

INCH-POUND

J-W-1177/35

June 10, 1988

FEDERAL SPECIFICATION SHEET

WIRE, MAGNET, ELECTRICAL, CLASS 200, TYPE PAP,
AROMATIC POLYAMIDE-PAPER-COVERED, 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 PAP/2 (bare with 2-mil paper), type PAP/3 (bare with 3-mil paper; rectangular).
- Insulating materials:** The insulating material shall be an aromatic polyamide paper of thermal class 200. The paper shall be either a nominal 0.002 or 0.003 inch in thickness. The paper covering shall consist of one or more tapes, each wrapped firmly, closely, evenly and continuously around the wire in a configuration necessary to provide the specified number of tape layers (thickness of paper insulation). The paper covering shall consist of at least two thicknesses of paper with not less than 40 percent overlap. If an adhesive is specified, this material shall perform in the applicable insulation system as required by the thermal class designation.
- NEMA/ANSI equivalent:** All test requirements are equivalent to MW-60 of NEMA MW 1000.
- General requirements:** See J-W-1177 for general requirements, quality assurance provisions, and packaging.

AMSC N/A

FSC 6145

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Requirements:

Characteristics	Test procedure, see J-W-1177	Wire sizes, AWG	Requirements
Dimensions	4.7.1.2	All	<p>Rectangular wire:</p> <p>(a) Conductor dimensions and radii - see table I.</p> <p>(b) Conductor tolerances - see table II.</p> <p>(c) Increase in thickness - see table III.</p> <p>Square wire:</p> <p>(a) Conductor dimensions, radii and tolerances - see table IV.</p> <p>(b) Increase in thickness and width - see table IV.</p> <p>The increase in diameter for coverings more than three thicknesses of paper shall be as specified below:</p> $\left(\begin{array}{c} \text{Minimum} \\ \text{increase in} \\ \text{diameter} \end{array} \right) = 2 \left(\begin{array}{c} \text{Number of} \\ \text{paper} \\ \text{thicknesses} \end{array} - 1 \right) \left(\begin{array}{c} \text{Nominal} \\ \text{tape} \\ \text{thickness} \end{array} \right)$ $\left(\begin{array}{c} \text{Maximum} \\ \text{increase in} \\ \text{diameter} \end{array} \right) = 2 \left(\begin{array}{c} \text{Number of} \\ \text{paper} \\ \text{thicknesses} \end{array} + 1 \right) \left(\begin{array}{c} \text{Nominal} \\ \text{tape} \\ \text{thickness} \end{array} \right)$
Elongation	4.7.5	All	Not less than 32 percent for thicknesses of 0.049 inch and greater, or 30 percent for thicknesses less than 0.049 inch.
Coverage	---		The covering shall not loosen appreciably nor open sufficiently to expose the bare wire after bending around a mandrel having a diameter 6X the thickness of the bare wire.
Dielectric strength	4.7.9	All	Not less than 300 volts/mil of the minimum thickness of the paper on one side (one-half the minimum increase).
Thermal endurance	---	All	Class 200. Insulating materials shall meet the thermal class ratings described above.

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TABLE III. Increase in thickness - rectangular wire.

Number of thickness of paper	Nominal tape thickness 0.002 inch (0.051 mm)				Nominal tape thickness 0.003 inch (0.076 mm)			
	Increase in thickness				Increase in thickness			
	Minimum		Maximum		Minimum		Maximum	
	inch	mm	inch	mm	inch	mm	inch	mm
2	0.004	0.102	0.012	0.305	0.006	0.152	0.018	0.457
3	.008	.203	.016	.406	.012	.305	.024	.610

NOTES:

1. The increase in width due to the paper covering shall be equal to or less than the increase in thickness.
2. The maximum increase in thickness or width due to the paper covering may be exceeded provided the overall dimension of the covered wire does not exceed the sum of the maximum thickness or width of the bare wire plus the maximum increase due to the paper covering.
3. The increase due to the paper covering for wires having dimensions not shown in table I shall be the same as those for the next larger thickness or width.

TABLE IV. Increase in thickness, square wire.

Minimum increase and maximum overall dimensions of aromatic polyamide paper covered, bare square wire, two thicknesses of aromatic polyamide paper.

Square AWG size	Bare wire dimension						Nominal radial/ inch/mm		Nominal tape thickness 0.002 inch (0.051 mm)				Nominal tape thickness 0.003 inch (0.076 mm)			
	Minimum		Nominal		Maximum				Minimum increase in dimension		Maximum overall dimension ² / dimension ²		Minimum increase in dimension		Maximum overall dimension ² / dimension ²	
	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm		
	0	.3219	8.176	.3249	8.252	0.3279	8.329	0.040	1.016	0.004	0.102	0.3399	8.633	0.006	0.152	0.3459
1	.2864	7.275	.2893	7.348	.2922	7.422	.040	1.016	.004	.102	.3042	7.727	.006	.152	.3102	7.879
2	.2550	6.477	.2576	6.543	.2602	6.609	.040	1.016	.004	.102	.2722	6.914	.006	.152	.2782	7.066
3	.2271	5.768	.2294	5.827	.2317	5.885	.040	1.016	.004	.102	.2437	6.190	.006	.152	.2497	6.342
4	.2023	5.138	.2043	5.189	.2063	5.240	.040	1.016	.004	.102	.2183	5.545	.006	.152	.2243	5.697
5	.1801	4.575	.1819	4.620	.1837	4.666	.040	1.016	.004	.102	.1957	4.971	.006	.152	.2017	5.123
6	.1604	4.074	.1620	4.115	.1636	4.155	.032	0.813	.004	.102	.1756	4.460	.006	.152	.1816	4.613
7	.1429	3.630	.1443	3.665	.1457	3.701	.032	.813	.004	.102	.1577	4.006	.006	.152	.1637	4.158
8	.1272	3.231	.1285	3.264	.1298	3.297	.032	.813	.004	.102	.1418	3.602	.006	.152	.1478	3.758
9	.1133	2.878	.1144	2.906	.1155	2.934	.026	.660	.004	.102	.1275	3.233	.006	.152	.1335	3.391
10	.1009	2.563	.1019	2.588	.1029	2.614	.026	.660	.004	.102	.1149	2.918	.006	.152	.1209	3.071
11	.0897	2.278	.0907	2.304	.0917	2.329	.020	.508	.004	.102	.1037	2.634	.006	.152	.1097	2.786
12	.0798	2.027	.0808	2.052	.0818	2.078	.020	.508	.004	.102	.0938	2.383	.006	.152	.0998	2.535
13	.0710	1.803	.0720	1.829	.0730	1.854	.016	.406	.004	.102	.0850	2.159	.006	.152	.0910	2.311
14	.0631	1.603	.0641	1.628	.0651	1.654	.016	.406	.004	.102	.0771	1.958	.006	.152	.0831	2.111

See footnotes at end of table.

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TABLE IV. Increase in thickness, square wire. - Continued

Minimum increase and maximum overall dimensions of aromatic polyamide paper covered, bare square wire, three thicknesses of aromatic polyamide paper.

Square AWG size	Bare wire dimension						Nominal radii/		Nominal tape thickness 0.002 inch (0.051 mm)				Nominal tape thickness 0.003 inch (0.076 mm)			
	Minimum		Nominal		Maximum				Minimum increase in dimension		Maximum overall dimension ^{2/}		Minimum increase in dimension		Maximum overall dimension ^{2/}	
	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm
0	0.3219	8.176	0.3249	8.252	0.3279	8.329	0.040	1.016	0.008	0.203	0.3439	8.735	0.012	0.305	0.3519	8.938
1	.2864	7.275	.2893	7.348	.2922	7.422	.040	1.016	.008	.203	.3082	7.828	.012	.305	.3162	8.031
2	.2550	6.477	.2576	6.543	.2602	6.609	.040	1.016	.008	.203	.2762	7.015	.012	.305	.2842	7.219
3	.2271	5.768	.2294	5.827	.2317	5.885	.040	1.016	.008	.203	.2477	6.292	.012	.305	.2557	6.495
4	.2023	5.136	.2043	5.189	.2063	5.240	.040	1.016	.008	.203	.2223	5.646	.012	.305	.2303	5.850
5	.1801	4.575	.1819	4.620	.1837	4.666	.040	1.016	.008	.203	.1997	5.072	.012	.305	.2077	5.276
6	.1604	4.074	.1620	4.115	.1636	4.155	.032	0.813	.008	.203	.1796	4.562	.012	.305	.1876	4.765
7	.1429	3.630	.1443	3.665	.1457	3.701	.032	0.813	.008	.203	.1617	4.107	.012	.305	.1697	4.310
8	.1272	3.231	.1285	3.264	.1298	3.297	.032	0.813	.008	.203	.1458	3.703	.012	.305	.1538	3.907
9	.1133	2.878	.1144	2.906	.1155	2.934	.026	0.660	.008	.203	.1315	3.340	.012	.305	.1395	3.543
10	.1009	2.563	.1019	2.588	.1029	2.614	.026	0.660	.008	.203	.1189	3.020	.012	.305	.1269	3.223
11	.0897	2.278	.0907	2.304	.0917	2.329	.020	0.508	.008	.203	.1077	2.736	.012	.305	.1157	2.939
12	.0798	2.027	.0808	2.052	.0818	2.078	.020	0.508	.008	.203	.0978	2.484	.012	.305	.1058	2.687
13	.0710	1.803	.0720	1.829	.0730	1.854	.016	0.406	.008	.203	.0890	2.261	.012	.305	.0970	2.464
14	.0631	1.603	.0641	1.628	.0651	1.654	.016	0.406	.008	.203	.0811	2.060	.012	.305	.0891	2.263

1/ Radii tolerance is plus or minus 25 percent.

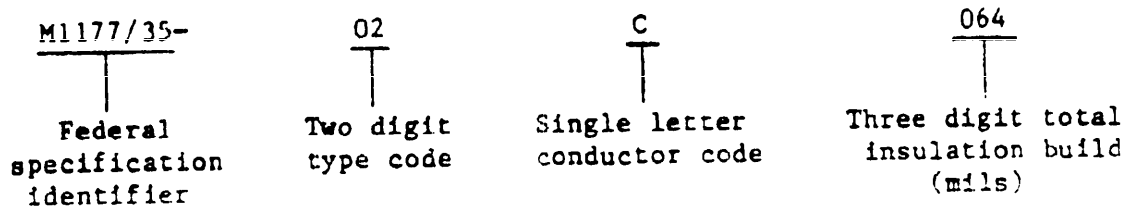
2/ The maximum overall dimensions have been calculated in accordance with the following:

AWG size	Maximum increase due to two thicknesses of paper	Maximum increase due to three thicknesses of paper
0-14	Tape thickness 0.003 inch (0.076 mm)	Tape thickness 0.003 inch (0.076 mm)
	0.012 inch (0.305 mm)	0.016 inch (0.406 mm)

NOTE: The increase due to the paper covering for wires having dimensions not shown shall be the same as for the next larger size.

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Part number: Magnet wire covered by this specification shall be defined by the following part numbering system. Example:
M1177/35-02C064.



The following codes shall apply:

Type	Type code	Conductor	Conductor code
PAP/2	01	Copper	C
PAP/3	02	Aluminum	A
		Nickel-coated copper	N
		Silver-coated copper	S

Intended use: Type PAP rectangular magnet wire is intended for use in 200°C applications similar to those for which type PAP round magnet wire is used.

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 6145-1111-31)