J-W-1177/7A
September 27, 1976
SUPERSEDING
J-W-001177/7 (NAVY-Ships)
September 21, 1973

FEDERAL SPECIFICATION SHEET

WIRE, MAGNET, ELECTRICAL, CLASS 105, TYPE SA, SOLDERABLE-ACRYLIC-COATED, ROUND

This specification was approved by the Commissioner, Federal Supply Service, General Services Administration, for use of all Federal agencies.

The complete requirements for procuring the wire described herein shall consist of this document and the latest issue of Specification J-W-1177/GEN.

The magnet wire shall be of the following classification:

Class 105, type SA (single) and type SA2 (heavy) round.

REQUIREMENTS

1. Qualification is required.
2. Insulating materials. The film coating shall be composed, primarily of acrylic resins.
3. Thermal evaluation. When tested in accordance with 4.7.18.1, the temperature index of the film coated wire shall be not less than 105. When tested in accordance with 4.7.18.2 for 168 hours at 180°C., the minimum dielectric breakdown strength shall be not less than 1000 volts per mil.
4. Dimensions-increase in diameter. When measured in accordance with 4.7.1 and 4.7.1.2 the bare wire diameter, the minimum increase in diameter due to the film coating and the maximum overall diameter shall be as shown in table I.

TABLE I - Dimensions, sizes 10 to 30 AWG.

AWG size	Bare wire diameter, inch 1/			Type SA, single		Type SA2, heavy	
	Minimum	Nominal	Maximum	Minimum increase in diameter, inch	Maximum overall diameter, inch	Minimum increase in diameter, inch	Maximum overall diameter, inch
10	0.1009	0.1019	0.1024	----	----	0.0031	0.1061
11	.0898	.0907	.0912	----	----	.0030	.0948
12	.0800	.0808	.0812	----	----	.0029	.0847
13	.0713	.0720	.0724	----	----	.0028	.0757
14	.0635	.0641	.0644	0.0016	0.0666	.0032	.0682
15	.0565	.0571	.0574	.0015	.0594	.0030	.0609
16	.0503	.0508	.0511	.0014	.0531	.0029	.0545
17	.0448	.0453	.0455	.0014	.0475	.0028	.0488
18	.0399	.0403	.0405	.0013	.0424	.0026	.0437
19	.0355	.0359	.0361	.0012	.0379	.0025	.0391
20	.0317	.0320	.0322	.0012	.0339	.0023	.0351
21	.0282	.0285	.0286	.0011	.0303	.0022	.0314
22	.0250	.0253	.0254	.0011	.0270	.0021	.0281
23	.0224	.0226	.0227	.0010	.0243	.0020	.0253
24	.0199	.0201	.0202	.0010	.0217	.0019	.0227
25	.0177	.0179	.0180	.0009	.0194	.0018	.0203
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

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.

5. Adhesion and flexibility. When the wire is tested in accordance with 4.7.2.1, no cracks shall be visible in the film coating.
6. Elongation. When the wire is tested in accordance with 4.7.4.1, the wire shall meet the requirements of table II.

TABLE II - Elongation of finished wire.

AWG size	Minimum elongation, percent	AWG size	Minimum elongation, percent
10	35	21	30
11	35	22	29
12	34	23	29
13	34	24	28
14	33	25	28
15	33	26	27
16	33	27	27
17	32	28	26
18	32	29	26
19	31	30	25
20	30		

7. Heat shock. When the wire is tested in accordance with 4.7.3.1 and table III, no cracks shall be visible in the film coating.

TABLE III - Heat shock.

AWG size	Minimum elongation, percent	Mandrel diameter	Minimum temperature, degrees C.
10-13	25	5X	175
14-30	20	3X	175

8. Scrape resistance. When the wire is tested in accordance with 4.7.5.1 the lowest "grams-to-rail" load in any one of the three required tests shall be not less than the minimum value specified in table IV. The average of the three tests shall be not less than the average value specified in table IV.

TABLE IV - Scrape resistance.

AWG size	Type SA single coating		Type SA2 heavy coating	
	Average grams-to-fail	Minimum grams-to-fail	Average grams-to-fail	Minimum grams-to-fail
10	---	---	1490	1270
11	---	---	1490	1270
12	---	---	1490	1270
13	---	---	1490	1270
14	730	620	1490	1270
15	680	580	1400	1190
16	640	545	1310	1115
17	600	510	1230	1045
18	560	480	1150	980
19	520	445	1070	910
20	485	415	1000	850
21	455	390	940	800
22	425	365	880	750
23	400	340	820	700
24	375	320	770	655
25	350	300	720	615
26	330	280	675	575
27	310	265	635	540
28	290	250	595	510
29	270	230	560	480
30	255	220	525	450

9. Springback. When the wire is tested in accordance with 4.7.6, the springback shall not exceed the values shown in table V.

TABLE V - Springback of finished wire.

AWG size	Maximum springback, degrees Types SA and SA2	AWG size	Maximum springback, degrees Types SA and SA2
14	42	23	62
15	46	24	67
16	50	25	72
17	54	26	76
18	58	27	50
19	62	28	55
20	66	29	61
21	53	30	66
22	58		

10. Dielectric strength. When the wire is tested in accordance with 4.7.8.2 the breakdown voltage shall be not less than shown in table VI.

TABLE VI - Minimum breakdown voltages.

AWG size	Volts Type SA	Volts Type SA2	AWG size	Volts Type SA	Volts Type SA2
10	----	6200	21	2925	5250
11	----	6000	22	2850	5125
12	----	5800	23	2775	5000
13	----	5600	24	2700	4850
14	3525	6325	25	2625	4725
15	3425	6175	26	2550	4600
16	3325	6000	27	2500	4500
17	3250	5850	28	2425	4375
18	3175	5700	29	2375	4250
19	3075	5550	30	2300	4150
20	3000	5400			

11. Continuity. When the wire is tested in accordance with 4.7.9 and 4.7.10, the number of discontinuities shall not exceed that shown in table VII.

TABLE VII - Continuity.

AWG size	Maximum number of discontinuities Type SA	Type SA2
14-24	10	5
25-29	10	5
30	10	5

12. Solderability. When the wire is tested in accordance with 4.7.13, except that the immersion time and solder temperature shall be as shown in table VIII, the wrapped or twisted portion of the specimen shall be covered with a continuous film of solder and shall not be capable of being readily separated.

TABLE VIII - Solderability.

AWG size	Maximum immersion time, seconds Type SA	Type SA2	Temperature of solder, degrees C.
14-15	7	8	480
16-19	7	8	455
20-23	5	6	455
24-30	4	5	455

13. Thermoplastic flow. When tested in accordance with 4.7.7, the specimens of size 18 AWG type SA2 heavy-film-coated wire shall not cause the circuit to operate at a temperature below 170°C.

14. Solubility. When tested in accordance with 4.7.11, the film coating on two specimens of size 18 AWG heavy film-coated wire which have been annealed by baking for 10 minutes at 150°C ± 3°C and immersed in the following liquids shall not soften sufficiently to expose the bare conductor:

    Xylene
    Perchlorethylene

15. Dielectric strength at rated temperature. When tested in accordance with 4.7.17, the average dielectric breakdown voltage of five specimens of size 18 AWG type SA2 heavy film-coated wire shall be at least 4275 volts.

16. Overload. When tested in accordance with 4.7.14, the specimens of size 18 AWG heavy film-coated wire shall yield a value of overload figure of merit equal to or greater than 0.5.

QUALITY ASSURANCE PROVISIONS

Qualification and quality conformance inspection. Qualification and quality conformance inspection shall consist of the examination and tests shown in table IX.

TABLE IX - Qualification and quality conformance inspection.

Examination or test	Test paragraph	Qualification inspection	Quality conformance inspection (Group)
Visual and dimensional	4.7.1	X	A
Adhesion and flexibility	4.7.2.1	X	A
Heat shock	4.7.3.1	X	B
Elongation	4.7.4.1	X	A
Scrape resistance	4.7.5.1	X	C
Springback	4.7.6	X	A
Thermoplastic flow	4.7.7	X	C
Dielectric strength	4.7.8.2	X	B
Continuity	4.7.9	X	B
High voltage continuity	4.7.10	X	A
Solubility	4.7.11	X	C
Solderability	4.7.13	X	B
Dielectric strength at rated temperature	4.7.17	X	C
Thermal evaluation	4.7.18.2	-	C
Temperature index	4.7.18.1	X	-
Overload	4.7.14	X	C

Intended use. Type SA magnet wire is intended for use in 105°C applications similar to those for which type T is used. The wire can be soldered without removing the film insulation.

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    Navy - SH
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User activities
    Army - ME
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Preparing activity:
    Navy - SH

Civil Agency Coordinating Activities
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    Interior - BPA
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DOCUMENT IDENTIFIER AND TITLE J-W-1177/7A Wire, Magnet, Electrical Class 105, Type SA, Solderable-Acrylic-Coated, Round

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