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

FEDERAL SPECIFICATION SHEET

WIRE, MAGNET, ELECTRICAL, CLASS 220, TYPE M2DgGM, POLYESTER-GLASS AND GLASS-FIBER, POLYIMIDE TREATED, 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 220; type M2DgGM (heavy film, single polyester-glass fiber, single glass fiber, polyimide varnished); rectangular.
Insulating materials:	The fiber covering and application of the covering shall be as specified in J-W-1177. If an underlying film coating is used, it shall have a class 220 rating. The varnish used in treating fibrous covered wire shall conform to the requirements of class 220 of MIL-I-24092, or an alternate selected on the basis of equivalent test data. The varnish shall be a modified polyimide insulating varnish to provide a tough outer finish. The varnish used shall be identified in the qualification test report. The glass covering shall be bonded with class 220 varnish, and the polyester-glass covering shall be either fused or bonded with class 220 varnish.
NEMA/ANSI equivalent:	There is no NEMA/ANSI equivalent.
General requirements:	See J-W-1177 for general requirements, quality assurance provisions, and packaging.

AMSC N/A FSC 6145

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 - see table III. (d) Increase in width due to the glass fiber covering shall be equal to or less than the increase in thickness. 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	All	No cracks visible in the film coating after 20 percent elongation. Examine with normal vision without removal of the glass fiber covering.
Elongation	4.7.5	All	Not less than 32 percent for thickness of 0.049 inch and greater, or 30 percent for thicknesses less than 0.049 inch.
Dielectric strength	4.7.9	All	Not less than 90 volts/mil of the minimum thickness of the fiber covering on one side (one-half the minimum specified under "Dimensions") plus the minimum breakdown for type M film coated wire.
Thermal endurance	----	All	Class 220. Insulating materials shall meet the thermal class ratings as described above.

TABLE I. Dimensions and radii for rectangular wire.

Nominal thickness	Nominal width																												
Inch	.079	1/.083	.088	1/.093	.098	1/.104	.110	1/.118	.124	1/.132	.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
0.025																																
.028																																
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.177																																
.197																																
.220																									0.039							

1/ R-40 series numbers.
Radii tolerances are plus or minus 25 percent.

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

TABLE II. Conductor tolerances.

Thickness, inch	Permissible variations in thickness
0.220 to 0.098	± 1 percent
Under 0.098 to 0.025	± 0.001 percent
Width, inch	
0.492 to 0.315	± 0.003 inch
Under 0.315 to 0.098	± 1 percent
Under 0.098 to 0.079	± 0.001 inch

TABLE III. Maximum increase in thickness, inch, due to single-polyester-glass-fiber and single-glass-fiber covering and heavy-film coating over rectangular wire.

Nominal thickness	Nominal width																						
Inch	0.079	1/.083	.088	1/.093	.098	1/.104	.110	1/.118	.124	1/.132	.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	Inch
0.025																																	0.025
.028																																	.028
.031																																	.031
.035																																	.035
.039																																	.039
.044				0.016					0.017				0.018									0.020											.044
.049																																	.049
.055																																	.055
.063																																	.063
.071																																	.071
.079																																	.079
.088																																	.088
.098																																	.098
.110									0.018				0.019						0020						0.021								.110
.124																																	.124
.140																																	.140
.157																																	.157
.177																0.020																	.177
.197																																	.197
.220																																	.220

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

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

NOTES:

1. The maximum increase due to the fiber covering may be exceeded provided the overall dimension of the covered wire does not exceed the sum of the maximum thickness of the bare or film-coated wire plus the maximum increase due to the fiber covering.
2. The increase due to the fiber covering for wire having dimensions not shown shall be the same as those for the next larger thickness or width.
3. The increase in thickness due to the heavy film coating, if any, shall be for film-coated wire.
4. The minimum increase shall be not less than 70 percent of the maximum increase for double-polyester-glass-fiber covering without an underlying film, rounded off to the nearest 0.001 inch.
5. Because it is impossible to separate accurately the fiber covering from the film coating, the total minimum increase in the thickness of film-coated double-fiber-covered rectangular wire shall be 70 percent of the maximum increase given in table III rounded off to the nearest 0.001 inch.

TABLE IV. Minimum increase and maximum overall dimensions of single-polyester-glass-fiber and single-glass fiber covering over heavy-film coated square wire.

AWG size	Bare wire dimension, inch			Radii inch1/	Type M2DgGM	
	Minimum	Nominal	Maximum		Minimum increase, inch	Maximum overall dimension, inch
0	0.3219	0.3249	0.3279	0.040	0.015	0.349
1	.2864	.2893	.2922	.040	.015	.313
2	.2550	.2576	.2602	.040	.015	.281
3	.2271	.2294	.2317	.040	.015	.253
4	.2023	.2043	.2063	.040	.015	.227
5	.1801	.1819	.1837	.040	.014	.204
6	.1604	.1620	.1636	.032	.014	.184
7	.1429	.1443	.1457	.032	.013	.165
8	.1272	.1285	.1298	.032	.012	.148
9	.1133	.1144	.1155	.026	.012	.134
10	.1009	.1019	.1029	.026	.011	.120
11	.0897	.0907	.0917	.020	.011	.108
12	.0798	.0808	.0818	.020	.011	.098
13	.0710	.0720	.0730	.016	.011	.089
14	.0631	.0641	.0651	.016	.011	.081

1/ Tolerance is plus or minus 25 percent.

NOTES:

1. The increase due to the heavy film coating or fiber covering for wires having dimensions not shown in table IV shall be the same as those for the next larger size.
2. The increase in thickness due to the heavy film coating, if any, shall be for film-coated wire.

Part number: Magnet wire covered by this specification shall be defined by the following part numbering system. Example: M1177/27-01CXXX.

M1177/27-	01	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
M2DgGM	01	Copper	C
		Aluminum	A
		Nickel-coated copper	N
		Silver-coated copper	S

Intended use: Type M2DgGM rectangular magnet wire is intended for use in 220°C applications similar to those for which type Dg magnet wire is used. Type M2DgGM magnet wire has been standardized for the repair of shipboard electrical power equipment.

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 6145-1111-23)

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