INCH-POUND
J-W-1177/9B
June 10, 1988
SUPERSEDING
J-W-1177/9A
September 27, 1976

FEDERAL SPECIFICATION SHEET

WIRE, MAGNET, ELECTRICAL, CLASS 130, TYPE SUN SOLDERABLE POLYURETHANE OVERCOATED WITH POLYAMIDE, ROUND

This specification is approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

The requirements for acquiring the wire described herein shall consist of this specification and the latest issue of J-W-1177.

Classification:	Class 130; type SUN (single), type SUN2 (heavy); round.
Insulating materials:	The conductor shall be coated with a dual film. The underlying coating shall be based on a solderable polyurethane resin. The superimposed coating shall be based on a polyamide resin.
NEMA/ANSI equivalent:	All test requirements except thermal endurance are equivalent to MW-28 of NEMA MW 1000.
General requirements:	See J-W-1177 for general requirements, quality assurance provisions, and packaging.

Requirements:

Characteristics	Test procedure, see J-W-1177	Wire sizes, AWG	Requirements
Dimensions	4.7.1.2	9-44	See table I.
Adherence and flexibility	4.7.2.1	9-44	No cracks visible in the film coating.
Elongation	4.7.5	9-44	Not less than the value in table II.
Heat shock	4.7.4	10-44	No cracks visible in the coating after conditioning as shown in table III.
Scrape resistance	4.7.6	10-30	Lowest grams-to-fail load for any of the three tests and the average of the three tests shall be not less than the values in table IV.

AMSC N/A FSC 6145

DISTRIBITION STATEMENT A Approved for public release; distribution unlimited

Requirements: (Continued)

Characteristics	Test procedure, see J-W-1177	Wire sizes, AWG	Requirements
Springback	4.7.7	14-30	Not greater than the value in table V.
Dielectric strength	4.7.9	9-44	Not less than the value in table VI.
Continuity	4.7.10 4.7.11	31-44 14-30	The number of discontinuities shall be not greater than the number listed in table VII.
Thermoplastic flow	4.7.8	18, 36	Median not less than 170°C with heavy film coated wire.
Solubility	4.7.12	18, 36	Heavy film coated wire shall not soften sufficiently to expose bare conductor when immersed in xylene.
Dielectric strength at temperature	4.7.14	18, 36	Heavy film coated wire shall average not less than 3825 volts for 18 AWG or 1725 volts for 36 AWG.
Thermal endurance	4.7.15.1	18	130°C minimum with heavy film coated wire.
	4.7.15.2	9-44	1000 volts/mil minimum after 168 hours at 200°C.
	4.7.15.3	10-44	175°C minimum as shown in table III.
Solderability	4.7.17	14-44	Covered with continuous film of solder and not readily separable after soldering as shown in table VIII.

TABLE I. Dimensions, sizes 9 to 44 AWG.

AWG size	Bare wire diameter, inch 1/			Type SUN, single		Type SUN2, heavy	
	Minimum	Nominal	Maximum	Minimum increase in diameter, inch	Maximum overall diameter, inch	Minimum increase in diameter, inch	Maximum overall diameter, inch
9	0.1133	0.1144	0.1150	—	—	0.0032	0.1189
10	.1009	.1019	.1024	—	—	.0031	.1061
11	.0898	.0907	.0912	—	—	.0030	.0948
12	.0800	.0808	.0812	—	—	.0029	.0847
13	.0713	.0720	.0724	—	—	.0028	.0757
14	.0635	.0641	.0644	0.0016	0.0666	.0032	.0682
15	.0565	.0571	.0574	.0015	.0594	.0030	.0609
16	.0503	.0508	.0511	.0014	.0531	.0029	.0545
17	.0448	.0453	.0455	.0014	.0475	.0028	.0488
18	.0399	.0403	.0405	.0013	.0424	.0026	.0437
19	.0355	.0359	.0361	.0012	.0379	.0025	.0391
20	.0317	.0320	.0322	.0012	.0339	.0023	.0351
21	.0282	.0285	.0286	.0011	.0303	.0022	.0314
22	.0250	.0253	.0254	.0011	.0270	.0021	.0281
23	.0224	.0226	.0227	.0010	.0243	.0020	.0253
24	.0199	.0201	.0202	.0010	.0217	.0019	.0227
25	.0177	.0179	.0180	.0009	.0194	.0018	.0203
26	.0157	.0159	.0160	.0009	.0173	.0017	.0182
27	.0141	.0142	.0143	.0008	.0156	.0016	.0164
28	.0125	.0126	.0127	.0008	.0140	.0016	.0147
29	.0112	.0113	.0114	.0007	.0126	.0015	.0133
30	.0099	.0100	.0101	.0007	.0112	.0014	.0119
31	.0088	.0089	.0090	.0006	.0100	.0013	.0108
32	.0079	.0080	.0081	.0006	.0091	.0012	.0098
33	.0070	.0071	.0072	.0005	.0081	.0011	.0088
34	.0062	.0063	.0064	.0005	.0072	.0010	.0078
35	.0055	.0056	.0057	.0004	.0064	.0009	.0070
36	.0049	.0050	.0051	.0004	.0058	.0008	.0063
37	.0044	.0045	.0046	.0003	.0052	.0008	.0057
38	.0039	.0040	.0041	.0003	.0047	.0007	.0051
39	.0034	.0035	.0036	.0002	.0041	.0006	.0045
40	.0030	.0031	.0032	.0002	.0037	.0006	.0040
41	.0027	.0028	.0029	.0002	.0033	.0005	.0036
42	.0024	.0025	.0026	.0002	.0030	.0004	.0032
43	.0021	.0022	.0023	.0002	.0026	.0004	.0029
44	.0019	.0020	.0021	.0001	.0024	.0004	.0027

1/ These bare wire diameters may be exceeded, provided:

(a) The maximum diameters specified by QQ-W-343 are not exceeded,
(b) The minimum increases in diameter shown in table I are maintained, and
(c) The maximum overall diameters shown in table I are not exceeded.

TABLE II. Elongation of finished wire.

AWG size	Minimum elongation, percent	AWG size	Minimum elongation, percent
9	36	27	27
10	35	28	26
11	35	29	26
12	34	30	25
13	34	31	24
14	33	32	24
15	33	33	23
16	33	34	22
17	32	35	21
18	32	36	20
19	31	37	20
20	30	38	19
21	30	39	18
22	29	40	17
23	29	41	17
24	28	42	16
25	28	43	15
26	27	44	14

TABLE III. Heat shock.

AWG size	Minimum elongation, percent	Mandrel diameter	Minimum temperature, °C
10-13	25	5X	175
14-30	20	3X	175
31-44	1/ 20	3X	175

1/ Or to the breaking point, whichever is less.

TABLE IV. Scrape resistance.

AWG size	Type SUN single coating		Type SUN2 heavy coating	
	Average grams-to-fail	Minimum grams-to-fail	Average grams-to-fail	Minimum grams-to-fail
10	—	—	1490	1270
11	—	—	1490	1270
12	—	—	1490	1270
13	—	—	1490	1270
14	840	715	1490	1270
15	780	665	1400	1190
16	735	625	1310	1115
17	690	585	1230	1045
18	645	550	1150	980
19	600	510	1070	910
20	560	475	1000	850
21	525	445	940	800
22	490	415	880	750
23	460	390	820	700
24	430	365	770	655
25	400	340	720	615
26	380	325	675	575
27	355	300	635	540
28	335	285	595	510
29	310	265	560	480
30	295	250	525	450

TABLE V. Springback of finished wire.

AWG size	Maximum springback, degrees	AWG size	Maximum springback, degrees
	Types SUN and SUN2		Types SUN and SUN2
14	42	23	62
15	46	24	67
16	50	25	72
17	54	26	76
18	58	27	50
19	62	28	55
20	66	29	61
21	53	30	66
22	58		

TABLE VI. Minimum breakdown voltages.

AWG size	Volts		AWG size	Volts		AWG size	Volts	
	Type SUN	Type SUN2		Type SUN	Type SUN2		Type SUN	Type SUN2
9	——	2875	21	2625	4725	33	1500	2925
10	——	5575	22	2575	4625	34	1350	2675
11	——	5400	23	2500	4500	35	1200	2475
12	——	5225	24	2425	4375	36	1075	2275
13	——	5050	25	2375	4250	37	975	2100
14	3175	5700	26	2300	4150	38	850	1925
15	3075	5550	27	2250	4050	39	775	1775
16	3000	5400	28	2175	3950	40	700	1625
17	2925	5275	29	2150	3825	41	625	1500
18	2850	5125	30	2075	3725	42	575	1375
19	2775	5000	31	1875	3450	43	500	1250
20	2700	4850	32	1675	3175	44	450	1175

TABLE VII. Continuity.

AWG size	Maximum number of discontinuities	
	Type SUN	Type SUN2
14-24	25	5
24-30	25	7
31-44	25	5

TABLE VIII. Solderability.

AWG size	Maximum immersion time, seconds		Temperature of solder, °C
	Type SUN	Type SUN2	
14-19	10	10	430
20-23	8	8	430
24-29	6	6	360
30-36	5	5	360
37-44	4	4	360

Part number: Magnet wire covered by this specification shall be defined by the following part numbering system. Example: M1177/9-02C029

M1177/9-	02	C	029
Federal specification identifier	Two digit type code	Single letter conductor code	Three character size code

The following codes shall apply:

Type	Type code	Conductor	Conductor code
SUN	01	Copper	C
SUN2	02	Aluminum	A
		Nickel-coated copper	N
		Silver-coated copper	S

The size code shall be the bare wire dimension. AWG wire size shall be used.

Intended use: Type SUN magnet wire is intended for use in 130°C applications similar to those for which type T is used and where a solderable wire is desired with good windability.

Revision letters are not used to denote changes due to the extensiveness of the changes.

MILITARY INTERESTS:

Custodians:
Army - CR
Navy - SH
Air Force - 85

Review activities:
Army - AR, ER, MI
DLA - IS

User activities:
Army - ME
Navy - AS, CG, MC, OS

CIVIL AGENCY COORDINATING ACTIVITIES:

GSA - FSS, PBO, PCD
INTERIOR - BLM
HHS - FDA
DCGOVT - DCG
NASA - JFK
COMMERCE - NBS
TRANSPORTATION - APM, FAA

Preparing activity:
Navy - SH
(Project 6145-1111-06)