

SPEC 55

Product Facts

- Resistant to electrical arc tracking in wet or dry conditions
- Single or dual wall constructions
- Small size, ultra light weight
- Exceptional chemical resistance
- -65°C to 200°C [-85°F to 392°F]



Applications

SPEC 55 wire is insulated with modified radiation cross-linked ETFE polymer. It has a temperature rating of -65°C to 200°C [-85°F to 392°F] continuous using a silver plated copper conductor, and combines the easy handling of a flexible wire with excellent scrape abrasion and cut-through characteristics.

The dual wall airframe construction of SPEC 55 wire is currently used on numerous aircraft programs. It has a choice of two total wall thicknesses, 0.25 [.010] (55A08XX 10 mil) and 0.2 [.008] (55A02XX 8 mil). Both have a contrasting core color to act as a damage indicator. Chosen for its balance of properties, SPEC 55 wire has outstanding resistance to chemicals and solvents, excellent electrical arc track resistance, and is not susceptible to UV and moisture degradation. Single wall equipment wire constructions are available in 0.10 [.004] (55/03XX 4 mil) and 0.15 [.006] (6 mil) wall thicknesses for use inside black boxes where flexibility and solder-iron resistance make it a wire which is very easy to install reliably.

Both single and dual wall insulated wires are available

in twisted pairs, triples, etc., and as shielded and jacketed cables.

Physical Characteristics

Size and Weight

SPEC 55 wire provides one of the most comprehensive wiring product ranges for aerospace users, with a wide choice of conductor sizes and insulation wall thicknesses. The dual wall airframe wire has an insulation wall thickness of either 0.2 [.008] or 0.25 [.010] for robustness in unprotected harnesses and has excellent wire to wire abrasion properties.

The single wall equipment wire has a 0.15 [.006] wall thickness for use inside equipment and protected harnesses. For high density, interconnect wiring, the 450 volt 55M041X series of equipment wire has a nominal 0.1 [.004] wall and provides considerable weight and size savings over other comparable wires.

Handling

The excellent flexibility and handleability makes SPEC 55 the ideal wire to install, both in new aircraft and equipment and for maintenance purposes. The wire is easily stripped with conventional tooling. The insulation is readily marked

by hot stamp, ink jet or laser, and can be potted without pre-etching.

SPEC 55PC Wire and Cable Insulation System

This product was originally developed to meet Boeing's material standard BMS13-48 for the 777 airliner. SPEC 55PC provides lightweight, compact insulation that matches the proven performance of our SPEC 55 wire. Today, 55PC is specified and utilized on the majority of aerospace platforms worldwide.

Tyco Electronics' rigorous, statistical-process-controlled manufacturing has produced Raychem wiring that is rugged and versatile enough for a wide range of commercial and defense aerospace applications, including electronic hook-ups in harsh, open airframe environments.

SPEC 55PC wire and cable systems feature an 8-mil airframe wire that is lighter and smaller than typical 10-mil wire, with little reduction in key mechanical performance features. SPEC 55PC wire offers flame resistance superior to FAA standards and also resists scrape abrasion, notch, propagation, cut-through, and electrical arc tracking.

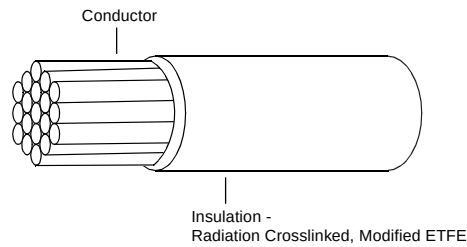
- Meets Boeing material standard BMS 13-48.
- Exceeds FAR 25 test requirements for flame resistance and smoke density.

Available in:

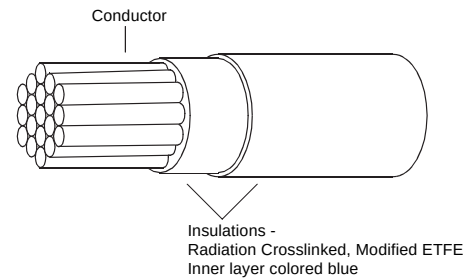
- Americas ■
- Europe ■
- Asia Pacific ■

SPEC 55 (Continued)

Specifications



SPEC 55 insulation system - single wall



SPEC 55 insulation system - dual wall

MIL-W-22759/32-35 and /41 to /46 and NEMA-WC-27500 (Cables)

Defense Standard 61-12 Part 33 Issue 4

Part 1001 and Part 1002

VDE 9426, 9427, 9428

British Standard 3G233

Civil Aviation Authority Accessory Approval E11749

Boeing BMS 13-48

Airbus ABS 0820 to 0826

NASA preferred product list

European Space Agency 3901/012, 3901/020 and 3901/022

Raychem Specification 55

Typical Properties

Temperature rating (Tin plated conductor)	-65°C to +150°C [-85°F to +302°F]
(Silver or nickel plated conductor)	-65°C to +200°C [-85°F to +392°F]
Thermal endurance	200 °C [392°F], 10000 h
Scrape abrasion (BS 3G233)	>100 cycles at 150°C [302°F]
Flexing endurance (Boeing BSS 7324)	>1000 cycles
Voltage rating	600 V, 450V
Tensile strength + elongation (core only)	(Dual wall wire) 35 N/mm2, 125% min.
Tensile strength + total elongation (core & primary jacket)	(Dual wall wire) 35 N/mm2, 75% min.
Notch propagation BS 3G230 0.05 mm notch	Pass
Solder iron resistance (370 °C, 1 minute)	Pass
Solderability - Tin plated copper conductor BS 3G233 conditions	<0.8 secs to wet
Shrinkage	<1%
Long term water resistance	Will not hydrolyze
Permittivity 1 KHz (ASTM D150)	2.7
Dissipation factor (ASTM D150)	0.001
FAR 25	Ø
Afterburn (sec)	30 sec. max.
Burn length	75 mm [3 in.] max.

SPEC 55 (Continued)

Environmental Performance

Temperature Rating

SPEC 55 wire and cable is rated for continuous operation from -65°C to +200°C [-85°F to +392°F] and for short periods at temperatures as high as 400°C [752°F].

Mechanical Performance

Radiation crosslinking of the SPEC 55 insulation significantly improves the following mechanical characteristics; scrape (sharp edges), cross wire abrasion, cut-through resistance and creep resistance.

Solder Iron/Overload Resistance

Radiation crosslinking ensures that the insulation resists melting at high temperatures. As a result SPEC 55 wire is resistant to hot solder irons and current overloads which would melt most thermoplastic insulations.

Chemical Resistance

SPEC 55 is unaffected by all commonly used chemicals, eg. fuels, hydraulic fluids, defluxing agents, cleaners, coolants and de-icers. It also shows excellent resistance to weathering (UV, ozone, pollutants, water).

Space Wire

SPEC 55 is available in special versions suitable for use in outer space meeting both ESA and NASA requirements for outgassing.

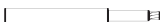
Flammability

Special additives increase the flame retardance of SPEC 55 compared to unirradiated ETFE so that it meets the latest high performance tests, eg. BS 3G230 vertical test FAR 25.

Electrical Arc Tracking Resistance

SPEC 55 insulation demonstrates resistance to arc tracking under both wet and dry conditions at aircraft system voltages.

**SPEC 55 Wire & Cable:
Standard Constructions,
Nominal Sizes, Strandings,
Diameters and Weights**

Conductor	Primary Wire	Twisted Pair	Shielded & Jacketed	
			Single	Pair
				

55PC - Extra Light Weight Constructions

For applications where weight is critical, light weight tight tolerance conductors and insulations are available. These are manufactured using statistical process control methods and achieve weights that are equal or lighter than the equivalent polyimide/PTFE constructions.

**55A - AWG Conductor:
Equipment/Interconnect Wires
& Cables**

High Performance Wire and Cable

SPEC 55 (Continued)

Wire Size (AWG)	Stranding (mm)	55A011X		55A012X	
		Nom. OD	Max. Weight (g per m/lbs per kft)	Nom. OD	Max. Weight (g per m/lbs per kft)
30	7/0.102	0.61 [0.024]	0.98 [0.66]	1.27 [0.048]	1.94 [1.3]
28	7/127	0.68 [0.027]	1.35 [0.91]	1.42 [0.054]	2.68 [1.8]
26	19/102	0.81 [0.032]	2.08 [1.4]	1.67 [0.064]	4.16 [2.8]
24	19/127	0.94 [0.037]	2.98 [2.0]	1.93 [0.074]	5.96 [4.0]
22	19/0.16	1.09 [0.043]	4.17 [2.8]	2.23 [0.086]	8.63 [5.8]
20	19/0.203	1.27 [0.050]	6.40 [4.3]	2.66 [0.102]	13.24 [8.9]
18	19/0.25	1.52 [0.060]	9.67 [6.5]	3.20 [0.122]	20.09 [13.5]
16	19/287	1.73 [0.068]	12.35 [8.3]	3.58 [0.138]	25.75 [17.3]
14	19/0.36	2.20 [0.085]	19.34 [13.0]	4.47 [0.172]	39.58 [26.6]
12	37/0.32	2.62 [0.103]	29.32 [19.7]	5.38 [0.208]	59.97 [40.3]
10	37/0.403	3.25 [0.128]	47.32 [31.8]	6.65 [0.256]	96.58 [64.9]
8	133/0.287	4.77 [0.188]	87.50 [58.8]	9.80 [0.376]	178.58 [120.0]

Wire Size (AWG)	Nom. OD	55A111X		55A112X	
		Nom. OD	Max. Weight (g per m/lbs per kft)	Nom. OD	Max. Weight (g per m/lbs per kft)
30	1.51 [0.057]	—	5.06 [3.4]	2.12 [0.081]	7.74 [5.2]
28	1.59 [0.060]	—	5.80 [3.9]	2.27 [0.087]	8.90 [6.0]
26	1.71 [0.065]	—	6.85 [4.6]	2.53 [0.097]	11.32 [7.6]
24	1.84 [0.070]	—	8.19 [5.5]	2.80 [0.107]	13.84 [9.3]
22	1.99 [0.076]	—	10.27 [6.9]	3.07 [0.119]	17.86 [12.0]
20	2.20 [0.084]	—	13.40 [9.0]	3.50 [0.135]	23.81 [16.0]
18	2.45 [0.094]	—	17.86 [12.0]	4.10 [0.155]	32.60 [21.9]
16	2.67 [0.102]	—	21.73 [14.6]	4.43 [0.171]	39.73 [26.7]
14	3.10 [0.119]	—	30.36 [20.4]	5.30 [0.205]	57.00 [38.3]
12	3.55 [0.137]	—	42.41 [28.5]	6.30 [0.243]	81.10 [54.5]
10	4.20 [0.161]	—	62.65 [42.1]	—	—
8	5.80 [0.223]	—	110.42 [74.2]	—	—

**55A - AWG Conductor:
Airframe Wires & Cables**

Wire Size (AWG)	Stranding (mm)	55A081X		55A082X	
		Nom. OD	Max. Weight (g per m/lbs per kft)	Nom. OD	Max. Weight (g per m/lbs per kft)
26	19/102	1.01 [0.040]	2.5 [1.7]	2.10 [0.080]	5.06 [3.4]
24	19/127	1.14 [0.045]	3.4 [2.3]	2.33 [0.090]	6.84 [4.6]
22	19/0.16	1.27 [0.050]	4.8 [3.2]	2.64 [0.102]	9.98 [6.7]
20	19/0.203	1.47 [0.058]	7.0 [4.7]	3.07 [0.118]	14.73 [9.9]
18	19/0.25	1.78 [0.070]	10.7 [7.2]	3.63 [0.140]	21.88 [14.7]
16	19/287	1.96 [0.077]	13.4 [9.0]	4.06 [0.156]	27.53 [18.5]
14	19/0.36	2.40 [0.094]	20.5 [13.8]	4.90 [0.190]	42.26 [28.4]
12	37/0.32	2.82 [0.111]	30.5 [20.5]	5.80 [0.224]	63.00 [42.3]
10	37/0.403	3.40 [0.134]	48.3 [32.4]	7.10 [0.272]	98.96 [66.5]

Wire Size (AWG)	Nom. OD	55A181X		55A182X	
		Nom. OD	Max. Weight (g per m/lbs per kft)	Nom. OD	Max. Weight (g per m/lbs per kft)
26	1.71 [0.073]	—	7.89 [5.3]	2.63 [0.113]	14.29 [9.6]
24	1.84 [0.078]	—	9.37 [6.3]	2.80 [0.123]	16.37 [11.0]
22	1.99 [0.084]	—	11.76 [7.9]	3.07 [0.135]	20.68 [13.9]
20	2.20 [0.092]	—	14.88 [10.0]	3.50 [0.151]	27.08 [18.2]
18	2.45 [0.103]	—	19.79 [13.3]	4.10 [0.173]	36.46 [24.5]
16	2.67 [0.111]	—	23.81 [16.0]	4.43 [0.189]	42.86 [28.8]
14	3.10 [0.128]	—	33.03 [22.2]	6.30 [0.225]	61.61 [41.4]
12	3.55 [0.145]	—	45.09 [30.3]	6.30 [0.259]	85.42 [57.4]
10	4.20 [0.168]	—	66.97 [45.0]	— [0.308]	127.54 [85.7]

**55PC - AWG Conductor:
Statistical Process Controlled
Airframe Wires & Cables**

High Performance Wire and Cable

SPEC 55 (Continued)

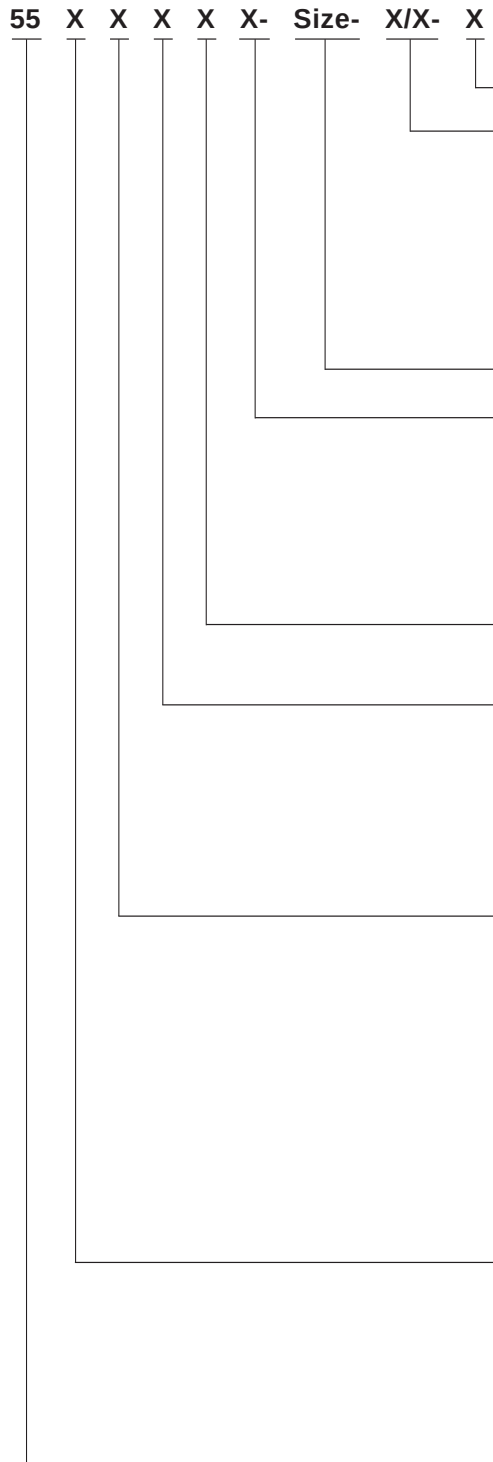
Wire Size (AWG)	Stranding (mm)	55PC021X		55PC022X	
		Nom. OD	Max. Weight (g per m/lbs per kft)	Nom. OD	Max. Weight (g per m/lbs per kft)
26	19/102	0.087 [0.045]	2.05 [1.38]	—	—
24	19/127	1.00 [0.0395]	2.95 [1.98]	2.00 [0.079]	5.95 [4.00]
22	19/0.16	1.15 [0.0455]	4.31 [2.90]	2.31 [0.091]	8.74 [5.87]
20	19/0.203	1.37 [0.0540]	6.51 [4.38]	2.74 [0.108]	13.2 [8.87]
18	19/0.25	1.61 [0.0635]	9.81 [6.59]	3.22 [0.127]	19.84 [13.33]
16	19/287	1.80 [0.0710]	12.46 [8.37]	3.60 [0.142]	25.21 [16.94]
14	19/036	2.18 [0.0860]	19.17 [12.88]	4.36 [0.172]	38.80 [26.07]
12	37/0.32	2.66 [0.1047]	29.36 [19.73]	5.30 [0.209]	59.42 [39.93]
10	37/0.403	3.27 [0.1290]	46.31 [31.12]	6.55 [0.258]	93.92 [63.11]

Wire Size (AWG)	55PC121X		55PC122X	
	Nom. OD	Max. Weight (g per m/lbs per kft)	Nom. OD	Max. Weight (g per m/lbs per kft)
26	1.52 [0.064]	6.54 [4.4]	2.33 [0.100]	11.34 [7.62]
24	1.65 [0.069]	7.86 [5.28]	2.89 [0.109]	13.90 [9.34]
22	1.80 [0.075]	9.81 [6.59]	2.89 [0.122]	17.89 [12.02]
20	2.00 [0.083]	12.83 [8.62]	3.30 [0.139]	23.84 [16.02]
18	2.23 [0.093]	17.01 [11.43]	3.78 [0.158]	32.10 [21.57]
16	2.44 [0.100]	20.36 [13.68]	4.16 [0.174]	39.00 [26.21]
14	2.79 [0.116]	28.69 [19.28]	4.92 [0.204]	55.21 [37.10]
12	3.30 [0.135]	40.73 [27.37]	5.92 [0.244]	80.23 [53.91]
10	3.98 [0.159]	59.90 [40.25]	7.39 [0.297]	123.65 [83.09]

X = 1 - Tin plated copper conductor.

4 - Silver plated high strength copper alloy conductor. (Recommended for size 24 & 26 in airframe applications and mandatory for CAA release.)

Part Numbering System



Jacket Color (in accordance with MIL-STD-681, white preferred)

Primary Wire Insulation Color

(in accordance with MIL-STD-681)

- | | | |
|-----------|------------|------------|
| 0 - Black | 3 - Orange | 7 - Violet |
| 1 - Brown | 4 - Yellow | 8 - Gray |
| 2 - Red | 5 - Green | 9 - White |
| 2L - Pink | 6 - Blue | |

Additional number after base color indicates stripe

Conductor Size

Conductor Type

- 1 - Tin-plated copper
- 2 - Silver-plated copper
- 3 - Nickel-plated copper
- 4 - Silver-plated high strength copper alloy
- 6 - Nickel-plated high strength copper alloy

Number of Conductors

- 0 - 10 conductors

Class of Wire

- 1 - 600 V equipment wire, light weight
- 2 - 600 V airframe wire, light weight
- 4 - 450 V equipment wire (55M Only sizes 20-30)
- 7 - 1000 V heavy duty, airframe wire
- 8 - 600 V airframe wire, normal weight

Constructions

- 0 - Primary wire and shielded, unjacketed cables
- 1 - Round braid screened & jacketed cable †
- 2 - Flat braid screened & jacketed cable †
- 3 - Round braid, screened cable, no jacket †
- 4 - Jacketed cable, no screen
- 5 - Spiral screened and jacketed cable †
- 8 - Special constructions (part numbers not coded)
- 9 - Special constructions including light weight

† Screen material same as conductor material except all flat screens and screen for conductor types 4 and 6 shall be tin-plated copper. Other combinations are special. (Refer to Wire and Cable Division).

Type

- A - General purpose
- M - Metric conductor
- / - Space wire
- PC- Process control
- D - Defense Standard 61-12 Part 33 Issue 4

Basic Specification Number

SPEC 55 (Continued)

Typical Ordering Example	3 conductors, red, yellow, blue, 600 volt equipment wire with overall round braid, 20 AWG tinned conductor and white jacket: total part number is 55A1131-20-2/4/6-9.
Ordering Information	A list of stock policy items can be identified by contacting Tyco Electronics. Stock policy items are recognized by the use of a suffix, such as (300) defining the pack size, typically 55A0111-22-9(300). UK only.

SPEC 55 Part Numbering System

Temperature Rating	Conductor Material	AWG Range Available	Raychem Part No.	MIL-SPEC No.
600-V Lightweight Single-wall Hookup Wire, .152 [.006] Nominal Wall				
150°C [302°F]	Tin-coated copper	12–30	55A0111	M22759/32
200°C [392°F]	Silver-coated copper	12–28	55A0112	M22759/44
200°C [392°F]	Nickel-coated copper	12–28	55A0113	M22759/45
200°C [392°F]	Silver-coated high-strength alloy	20–30	55A0114	M22759/33
200°C [392°F]	Nickel-coated high-strength alloy	20–28	55A0116	M22759/46
600-V Lightweight Dual-wall Airframe Wire, .203 [.008] Nominal Wall				
150°C [302°F]	Tin-coated copper	6–26	55A0211	—
200°C [392°F]	Silver-coated copper	10–26	55A0212	—
200°C [392°F]	Nickel-coated copper	10–26	55A0213	—
200°C [392°F]	Silver-coated high-strength alloy	18–30	55A0214	—
200°C [392°F]	Nickel-coated high-strength alloy	16–26	55A0216	—
600-V Dual-wall Airframe Wire, .254 [.010] Nominal Wall				
150°C [302°F]	Tin-coated copper	00–24	55A0811	M22759/34
200°C [392°F]	Silver-coated copper	00–26	55A0812	M22759/43
200°C [392°F]	Nickel-coated copper	00–26	55A0813	M22759/41
200°C [392°F]	Silver-coated high-strength alloy	20–26	55A0814	M22759/35
200°C [392°F]	Nickel-coated high-strength alloy	20–26	55A0816	M22759/42
600-V Medium-Weight Dual-wall Airframe Wire, .381 [.015] Nominal Wall				
150°C [302°F]	Tin-coated copper	10–24	55A0711	—
200°C [392°F]	Silver-coated copper	16–24	55A0712	—
200°C [392°F]	Nickel-coated copper	16–24	55A0713	—
200°C [392°F]	Silver-coated high-strength alloy	16–24	55A0714	—
200°C [392°F]	Nickel-coated high-strength alloy	16–26	55A0716	—

**SPEC 55 Cable
Constructions**

Construction	Number of Components	Component Conductor ¹	Shield Material ¹	Part Number	
				Light Wt. ²	Medium Wt.
Unshielded, unjacketed	2-10	1	—	55*01X1-AWG-Y	55*08X1-AWG-Y
		2	—	55*01X2-AWG-Y	55*08X2-AWG-Y
		3	—	55*01X3-AWG-Y	55*08X3-AWG-Y
		4	—	55*01X4-AWG-Y	55*08X4-AWG-Y
		6	—	55*01X6-AWG-Y	55*48X6-AWG-Y
Unshielded, jacketed	2-10	1	—	55*41X1-AWG-Y	55*48X1-AWG-Y
		2	—	55*41X2-AWG-Y	55*48X2-AWG-Y
		3	—	55*41X3-AWG-Y	55*48X3-AWG-Y
		4	—	55*41X4-AWG-Y	55*48X4-AWG-Y
		6	—	55*41X6-AWG-Y	55*18X6-AWG-Y
Shielded (round braid), jacketed	1-10	1	1	55*11X1-AWG-Y	55*18X1-AWG-Y
		2	2	55*11X2-AWG-Y	55*18X2-AWG-Y
		3	3	55*11X3-AWG-Y	55*18X3-AWG-Y
		4	1	55*11X4-AWG-Y	55*18X4-AWG-Y
		6	3	55*11X6-AWG-Y	55*18X6-AWG-Y
Shielded (flat braid), jacketed	1-10	1	1	55*21X1-AWG-Y	55*28X1-AWG-Y
		2	1	55*21X2-AWG-Y	55*28X2-AWG-Y
		3	1	55*21X3-AWG-Y	55*28X3-AWG-Y
		4	1	55*21X4-AWG-Y	55*28X4-AWG-Y
		6	1	55*21X6-AWG-Y	55*28X6-AWG-Y

¹Type of conductor or shield material:

1 = tin-coated copper

2 = silver-coated copper

3 = nickel-coated copper

4 = silver-coated high-strength copper alloy

6 = nickel-coated high-strength copper alloy

* = A or PC

² X = no. of wire components

Y = color code

For complete part number, see Part Numbering System on page 9-15.

**NEMA WC-27500 Cable
Part Numbering System**

M27500 X AWG XX X X XX

Basic Specification Number

Component Wire ID/Shield Coverage Code

Shield Coverage

85% 90%

-

C

A

D

B

E

F

H

G

J

K

M

L

N

P

R

S

T

Component Wire Identification

Colored Stripes on White Wire

(9/96/93/95/92/90/94/97/98/91... etc.)

Solid Color Wires (9/6/3/5/2/0/4/7/8/1...etc.)

Band Marks on Solid Colors (by AWG)

Alternate Colored Stripes

(92/96/94/95/9/90/91/93/97/98...etc)

Alternate Solid Colors (2/6/4/5/9/0/1/3/7/8...etc.)

Number Marking on Solid Colors (by AWG)

Number Marking on White Wires

Band Marks on Colored Stripes (by AWG)

Band Marks on White Wires

Conductor Size (AWG)

Basic Wire Spec Code (MIL-W-22759) and Slash Sheet

SB - 32 = 55A0111

SC - 33 = 55A0114

SD - 34 = 55A0811

for 2 AWG and larger, use 55A8039

SE - 35 = 55A0814

SM - 41 = 55A0813

for 2 AWG and larger, use 55A8595

SN - 42 = 55A0816

SP - 43 = 55A0812

for 2 AWG and larger, use 55A6089

SR - 44 = 55A0112

SS - 45 = 55A0113

ST - 46 = 55A0116

Number of Component Wires

1 through 9; 10 Components = 0

Shield Material and Style Code

U - No shield

T - Tin-coated copper, round

J - Tin-coated copper, flat

S - Silver-coated copper, round

G - Silver-coated copper, flat

N - Nickel-coated copper, round

V - Tin-coated copper, round, double shield

W - Silver-coated copper, round, double shield

Jacket Material and Style Code

00 - No jacket

23 - Single jacket crosslinked, modified ETFE, white

73 - Double jacket crosslinked, modified ETFE, white

Example: M27500-22SB3T23 = 55AM1131-22-9/96/93-9

Raychem Part No.

Military Part No.