INCH-POUND
J-W-1177/30
June 10, 1988

FEDERAL SPECIFICATION SHEET

WIRE, MAGNET, ELECTRICAL, CLASS 105, TYPE SUNB, SOLDERABLE POLYURETHANE/POLYAMIDE WITH SELF-BONDING THERMOPLASTIC OVERCOAT, 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 105; type SUNB (single), type SUNB2 (heavy); round.

Insulating materials: The conductor shall be coated with a multiple film. The underlying coating shall be based on a polyurethane resin. The intermediate coating shall be based on a polyvinyl butyral thermoplastic resin.

NEMA/ANSI equivalent: All test requirements except thermal endurance are equivalent to MW-29 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	14-44	See table I.
Adherence and flexibility	4.7.2.1	14-44	No cracks visible in the film coating.
Elongation	4.7.5	14-44	Not less than the value in table II.
Heat shock	4.7.4	14-44	No cracks visible in the coating after conditioning as shown in table III.
Springback	4.7.7	14-30	Not greater than the value in table IV.

AMSC N/A
FSC 6145
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Requirements: (Continued)

Characteristics	Test procedure, see J-W-1177	Wire sizes, AWG	Requirements
Dielectric strength	4.7.9	14-44	Not less than the value in table V.
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 VI.
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 1925 volts for 36 AWG.
Thermal endurance	4.7.15.1	18	105°C minimum with heavy film wire.
	4.7.15.2	14-44	1000 volts/mil minimum after 168 hours at 180°C.
	4.7.15.3	14-44	175°C minimum.
Solderability	4.7.17	14-44	Covered with continuous film of solder and not readily separable after soldering as shown in table VII.
Bond	4.7.13.1	18, 26, 36	Heavy film coated wire shall show no separation of turns when bonded 1 hour at 150°C.

TABLE I. Dimensions.

AWG size	Bare wire diameter, inch			Type SUNB			Type SUNB2		
				Minimum increase in diameter, inch		Maximum overall diameter, inch	Minimum increase in diameter, inch		Maximum overall diameter, inch
	Minimum	Nominal	Maximum	Film coating	Outer coating		Film coating	Outer coating	
14	0.0635	0.0641	1/ 0.0644	0.0016	0.0006	0.0682	0.0032	0.0006	0.0700
15	.0565	.0571	1/ .0574	.0015	.0006	.0609	.0030	.0006	.0627
16	.0503	.0508	1/ .0511	.0014	.0006	.0545	.0029	.0006	.0562
17	.0448	.0453	1/ .0455	.0014	.0006	.0488	.0028	.0006	.0504
18	.0399	.0403	1/ .0405	.0013	.0006	.0437	.0026	.0006	.0452
19	.0355	.0359	1/ .0361	.0012	.0006	.0391	.0025	.0006	.0406
20	.0317	.0320	1/ .0322	.0012	.0005	.0351	.0023	.0005	.0364
21	.0282	.0285	1/ .0286	.0011	.0005	.0314	.0022	.0005	.0326
22	.0250	.0253	1/ .0254	.0011	.0005	.0281	.0021	.0005	.0293
23	.0224	.0226	1/ .0227	.0010	.0005	.0253	.0020	.0005	.0264
24	.0199	.0201	1/ .0202	.0010	.0005	.0227	.0019	.0005	.0238
25	.0177	.0179	1/ .0180	.0009	.0005	.0203	.0018	.0005	.0214
26	.0157	.0159	1/ .0160	.0009	.0005	.0182	.0017	.0005	.0193
27	.0141	.0142	.0143	.0008	.0005	.0164	.0016	.0005	.0173
28	.0125	.0126	.0127	.0008	.0005	.0147	.0016	.0005	.0156
29	.0112	.0113	.0114	.0007	.0004	.0133	.0015	.0004	.0142
30	.0099	.0100	.0101	.0007	.0004	.0119	.0014	.0004	.0128
31	.0088	.0089	.0090	.0006	.0004	.0108	.0013	.0004	.0115
32	.0079	.0080	.0081	.0006	.0004	.0098	.0012	.0004	.0105
33	.0070	.0071	.0072	.0005	.0004	.0088	.0011	.0004	.0095
34	.0062	.0063	.0064	.0005	.0003	.0078	.0010	.0003	.0084

See footnote at end of table.

TABLE I. Dimensions. - Continued

AWG size	Bare wire diameter, inch			Type SUNB			Type SUNB2		
				Minimum increase in diameter, inch		Maximum overall diameter, inch	Minimum increase in diameter, inch		Maximum overall diameter, inch
	Minimum	Nominal	Maximum	Film coating	Outer coating		Film coating	Outer coating	
35	.0055	.0056	.0057	.0004	.0003	.0070	.0009	.0003	.0076
36	.0049	.0050	.0051	.0004	.0003	.0063	.0008	.0003	.0069
37	.0044	.0045	.0046	.0003	.0003	.0057	.0008	.0003	.0062
38	.0039	.0040	.0041	.0003	.0002	.0051	.0007	.0002	.0056
39	.0034	.0035	.0036	.0002	.0002	.0045	.0006	.0002	.0050
40	.0030	.0031	.0032	.0002	.0002	.0040	.0006	.0002	.0044
41	.0027	.0028	.0029	.0002	.0002	.0036	.0005	.0002	.0040
42	.0024	.0025	.0026	.0002	.0002	.0032	.0004	.0002	.0037
43	.0021	.0022	.0023	.0002	.0001	.0029	.0004	.0001	.0033
44	.0019	.0020	.0021	.0001	.0001	.0027	.0004	.0001	.0030

1/ The maximum bare wire dimensions may be exceeded up to the NEMA/ANSI maximum bare wire limit, provided the minimum increase is maintained and the maximum overall diameter specified is not exceeded.

TABLE II. Elongation.

AWG size	Elongation, minimum percent
14	33
15	33
16	33
17	32
18	32
19	31
20	30
21	30
22	29
23	29
24	28
25	28
26	27
27	27
28	26
29	26
30	25
31	24
32	24
33	23
34	22
35	21
36	20
37	20
38	19
39	18
40	17
41	17
42	16
43	15
44	14

TABLE III. Heat shock.

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

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

TABLE IV. Springback.

AWG size	Type SUNB Springback, maximum degrees per turn	Type SUNB2 Springback, maximum degrees per turn
14	42	46
15	46	49
16	50	53
17	54	58
18	58	62
19	62	66
20	66	70
21	53	53
22	58	58
23	62	64
24	67	69
25	72	74
26	76	80
27	50	55
28	55	60
29	61	65
30	66	70
31	—	—
32	—	—
33	—	—
34	—	—
35	—	—
36	—	—
37	—	—
38	—	—
39	—	—
40	—	—
41	—	—
42	—	—
43	—	—
44	—	—

TABLE V. Dielectric strength.

AWG size	Type SUNB Dielectric strength minimum breakdown volts	Type SUNB2 Dielectric strength minimum breakdown volts
14	3175	5700
15	3075	5550
16	3000	5400
17	2925	5275
18	2850	5125
19	2775	5000
20	2700	4850
21	2625	4725
22	2575	4625
23	2500	4500
24	2425	4375
25	2375	4250
26	2300	4150
27	2250	4050
28	2175	3950
29	2150	3825
30	2075	3725
31	1875	3450
32	1675	3175
33	1500	2925
34	1350	2675
35	1200	2475
36	1075	2275
37	975	2100
38	850	1925
39	775	1775
40	700	1625
41	625	1500
42	575	1375
43	500	1250
44	450	1175

TABLE VI. Continuity.

AWG size	Maximum number of discontinuities	
	Type SUNB	Type SUNB2
14-24	25	5
25-30	25	7
31-44	25	5

TABLE VII. Solderability.

AWG size	Maximum immersion time, seconds		Temperature of solder, °C
	Type SUNB	Type SUNB2	
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: M1177/30-02C029.

M1177/30-	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
SUNB	01	Copper	C
SUNB2	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 SUNB magnet wire is intended for use in 105°C applications similar to type T where a solderable and bondable magnet wire is desired.

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
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