

INCH-POUND

J-W-1177/31

June 10, 1988

## FEDERAL SPECIFICATION SHEET

WIRE, MAGNET, ELECTRICAL, CLASS 180, TYPE G0,  
GLASS-FIBER-COVERED, ORGANIC VARNISH TREATED, ROUND

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 180;  
type G0 and type G20 (bare with single or double glass fiber, varnished),  
type LG0 and type LG20 (single film, single or double glass fiber, varnished),  
type L2G0 and type L2G20 (heavy film, single or double glass fiber, varnished); round.

**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 155 rating. The varnish used in treating fibrous covered wire shall conform to the requirements of class 180 of MIL-I-24092, or an alternate selected on the basis of equivalent test data. The varnish shall be a high temperature non-silicone insulating varnish. The varnish used shall be identified in the qualification test report.

**NEMA/ANSI equivalent:** All test requirements are equivalent to MW-50 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,<br>see J-W-1177 | Wire sizes,<br>AWG | Requirements   |
|------------------------------|---------------------------------|--------------------|--|
| Dimensions                   | 4.7.1.2                         | 4/0-30             | See table I.   |
| Adherence and<br>flexibility | 4.7.2.2.1                       | 4/0-30             | Covering shall not open sufficiently to expose the bare or underlying film-coated wire after bending 0 AWG and heavier wire on a 15X mandrel and 1-30 AWG wire on a 10X mandrel. |
| Elongation                   | 4.7.5                           | 4/0-30             | Not less than the values shown in table II.  |
| Dielectric strength          | 4.7.9                           | 4/0-30             | Not less than the values shown in table III.   |
| Thermal endurance            | ---                             | 4/0-30             | Class 180. Insulating materials shall meet the thermal class ratings as described above.   |

TABLE I. Dimensions.

| AWG size | Bare wire diameter, inch |         | Minimum increase glass fiber covering, inch | Single covering                |        | Minimum increase glass fiber covering, inch | Double covering |             |            |
|----------|--------------------------|---------|---|--------------------------------|--------|---|-----------------|-------------|------------|
|          | Minimum                  | Nominal |   | Maximum overall diameter, inch |        |   | Bare            | Single film | Heavy film |
|          |                          |         |   | Maximum overall diameter, inch |        |   |                 |             |            |
| 4/0      | 0.4554                   | 0.4600  | 0.0045                                      | 0.4716                         | ---    | 0.0070                                      | 0.4756          | ---         |            |
| 3/0      | .4055                    | .4096   | .0045                                       | .4207                          | ---    | .0070                                       | .4247           | ---         |            |
| 2/0      | .3612                    | .3648   | .0045                                       | .3754                          | ---    | .0070                                       | .3794           | ---         |            |
| 1/0      | .3217                    | .3249   | .0045                                       | .3351                          | ---    | .0070                                       | .3391           | ---         |            |
| 1        | .2864                    | .2893   | .0045                                       | .2992                          | ---    | .0070                                       | .3032           | ---         |            |
| 2        | .2550                    | .2576   | .0045                                       | .2672                          | ---    | .0070                                       | .2712           | ---         |            |
| 3        | .2271                    | .2294   | .0045                                       | .2367                          | ---    | .0070                                       | .2427           | ---         |            |
| 4        | .2023                    | .2043   | .0045                                       | .2133                          | ---    | .0070                                       | .2173           | 0.2210      |            |
| 5        | .1801                    | .1819   | .0045                                       | .1907                          | ---    | .0070                                       | .1947           | .1982       |            |
| 6        | .1604                    | .1620   | .0045                                       | .1706                          | ---    | .0070                                       | .1746           | .1781       |            |
| 7        | .1429                    | .1443   | .0045                                       | .1527                          | ---    | .0070                                       | .1567           | .1601       |            |
| 8        | .1272                    | .1285   | .0045                                       | .1368                          | ---    | .0070                                       | .1408           | .1442       |            |
| 9        | .1133                    | .1144   | .0045                                       | .1225                          | ---    | .0070                                       | .1265           | .1299       |            |
| 10       | .1009                    | .1019   | .0040                                       | .1089                          | ---    | .0060                                       | .1119           | .1151       |            |
| 11       | .0898                    | .0907   | .0040                                       | .0976                          | ---    | .0060                                       | .1006           | .1038       |            |
| 12       | .0800                    | .0808   | .0040                                       | .0876                          | ---    | .0060                                       | .0906           | .0937       |            |
| 13       | .0713                    | .0720   | .0040                                       | .0787                          | ---    | .0060                                       | .0817           | .0847       |            |
| 14       | .0635                    | .0641   | .0040                                       | .0707                          | 0.0726 | .0060                                       | .0737           | 0.0772      |            |
| 15       | .0565                    | .0571   | .0040                                       | .0637                          | .0654  | .0060                                       | .0667           | .0699       |            |
| 16       | .0503                    | .0608   | .0040                                       | .0573                          | .0591  | .0060                                       | .0603           | .0635       |            |

See footnote at end of table.

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TABLE I. Dimensions. - Continued

| AWC size | Bare wire diameter, inch |         | Minimum increase glass fiber covering, inch | Single covering |                                |             | Minimum increase glass fiber covering, inch | Double covering                |        |             |            |
|----------|--------------------------|---------|---|-----------------|--------------------------------|-------------|---|--------------------------------|--------|-------------|------------|
|          | Minimum                  | Nominal |   | Maximum         | Maximum overall diameter, inch |             |   | Maximum overall diameter, inch |        |             |            |
|          |                          |         |   |                 | Bare                           | Single film |   | Heavy film                     | Bare   | Single film | Heavy film |
| 17       | 0.0448                   | 0.0453  | 1/0.0455                                    | 0.0518          | 0.0535                         | 0.0548      | 0.0040                                      | 0.0548                         | 0.0548 | 0.0578      |            |
| 18       | 0.0399                   | 0.0408  | 1/0.0405                                    | 0.0467          | 0.0484                         | 0.0497      | 0.0040                                      | 0.0497                         | 0.0497 | 0.0527      |            |
| 19       | 0.0355                   | 0.0359  | 1/0.0361                                    | 0.0423          | 0.0439                         | 0.0451      | 0.0040                                      | 0.0451                         | 0.0453 | 0.0481      |            |
| 20       | 0.0317                   | 0.0320  | 1/0.0322                                    | 0.0383          | 0.0399                         | 0.0411      | 0.0040                                      | 0.0411                         | 0.0413 | 0.0441      |            |
| 21       | 0.0282                   | 0.0285  | 1/0.0286                                    | 0.0348          | 0.0363                         | 0.0374      | 0.0040                                      | 0.0374                         | 0.0378 | 0.0404      |            |
| 22       | 0.0250                   | 0.0253  | 1/0.0254                                    | 0.0316          | 0.0330                         | 0.0341      | 0.0040                                      | 0.0341                         | 0.0346 | 0.0371      |            |
| 23       | 0.0224                   | 0.0226  | 1/0.0227                                    | 0.0288          | 0.0303                         | 0.0313      | 0.0040                                      | 0.0313                         | 0.0318 | 0.0343      |            |
| 24       | 0.0199                   | 0.0201  | 1/0.0202                                    | 0.0243          | 0.0257                         | 0.0267      | 0.0025                                      | 0.0267                         | 0.0263 | 0.0287      |            |
| 25       | 0.0177                   | 0.0179  | 1/0.0180                                    | 0.0221          | 0.0234                         | 0.0243      | 0.0025                                      | 0.0243                         | 0.0241 | 0.0263      |            |
| 26       | 0.0157                   | 0.0150  | 1/0.0160                                    | 0.0201          | 0.0213                         | 0.0222      | 0.0025                                      | 0.0222                         | 0.0221 | 0.0242      |            |
| 27       | 0.0141                   | 0.0142  | 0.0143                                      | 0.0183          | 0.0196                         | 0.0204      | 0.0025                                      | 0.0204                         | 0.0203 | 0.0224      |            |
| 28       | 0.0125                   | 0.0126  | 0.0127                                      | 0.0167          | 0.0180                         | 0.0187      | 0.0025                                      | 0.0187                         | 0.0187 | 0.0207      |            |
| 29       | 0.0112                   | 0.0113  | 0.0114                                      | 0.0154          | 0.0166                         | 0.0173      | 0.0025                                      | 0.0173                         | 0.0174 | 0.0193      |            |
| 30       | 0.0099                   | 0.0100  | 0.0101                                      | 0.0141          | 0.0152                         | 0.0159      | 0.0025                                      | 0.0159                         | 0.0161 | 0.0179      |            |

1/ The maximum bare wire dimensions may be exceeded up to the NEMA/ANSI maximum bare wire limit, provided the minimum increase is maintained and the maximum overall diameter specified is not exceeded.

TABLE II. Elongation.

| AWG size  | Minimum elongation, percent |                              |
|-----------|-----------------------------|------------------------------|
|           | With glass fiber covering   | Glass fiber covering removed |
| 4/0-0     | 35.0                        | 35.0                         |
| 1-8       | 30.0                        | 30.0                         |
| 9-15      | 20.0                        | 30.0                         |
| 16-21     | 15.0                        | 25.0                         |
| 22-28     | ---                         | 20.0                         |
| 29 and 30 | ---                         | 15.0                         |

TABLE III. Minimum breakdown voltages.

| AWG size | Diameter of mandrel, inches | Minimum breakdown, volts <sup>1/</sup> |                 |
|----------|-----------------------------|--|-----------------|
|          |                             | Single covering                        | Double covering |
| 4/0-9    | ---                         | 170                                    | 315             |
| 10-23    | 1.00                        | 360                                    | 540             |
| 24-30    | 0.25                        | 225                                    | 400             |

<sup>1/</sup> For glass fiber covered wire having an underlying film coating, add the minimum breakdown voltage for the film coated wire.

Part number: Magnet wire covered by this specification shall be defined by the following part numbering system. Example: M1177/31-06C021.

|  |                        |                                 |                              |
|--|------------------------|---------------------------------|------------------------------|
| M1177/31-                              | 06                     | C                               | 021                          |
|  |                        |                                 |                              |
| Federal<br>specification<br>identifier | Two digit<br>type code | Single letter<br>conductor code | Three character<br>size code |

The following codes shall apply:

| Type  | Type code | Conductor            | Conductor code |
|-------|-----------|----------------------|----------------|
| GO    | 01        | Copper               | C              |
| G20   | 02        | Aluminum             | A              |
| LGO   | 03        | Nickel-coated copper | N              |
| LG20  | 04        | Silver-coated copper | S              |
| L2GO  | 05        |                      |                |
| L2G20 | 06        |                      |                |

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The size code shall be the bare wire dimension. AWG wire size shall be used.

Intended use: Type GO magnet wire is intended for use in 180°C applications similar to GK where a silicone varnish cannot be 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 6145-1111-27)