INCH-POUND

MIL-DTL-87218E
27September 2012
SUPERSEDING
MIL-DTL-87218D
w/Amendment 2
27 March 2007

DETAIL SPECIFICATION

CABLE, LOCKCLAD, FOR AIRCRAFT CONTROL

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

1. SCOPE

1.1 Scope. This specification covers the requirements for lockclad control cable material used in aircraft flight controls and aircraft control cable assemblies that include lockclad as a portion of the assembly. Lockclad is defined as the resulting material of swaging aluminum alloy tubing onto MIL-DTL-83420, type I, nonjacketed wire rope to the extent necessary to comply with the elongation and coefficient of thermal expansion properties specified herein.

1.2 Classification. The lockclad will be of the following types and classes, as specified (see 6.2).

1.2.1 Types. The types of lockclad are as follows:

Type I - Lockclad manufactured with MIL-DTL-83420, type I, composition A carbon steel, zinc or tin over zinc coated wire rope.
Type II - Lockclad manufactured with MIL-DTL-83420, type I, composition B corrosion resistant steel wire rope.

1.2.2 Classes. The classes of lockclad have been assigned for various base cable sizes and construction and aluminum cladding outside diameter for ease of reference. These classes are identified in table I.

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2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of the documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications and handbooks. The following specifications and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-DTL-781	-	Terminal, Wire Rope Swaging, General Specification for.
MIL-DTL-5688	-	Wire Rope Assemblies; Aircraft, Proof Testing and Prestretching of.
MIL-DTL-6117	-	Wire Rope Assemblies, Aviation, Swaged Type.
MS20667	-	Terminal, Wire Rope, Swaging, Fork End.
MS20668	-	Terminal, Wire Rope, Swaging, Eye End.
MIL-DTL-83420	-	Wire Rope, Flexible, for Aircraft Control, General Specification for.

DEPARTMENT OF DEFENSE HANDBOOK

MIL-HDBK-1599	-	Bearings, Control System Components, and Associated Hardware Used in the Design and Construction of Aerospace Mechanical Systems and Subsystems.

(Copies of these documents are available online at https://assist.dla.mil/ or from the Standardization Documents Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.2.2 Other government documents. The following other government documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

STANDARDIZATION DOCUMENTS

SD-6	-	Provisions Governing Qualification.

(Copies of this document are available online at https://assist.dla.mil/ or from the Standardization Documents Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

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2.3 Non-government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

SAE INTERNATIONAL

SAE AMS-WW-T-700/6 - Tube, Aluminum Alloy, Drawn, Seamless, 6061.

(Copies of this document are available from http://www.sae.org/ or from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001.)

2.4 Order of precedence. Unless otherwise noted herein or in the contract, in the event of conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Qualification. Lockclad (see 6.4.6) material furnished under this specification shall be products that are authorized by the qualifying activity for listing on the applicable qualified products list before contract award (see 4.2.3 and 6.3). The qualifying activity will be advised of any plant relocation, changes in key personnel, or major process change(s) (e.g. changes in lubricant and/or jacketing material, changes in the lubricant application process, etc.) for requalification testing determinations.

3.2 Materials.

3.2.1 Base wire rope. The base wire rope shall be in accordance with MIL-DTL-83420.

3.2.2 Aluminum cladding. The aluminum cladding of lockclad shall be 6061-T4 or 6061-T6 extruded aluminum alloy tubing, conforming to SAE AMS-WW-T-700/6, of uniform quality and thickness, clean, smooth, and free of defects or foreign materials. The original tubing size and wall thickness shall be selected by the lockclad manufacturer as required to manufacture lockclad that will meet the requirements set forth herein.

3.2.3 Lubricants. Lubricants required in wire rope shall not be removed prior, during, or after swaging (see 6.4.10) operations. Lubricants added to the interior of the tubing prior to swaging shall be chemically compatible with lubricant in the base cable. Lubricants applied to the exterior of the aluminum or to the swaging tooling prior to swaging shall be removed after swaging and prior to shipment of lockclad control cable assemblies.

3.2.4 Terminals. Terminals shall conform to the requirements specified in 4.2.2 or as specified in the contract (see 6.2).

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3.3 Design and construction.

3.3.1 Design. MIL-HDBK-1599, Requirement 206 should be used as guidance for the application and installation of the lockclad cable.

3.3.2 Construction.

3.3.2.1 Base wire rope construction. Construction of base wire rope shall be in accordance with MIL-DTL-83420.

3.3.2.2 Lockclad diameter. The aluminum tubing shall be uniformly cold worked (swaged) over the base wire rope to the dimension specified in table I and sufficiently to meet the performance requirements herein. Tolerance of the outside diameter of the lockclad after swaging shall be as specified in table I.

3.3.2.3 Lockclad concentricity. The cladding after swaging shall be concentric around the base wire rope such that the thickness of the clad material does not vary more than 10 percent around the circumference of the base wire rope.

3.3.2.4 Cladding placement. The length, location, and length tolerances of cladding on a base wire rope length shall be as specified on the lockclad control cable assembly drawing or MS sheet. Sections of lockclad which are not separated on the control cable assembly drawing or MS sheet shall be one continuous section of aluminum tubing as opposed to two or more sections. Relative to lockclad control cable assemblies which include sections of bare base wire rope (see 6.4.1), the after swage lengths of cladding must be determined prior to swaging. Once cladding has been swaged, it shall not be stripped from base wire rope under any circumstances or in any amount.

3.3.2.5 Lockclad straightness. The lockclad assembly shall be straight within 0.062 inch for each 5 feet of length when the lockclad assembly is loaded to 10 percent minimum breaking strength (MBS) (see 6.4.7) of the base cable. The MBS shall be in accordance with MIL-DTL-83420.

3.3.2.6 Terminal Swaging. When cable assemblies require installation of terminals conforming to MIL-DTL-781, swaging of the terminals shall be accordance with MIL-DTL-6117.

3.4 Performance.

3.4.1 Breaking strength. The cladding of lockclad shall not be considered to be additive to the MBS of the base wire rope (see 6.4.2) whether terminals are swaged to the base wire rope or directly to the cladding. The MBS for the base wire rope is specified in MIL-DTL-83420. Lockclad assemblies shall be tested for ultimate tensile strength per MIL-DTL-6117.

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3.4.2 Elongation. The clad portion of all lockclad material and control cable assemblies furnished in accordance with this specification shall be in accordance with the elongation and SV values (see 6.4.9) specified in table II.

3.4.3 Coefficient of thermal expansion (see 6.4.3). The clad portion of all lockclad material furnished in accordance with this specification shall be in accordance with the values specified in table II.

3.4.4 Endurance. The bare base wire rope portions of lockclad cable assembles shall meet the endurance requirements of MIL-DTL-83420. The clad portions of lockclad assemblies are not subject to flexing or bending by application and are not subject to endurance requirements.

3.4.5 Proof loading. All lockclad control cable assemblies shall be proof loaded in accordance with MIL-DTL-5688.

3.4.6 Temperature limits. The base wire rope and the cladding after assembly into lockclad shall meet the temperature requirements specified in MIL-DTL-83420 for the wire rope. The cladding or swaging of the cladding shall maintain properties specified herein in a temperature environment of -65 °F to 200 °F.

3.4.7 Weight. The finished lockclad material shall not exceed the maximum weight specified in table I.

3.5 Identification.

3.5.1 Lockclad assemblies. As a minimum and unless otherwise specified by the procuring agency, the following information shall be marked with permanent ink, chemical etching, electro-etching or laser marking on the outside diameter of the cladding in an axial direction of all lockclad assemblies starting not less than one inch nor more than six inches from one end of the cladding or one section of cladding nearest a terminal:

a. The complete part or assembly number of the lockclad assembly as specified on the assembly drawing or specification.

b. The lockclad manufacturer's name, trademark, or Commercial and Government Entity Codes (CAGEs). If the latter is used, the five digit code must be preceded by the letters "CAGE". More than one method may be used.

3.6 Workmanship. All details of workmanship and finish shall be in accordance with the best practice of aircraft quality. Unclad lengths of wire rope of lockclad assemblies shall meet the workmanship requirements of MIL-DTL-83420 before and after swaging of the cladding material and terminals. In addition, the cladding and assemblies shall conform to paragraphs 3.6.1 and 3.6.2.

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3.6.1 Cladding after swaging. There shall be no kinks, bends, or abrupt changes in direction of the cladding. There shall be no scratches, die marks, flat spots, or discontinuities in the finished cladding when inspected with the unaided human eye.

3.6.2 Lockclad control cable assemblies. At all transition points (see 6.4.11) of cladding and bare base wire rope there shall be no kinks, abrupt changes in direction, broken wires, or other evidence of damage to the base wire rope.

4. VERIFICATION

4.1 Classification of inspection. The inspection and testing of the base wire rope shall conform to the requirements of MIL-DTL-83420. The inspection and testing of the cladding and assemblies of lockclad shall be classified as follows:

a. Qualification inspection (see 4.2).

b. Conformance inspection (see 4.3).

c. Retention of qualification (see 4.2.4)

4.2 Qualification inspection.

4.2.1 Qualification test sample. The number of samples shall be as specified in table III.

4.2.2 Specimen for breaking strength test for swaging of cladding. Three assemblies of each type and class of lockclad for which qualification is desired (types and classes per table I) shall be manufactured in the following configuration using equipment and procedures which will be or are being used for production lots:

a. Length of cladding: 4 to 10 feet.

b. Overall length of assembly: 1 to 2 feet longer than cladding. Cladding shall be approximately centered over the overall length of the assembly.

c. Terminals: Swage one MS20667 or MS20668 terminal on each end of the lockclad assembly.

d. Proof loading: Proof load each of the three assemblies as specified in MIL-DTL-5688.

4.2.3 Qualification testing. The qualification tests shall include all of the examinations and tests designated in table IV.

4.2.4 Retention of qualification. The manufacturer, at regular intervals, must be able to demonstrate that the company still has the capabilities and facilities necessary to produce the QPL items in accordance with this specification and in accordance with the provisions governing qualification specified in SD-6. This will include the performance of the following tests:

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4.2.4.1 Five year testing. Every 5 years, the manufacturer shall perform the following tests:

a. Examination of product (see 4.4.1)
b. Elongation (see 4.4.3)
c. Concentricity (see 4.4.8)

4.2.4.2 At changes in processes or cladding material. Following any major change in tooling, processing procedure or cladding material, the manufacturer shall perform the following tests:

a. Examination of product (4.4.1)
b. Elongation (see 4.4.3)
c. Thermal expansion (see 4.4.4)
d. Concentricity (see 4.4.8)

4.2.5 Rejection and retest. The failure of any specimen during qualification testing shall be cause for complete requalification of the type and class of lockclad experiencing failures.

4.3 Conformance inspection. Conformance inspection shall consist of individual tests (4.3.1) and sampling plan (4.3.2).

4.3.1 Individual test. Individual test shall consist of the following:

a. Examination of product (4.4.1).

4.3.2 Sampling plan. The sampling plan shall consist of the following:

a. Breaking strength (4.4.2.1).
b. Proof loading (4.4.5).
c. Concentricity (4.4.8).
d. Straightness (4.4.9).

4.3.2.1 Sampling. When conducting the tests specified herein, with the exception of examination of product, samples of lockclad may be specially manufactured for qualification testing and shall be taken from each lot to be delivered for conformance testing. Sample size for each test shall be as specified in table III.

4.3.2.2 Lot. A lot shall consist of not more than 110 lockclad control cable assemblies or 110 pieces of lockclad material manufactured from the same manufacturer's lot of base wire rope and manufactured continuously by one machine or by one series of progressive processing machines. All items in a lot shall be of the same outside diameter cladding.

4.3.2.3 Specimen. A specimen is a lockclad assembly or portion of an assembly or lockclad material taken for the performance of a testing method. All specimens for qualification testing shall be taken from the same lot for each particular size. All specimens for conformance testing shall be taken from the lot to be delivered on a specific contract.

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

4.4 Test method.

4.4.1 Examination of product.

4.4.1.1 Components. Manufacturer certificates shall be used to determine compliance with 3.2.1, 3.2.2 and 3.3.2.1 and component QPL requirements. When required, manufacturer certificates shall be used to determine compliance of the terminals to their requirements including QPL requirements.

4.4.1.2 Identification and workmanship. Each assembly shall be examined to determine compliance with 3.5 and 3.6. When required, the examination shall include compliance of the terminals to their respective detail sheet.

4.4.1.3 Cladding placement. Each assembly shall be examined for compliance with 3.3.2.4

4.4.2 Breaking strength.

4.4.2.1 Breaking strength test. For lockclad furnished as assemblies with terminals, two assemblies from each lot of 40 or less assemblies or three assemblies for each lot of 41 to 110 assemblies shall be loaded, by gripping the terminals at each end, in tension to the MBS of the size and type base wire rope used in the manufacture of lockclad. The MBS is specified in MIL-DTL-83420. Terminal slippage, broken wires in the bare portions of the base wire rope in excess of those allowed by MIL-DTL-83420 or MIL-DTL-6117, longitudinal or circumferential cracking of the cladding, or wire rope breakage, are cause for rejection of the lot. This test shall comply with all requirements of MIL-DTL-6117. Assemblies used for this test shall be destroyed.

4.4.2.2 Breaking strength test for qualification. Load each lockclad assembly, by gripping the terminals, in tension to failure of some component of the assembly. Successful completion of the test requires that all three assemblies (see 4.2.2) fail in the base wire rope at or above the MBS for the wire rope.

4.4.3 Elongation. Three lockclad control cable assemblies similar to those manufactured per 4.3.2.1 shall be manufactured for the qualification test. Specimens shall be gripped at the terminals and loaded to not more than 1 percent MBS of the base wire rope. The elongation shall be determined as follows:

Designate and measure a length of not less than one foot of cladding on each assembly. Gradually increase the tension load to 60 percent MBS of the base wire rope. Measure the length of the designated section of cladding at not more than each 5 percent MBS increment. The elongation at the appropriate loads shall be within the elongation values

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specified in table II for all 3 specimens. The SV values shall be calculated and shall fall within the SV values specified in table II for all 3 specimens.

4.4.4 Coefficient of thermal expansion check. Three specimens shall be prepared for each type and class of lockclad for which qualification is desired. Specimens may be continuous lockclad or may terminate in bare base wire rope with terminals swaged thereon. Designate and measure a length of not less than 2.5 feet of cladding on each assembly. Specimens shall be tested for determination of the change in length due to temperature changes. The specimens shall be tested by measuring the lockclad length at 32 °F ± 1 °F and raising the temperature to 80 °F ± 1 °F while measuring the lockclad length at each 10 °F increment as a minimum. The coefficient of thermal expansion shall be calculated from these data and all values shall fall within the values specified in table II.

4.4.5 Proof loading. All lockclad control cable assemblies furnished under a contract shall be proof loaded, by gripping the terminals at the two ends, as specified in MIL-DTL-5688.

4.4.6 Qualification test for temperature limits. Three specimens shall be manufactured as specified in 4.3.2.1. The specimens shall be loaded in tension to 60 percent MBS and the elongation determined while the temperature is -65 °F, +5°, -0° and again at 200 °F, +5°, -0°. The elongation shall be within 20 percent of the elongation limits specified in table II.

4.4.7 Qualification test for weight. At least three sections of lockclad material not less than 2 feet in length manufactured at the same time of the same materials and processes shall be weighed. Weight shall not exceed the maximum weight specified in table I.

4.4.8 Concentricity. Three lockclad assemblies shall be sectioned approximately in the middle of the lockclad. A 0.10 to 1-inch section may be removed. The section may be mounted. The thickness of the clad shall be measured at four points on the diameter approximately 90° apart. The thinner of the four points shall not be less than 90 percent of the thickness of the thicker of the four points.

4.4.9 Straightness. The lockclad assembly manufacturer is responsible for assurance that the straightness requirement specified in paragraph 3.3.2.5 is in compliance on all lockclad control cable assemblies or lockclad material delivered under a contract. Methods and frequencies of measurement shall be sufficient to assure this condition. Inspection may be accomplished during the proof loading procedure.

4.5 Identification of product. All lockclad control cable assemblies and lockclad material shall be inspected for appropriate marking prior to shipping. Marking shall comply with 3.5. Marking which does not comply shall be corrected and if not correctable within the requirements of 3.5, the lot shall be rejected.

4.6 Certification. For each government order or contract, the wire rope manufacturer shall certify that the product satisfactorily passed the quality conformance inspections of this specification. The certification shall include, as a minimum, actual results of the tests specified

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herein (see 6.3) and shall be retained on file at the manufacturer's facility for a minimum of 7 years.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When packaging of material is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the military service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. The lockclad control cable assemblies and lockclad material covered by this specification are intended for use in aircraft control cable systems where low elongation under tension loads and/or a coefficient of thermal expansion more nearly matching that of a basically aluminum airframe is desired or required. Where these factors are not significant, unclad wire rope per MIL-DTL-83420 may be used for avoidance of the weight penalty of lockclad.

6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number, and date of this specification.
b. Type and class of lockclad (see 1.2).
c. Applicable MS sheet, assembly drawing, or other specification, if required.
d. Packaging requirements (see 5.1).

6.3 Qualification. With respect to products requiring qualification, awards will be made only for products that are, at the time of award of contract, qualified for inclusion in QPL-87218 whether or not such products have actually been so listed by that date. The attention of contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from Defense Logistics Agency Aviation, DLA Aviation-VEB, 8000 Jefferson Davis Highway, Richmond, VA 23297-5616 or STDZNMGT@dla.mil. An online listing of products qualified to this specification may be found in the Qualified Products Database (QPD) at https://assist.dla.mil

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6.4 Definitions.

6.4.1 Bare base wire rope. The term for the portions of a lockclad control cable assembly where aluminum tubing is not swaged onto the wire rope. This area is also known as the "bare" sections of lockclad control cable assemblies.

6.4.2 Base wire rope. The wire rope per MIL-DTL-83420 over which aluminum tubing is swaged in order to manufacture lockclad.

6.4.3 Coefficient of thermal expansion. The change in length of lockclad material for each degree of temperature change in inches per inch.

6.4.4 Deflection. Elongation of a specified length of wire rope or lockclad under a specified tension load.

6.4.5 Effective area. The cross sectional area of wire rope or lockclad reflected as if the combination of wires or wires and aluminum were a solid metal mass.

6.4.6 Lockclad. The term for the material resulting from the swaging of a tubing material over wire rope or aircraft control cable material in such manner as to reflect a lower elongation under tensile loading than the wire rope without the swaged cladding.

6.4.7 Minimum breaking strength (MBS). The minimum tension load that the base wire rope of lockclad must support. The cladding material should not be considered additive to the tensile strength of lockclad assemblies.

6.4.8 Outside diameter of lockclad. The diameter of the exterior of the cladding after swaging onto the wire rope.

6.4.9 SV Value. Stiffness may be expressed in terms of SV Values. The units for SV are lb-inch^2/inch^2, where "S" is the modulus of elasticity of steel, (30 X 10^6 psi) and "V" is the effective area (see 6.4.5) of the wire rope or lockclad material. The SV value may be considered as the theoretical tensile load that would double the length if the material did not yield or fail in tension.

6.4.10 Swaging. The process of cold working the cladding material onto the base wire rope to such intimate contact as necessary to meet the requirements of this specification for lockclad.

6.4.11 Transition point. The point at which base wire rope extends beyond the cladding of lockclad control cable assemblies.

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6.5 Subject term (key word) listing.

Aluminum sheathed wire rope
Sheathed wire rope assemblies
Sheathing

6.6 Applicable Calculations.

6.6.1 SV Value. The SV Value may be determined by use of the following formulae:

$$SV = E(A_f), \quad \text{and} \quad \delta = \frac{PL}{E(A_f)} \quad \text{or} \quad e = \frac{P}{E(A_f)} = \frac{\delta}{L}$$

Where: δ = Change in total length under P load.
P = Load in pounds.
L = Length of wire rope or lockclad.
E = Young's Modulus of Elasticity for the base wire rope material (30 X 10^6 psi).
A_f = Effective Area of the wire rope or lockclad.

6.6.2 Elongation. Elongation may be calculated by use of the formula:

$$e = \frac{P}{E(A_f)} = \frac{\delta}{L}$$ (see 6.6.1)

6.6.3 Effective area. Effective area may be calculated by use of the formula:

$$A_f = \frac{P}{E(e)} = \frac{P(L)}{E(\delta)}$$ (see 6.6.1)

6.7 Swaged terminals.

6.7.1 Attached to base wire rope. In assemblies designed to leave an extension of base wire rope at one or both ends and terminals are swaged directly onto the base wire rope, terminals in accordance with MIL-DTL-781 should be swaged in accordance with the appropriate terminal MS sheet drawings.

6.7.2 Swaged over cladding. In assemblies designed for cladding the complete length, special non-standard terminals may be swaged directly to the cladding. Special terminals and terminal swaging instructions should be as specified by the procuring agency for the lockclad control cable assemblies.

6.8 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

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TABLE I. Lockclad classes and physical properties.

Class identity	Base wire rope 1/			Finished lockclad cladding diameter inch ± 0.003	Lockclad weight maximum lbs./100 ft.
	Diameter		Construction (reference)		
	Nominal (reference)	Minimum			
2A	1/16	0.062	7 X 7	0.1495	2.60
2B	1/16	0.062	7 X 7	0.1695	3.10
3A	3/32	0.093	7 X 7	0.1695	3.80
3B	3/32	0.093	7 X 7	0.2010	4.80
3C	3/32	0.093	7 X 19	0.1695	3.80
3D	3/32	0.093	7 X 19	0.2010	4.80
4A	1/8	0.125	7 X 19	0.2010	5.56
4B	1/8	0.125	7 X 19	0.2500	7.45
5A	5/32	0.156	7 X 19	0.2500	8.61
5B	5/32	0.156	7 X 19	0.2950	10.71
6A	3/16	0.187	7 X 19	0.2500	9.71
6B	3/16	0.187	7 X 19	0.2700	11.02
6C	3/16	0.187	7 X 19	0.2950	12.02
6D	3/16	0.187	7 X 19	0.3020	12.49
8A	1/4	0.250	7 X 19	0.3320	17.43
8B	1/4	0.250	7 X 19	0.3580	19.32
8C	1/4	0.250	7 X 19	0.3750	20.47

1/ Wire rope per MIL-DTL-83420 type I composition A or B.

TABLE II. Lockclad performance properties.

Class (see table I)	Maximum percent elongation at designated load		Minimum SV value at designated load x 10^3 (lb-inch^2/inch^2)				Coefficient of thermal expansion (minimum) 32 - 80 °F (in./in. x 10^{-6} per °F)	
			Type I lockclad 1/		Type II lockclad 1/			
	5% MBS	60% MBS	5% MBS	60% MBS	5% MBS	60% MBS	Type I 1/	Type II 1/
2A	.06	.4	111	166	111	166	11.9	12.2
2B	.06	.4	144	216	144	216	12.4	12.4
3A	.06	.4	165	247	157	235	11.1	11.3
3B	.06	.4	213	320	209	314	11.8	12.0
3C	.06	.4	165	247	157	235	11.1	11.3
3D	.06	.4	213	320	209	314	11.8	12.0
4A	.06	.4	237	355	228	343	10.4	10.5
4B	.06	.4	330	495	322	483	11.5	11.5
5A	.06	.4	372	558	362	543	10.6	10.7
5B	.06	.4	459	689	449	674	11.4	11.4
6A	.06	.4	402	603	382	573	9.3	9.3
6B	.06	.4	452	678	432	655	9.8	10.1
6C	.06	.4	501	751	482	723	10.3	10.4
6D	.06	.4	534	801	515	773	10.6	10.7
8A	.06	.4	720	1080	680	1019	9.5	9.7
8B	.06	.4	780	1170	741	1112	10.0	10.2
8C	.06	.4	870	1305	830	1246	10.3	10.4

1/ Type I or II lockclad as specified herein; not to be confused with type I or II wire rope per MIL-DTL-83420. All wire rope used in the manufacture of lockclad is type I per MIL-DTL-83420.

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TABLE III. Summary of test specimens.

Test	Qualification testing 1/ 2/ (each type and class)			Conformance testing		Comments
	Paragraph	No. of specimens	Comments	Paragraph	No. of specimens	
Examination of product	4.4.1	-	-	4.4.1	100% of all lots	Retention test every 5 years or on process change
Breaking strength	4.4.2.2	3	5 to 12 foot length	4.4.2.1	2 of each lot of 40 or less: 3 of each lot of 41 - 110	Test only on lockclad assemblies
Elongation	4.4.3	3	5 to 12 foot length	-	-	Retention test every 5 years or on process change
Coefficient of thermal expansion	4.4.4	3	2 to 4 foot length	-	-	Retention test on process change
Proof loading	-	-	-	4.4.5	100% of all lots	-
Temperature limits	4.4.6	3	5 to 12 foot length	-	-	-
Weight	4.4.7	3	2 foot length	-	-	-
Concentricity	4.4.8	3	3 Sectioned pieces	-	-	Retention test every 5 years or on process change
Straightness	-	-	-	4.4.9	Visual inspect 100%. Sample measure all lots	-
Identification of product	-	-	-	4.5	100% of all lots	-

1/ When qualification testing has been successfully accomplished on one type and class of cable, only sampling qualification testing is required on the type and class not previously tested.
2/ Qualification test data for two different size cables shall be submitted, for consideration, to the Government agency responsible for qualification approval.

TABLE IV. Qualification and conformance tests and inspections.

Tests	Requirements paragraph	Qualification paragraph	Conformance paragraph
Examination of product	3.6	4.4.1	4.4.1
Breaking strength	3.4.1	4.4.2.2	4.4.2.1
Elongation	3.4.2	4.4.3	-----
Coefficient of thermal expansion	3.4.3	4.4.4	-----
Proof loading	3.4.5	-----	4.4.5
Temperature limits	3.4.6	4.4.6	-----
Weight	3.4.7	4.4.7	-----
Diameter and concentricity	3.3.2.2, 3.3.2.3	4.4.8	-----
Straightness	3.3.2.5	-----	4.4.9
Identification	3.5	-----	4.5

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Custodians:
Army – AV
Navy – AS
Air Force – 99
DLA – GS

Preparing Activity:
DLA – GS5

(Project 1640-2012-006)

Review Activity:
Air Force – 71, 11

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST database at https://assist.dla.mil/.

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