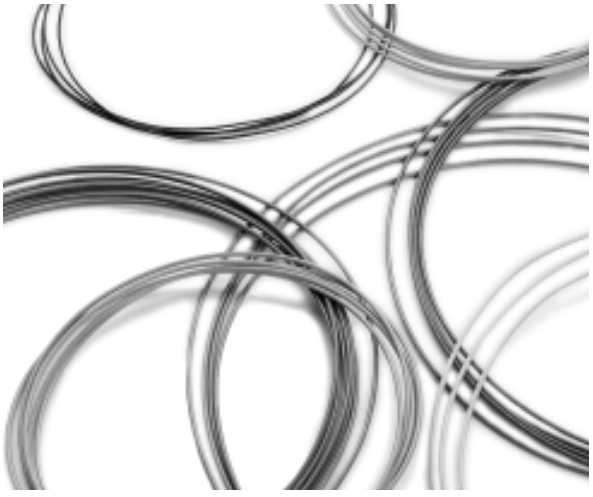
SPEC 55® Wire and Cable

High-performance wire and cable insulation system for –65°C to 200°C



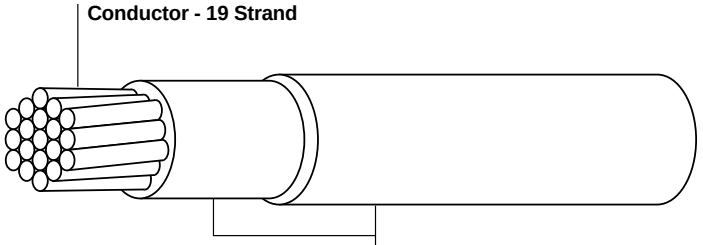
Applications

Hookup and signal wire and cable used in aircraft, avionics, military electronics, satellites, helicopters, missiles, automobiles, and appliances.

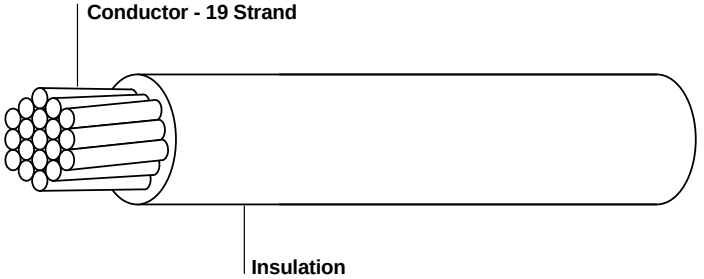
Features/Benefits

- Temperatures of –65˚C to 200˚C.
- Single- or dual-wall constructions.
- Small size; light weight.
- Exceptional chemical resistance.
- Mechanical ruggedness.
- Excellent shop handling and flexibility.
- Pottable insulation system.
- Solderable conductor.
- Choice of marking with hot stamp, ink jet, or excimer laser equipment.
- Resistance to electrical arc tracking in wet or dry conditions.
- Primary wire and cable configurations.

SPEC 55 Insulation System—Dual Wall



SPEC 55 Insulation System—Single Wall



10

Specifications

UL	Military	Industry	Agency	Raychem
3467	MIL-W-22759/32–35 and /41–46 MIL-C-27500 (cables)	Civil Aviation Authority Accessory Approval E11749	NASA preferred product list	Specification 55
3523	Def. Stan. 61-12, Part 21, Types 1, 2, and 3	Boeing material specification (BMS)13-48F	European Space Agency 3901/011 and 3901/012	
3557	Def. Stan. 61-12, Part 29			
3560	British Standard G233			

Typical Properties

	Typical value	Test method
Electrical		
Dielectric breakdown (.010 in)	27 kV	ASTM D3032
Volume resistivity (ohm-cm)	10^{16}	ASTM D257
Surface resistance (megohms-in)	5×10^{9}	ASTM D257
Dielectric constant (permittivity)	2.7	ASTM D150
Dissipation factor	.001	ASTM D150
Insulation resistance (megohms for 1000 ft)	50,000	M22759/34
Physical		
Tensile strength (psi)	6,000–8,000	M22759/34
Elongation (%):		
Primary insulation (core)	170	M22759/34
Overall	100	M22759/34
Electrical arc tracking	Pass	ASTM D3032
Flammability		
Oxygen index (%)	40	ASTM 2863
Vertical flame test:		
Afterburn (sec)	0	Raychem Spec. 55
Burn length (in)	2.25	Raychem Spec. 55
Thermal properties		
Crosslinking proof test (7 hr @ 300˚C)	Pass	M22759/34
Cold bend (–65˚C)	Pass	M22759/34
Chemical resistance		
Water absorption (%)	.03	ASTM D570
Hydrolytic stability	Will not hydrolyze	ASTM D570
Fluid immersion	Pass	M22759/34
Mechanical*		
Dynamic cut-through (lb)*	45	Raychem Spec. 55
Scrape abrasion (cycles)*	75	Raychem Spec. 55
Crush resistance (lb)*	135	.062-inch-diameter mandrel
Impact resistance (in-lb)*	14.2	ASTM D256 (.031 rad, 1 ft-lb arm)

* Mechanical tests performed at room temperature on dual-wall 20 AWG SPEC 55 wire (55A0811-20).

SPEC 55 Wire Number System

55 A X X X X - AWG - XX/XX/XX - X

Base color of primary wire or cable jacket. Replace X by number indicating base color for primary wire or cable jacket (0 = black; 1 = brown; 2 = red; 2L = pink; 3 = orange; 4 = yellow; 5 = green; 6 = blue; 7 = violet; 8 = gray; 9 = white). Additional number(s) after base color indicates stripe(s) color(s); for example: 95 = white wire with a green stripe; 952 = white wire with a green stripe followed by a red stripe (see example below).

Component color code (required for cable constructions only). Replace XX by number(s) indicating base color followed by stripe(s) as required (see example below). Slashes are used to separate individual component wire colors.

Wire size (American Wire Gauge).

Conductor type. 1 = tin-coated copper; 2 = silver-coated copper; 3 = nickel-coated copper; 4 = silver-coated high-strength copper alloy (HSCA); 6 = nickel-coated HSCA.

Number of conductors. 1 through 9.

Class of wire. 1 = 600-V lightweight hookup wire; 2 = 600-V dual-wall hookup wire; 7 = 600-V extra-rugged airframe wire; 8 = 600-V dual-wall airframe wire.

Construction. 0 = primary wire and unshielded, unjacketed cable; 1 = round-braid shielded, jacketed cable; 2 = flat-braid shielded, jacketed cable; 3 = round-braid shielded, unjacketed cable; 4 = unshielded, jacketed cable; 5 = spirally shielded, jacketed cable; 6–9 = special constructions.

Example: 55A1131-22-9/96/93-9
Round-braid shielded, jacketed cable with three components of 600-V lightweight hookup wire that is 22 AWG tin-coated copper. Components are coded white, white with a blue stripe, and white with an orange stripe, with an overall white, crosslinked, modified ETFE jacket.

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, .006-inch nominal wall				
150˚C	Tin-coated copper	12–30	55A0111	M22759/32
200˚C	Silver-coated copper	12–28	55A0112	M22759/44
200˚C	Nickel-coated copper	12–28	55A0113	M22759/45
200˚C	Silver-coated high-strength alloy	20–30	55A0114	M22759/33
200˚C	Nickel-coated high-strength alloy	20–28	55A0116	M22759/46
600-V lightweight dual-wall airframe wire, .008-inch nominal wall				
150˚C	Tin-coated copper	6–26	55A0211	
200˚C	Silver-coated copper	10–26	55A0212	
200˚C	Nickel-coated copper	10–26	55A0213	
200˚C	Silver-coated high-strength alloy	18–30	55A0214	
200˚C	Nickel-coated high-strength alloy	16–26	55A0216	
600-V dual-wall airframe wire, .010-inch nominal wall				
150˚C	Tin-coated copper	00–24	55A0811	M22759/34
200˚C	Silver-coated copper	00–26	55A0812	M22759/43
200˚C	Nickel-coated copper	00–26	55A0813	M22759/41
200˚C	Silver-coated high-strength alloy	20–26	55A0814	M22759/35
200˚C	Nickel-coated high-strength alloy	20–26	55A0816	M22759/42
600-V medium-weight dual-wall airframe wire, .015-inch nominal wall				
150˚C	Tin-coated copper	10–24	55A0711	
200˚C	Silver-coated copper	16–24	55A0712	
200˚C	Nickel-coated copper	16–24	55A0713	
200˚C	Silver-coated high-strength alloy	16–24	55A0714	
200˚C	Nickel-coated high-strength alloy	16–26	55A0716	

Wire size (AWG)	Raychem part number [a,b]	Conductor stranding (no. × AWG)	Diameter in inches *(mm)*	Max. weight in lb/1000 ft[c] *(g/m or kg/km)*
Hookup wire 600-V 55A011X[a] .006-inch wall thickness				
30	55A011X-30-Y	7 × 38	.024 *(.61)*	.66 *(.98)*
28	55A011X-28-Y	7 × 38	.027 *(.69)*	.91 *(1.35)*
26	55A011X-26-Y	19 × 38	.032 *(.81)*	1.4 *(2.08)*
24	55A011X-24-Y	19 × 36	.037 *(.94)*	2.0 *(2.98)*
22	55A011X-22-Y	19 × 34	.043 *(1.09)*	2.8 *(4.17)*
20	55A011X-20-Y	19 × 32	.050 *(1.27)*	4.3 *(6.40)*
18	55A011X-18-Y	19 × 30	.060 *(1.52)*	6.5 *(9.67)*
16	55A011X-16-Y	19 × 29	.068 *(1.73)*	8.3 *(12.35)*
14	55A011X-14-Y	19 × 27	.085 *(2.16)*	13.0 *(19.35)*
12	55A011X-12-Y	37 × 28	.103 *(2.62)*	19.7 *(29.30)*
Airframe wire 600-V 55A081X[a] .010-inch wall thickness				
26	55A081X-26-Y	19 × 38	.040 *(1.02)*	1.7 *(2.53)*
24	55A081X-24-Y	19 × 36	.045 *(1.14)*	2.3 *(3.42)*
22	55A081X-22-Y	19 × 34	.050 *(1.27)*	3.2 *(4.76)*
20	55A081X-20-Y	19 × 32	.058 *(1.47)*	4.7 *(6.99)*
18	55A081X-18-Y	19 × 30	.070 *(1.78)*	7.2 *(10.71)*
16	55A081X-16-Y	19 × 29	.077 *(1.96)*	9.0 *(13.39)*
14	55A081X-14-Y	19 × 27	.094 *(2.39)*	13.8 *(20.54)*
12	55A081X-12-Y	37 × 28	.111 *(2.82)*	20.5 *(30.51)*
10	55A081X-10-Y	37 × 26	.134 *(3.40)*	32.4 *(48.22)*
8	55A081X-8-Y	133 × 29	.195 *(4.95)*	60.3 *(89.74)*
6	55A081X-6-Y	133 × 27	.241 *(6.12)*	94.5 *(140.63)*
4	55A081X-4-Y	133 × 25	.310 *(7.87)*	150.0 *(223.22)*
2	55A081X-2-Y	665 × 30	.408 *(10.36)*	239.0 *(370.51)*
1	55A081X-1-Y	817 × 30	.470 *(11.94)*	290.0 *(483.60)*
0	55A081X-0-Y	1045 × 30	.510 *(12.95)*	377.0 *(569.90)*
00	55A081X-00-Y	1330 × 30	.570 *(14.78)*	487.0 *(744.00)*

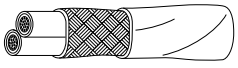
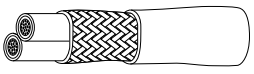
[a]X = conductor type (see Part Numbering System on previous page)

[b]Y=color as specified

[c]Weight is for tin-coated copper conductor

Note: MIL-W-22759 requires a fabric overbraid on 2 through 00 AWG; special Raychem part numbers are assigned to these MIL-SPEC constructions.

SPEC 55 Cable Constructions

Construction	Number of components	Component conductor [a]	Shield material[a]	Part number Light wt.[b]	Part number Medium wt.
Unshielded, unjacketed 	2–9	1		55A01X1-AWG-Y	55A08X1-AWG-Y
		2		55A01X2-AWG-Y	55A08X2-AWG-Y
		3		55A01X3-AWG-Y	55A08X3-AWG-Y
		4		55A01X4-AWG-Y	55A08X4-AWG-Y
		6		55A01X6-AWG-Y	55A48X6-AWG-Y
Unshielded, jacketed 	2–9	1		55A41X1-AWG-Y	55A48X1-AWG-Y
		2		55A41X2-AWG-Y	55A48X2-AWG-Y
		3		55A41X3-AWG-Y	55A48X3-AWG-Y
		4		55A41X4-AWG-Y	55A48X4-AWG-Y
		6		55A41X6-AWG-Y	55A18X6-AWG-Y
Shielded (round braid), jacketed 	1–9	1	1	55A11X1-AWG-Y	55A18X1-AWG-Y
		2	2	55A11X2-AWG-Y	55A18X2-AWG-Y
		3	3	55A11X3-AWG-Y	55A18X3-AWG-Y
		4	1	55A11X4-AWG-Y	55A18X4-AWG-Y
		6	3	55A11X6-AWG-Y	55A18X6-AWG-Y
Shielded (flat braid), jacketed 	1–9	1	1	55A21X1-AWG-Y	55A28X1-AWG-Y
		2	1	55A21X2-AWG-Y	55A28X2-AWG-Y
		3	1	55A21X3-AWG-Y	55A28X3-AWG-Y
		4	1	55A21X4-AWG-Y	55A28X4-AWG-Y
		6	1	55A21X6-AWG-Y	55A28X6-AWG-Y

[a] Type 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

[b] X = no. of wire components
Y = color code
For complete part number, see Part Numbering System on page 10-10.

MIL-C-27500 Cable Part Numbering System

M27500 - AWG XX X X XX

Jacket style and material
00 = no jacket; 23 = crosslinked, modified ETFE, white;
73 = double jacket crosslinked, modified ETFE, white

Shield material and style
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

Number of components. 1 through 9; 10 components = 0

Basic wire spec (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

Example: M27500 - 20SB3T23 = 55A1131-20-9/96/93-9

Military part no.

Raychem part no.

10

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