INCH-POUND
J-W-1177/5B
June 10, 1988
SUPERSEDING
J-W-1177/5A
September 27, 1976

FEDERAL SPECIFICATION SHEET

WIRE, MAGNET, ELECTRICAL, CLASS 105, TYPE TN, POLYVINYL FORMAL OVERCOATED WITH POLYAMIDE, 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 TN (single), type TN2 (heavy); round.
Insulating materials:	The conductor shall be coated with a dual film. The underlying coating shall be based on a polyvinyl formal and phenolic resin. The superimposed coating shall be based on a polyamide resin.
NEMA/ANSI equivalent:	All test requirements except thermal endurance are equivalent to MW-17 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.
Scrape resistance	4.7.6	14-30	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	14-44	Not less than the value in table VI.

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Requirements: (Continued)

Characteristics	Test procedure, see J-W-1177	Wire sizes, AWG	Requirements
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 180°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 1725 volts for 36 AWG.
Thermal endurance	4.7.15.1	18	105°C minimum with heavy film coated 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 as shown in table III.

TABLE I. Dimensions, sizes 14 to 44 AWG.

AWG size	Bare wire diameter, inch			Type TN, single		Type TN2, heavy	
	Minimum	Nominal	Maximum	Minimum increase in diameter, inch	Maximum overall diameter, inch	Minimum increase in diameter, inch	Maximum overall diameter, inch
1/14	0.0635	0.0641	0.0644	0.0016	0.0666	0.0032	0.0682
1/15	.0565	.0571	.0574	.0015	.0594	.0030	.0609
1/16	.0503	.0508	.0511	.0014	.0531	.0029	.0545
1/17	.0448	.0453	.0455	.0014	.0475	.0028	.0488
1/18	.0399	.0403	.0405	.0013	.0424	.0026	.0437
1/19	.0355	.0359	.0361	.0012	.0379	.0025	.0391
1/20	.0317	.0320	.0322	.0012	.0339	.0023	.0351
1/21	.0282	.0285	.0286	.0011	.0303	.0022	.0314
1/22	.0250	.0253	.0254	.0011	.0270	.0021	.0281
1/23	.0224	.0226	.0227	.0010	.0243	.0020	.0253
1/24	.0199	.0201	.0202	.0010	.0217	.0019	.0227
1/25	.0177	.0179	.0180	.0009	.0194	.0018	.0203
1/26	.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
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
14	33	30	25
15	33	31	24
16	33	32	24
17	32	33	23
18	32	34	22
19	31	35	21
20	30	36	20
21	30	37	20
22	29	38	19
23	29	39	18
24	28	40	17
25	28	41	17
26	27	42	16
27	27	43	15
28	26	44	14
29	26		

TABLE III. Heat shock.

AWG size	Minimum elongation, percent	Mandral 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. Scrape resistance.

AWG size	Type TN single coating		Type TN2 heavy coating	
	Average grams-to-fail	Minimum grams-to-fail	Average grams-to-fail	Minimum grams-to-fail
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 of finished wire.

AWG size	Maximum springback degrees
	Types TN and TN2
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. Minimum breakdown voltages.

AWG size	Volts		AWG size	Volts	
	Type TN	Type TN2		Type TN	Type TN2
14	3175	5700	30	2075	3725
15	3075	5550	31	1875	3450
16	3000	5400	32	1675	3175
17	2925	5275	33	1500	2925
18	2850	5125	34	1350	2675
19	2775	5000	35	1200	2475
20	2700	4850	36	1075	2275
21	2625	4725	37	975	2100
22	2575	4625	38	850	1925
23	2500	4500	39	775	1775
24	2425	4375	40	700	1625
25	2375	4250	41	625	1500
26	2300	4150	42	575	1375
27	2250	4050	43	500	1250
28	2175	3950	44	450	1175
29	2150	3825			

TABLE VII. Continuity.

AWG size	Maximum number of discontinuities	
	Type TN	Type TN2
14-24	25	5
25-30	25	7
31-44	25	5

Part number: Magnet wire covered by this specification shall be defined by the following part numbering system.
Example: M1177/5-02C029

M1177/5-	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
TN	01	Copper	C
TN2	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 TN magnet wire is intended for use in 105°C applications similar to those for which type T is used and where good windability 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
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