

SPEC 44

Wire and cable



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 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.

Features and benefits

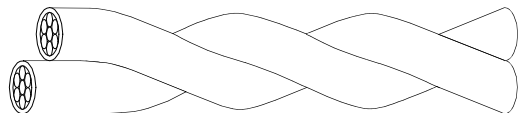
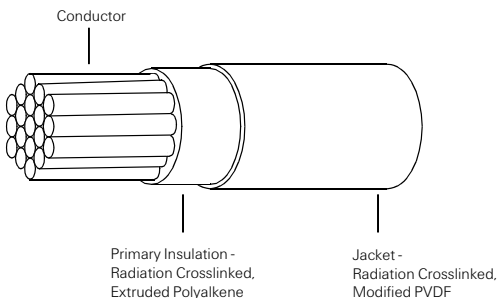
- Dual wall construction.
- 600, 1000 and 2500 voltage rating.
- Small size, light weight.
- Low smoke and low corrosive gas generation.
- Resistant to most chemicals and electrical arc tracking.

Available in:

Americas

Europe

Asia Pacific



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Physical characteristics

Small size

SPEC 44 equipment wire, 600 volt rated has a 0.19 mm (.008 in) nominal wall thickness compared to 0.25 mm (.010 in) and 0.38 mm (.015 in) 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
22AWG PTFE equipment wire, MIL-W-22759 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
Voltage rating (thin wall)	600 V
Voltage rating (thick wall)	2500 V
Tensile strength and elongation of insulation	30 N/mm ² , 230%
Notch propagation, 0.05mm notch	Pass
Solder iron resistance (370°C, 1 minute)	Pass
Shrinkage, 200°C	<1%
Low temperature bend	-65°C
Voltage withstand (thin wall)	2500 V
Insulation resistance (20°C)	1500 M ohms for 1 km
Resistance: fuels, oils, solvents	Pass



*Users should independently evaluate the suitability of the product for their application.
Before ordering check with factory for most current data.*

SPEC 44 (cont'd.)

Wire and cable



SPEC 44 wire and cable

Primary wires/twisted pair

				44A011X (600 V)				44A021X (1000 V)			
				primary wire				primary wire			
											
Size	Stranding		CSA (mm ²)	Nom. OD		Max. Weight		Nom. OD		Max. Weight	
	(mm)	#/AWG		(mm)	(in)	(g/m)	lb/kft	(mm)	(in)	(g/m)	lb/kft
30	7/0.10	7/38	0.06	0.68	0.027	1.00	0.71				
28	7/0.13	7/36	0.09	0.76	0.03	1.36	0.96				
26*	19/0.10	19/38	0.15	0.86	0.034	1.98	1.4	1.02	0.04	2.23	1.6
24	19/0.13	19/36	0.25	1.02	0.04	2.97	2	1.17	0.046	3.43	2.4
22	19/0.16	19/34	0.40	1.19	0.047	4.38	3	1.37	0.054	4.92	3.5
20	19/0.20	19/32	0.60	1.40	0.055	6.50	4.5	1.57	0.062	7.30	5.1
18	19/0.25	19/30	1.00	1.65	0.065	9.90	6.8	1.85	0.073	10.90	7.7
16	19/0.29	19/29	1.25	1.83	0.072	12.58	8.6	2.06	0.081	13.88	9.8
14	19/0.36	19/27	2.00	2.26	0.089	19.65	13.2	2.49	0.098	20.90	14.7
12	37/0.32	37/28	3.00	2.74	0.108	30.68	20.2	2.98	0.117	31.34	22.1
10	37/0.40	37/26	5.00	3.28	0.129	46.28	31.1	3.73	0.146	50.4	35.6
8	133/0.29	133/29				5.23		87.6	0.206	5.56	61.8

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

Screened and jacketed cable

				44A111X (600 V)				44A121X (600 V)			
				1 conductor				1 conductor			
											
Size	Stranding		Nom. OD (mm)	Nom. OD		Max. Weight		Nom. OD		Max. Weight	
	(mm)	#/AWG		(mm)	(in)	(g/m)	lb/kft	(mm)	(in)	(g/m)	lb/kft
30	7/0.10	7/38									
28	7/0.13	7/36									
26	19/0.10	19/38	1.65	0.065	5.82	4.6	1.73	0.068	6.51	4.6	
24	19/0.13	19/36	1.83	0.072	8.20	5.8	1.98	0.078	9.18	6.5	
22	19/0.16	19/34	2.00	0.076	10.30	7.2	2.24	0.088	12.35	8.3	
20	19/0.20	19/32	2.26	0.089	14.02	9.9	2.54	0.100	17.40	11.7	
18	19/0.25	19/30	2.62	0.103	19.70	13.9	2.82	0.111	22.61	15.2	
16	19/0.29	19/29	2.79	0.11	23.40	16.5	3.02	0.119	26.63	17.9	
14	19/0.36	19/27	3.22	0.127	32.50	22.9	3.45	0.136	36.15	24.3	
12	37/0.32	37/28	3.70	0.146	45.67	32.1	4.14	0.155	49.55	33.3	


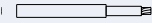



Other sizes are also available in some constructions depending on conductor type and construction required.

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44A031X (2500 V)				44A081X (600 V)				44A012X (600 V)			
primary wire				airframe wire				twisted pair			
											
Nom. OD		Max. Weight		Nom. OD		Max. Weight		Nom. OD		Max. Weight	
(mm)	(in)	(g/m)	lb/kft	(mm)	(in)	(g/m)	lb/kft	(mm)	(in)	(g/m)	lb/kft
								1.37	0.054	2.12	1.6
								1.52	0.060	2.90	2.1
				1.22	0.048	2.28	2.0	1.73	0.068	4.10	3
1.44	0.057	4.18	3.0	1.37	0.054	3.73	2.6	2.03	0.080	6.08	4.5
1.75	0.069	6.12	4.3	1.57	0.062	5.52	3.8	2.38	0.094	8.91	6.6
1.98	0.078	8.65	6.1	1.78	0.07	7.91	5.4	2.79	0.110	13.30	9.9
2.23	0.088	12.38	8.7	2.03	0.08	11.49	8.0	3.30	0.130	20.21	15
2.46	0.097	15.37	10.9	2.26	0.089	14.32	9.9	3.65	0.144	25.73	19.1
2.92	0.115	23.13	16.2	2.74	0.108	22.08	14.9	4.52	0.178	40.15	29.8
3.32	0.131	34.32	24.2	3.20	0.126	32.23	21.9	5.48	0.216	62.63	46.5
4.09	0.161	54.02	36.5	3.94	0.155	51.80	35.0				
96.20	0.219	5.44	65.0	92.94	0.214		62.8				
44A181X (600 V)				44A112X (600 V)							
1 conductor				2 conductors							
											
Nom. OD		Max. Weight		Nom. OD		Max. Weight					
(mm)	(in)	(g/m)	lb/kft	(mm)	(in)	(g/m)	lb/kft				
				2.23	0.088	8.20	5.8				
				2.38	0.094	9.40	6.6				
				2.59	0.102	12.05	8.1				
2.26	0.089	11.69	7.9	2.99	0.118	16.12	11.3				
2.57	0.101	15.39	10.4	3.35	0.132	21.50	14.5				
2.77	0.109	19.09	12.9	3.76	0.148	27.97	18.8				
3.02	0.119	23.98	16.2	4.32	0.170	38.24	25.7				
3.25	0.128	27.97	18.9	4.67	0.184	44.93	30.2				
3.73	0.147	38.48	26	5.53	0.218	64.28	43.2				
4.19	0.165	52.10	35.2	6.50	0.256	91.51	61.5				

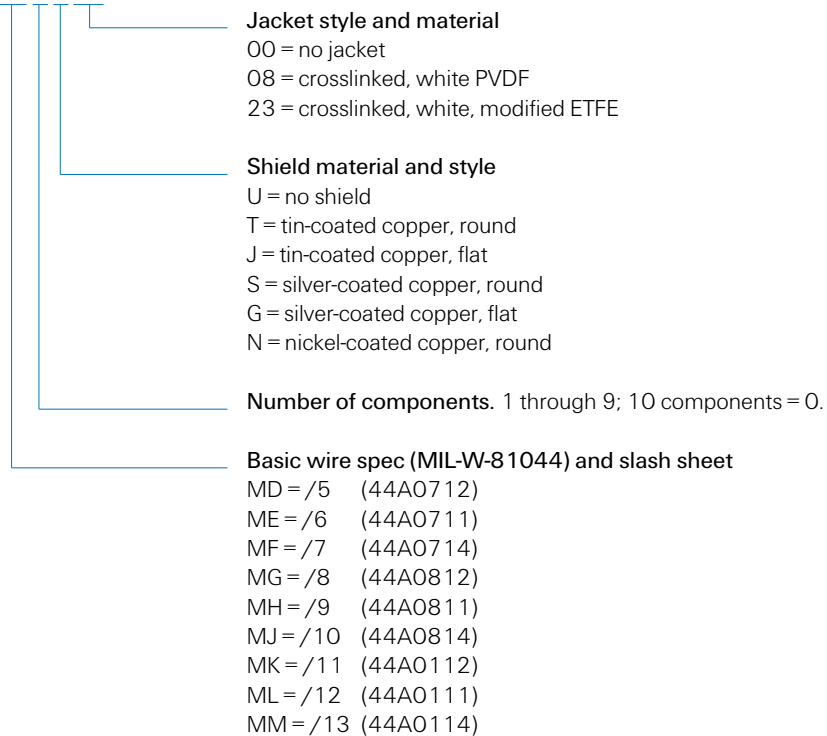
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SPEC 44 (cont'd.)

Wire and cable

NEMA WC-27500 Cable Part Numbering System

M27500 - AWG XX X X XX



Example:

M27500-22ML3T08 = 44AM1131-22-9/96/93-9

Military part no. _____

Raychem part no. _____

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Environmental Performance

Temperature rating

SPEC 44 wire and cable is rated for continuous operation from -65°C to +150°C and for short periods at temperatures as high as 300°C. Heat ageing tests are routinely performed at temperatures of 200°C (168 h) and 300°C (6 h). In addition SPEC 44's 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.

SPEC 44 (cont'd.)

Wire and cable

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

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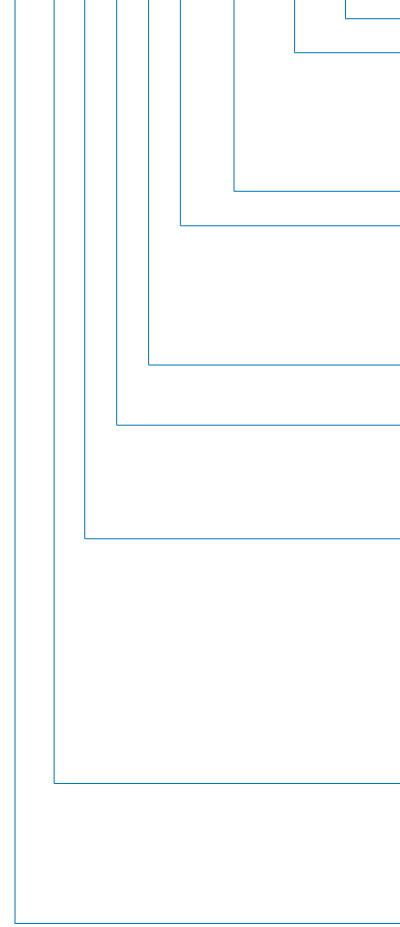
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Part numbering system

44 X X X X X- Size- X/X- X



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

Primary wire insulation color

(in accordance with MIL-STD-681)

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

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 (SPHSCA)
- 6 - Nickel-plated high strength copper alloy (NPHSCA)

Number of conductors

1 to 9 0 = 10 conductor

Class of wire

- 1 - 600 V equipment wire
- 2 - 1000 V equipment wire
- 3 - 2500 V equipment wire
- 7 - 600 V nominal weight wire
- 8 - 600 V medium weight wire

Constructions

- 0 - Primary wire and unscreened, unjacketed cables
- 1 - Round braid screened and jacketed†
- 2 - Flat braid screened and jacketed†
- 3 - Round braid, screened, no jacket†
- 4 - Jacketed, no screen
- 5 - Spirally screened and jacketed†
- 7-9 - Special constructions

† Screen material same as conductor material except screen for type 4 conductor is tinned copper.

Type

- I - 135 °C space wire
- A - AWG conductor
- CD - Custom Design
- M - Metric conductor
- B - Radiation crosslinked modified ETFE jacket in place of PVDF
- AM - Designation for M27500 cables
- D - Defense Standard 61-12 Part 2b Issue 3

Basic specification number

Typical ordering example

3 conductors, brown, yellow with green stripe, blue, white jacket. If 600 volt, round braid, 20 AWG tinned conductor, total part number is 44A1131-20-1/45/6-9.

Ordering information

Standard equipment wires (44A0111 12 to 30 AWG) in most common AWGs and colors are kept in stock. In addition, many of the most commonly used single/pair and triple screened cables are also stock items, as are some airframe constructions*. Other constructions and custom designed wire and cable are available on request.

*Europe only.

Users should independently evaluate the suitability of the product for their application. Before ordering check with factory for most current data.