

J-W-1177/1A
 September 27, 1976
 SUPERSEDING
 J-W-001177/1 (NAVY-Ships)
 September 21, 1973

FEDERAL SPECIFICATION SHEET

WIRE, MAGNET, ELECTRICAL, CLASS 105, TYPE E OLEORESINOUS-
 ENAMEL-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 E (single), round.

REQUIREMENTS:

1. Qualification is required.
2. Insulating materials. The film coating shall be composed of natural resins with or without the minor addition of synthetic resins.
3. Thermal evaluation. When tested in accordance with 4.7.18.1, the temperature index of AWG No 18 film coated magnet 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 break-down 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 25 to 44 AWG.

| AWG size | Bare wire diameter, inch ^{1/} | | | Type E, single | |
|----------|--|---------|---------|------------------------------------|--------------------------------|
| | | | | Minimum increase in diameter, inch | Maximum overall diameter, inch |
| | Minimum | Nominal | Maximum | | |
| 25 | 0.0177 | 0.0179 | 0.0180 | 0.0009 | 0.0194 |
| 26 | .0157 | .0159 | .0160 | .0008 | .0173 |
| 27 | .0141 | .0142 | .0143 | .0008 | .0156 |
| 28 | .0125 | .0126 | .0127 | .0007 | .0139 |
| 29 | .0112 | .0113 | .0114 | .0007 | .0126 |
| 30 | .0099 | .0100 | .0101 | .0006 | .0112 |
| 31 | .0088 | .0089 | .0090 | .0006 | .0099 |
| 32 | .0079 | .0080 | .0081 | .0006 | .0090 |
| 33 | .0070 | .0071 | .0072 | .0005 | .0080 |
| 34 | .0062 | .0063 | .0064 | .0005 | .0071 |
| 35 | .0055 | .0056 | .0057 | .0004 | .0063 |
| 36 | .0049 | .0050 | .0051 | .0004 | .0057 |
| 37 | .0044 | .0045 | .0046 | .0003 | .0051 |
| 38 | .0039 | .0040 | .0041 | .0003 | .0046 |
| 39 | .0034 | .0035 | .0036 | .0002 | .0040 |
| 40 | .0030 | .0031 | .0032 | .0002 | .0036 |
| 41 | .0027 | .0028 | .0029 | .0002 | .0032 |
| 42 | .0024 | .0025 | .0026 | .0002 | .0029 |
| 43 | .0021 | .0022 | .0023 | .00015 | .0025 |
| 44 | .0019 | .0020 | .0021 | .0001 | .0023 |

^{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.

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5. Adhesion. When the wire is tested in accordance with 4.7.2.1 and elongated 15 percent or to the breaking point, whichever is less, 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 shown in table II.

TABLE II - Elongation of finished wire.

| AWG size | Minimum elongation, percent | AWG size | Minimum elongation, percent |
|----------|-----------------------------|----------|-----------------------------|
| 25 | 28 | 35 | 21 |
| 26 | 27 | 36 | 20 |
| 27 | 27 | 37 | 20 |
| 28 | 26 | 38 | 19 |
| 29 | 26 | 39 | 18 |
| 30 | 25 | 40 | 17 |
| 31 | 24 | 41 | 17 |
| 32 | 24 | 42 | 16 |
| 33 | 23 | 43 | 15 |
| 34 | 22 | 44 | 14 |

7. Springback. When tested in accordance with 4.7.6 the springback shall not exceed the values shown in table III.

TABLE III - Springback of finished wire.

| AWG size | Maximum springback, degrees |
|----------|-----------------------------|
| 25 | 72 |
| 26 | 76 |
| 27 | 50 |
| 28 | 55 |
| 29 | 61 |
| 30 | 66 |

8. Dielectric strength. When tested in accordance with 4.7.8.2. the breakdown voltage of the wire shall be not less than the values shown in table IV.

TABLE IV - Minimum breakdown voltages.

| AWG size | Volts | AWG size | Volts |
|----------|-------|----------|-------|
| 25 | 2625 | 35 | 1325 |
| 26 | 2550 | 36 | 1200 |
| 27 | 2500 | 37 | 1075 |
| 28 | 2425 | 38 | 950 |
| 29 | 2375 | 39 | 850 |
| 30 | 2300 | 40 | 775 |
| 31 | 2075 | 41 | 700 |
| 32 | 1850 | 42 | 625 |
| 33 | 1675 | 43 | 550 |
| 34 | 1500 | 44 | 500 |

9. Continuity. When the wire is tested in accordance with 4.7.9 the number of discontinuities shall not exceed the number shown in table V.

TABLE V - Continuity.

| AWG size | Maximum number of discontinuities |
|----------|-----------------------------------|
| 25-29 | 10 |
| 30-34 | 10 |
| 35-40 | 15 |
| 41-44 | 20 |

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10. Thermoplastic flow. When tested in accordance with 4.7.7 the specimens of size 36 AWG heavy-film-coated wire shall not cause the circuit to operate at a temperature below 180°C.
11. Solubility. When the wire is tested in accordance with 4.7.11, the film coating on a specimen of size 36 AWG film coated wire which has been annealed by baking for 10 minutes at 150° ±1°C and immersed in petroleum naphtha shall not soften sufficiently to expose the bare conductor.

QUALITY ASSURANCE PROVISIONS:

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

TABLE VI - 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 | 4.7.2.1 | X | A |
| Elongation | 4.7.4.1 | X | A |
| Springback | 4.7.6 | X | A |
| Dielectric strength | 4.7.8.2 | X | B |
| Continuity | 4.7.9 | X | B |
| Thermoplastic flow | 4.7.7 | X | C |
| Solubility | 4.7.11 | X | C |
| Thermal evaluation | 4.7.18.2 | - | C |
| Temperature index | 4.7.18.1 | X | - |

Intended use. Type E magnet wire is intended for applications where a high space factor is needed and where mechanical abuse is not great.

Custodians:

Army - EL
Navy - SH
Air Force - 80

Review activity:

Army - EL, MI, MU

User Activity:

Army - ME
Navy - AS, CG, MC

Preparing activity:
Navy - SH

Civil Agency Coordinating Activities

GSA - FSS, FBO, PCD
Interior - BPA
DOT - ACO, FIS, RDS
DCGOVT - DCG
NASA - JFK
HEW - FEC, FDA
COM - NBS

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