INCH-POUND
J-W-1177/23B
June 10, 1988
SUPERSEDING
J-W-1177/23A
September 27, 1976

FEDERAL SPECIFICATION SHEET

WIRE, MAGNET, ELECTRICAL, CLASS 200, TYPE GK, GLASS-FIBER-COVERED, SILICONE 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 200; type G2K (bare with double glass fiber, silicone varnished), type H2GK and type H2G2K (heavy film, single or double glass fiber, silicone 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 180 rating. The varnish used in treating fibrous covered wire shall conform to the requirements of class 200 of MIL-I-24092, or an alternate selected on the basis of service experience or equivalent test data. The varnish shall be a modified silicone insulating varnish or silicone compound to provide a tough outer finish. The varnish used shall be identified in the qualification test report.
NEMA/ANSI equivalent:	All test requirements are equivalent to MW-43 of NEMA MW 1000.
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 (type H2GK), table IV (type G2K) and table V (type H2G2K). (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 VI. (b) Increase in thickness and width - see table VI.
Adherence and flexibility	4.7.2.3.1	All	For bare wire, not less than 75 volts/mil of minimum thickness of the glass fiber covering on one side of the bare conductor.
	4.7.2.3.2	All	For film coated wire, 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 glass fiber covering on one side (one-half the minimum specified under "Dimensions") plus the minimum breakdown for film coated wire.
Thermal endurance	----	All	Class 155. 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																																
.031																																
.035																																
.039												ROUNDED EDGES																				
.044																																
.049																																
.055																																
.063																																
.071																																
.079									0.020																		0.031					
.088																																
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.110												0.025																				
.124																																
.140																																
.157																																
.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-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																																	.044
.049					0.010						0.011						0.012								0.013								.049
.055																																	.055
.063																																	.063
.071																																	.071
.079																																	.079
.088																																	.088
.098																																	.098
.110																																	.110
.124																																	.124
.140																																	.140
.157																																	.157
.177																																	.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 heavy-film coating and single-glass-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 wire plus the maximum increase due to the heavy-film coating and single-glass-fiber covering.
2. The increase due to the heavy-film coating and single-glass-fiber covering for wire having dimensions not shown in table III 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 increase in thickness due to the single-glass-fiber covering shall be determined by subtracting 0.005 inch (maximum thickness of film coating) from the maximum increase in thickness given in table III.

TABLE IV. Maximum increase in thickness, inch, due to double-glass-fiber covering 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					0.011					0.012				0.013									0.015											.044
.049																																		.049
.055																																		.055
.063																																		.063
.071																																		.071
.079																																		.079
.088																																		.088
.098																																		.098
.110										0.013					0.014				0.015								0.016							.110
.124																																		.124
.140																																		.140
.157																																		.157
.177																	0.015																	.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 glass-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 wire plus the maximum increase due to the glass-fiber covering.
2. The increase due to the glass-fiber covering for wires having dimensions not shown in table IV shall be the same as those for the next larger thickness or width.
3. The minimum increase shall be 70 percent of the maximum increase shown in table IV, rounded off to the nearest 0.001 inch.

TABLE V. Maximum increase in thickness, inch, due to double-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						0.020						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 glass-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 glass-fiber covering.
2. The increase due to the glass-fiber covering for wires having dimensions not shown in table IV 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 shown in table IV, rounded off to the nearest 0.001 inch.
5. Because it is impossible to separate accurately the glass-fiber covering from the film-coating, the total minimum increase in the thickness of film-coated double-glass-fiber-covered rectangular wire shall be 70 percent of the maximum increase given in table V, rounded off to the nearest 0.001 inch.

TABLE VI. Minimum increase and maximum overall dimensions of glass-fiber-covered square wire.

AWG size	Bare wire dimension, inch			Radii, inch1/	Type G2K		Type H2G2K		Type H2G2K	
	Min	Nom	Max		Minimum increase, inch	Maximum overall dimension, inch	Minimum increase, inch	Maximum overall dimension, inch	Minimum increase, inch	Maximum overall dimension, inch
0	0.3219	0.3249	0.3279	0.040	0.012	0.344	0.009	0.341	0.015	0.349
1	.2864	.2893	.2922	.040	.012	.308	.009	.305	.015	.313
2	.2550	.2576	.2602	.040	.012	.276	.008	.272	.015	.281
3	.2271	.2294	.2317	.040	.012	.248	.008	.244	.015	.253
4	.2023	.2043	.2063	.040	.012	.222	.008	.219	.015	.227
5	.1801	.1819	.1837	.040	.011	.199	.008	.196	.014	.204
6	.1604	.1620	.1636	.032	.011	.179	.008	.175	.014	.184
7	.1429	.1443	.1457	.032	.010	.160	.008	.157	.013	.165
8	.1272	.1285	.1298	.032	.009	.143	.008	.141	.012	.148
9	.1133	.1144	.1155	.026	.009	.129	.008	.127	.012	.134
10	.1009	.1019	.1029	.026	.008	.115	.007	.113	.011	.120
11	.0897	.0907	.0917	.020	.008	.103	.007	.102	.011	.108
12	.0798	.0808	.0818	.020	.008	.093	.007	.092	.011	.098
13	.0710	.0720	.0730	.016	.008	.084	.007	.084	.011	.089
14	.0631	.0641	.0651	.016	.008	.076	.007	.076	.011	.081

1/ Tolerance is plus or minus 25 percent.

NOTES:

1. The increase due to the heavy coating or glass-fiber covering for wires having dimensions not shown in table VI 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: M1177/23-02CXXX.

M1177/23-	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
G2K	01	Copper	C
H2GK	02	Aluminum	A
H2G2K	03	Nickel-coated copper	N
		Silver-coated copper	S

Intended use: Type GK rectangular magnet wire is intended for use in 200°C applications similar to those for which type GK 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 6145-1111-19)

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