MIL-W-5693C
6 DECEMBER 1965

Superseding
MIL-C-5693B
29 May 1963

MILITARY SPECIFICATION

WIRE STRAND, STEEL (CORROSION RESISTANT) PREFORMED (AIRCRAFT APPLICATIONS)

This specification is mandatory for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope.- This specification covers nonflexible, corrosion-resistant steel cable intended for use in aircraft applications other than flight controls.

1.2 Classification.- Cable shall be furnished in one of two types, as specified (see 6.2).

Type I - Nonflexible 1 x 7, with wire center.
Type II - Nonflexible 1 x 19, with wire center.

2. APPLICABLE DOCUMENTS

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

SPECIFICATIONS

Federal

QQ-S-781	Steel Strapping, Flat
QQ-S-790	Steel Strapping, Round (Bare and Zinc Coated)
UU-P-271	Paper, Wrapping, Waterproofed, Kraft

Military

MIL-B-121	Barrier Material, Greaseproofed, Waterproofed, Flexible

FSC 4010

STANDARDS

Federal

Fed. Test Method Std. No. 151	Metals; Test Methods

Military

MIL-STD-129	Marking for Shipment and Storage

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

3. REQUIREMENTS

3.1 Material.- The wire used in the fabrication of cable shall be manufactured of induction furnace or electric-arc furnace steel. An analysis of each heat or lot of steel from which the wire is made shall be furnished by the contractor. This analysis shall meet the following chemical composition requirements:

Element	Percent
Carbon	0.15 maximum
Manganese	2.00 maximum
Silicon	1.00 maximum
Phosphorous	0.045 maximum
Sulfur	0.030 maximum
Chromium	17.0-20.0
Nickel	8.0-12.0

3.1.1 The wire used shall be suitable for manufacture into aircraft cable which will conform to this specification. The wire shall meet the following tensile strength requirements:

Wire Diameter	Minimum tensile strength (lb./sq. in.)
Up to but not including 0.011	280,000
0.011 up to but not including .021	260,000
.021 up to but not including .031	250,000
.031 up to but not including .051	240,000
.051 up to but not including .081	230,000
.081 up to but not including .130	205,000

3.1.2 Preforming of wires.- The individual wire composing the cable shall be preformed into the exact helical position they will have in the finished cable so that if the cable is cut or severed there is no tendency for the normal diameter of the cable at the unseized ends to increase by more than the amount specified in table I.

TABLE I. Tolerance in diameter and breaking strength of cable

Cable type	Nominal diameter of cable	Tolerance on diameter (plus only)	Allowable increase in diameter at unseized end (max)	Breaking strength (min)	Weight per 100 feet (approx)
	Inch	Inch	Inch	Pounds	Pounds
I	1/32	0.003	0.006	150	0.25
	3/64	.005	.008	375	.55
II	1/16	0.006	0.009	500	0.85
	5/64	.008	.009	800	1.40
	3/32	.009	.010	1,200	2.00
	7/64	.011	.010	1,600	2.70
	1/8	.013	.011	2,100	3.50
	5/32	.016	.016	3,300	5.50
	3/16	.013	.019	4,700	7.70
	7/32	.015	.020	6,300	10.20
	1/4	.018	.021	8,200	13.50
	5/16	.023	.024	12,500	21.00

3.1.3 Joining.- Splices in individual wires 0.014 inch in diameter and smaller may be twisted. Wire of larger diameter shall be brazed or welded. Splices in individual wires in any layer of a strand shall be not closer than 30 feet.

3.2 Construction.-

3.2.1 Type I (1 x 7).- Each cable of this construction shall consist of six wires laid right lay around a center wire.

3.2.2. Type II (1 x 19).- Each cable of this construction shall consist of a layer of six wires laid left lay around a center wire plus twelve wires laid right lay around the inner strand.

3.2.3 Pitch or length of lay.- The length of lay of the preformed wires around the center shall be not more than 11 times nor less than 9 times the cable diameter.

3.3 Diameter.- The diameter of the cable or strand shall be not less than that specified by table I, but may exceed it by the amount shown therein.

3.4 Breaking strength.- Breaking strength shall be no less than the values of table I.

3.5 Lubrication.- The wires of the cable shall be thoroughly coated with a suitable friction-preventive compound. The amount of compound adhering to the finished cable after the application shall be such that a white cloth, which has been rubbed once over a 1 foot length of cable, will show a noticeable amount of the compound. The friction-preventive compound shall possess corrosion resisting properties.

3.6 Workmanship.- All details of workmanship shall be in accordance with the best practice for high-quality cable, consistent with the requirements of this specification. The cable shall be securely laid and free from kinks, loose wires, or other defects.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection.- The supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own or any other inspection facilities and services acceptable to 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.

4.2 Classification of inspections.- All the inspections required herein for the testing of steel cable are classified as quality conformance inspections.

4.3 Sampling.-

4.3.1 Lot.- An inspection lot shall consist of one continuous length (master coil) of cable or the shipping reels on which the product from one master coil has been rewound for shipment. The shipping reel wound from the head of each master reel shall be so identified.

4.3.2 Inspection for packaging and packing requirements.- A reel shall be selected from the shipping reels of each cable size presented for acceptance at one time.

4.3.3 Sampling for chemical analysis.- One sample consisting of approximately 4 ounces of material shall be taken from each lot in accordance with Federal Test Method Standard No. 151.

4.3.4 Sampling for breaking strength.-

4.3.4.1 Sampling for breaking strength of wires.- Wire samples shall be taken from a sample of cable from the head or starting end of each master coil (see 6.3.8). One specimen shall be selected from wire of each diameter from each strand, and tested. Wires shall be considered of the same diameter when the smallest wire and the diameter of the largest wire does not exceed the following values:

Wire diameter (inch)	Difference between the diameter of the smallest wire and the diameter of the largest wire (inch)
Up to 0.029	0.0015
0.030 to .059	.0020
.060 to .099	.0025
.100 to .130	.0030

4.3.4.2 Sampling for breaking strength of cable.- A sample at least 10 feet in length shall be taken from the head or starting end of each master coil (see 6.3.8).

4.4 Examinations and tests.-

4.4.1 Examinations.-

4.4.1.1 Examination of product.- All cables shall be examined visually for compliance with construction and workmanship requirements at the time the cable is wound on shipping reels. For this purpose the cable shall travel no faster than 200 feet per minute and shall be stopped for closer examination as appropriate.

4.4.1.2 Preparation for delivery.- Samples shall be inspected for compliance with section 5.

4.4.2 Chemical composition.- Chemical composition of the wire shall be determined in accordance with Method 111 or 112 of Fed. Test Method Std. No. 151.

4.4.3 Breaking strength.-

4.4.3.1 Breaking strength of wire.- Specimens shall be tested in accordance with Method 211 of Fed. Test Method Std. No. 151. The distance between the jaws of the tensile testing machine, with the specimen in place, shall be not less than 10 inches (see 3.1.1).

4.4.3.2 Breaking strength of cable.- Each breaking strength specimen shall be broken in a tension testing machine in accordance with Method 211 of Fed. Test Method Std. No. 151. The length of the test section of the specimen in place ready for testing shall be not less than 20 inches. Zinc-socketed or swaged fittings shall be used (see 3.4).

4.5 Rejection.- The failure of any specimen shall be cause for rejection of the lot represented.

4.5.1 Reels other than failed sample reels from rejected lots may be resubmitted for testing individually.

5. PREPARATION FOR DELIVERY

5.1 Packaging.- Not applicable.

5.2 Packing.- Packing shall be level A or B, as specified (see 6.2).

5.2.1 Level A.- When overseas packing is specified, the cable shall be wound, one size on a reel, on reels constructed to the dimensions specified in table II. Before starting to wind the cable on the reel, a layer of waterproof barrier material conforming to UU-P-271, and then a layer of greaseproof barrier material, conforming to MIL-B-121, shall be applied to the barrel of the reel and the inside of the flanges against which the cable will subsequently rest. After the cable is wound on the lined reel, a layer of greaseproof barrier material conforming to MIL-B-121, and then a layer of waterproof barrier material conforming to UU-P-271 shall be applied and fastened by three or more wooden lagging strips and two metal straps. The metal strapping shall conform to QQ-S-781 or QQ-S-790. Each reel shall be lagged with a layer of lumber in such manner that the waterproof barrier material is not exposed to forces which may cause mechanical damage. Cable may be wound on smaller reels than those specified in table II and packed in wooden boxes when approved by the procuring activity.

5.2.2 Level B.- When level B packing is specified, cable shall be treated as specified in 5.2.1, except that the final protective lagging may be omitted.

5.3 Marking and labeling.- Shipments for the Air Force and Navy shall be marked in accordance with requirements of the individual services as specified in MIL-STD-129. In addition, the following information shall be legibly marked on each reel:

WIRE STRAND, STEEL: (CORROSION-RESISTANT),
PREFORMED (AIRCRAFT APPLICATIONS)
MIL-W-5693C
Size
Type
Quantity
Stock No.
Contract or order no.
Name of manufacturer
Name of contractor (if different from manufacturer)

6. NOTES

6.1 Intended use.- The cable covered by this specification is intended for general aircraft use, where high resistance to corrosion is required.

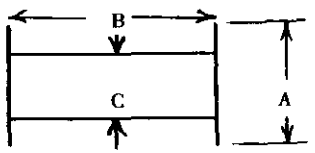
6.2 Ordering data.- Procurement documents should specify:

(a) Title, number, and date of this specification.
(b) Size, type, and quantity to be furnished (see 1.2).
(c) If lengths greater than 1,000 feet are required or if lengths between 500 and 1,000 feet are not desired, exact lengths are to be specified.
(d) Level of packing desired (see 5.2).

TABLE II. Reels for cable

Diameter of cable	1,000 feet				3,000 feet				5,000 feet				10,000 feet			
	Diameter of head	Traverse or distance between heads	Diameter of drum	Diameter of arbor hole	Diameter of head	Traverse or distance between heads	Diameter of drum	Diameter of arbor hole	Diameter of head	Traverse or distance between heads	Diameter of drum	Diameter of arbor hole	Diameter of head	Traverse or distance between heads	Diameter of drum	Diameter of arbor hole
Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches	Inches
1/32	12	4	8	1-1/8	12	4	8	1-1/8	12	4	8	1-1/8	16	4	10	1-1/8
3/64	12	4	8	1-1/8	12	4	8	1-1/8	12	4	8	1-1/8	16	4	10	1-1/8
1/16	12	4	8	1-1/8	12	4	8	1-1/8	16	4	10	1-1/8	16	7	12	1-1/8
5/64	12	4	8	1-1/8	16	4	10	1-1/8	16	7	12	1-1/8	16	10	8	1-1/8
3/32	12	4	8	1-1/8	16	4	10	1-1/8	16	7	12	1-1/8	16	10	8	1-1/8
7/64	16	4	10	1-1/8	16	7	12	1-1/8	16	10	8	1-1/8	18	10	8	1-1/8
1/8	16	4	10	1-1/8	16	7	12	1-1/8	16	10	8	1-1/8	24	10	10	1-1/8
5/32	16	7	12	1-1/8	16	10	8	1-1/8	24	10	10	1-1/8	24	16	10	2-1/8
3/16	18	7	12	2-1/8	18	10	8	2-1/8	24	10	10	2-1/8	24	16	10	2-1/8
7/32	18	7	12	2-1/8	18	10	8	2-1/8	24	10	10	2-1/8	32	20	16	3-1/8
1/4	18	10	10	2-1/8	24	10	10	2-1/8	32	18	16	2-1/8	36	22	18	3-1/8
5/16	18	10	10	2-1/8	24	10	10	2-1/8	32	18	16	2-1/8	36	22	18	3-1/8

A=Dia head
B=Traverse
C=Dia drum



6.3 Definitions.-

6.3.1 Wire.- Each individual cylindrical steel rod or filament shall be designated as a wire.

6.3.2 Strand.- Each group of wires helically twisted or laid together shall be designated as a strand.

6.3.3 Preformed cable.- Cable consisting of wires shaped, during fabrication of the cable, to conform to the form or curvature which they take in the finished cable, shall be designated as preformed cable.

6.3.4 Diameter.- The diameter of cable is the diameter of the circumscribed circle.

6.3.5 Lay or twist.- The helical form taken by the wires in strand is characterized as the lay or twist of the cable.

6.3.6 Pitch (or length of lay).- The distance parallel to the axis of the cable in which a wire makes one complete turn about that axis is designated as the pitch (or length of lay) of the cable.

6.3.7 Wire center.- The center of a strand shall be an individual wire and shall be designated a wire center.

6.3.8 Master coil.- A master coil or reel shall consist of a single continuous strand as produced in the stranding operation or wire rope laid up from continuous lengths of strands.

Custodians:
Army - MO
Navy - WP
Air Force - (69)

Preparing activity:
Navy - WP

Project No. 4010-0043

Reviewer activities:
Army - MO
Navy - WP
Air Force - (69)

User activity:
Army - MO

SPECIFICATION ANALYSIS SHEET

Form Approved Budget Bureau No. 119-R004

INSTRUCTIONS

This sheet is to be filled out by personnel either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity.

SPECIFICATION

MIL-W-56930 Wire Strand, Steel (Corrosion Resistant) AC Applications

ORGANIZATION	CITY AND STATE

CONTRACT NO.	QUANTITY OF ITEMS PROCURED	DOLLAR AMOUNT
		$

MATERIAL PROCURED UNDER A

☐ Direct Government Contract ☐ Subcontract

1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?

   A. GIVE PARAGRAPH NUMBER AND WORDING

   B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES

2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID

3. IS THE SPECIFICATION RESTRICTIVE?

   ☐ YES ☐ NO IF "YES" IN WHAT WAY?

4. REMARKS (Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity.)

SUBMITTED BY (Printed or typed name and activity) DATE

DD Form 1426