INCH-POUND

J-W-1177/43
June 10, 1988

FEDERAL SPECIFICATION SHEET

WIRE, MAGNET, ELECTRICAL, CLASS 200, TYPE PEAI, POLYESTER-AMIDE-IMIDE 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 200; type PEAI (single), type PEAI2 (heavy); round.
Insulating materials:	The film shall be based on polyester-amide-imide resin.
NEMA/ANSI equivalent:	All test requirements are equivalent to MW-74 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	4-56	See table I.
Adherence and flexibility	4.7.2.1	4-56	No cracks visible in the film coating.
Elongation	4.7.5	4-50	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.

AMSC N/A FSC 6145

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Requirements: (Continued)

Characteristics	Test procedure, see J-W-1177	Wire sizes, AWG	Requirements
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.
Springback	4.7.7	14-30	Not greater than the value in table V.
Dielectric strength	4.7.9	4-44	Not less than the value in table VI.
Continuity	4.7.10 4.7.11	31-56 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 300°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 or 50/50 parts by volume xylene/ethyl Cellosolve.
Dielectric strength at temperature	4.7.14	18, 36	Heavy film coated wire shall average not less than 4275 volts for 18 AWG or 1900 volts for 36 AWG.
Thermal endurance	4.7.15.1	18	200°C minimum with heavy film coated wire.
	4.7.15.2	14-44	1000 volts/mil minimum after 168 hours at 250°C.
	4.7.15.3	10-44	220°C minimum.

TABLE I. Dimensions.

AWG size	Bare wire diameter, inch			Type PEAI		Type PEAI2	
	Minimum	Nominal	Maximum	Minimum increase in diameter, inch	Maximum overall diameter, inch	Minimum increase in diameter, inch	Maximum overall diameter, inch
4	----	----	----	----	----	0.0037	0.2098
5	----	----	----	----	----	.0036	.1872
6	----	----	----	----	----	.0035	.1671
7	----	----	----	----	----	.0034	.1491
8	----	----	----	----	----	.0033	.1332
9	----	----	----	----	----	.0032	.1189
10	----	----	----	----	----	.0031	.1061
11	----	----	----	----	----	.0030	.0948
12	----	----	----	----	----	.0029	.0847
13	----	----	----	----	----	.0028	.0757
14	0.0635	0.0641	1/0.0644	0.0016	0.0666	.0032	.0682
15	.0565	.0571	1/ .0574	.0015	.0594	.0030	.0609
16	.0503	.0508	1/ .0511	.0014	.0531	.0029	.0545
17	.0448	.0453	1/ .0455	.0014	.0475	.0028	.0488
18	.0399	.0403	1/ .0405	.0013	.0424	.0026	.0437
19	.0355	.0359	1/ .0361	.0012	.0379	.0025	.0391
20	.0317	.0320	1/ .0322	.0012	.0339	.0023	.0351
21	.0282	.0285	1/ .0286	.0011	.0303	.0022	.0314
22	.0250	.0253	1/ .0254	.0011	.0270	.0021	.0281
23	.0224	.0226	1/ .0227	.0010	.0243	.0020	.0253
24	.0199	.0201	1/ .0202	.0010	.0217	.0019	.0227
25	.0177	.0179	1/ .0180	.0009	.0194	.0018	.0203
26	.0157	.0159	1/ .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

See footnote at end of table.

TABLE I. Dimensions. - Continued

AWG size	Bare wire diameter, inch			Type PEAI		Type PEAI2	
	Minimum	Nominal	Maximum	Minimum increase in diameter, inch	Maximum overall diameter, inch	Minimum increase in diameter, inch	Maximum overall diameter, inch
37	0.0044	0.0045	0.0046	0.0003	0.0052	0.0008	0.0057
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
	Conductor resistance at 20°C, ohms per foot						
	Minimum	Nominal	Maximum				
45	3.080	3.348	3.616	.00010	.00205	.00030	.00230
46	3.870	4.207	4.544	.00010	.00185	.00030	.00210
47	4.868	5.291	5.714	.00010	.00170	.00030	.00190
48	6.205	6.745	7.285	.00010	.00150	.00020	.00170
49	7.744	8.417	9.090	.00010	.00130	.00020	.00150
50	9.734	10.58	11.43	.00010	.00120	.00020	.00140
51	12.32	13.39	14.46	.00010	.00110	----	----
52	15.69	17.05	18.41	.00010	.00100	----	----
53	19.48	21.17	22.86	.00005	.00085	----	----
54	24.82	26.98	29.14	.00005	.00075	----	----
55	31.54	34.28	37.02	.00005	.00070	----	----
56	39.73	43.19	46.65	.00005	.00065	----	----

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
4	38
5	37
6	37
7	36
8	36
9	36
10	35
11	35
12	34
13	34
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
45	11
46	10
47	8
48	7
49	6
50	5

TABLE III. Heat shock.

AWG size	Minimum elongation, percent	Mandrel diameter	Minimum temperature, °C
10-13	25	5X	220
14-30	20	3X	220
31-44	1/20	3X	220

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

TABLE IV. Scrape resistance.

AWG size	Type PEAI		Type PEAI2	
	Scrape, grams-to-fail		Scrape, grams-to-fail	
	Average	Minimum	Average	Minimum
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.

AWG size	Springback, maximum degrees per turn
14	42
15	46
16	50
17	54
18	58
19	62
20	66
21	53
22	58
23	62
24	67
25	72
26	76
27	50
28	55
29	61
30	66

TABLE VI. Dielectric strength.

AWG size	Type PEAI	Type PEAI2
	Dielectric strength, minimum breakdown volts	Dielectric strength, minimum breakdown volts
4	----	3700
5	----	3600
6	----	3500
7	----	3400
8	----	3300
9	----	3200
10	----	6200
11	----	6000
12	----	5800
13	----	5600
14	3525	6325
15	3425	6175
16	3325	6000
17	3250	5850

TABLE VI. Dielectric strength. - Continued

AWG size	Type PEAI	Type PEAI2
	Dielectric strength, minimum breakdown volts	Dielectric strength, minimum breakdown volts
18	3175	5700
19	3075	5550
20	3000	5400
21	2925	5250
22	2850	5125
23	2775	5000
24	2700	4850
25	2625	4725
26	2550	4600
27	2500	4500
28	2425	4375
29	2375	4250
30	2300	4150
31	2075	3825
32	1850	3525
33	1675	3250
34	1500	2975
35	1325	2750
36	1200	2525
37	1075	2325
38	950	2150
39	850	1975
40	775	1800
41	700	1675
42	625	1525
43	550	1400
44	500	1300

TABLE VII. Continuity.

AWG size	Maximum number of discontinuities	
	Type PEAI	Type PEAI2
14-24	25	5
25-30	25	7
31-44	25	5
44-56	25	-

Part number: Magnet wire covered by this specification shall be defined by the following part numbering system. Example: M1177/43-02C029.

M1177/43-	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
PEAI	01	Copper	C
PEAI2	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 PEAI magnet wire is intended for use in 200°C applications similar to those for which type T is used.

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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