17.78[0.7]	40.6[1.6]	88.9[3.5]
T500-600 FR	3	124.46[4.90]	58.93[2.32]	50.8[2]	22.86[0.9]	50.8[2]	187.96[7.40]
F3-9 FR	4	22.86[0.9]	10.92[0.43]	7.11[0.28]	2.79[0.11]	19.05[0.75]	50.8[2]
F-23 FR	4	31.75[1.25]	20.32[0.8]	12.7[0.5]	5.08[0.2]	27.94[1.1]	63.50[2.50]
F42-60 FR	4	44.45[1.75]	25.4[1]	20.32[0.8]	8.13[0.32]	30.48[1.25]	63.50[2.50]
F75-100 FR	4	59.69[2.35]	25.4[1]	25.4[1]	8.89[0.35]	43.18[1.7]	165.1[6.5]
F133-200 FR	4	67.31[2.65]	35.56[1.4]	30.48[1.2]	10.92[0.43]	38.1[1.5]	91.44[3.6]
F150-400 FR	4	133.35[5.25]	76.2[3]	34.29[1.35]	13.97[0.55]	76.2[3]	152.4[6]
6S100-200 FR	6	60.96[2.4]	36.83[1.45]	20.32[0.8]	8.89[0.35]	69.85[2.75]	86.36[3.4]
8S23-75 FR	8	35.56[1.4]	21.59[0.85]	10.16[0.4]	3.3[0.13]	30.48[1.25]	50.8[2]
8S14-50 FR	8	57.15[2.25]	21.59[0.85]	14.22[0.56]	3.3[0.13]	30.48[1.25]	50.8[2]
8S42-100 FR	8	63.50[2.50]	21.59[0.85]	22.1[0.87]	3.3[0.13]	30.48[1.25]	50.8[2]

Heat-Shrink Bobbins

Product Facts

- Fast installation
- Temperature range of -40°C to 105°C [-40°F to 221°F]
- Fits range of diameters
- Low cost, high volume installation
- Shrinks onto hose/pipe/ wire harnesses
- Good mechanical, thermal and chemical properties
- Good abrasion resistance
- Excellent location, cushioning and protection of cable or hoses from P clips and wire ties
- Stays in place when heated.
- Suits most hoses/pipes/wire harnesses
- No expensive tooling required under body solution
- Engine area solution



Square expanded = -130 material

Circular expanded = -12 and -25 material
-3, -4

Materials Available

202W302 to 342 (Continued)

Material	Material Description	Precoating No.	Adhesive Part No.
-3	Polyolefin, semi-rigid	/42, /86	S-1017, S-1048
-4	Polyolefin, flexible	/42, /86	S-1017, S-1048
-12	Viton	N/A	S-1255-04
-25	Fluid resistant elastomer	/86 or /225	S-1017 or S-1048 or S-1125
-130	Flexible polyolefin	/42, /86	S-1017

Product Dimensions

Part No.	H		J Min. a	P ±10% b	R ±10% b	S ±10% b	T ±10% b	W ±20% b	Recommended Hose Sizes	
	Min. a	Max. b							Min.	Max.
202W302	29.0 [1.142]	9.5 [.374]	29.0 [1.142]	35.0 [1.378]	25.0 [.984]	5.0 [.197]	3.0 [.118]	1.5 [.059]	11.0 [.433]	25.0 [.984]
202W312	39.0 [1.535]	12.7 [.500]	39.0 [1.535]	35.0 [1.378]	25.0 [.984]	5.0 [.197]	3.0 [.118]	2.0 [.079]	14.0 [.551]	34.0 [1.339]
202W321	10.0 [.394]	3.0 [.118]	10.0 [.394]	29.0 [1.142]	23.0 [.906]	3.0 [.118]	3.0 [.118]	1.5 [.059]	4.0 [.157]	8.0 [.315]
202W331	19.0 [.748]	6.4 [.252]	19.0 [.748]	29.0 [1.142]	24.0 [.945]	2.5 [.098]	2.0 [.079]	1.5 [.059]	8.0 [.315]	17.0 [.669]
202W342	54.0 [2.126]	18.0 [.709]	54.0 [2.126]	35.0 [1.378]	25.0 [.984]	5.0 [.197]	3.0 [.118]	2.0 [.079]	20.0 [.787]	48.0 [1.889]

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

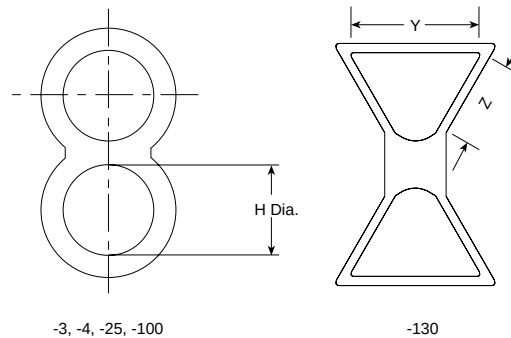
Heat-Shrink Positioning Ring

Product Facts

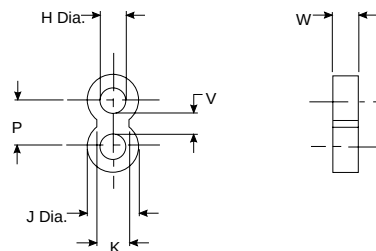
- Easy to install
- Close fit to hose/pipe
- Fits range of diameters due to high expansion
- Low cost, high volume installation
- Shrinks onto hose/pipe
- Minimum distance between substrates
- Good mechanical, thermal and chemical properties
- Push on fit to hose/pipe
- Stays in place when installed
- No expensive tooling required
- Positions where needed
- Keeps hoses/pipes together, optimizing space
- Under body solution
- Engine area solution
- Twinning two hoses/pipes rationalizes part descriptions
- Hose/pipe can be orientated correctly for ease of fitting to vehicle



As Supplied (a)



After Unrestricted Recovery (b)



Materials Available

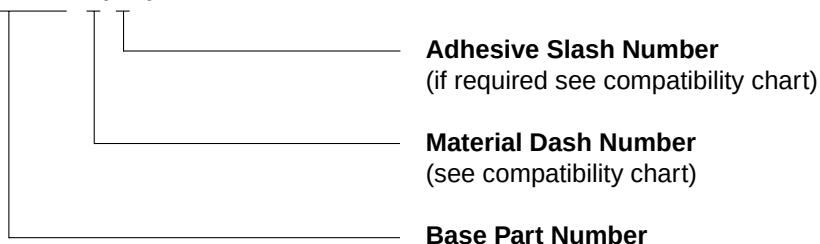
400W242 (Continued)

Material	Material Description	Precoating no.	Adhesive part no.
-3	Polyolefin, semi-rigid	/42, /86	S-1017 or S-1048
-4	Polyolefin, flexible	/42, /86	S-1017 or S-1048
-25	Elastomer, fluid resistant	/86, /225	S-1017 or S-1048
-100	Polyolefin, Zerohal	-100-CS1972 (S1030 tape supplied in bag)	S-1030
-130	Flexible polyolefin	/42, /86	S-1017

As supplied dimensions are for uncoated parts, when coating is added, entry diameters will reduce by 1.5 [.06] max.

Part Numbering System

400W242 -/**-0**



Product Dimensions

Part No.	H		J	K	P	V	W	Y*	Z*
	Min. a	Max. b	Max. b	± 1.2 b	± 1.7 b	± 0.45 b	± 1 b	± 2 a	± 2 a
400W242	28 [1.102]	10.2 [.402]	19.3 [.760]	12 [.472]	17 [.669]	7.0 [.276]	10 [.394]	29 [1.142]	25 [.984]

*Applicable for -130 only.

**Chem-X Heat-Shrinkable
Cable Entry Seals****Product Facts**

- Comes in many sizes and configurations
- Seals multicable openings
- Meets or exceeds MIL-I-81765/1A
- Seals per U.S. Coast Guard HQ 3774 in wet, dry, and corrosive locations

CES**Applications**

Raychem Chem-X Heat-Shrinkable Cable-Entry Seals (CESs) provide a watertight, fume-tight seal where cables enter connection boxes, bulkheads, or other enclosures.

CESs are available in two basic types: standard and threaded. The standard CES for thin-wall enclosures consists of a three-part assembly — a rigid plastic

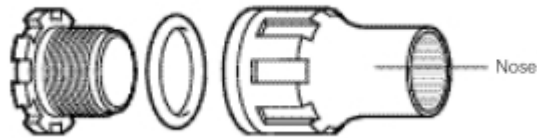
nylon nut, an O-ring, and a heat-shrinkable molded area. The CES for threaded-hole applications is a one-part assembly that combines a tapered national pipe thread (NPT) in rigid plastic nylon with a heat-shrinkable molded area.

All CESs are available with the molded area configured with one opening for a single wire or cable entry or with two, three, or four legs

of equal size to seal multiple wires or cables at the entry to enclosures and/or bulkheads. To meet sealing requirements, all CESs have factory-applied adhesive that provides the seal to wire and cable jackets. When armored cable is being sealed it may be necessary to use additional sealants, such as G.E. RTV 112 or Dow Corning RTV 732, to form the water seal.

CES (Continued)

Standard CES



Temperature

Temperature rating	-55°C to 90°C [-67°F to 194°F]
Minimum shrink temperature	121°C [250°F]

Specifications

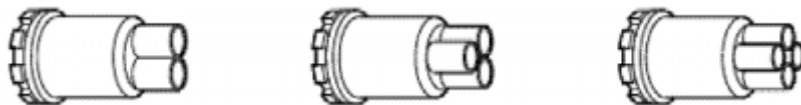
Type	Raychem	
Molded heat-shrink nose	RT-301	Flame retardant polyolefin
Adhesive	RW-2019	Hot melt adhesive

Product Dimensions

Part No.	No. of Legs	Overall Nom. Recommended Length	Min. Expanded I.D. Nose	Max. Recovered I.D. Nose	Max. I.D. of Part	Drill Size	Max. O.D. of Nut
CES-1	1	69.85 [2.75]	12.70 [0.50]	4.32 [0.17]	19.05 [0.75]	25.40 [1.00]	35.81 [1.410]
CES-2	1	69.85 [2.75]	19.05 [0.75]	6.35 [0.25]	19.05 [0.75]	25.40 [1.00]	35.81 [1.410]
CES-3	1	95.25 [3.75]	28.45 [1.12]	12.70 [0.50]	27.94 [1.10]	35.05 [1.38]	48.31 [1.902]
CES-4	1	114.30 [4.50]	40.64 [1.60]	19.05 [0.75]	39.62 [1.56]	50.80 [2.00]	69.09 [2.720]
CES-4S*	1	114.30 [4.50]	50.80 [2.00]	19.05 [0.75]	53.34 [2.10]	59.94 [2.36]	85.09 [3.350]
CES-5	1	177.80 [7.00]	69.85 [2.75]	36.32 [1.43]	73.66 [2.90]	88.90 [3.50]	103.38 [4.070]

*Part configuration may be different than depicted in figure. Contact Tyco Electronics for specification.

Breakout CES

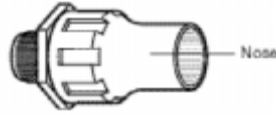


Product Dimensions

Part No.	No. of Legs	Overall Nom. Recommended Length	Min. Expanded I.D. (Each Leg)	Max. Recovered I.D. (Each Leg)	Max. I.D. of Part	Drill Size	Max. O.D. of Nut
CES-2-D1A	2	69.85 [2.75]	15.24 [0.60]	2.79 [0.11]	19.05 [0.75]	25.40 [1.00]	35.81 [1.41]
CES-2-T1	3	69.85 [2.75]	10.16 [0.40]	2.79 [0.11]	19.05 [0.75]	25.40 [1.00]	35.81 [1.41]
CES-2-T1B	3	88.90 [3.50]	15.24 [0.60]	4.32 [0.17]	19.05 [0.75]	25.40 [1.00]	35.81 [1.41]
CES-2-F1A	4	69.85 [2.75]	10.16 [0.40]	2.79 [0.11]	19.05 [0.75]	25.40 [1.00]	35.81 [1.41]
CES-2-F1	4	88.90 [3.50]	15.24 [0.60]	4.32 [0.17]	19.05 [0.75]	25.40 [1.00]	35.81 [1.41]
CES-3-D1	2	88.90 [3.50]	15.24 [0.60]	4.32 [0.17]	27.94 [1.10]	35.05 [1.38]	48.26 [1.90]
CES-3-T1	3	88.90 [3.50]	15.24 [0.60]	4.32 [0.17]	27.94 [1.10]	35.05 [1.38]	48.26 [1.90]
CES-3-F1	4	88.90 [3.50]	15.24 [0.60]	4.32 [0.17]	27.94 [1.10]	35.05 [1.38]	48.26 [1.90]
CES-4-D3	2	101.60 [4.00]	22.86 [0.90]	7.62 [0.30]	40.64 [1.60]	50.80 [2.00]	69.09 [2.72]
CES-4-T1	3	101.60 [4.00]	22.86 [0.90]	7.62 [0.30]	40.64 [1.60]	50.80 [2.00]	69.09 [2.72]
CES-4-F1	4	101.60 [4.00]	22.86 [0.90]	7.62 [0.30]	40.64 [1.60]	50.80 [2.00]	69.09 [2.72]
CES-5-T4	3	127.00 [5.00]	31.75 [1.25]	12.70 [0.50]	73.66 [2.90]	63.50 [2.50]	103.38 [4.07]
CES-5-F4	4	127.00 [5.00]	31.75 [1.25]	12.70 [0.50]	73.66 [2.90]	63.50 [2.50]	103.38 [4.07]

CES (Continued)

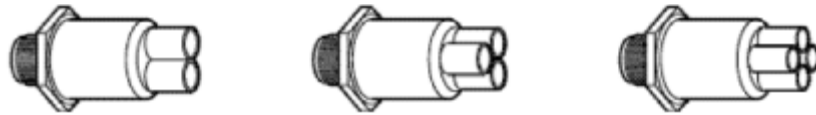
Threaded CES



Part No.	Overall Nom. Recommended Length	Min. Expanded I.D. Nose	Max. Recovered I.D. Nose	National Adapter I.D.	Pipe Thread Size
CES-2-A50	83.82 [3.30]	19.05 [0.75]	6.35 [0.25]	12.70 [0.50]	1/2–14
CES-2-A75	83.82 [3.30]	19.05 [0.75]	6.35 [0.25]	19.05 [0.75]	3/4–14
CES-2-A100	83.82 [3.30]	19.05 [0.75]	6.35 [0.25]	19.05 [0.75]	1–11 1/2
CES-3-A100	111.00 [4.37]	28.45 [1.12]	12.70 [0.50]	25.40 [1.00]	1–11 1/2
CES-3-A150	117.35 [4.62]	28.45 [1.12]	12.70 [0.50]	27.94 [1.10]	1 1/2–11 1/2
CES-4A-A150*	127.00 [5.00]	50.80 [2.00]	19.05 [0.75]	35.56 [1.40]	1 1/2–11 1/2
CES-5-A250*	152.40 [6.00]	69.85 [2.75]	25.40 [1.00]	60.96 [2.40]	2 1/2–10

* Not illustrated - refer to Specification Control Drawing for details.

Threaded Breakout CES



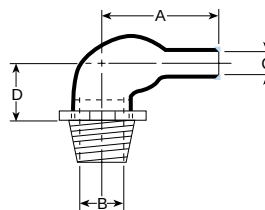
Product Dimensions

Part No.	No. of Legs	Overall Nom. Recommended Length	Min. Expanded I.D. (Each Leg)	Max. Recovered I.D. (Each Leg)	Max. I.D. of Part	Pipe Thread Size (NPT)
CES-2A-T1	3	95.25 [3.75]	10.16 [0.4]	2.79 [0.11]	12.70 [0.50]	1/2–14
CES-2A-F1	4	95.25 [3.75]	10.16 [0.4]	2.79 [0.11]	12.70 [0.50]	1/2–14
CES-2A-D1	2	95.25 [3.75]	15.24 [0.6]	2.79 [0.11]	19.05 [0.75]	3/4–14
CES-2A-T2	3	95.25 [3.75]	10.16 [0.4]	2.79 [0.11]	19.05 [0.75]	3/4–14
CES-2A-F2	4	95.25 [3.75]	10.16 [0.4]	2.79 [0.11]	19.05 [0.75]	3/4–14
CES-3A-D1	2	95.25 [3.75]	15.24 [0.6]	4.32 [0.17]	25.40 [1.00]	1–11 1/2
CES-3A-T3	3	95.25 [3.75]	15.24 [0.6]	4.32 [0.17]	25.40 [1.00]	1–11 1/2
CES-3A-F1	4	95.25 [3.75]	15.24 [0.6]	4.32 [0.17]	25.40 [1.00]	1–11 1/2
CES-3A-D2	2	95.25 [3.75]	15.24 [0.6]	4.32 [0.17]	27.94 [1.10]	1 1/2–11 1/2
CES-3A-T2	3	95.25 [3.75]	15.24 [0.6]	4.32 [0.17]	27.94 [1.10]	1 1/2–11 1/2
CES-3A-F2	4	95.25 [3.75]	15.24 [0.6]	4.32 [0.17]	27.94 [1.10]	1 1/2–11 1/2
CES-4A-D3	2	95.25 [3.75]	22.86 [0.9]	7.62 [0.30]	37.34 [1.47]	1 1/2–11 1/2
CES-4A-T3	3	95.25 [3.75]	22.86 [0.9]	7.62 [0.30]	37.34 [1.47]	1 1/2–11 1/2
CES-4A-F3	4	95.25 [3.75]	22.86 [0.9]	7.62 [0.30]	37.34 [1.47]	1 1/2–11 1/2

Note: Coating is optional. As supplied dimensions appearing in table are for uncoated parts. When coating is added, entry diameters will be reduced by 1.5 [.06] max.

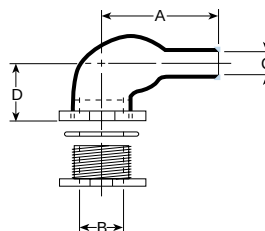
CES (Continued)

Right-Angle Threaded CES



Part No.	Min. Exp. ID	Max. Rec. ID	ID Min	Length		Drill Size
				D	A	
CES-2R-A50	13.97 [0.55]	7.11 [0.28]	12.70 [0.50]	35.56 [1.4]	25.40 [1.00]	12.70 [0.50]
CES-2R-A75	19.05 [0.75]	8.38 [0.33]	19.05 [0.75]	43.18 [1.7]	27.94 [1.10]	19.05 [0.75]
CES-3R-A100	27.94 [1.10]	9.65 [0.38]	25.40 [1.00]	53.34 [2.1]	33.78 [1.33]	25.40 [1.00]
CES-3R-A150	40.64 [1.60]	15.75 [0.62]	27.94 [1.10]	78.74 [3.1]	39.62 [1.56]	38.10 [1.50]

Right-Angle Breakout CES



Part No.	Min. Exp. ID	Max. Rec. ID	ID Min	Length		Drill Size
				D	A	
CES-1R	13.97 [0.55]	7.11 [0.28]	12.70 [0.50]	35.56 [1.4]	42.67 [1.68]	25.40 [1.00]
CES-2R	19.05 [0.75]	8.38 [0.33]	19.05 [0.75]	43.18 [1.7]	44.96 [1.77]	25.40 [1.00]
CES-3R	27.94 [1.10]	9.65 [0.38]	27.94 [1.10]	53.34 [2.1]	58.42 [2.30]	34.80 [1.37]
CES-4R	40.64 [1.60]	15.75 [0.62]	40.64 [1.60]	78.74 [3.1]	71.12 [2.80]	50.80 [2.00]

Roll-On Sealing Sleeve

Product Facts

- A Raychem heatless sealing solution
- Re-useable sealing solution
- Roll-on to seal, roll-off to re-enter
- Sealing with Raychem GelTek strip*
- Protection of connectors and splices against corrosion
- Available in many conveniently packaged kits



Applications

RayOLOn re-useable roll-on sealing sleeves are a family of products designed to protect connectors, electrical cable splices, and other cylindrical substrates from harsh environmental elements like salt spray and water moisture. RayOLOn sleeves are a part of Raychem's "heatless" sealing products that require no

heat guns or torches. This is useful in the areas where the use of motorized heat sources or open flames are prohibited or undesirable.

RayOLOn sealing sleeves provide the sealing of the substrates by simply rolling the sleeve over the area to be protected. If the substrate requires servicing, the sleeve can be rolled off to provide access to the

component under the sleeve. After the service is completed, the sleeve can be rolled on the part again to provide the protection. This operation may be done many times throughout the life of the sleeve providing time and material cost savings.

Operating Temperature Range

-40°C to 70°C
[-40°F to 158°F]

Specifications and Approvals

Raychem	RW 3031
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Temperature Ratings

Continuous operating temperature range	-40°C to 70°C [-40°F to 158°F]
Short term temperature exposure	-63°C to 90°C [-81°F to 194°F]
Minimum installation	-25°C [-13°F]

Sleeve Dimensions Inches (millimeters)

Base Part No.	Available Kits	Dimensions (Reference)		Recommended Use Range	Connection Length
		Diameter	Lengths		
LNCL-11-125	GK	0.51 [13.0]	4.92 [125]	0.22 - 0.68 [6 - 17]	3.00 [75]
LNCL-11-205	GK	0.51 [13.0]	8.07 [205]	0.22 - 0.68 [6 - 17]	6.00 [150]
LNCL-12-140	GK, CK-N	0.56 [14.2]	5.51 [140]	0.48 - 0.90 [12 - 23]	4.00 [100]
LNCL-12-240	GK, CK-N	0.56 [14.2]	9.45 [240]	0.48 - 0.90 [12 - 23]	7.00 [175]
LNCL-13-155	GK, TK-8	0.75 [19.0]	6.10 [155]	0.69 - 1.20 [18 - 30]	4.00 [100]
LNCL-13-305	GK	0.75 [19.0]	12.00 [305]	0.69 - 1.20 [18 - 30]	9.00 [225]
LNCL-14-185	GK, TK-7	1.02 [25.9]	7.28 [185]	0.96 - 1.50 [25 - 38]	5.00 [125]
LNCL-14-355	GK	1.02 [25.9]	14.00 [355]	0.96 - 1.50 [25 - 38]	10.0 [250]
LNCL-15-185	GK, TK-1, TK-5, TK-6	1.45 [36.8]	7.28 [185]	1.40 - 2.00 [36 - 46]	5.00 [125]
LNCL-15-260	GK, SS	1.45 [36.8]	10.2 [260]	1.40 - 2.00 [36 - 46]	7.50 [190]
LNCL-15-450	GK, SS	1.45 [36.8]	17.72 [450]	1.40 - 2.00 [36 - 46]	12.0 [300]

Refer to Raychem specification control drawing LNCL-XX-125 thru LNCL-XX-450 for more details.

*Tyco Electronics Gel and Sealant product information available at www.tycoelectronics.com

Typical RayOLOn Roll-On Sealing Sleeve Properties

Molded Parts — Accessories

RayOLOn Kits (Continued)

	Property	Performance	Test method
Physical/ Chemical	Tensile strength	8.3 MPa (1200 psi) minimum	ASTM D 2671
	Ultimate elongation	100 % minimum	ASTM D 412
	Density	1.1 g/cm ³ maximum	ASTM D 792
	Water absorption 24 hours at 23°C [73°F]	0.5 % maximum	ASTM D 570
	Flammability	40 mm/min maximum	ASTM D 635
Electrical	Dielectric strength	90 kV/cm (225 V/mil) minimum	ASTM D 149
	Volume resistivity	1x10 ¹² Ω-cm	ASTM D 257

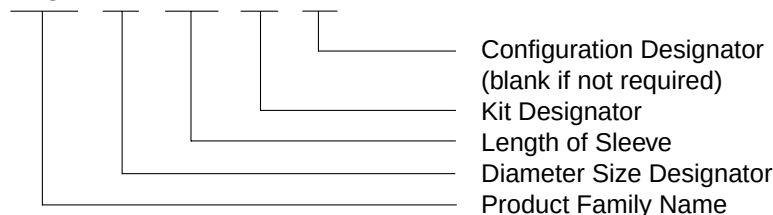
Refer to Raychem specification RW3031 for more requirements and performance information.

Notes:

1. The sleeve is not intended to be heated during the installation process.
2. DO NOT CUT LNCL roll-on sealing sleeve.
3. In case of a conflict between this data sheet and RW3031, RW3031 takes precedence.
4. Not recommended for extended exposure to hydrocarbon based fuel or fluids.

Part Numbering System

LNCL - XX - XXX - XX - XX



Kits

GK—General kit:	Roll-on sleeve, gel strip, cable tie, core tube, installation instruction
CK—Connector sealing kit:	Roll-on sleeve, cable tie, connector flange cover, gel strip, installation instruction
TK—Panel boot sealing kit:	Roll-on sleeve, ferrule, gel strip, cable tie, installation instruction
SS—Ship-or-shore kit:	Roll-on sleeve, connection shield, installation instruction

Note: Not all sizes and lengths are available for all kit combinations. Please refer to the table on the previous page.

Cable Clamp Heat-Shrink Grommet**Product Facts**

- Less assembly time
- Superior strain-relief
- Fewer errors — less rework
- Rework made easier
- No build-up taping or feeding wire through grommet
- Typical installation in just 10-20 seconds
- Re-expandable I.D. allows wire addition to a cable bundle

shrinkHOoP**Applications**

shrinkHOoP grommet (URHR) is an ultra high ratio heat-shrinkable-strain-relief grommet that can be placed over the cable assembly after the connector pinning operation is completed. The ultra-high expansion ratio material conveniently fills the space between the clamp type connector accessory and the cable. (When clamped into position, shrinkHOoP grommet provides strain relief that is more consistent and convenient than many conventional practices — for example, taping, grommet, or tape/grommet combination). The high ratio conformity of shrinkHOoP grommets will match most

typical cable configurations from single conductor to the high density multiple conductor arrangements.

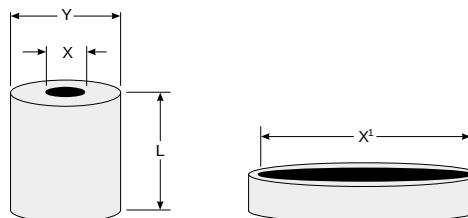
With shrinkHOoP grommet, repairs and rework are a snap – simply heat the grommet until soft, slide a NON-METALLIC probe through the center of the wire bundle (enlarging the grommet I.D.). Once cooled, the grommet will remain open allowing wires to be added, removed or reworked. The system can then be checked, the grommet reheated (shrinking it down again), positioned, and clamped in place.

Operating Temperature Range

-55°C to 135°C
[-67°F to 275°F]

shrinkHOoP (Continued)

RW



Product Dimensions
Inches (millimeters)

Part No.	I.D. Expanded (X1) min.	I.D. Recovered (X) max.	O.D. (Y) Ref.	Length (L) Ref.	Wt. (gm) Ref.	Notes
URHR-1	1 [25]	.08 [2.1]	0.25 [6]	0.5 [13]	0.75	
URHR-2	1.23 [31]	.10 [2.6]	0.375 [10]	0.5 [13]	1	
URHR-3	1.44 [37]	.14 [3.6]	0.5 [13]	0.5 [13]	1.5	
URHR-4	1.85 [47]	0.18 [4.7]	0.562 [14]	0.75 [19]	3.5	
URHR-5	2 [51]	0.20 [5.1]	0.812 [21]	0.75 [19]	5	

a) Recovered length will allow for 1.91 [0.075] either side of the collar, minimum in most cases.

Typical shrinkHOoP Grommet
Performance

	Property	Performance	Test Method
Physical	Tensile strength	1500 psi (10.3 Mpa)	ASTM D-412
	Ultimate elongation	250% minimum	ASTM D-412
	Specific gravity	1.4 maximum	ASTM D-792
	Water absorption	0.5 % maximum	ASTM D-570 A
	Flammability	Pass	ASTM D-635
	Corrosion resistance	Pass	ASTM D-2671 A
	Low temperature flex 4 hours at - 55+/-1°C [67+/-2°F]	Pass	ASTM D-2671 C
	Heat resistance	200% ultimate elongation, minimum	ASTM D-2671
	168 hrs at 175+/-1°C [347+/-2°F]	1200 psi (8.3 Mpa) tensile strength, minimum	
	Heat shock 4 hrs at 225+/-2°C [437+/-5°F]	No cracking, dripping or flowing	ASTM D 2671
Elastic Memory	—	275% minimum expansion to 4 inch (10 cm) of a fully recovered test specimen, and 93% recovery of expanded specimen after oven conditioning for 1 minute at 150+/-2°C[302 +/- 4°F]	—
Electrical	Dielectric strength	200 v/mil (7880 v/mm) minimum	ASTM D-876
	Volume resistivity	10 14 ohm-cm minimum	ASTM D-257
Chemical Fluid Resistance	—	200% ultimate Elongation, minimum 1200 psi (8.3 Mpa) tensile strength, minimum	ASTM F-146

10

Heat-Shrink Tubing,
Molded Parts and Adhesives

Selection chart

Molded Parts

shrinkHOoP (Continued)

Connector Series	Connector Size				
	8 (9)	10, 12 (11, 13)	14, 16 (15, 17)	18, 20 (19, 21)	22, 24, 28*
MIL-C-5015					
MS3451, 52, 56, 59	1	2	3	4	5
MS3450	2	3	4	5	*
MIL-C-26500**					
MS24266	1	2	3	4	5
MS24264, 265	2	3	4	5	*
MIL-C-26482					
MS3120, 21, 22, 26	1	2	3	4	5
MS3470, 71, 74, 75, 76	1	2	3	4	5
MS3124, MS3472	2	3	4	5	*
MIL-C-83723 Series I					
M83723/01 & 02, 05 & 06	1	2	3	4	5
07 & 08, 13 & 14, 23 & 24	1	2	3	4	5
M83723/03 & 04	2	3	4	5	*
MIL-C-83723 Series II					
M83723/17 & 18, 23 & 24	1	2	3	4	5
M83723/12 & 20, 21 & 22	2	3	4	5	*
MIL-C-83723 Series III					
M83723/71 & 72 thru 97 & 98	1	2	3	4	5
M83723/66, 67, 68 & 69	2	3	4	5	*
MIL-C-38999 Series I					
MS27469	1	2	3	4	5
MS27466, 68, 96, 27505, 27656	2	3	4	5	*
MIL-C-38999 Series II					
MS27472, 97, 98, 27508, 27513	1	2	3	4	5
MS27473, 84, 27474	2	3	4	5	*
MIL-C-38999 Series III					
38999/26	1	2	3	4	5
38999/20, 24	3	4	5	5	*
Boeing					
BACC45, F, M, N, P, R, S, T	—	2	3	4	5
BACC 63X	—	3	4	5	*
Boeing					
DC39, 31, 34, 35, 50-57	1	2	3	4	5
DC32, 33, 36, 37, 60, 61, 62, 63	2	3	4	5	*

* Consult Tyco Electronics for availability of larger sizes.

** Note: cable support clamp I.D. may effect the size of shrinkHOoP grommet selected.

Tyco Electronics Corporation has acquired XL Technologies. Use the information in the following table to convert the XL part number into the new Tyco Electronics Raychem product description.

Ordering Information

Description XL Part No.	Convert to Description
080EK025	SSC-2/239
080EK025-woA	SSC-2/U
137EK050	SSC-3/239
137EK050-woA	SSC-3/U
1-8117-2A	CES-2A-D1
1-8117-3A	CES-2A-T1
1-8117-4A	CES-2A-F1
200EK075	SSC-4/239
200EK075-woA	SSC-4/U
20432242	CES-4/HR-3
2-8115-2A	CES-2-D1A
2-8115-2AOE	CES-2-D1A
2-8115-2B	CES-2-D1
2-8115-3A	CES-2-T1
2-8115-3B	CES-2-T1B
2-8115-4A	CES-2-F1A
2-8115-4B	CES-2-F1
2-8117-2A	CES-2A-D1
2-8117-2AOE	CES-2A-D1
2-8117-3A	CES-2A-T2
2-8117-4A	CES-2A-F2
2-8118-3A	CES-2-T1
2S-8115-2A	CES-2-D1A
2S-8115-3A	CES-2-T1
2S-8115-4A	CES-2-F1A
380EK150	SSC-6/239
380EK150woA	SSC-6/U
3-8115-2B	CES-3-D1
3-8115-3B	CES-3-T1
3-8115-4B	CES-3-F1
3-8118-4B	CES-3-F1
3A-8117-2B	CES-3A-D1
3A-8117-3B	CES-2A-T3
3A-8117-4B	CES-3A-F1
4-8115-2C	CES-4-D3
4-8115-3C	CES-4-T1
4-8115-4C	CES-4-F1
4-8117-2B	CES-3A-D2
4-8117-3B	CES-3A-T2
4-8117-4B	CES-3A-F2
4A-8117-2C	CES-4A-D3
4A-8117-3C	CES-4A-T3
4A-8117-4C	CES-4A-F3
52451-2X12A	91385-2/12
5-8115-3D	CES-5-T4
8114-1	CES-1
1/2/14	CES-1-2
8114-1-49R	CES-1R
8114-2	CES-2
8114-2-50R	CES-2R
8114-2S	CES-2
8114-2V	CES-2V
8114-2VL	CES-2V
8114-3	CES-3
8114-3-51R	CES-3R
8114-3L	CES-3L
8114-3S	CES-3S
8114-4	CES-4
8114-4-54R	CES-4R
8114-4N	CES-4
8114-4S	CES-4S

Description XL Part No.	Convert to Description
8114-4S/C	CES-4S
8114-5	CES-5
8116-1	CES-2-A50
8116-1-49R	CES-2R-A50
8116-1A	CES-2-A50
8116-2	CES-2-A75
8116-2-50R	CES-2R-A75
8116-3	CES2-A100
8116-3-51R	CES-3R-A100
8116-3A	CES-3-A100
8116-4	CES-3-A150
8116-4-52R	CES-3R-A150
8116-4A	CES-4A-A150
8116-5	CES-5-A250
8118-2	CES-2
91342-1	D3-9 FR
91342-12	D3-30 FR
91342-2	D14-30 FR
91342-23	D14-100 FR
91342-3X2.5	D50-200 FR
91342-3	D50-100 FR
91342-34	D50-400 FR
91342-4	D200-400 FR
91343-1	T3-9 FR
91343-2	T14-23 FR
91343-2A	T14-50 FR
91343-3	T42-100 FR
91343-4	T150-300 FR
91343-5	T-400 FR
91343-5678	T3-100 FR
91343-6	T500-600 FR
91343-910	T150-400 FR
91344-1	F3-9 FR
91344-1213	F3-23 FR
91344-1415	F42-100 FR
91344-1617	F75-200 FR
91344-2	F-23 FR
91344-3	F42-60 FR
91344-4	F75-100 FR
91344-5	F133-200 FR
91344-6	F150-400 FR
91346-3	6S100-200 FR
91346-30	202A111-3-0
91346-31	202A111-3/42-0
91346-32	202A111-3/86-0
91347-30	202A121-3-0
91347-31	202A121-3/42-0
91347-32	202A121-3/86-0
91348-1	8S23-75 FR
91348-2	8S14-50 FR
91348-3	8S42-100 FR
91348-30	202A132-3-0
91348-31	202A132-3/42-0
91348-32	202A132-3/86-0
91349-30	202A142-3-0
91349-31	202A142-3/42-0
91349-32	202A142-3/86-0
91350-30	202A153-3-0
91350-31	202A153-3/42-0
91350-32	202A153-3/86-0
91351-30	202A163-3-0

Ordering Information (Continued)

Description XL Part No.	Convert to Description
91351-31	202A163-3/42-0
91351-32	202A163-3/86-0
91352-30	202A174-3-0
91352-31	202A174-3/42-0
91352-32	202A174-3/86-0
91353-30	202A185-3-0
91353-31	202A185-3/42-0
91353-32	202A185-3/86-0
91354-30	202A196-3-0
91354-31	202A196-3/42-0
91354-32	202A196-3/86-0
913L87-30	202D921-3/-0
913L87-31	202D921-3/42-0
913L87-32	202D921-3/86-0
91387-30	202A921-3/-0
91387-31	202A921-3/42-0
913L47-30	202D121-3/-0
913L47-31	202D121-3/42-0
913L47-32	202D121-3/86-0
913L48-30	202D132-3/-0
913L48-31	202D132-3/42-0
913L48-32	202D132-3/86-0
913L49-30	202D142-3/-0
913L49-31	202D142-3/42-0
913L49-32	202D142-3/86-0
913L50-30	202D153-3-0
913L50-31	202D153-3/42-0
913L50-32	202D153-3/86-0
913L51-30	202D163-3-0
913L51-31	202D163-3/42-0
913L51-32	202D163-3/86-0
913L52-30	202D174-3-0
913L52-31	202D174-3/42-0
913L52-32	202D174-3/86-0
913L53-30	202D185-3-0
913L53-31	202D185-3/42-0
913L53-32	202D185-3/86-0
913L54-30	202D196-3-0
913L54-31	202D196-3/42-0
913L54-32	202D196-3/86-0
913L66-30	202D211-3-0
913L66-31	202D211-3/42-0
913L66-32	202D211-3/86-0
913L67-30	202D221-3-0
913L67-31	202D221-3/42-0
913L67-32	202D221-3/86-0
913L68-30	202D232-3-0
913L68-31	202D232-3/42-0
913L68-32	202D232-3/86-0
913L69-30	202D242-3-0
913L69-31	202D242-3/42-0
913L69-32	202D242-3/86-0
913L70-30	202D253-3-0
913L70-31	202D253-3/42-0

Description XL Part No.	Convert to Description
913L70-32	202D253-3/86-0
913L87-30	202D921-3-0
913L87-31	202D921-3/42-0
913L87-32	202D921-3/86-0
913R48-30	222A132-3-0
913R48-31	222A132-3/42-0
913R48-32	222A132-3/86-0
913R49-30	222A142-3-0
913R49-31	222A142-3/42-0
913R49-32	222A142-3/86-0
913R50-30	222A152-3-0
913R50-31	222A152-3/42-0
913R50-32	222A152-3/86-0
913R51-30	222A163-3-0
913R51-31	222A163-3/42-0
913R51-32	222A163-3/86-0
913R52-30	222A174-3-0
913R52-31	222A174-3/42-0
913R52-32	222A174-3/86-0
913RL48-30	222D132-3-0
913RL48-31	222D132-3/42-0
913RL48-32	222D132-3/86-0
913RL49-30	222D142-3-0
913RL49-31	222D142-3/42-0
913RL49-32	222D142-3/86-0
913RL50-30	222D152-3-0
913RL50-31	222D152-3/42-0
913RL50-32	222D152-3/86-0
913RL51-30	222D163-3-0
913RL51-31	222D163-3/42-0
913RL51-32	222D163-3/86-0
913RL52-30	222D174-3-0
913RL52-31	222D174-3/42-0
913RL52-32	222D174-3/86-0
913Y95-30	381A301-71/-0
913Y95-31	381A301-71/42-0
913Y95-32	381A301-71/86-0
913Y96-30	381A302-71/-0
913Y96-31	381A302-71/42-0
913Y96-32	381A302-71/86-0
HHW-1.3/6A	SST-6-13FR/97-0
HHW-13/6A	SST-6-13FR/97-0
HHW-15/12	SST-12-15FR/97-0
HHW-15/6	SST-6-15FR/97-0
HHW-15/9	SST-9-15FR/97-0
HHW-20/9	SST-9-20FR/97-0
HRSR-1	URHR-1
HRSR-2	URHR-2
HRSR-3	URHR-3
HRSR-4	URHR-4
HRSR-5	URHR-5
XHTA	RHW
XHTU	RHW
XMTA	RPRD

Tyco Electronics manufacturers Raychem adhesives and sealants to accommodate a wide range of applications, materials, and environmental conditions.

Raychem adhesives include both thermosets and thermoplastics.

Thermosets are curable two-part epoxies or crosslinked elastomers.

Thermoplastics are hot-melt adhesives that flow when heated and set when cooled. They reflow when reheated to simplify component repair.

Tyco Electronics also manufactures Raychem products that include a thermoplastic adhesive or a mastic-type sealant for water holdout applications. The sealants adhere to non-oily substrates and can be removed where reentry is necessary.

Introduction

Selection Guide

To determine the adhesive or sealant most compatible with a Raychem part, you must know the part's product type.

Use the Adhesive/Sealant Selection Table below to determine a Raychem part's product type and the adhesive/sealant compatible with that type.

Use the Adhesive/Sealant Product Characteristics Table (pages 10184 and 10185) to be sure the adhesive or sealant has the product characteristics your application requires.

To use the Selection Table, follow these four steps:

1. Under "Substrate Category," find the product material and product name/part number for the Raychem part.
2. Across the top of the table, find the part's product type and dash number.
3. At the intersection of the substrate category (product material/name/part number) and the product type (by designated dash number) you will find the part number for the most compatible adhesive for the Raychem part.

4. See the Adhesive/Sealant Product Characteristics Table below to verify the characteristics of the adhesive/sealant you selected.

Adhesive/Sealant Selection Table

Substrate Category	Product Name Examples	Molded Part Material Dash Number												
		-3	-4	-6	-8	-12	-25	-50	-51	-55	-71	-100	-125	-130
Polyolefin	RNF-100	S-1006	S-1006	—	—	—	—	—	—	—	S-1006	—	—	S-1006
	Versafit	S-1009	S-1009	—	—	—	—	—	—	—	S-1009	—	—	S-1009
	CRN	S-1017	S-1017	—	—	—	—	—	—	—	S-1017	—	—	S-1017
	BSTS	S-1030	S-1030	—	—	—	—	—	—	—	S-1030	—	—	—
	SST	S-1048	S-1048	—	—	—	—	—	—	—	S-1048	—	—	—
	HR	S-1298	S-1297	—	—	—	—	—	—	—	S-1297	—	—	—
Fluoro-polymer	Kynar	S-1009	S-1009	—	S-1009	—	S-1125	—	—	—	S-1009	—	S-1009	—
		S-1048	S-1048	—	—	—	—	—	—	—	S-1048	—	S-1048	—
		S-1125	S-1125	—	—	—	—	—	—	—	S-1125	—	S-1125	—
	RT555	—	—	—	—	S-1255	—	—	—	S-1255	—	—	S-1255	—
	HCTE	—	—	—	—	S-1255	S-1125	—	—	S-1255	—	—	—	—
	CONVOLEX	—	—	—	—	S-1125	—	—	—	S-1125	—	—	—	—
Vinyl	PVC	S-1006	S-1006	—	—	—	—	—	—	—	S-1006	—	—	—
		S-1009	S-1009	—	—	—	—	—	—	—	S-1009	—	—	—
		S-1017	S-1017	—	—	—	—	—	—	—	S-1017	—	—	—
Elastomer	DR-25	—	—	—	—	—	S-1125	S-1125	S-1125	—	—	—	—	—
	NT	S-1006	S-1006	—	—	—	—	—	—	—	S-1006	—	—	—
		S-1009	S-1009	—	—	—	—	—	—	—	S-1009	—	—	—
		S-1017	S-1017	—	—	—	—	—	—	—	S-1017	—	—	—
	NT-FR	—	—	—	—	—	S-1125	—	S-1124	—	—	—	—	—
	SFR	—	—	*	—	—	—	—	—	—	—	—	—	—
	SRFR	—	—	*	—	—	—	—	—	—	—	—	—	—
	VITON	—	—	—	—	S-1255	—	—	—	S-1255	—	—	S-1255	—
	VPB	—	—	—	—	—	—	S-1125	—	—	—	—	—	—
Zerohal	XFFR	—	—	—	—	—	—	—	—	—	—	S-1030	—	—
	ZHTM	—	—	—	—	—	—	—	—	—	—	S-1030	—	—

*GE RTV 108 used with SFR SRFR and -6 (silicone) molded parts.

Adhesive/Sealant Product Characteristics Tables
Adhesive/Sealant Product Characteristics Table

Product Type	Precoat Designation	Type	Operating Temperature Range	Product Designation	Available Form/ Packaging
Thermosets					
S-1006	—	Epoxy/ polyamide two-part paste	-55°C to 135°C [-67°F to 275°F]	S-1006 Kit 1	Two x 15-gram packs
				S-1006 Kit 2	Four x 7.5-gram packs
				S-1006 Kit A	Ten 3-gram packs
S-1009	—	Epoxy/ polymercaptan two-part paste	-55°C to 135°C [-67°F to 275°F]	S-1009 Kit A	Ten 3-gram packs
S-1255-04	—	One-part epoxy tape adhesive	-55°C to 200°C [-67°F to 392°F]	S-1255-04	Tape [3/4 in. x .020 x 100 ft.]
S-1125	—	Epoxy/polyamide two-part paste	-55°C to 150°C [-67°F to 302°F]	S-1125 Kit 1	Five 10-gram packs
				S-1125 Kit 2	Two 10-gram packs
				S-1125 Kit 3	One 100-gram pack
				S-1125 Kit 4	Five 10-gram packs
				S-1125 Kit 5	One 10-gram pack
				S-1125 Kit 8	Two 50-ml syringes
	/225	Precoated latent-curing epoxy/polyamide	-75°C to 150°C [-103°F to 302°F]	Precoat only on -25 molded parts	—
Thermoplastics					
S-1017	/42	Hot-melt/ polyamide	-20°C to 60°C*** [-4°F to 140°F]	S-1017	Tape [1 in. x .010 in. x 50 ft.]
S-1030	/180	Hot-melt/ polyolefin	-80°C to 80°C [-112°F to 176°F]	S-1030	Tape [3/4 in. x .010 in. x 33 ft.]
S-1048	/86	Hot-melt, high performance	-55°C to 120°C [-67°F to 248°F]	S-1048	Tape [1 in. x .026 in. x 100 ft.]
S-1124	/164	Hot-melt/ elastomeric polymer	-55°C to 105°C [-67°F to 221°F]	S-1124	Tape [3/4 in. x .018 in. x 10 ft.]
S-1297	/97	Hot-melt/ polyamide adhesive	-20°C to 90°C [-4°F to 194°F]	S-1297	Tape [1 in. x .010 in. x 10 ft.]
Sealants					
S-1278	—	Hot-melt grey butyl sealant	-40°C to 90°C [-40°F to 194°F]	S-1278-01	Tape [1 in. x .062 in. x 25 ft.]
				S-1278-02	Tape [3/4 in. x .125 in. x 10 ft.)
S-1305	—	Hot-melt grey butyl sealant	-40°C to 90°C [-40°F to 194°F]	S-1305-01	Tape [1 in. x .062 in. x 25 ft.]

*Shelf life from date of manufacture.

**For specific adhesion properties, see product specification sheets.

***Passes cold bend at -40°C [-40°F] per RT-4204.

****Only S-1006 Kit A conforms to MIL-A-46864.

Adhesive/Sealant Product Characteristics Tables (Continued)

Pot Life at 23°C	Curing Conditions	Shelf life* at or below 25°C	Specifications**	Comments
1 h	96 h at 20°C [68°F] min. or 1 hr at 120°C [248°F]	2 years	RT-1006 RK-6612 MIL-A-46864****	General purpose harnessing adhesive. Not used on Viton, silicone or Kynar; 20-minute pot life
20 min	24 h at 20°C [68°F] min. or 1 hr at 95°C [203°F]	2 years	RT-1009	General purpose harnessing adhesive. Not used on Viton or silicone; 20-minute pot life
	45 min at 120°C [248°F] 2 h at 155°C [311°F] min. or 15 min at 240°C [464°F]	1 year	RT-1014	One-part epoxy tape used with Viton harness systems. Heat cure required (2 hours at 155°C [311°F])
90 min	24 h at 20°C min. or 1 hr at 85°C [185°F]	18 months	RT-1011 RK-6619 VG-95343	Good fluid-resistant epoxy used with System 25
	Cure during installation of molded parts	1 year	VG-95343 RK-6630	Precoated epoxy system for System 25
—	120°C [248°F]	Unlimited	RT-1050/1	General purpose harnessing adhesive. Standard precoated adhesive for -3 and -4 molded parts
—	120°C [248°F]	Unlimited	RT-1050/6 RK-6017	Good low-temperature flexibility. Available as a preinstalled tape for molded parts
—	160°C [320°F]	Unlimited	RT-1050/3 RK-6626	Requires high temperature to achieve bonding. Highest service temperature for hot melt
—	135°C [275°F]	Unlimited	RT-1050/13	Requires reflowing in an oven at 150°C [302°F] for 90 minutes. Designed to bond to -51 molded parts.
—	120°C [248°F]	Unlimited	RW-2019	General purpose harnessing adhesive. Standard precoated adhesive in Sigmaform molded parts, CES and CSGA cable entry seals, and SST-FR heat-shrinkable tubing
—	110°C [230°F]	Unlimited	RW-2020	General purpose sealant and cable breakout area filler
—	110°C [230°F]	Unlimited	RW-2021	Halogen-free, flame-retardant sealant and cable breakout area filler

*Shelf life from date of manufacture.

**For specific adhesion properties, see product specification sheets.

***Passes cold bend at -40°C [-40°F] per RT-4204.

****Only S-1006 Kit A conforms to MIL-A-46864.

Installation Guide

Substrate Preparation Procedures

Preparation of the substrate depends on the part to be bonded. Following are two preparation procedures. The first applies to plated metals and adapters; the second applies to polymer molded parts, cable jackets, and tubing materials.

Plated Metals and Adapters

Thoroughly degrease the surface with a clean cloth or paper wipe dampened with a solvent. The cloth or paper should not be saturated with the solvent.

Allow the part to stand for a minute or two to allow complete evaporation of the solvent.

Molded Parts, Cable Jackets, and Tubing Materials

Carefully and evenly abrade the surface with #320 emery cloth. Wipe contaminants and abraded particles away with a clean cloth or paper wipe dampened with a solvent. The cloth or paper should not be saturated with the solvent. Allow the part to stand for a minute or two to allow complete evaporation of the solvent.

Note:

- Avoid contamination of the prepared surface. If using primer, apply it according to the manufacturer's instructions and allow it to dry.
- Epoxy adhesives may cause skin and eye irritation. Be sure to observe the handling instructions.
- When using hot-melt adhesives on substrates with high heat-sink capacity (such as connector backshells), preheat the substrate until it is hot to touch, then apply the adhesive tape and shrink the molded part in place.

Caution:

The use of cleaning solvent is described in the preparation of various components for adhesive bonding. Please observe the solvent manufacturer's safety recommendations. Several Raychem epoxy adhesives and solvent base primers are also described in some cases. For specific handling precautions, please consult the appropriate Raychem material safety data sheet for the adhesive being used.

Installation Procedures

The three sets of installation instructions that follow are based on the type and/or form of adhesive or sealant to be used.

Select the set of instructions that applies to your application.

Tape Adhesives and Sealants Connector Boot

1. Degrease the area of the adapter to which the boot will be bonded, using appropriate solvent on a paper tissue or clean cloth. Do not abrade the adapter.
2. Lightly abrade the bonding area of the cable jacket with #320 emery cloth, then wipe off loose particles with a tissue or clean cloth dampened with a solvent.
3. Lightly abrade and wipe 25.4 [1.0] back inside each end of the boot.
4. When using primer, apply a thin, uniform coating to the bonding surface and let it air dry (15–20 minutes).
5. Double-wrap the adhesive tape around the cleaned area of the adapter, placing slight tension on the tape as you wrap. Tack the ends in place with a soldering iron or hot tool.

6. Double-wrap adhesive tape around the cable jacket where the end of the boot is to be located.
7. Position the boot on the adapter and the cable. Apply heat, starting at the connector end.
8. Recover the connector end of the boot onto the adapter and continue heating until the area is fully recovered and the adhesive tape is properly melted.
9. Complete the recovery of the boot, continuing toward the cable end. Heat the cable end of the boot where the adhesive is placed, until the part is fully recovered and the tape has properly melted or flowed. The tape should appear wet, form a bead or fillet between the cable and boot, and show no definition between the layers of tape.
10. Where oven curing is required to complete adhesive bonding, heat the assembled harness in a preheated oven according to the following schedule:
 - S-1255-02:
2 hours at 155°C [311°F]
 - S-1124:
90 minutes at 150°C [302°F]

Transition

1. Lightly abrade the bonding area of the cable jacket with #320 emery cloth, then wipe off loose particles with a tissue or clean cloth dampened with a solvent.
2. Abrade and wipe the inside of each transition opening.
3. When using primer, apply a thin, uniform coating to the bonding surface and let it air dry (15–20 minutes).

Installation Guide (Continued)

4. Double-wrap the tape around the abraded areas of the cable, placing slight tension on the tape as you wrap. Tack the ends in place with a soldering iron or hot tool.
5. Center the molded part over the transition area. When properly positioned, the part should not fit tightly in the "branched" area of the breakout. A tight fit may cause the part to crease or wrinkle as it recovers. The tape should extend slightly beyond the end of the transition.
6. Apply heat to the center of the transition. Recover one leg of the transition, moving heat from the center of the transition to the adhesive opening of the leg. Repeat the procedure on each leg of the transition.
7. Continue heating each end of the transition until the part is fully recovered and the adhesive tape has properly melted or flowed. The tape should now appear wet, form a bead or fillet between the cable and transition, and show no definition between the layers of tape.
8. Where oven curing is required to complete adhesive bonding, heat the assembled harness in a preheated oven according to the following schedule:

S-1255-02:
2 hours at 155°C [311°F]

S-1124:
90 minutes at 150°C [302°F]

Thermosets

Connector Boot

1. Thoroughly mix the two parts according to the instructions provided with the kit.
2. Degrease the area of the adapter to which the boot will be bonded, using appropriate solvent on a paper tissue or clean cloth. Do not abrade the adapter.
3. Lightly abrade the bonding area of the cable jacket with #320 emery cloth, then wipe off loose particles with a tissue or clean cloth.
4. Lightly abrade back 25.4 mm [1.0] inside each end of the boot.
5. Using a spatula, apply the mixed adhesive to the adapter and shrink the adapter to the end of the boot.
6. Apply adhesive to the cable jacket and complete the shrinking process.
7. With a clean cloth, remove excess adhesive from all areas immediately.
8. Follow the curing conditions outlined in this guide.

Transition

1. Thoroughly mix the two parts according to the instructions provided with the kit.
2. Lightly abrade the bonding area of the cable jacket with #320 emery cloth, then wipe off loose particles with a tissue or clean cloth.
3. Abrade and wipe inside each opening of the transition.
4. Using a spatula, apply the mixed adhesive to the cable jacket.
5. Apply heat to the center of the transition. Recover one leg of the transition, moving heat from the center of the transition to the adhesive opening of the leg. Repeat the procedure on each leg.
6. Remove excess adhesive from all areas immediately with a clean cloth.
7. Follow the curing conditions specified for "thermosets" in the "Adhesive/Sealant Product Characteristics Table" on pages 10184 and 10185.

Installation Guide (Continued)**Molded Parts Pre-coated
with Thermoplastic
Adhesive****Connector Boot**

1. Degrease the area of the adapter to which the boot will be bonded, using appropriate solvent on a paper tissue or clean cloth. Do not abrade the adapter or inside surface of the boot.
2. Lightly abrade the bonding area of the cable jacket with #320 emery cloth, then wipe off loose particles with a tissue or clean cloth dampened with solvent.
3. Position the boot on the adapter and cable. Apply heat starting at the connector end.
4. Recover the connector end of the boot onto the adapter and continue heating until the area is fully recovered and the adhesive is properly melted.
5. Complete the recovery of the boot, continuing toward the cable end of the boot until the part is fully recovered and the adhesive is properly melted. The adhesive should form a bead or fillet between the cable and boot when fully melted.
6. With a clean cloth, remove excess adhesive from all areas immediately.
7. Follow the curing conditions outlined in this guide.

Transition

1. Lightly abrade the bonding area of the cable jacket with #320 emery cloth, then wipe off loose particles with a tissue or clean cloth dampened with solvent.
2. Center the molded part over the transition area.
3. Apply heat to the center of the transition. Recover one leg of the transition, moving heat from the center of the transition to the adhesive opening of the leg. Repeat the procedure on each leg of the transition.
4. Continue heating each end until the part is fully recovered and the adhesive has properly melted. The adhesive should form a bead or fillet between the cable and transition when fully melted.
5. Follow the curing conditions specified for "thermosets" in the "Adhesive/Sealant Product Characteristics Table" on pages 10184 and 10185.

AA-400 Super Heater Compressed-Air Heating Tool

Product Facts

- Automatic power cut-off switch to protect heating element if air flow is interrupted
- Pressure regulator and gauge for adjusting air flow and temperature
- Indicator light that goes on when power is applied to heating element
- Very focused heat
- Wide variety of reflectors available
- Excellent tool for small items and confined areas

Applications

Used for installing heat-shrinkable tubing in multiple applications. Excellent for installing SolderSleeve devices (wire-to-pin applications) and SolderTacts contacts.



Specifications

Utility Requirements	
Electrical	120-V model: 120 Vac, 4 A, 50–60 Hz 240-V model: 240 Vac, 2 A, 50–60 Hz
Air (oil free)	60 psig minimum, 5 cfm

Ordering Information

Model	Voltage	Description	Part No.
AA-400 Super Heater with stand, needlepoint tip, Mini SolderSleeve reflector, and input air filter	120 Vac	AA-400-32	582602-000
	240 Vac (CE version)	AA-400-200	281917-000

Accessories and Replacement Parts	Part No.	Description	NSN Stock No.
SolderSleeve reflector	979646-000	AA-400-94	4940-00-609-4993
Needlepoint tip	979647-000	AA-400-96	4940-00-148-9847
Boot and tubing tip	979691-000	AA-400-101	4940-00-148-9848
Mini SolderSleeve reflector	979663-000	AA-400-102	4940-01-043-7634
Low-flow tip	979672-000	AA-400-103	3439-01-173-8810
Element replacement kit, 120 V	013750-000	AA-400-128	—
Element replacement kit, 240 V (CE)	444179-000	AA-400-228	—
Stand	979649-000	AA-400-09	—
Input air filter	979673-000	AA-400-P-Y-92	—

CV-1981 and CV-1983 Heavy-Duty Hot-Air Heating Tools

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.



Technical Specification

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 [13]
CV-1983	320 [13]
CV-1981 PID	350 [13]
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 Tyco Electronics.	

Ordering Information

CV-1981 and CV-1983 Heavy-Duty Hot-Air Heating Tools (Continued)

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-1981-230V1600W-MK2	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 [0.25–1.0]	991973-000
PR-13 reflector	Tubing: Up to 6 [0.25]	991963-000
PR-13C reflector	Large SolderSleeve products	991974-000
PR-21 reflector	Tubing: Up to 25.4 [1.0]	991984-000
PR-24 reflector	Tubing/molded parts: 25.4–34.93 [1.0–1.38]	991964-000
PR-24A reflector	Tubing/molded parts: 34.93–60.33 [1.38–2.38]	991989-000
PR-25 reflector	SolderSleeve products: Up to 7 [0.28]	991965-000
PR-25D reflector	SolderSleeve products: 6.3–12.7 [0.25–0.50]	989523-000
PR-26 reflector	Small SolderSleeve products	991967-000
PR-33 reflector	SolderSleeve products: 19.05–25.4 [0.75–1.0]	997768-000
AD-1962 adapter for larger-barrel CV-1983	—	989172-000
PR-34 reflector	SolderSleeve products: 12.0–20.0 [0.47–0.79]	989111-000
PR-51	Special narrow reflector for molded part transitions (21.5 x 3.5 mm nozzle) [.85 x .14]	113069-000

*Note: A42716 supersedes and replaces 538005
340970 supersedes and replaces 923002

HL1802E and HL2005E Steinel General Purpose Hot-Air Heating Tool

Products Facts

- Light weight
- Easy, quiet operation
- Precise variable temperature
- 1500 watts
- Reflectors and stand (optional)
- Wide variety of applications
- CE approved (230 V only)

Applications

Used for installing heat-shrinkable tubings and molded parts, SolderSleeve devices, and SolderTacts contacts.



Specifications

Steinel (120 V) power requirement	120 V, 60 Hz, 12.5 A
Steinel (230 V) power requirement	230 V, 50 Hz, 8.7 A
Rated heater element power	110V - 1500 W/230V-2000W
Weight	850 g [1.9 lb]
Cord length	Approx. 3 m [approx. 8 ft]
Typical temperature output*	49°C to 593°C [120°F to 1100°F]

*The Steinel heating tool is equipped with a variable temperature control. The correct temperature setting of the tool will vary, depending on application characteristics. The recommended procedure is to experiment with scrap materials and start with the lowest temperature range.

Ordering Information

Application Tooling

HL1802E and HL2005E Steinel General Purpose Hot-Air Heating Tool (Continued)

Model /Description	Part No.
HL1802E-Kit-120 V**	289759-000
HL2005E-230V-Euro	910424-000
HL2005E-230V-UK	629014-000
HL2005E-Kit-230-Euro**	849224-000

Accessories and Replacement Parts	Description	Part No.
SolderSleeve reflector	HL1802E-074616	832011-000
HL1802E-ADAPT for use with PR reflectors***	HL1802E-ADAPT-PR	444817-000
Tubing reflector	HL1802E-070519	022611-000
Bench stand	HL1802E-BENCH-STD	717083-000
9-mm-diameter reduction nozzle	HL1802E-070618	930321-000

**Complete with SolderSleeve reflector.

***Selection of PR reflectors can be found in CV-1981/CV-1983 section.

Accessories



Clip-on bench stand (P/N 717083-000) for heating tool. Must be ordered separately.



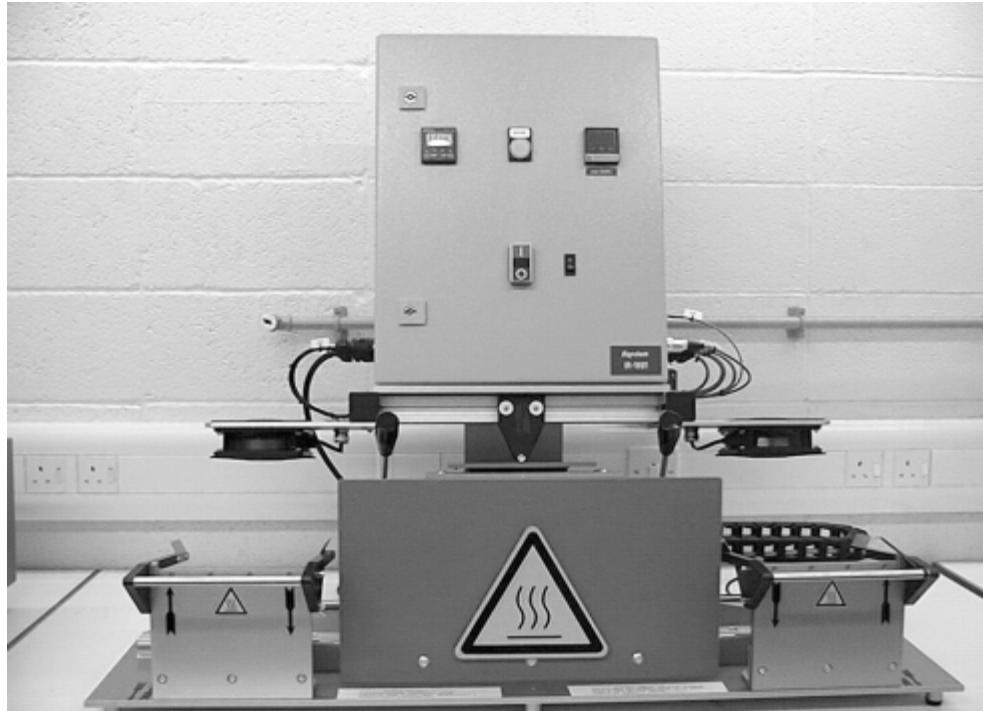
SolderSleeve reflector (P/N 832011-000) for SolderSleeve terminators, SolderTacts contacts, and small-diameter tubing. Comes standard with Steinel heating tool.

Optional tubing reflector (P/N 022611-000) for larger tubing and molded parts. Must be ordered separately.

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

IR-1891 Shuttle Machine — Twin Workstation Heater for Multiple Installation of Short Length Tubing Products



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 workstations 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 cor-

rectly positioned and then slides the heat head into position before initiating the heating cycle. The operator then continues with loading/unloading the other workstation whilst the heating cycle is taking place.

The IR-1891-220V-Shuttle-Retr 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/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 infra-red 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.

IR-1891 Shuttle Machine — Twin Workstation Heater for Multiple Installation of Short Length Tubing Products (Continued)

Technical Specification

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 20 seconds depending on application
System Noise	< 70 dB
Dimensions – 508636-000	L1100 x H650 x D500 [L43 x H25 x D20]
Dimensions – 613148-000 / 167309-000 / 289588-000	L1100 x H900 x D500 [L43 x H35 x D20]
Base Plate Dimensions 289588-000 / 167309-000	L1040 x D450 [L41 x D18]
Base Plate Dimensions 613148-000	L1040 x D397 [L41 x D16]

Product Range

Wide range of Raychem tubing products in particular LSTT, RNF-3000, RNF-100, HTAT, ATUM.
Maximum diameter 20 [0.8] and maximum length 60 [2.0]

Ordering Information

Description	Part No.
* IR-1891-220V-Shuttle-Retrn	289588-000
* IR-1891-220V-Retrn-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.

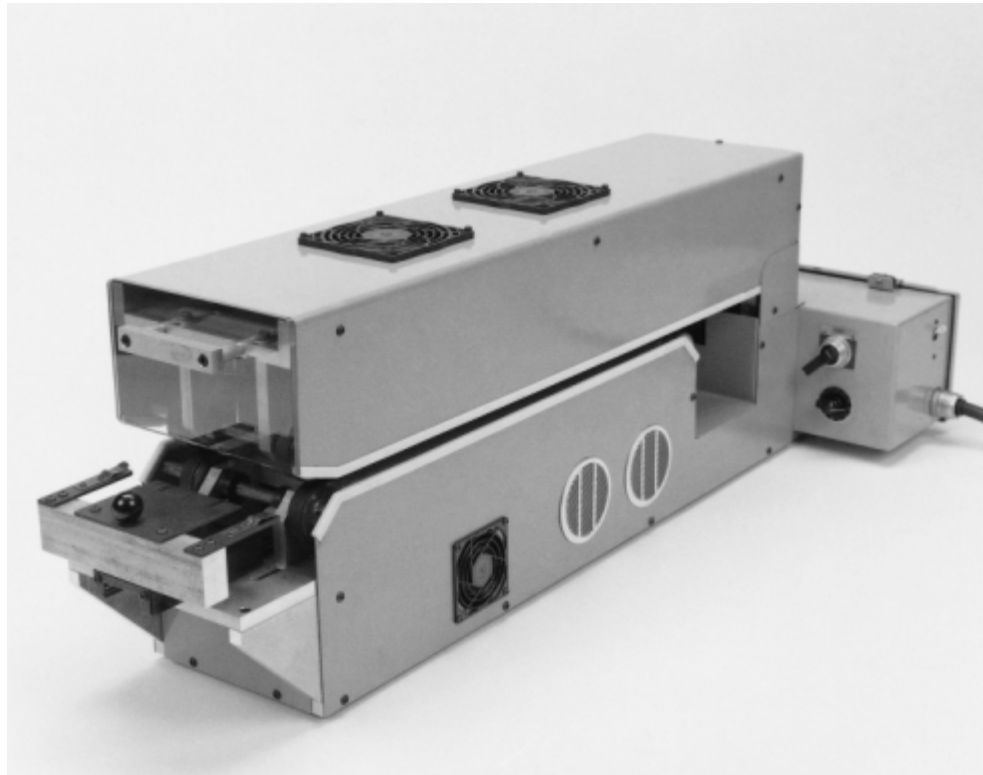
Accessories

Description	Part No.
Auto-Return-Kit IR-1891-Heater-Return-Kit	184947-000 For use on non-preferred IR-1891-220V-shuttle-std serial nos 400 and above

Note: A range of tooling fixtures designed for previous applications are available. Please contact Tyco Electronics for details.

Model 16B Belt Heater**Product Facts**

- Controlled heating for installation of Raychem heat-shrinkable tubing at rates required for mass production
- Controlled repeatable heating: time and temperature settings can be fixed to maintain repeatable installation parameters
- Part positioning that is clearly defined and easy to maintain
- Operation that requires only minimal skill
- Efficient and economical operation, which greatly reduces labor costs. In most cases the throughput rate is limited only by the rate at which an operator can load parts into the heater

**Applications**

Designed for processing a broad range of heat-shrinkable tubing products up to 19 [75] in diameter and 101 [4.0] long. Suitable for either single-wall or adhesive-lined tubing. Heating-element temperature is adjustable up to 600°C [1112°F] and the belt speed is adjustable to 2.28 [7.5] per minute. Operator simply positions the heat-shrink tubing over the assembly and feeds it into the process chamber. Heating and cooling take place automatically with the cables or wires securely fixed.

Specifications and Dimensions

Model 16B Belt Heater (Continued)

Electrical	Part No. 827429-000	Part No. 047143-000	Part No. 584313-000
Power requirements	120 Vac, 1 Ø, 50/60 Hz, 20 A	220 Vac, 1 Ø, 50/60 Hz, 15 A, 3-wire	120 Vac, 1 Ø, 50/60 Hz, 15 A, 4-wire
Heating elements	875 W (upper and lower)	875 W (upper and lower)	875 W (upper and lower)

Mechanical

Conveyor belt system	Two sets of pinch belts right and left, four belts total
Machine dimensions	48 cm [19] W x 110 cm [43] L x 33 cm [13] H
Shipping dimensions	61 cm [24] W x 111 cm [44] L x 56 cm [42] H
Machine weight without crate	55 kg [120 lb]
Shipping weight with crate	91 kg [200 lb]

Tubing Sizes

Inside diameter before recovery	Up to 19 [0.75]
Length	Up to 101[4.0]

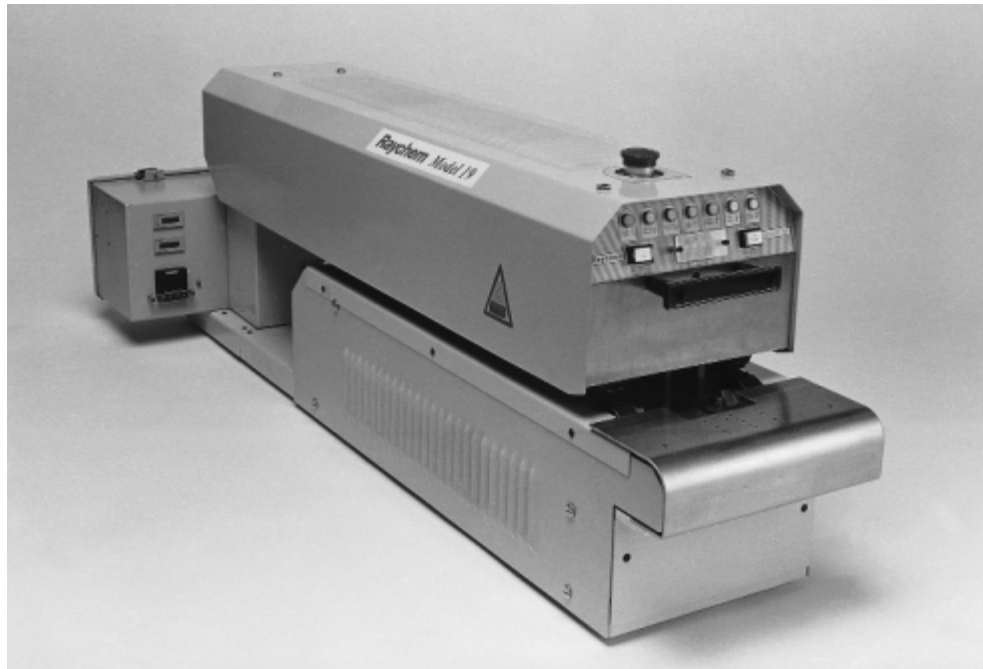
Optional Attachment

Ring terminal kit	Part No. 060053-000
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Product Facts

- Closed-loop speed and temperature control
- CE approved for worldwide use
- Adaptable for different applications
- Continuous controlled process

Model 19 Conveyor Heater for Processing Raychem Heat-Shrinkable Tubing and Termination Devices



Applications

The Model 19 conveyor heater is the latest generation of reliable and versatile process heaters for a wide variety of heat-shrinkable products.

Two sets of timing belts grip the individual assemblies and carry them through a closed-loop infrared heating zone, then through a cooling zone, and deposit the completed assemblies in a collection bin.

The processor was designed to meet the requirements of the European Safety Directives and is CE approved, allowing for worldwide use.

The processor is designed to operate on the following line voltages: 210 to 240 Vac, 20 A, 1 Ø, 50/60 Hz.

Options for this processor include:

- Powered or unpowered extension tables to support long or heavy harnesses.

- Kit for processing ring terminals and end terminations.
- Floor stand with wheels.
- Wider heating elements for tubing up to 178 [7.0] long.
- Narrow heating elements for Solder Sleeve devices up to 10 [0.4] diameter and 45 [1.8] long or short length tubing less than 50 mm [2.0].

Product Features
Controlled Heating Zone

The Model 19 has two etched-foil heating elements mounted under a quartz face. Consistent heating chamber temperatures are obtained with a closed-loop temperature controller. There is a lockout on the controller to prevent unauthorized changes.

Speed Control

Consistent speed is obtained with a closed-loop speed controller. The speed is adjusted using a 3-digit thumbwheel on the front

control panel. There is a lockout on the thumbwheel to prevent unauthorized changes.

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; the grippers carry it through the heating and cooling zone and deposit it into the unloading bin.

Economical Production

The throughput rate is determined by the rate at which an operator can load the processor.

Versatility

The tool description CLTEQ-M19-Belt-htr part number 714529-000 will handle tubing up to 25 [1.0] diameter and 102 [4.0] long. Tubing up to 178 [7.0] long can be handled with the use of tool description CLTEQ-M19-Belt-Htr-6in part number 075131-000. The tool

description CLTEQ-M19-Beltheater-SS part number D43037-000 will handle Solder Sleeve devices up to 10 [0.4] diameter and 45 [1.8] long, or short length tubing (less than 50 [2.0]), where applications require a narrow heat width.

Self-Diagnostic Circuitry

There are several "self-diagnostic" circuits that alert the operator if any major component fails or if an unsafe processing condition occurs. A light will turn on and a lockout gate will lift in the entry zone, preventing the operator from loading assemblies until the situation has been corrected.

Other Features Include:

- Emergency stop.
- Automatic cool-down circuit to extend the life of components.
- Lockout on temperature and speed controllers to prevent unauthorized changes.

Model 19 Conveyor Heater for Processing Raychem Heat-Shrinkable Tubing and Termination Devices (Continued)

Specifications and Dimensions

Electrical	
Power requirements	210–240 Vac, 20 A, 1 Ø, 50/60 Hz
Heating elements	Std = 3160 W/Wide = 3320 W/Narrow = 1760 W
Mechanical	
Conveyor belt system	Double-sided timing belts, pitch - 9.5 [0.375]
Belt speed	Up to 152 cm/min [5.0/min]
Processor dimensions	53 cm [21] W, 135 cm [53] L, 45 cm [18] H
Shipping dimensions	66 cm [26] W, 147 cm [58] L, 58 cm [23] H
Shipping weight with crate	86 kg [190 lb]
Tubing sizes	
Tubing diameter (max)	25 [1.0]
Tubing length (max)	102 [4.0]
	178 [7.0] wide heating element tool
	50 [2.0] narrow heating element tool
Work-piece length (min)	240 [9.5]
Version	
Part No.	
Model 19 Standard	714529-000
Model 19 Wide	075131-000
Model 19 Narrow	D43037-000

Model 81CE Discrete Heater**Product Facts**

- Closed-loop temperature control for a precise and repeatable thermal process
- Oven dwell time precisely set by a 3-digit thumb wheel digital timer
- Heat output can be controlled to accommodate a wide variety of applications
- Operation requires only minimal skill
- Contains numerous safety features
- Meets the requirements of CE, OSHA and the NEC

**Applications**

The Model 81CE is a discrete heater that can process large, complex assemblies or other suitable substrates using a wide variety of heat-shrinkable tubing products up to 25 [1.0] in diameter and 127 [5.0] in length. It is suitable for use with both single wall and adhesive-lined tubing. Two jaws grip the assembly or substrate, carry it into an infrared heating chamber for a user-selectable predetermined period of time, then return the completed assembly back to the start position for removal.

Specifications and Dimensions

Model 81CE Discrete Heater (Continued)

Electrical	Part No. 071965-000	Part No. 704393-000
Power requirements	120 VAC, 1Ø, 50/60 Hz, 15 A	220 VAC, 1Ø, 50/60 Hz, 15 A
Heating elements	Two 400 watt infrared stamped foil with infrared heating elements, one top and bottom.	Two 400 watt infrared stamped foil with infrared heating elements, one top and bottom.
Timing system	Eagle digital timer, 1 to 999 seconds	Eagle digital timer, 1 to 999 seconds

Pneumatic

Requirements for jaw traverse	30-40 psi clean shop air	30-40 psi clean shop air
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Dimensions

Control box dimensions:		
Length	432 [17]	432 [17]
Width	216 [9]	216 [9]
Height	165 [7]	165 [7]
Control box weight	7.7 kg [17 lb.]	7.7 kg [17 lb.]
Heating chamber dimensions:		
Length	380 [15]	380 [15]
Width	240 [10]	240 [10]
Height	343 [14]	343 [14]
Heating chamber weight	18 kg [40 lb.]	18 kg [40 lb.]

Shipping Dimensions

Length	610 [24]	610 [24]
Width	610 [24]	610 [24]
Height	530 [21]	530 [21]
Shipping weight	41 kg [90 lb.]	41 kg [90 lb.]

Tubing Sizes

Inside diameter before heat	Up to 25.4 [1]	Up to 25.4 [1]
Length	Up to 127 [5]	Up to 127 [5]

Model 105 Tunnel Oven**Product Facts**

- Closed-loop temperature control for a precise and repeatable thermal process
- Conveyor speed precisely set by a 3-digit potentiometer
- Operation requires only minimal skill
- Contains numerous safety features
- Custom length conveyors for longer entry and/or exit sections available
- Optional accessories to customize the tunnel oven

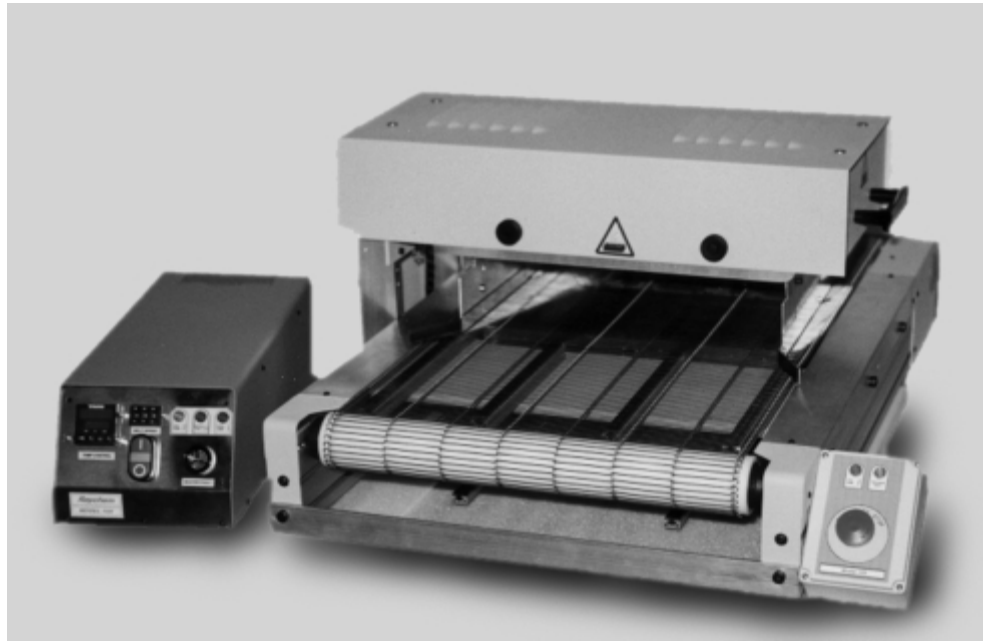
**Applications**

Table conveyor heater that provides a controlled process system suitable for installing a wide variety of heat-shrinkable tubing products up to 76 [3.0] diameter and unlimited in length. Ideally suited for efficient processing of fiber and fabric HFT and both single wall and dual wall tubing. Designed as an integrated modular unit. Assemblies are placed on the entry section of a mesh belt, transported through a heating chamber, across a bank of cooling fans then discharged from the rear of the conveyor.

Specifications and Dimensions
Model 105 Tunnel Oven (Continued)

Electrical		Part number 955018-000
Power requirements		208/240 VAC, 1Ø, 50/60 Hz, 15 A
Heating elements		Two 1500 watt infrared stamped foil with black quartz face, one top and bottom
Operating temperature		Ambient to 650°C [1202°F]
Effective heating width		356 [14]
Dimensions		
Control box dimensions		
Length		515 [20]
Width		210 [8]
Height		178 [7]
Control box weight		7.7 kg [17 lb]
Heating conveyor dimensions		
Length		990 [39]
Width		685 [27]
Height		417 [17]
Heating conveyor weight		68 kg [150 lb]
Shipping Dimensions		
Length		1346 [53]
Width		1168 [46]
Height		635 [25]
Shipping weight		146 kg [320 lb]
Tubing sizes		
Inside diameter before heat		Up to 76.2 [3]
Length		
Perpendicular to belt travel		356 [14]
Parallel to belt travel		Unlimited

ThermoGun HG Hot-Air 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

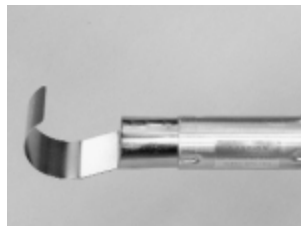
*CFM = Cubic feet per minute.

**RPM = Revolutions per minute.

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.