J-W-1177/8A
September 27, 1976
SUPERSEDING
J-W-001177/8(NAVY-Ships)
September 21, 1973

FEDERAL SPECIFICATION SHEET

WIRE, MAGNET, ELECTRICAL, CLASS 105, TYPE SAN, SOLDERABLE-ACRYLIC-NYLON-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 SAN (single) and Type SAN2 (heavy) round.

REQUIREMENTS.

1. Qualification is required.
2. Insulating materials. The wire shall be coated with a dual film. The underlying film shall be primarily composed of acrylic resins and the superimposed film shall be primarily composed of polyamide 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 SAN, single		Type SAN2, 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 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-fail" load in any one of the three required tests shall be not less than the minimum value shown 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 of finished wire.

AWG size	Type SAN		Type SAN2	
	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	AWG size	Maximum springback, degrees
	Types SAN and SAN2		Types SAN and SAN2
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		AWG size	Volts	
	Type SAN	Type SAN2		Type SAN	Type SAN2
10	---	5575	21	2625	4725
11	---	5400	22	2575	4625
12	---	5225	23	2500	4500
13	---	5050	24	2425	4375
14	3175	5700	25	2375	4250
15	3075	5550	26	2300	4150
16	3000	5400	27	2250	4050
17	2925	5275	28	2175	3950
18	2850	5125	29	2150	3825
19	2775	5000	30	2075	3725
20	2700	4850			

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 SAN	Type SAN2
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		Temperature of solder, degrees C
	Type SAN	Type SAN2	
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 SAN2 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 SAN2 heavy film-coated wire shall be at least 3850 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	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 SAN 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.

Custodians:
    Army - EL
    Navy - SH
    Air Force - 80
Review activities:
    Army - EL, MI, MU
User activities:
    Army - ME
    Navy - AS, CG, MC

Preparing activity:
    Navy - SH

Civil Agency Coordinating Activities:
    GSA - FSS, PBO, PCD
    Interior - BPA
    DOT - ACO, FIS, RDS
    DC GOVT - DCG
    NASA - JPK
    HEW - FEC, FDA
    COM - NBS

(Project 6145-0439-8)

Orders for this publication are to be placed with General Services Administration, acting as an agent for the Superintendent of Documents. See Section 2 of this specification to obtain extra copies and other documents referenced herein. Price 25 cents each.

FOLD

COMMANDER
NAVAL SHIP ENGINEERING CENTER
CENTER BUILDING - SEC 6124
PRINCE GEORGE'S CENTER
HYATTSVILLE, MARYLAND 20782

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE $300

POSTAGE AND FEES PAID
DEPARTMENT OF NAVY

DOD 316

COMMANDER
NAVAL SHIP ENGINEERING CENTER
CENTER BUILDING - SEC 6124
PRINCE GEORGE'S CENTER
HYATTSVILLE, MARYLAND 20782

FOLD

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

OMB Approval
No. 22-R255

INSTRUCTIONS: The purpose of this form is to solicit beneficial comments which will help achieve procurement of suitable products at reasonable cost and minimum delay, or will otherwise enhance use of the document. DoD contractors, government activities, or manufacturers/vendors who are prospective suppliers of the product are invited to submit comments to the government. Fold on lines on reverse side, staple in corner, and send to preparing activity. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements. Attach any pertinent data which may be of use in improving this document. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity.

DOCUMENT IDENTIFIER AND TITLE J-W-1177/8A Wire, Magnet, Electrical, Class 105, Type SAN, Solderable-Acrylic-Nylon-Coated, Round

NAME OF ORGANIZATION AND ADDRESS

CONTRACT NUMBER

MATERIAL PROCURED UNDER A

☐ DIRECT GOVERNMENT CONTRACT ☐ SUBCONTRACT

1. HAS ANY PART OF THE DOCUMENT CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?
   A. GIVE PARAGRAPH NUMBER AND WORDING.

   B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES

2. COMMENTS ON ANY DOCUMENT REQUIREMENT CONSIDERED TOO RIGID

3. IS THE DOCUMENT RESTRICTIVE?

   ☐ YES ☐ NO *(If "Yes", in what way?)*

4. REMARKS

SUBMITTED BY *(Printed or typed name and address - Optional)*

TELEPHONE NO.

DATE

DD FORM 1 JAN 72 1426

REPLACES EDITION OF 1 JAN 66 WHICH MAY BE USED

S/N 0102-014-1802