INCH-POUND
J-W-1177/14B
June 10, 1988
SUPERSEDING
J-W-1177/14A
September 27, 1976

FEDERAL SPECIFICATION SHEET

WIRE, MAGNET, ELECTRICAL, CLASS 200, TYPE K, POLYESTER, POLYESTER-IMIDE OR POLYESTER-AMIDE-IMIDE OVERCOATED WITH POLYAMIDE-IMIDE, 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 K (single), type K2 (heavy), type K3 (triple); round.
Insulating materials:	The conductor shall be coated with a dual film. The underlying coating shall be based on a polyester, polyester-imide or a polyester-amide-imide resin. The superimposed coating shall be based on a polyamide-imide resin.
NEMA/ANSI equivalent:	All test requirements except thermal endurance are equivalent to MW-35 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	4-44	See table I.
Adherence and flexibility	4.7.2.1	4-44	No cracks visible in the film coating.
Elongation	4.7.5	4-44	Not less than the value in table II.
Heat shock	4.7.4	4-44	No cracks visible in the coating after conditioning as shown in table III.

AMSC N/A FSC 6145

DISTRIBUTION STATEMENT A Approved for public release; distribution unlimited

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	31-44	The number of discontinuities shall be not greater than the number listed in table VII.
	4.7.11	14-30	
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	4-44	800 volts/mil minimum after 168 hours at 250°C.
	4.7.15.3	4-44	220°C minimum as shown in table III.

TABLE I. Dimensions, sizes 4 to 44 AWG.

AWG size	Bare wire diameter, inch			Type K, single		Type K2, heavy		Type K3, triple	
	Minimum	Nominal	Maximum	Minimum increase in diameter, inch	Maximum overall diameter, inch	Minimum increase in diameter, inch	Maximum overall diameter, inch	Minimum increase in diameter, inch	Maximum overall diameter, inch
1/ 4	0.2023	0.2043	0.2053	----	----	0.0037	0.2098	----	----
1/ 5	.1801	.1819	.1828	----	----	.0036	.1872	----	----
1/ 6	.1604	.1620	.1628	----	----	.0035	.1671	----	----
1/ 7	.1429	.1443	.1450	----	----	.0034	.1491	----	----
1/ 8	.1272	.1285	.1292	----	----	.0033	.1332	----	----
1/ 9	.1133	.1144	.1150	----	----	.0032	.1189	----	----
1/10	.1009	.1019	.1024	----	----	.0031	.1061	----	----
1/11	.0898	.0907	.0912	----	----	.0030	.0948	----	----
1/12	.0800	.0808	.0812	----	----	.0029	.0847	----	----
1/13	.0713	.0720	.0724	----	----	.0028	.0757	----	----
1/14	.0635	.0641	.0644	0.0016	0.0666	.0032	.0682	0.0048	0.0700
1/15	.0565	.0571	.0574	.0015	.0594	.0030	.0609	.0045	.0627
1/16	.0503	.0508	.0511	.0014	.0531	.0029	.0545	.0043	.0562
1/17	.0448	.0453	.0455	.0014	.0475	.0028	.0488	.0041	.0504
1/18	.0399	.0403	.0405	.0013	.0424	.0026	.0437	.0039	.0452
1/19	.0355	.0359	.0361	.0012	.0379	.0025	.0391	.0037	.0406
1/20	.0317	.0320	.0322	.0012	.0339	.0023	.0351	.0035	.0364
1/21	.0282	.0285	.0286	.0011	.0303	.0022	.0314	.0033	.0326
1/22	.0250	.0253	.0254	.0011	.0270	.0021	.0281	.0032	.0293
1/23	.0224	.0226	.0227	.0010	.0243	.0020	.0253	.0030	.0264
1/24	.0199	.0201	.0202	.0010	.0217	.0019	.0227	.0029	.0238
1/25	.0177	.0179	.0180	.0009	.0194	.0018	.0203	.0027	.0214
1/26	.0157	.0159	.0160	.0009	.0173	.0017	.0182	.0026	.0193
1/27	.0141	.0142	.0143	.0008	.0156	.0016	.0164	.0024	.0173
1/28	.0125	.0126	.0127	.0008	.0140	.0016	.0147	.0023	.0156
1/29	.0112	.0113	.0114	.0007	.0126	.0015	.0133	.0022	.0142
1/30	.0099	.0100	.0101	.0007	.0112	.0014	.0119	.0021	.0128

See footnote at end of table.

TABLE I. Dimensions, sizes 4 to 44 AWG. - Continued

AWG size	Bare wire diameter, inch			Type K, single		Type K2, heavy		Type K3, triple	
	Minimum	Nominal	Maximum	Minimum increase in diameter, inch	Maximum overall diameter, inch	Minimum increase in diameter, inch	Maximum overall diameter, inch	Minimum increase in diameter, inch	Maximum overall diameter, inch
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	AWG size	Minimum elongation percent
4	38	18	32	32	24
5	37	19	31	33	23
6	37	20	30	34	22
7	36	21	30	35	21
8	36	22	29	36	20
9	36	23	29	37	20
10	35	24	28	38	19
11	35	25	28	39	18
12	34	26	27	40	17
13	34	27	27	41	17
14	33	28	26	42	16
15	33	29	26	43	15
16	33	30	25	44	14
17	32	31	24		

TABLE III. Heat shock.

AWG size	Minimum elongation, percent	Mandrel diameter	Minimum temperature, °C
4-9	30	None	220
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 K single coating		Type K2 heavy coating		Type K3 triple coating	
	Average grams-to-fail	Minimum grams-to-fail	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	1735	1475
15	780	665	1400	1190	1620	1375
16	735	625	1310	1115	1525	1295
17	690	585	1230	1045	1425	1210
18	645	550	1150	980	1335	1135
19	600	510	1070	910	1255	1065
20	560	475	1000	850	1180	1000
21	525	445	940	800	1115	945
22	490	415	880	750	1045	890
23	460	390	820	700	975	830
24	430	365	770	655	910	770
25	400	340	720	615	850	720
26	380	325	675	575	795	675
27	355	300	635	540	735	625
28	335	285	595	510	690	585
29	310	265	560	480	645	550
30	295	250	525	450	605	515

TABLE V. Springback of finished wire.

AWG size	Maximum springback degrees		AWG size	Maximum springback degrees	
	Types K and K2	Type K3		Types K and K2	Type K3
14	42	46	23	62	64
15	46	49	24	67	69
16	50	53	25	72	74
17	54	58	26	76	80
18	58	62	27	50	55
19	62	66	28	55	60
20	66	79	29	61	65
21	53	83	30	66	70
22	58	58			

TABLE VI. Minimum breakdown voltages.

AWG size	Volts			AWG size	Volts		
	Type K	Type K2	Type K3		Type K	Type K2	Type K3
4	----	3700	----	25	2625	4725	6325
5	----	3600	----	26	2550	4600	6150
6	----	3500	----	27	2500	4500	6000
7	----	3400	----	28	2425	4375	5850
8	----	3300	----	29	2375	4250	5700
9	----	3200	----	30	2300	4150	5550
10	----	6200	----	31	2075	3825	----
11	----	6000	----	32	1850	3525	----
12	----	5800	----	33	1675	3250	----
13	----	5600	----	34	1500	2975	----
14	3525	6325	8450	35	1325	2750	----
15	3425	6175	8225	36	1200	2525	----
16	3325	6000	8000	37	1075	2325	----
17	3250	5850	7800	38	950	2150	----
18	3175	5700	7600	39	850	1975	----
19	3075	5550	7400	40	775	1800	----
20	3000	5400	7200	41	700	1675	----
21	2925	5250	7025	42	625	1525	----
22	2850	5125	6850	43	550	1400	----
23	2775	5000	6675	44	500	1300	----
24	2700	4850	6500				

TABLE VII. Continuity.

AWG size	Maximum number of discontinuities		
	Type K	Type K2	Type K3
14-24	25	5	3
24-30	25	7	5
31-44	25	5	-

Part number: Magnet wire covered by this specification shall be defined by the following part numbering system. Example: M1177/14-02C029

M1177/14-	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
K	01	Copper	C
K2	02	Aluminum	A
K3	03	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 K magnet wire is intended for use in 200°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 6145-1111-11)

☆U.S. GOVERNMENT PRINTING OFFICE: 1988 - 505-033/92145