

J-C-30B  
 16 February 1989  
 SUPERSEDING  
 J-C-30A  
 7 OCT 1970

# FEDERAL SPECIFICATION

## CABLE AND WIRE, ELECTRICAL

### (POWER, FIXED INSTALLATION)

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

#### 1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers single and multiple conductor cables and wires employing soft-annealed copper or copper clad aluminum conductors, 1350 aluminum and 8000-series aluminum alloys conductors, insulated with rubber, thermoplastic, cross-linked-polyethylene, ethylene propylene rubber, chlorosulphonated polyethylene, varnished cloth. They are intended to be used for transmission of power in fixed type installations; also for special purpose applications (e.g. control) when appropriate.

#### 1.2 Classification

1.2.1 Types. Cable and wire furnished under this specification shall be of the types specified in table I.

1.2.2 Type designation. Cables and wires covered by this specification shall be identified by a type designation, formed as indicated below. This type designation is intended for cataloging and ordering purposes, and not for surface printing on the wire or cable.

1.2.3 Cable and wire specification No. J-C-30B.

J-C-30A	MM	10	A-	E	4/18	SR	SJ	G	9
SPXC	UL type	Maximum	Conductor	Type	Number	Type of	Outer	Ground	Color
NO.	designa-	working	material	conduc-	and size	insula-	Covering	wire	code of
(1.2.3)	tion	voltage	(1.2.6)	tor(s)	of con-	tion	(1.2.10)	(1.2.11)	single
	(1.2.4)	(1.2.5)		(1.2.7)	ductor(s)	(1.2.9)			conductor
					(1.2.8)				(1.2.12)

AMSC N/A

FSC 6145

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

J-C-30B

TABLE I. Cable and wire types

UL type	UL standard No.	Description	Maximum working voltage	Temp deg C.
RHW	44	Heat and moisture resistant	600 or 2000	75 wet
RHH	44	Heat resistant	600 or 2000	90 dry
SA	44	Silicone, heat resistant	600	90
TW	83	Moisture resistant	600	60
THWN	83	Heat and moisture resistant	600	75
THW	83	Heat and Moisture resistant	600	75 wet
THHN	83	Heat resistant, for use in dry locations	600	90 dry
NM-B	719	For use in dry locations	600	60
NMC-B	719	For use in dry and moist and mildly corrosive locations	600	60
UF	493	For direct burial in earth	600	60
UF-B	493	For direct burial in earth	600	60 or 75 wet
V	133	Dry locations only; general purpose	5000 [1]	85
VD	133	Dry locations only; general purpose	5000 [1]	85
VM	133	Dry locations only; general purpose	5000 [1]	85
VL	133	Dry, general purpose, lead sheath	5000 [1]	85
VDL	133	Dry, general purpose, lead sheath	5000 [1]	85
VML	133	Dry, general purpose, lead sheath	5000 [1]	85
SE	854	Flame and moisture retardant, no mechanical protection	600	75
USE	854	Moisture resistant, no mechanical protection, for underground use	600	75
ACHH	4	Heat-resistant, armored	600	90
ACHHL	4	Heat resistant, armored, lead sheath	600	90
ACTH	4	Heat resistant, armored	600	75
ACTHH	4	Heat resistant, armored	600	90
ACT	4	Dry locations, armored	600	60
ACL	4	Armored, lead sheath	600	75
ACHL	4	Heat resistant, armored, lead sheath	600	75
XHHW	44	Heat and moisture resistant (cross linked polyethylene, thin wall)	600	75 wet 90 dry
MC	1569	Metal-clad	600- 35000	75, 85, or 90
MV	1072	Medium-voltage	5-35 kV	75 or 90

TABLE I. Cable and wire types - Continued

UL type	UL standard	Description	Maximum working voltage	Temp deg C.
[3] RHH or RHW	44	Heat and moisture resistant	600	90
[3] THHN or THWN	83	Heat and moisture resistant	600	90

[1] Voltage rating is maximum value. Desired voltage rating should be specified (see 1.2.4)

[3] For dual marking, see paragraph see 3.4.

1.2.4 UL type designation. The UL (Underwriters' Laboratories) type designation shall consist of the types specified in 1.2.1.

1.2.5 Maximum working voltage. The maximum working voltage shall be designated as follows:

- 03 - for use at not more than 300 volts.
- 06 - for use at not more than 600 volts.
- 10 - for use at not more than 1000 volts.
- 20 - for use at not more than 2000 volts.
- 30 - for use at not more than 3000 volts.
- 40 - for use at not more than 4000 volts.
- 50 - for use at not more than 5000 volts.

1.2.6 Conductor material. The conductor material shall be designated as follows:

- A - 1350 aluminum
- C - copper.
- CA - copper clad aluminum (UL 83)
- AA - aluminum alloy, 8000 series  
(UL 83, 44, 493, 854)

J-C-30B

1.2.7 Type of conductor(s). The type of conductor(s) shall be designated as follows:

- E - Solid conductor (AWG 20 to AWG 8 only).
- F - Concentric-lay-stranded conductor(s) of standard flexibility, conforming to type C, class B of QQ-W-343 or class B of American Society for Testing and Materials Document ASTM-B231, as applicable.
- G - Concentric-lay-stranded conductor(s) where greater flexibility is desired, conforming to type C, class C of QQ-W-343 or class C of ASTM-B231 as applicable.
- H - Rope-lay-stranded conductor(s) where extreme flexibility is desired, conforming to type RC, class G of QQ-W-343.
- J - Rope-lay-stranded conductor(s) where extreme flexibility is desired, conforming to type RC, class H of QQ-W-343.
- K - Bunch-stranded conductor(s) where extreme flexibility in the smaller AWG sizes is desired, conforming to type B, class K of QQ-W-343.
- L - Compact stranded conductor(s) where greater flexibility is desired, conforming to Class B of ASTM B400.

1.2.8 Number and size of conductor(s). The number of individual conductors of the same wire size shall be designated by that number followed by a slant line and followed by a number indicating the conductor AWG size. When cables are made up of different wire sizes, each different wire size with the number of conductors shall be individually represented, with a dash separating each different wire size. A conductor larger than No. 0000 AWG shall be designated by its cross-sectional area in circular mils.

1.2.9 Type of insulation. The type of insulation shall be designated as follows:

- SR - synthetic rubber
- T - thermoplastic
- XP - cross linked polyethylene
- CP - chlorosulfonated polyethylene
- V - varnished cloth
- EP - Ethylenepropylene

1.2.10 Outer covering. The outer covering shall be designated as follows:

SJ - synthetic rubber jacket  
 NJ - neoprene jacket  
 TJ - thermoplastic jacket  
 PJ - polyamide jacket  
 XP - cross linked polyethylene jacket  
 CB - cotton braid  
 GB - glass braid  
 FC - fibrous covering  
 LS - lead sheath  
 AL - aluminum sheath  
 AR - armored  
 UJ -unjacketed  
 CPE - chlorinated polyethylene

1.2.11 Ground wire. When a ground wire is part of a cable configuration, it shall be designated by the letter "G".

1.2.12 Color code. The color code for single conductor cables and wires shall be designated by the appropriate identifying number as shown in table II. (See 3.3.1.)

TABLE II. Color-code identification for single conductor cables and wires

Number designator	Color	Number designator	Color
0	Black	5	Green
1	Brown	6	Blue
2	Red	7	Violet (purple)
3	Orange	8	Gray (slate)
4	Yellow	9	White

NOTE: This table is not intended to signify a color sequence but only a number-color identification reference.

J-C-30B

1.2.13 Color code for multi-conductor cables. For 2-, 3-, and 4-conductor cables designation of color-coding will not be necessary in the type designation (see 1.2.2 and 1.2.12). These multi-conductors have a definite color-coding arrangement (see 3.3.2); consequently, the number of multi-conductors in the type designation (see 1.2.8) automatically signifies the color-code.

## 2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issues in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein:

### FEDERAL SPECIFICATIONS

QQ-W-343	- Wire, Electrical (Uninsulated)
PPP-B-576	- Boxes, Wood, Cleated, Veneer, Paper Overlaid
PPP-B-585	- Boxes, Wood, Wirebound
PPP-B-591	- Boxes, Fiberboard, Wood-Cleated
PPP-B-601	- Boxes, Wood, Cleated-Plywood
PPP-B-621	- Boxes, Wood, Nailed and Lock-Corner
PPP-B-636	- Box, Fiberboard
PPP-B-640	- Boxes, Fiberboard, Corrugated, Triple-Wall
PPP-B-1055	- Barrier Material, Waterproofed, Flexible

### FEDERAL STANDARDS

FED-STD-123 - Marking for Shipment (Civil Agencies)

(Activities outside the Federal Government may obtain copies of Federal specifications, standards and commercial item descriptions as outlined under General Information in the Index of Federal Specifications, Standards and Commercial Item Descriptions. The Index, which includes cumulative bimonthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402).

(Single copies of this specification and other Federal specifications and commercial item descriptions required by activities outside the Federal Government for bidding purposes are available without charge from General Services Administration Business Service Centers in Boston, MA; New York, NY; Philadelphia, PA; Washington, DC; Atlanta, GA; Chicago, IL; Kansas City, MO; Fort Worth, TX; Houston, TX; Denver, CO; San Francisco, CA; Los Angeles, CA; and Seattle, WA.)

(Federal Government activities may obtain copies of Federal standardization documents and the Index of Federal Specifications, Standards and Commercial Item Descriptions from established distribution points in their agencies)

## MILITARY SPECIFICATIONS

- |             |  |
|-------------|--|
| MIL-C-12000 | - Cable, Cord and Wire, Electric,<br>Packaging of. |
|-------------|--|

## MILITARY STANDARDS

- |             |  |
|-------------|--|
| MIL-STD-129 | - Marking for Shipment and Storage                               |
| MIL-STD-105 | - Sampling procedures and Tables for<br>inspection of attributes |

(Copies of military specifications and standards required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless a specific issue is identified, the issue in effect on date of invitation for bids or request for proposal shall apply.

## Underwriter's Laboratories, Inc. (UL) Standards:

- |         |   |
|---------|---|
| UL-4    | - Standard for Armored Cable.                                   |
| UL-44   | - Standard for Rubber-Insulated Wires and Cable.                |
| UL-83   | - Standard for Thermoplastic-Insulated Wires.                   |
| UL-133  | - Standard for Varnished-Cloth Wires and Cable.                 |
| UL-493  | - Standard for Underground Feeder and Branch<br>Circuit Cables. |
| UL-719  | - Standard for Nonmetallic-Sheathed Cables.                     |
| UL- 854 | - Standard for Service Cables.                                  |
| UL-1072 | - Standard for Cables, Power, Medium voltage                    |
| UL-1569 | - Standard for Cables, Metal-clad.                              |
| UL-1581 | - Standard for Electrical wires, cables, and<br>Flexible cords  |

(Applications for copies should be addressed to Underwriter's Laboratories, Inc., 207 East Ohio Street 333 Pfingsten Road, Northbrook, IL 60062, 1285 Walt Whitman Road, Melville, L.I., New York 11747; or 1655 Scott Blvd., Santa Clara, Calif., 95050. 12 Laboratory Drive, Research Triangle Park, NC 27709.)

## AMERICAN SOCIETY FOR TESTING AND MATERIAL (ASTM).

- |           |   |
|-----------|---|
| ASTM-B231 | -Standard specification for concentric-lay-stranded<br>aluminum 1350 conductors |
| ASTM-B397 | -Standard specification for concentric-lay-stranded<br>aluminum alloy           |

(Applications for copies should be addressed to the American Society For Testing and Material, 1916 Race Street, Philadelphia, PA 19103.)

J-C-30B

### 3. REQUIREMENTS

3.1 Cable and wire covered by this specification shall conform to the requirements of the applicable UL standards for the types specified herein (see 1.2 and 2.2).

#### 3.2 Fire and casualty hazards.

3.2.1 Each contractor shall submit to the contracting agency proof that the cable or wire he proposes to supply under this specification conforms to the requirements of the applicable UL Standard. The label, or listing with re-examination, of the UL may be accepted as evidence that the cable or wire conforms to the requirements.

3.2.2 In lieu of the UL label, or listing with re-examination, the contractor shall submit independent proof, satisfactory to the contracting agency, that the cable or wire conforms to the applicable requirements of the published standards including methods of tests of the applicable UL Standard.

3.2.3 Compliance with the above preliminary requirements in regard to fire and casualty hazards does not absolve the contractor from complete compliance with the requirements of this specification in order to secure acceptance of his material.

#### 3.3 Color code.

3.3.1 Single conductor. The color of a single conductor cable or wire is usually arbitrarily selected for purposes of differentiating between circuits when a number of single conductor cables or wires are to be used. Consequently, the number designated in the type designation (see 1.2.11) signifies the color of a single conductor cable or wire.

3.3.2 Multi-conductor. Multi-conductor cables shall be color-coded as follows:

- 2-conductor      - black, white.[1]
- 3-conductor      - black, white, red.[1]
- 4-conductor      - black, white, red, blue.

[1] For type SE cable, the color white is omitted for the uninsulated neutral conductor.



### 3.4 Dual marking.

3.4.1 THHN or THWN wire. Any Types of THHN wire that complies with the requirements in UL Standard 83 for Type THWN wire as well as those for Type THHN may be dual marked "THHN or THWN" if the manufacturer so desires.

3.4.2 RHH or RHW wire. A wire or a cable which complies with the requirements in UL Standard 44 for Type RHH wire and all the requirements for Type RHW wire may be dual marked "RHH or RHW".

3.4.3 RHW or USE cable. If a rubber insulated wire or cable also qualifies completely for use as a cable in a different classification (such as Type USE service-entrance cable), the product may carry an amplified marking including the word "or" to indicate the additional classification and the optional use - for example, "RHW or USE".

## 4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the government. The government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Unless otherwise specified, inspections by the supplier may be performed on a statistical or production lot basis to assure that the quality of manufacture is equal to the standards set by UL. (See 6.2).

4.2 Sampling, inspection, and tests. Unless otherwise specified in the invitation for bids or request for proposal, sampling, inspection, and tests shall be in accordance with the applicable UL standard (see 1.2.1).

4.3 Inspection of preparation for delivery. An inspection shall be made to determine that the packaging, and marking comply with the requirements in section 5 of this specification. Defects shall be scored in accordance with table III. For examination of interior packaging the sample unit shall be one shipping container fully prepared for delivery, selected at random just prior to the closing operations. Sampling shall be in accordance with MIL-STD-105. Defects of closure listed shall be examined on shipping containers fully prepared for delivery. The lot size shall be the number of shipping containers in the end item inspection lot. The inspection level shall be S-2 with and AQL of 4.0 defects per hundred units.

J-C-30B

TABLE III. Classification of Preparation For Delivery Defects

Examine	Defects
Markings (exterior and interior)	Omitted; incorrect; illegible; improper size, location, sequence, or method of application.
Materials	Any component missing or damaged.
Workmanship	Inadequate application of components such as incomplete closure of container flaps, loose strapping, inadequate stapling, or distortion of container.
Contents (exterior container)	Number per container is more or less than required. Net weight exceeds requirements.

## 5. PREPARATION FOR DELIVERY

5.1 Packaging. Packaging shall be level A, B or C, as specified (see 6.1).

### 5.1.1 Level A.

5.1.1.1 Coils (AWG sizes 20 to 8). Cable and wire in the length specified (see 6.1), shall be uniformly coiled and packaged in a close-fitting box conforming to PPP-B-636, class weather-resistant and may be provided with the special knockout feature normally used in commercial practice for dispensing purposes. Close, seal and strap the container in accordance with the appendix to PPP-B-636. Alternatively, the reels may be packaged in a round, form-fitting, shrunk wrapped polyethylene package. The film shall have a minimum thickness of 0.006 inches. A top hole shall be provided to dispense the wire.

5.1.1.2 Coils (AWG sizes 6 to 2). Cable and wire in the lengths specified (see 6.1), shall be uniformly coiled and the coil shall be spirally wrapped with water-proofed flexible barrier material conforming to PPP-B-1055, and sealed.

5.1.1.3 Coils (Armored Cable). Armored cable shall be uniformly coiled in lengths specified (see 6.1), and secured with twine.

5.1.1.4 Reels. Cable and wire shall be packaged on nonreturnable wood or metal reels designed with strong flanges of a diameter that will protect the cable or wire during shipment or storage. After the cable or wire has been wound on the reel, it shall be covered with a full wrap of water-proofed flexible barrier material conforming to PPP-B-1055. The wrap shall extend between the flanges and shall be secured in place with a minimum of two metal or non-metallic straps.

5.1.2 Level B. The coils and reels shall be packaged as specified in 5.1.1 except that the fiberboard boxes, when utilized shall conform to PPP-B-636, class domestic and sealing of the box is not required.

5.1.3 Level C. Cable and wire shall be packaged in accordance with the manufacturers standard practice, providing that it insures protection for the product during shipment and safe delivery to its destination.

5.2 Packing. Packing shall be level A, B, or C, as specified (see 6.1).

5.2.1 Level A.

5.2.1.1 Coils (AWG sizes 20 to 8). Cable and wire, packaged as specified herein shall be packed in close-fitting boxes conforming to PPP-B-576, class 2; PPP-B-585, class 2 or 3; PPP-B-591, style A or B, class II; PPP-B-601, overseas type; PPP-B-621, class 2; PPP-B-636, class weather-resistant or PPP-B-640, class 2.

5.2.1.2 Coils (AWG sizes 6 to 2). Cable and wire, packaged as specified herein require no further packing.

5.2.1.3 Reels. Reels of cable and wire, packaged as specified herein, shall be lagged in accordance with the level A requirements of MIL-C-12000.

5.2.2 Level B. Coils packaged in shrink wrapped polyethylene film as specified in 5.1.1.1, shall be packed four packaged coils to a box. The box shall conform to PPP-B-636, class domestic. All other coils and reels packaged as specified herein, for level A or B, shall require no packing.

5.2.3 Level C. Coils and reels packaged as specified in 5.1.3 shall be packed to assure carrier acceptance and safe arrival at destination in compliance with the National Motor Freight Classification or the Uniform Freight Classification.

5.3 Marking. Marking shall be in accordance with 5.3.1 or 5.3.2, as specified (see 6.1).

5.3.1 Civil agencies. In addition to any special marking required by the contract or order, all interior packages and shipping containers shall be marked in accordance with FED-STD-123.

J-C-30B

5.3.2 Military agencies. In addition to any special marking required by the contract or order, all interior packages and shipping containers shall be marked in accordance with MIL-STD-129.

## 6. NOTES

6.1 Ordering data. Purchasers should select the preferred options permitted herein, and include the following information in procurement documents:

- (a) Title, symbol, and date of this specification.
- (b) Type of designation of cable or wire to be furnished (1.2.2).
- (c) Length of cable or wire to be furnished.
- (d) Responsibility for inspection, if other than specified (4.1).
- (e) Basis of inspection, if other than specified (4.1.1).
- (f) Level of of packaging and packing required (5.1 and 5.2).
- (g) Special marking, if required (5.1.3 and 5.2.3).
- (h) Color or color coding, if other than specified (3.3).
- (i) Civil or Military marking if required (see 5.3).

6.2 Requirements for tests. If laboratory tests by the government are required, purchasing officers should order cable or wire for test purposes, in addition to the number of feet required for installation.

6.3 Transportation description. Transportation descriptions and minimum weights applicable to this commodity are:

### Cable-Copper

#### Rail:

Cable, electric, copper, not otherwise indexed by name.  
Carload minimum weight 30,000 pounds.

#### Motor:

Cable, electric, copper, not otherwise indexed.  
Truckload minimum weight 30,000 pounds, subject to Rule 115, National  
Motor Freight Classification.

J-C-30B

Cable-Aluminum

Rail:

Cable, electric, aluminum, insulated.  
Carload minimum weight 30,000 pounds.

Motor:

Cable, electric, aluminum.  
Truckload minimum weight 30,000 pounds, subject to Rule 115, National  
Motor Freight Classification.

Wire-Copper

Rail:

Wire, insulated, copper.  
Carload minimum weight 30,000 pounds.

Motor:

Wire, insulated, copper.  
Truckload minimum weight 30,000 pounds, subject to Rule 115, National  
Motor Freight Classification.

Wire-Aluminum

Rail:

Wire, insulated, aluminum.  
Truckload minimum weight 30,000 pounds, subject to Rule 115, National  
Motor Freight Classification.

Motor:

Wire, insulated, aluminum.  
Truckload minimum weight 30,000 pounds, subject to Rule 115, National  
Motor Freight Classification.

J-C-30B

MILITARY INTERESTS:

Custodians:

Army - CR  
Navy - YD  
Air Force - 85

Review Activities:

Army - ME  
Navy - AS, YD  
Air Force - 99  
NSA - NS  
DLA - IS

User Activities:

Army - MI, AR  
Navy - MC  
Air Force - 11  
Air Force - 80

CIVIL AGENCY COORDINATING ACTIVITIES:

GSA-FSS

PREPARING ACTIVITY:

Army - CR

AGENT:

DLA - IS

(Project 6145-1129)