

INCH-POUND

J-W-1177/10B

June 10, 1988

SUPERSEDING

J-W-1177/10A

September 27, 1976

FEDERAL SPECIFICATION SHEET

WIRE, MAGNET, ELECTRICAL, CLASS 155, TYPE L,
POLYESTER 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 155; type L (single), type L2 (heavy); round.
 Insulating materials: The film shall be based on a polyester resin.
 NEMA/ANSI equivalent: All test requirements except thermal endurance are equivalent to MW-5 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.

AMSC N/A

FSC 6145

DISTRIBUTION STATEMENT A Approved for public release; distribution unlimited

J-W-1177/10B

Requirements: (Continued)

Characteristics	Test procedure, see J-W-1177/GEN	Wire sizes, AWG	Requirements
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.
Continuity	4.7.10	31-50	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 250°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 for 36 AWG.
Thermal endurance	4.7.15.1	25	155°C minimum with heavy film coated wire.
	4.7.15.2	25-44	1000 volts/mil minimum after 168 hours at 200°C.
	4.7.15.3	25-44	175°C minimum as shown in table IV.

TABLE I. Dimensions, sizes 25 to 44 AWG.

AWG size	Bare wire diameter, inch ^{1/}			Type L, single		Type L2, heavy	
				Minimum increase in diameter, inch	Maximum overall diameter, inch	Minimum increase in diameter, inch	Maximum overall diameter, inch
	Minimum	Nominal	Maximum				
1/25	0.0177	0.0179	0.0180	0.0009	0.0194	0.0018	0.0203
1/26	.0157	.0159	.0160	.0009	.0173	.0017	.0182
1/27	.0141	.0142	.0143	.0008	.0156	.0016	.0164
1/28	.0125	.0126	.0127	.0008	.0140	.0016	.0147
1/29	.0112	.0113	.0114	.0007	.0126	.0015	.0133
1/30	.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

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

AWG size	Bare wire diameter, inch ^{1/}			Type L, single		Type L2, heavy	
				Minimum increase in diameter, inch	Maximum overall diameter, inch	Minimum increase in diameter, inch	Maximum overall diameter, inch
	Minimum	Nominal	Maximum				
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-M-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.

J-W-1177/10B

TABLE II. Characteristics of wire, sizes 45 to 56 AWG.

AWG size	Theoretical ^{1/} nominal bare wire diameter, inch	Conductor resistance at 20°C, ohms per foot			Type L, single		Type L2, 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	—	—	—	—
52	.00078	15.69	17.05	18.41	—	—	—	—
53	.00070	19.48	21.17	22.86	—	—	—	—
54	.00062	24.82	26.98	29.14	—	—	—	—
55	.00055	31.54	34.28	37.02	—	—	—	—
56	.00049	39.73	43.19	46.64	—	—	—	—

^{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.

TABLE III. Elongation of finished wire.

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

TABLE IV. Heat shock.

AWG size	Minimum elongation, percent	Mandrel diameter	Minimum temperature, °C
25-30	20	3X	175
31-44	<u>1</u> /20	3X	175

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

TABLE V. Scrape resistance.

AWG size	Type L single coating		Type L2 heavy coating	
	Average grams-to-fail	Minimum grams-to-fail	Average grams-to-fail	Minimum grams-to-fail
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 VI. Springback of finished wire.

AWG size	Maximum springback, degrees	AWG size	Maximum springback, degrees
	Types L and L2		Types L and L2
25	72	28	55
26	76	29	61
27	50	30	66

J-W-1177/10B

TABLE VII. Minimum breakdown voltages.

AWG size	Volts		AWG size	Volts	
	Type L	Type L2		Type L	Type L2
25	2625	4725	37	1075	2325
26	2550	4600	38	950	2150
27	2500	4500	39	850	1975
28	2425	4375	40	775	1800
29	2375	4250	41	700	1675
30	2300	4150	42	625	1525
31	2075	3825	43	550	1400
32	1850	3525	44	500	1300
33	1675	3250			
34	1500	2975			
35	1325	2750			
36	1200	2525			

TABLE VIII. Continuity.

AWG size	Maximum number of discontinuities	
	Type L	Type L2
24-30	25	7
31-46	25	5
46-50	25	10

Part number: Magnet wire covered by this specification shall be defined by the following part numbering system. Example:
M1177/10-02C029

<u>M1177/10-</u> Federal specification identifier	<u>02</u> Two digit type code	<u>C</u> Single letter conductor code	<u>029</u> Three character size code
---	--	--	---

The following codes shall apply:

Type	Type code	Conductor	Conductor code
L	01	Copper	C
L2	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 L magnet wire is intended for use in 155°C applications similar to those for which type T is used.

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 6145-1111-07)