

INCH-POUND

J-W-1177/16B

June 10, 1988

SUPERSEDING

J-W-1177/16A

September 27, 1976

## FEDERAL SPECIFICATION SHEET

WIRE, MAGNET, ELECTRICAL, CLASS 105, TYPE T,  
POLYVINYL-FORMAL-COATED, RECTANGULAR

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 T2 (heavy), type T4 (quadruple);  
rectangular.  
Insulating materials: The film shall be based on a polyvinyl formal and  
phenolic resin.  
NEMA/ANSI equivalent: All test requirements except thermal endurance  
are equivalent to MW-18 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	All	Rectangular wire: (a) Conductor dimensions and radii - see table I. (b) Conductor tolerances - see table II. (c) Increase in thickness and width - see table III. Square wire: (a) Conductor dimensions, radii and tolerances - see table IV. (b) Increase in thickness and width - see table IV.
Adherence and flexibility	4.7.2.1	All	No cracks visible in the film coating.

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
Elongation	4.7.5	All	Not less than 32 percent for thickness of 0.049 and greater, or 30 percent for thickness of less than 0.049 inch.
Heat shock	4.7.4	All	No cracks visible in the film coating after 30 percent elongation followed by conditioning at 150°C.
Dielectric strength	4.7.9	All	Not less than the values shown in table V.
Completeness of cure	4.7.16.1	All	No swelling or blistering visible in the film coating.
Thermoplastic flow	4.7.8	18 AWG	Median not less than 180°C with heavy film coated wire.
Solubility	4.7.12	All	The specimens shall not soften sufficiently to expose bare conductor when immersed in xylene.
Dielectric strength at temperature	4.7.14	18 AWG	Heavy film coated wire shall average not less than 4275 volts.
Thermal endurance	4.7.15.1	18 AWG	105°C minimum with heavy film coated wire.
	4.7.15.3	All	150°C minimum.

TABLE I. Dimensions and radii for rectangular wire.

Nominal thickness	Nominal width																																															
Inch	.063	1/.067	.071	1/.075	.079	1/.083	.088	1/.093	.098	.110	.124	.140	1/.148	.157	1/.167	.177	1/.187	.197	1/.209	.220	1/.236	.248	1/.264	.280	1/.295	.315	1/.335	.354	1/.374	.394	1/.417	.441	1/.465	.492	1/.520	.551	1/.591	.630	1/.669	.709	1/.748							
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.220																																																
.248																																																
.280																																																

ROUNDED EDGES

EXAMPLE - Preferred sizes 55 x 110 (R20 x R20)  
Intermediate sizes 55 x 118 (R20 x R40)

1/ R-40 series numbers.  
Radii tolerance is plus  
or minus 25 percent.

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TABLE II. Conductor tolerances.

Thickness, inch	Permissible variations in thickness
0.280 to 0.098	$\pm 1$ percent
Under 0.098 to 0.025	$\pm 0.001$ inch
<u>Width, inch</u>	
Over 0.492	$\pm 1$ percent
0.492 to 0.315	$\pm 0.003$ inch
Under 0.315 to 0.098	$\pm 1$ percent
Under 0.098 to 0.063	$\pm 0.001$ inch

TABLE III. Increase in thickness and width due to film coating.

Type	Increase in width, inch		Increase in thickness, inch	
	Minimum	Maximum <sup>1/</sup>	Minimum	Maximum <sup>1/</sup>
Heavy T2	0.0025	0.0045	0.0030	0.0050
Quadruple T4	.0040	.0060	.0050	.0070

<sup>1/</sup> The maximum increase may be exceeded provided the maximum overall dimensions of the coated wire do not exceed the sum of the maximum dimensions of the bare wire plus the maximum increase due to the coating.

TABLE IV. Dimensions of square wire, sizes 1 to 14 AWG.

AWG size	Bare wire dimensions, inch			Radii, inch1/	T2, heavy		T4, quadruple	
	Min	Nom	Max		Minimum increase in dimensions, inch	Maximum overall dimensions, inch	Minimum increase in dimensions, inch	Maximum overall dimensions, inch
1	0.2864	0.2893	0.2922	0.040	0.0030	0.2972	0.0050	0.2992
2	.2550	.2576	.2602	.040	.0030	.2652	.0050	.2672
3	.2271	.2294	.2317	.040	.0030	.2367	.0050	.2387
4	.2023	.2043	.2063	.040	.0030	.2113	.0050	.2133
5	.1801	.1819	.1837	.040	.0030	.1887	.0050	.1907
6	.1604	.1620	.1636	.032	.0030	.1686	.0050	.1706
7	.1429	.1443	.1457	.032	.0030	.1507	.0050	.1527
8	.1272	.1285	.1298	.032	.0030	.1348	.0050	.1368
9	.1133	.1144	.1155	.026	.0030	.1205	.0050	.1225
10	.1009	.1019	.1029	.026	.0030	.1079	.0050	.1099
11	.0897	.0907	.0917	.020	.0030	.0967	.0050	.1987
12	.0798	.0808	.0818	.020	.0030	.0868	.0050	.0888
13	.0710	.0720	.0730	.016	.0030	.0780	.0050	.0800
14	.0631	.0641	.0651	.016	.0030	.0701	.0050	.0721

<sup>1/</sup> Radii tolerance is plus or minus 25 percent.

TABLE V. Minimum breakdown voltages.

Type	Volts	
	Any three out of four electrodes	Fourth electrode
T2	1500	500
T4	2500	900

Part number: Magnet wire covered by this specification shall be defined by the following part numbering system. Example:  
M1177/16-02CXXX.

M1177/16-	02	C	XXX
Federal specification identifier	Two digit type code	Single letter conductor code	Rectangular wire code

The following codes shall apply:

Type	Type code	Conductor	Conductor code
T2	01	Copper	C
T4	02	Aluminum	A
		Nickel-coated copper	N
		Silver-coated copper	S

Intended use: Type T rectangular magnet wire is intended for use in 105°C applications similar to those for which type T round magnet wire 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 6145-1111-13)