SPEC 44

Product Facts

- Dual wall construction
- 600, 1000 and 2500 voltage rating
- Small size, light weight
- Low smoke and low corrosive gas generation
- Resistant to most chemicals and electrical arc tracking

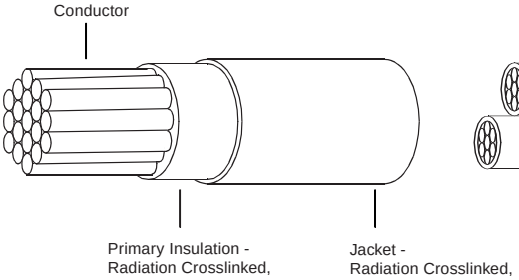
Applications

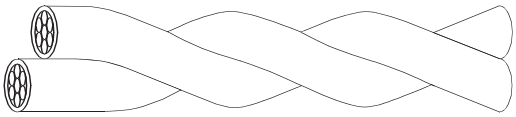
SPEC 44 wire has a dual wall construction which combines the outstanding physical and electrical characteristics of radiation crosslinked polyalkene with the excellent mechanical and chemical properties of radiation cross-linked polyvinylidene fluoride (PVDF).

The result is a wire insulation system that offers a 150°C [302°F] temperature rating, small size, light weight, solder iron resistance, and resistance to most solvents, fuels and lubricants.

SPEC 44 wire and cable is highly flame retardant, non-melting, does not cold flow, and though mechanically very tough, is easy to handle and install using conventional tools.

Originally developed for aerospace and military requirements in applications of high density and complex circuitry, SPEC 44 wire and cable now finds wide use throughout industry, in commercial and military electronics, avionics, on satellites, aircraft, helicopters, ships, trains, and offshore platforms where environmental conditions demand consistently reliable performance. In airframe applications SPEC 44 constructions can offer a modern dimensional replacement for PVC/Nylon/Glass braid type wire and cables. SPEC 44 wire is offered in a wide range of sizes in stranded conductors, standard materials available being tin or silver-plated copper and high strength copper alloy. Voltage ratings of 600, 1000 and 2500 volts are available as standard. Shielded and jacketed versions include single and multi-conductor constructions and flat braid shields where further size and weight savings are achieved.





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Available in:	Americas	Europe	Asia Pacific
	■	■	■

Catalog 1654025
Revised 12-04

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

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USA: 1-800-522-6752
Canada: 1-905-470-4425
Mexico: 01-800-733-8926
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

SPEC 44 (Continued)

Physical Characteristics

Small Size

SPEC 44 equipment wire, 600 volt rated has a 0.19 [.008] nominal wall thickness compared to 0.25 [.010] and 0.38 [.015] for equivalent PTFE and PVC wires in MIL-W-16878, MIL-W-22759 or BS G210.

Light Weight

Because of the thin wall and low density of the insulation materials considerable weight savings are made over similarly rated PTFE wires, eg:- 44A0111-22AWG equipment wire 4.62 grams/meter max
22 AWG PTFE equipment wire, MIL-W-81044
5.54 grams/meter max

General Handling

The flexibility of SPEC 44 and the ease with which it takes a 'set' makes it one of the easiest of the 'high performance' wires to install. Stripping is done with conventional die blade strippers.

For details of appropriate tools see separate wire handling guide. The tin-plated conductor usually specified is easily soldered or crimped. The insulation may be hot stamp marked or printed and does not need etching before potting.

Lengths

SPEC 44 is available in long continuous lengths and can be supplied for use on automatic cut and strip wire preparation machines.

Specifications/Approvals

MIL-W-81044, NEMA-WC-27500 (Cables)
Def Stan. 61-12 Part 18 Issue 4 - Type 1 pliable (Maintenance Range)
Def Stan. 61-12 Part 26 Issue 3 Type 2, 3, 8 & 9 & METS
VG 95218 Parts 20, 21, 22, 23 and 1000
NATO Stock Numbers (NSN's) exist for most standard constructions
Civil Aviation Authority Accessory Approval E11623
Lloyds Register of Shipping
NASA Preferred Product List
Raychem Specification 44

Typical Properties

Temperature rating	-65°C to +150°C [-85°F to +302°F]
Voltage rating (thin wall)	600 V
Voltage rating (thick wall)	2500 V
Tensile strength and elongation of insulation	28 N/mm2 , 230%, 4000 PSI
Notch propagation, 0.05mm notch	Pass
Solder iron resistance (370°C, 1 minute)	Pass
Shrinkage, 200°C	<1%
Low temperature bend	-65°C [-85°F]
Voltage withstand (thin wall)	2500 V
Resistance: fuels, oils, solvents	Pass

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SPEC 44 (Continued)

Environmental Performance

Temperature Rating

SPEC 44 wire and cable is rated for continuous operation from -65°C to +150°C [-85°F to +302°F] and for short periods at temperatures as high as 300°C [572°F]. Heat ageing tests are routinely performed at temperatures of 200°C [392°F] (168 h) and 300°C [572°F] (6 h). In addition SPEC 44 insulation will not shrink back under repeated cycling.

Mechanical Performance

SPEC 44 wire provides better cut through resistance than some wires with much thicker walls. 600 volt equipment wire 44A0111 (0.19 mm wall) has 40% greater cut through resistance than 600 volt PTFE insulated wire (0.25 mm wall).

Solder Iron/Overload Resistance

The radiation crosslinking of the materials used in SPEC 44 makes them non-melting at high temperature. As a result SPEC 44 wire is resistant to prolonged contact with solder irons and is resistant to current overloads which would melt most thermoplastic insulations.

Chemical Resistance

The irradiated dual wall construction of SPEC 44 wire is highly resistant to many acids, alkalis, hydrocarbon solvents, fuels, lubricants, water, and many missile fuels and oxidizers.

Cold Flow

Radiation cross-linking of SPEC 44 prevents cold flow of the insulation — a recognized problem of some uncrosslinked materials.

Voltage Ratings

Standard available voltage ratings for SPEC 44 wire are 600 volts (0.19 mm wall thickness), 1000 volts (0.28 mm wall) and 2500 volts (0.48 mm wall).

Electrical Arc Track Resistance

SPEC 44 insulation demonstrates a total resistance to arc tracking under both wet and dry conditions at aircraft system voltages.

Low Outgassing

For use in space applications, special constructions of SPEC 44 wire are available with low outgassing characteristics, for use in an environment of high vacuum and high temperature.

Fire Hazard Performance

Flammability	Federal Aviation Reg FAR-25	Pass
	BS4066 vertical flammability	Pass
	S424 14751 (Swedish chimney)	Pass
	NFC 32070 (2) (French chimney)	Pass
	IEC 332 part 3 (Cable ladder)	Pass
Smoke/Toxicity Index	Smoke Index, Def Stan 61-12 (18)	6 per meter of wire
	Toxicity Index, Def Stan 61-12 (18)	0.8 per meter of wire
	Oxygen Index, NES 714	30% Oxygen
	Temperature Index, NES 715	>300°C [572°F]

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Part Numbering System

44 X X X X X- AWG- X/X- X

Basic Product Number

Temperature Rating:

/ - 135˚C (XL-PVF2 cable jacket)
A - 150˚C (XL-PVF2 cable jacket)
AC - 150˚C (same as 44AM with 90% min. shield coverage)
AM - 150˚C (M27500, shielded and/or XL-PVF2 jacketed cable)
B - 150˚C (XL-ETFE cable jacket)

Construction

0 - Primary wire; or unshielded & unjacketed cable
1 - Round braid shielded and jacketed cable**
2 - Tin-coated copper flat braid shielded & jacketed cable
3 - Round braid shielded cable, no jacket**
4 - Jacketed cable, no shield
5 - Spiral braid shielded & jacketed cable**
7-9 - Special constructions

Class of Wire

1 - 600 V, general purpose
2 - 1000 V, general purpose
3 - 2500 V, general purpose
4 - 600 V, outerspace*
5 - 1000 V, outerspace*
6 - 2500 V, outerspace*
7 - 600 V, airframe
8 - 600 V, medium weight

Number of Conductors

1 through 10 (designator for 10 conductor = 0)

Conductor Type

1 - Tin-coated copper
2 - Silver-coated copper
3 - Nickel-coated copper
4 - Silver-coated high strength copper alloy
5 - Aluminum
6 - Nickel-coated high strength copper alloy
A - Silver-coated CS95
C - Silver-coated high strength copper alloy (cadmium-free)
D - Nickel-coated high strength copper alloy (cadmium-free)

Conductor Size (AWG)

Primary Wire Insulation Color

(code per MIL-STD-681)

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

Jacket Color

(codes same as for Primary Wire Insulation Color)

* Classes 4, 5 and 6 available only as "44/" constructions. 44/7xxx and 44A7xxx will be available as indicated on the applicable SCD.
**Shield coating same as conductor coating except: - for Conductor Type 4, 6, C and D, shield shall be tin-coated copper

Typical ordering example	3 conductors, brown, yellow with green stripe, blue, white jacket. If 600 volt, round braid, 20 AWG tinned conductor, 44A1131-20-1/45/6-9.
Ordering information	Other constructions and custom designed wire and cable are available on request.

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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%	Shield Coverage 90%	Component Wire Identification
-	C	Colored Stripes on White Wire (9/96/93/95/92/90/94/97/98/91... etc.)
A	D	Solid Color Wires (9/6/3/5/2/0/4/7/8/1...etc.)
B	E	Band Marks on Solid Colors (by AWG)
F	H	Alternate Colored Stripes (92/96/94/95/9/90/91/93/97/98...etc)
G	J	Alternate Solid Colors (2/6/4/5/9/0/1/3/7/8...etc.)
K	M	Number Marking on Solid Colors (by AWG)
L	N	Number Marking on White Wires
P	R	Band Marks on Colored Stripes (by AWG)
S	T	Band Marks on White Wires

Conductor Size (AWG)

Basic Wire Spec Code (MIL-W-81044) and Slash Sheet

MD - M81044/5 (44A0712)
ME - M81044/6 (44A0711)
MF - M81044/7 (44A0714)
MG - M81044/8 (44A0812)
MH - M81044/9 (44A0811)
MJ - M81044/10 (44A0814)
MK - M81044/11 (44A0112)
ML - M81044/12 (44A0111)
MM - M81044/13 (44A0114)

Number of Component Wires

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

Jacket Material and Style Code

00 - No jacket
08 - Crosslinked, white PVDF
23 - Crosslinked, white Modified ETFE

Example: **M27500-22ML3T08 = 44AM1131-22-9/96/93-9**

Raychem Part No.
Military Part No.

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SPEC 44 (Continued)

Primary Wires/Twisted Pair

44A011X (600 V)
Primary Wire

44A021X (1000 V)
Primary Wire

Wire Size (AWG)	Stranding (mm)	Stranding #/AWG	CSA (mm^2)	44A011X (600 V) Nom. OD	44A011X (600 V) Max. Weight (g/m) lb/kft	44A021X (1000 V) Nom. OD	44A021X (1000 V) Max. Weight (g/m) lb/kft
30	7/0.10	7/38	0.06	0.68 [0.027]	1.06 [0.71]	—	—
28	7/0.13	7/36	0.09	0.76 [0.030]	1.43 [0.96]	—	—
26*	19/0.10	19/38	0.15	0.86 [0.034]	2.08 [1.4]	1.02 [0.040]	2.38 [1.6]
24	19/0.13	19/36	0.25	1.02 [0.040]	2.98 [2.0]	1.17 [0.046]	3.57 [2.4]
22	19/0.16	19/34	0.40	1.19 [0.047]	4.46 [3.0]	1.37 [0.054]	5.20 [3.5]
20	19/0.20	19/32	0.60	1.40 [0.055]	6.70 [4.5]	1.57 [0.062]	7.59 [5.1]
18	19/0.25	19/30	1.00	1.65 [0.065]	10.12 [6.8]	1.85 [0.073]	11.46 [7.7]
16	19/0.29	19/29	1.25	1.83 [0.072]	12.80 [8.6]	2.06 [0.081]	14.58 [9.8]
14	19/0.36	19/27	2.00	2.26 [0.089]	19.64 [13.2]	2.49 [0.098]	21.88 [14.7]
12	37/0.32	37/28	3.00	2.74 [0.108]	30.06 [20.0]	2.97 [0.117]	32.89 [22.1]
10	37/0.40	37/26	5.00	3.28 [0.129]	46.28 [31.1]	3.71 [0.146]	52.98 [35.6]
8	133/0.29	133/29	—	—	—	5.23 [0.206]	91.97 [61.8]

*For 44A0211-26 the stranding is 7/0.16mm 7/34 AWG

44A031X (2500 V)
Primary Wire

44A081X (600 V)
Airframe Wire

44A012X (600 V)
Twisted Pair

44A031X (2500 V) Nom. OD	44A031X (2500 V) Max. Weight (g/m) lb/kft	44A081X (600 V) Nom. OD	44A081X (600 V) Max Weight (g/m) lb/kft	44A012X (1000 V) Nom. OD	44A012X (1000 V) Max. Weight (g/m) lb/kft
—	—	—	—	1.37 [0.054]	2.38 [1.6]
—	—	—	—	1.52 [0.060]	3.13 [2.1]
1.35 [0.053]	3.13 [2.1]	1.22 [0.048]	2.98 [2.0]	1.73 [0.068]	4.47 [3.0]
1.44 [0.057]	4.46 [3.0]	1.37 [0.054]	3.87 [2.6]	2.03 [0.080]	6.69 [4.5]
1.75 [0.069]	6.40 [4.3]	1.57 [0.062]	5.65 [3.8]	2.38 [0.094]	9.82 [6.6]
1.98 [0.078]	9.08 [6.1]	1.78 [0.070]	8.04 [5.4]	2.79 [0.110]	14.73 [9.9]
2.23 [0.088]	12.95 [8.7]	2.03 [0.080]	11.91 [8.0]	3.30 [0.130]	22.32 [15.0]
2.46 [0.097]	16.22 [10.9]	2.26 [0.089]	14.73 [9.9]	3.65 [0.144]	28.42 [19.1]
2.92 [0.115]	24.10 [16.2]	2.74 [0.108]	22.17 [14.9]	4.52 [0.178]	44.35 [29.8]
3.32 [0.131]	36.01 [24.2]	3.20 [0.126]	32.59 [21.9]	5.48 [0.216]	69.00 [46.5]
4.09 [0.161]	54.32 [36.5]	3.94 [0.155]	52.08 [35.0]	—	—
96.20 [0.219]	96.73 [65.0]	92.94 [0.214]	93.46 [62.8]	—	—

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SPEC 44 (Continued)

Shielded and Jacketed Cable

44A111X (600 V)
1 Conductor

44A121X (600 V)
1 Conductor

Wire Size (AWG)	Stranding (mm)	Stranding #/AWG	44A111X (600 V) Nom. OD	44A111X (600 V) Max. Weight (g/m) lb/kft	44A121X (600 V) Nom. OD	44A121X (600 V) Max. Weight (g/m) lb/kft
30	7/0.10	7/38	1.47 [0.058]	5.20 [3.5]	—	—
28	7/0.13	7/36	1.55 [0.061]	5.80 [3.9]	1.60 [0.063]	5.65 [3.8]
26	19/0.10	19/38	1.57 [0.065]	6.84 [4.6]	1.73 [0.068]	6.85 [4.6]
24	19/0.13	19/36	1.83 [0.072]	8.63 [5.8]	1.98 [0.078]	9.67 [6.5]
22	19/0.16	19/34	2.01 [0.079]	10.71 [7.2]	2.24 [0.088]	12.35 [8.3]
20	19/0.20	19/32	2.26 [0.089]	14.73 [9.9]	2.54 [0.100]	17.41 [11.7]
18	19/0.25	19/30	2.62 [0.103]	20.68[13.9]	2.82 [0.111]	22.62 [15.2]
16	19/0.29	19/29	2.79 [0.110]	24.55 [16.5]	3.02 [0.119]	26.64 [17.9]
14	19/0.36	19/27	3.22 [0.127]	34.08 [22.9]	3.45 [0.136]	36.16 [24.3]
12	37/0.32	37/28	3.70 [0.146]	47.77 [32.1]	4.14 [0.155]	49.56 [33.3]

Other sizes are also available in some constructions depending on conductor type and construction required.

44A181X (600 V)
1 Conductor

44A112X (600 V)
2 Conductor

Wire Size (AWG)	44A181X (600 V) Nom. OD	44A181X (600 V) Max. Weight (g/m) lb/kft	44A112X (600 V) Nom. OD	44A112X (600 V) Max. Weight (g/m) lb/kft
30	—	—	2.23 [0.088]	8.63 [5.8]
28	—	—	2.38 [0.094]	9.82 [6.6]
26	—	—	2.59 [0.102]	12.05 [8.1]
24	2.26 [0.089]	11.76 [7.9]	2.99 [0.118]	16.82 [11.3]
22	2.57 [0.101]	15.48 [10.4]	3.35 [0.132]	21.57 [14.5]
20	2.77 [0.109]	19.19 [12.9]	3.76 [0.148]	27.97 [18.8]
18	3.02 [0.119]	24.11 [16.2]	4.32 [0.170]	38.24 [25.7]
16	3.25 [0.128]	28.13 [18.9]	4.67 [0.184]	44.94 [30.2]
14	3.73 [0.147]	38.69 [26.0]	5.53 [0.218]	64.28 [43.2]
12	4.19 [0.165]	52.38 [35.2]	6.50 [0.256]	91.51 [61.5]

Other sizes are also available in some constructions depending on conductor type and construction required.

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