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Note: Users should independently evaluate the suitability of the product for their application. Before ordering, check with Tyco Electronics for most current data.

4 Molded Parts

Catalog 1654025
Revised 12-03

www.tycoelectronics.com

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

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

USA: 1-800-522-6752
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Singapore: 65-4866-151
UK: 44-1793-528171

Table of Contents (Continued)

Overview

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, which provide optimum waterproofing and environmental protection for underwater, underground, or outdoor applications. The end caps are highly resistant to moisture, fungus, and weathering.
- Raychem heat-shrinkable boots and transitions, which replace tapes, mold-in-place epoxies, and grease. These molded parts can be used for cable breakouts, transitions, and terminations. For example, they provide reliable sealing to specific altitudes on standard Navy cable jackets and on lead, steel, aluminum, copper, and most elastomeric insulation materials.

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 separate components (see Section 5).

Also available is an extensive line of adapters (see Section 6) and heat-shrinkable tubings (see Section 3) to further integrate and strengthen harness assemblies.

Whatever your application, Raychem molded parts almost always meet 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.

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General Information

Bulbous Molded Parts

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.

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General Information (Continued)

Chem-X Breakout Boots

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 Molded Parts

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

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.

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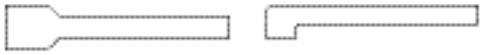
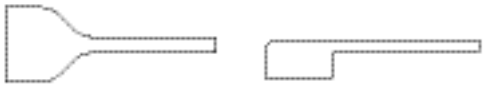
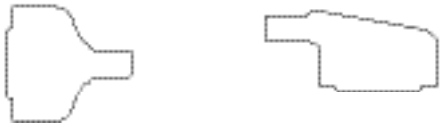
Boots

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	
Lipped boots for use with a circular adapter	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	

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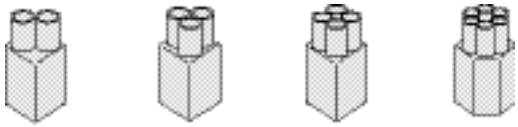
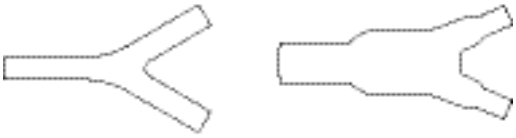
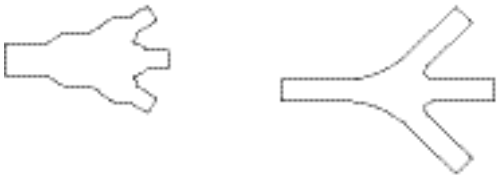
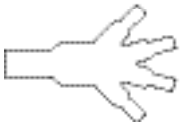
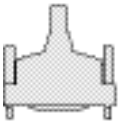
Transitions

Application	Family Description	Typical Shapes
Breakout Boots	SSB, T, F, 6S, 85	
"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 and CES	
D-Subminiatures	214P009 to 037	
End Caps	101A011 to 094 and SSC	

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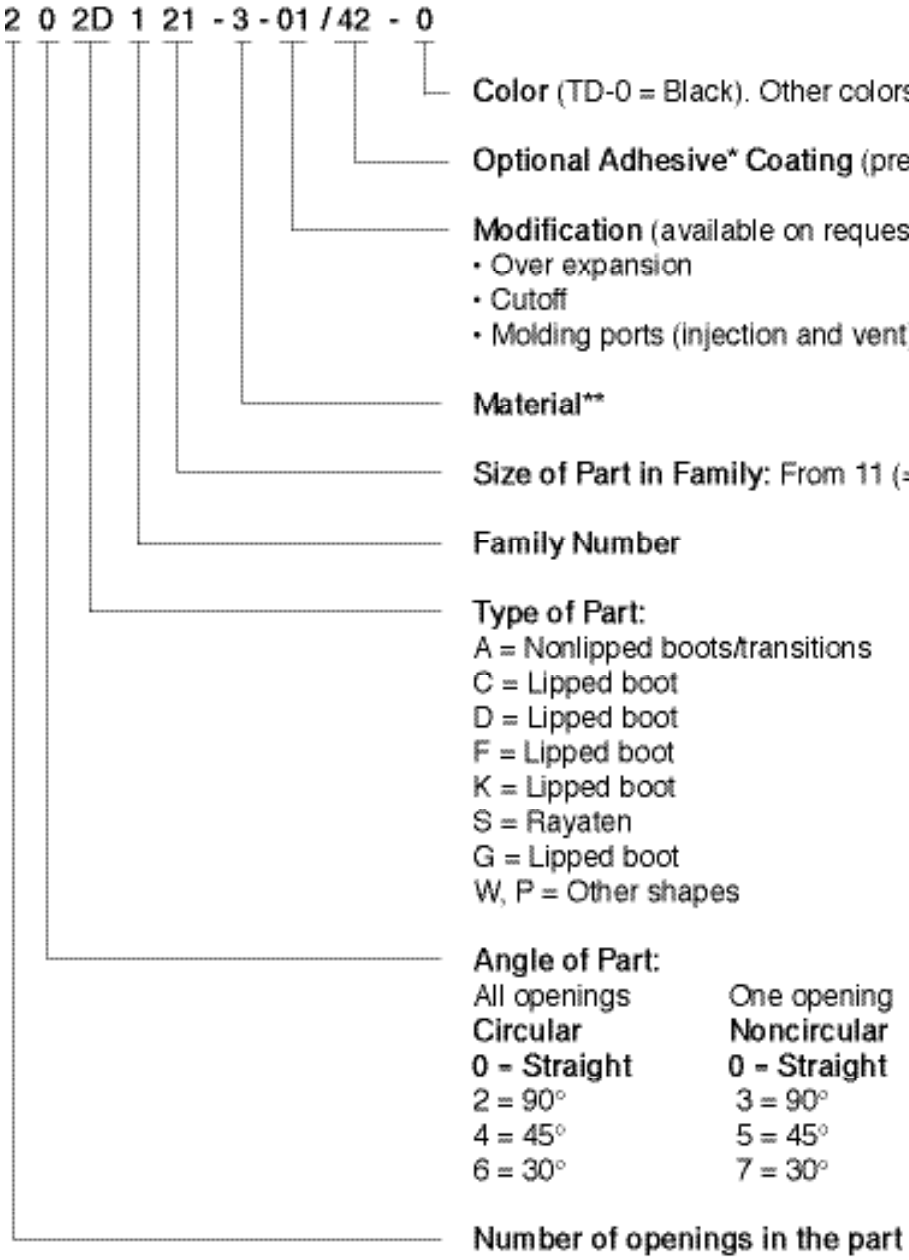
Part Numbering System



*See section 5 for details on adhesives.
**See page 4-24 for details on materials.

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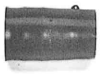
Boots: Circular Connectors — Lipped

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

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Visual Selection Guide (Continued)

Boots: Circular Connectors — Nonlipped

Nonlipped Boots for Direct Attachment on Connectors

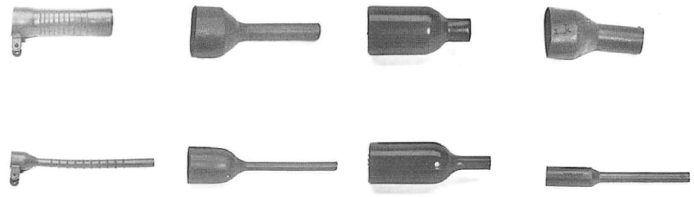
As supplied

After recovery

202A011 through 096 | 202A111 through 196 | 202A212 through 264 | 202A312 through 364 | 202A512

As supplied

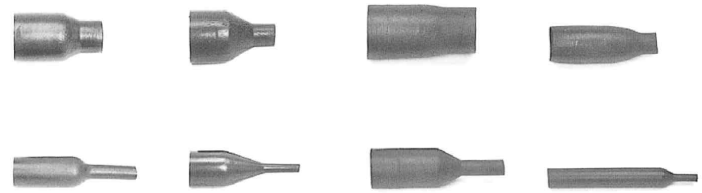
After recovery



202A915 | 202A921 | 202B422 and 433 | 203A021

As supplied

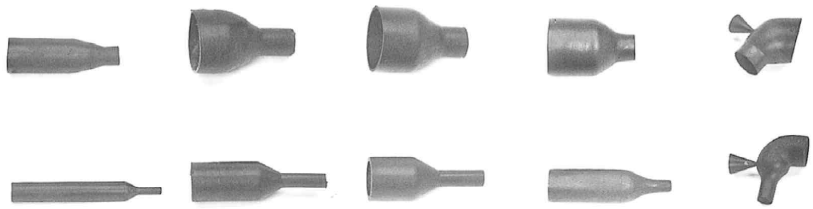
After recovery



203A211 | 203A312 | 204A011 | 204A311

As supplied

After recovery



204A411 | 204A511 | 204A612 | 208A011 through 098 | 222A011 through 096

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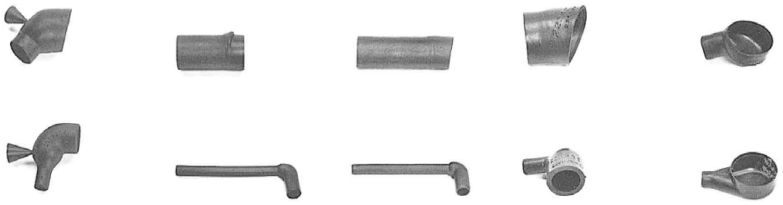
Boots: Circular Connectors — Nonlipped (Continued)

Nonlipped Boots for Direct Attachment on Connectors

As supplied

After recovery



222A111 through 196 | 222A213 through 255 | 222A313 through 355 | 223A213 through 233 | 224A012

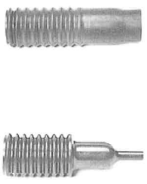
As supplied

After recovery

226A045 & 075 | 228A011 through 097 | 242A142 | 243A012 & 022 | 246A166

As supplied

After recovery

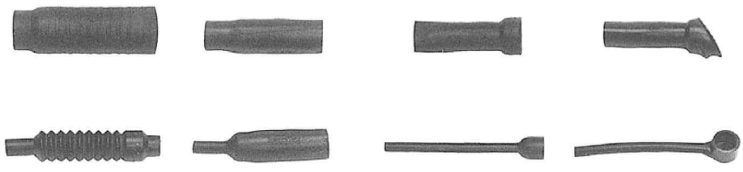


202B521 through 598

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

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Visual Selection Guide (Continued)

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					
	214B713	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	

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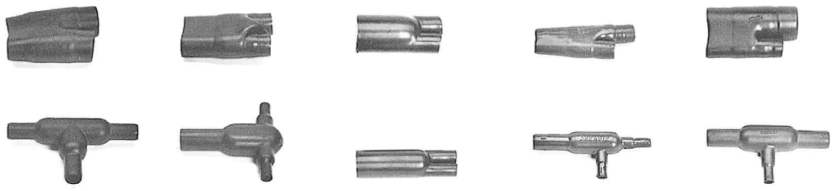
Transitions: Bulbous

As supplied

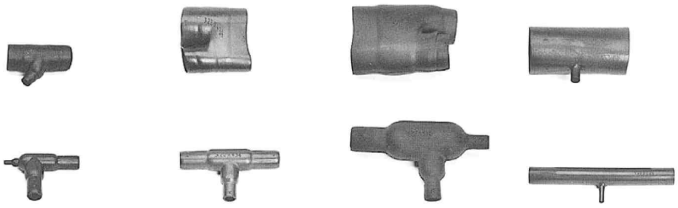
After recovery



301A011 through 048 | 302A012 through 037 | 302A214 | 322A012 through 037 | 322A112 through 158

As supplied

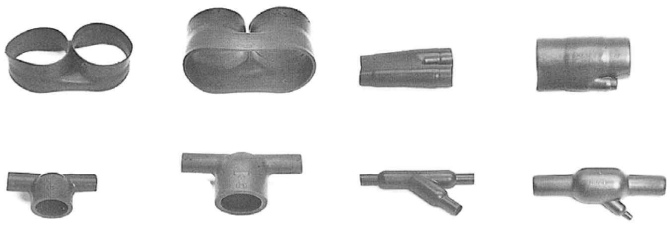
After recovery



322A315 | 322A412 through 434 | 322A514 | 322B813

As supplied

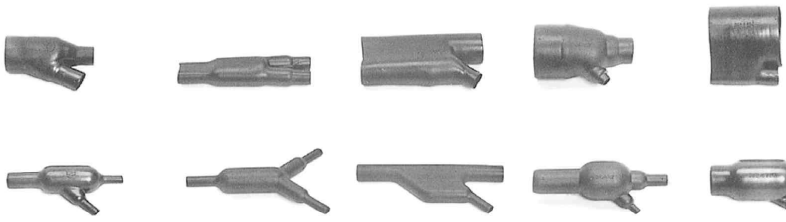
After recovery



323A211 | 323A222 | 341A015 | 342A012 through 058

As supplied

After recovery



342A112 through 138 | 342A215 | 342A313 and 323 | 343A014 through 027 | 362A014 through 114

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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	
As supplied					
After recovery					
	453A017	453A215 and 225	462A011 through 060	462A214	

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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

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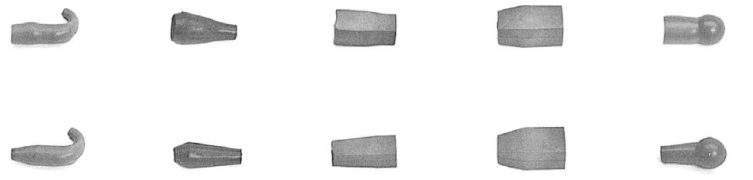
Covers

As supplied

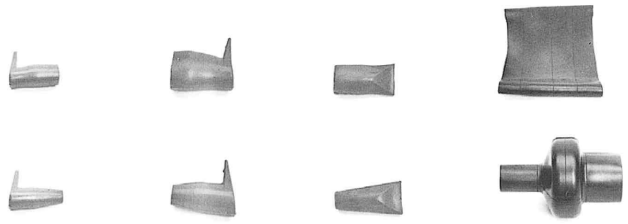
After recovery



102A911 102A951 102A961 102A962 102A981

As supplied

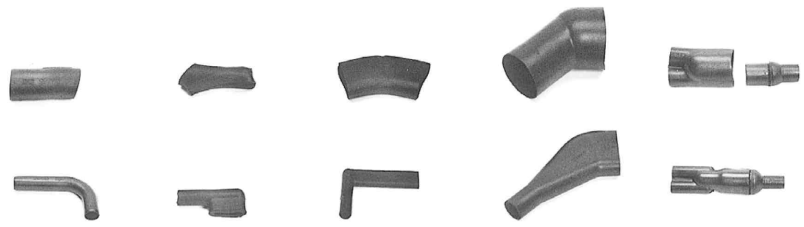
After recovery



102A992 102A993 102A994 202A817

As supplied

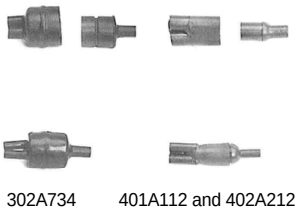
After recovery



220A012 through 023 234A211 234B111 and 122 301A212 254A015 301A222, 301A312

As supplied

After recovery



302A734 401A112 and 402A212

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C. America: 52-55-5-729-0425

South America: 55-11-3611-1514
Japan: 81-44-900-5102
Singapore: 65-4866-151
UK: 44-1793-528171

Covers (Continued)

As supplied

After recovery

401A212 and 403A312 | 401A414 | 402A222 | 403A016 | 501A012 and 502A212

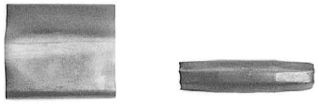
As supplied

After recovery

501A112 | 601A012

Sleeves

As supplied

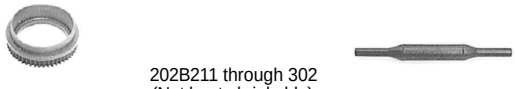


After recovery

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

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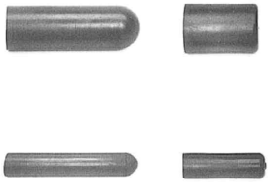
Caps

As supplied

After recovery



101A011 thru 094 102A811 through 865

Miscellaneous

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

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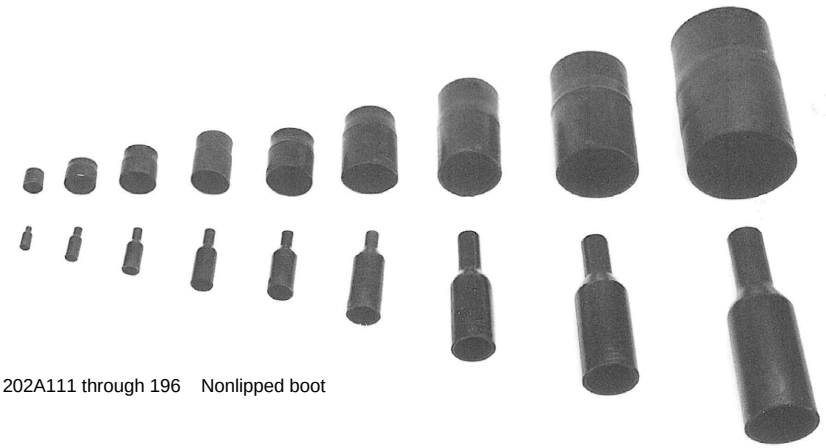
Selected Molded Shapes Families

As supplied

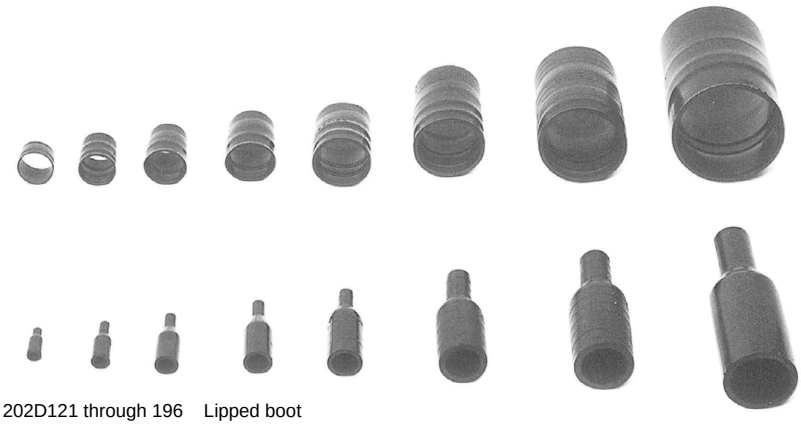
After recovery



202A111 through 196 Nonlipped boot

As supplied

After recovery



202D121 through 196 Lipped boot

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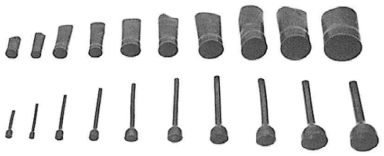
Selected Molded Shapes
Families (Continued)

As supplied

After recovery

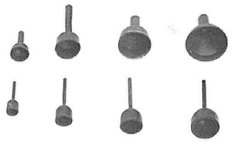
202A212 through 264 Nonlipped boot



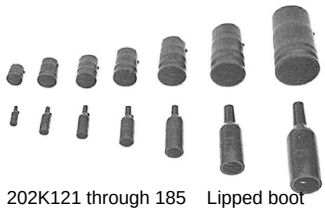
202D211 through 299 Lipped boot

As supplied

After recovery



202D921 through 963 Lipped boot



202K121 through 185 Lipped boot

As supplied

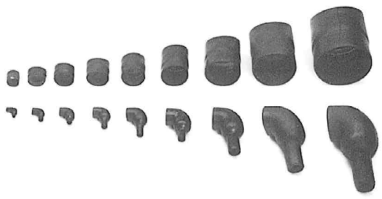
After recovery

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

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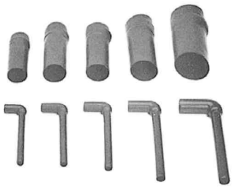
Selected Molded Shapes Families (Continued)

As supplied

After recovery



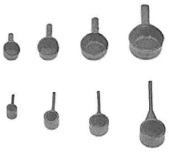
222A313 through 355 90° boot nonlipped

222D121 through 196 90° boot lipped

As supplied

After recovery

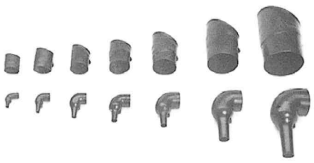
222D211 through 299 90° boot lipped



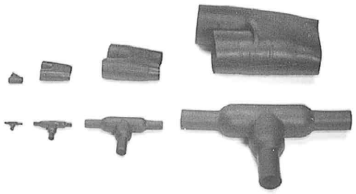
222D921 though 963 90° boot lipped

As supplied

After recovery



222K121 through 185 90° boot lipped



301A011 through 048 Ttransition

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
		202F274	14.99-42.93 [.59-1.69]	203.20 [8.00]	24	32	—	—
	55	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	—	—

(continued on next page)

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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]	—	—	—	—

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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
202D2421202F242	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

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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	Ageneral 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.
-3S Molded Part Material	Ageneral 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	Ageneral 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.
-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 color 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 color is black.
-12 Molded Part Material	Ahigh temperature, heat-shrinkable, flexible, flame retarded, fluoroelastomeric molding compound with excellent resistance to long term fluid immersion and heat exposure. Awide range of shapes are available in this material. -12 molded parts are recommended for use in System 200.
-25 Molded Part Material	Aheat-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. Awide range of shapes are available in this material. -25 molded parts are recommended for use in System 25.
-25S Molded Part Material	Aheat-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	Aheat-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. Uniboots and a wide range of low profile shapes are available in this material. -50 molded parts are recommended for use in System 30.
-51 Molded Part Material	Aheat-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. Uniboots 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	Aheat-shrinkable, flexible, flame retarded, fluid and high temperature resistant, modified fluoropolymer molding compound. Awide range of shapes is available. -55 molded parts are recommended for use in System 300.
-71 Molded Part Material	Aheat-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. Uniboots and a wide range of low profile shapes are available. -71 molded parts are suitable for use in System 10.
-100 Molded Part Material	Aheat-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. Awide range of shapes are available in this material. -100 molded parts are recommended for use in System 100.
-100S Molded Part Material	Aheat-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	Aheat-shrinkable, flame retarded, fluid and high temperature resistant, modified fluoropolymer molding compound. Arange of shapes are available. -125 molded parts are recommended for use in System 300.
-130 Molded Part Material	Non flame-retarded molded material. Low shrink temperature.
-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.

Catalog 1654025
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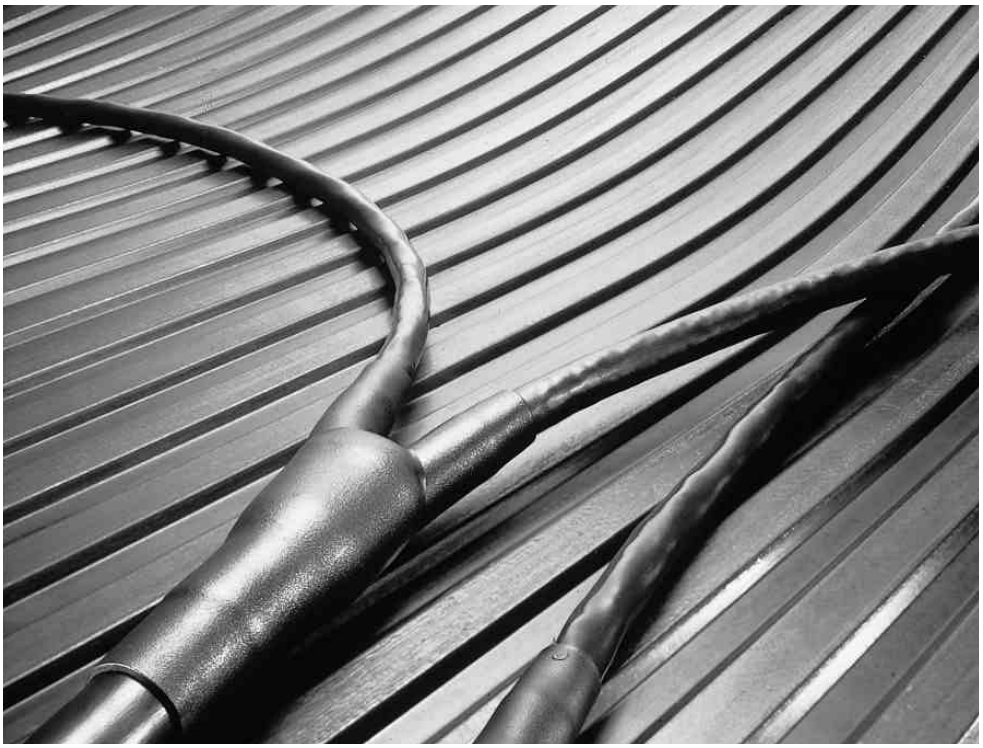
South America: 55-11-3611-1514
Japan: 81-44-900-5102
Singapore: 65-4866-151
UK: 44-1793-528171

-3

Semi-Rigid Modified Polyolefin

Product Facts

- Heat-shrinkable
- Semi-Rigid
- Flame Retardant
- 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]

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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UK: 44-1793-528171

-3 (Continued)

Specifications/Approvals

UL	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, CL2.7: RT-301 Sec. 4.3.4
	Flammability	Self-extinguishing	RK-6703, CL2.8: 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]

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-4

Flexible Polyolefin

Product Facts

- Heat-shrinkable
- Flexible
- Flame Retardant
- 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]

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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Singapore: 65-4866-151
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-4 (Continued)

Specifications/Approvals

UL	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.)	RT1304 Sec. 4.3.3
	Heat shock for 4 h at 225°C [437°F]	No dripping, flowing, or cracking	RT1304 Sec. 4.3.5
	Low-temperature flex at -55°C [-67°F]	No cracking	RT1304 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.) Ultimate elongation 200% (min.)	RT-1304 Sec. 4.3.3

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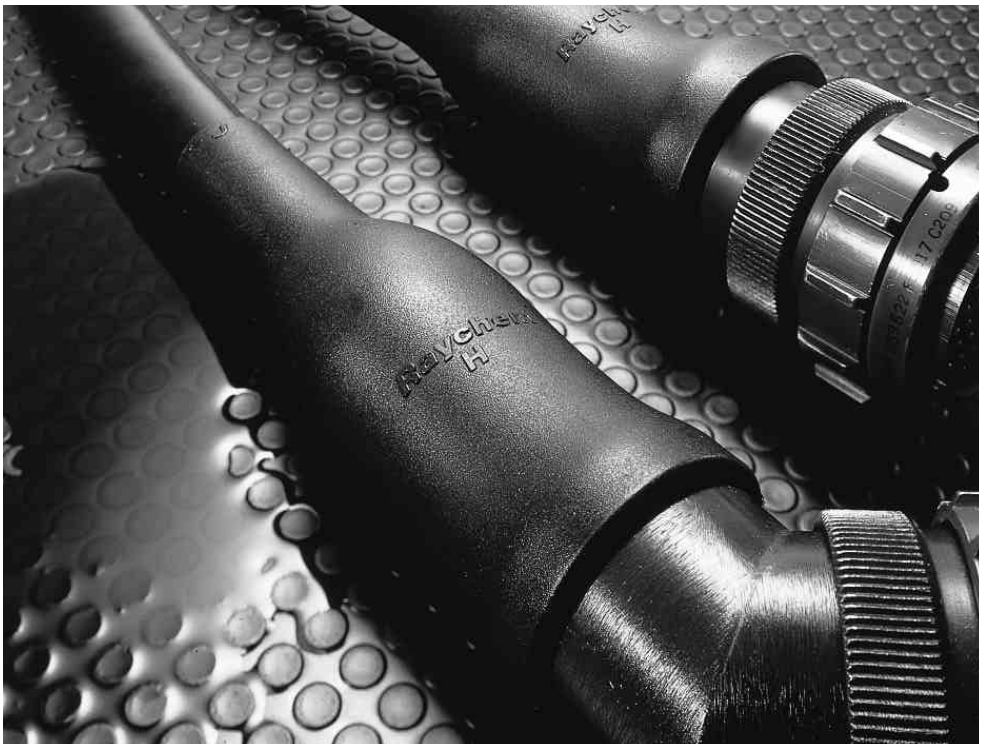
-12

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 multi-conductor cable jackets and a suitable adhesive in Raychem 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]

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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Singapore: 65-4866-151
UK: 44-1793-528171

-12 (Continued)

Specifications/Approvals

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.) Ultimate elongation 200% (min.)	ISO 1817 after immersion for 24 h at 93°C [200°F]

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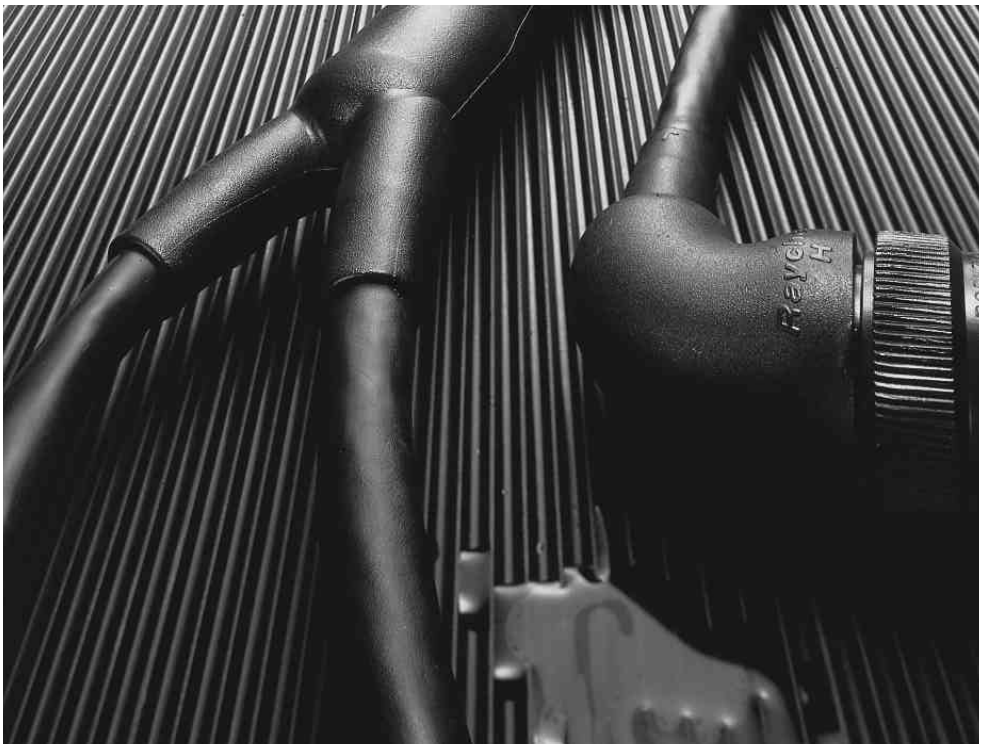
Japan: 81-44-900-5102
Singapore: 65-4866-151
UK: 44-1793-528171

-25

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 components such as DR-25 tubing and S1125 adhesive, 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]

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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UK: 44-1793-528171

-25 (Continued)

Specifications/Approvals

Military	Raychem
VG95343 Parts 6, 7, 8 and 9 (Europe)	RT-1325
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]

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South America: 55-11-3611-1514
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Singapore: 65-4866-151
UK: 44-1793-528171

-25S

Fluid-Resistant Screened Elastomer

Product Facts

- **Fuel and heat resistance**
- **RFI, EMI protection**

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 section 7).

Operating Temperature Range

-55°C to 150°C
[-67°F to 302°F]

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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UK: 44-1793-528171

-25S (Continued)

Specifications/Approvals

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.)	Screening effectiveness in dB at >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.

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-50

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 30 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]

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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Singapore: 65-4866-151
UK: 44-1793-528171

-50 (Continued)

Specifications/Approvals

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]

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-51

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 135°C [-67°F to 275°F]

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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UK: 44-1793-528171

-51 (Continued)

Specifications/Approvals

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

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UK: 44-1793-528171

-55

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 are available. -55 molded parts are recommended for use in System 300.

Use the System 300 family of parts in military and industrial applications where excellent high temperature performance 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]	—	—	Section 4.3.6
	Followed by tests for: Tensile Strength Elongation	 psi (MPa) percent	 2000 minimum (13.8) 150 minimum	 Section 4.3.3 ASTM D 2671

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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-55 (Continued)

Product Characteristics
(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	seconds	15 maximum	ASTM D 635
Average Extent of Burning	inches (mm)	0.5 maximum (12.5)	
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	—	—	Section 4.3.8
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:			
Tensile Strength	psi (MPa)	3000 minimum (20.7)	Section 4.3.3
Ultimate Elongation	percent	150 minimum	ASTM D 2671
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:			
Tensile Strength	psi (MPa)	3000 minimum (20.7)	Section 4.3.3
Ultimate Elongation	percent	150 minimum	ASTM D 2671
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:	—	—	Section 4.3.8
Tensile Strength	psi (MPa)	3000 minimum (20.7)	Section 4,3.3
Ultimate Elongation	percent	150 minimum	ASTM D 2671
Fluid Resistance	—	—	Section 4.3.8
5 hours at 23 ± 3°C [73± 5°F]			
Tensile Strength	psi (MPa)	3500 minimum (24.1)	Section 4.3.3
Ultimate Elongation	Percent	150 minimum	ASTM D 2671
Nuclear			Section 4.3.9
Radiation Resistance Followed by tests for:			
Tensile Strength	psi (MPa)	3500 minimum (24.1)	—
Ultimate Elongation	percent	150 minimum	

-71

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]

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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-71 (Continued)

Specifications/Approvals

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]

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-100

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 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 applications, 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]

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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-100 (Continued)

Specifications/Approvals

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]

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-100S

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 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 section 7).

Operating Temperature Range

-30°C to 105°C
[-22°F to 221°F]

Available in:	Americas	Europe	Asia Pacific
	■	■	■

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-100S (Continued)

Specifications/Approvals

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 section 5.)

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-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. 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 and industrial applications where excellent high temperature performance 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

-55°C to 175°C
[-67°F to 347°F]

4 Molded Parts

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]	—	—	Section 4.3.7.1
	Followed by tests for: Tensile Strength Ultimate Elongation	 psi (MPa) Percent	 3500 minimum (24.1) 250 minimum	 Section 4.3.3 Section 4.3.3
	2000 hours at 150 ± 3°C [302 ± 5°F]	—	—	Section 4.3.7.2
	Followed by tests for: Tensile Strength Ultimate Elongation	 psi (MPa) Percent	 3500 minimum (24.1) 250 minimum	 Section 4.3.3 Section 4.3.3

Available in:	Americas	Europe	Asia Pacific
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-125 (Continued)

Product Characteristics
(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 Average Extent of Burning After Fluid Immersion 24 hours at 23 ± 3°C [73 ± 5°F] Gasoline, Automotive, Combat MIL-G-3056 Fuel Oil, Diesel VV-F-800 DF-2 Turbine Fuel, Aviation, JP-4 MIL-T-5624 Average Time of Burning Average Extent of Burning	 Seconds Inches (mm) Seconds Inches (mm)	 15 maximum 1 maximum (25) 30 maximum 1 maximum (25)	 ASTM D 635 Section 4.3.10 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] 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 Ultimate Elongation Weight Increase	— psi (MPa) Percent Percent	— 3000 minimum (20.7) 250 minimum 3 maximum	Section 4.3.9 Section 4.3.3 Section 4.3.3 Section 4.3.9
Adhesive Compatibility Lap Shear Strength NSM to S-1264 to DCNS	psi (kPa)	100 minimum (689)	Section 4.3.11
Nuclear			
Radiation Resistance Followed by tests for: Tensile Strength Ultimate Elongation	 psi (MPa) Percent	 4000 (27.6) 250	Section 4.3.12 Section 4.3.3