

INCH-POUND

J-W-1177/2B

June 10, 1988

SUPERSEDING

J-W-1177/2A

September 27, 1976

## FEDERAL SPECIFICATION SHEET

WIRE, MAGNET, ELECTRICAL, CLASS 105, TYPE SU,  
SOLDERABLE POLYURETHANE COATED, 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 SU (single), type SU2 (heavy); round.  
 Insulating materials: The film shall be based on a solderable polyurethane resin.  
 NEMA/ANSI equivalent: All test requirements except thermal endurance are equivalent to MW-2 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	25-56	See tables I and II.
Adherence and flexibility	4.7.2.1	25-56	No cracks visible in the film coating.
Elongation	4.7.5	25-50	Not less than the value in table III.
Heat shock	4.7.4	25-44	No cracks visible in the coating after conditioning as shown in table IV.
Scrape resistance	4.7.6	25-30	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 V.
Springback	4.7.7	25-30	Not greater than the value in table VI.
Dielectric strength	4.7.9	25-44	Not less than the value in table VII.

AMSC N/A

FSC 6145

DISTRIBUTION STATEMENT A Approved for public release; distribution unlimited

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## Requirements: (Continued)

Characteristics	Test procedure, see J-W-1177	Wire sizes, AWG	Requirements
Continuity	4.7.10	31-56	The number of discontinuities shall be not greater than the number listed in table VIII.
	4.7.11	25-30	
Thermoplastic flow	4.7.8	36	Median not less than 170°C with heavy film coated wire.
Solubility	4.7.12	36	Heavy film coated wire shall not soften sufficiently to expose bare conductor when immersed in xylene.
Dielectric strength at temperature	4.7.14	36	Heavy film coated wire shall average not less than 1900 volts.
Thermal endurance	4.7.15.1	18	105°C minimum with heavy film coated wire.
	4.7.15.2	25-44	1000 volts/mil minimum after 168 hours at 180°C.
	4.7.15.3	25-44	150°C minimum as shown in table IV.
Solderability	4.7.17	25-46	Covered with continuous film of solder and not readily separable after soldering as shown in table IX.

TABLE I. Dimensions, sizes 25 to 44 AWG.

AWG size	Bare wire diameter, inch			Type SU, single		Type SU2, heavy	
				Minimum increase in diameter, inch	Maximum overall diameter, inch	Minimum increase in diameter, inch	Maximum overall diameter, inch
	Minimum	Nominal	Maximum				
<u>1/25</u>	0.0177	0.0179	0.0180	0.0009	0.0194	0.0018	0.0203
<u>1/26</u>	.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

See footnote at end of table.

TABLE I. Dimensions, sizes 25 to 44 AWG. - Continued

AWG size	Bare wire diameter, inch			Type SU, single		Type SU2, heavy	
				Minimum increase in diameter, inch	Maximum overall diameter, inch	Minimum increase in diameter, inch	Maximum overall diameter, inch
	Minimum	Nominal	Maximum				
38	0.0039	0.0040	0.0041	0.0003	0.0047	0.0007	0.0051
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. Characteristics of wire sizes 45 to 56 AWG.

AWG size	Theoretical <sup>1/</sup> nominal bare wire diameter, inch	Conductor resistance at 20°C, ohms per foot			Type SU, single		Type SU2, heavy	
					Minimum increase in diameter, inch	Maximum overall diameter, inch	Minimum increase in diameter, inch	Maximum overall diameter, inch
		Minimum	Nominal	Maximum				
45	0.00176	3.080	3.348	3.616	0.00010	0.00205	0.00030	0.00230
46	.00157	3.870	4.207	4.544	.00010	.00185	.00030	.00210
47	.00140	4.868	5.291	5.714	.00010	.00170	.00030	.00190
48	.00124	6.205	6.745	7.285	.00010	.00150	.00020	.00170
49	.00111	7.744	8.417	9.090	.00010	.00130	.00020	.00150
50	.00099	9.734	10.58	11.43	.00010	.00120	.00020	.00140
51	.00088	12.32	13.39	14.46	.00010	.00110	-----	-----
52	.00078	15.69	17.05	18.41	.00010	.00100	-----	-----
53	.00070	19.48	21.17	22.86	.00005	.00085	-----	-----
54	.00062	24.82	26.98	29.14	.00005	.00075	-----	-----
55	.00055	31.54	34.28	37.02	.00005	.00070	-----	-----
56	.00049	39.73	43.19	46.65	.00005	.00065	-----	-----

1/ Theoretical nominal bare wire diameters are in accordance with NBS Handbook 100. Conductor diameter tolerances are shown as resistance values and shall be determined by measuring the resistance of the wire in accordance with ASTM B 193, where applicable. A specimen at least 5 feet long shall be used.

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TABLE III. Elongation of finished wire.

AWG size	Minimum elongation, percent	AWG size	Minimum elongation, percent
25	28	38	19
26	27	39	18
27	27	40	17
28	26	41	17
29	26	42	16
30	25	43	15
31	24	44	14
32	24	45	11
33	23	46	10
34	22	47	8
35	21	48	7
36	20	49	6
37	20	50	5

TABLE IV. Heat shock.

AWG size	Minimum elongation, percent	Mandrel diameter	Minimum temperature, °C
25-30	20	6X	150
31-44	<u>1</u> /20	6X	150

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

TABLE V. Scrape resistance.

AWG size	Type SU, single		Type SU2, heavy	
	Average grams-to-fail	Minimum grams-to-fail	Average grams-to-fail	Minimum grams-to-fail
25	350	300	720	615
26	330	280	675	575
27	310	265	635	540
28	290	250	595	510
29	270	230	560	480
30	255	220	525	450

TABLE VI. Springback of finished wire.

AWG size	Maximum springback, degrees
25	72
26	76
27	50
28	55
29	61
30	66

TABLE VII. Minimum breakdown voltages.

AWG size	Volts		AWG size	Volts	
	Type SU	Type SU2		Type SU	Type SU2
25	2625	4725	35	1325	2750
26	2550	4600	36	1200	2525
27	2500	4500	37	1075	2325
28	2425	4375	38	950	2150
29	2375	4250	39	850	1975
30	2300	4150	40	775	1800
31	2075	3825	41	700	1675
32	1850	3525	42	625	1525
33	1675	3250	43	550	1400
34	1500	2975	44	500	1300

TABLE VIII. Continuity.

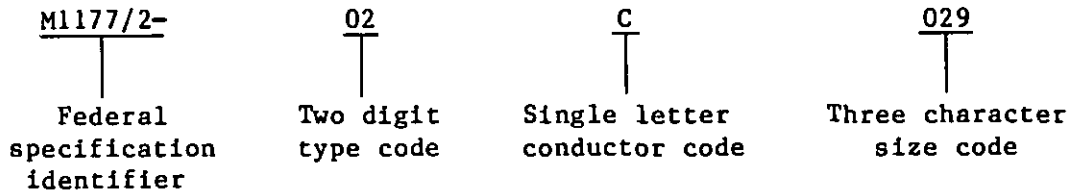
AWG size	Maximum number of discontinuities	
	Type SU	Type SU2
25-30	25	7
31-46	25	5
47-50	25	10
51-56	25	—

TABLE IX. Solderability.

AWG size	Maximum immersion time, seconds	Temperature of solder, °C
25-29	6	360
30-36	5	360
37-46	4	360

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Part number: Magnet wire covered by this specification shall be defined by the following part numbering system.  
Example: M1177/2-02C029



The following codes shall apply:

Type	Type code	Conductor	Conductor code
SU	01	Copper	C
SU2	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 SU magnet wire is intended for use in 105°C applications similar to those for which type I is used and where a solerable wire is desired.

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 6145-1111-01)