

HEAT SHRINKABLE PRODUCTS

AMP's heat shrinkable products are finding wide usage in corrosion protection, water sealing, strain relief, abrasion protection, and underground applications. Shrink tubing is also available to eliminate tape wrapping and other bothersome post insulating techniques.

Thick wall heat shrinkable products	25-3
Heat shrinkable plastic insulation tubing	25-9
AMPSULATION Tubing	

Heat Shrinkable Products



AMP Thick Wall Heat Shrinkable Products

AMP thick wall heat shrinkable products are finding wide usage in corrosion protection, water sealing, strain relief, underground applications, overhead applications and underwater. In the expanded state, they are stable and not affected by prolonged shelf life. The addition of carbon black and other ultraviolet inhibitors to standard products provides excellent resistance to ultraviolet degradation and allows these products to last at least as long as the most advanced wire and cable systems available today.

Made of "thermally stabilized modified polyolefins", this product when subjected to extreme temperatures, rarely melts, flows, or sags, when compared to thermoplastic products. Thick wall heat shrinkable products have been subjected to a continuous (10,000 hrs.) operating temperature of -85°F [-65°C] to 266°F [130°C] which is higher than the newest conventional wire and cable system requirements of 203°F [95°C].

Most other heat shrinkable products rarely exceed a 2 to 1 shrink ratio. The AMP line of thick wall, self-sealing heat shrinkable product features an extremely high shrink ratio of 3 to 1. This shrink ratio offers these advantages: (1) Since fewer sizes are required, it reduces inventory

problems. (2) It solves the common problem of how to properly seal a large connector or splice bundle when applied to a smaller diameter cable.

Thick wall heat shrinkable products are available with factory applied sealants. When heat is applied, the sealant inside the product softens and flows around and over any irregularly shaped configuration, filling voids, and completely water sealing. This sealant mechanically bonds to all types of cable jackets, metals, conduits, and pipe; provided the surface is relatively clean of oils and greases. Even when subjected to vibration or movement, the sealant remains in a semi-flexible state, assuring a complete moisture seal.

With thick wall construction, heat sources need not be critical. Heat sources for the shrinking process can be an electric heat gun, a propane or butane gas torch or other heating devices. Ovens and heat lamps can be used in assembly lines.

Thick wall heat shrinkable products are available in tube form in various sizes and lengths and a wide range of molded shapes including caps, multi-legged boots, plus a selection of water proof strain reliefs. Other sizes, lengths and shapes can be made.

Features

- Thermally stabilized
- Thick wall
- High shrink ratio 3 to 1
- Excellent electrical insulating properties
- Unaffected by long shelf life
- Highly resistant to moisture, fungus and weathering
- Exceptional chemical resistance
- Highly resistant to splitting even over severe configurations
- Mechanically seals to lead, other metals and all standard plastic and elastomeric materials and conduit
- Complete sealing properties remove the guess work that might occur where taping, lacquering or vulcanizing is used to seal a connection

Dimensioning:

All dimensions in inches and millimetres.

Specifications subject to change. Consult AMP Incorporated for latest design specifications.

Dimensioning:
All dimensions in inches and millimetres.
Values in brackets are metric equivalents.

Physical Properties

Electrical Properties

Flammability

Thermal Properties

Test	Test Results	Test Method
Tensile Strength	1070 psi [7 377 kPa]	ASTM D-412
Ultimate Elongation	285%	ASTM D-412
Stress Modulus	710 psi [4 895 kPa]	ASTM D-412
Secant Modulus	7980 psi [55 020 kPa]	ASTM D-882
Hardness - Shore "D"	32	ASTM D-2240
Specific Gravity	1.44	ASTM D-792
Water Absorption	0.02%	Method A-1 ASTM D-570
Stiffness in Flexure	4640 psi [31 992 kPa]	Method 6.1 ASTM D-747
Dielectric Strength 150 mils (v/mil).	275	ASTM D-876
Volume Resistivity (ohm-cm).	6.60×10^{15}	ASTM D-876
Dissipation Factor (100 Hz).	0.00520	ASTM D-150
	(1 KHz).	0.00483
Dielectric Constant (100 Hz).	2.46	ASTM D-150
	(1 KHz).	2.44
Flammability (sec)	0	ASTM D-876
Flame Retardancy	1*	ASTM D-2671
Flammability	FR-1	UL 224
Oxygen Index	25.4	ASTM D-2863
Heat Aging		MIL-I-81765
Tensile Strength	530 psi [3 654 kPa]	4.6.6
Elongation	16%	
Heat Shock 4 Hrs. at 300°F [149°C]]	No cracks, no flowing	ASTM D-2671
Heat Resistance		
Ultimate Elongation.	246% **	ASTM D-2671
Shelf Life (40°C for 2 weeks)		
Shrinkage of Expanded Dia.	1.54%	ASTM D-2671
Low Temperature Properties		
Brittleness Temp.	-64.4°C	ASTM D-746
Low Temperature Flexibility	No Cracks, No Breaks	MIL-I-81765
		4.6.4

Bureau of Mines Approval No. P-158-MESA
Material successfully passed heat age and radiation exposure to 200 megarads.
(Request AMP test report GPR-575-109)

*The paper indicator was not charred or burned. There was no falling and/or burning particles.
** Avg. of 3 specimens after exposure to 300°F [149°C] for 7 days in an air circulating oven.

Note: For tests requiring recovered specimens the tubing was shrunk at 300°F [149°C] for 30 min.

Specifications and Tubing

Dimensioning:

1. All dimensions in inches and millimetres. Values in brackets are metric equivalents.
2. Charts contain dimensions in inches and metric equivalents.

Chemical Properties

Solvent Resistance

(24 hrs. immersion, air dry 45 min. determine tensile strength)

	Tensile Strength		Voltage
	psi	kPa	Breakdown (Kv)
Acetone	1150	7 929	44.2
Gasoline	1080	7 446	48.1
Isopropanol	1120	7 722	43.8
Kerosene	873	6 019	44.2
MEK	1100	7 584	44.9
Toluene	1140	7 860	46.7

Test Method
ASTM D-2671

Corrosion — Noncorrosive

ASTM D-2671
Method A

Ozone Resistance — No cracking

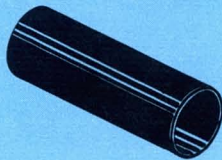
Oil Resistance (24 hrs. at 25°C)

	Tensile Strength		Elongation
	psi	kPa	%
Hydraulic Fluid	893	6 157	217
Lubrication Oil	1123	7 743	306
Diesel Fuel	710	4 895	189
JP-4	707	4 875	168
De-Icer Fluid	1130	7 791	316
Transformer Oil	983	6 778	263

MIL-H-5606C
MIL-L-7808G

Note: For tests requiring recovered specimens the tubing was shrunk at 300°F [149°C] for 30 min.

Tubing With and Without Sealant



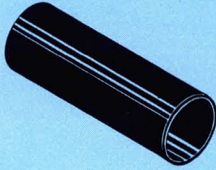
Recommended Application Range		Minimum Expanded I.D.		Nominal Length		Part Number	
inch	mm	inch	mm	in./ft.	mm/m	Without Sealant	With Sealant
.180 to .300	4.57 to 7.62	.400	10.16	3"	76.2mm	54079-1	54081-1
				4"	101.6mm	54079-2	54081-2
				6"	152.4mm	54079-3	54081-3
				9"	228.6mm	54079-4	54081-4
				12"	304.8mm	54079-5	54081-5
				100'	30.48m	54079-6	—
.260 to .600	6.6 to 15.24	.750	19.05	3"	76.2mm	54020-1	54021-1
				4"	101.6mm	54020-2	54021-2
				6"	152.4mm	54020-3	54021-3
				9"	228.6mm	54020-4	54021-4
				12"	304.8mm	54020-5	54021-5
				4'	1219.2mm	54020-6	—
				25'	7.62m	54020-7	—
				100'	30.48m	54020-8	—
.450 to .880	11.43 to 22.35	1.100	27.94	4"	101.6mm	54025-1	54026-1
				6"	152.4mm	54025-2	54026-2
				8"	203.2mm	54025-3	54026-3
				9"	228.6mm	54025-4	54026-4
				12"	304.8mm	54025-5	54026-5
				18"	457.2mm	54025-6	54026-6
				24"	609.6mm	54025-7	54026-7
				30"	762 mm	—	54026-8
				4'	1219.2mm	54025-8	—
				25'	7.62m	54025-9	—
100'	30.48m	1-54025-0	—				
.450 to 1.100	11.43 to 1.100	1.300	27.94	12"	304.8mm	—	54084-1
				20"	508 mm	—	54084-2
				25'	7.62m	54097-1	—

Tubing and End Caps

Dimensioning:

1. All dimensions in inches and millimetres. Values in brackets are metric equivalents.
2. Charts contain dimensions in inches and metric equivalents.

Tubing With and Without Sealant (Cont'd)

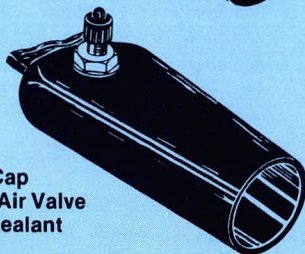


Recommended Application Range		Minimum Expanded I.D.		Nominal Length		Part Number	
inch	mm	inch	mm	in./ft.	mm/m	Without Sealant	With Sealant
.600 to 1.200	15.24 to 30.48	1.500	38.1	4"	101.6mm	54030-1	54031-1
				6"	152.4mm	54030-2	54031-2
				8"	203.2mm	54030-3	54031-3
				9"	228.6mm	54030-4	54031-4
				12"	304.8mm	54030-5	54031-5
				18"	457.2mm	54030-6	54031-6
				20"	508 mm	54030-7	54031-7
				24"	609.6mm	54030-8	54031-8
				30"	762 mm	54030-9	54031-9
				36"	914.4mm	1-54030-0	1-54031-0
				4'	1219.2mm	1-54030-1	—
				25'	7.62m	1-54030-2	—
				40'	12.19m	1-54030-3	—
				30'	9.14m	1-54030-4	—
100'	30.48m	1-54030-5	—				
.900 to 1.600	22.86 to 40.64	2.000	50.8	4"	101.6mm	54035-1	54036-1
				6"	152.4mm	54035-2	54036-2
				8"	203.2mm	54035-3	54036-3
				9"	228.6mm	54035-4	54036-4
				12"	304.8mm	54035-5	54036-5
				18"	457.2mm	54035-6	54036-6
				20"	508 mm	54035-7	54036-7
				24"	609.6mm	54035-8	54036-8
				30"	762 mm	54035-9	54036-9
				36"	914.4mm	1-54035-0	1-54036-0
				4'	1219.2mm	1-54035-1	—
				25'	7.62m	1-54035-2	—
				100'	30.48m	1-54035-3	—
				1.400 to 2.750	35.56 to 69.85	3.000	76.2
9"	228.6mm	54140-2	54141-2				
12"	304.8mm	54140-3	54141-3				
18"	457.2mm	54140-4	54141-4				
24"	609.6mm	54140-5	54141-5				
30"	762 mm	54140-6	54141-6				
36"	914.4mm	54140-7	54141-7				
4'	1219.2mm	54140-8	—				
25'	7.62m	54140-9	—				

End Caps



End Cap With and Without Sealant



End Cap With Air Valve and Sealant

Recommended Application Range		Minimum Expanded I.D.		Nominal Length		Part Number	
inch	mm	inch	mm	inch	mm	Without Sealant	With Sealant
.180-.320	4.57- 8.13	.400	10.16	2.250	57.15	54085-1	54086-1
.260-.600	6.6 -15.24	.750	19.05	3.000	76.2	54087-1	54088-1
.450-.880	11.43-22.35	1.100	27.94	3.250	82.55	54089-1	54090-1
.600-1.200	15.24-30.48	1.500	38.1	3.500	88.9	54091-1	54092-1
.900-1.600	22.86-40.64	2.000	50.8	3.750	95.25	54093-1	54094-1
1.400-2.750	35.56-69.85	3.000	76.2	5.500	139.7	54095-1	54096-1

Recommended Application Range		Minimum Expanded I.D.		Nominal Length		Part Number
inch	mm	inch	mm	inch	mm	With Sealant
.260-.600	6.6 -15.24	.750	19.05	3.000	76.2	54173-1
.450-.880	11.43-22.35	1.100	27.94	3.250	82.55	54174-1
.600-1.200	15.24-30.48	1.500	38.1	3.500	88.9	54175-1
.900-1.600	22.86-40.64	2.000	50.8	3.750	95.25	54176-1
1.400-2.750	35.56-69.85	3.000	76.2	5.500	139.7	54177-1

Boots and Water Proof Strain Reliefs

Dimensioning:

1. All dimensions in inches and millimetres. Values in brackets are metric equivalents.
2. Charts contain dimensions in inches and metric equivalents.

Boots with Sealant

3 Leg **4 Leg**

Strain Relief for Circular Connectors

Bulkhead Feed-Thru Strain Relief with "O" Ring and Nut

Bulkhead Feed-Thru Strain Relief with Pipe Threads

Type	Recommended Application Range						Nominal Length		Part Number
	Base		Legs		inch	mm	inch	mm	
	inch	mm	inch	mm					
3 Leg	.400- .850	10.16-21.59	.140- .300	3.56- 7.62	2.840	72.14	54203-1		
	.725-1.100	18.42-27.94	.200- .475	5.08-12.07	3.470	88.14	54203-2		
	.950-1.650	24.13-41.91	.275- .750	6.99-19.05	3.660	92.96	54203-3		
	1.250-2.200	31.75-55.88	.550-1.000	13.97-25.4	6.362	161.59	54203-4		
	2.100-3.000	53.35-76.2	.800-1.300	20.32-33.02	6.362	161.59	54203-5		
4 Leg	.750-1.100	19.05-27.94	.225- .400	5.72-10.16	3.750	95.25	54204-1		

Type	Recommended Application Range		Circular Connector Shell Size	Nominal Length		Part Number
	inch	mm		inch	mm	
	Straight	.260- .600		6.6 -15.24	11	
.400- .875		10.16-22.23	17	2.250	57.15	54011-1
.550-1.100		13.97-27.94	23	3.250	82.55	54012-1



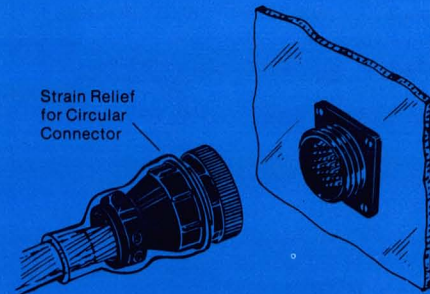
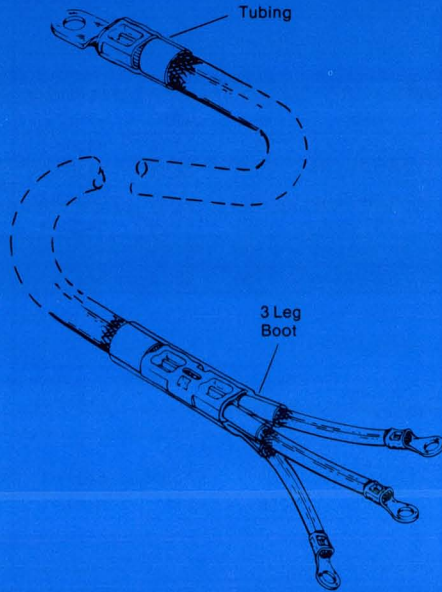
Type	Recommended Application Range		Thread Size and Diameter	Nominal Length		Part Number
	inch	mm		inch	mm	
	Straight	.300- .725		7.62-18.42	12 UNF 2A Thd.x 1" D.	
.550-1.100		13.97-27.94	12 UNF 2A Thd.x 1-3/8" D.	3.676	93.37	54017-1
.825-1.600		20.96-40.64	12 UNF 2A Thd.x 2" D.	4.332	110.03	54018-1
90°	.300- .725	7.62-18.42	12 UNF 2A Thd.x 1" D.	—	—	54125-1
	.450-1.100	11.43-27.94	12 UNF 2A Thd.x 1-3/8" D.	—	—	54126-1
3 Leg	.140- .300	3.56- 7.62	12 UNF 2A Thd.x 1" D.	3.870	98.3	54170-1
	.275- .500	6.99-12.7	12 UNF 2A Thd.x 1-3/8" D.	4.670	118.62	54171-1



Type	Recommended Application Range		NP Thread Size	Nominal Length		Part Number
	inch	mm		inch	mm	
	Straight	.300- .725		7.62-18.42	1/2 x 14	
.300- .725		7.62-18.42	3/4 x 14	3.375	85.73	54120-3
.300- .725		7.62-18.42	1 x 11 1/2	3.375	85.73	54120-4
.550-1.100		13.97-27.94	1 x 11 1/2	3.750	95.25	54121-1
.550-1.100		13.97-27.94	1 1/2 x 11 1/2	4.000	101.6	54122-1
90°	.450-1.100	11.43-27.94	1 x 11 1/2	—	—	54129-1
4 Leg	.225- .400	5.72-10.16	1 x 11 1/2	5.130	130.3	54172-1

Dimensioning:
All dimensions in inches and millimetres.
Values in brackets are metric equivalents.

Typical Applications

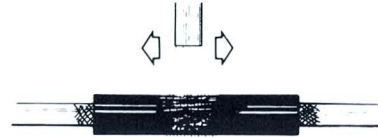


Application Procedures

1. Abrade cable jacket on all applications.
2. Position shrink product as desired.
3. Use heat sources capable of delivering at least 250°F [121°C].
(Electric heatgun, propane or butane torch, oven, heat lamp)
4. Apply heat evenly around full circumference of each application.
5. Avoid overheating to prevent damage to cable jacket and plastic parts.
Note: Keep heat source in motion to avoid overheating.
6. Shrink process is complete when sealant extrudes from end of tubing.

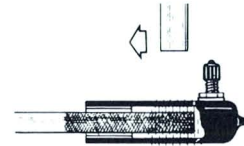
Tubing

- Apply heat at center and work toward ends.



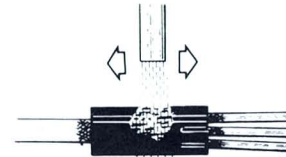
End Caps

- Insert cable to (not under) air fitting.
- Apply heat as shown and work towards open end. Keep excessive heat away from air valve and cap.



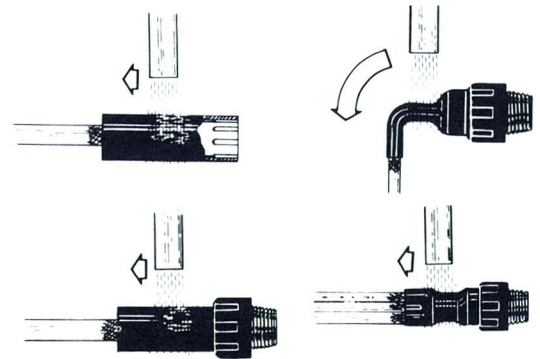
Boots

- Apply heat at center and work toward ends.



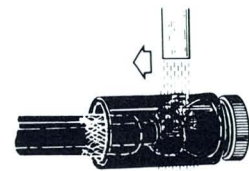
Waterproof Strain Reliefs

- Apply heat as shown and work toward open end.
- Keep excessive heat away from plastic body.



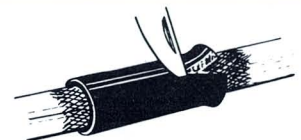
Bundling

- Apply heat at connector end and work towards open end.
- Keep excessive heat away from exposed connector.



Removal Procedure

Simply heat tubing and cut with sharp knife while tubing and sealant is hot.



Cable Ties and Bundling

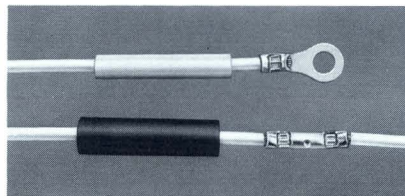


AMPSULATION Tubing

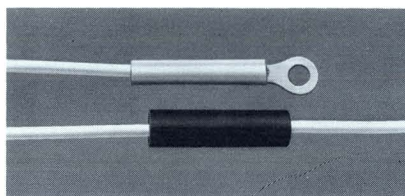
Quickly and Easily Applied — No Special Tools Required

AMPSULATION tubing eliminates tape wrapping and other bothersome post insulating techniques. It is made of pre-dilated polyvinyl chloride which shrinks over circuit connectors when exposed to temperatures no higher than 250°F for thirty seconds or more. AMPSULATION tubing will remain chemically stable in temperatures as high as 170°F. (Maximum storage temperature with no shrinkage.)

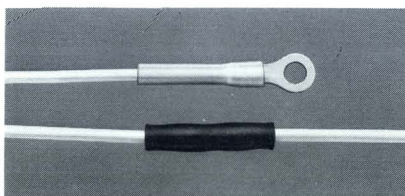
AMPSULATION tubing is color coded (red, blue, yellow) to simplify identification of different diameter sizes. It is available in standard lengths or cut to specified lengths. This post-insulation provides excellent protection against abrasives and other hostile elements.



Pass wire through tubing and crimp on the terminal or splice.



Slip tubing over the connection. Heat with a hot air gun or other heat source.



Tubing shrinks into position, providing long lasting, reliable protection.

Features

- Eight diameter sizes of tubing cover a wire insulation range from .078" through 1.125"
- Provides additional wire insulation support for vibration resistance
- Only hot air guns or heat lamps are needed to shrink tubing
- Retains plasticizer, so it does not become brittle
- Provides positive insulation and dielectric strength
- Excellent protection against abrasion and other hostile elements
- Does not require preliminary preparation
- Recognized under the Component Program of Underwriters' Laboratories, Inc. for electrical insulating tubing having a rating of 105°C and 600 volts



Note: All dimensions in inches.

Specifications subject to change. Consult AMP Incorporated for latest design specifications.

Specifications



.078 Min. to .125 Max. Wire Insulation Range*

Part No.	Color	A	B	C Min.
2-325128-7	Yellow	.018	.875	.127
325128	Yellow	.018	1.062	.127
2-325128-6	Yellow	.018	2.000	.127
327216	Yellow	.018	12.000	.127
2-325128-5	Yellow	.018	36.000	.127

.125 Min. to .203 Max. Wire Insulation Range*

Part No.	Color	A	B	C Min.
2-325131-8	Red	.018	.375	.213
3-325131-8	Red	.018	.875	.213
2-325131-1	Red	.018	.812	.213
3-325131-5	Red	.018	.937	.213
325131	Red	.018	1.093	.213
2-325131-9	Red	.018	1.250	.213
3-325131-3	Red	.018	1.312	.213
3-325131-1	Red	.018	1.500	.213
3-325131-6	Red	.018	1.937	.213
2-325131-6	Red	.018	2.000	.213
2-325131-2	Red	.018	3.000	.213
2-325131-3	Red	.018	6.000	.213
327217	Red	.018	12.000	.213
2-325131-7	Red	.018	36.000	.213

.203 Min. to .302 Max. Wire Insulation Range*

Part No.	Color	A	B	C Min.
325134	Blue	.018	1.093	.340
2-325134-1	Blue	.018	1.500	.340
2-325134-5	Blue	.018	2.000	.340
2-325134-7	Blue	.018	2.250	.340
328279	Blue	.018	3.000	.340
3-325134-2	Blue	.018	3.750	.340
327218	Blue	.018	12.000	.340
2-325134-6	Blue	.018	36.000	.340

.302 Min. to .437 Max. Wire Insulation Range*

Part No.	Color	A	B	C Min.
2-325137-1	Yellow	.022	.250	.490
2-325137-7	Yellow	.022	.500	.490
325137	Yellow	.022	1.093	.490
2-325137-5	Yellow	.022	2.000	.490
328280	Yellow	.022	3.000	.490
327219	Yellow	.022	12.000	.490
2-325137-6	Yellow	.022	36.000	.490

*AMPSULATION tubing in these sizes will lose approximately 10% in length at maximum shrinkage.

All dimensions in inches.

.437 Min. to .615 Max. Wire Insulation Range**

Part No.	Color	A	B	C Min.
2-325140-9	Red	.030	.750	.640
2-325140-7	Red	.030	1.000	.640
325140	Red	.030	1.500	.640
2-325140-5	Red	.030	2.000	.640
2-325140-1	Red	.030	3.000	.640
3-325140-0	Red	.030	7.500	.640
328528	Red	.030	12.000	.640
2-325140-6	Red	.030	36.000	.640

.615 Min. to .790 Max. Wire Insulation Range**

Part No.	Color	A	B	C Min.
325143	Blue	.030	1.500	.875
2-325143-4	Blue	.030	2.000	.875
2-325143-6	Blue	.030	2.500	.875
328658	Blue	.030	3.000	.875
328529	Blue	.030	12.000	.875
2-325143-3	Blue	.030	18.000	.875
2-325143-5	Blue	.030	36.000	.875

.790 Min. to .855 Max. Wire Insulation Range**

Part No.	Color	A	B	C Min.
330289	Red	.030	1.500	.945
330290	Red	.030	12.000	.945

.855 Min. to 1.100 Max. Wire Insulation Range**

Part No.	Color	A	B	C Min.
325146	Yellow	.030	1.500	1.187
2-325146-5	Yellow	.030	2.000	1.187
2-325146-1	Yellow	.030	3.000	1.187
2-325146-2	Yellow	.030	6.000	1.187
328530	Yellow	.030	12.000	1.187
2-325146-6	Yellow	.030	36.000	1.187

AMPSULATION Tubing Available in Random or Specific Cut Lengths

Part No.	Color	A	After and Before Shrinking	
			C Max.	C Min.
329767	Black	.040	1.093	1.625
329768	Black	.060	1.625	2.500

**AMPSULATION tubing in these sizes will gain approximately 25% in length at maximum shrinkage.