

INCH-POUND

MIL-DTL-6117M
1 September 2020
SUPERSEDING
MIL-DTL-6117L
w/ AMENDMENT 1
26 January 2011

DETAIL SPECIFICATION

WIRE ROPE ASSEMBLIES, AVIATION, SWAGED TYPE

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

1. SCOPE

1.1 Scope. This specification covers swaging terminals to wire rope to fabricate wire rope assemblies. It also provides the requirements, criteria, and provisions for qualification of wire rope assembly manufacturers for listing in a Qualified Manufacturers List (QML).

2. APPLICABLE DOCUMENTS

2. 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. The following specifications 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.

Comments, suggestions, or questions on this document should be addressed to Defense Logistics Agency Aviation VEB, 8000 Jefferson Davis Highway, Richmond, VA 23297-5616, or e-mailed to STDZNMGT@dla.mil . Since contact information can change, you may want to verify the currency of this address information using the ASSIST database at https://assist.dla.mil/ .
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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-18375	-	Wire Rope, Flexible, Corrosion-Resisting, Nonmagnetic, for Aircraft Control
MS20658	-	Terminal, Wire Rope, Swaging, Fork End
MS20667	-	Terminal, Wire Rope, Swaging, Fork End
MS20668	-	Terminal, Wire Rope, Swaging, Eye End
MS21260	-	Terminal, Wire Rope, Swaging, Stud
MIL-DTL-83420	-	Wire Rope, Flexible, for Aircraft Control, General Specification for
MIL-DTL-83420/1	-	Wire Rope, Flexible, Type I, Composition A
MIL-DTL-83420/2	-	Wire Rope, Flexible, Type I, Composition B
MIL-DTL-83420/3	-	Wire Rope, Flexible, Type II (Jacketed), Composition A
MIL-DTL-83420/4	-	Wire Rope, Flexible, Type II (Jacketed), Composition B
MIL-DTL-87161	-	Wire Strand, Nonflexible, for Aircraft Application
MIL-DTL-87218	-	Cable, Lockclad, for Aircraft Control

(Copies of these documents are available online at <https://quicksearch.dla.mil/>.)

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 DOCUMENT

SD-6	-	Provisions Governing Qualification
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(Copies of this document are available online at <https://quicksearch.dla.mil/>.)

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.

AEROSPACE INDUSTRIES ASSOCIATION

NAS494	-	Terminal - Ball Type Cable
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(Copies of this document are available online at <https://www.aia-aerospace.org/>.)

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SAE INTERNATIONAL

SAE AS10081 - Terminal Shank-Swaging, Dimensions for

(Copies of this document are available from <https://www.sae.org/>.)

2.4 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a 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. Wire rope assemblies furnished under this specification shall be products that are manufactured by a manufacturer authorized by the qualifying activity for listing on the applicable QML before contract award (see 4.2 and 6.3). Qualification test samples will be tested by a test facility located in the continental United States or Canada.

3.2 Materials. Wire rope shall conform to MIL-DTL-83420, MIL-DTL-18375, MIL-DTL-87161, or MIL-DTL-87218 (see 6.2). Terminals shall conform to MIL-DTL-781, SAE AS10081, and the applicable MS or NAS sheet (see 6.2). Special terminals not dimensionally conforming to detail specifications shall conform to SAE AS10081 and/or the applicable detail drawings (see 6.2).

3.3 Components. All wire rope assembly components having qualification requirements must be acquired from sources having their products listed in the applicable terminal and wire rope Qualified Products List (QPL).

3.4 Swaging. Wire rope assemblies shall be swaged in accordance with the appropriate specifications, SAE AS10081 and/or detail drawings, as applicable. Before swaging, the wire rope end shall be inserted to the full depth of the fitting bore and held in a manner that will prevent slippage. Swaging shall be accomplished by uniformly cold-working the terminal until its dimensions conform to the appropriate dimensions listed in the applicable specification or, in the case of special terminals, to the appropriate dimensions listed in SAE AS10081 and/or applicable drawings.

3.4.1 Insertion in MS20658 and MS20667 terminals. For MS20658 terminals and MS20667, size -2 through -10, terminals which are drilled through to the fork opening, the wire rope shall be inserted to within the following distance of the fork bottom:

-2 and -3	.188 inch
-4, -5 and -6	.250 inch
-7, -8, -9 and -10	.375 inch

The wire rope shall not extend more than .062 inch into the fork opening. The insertion depth shall be verified after initial crimp.

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3.5 Breaking strength. The breaking strength of the wire rope assemblies shall not be less than the allowable minimum breaking strength (MBS) for the type, size, and composition of the wire rope to which the terminal is attached except as noted in 3.5.1 and 3.5.2.

3.5.1 Lower terminal breaking strength. The breaking strength of wire rope assemblies employing terminals with breaking strengths lower than the wire rope shall not be less than the allowable MBS of the terminal.

3.5.2 Wire strand breaking strength. The breaking strength of wire rope assemblies employing MIL-DTL-87161 wire strand shall not be less than 80 percent of the allowable wire strand breaking strength.

3.6 Workmanship. Workmanship shall be such that, after swaging, terminals shall be uniform in quality and free from pits, voids, burrs, sharp edges, rust, laps, cracks, splits, manufacturing indentations or other physical imperfections.

3.7 Proof load test. All wire rope assemblies shall be subjected to a proof load test in accordance with MIL-DTL-5688. Unless otherwise specified, the proof load for applications using NAS494 terminals and/or wire rope other than MIL-DTL-83420, shall be 60 percent of the terminal MBS, or 60 percent of the wire rope MBS, or 60 percent of the wire rope assembly MBS, whichever is lower.

3.8 Slippage indicator. The junction of the swaged fitting and wire rope will be marked with a durable, permanent paint or similar media to assist in determining evidence of slippage. Marking shall be applied to the wire rope or any abutting jacketing, tubing or other covering. The color of the marking shall be as specified in the contract, order, or drawing. If no color is specified, a color that is clearly visible and contrasting with surrounding elements shall be used.

4. VERIFICATION

4.1 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. Qualification inspection (see 4.2).
- b. Conformance inspection (see 4.3).

4.2 Qualification inspection. The qualification inspection shall consist of all the tests and examinations of this specification.

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4.2.1 Qualification inspection samples. Qualification testing samples shall consist of a wire rope assembly, 2 feet in length, for each of the following configurations:

- a. MIL-DTL-83420/1-002 wire rope with a MS21260 terminal and a MS20667 fork end terminal.
- b. MIL-DTL-83420/1-003 wire rope with a MS21260 terminal and a MS20668 eye end terminal.
- c. MIL-DTL-83420/2-004 wire rope with a MS21260 terminal and a MS20667 fork end terminal.
- d. MIL-DTL-83420/2-003 wire rope with a MS21260 terminal and a MS20668 eye end terminal.
- e. MIL-DTL-83420/3-002 wire rope with a MS21260 terminal and a MS20667 fork end terminal.
- f. MIL-DTL-83420/3-003 wire rope with a MS21260 terminal and a MS20668 eye end terminal.
- g. MIL-DTL-83420/4-003 wire rope with a MS21260 terminal and a MS20667 fork end terminal.
- h. MIL-DTL-83420/1-009 wire rope with a MS21260 terminal and a MS20667 fork end terminal.
- i. MIL-DTL-83420/1-010 wire rope with a MS21260 terminal and a MS20668 eye end terminal.
- j. MIL-DTL-83420/2-012 wire rope with a MS21260 terminal and a MS20667 fork end terminal.
- k. MIL-DTL-83420/2-013 wire rope with a MS21260 terminal and a MS20668 eye end terminal.

4.2.2 Qualification testing. Qualification testing shall be performed on two test samples of each configuration and consist of the:

- a. Examination of product (see 4.5.1).
- b. Proof load test (see 4.3.2.2).
- c. Breaking strength (see 4.6.1.1).

4.2.3 Maintenance of qualification. At specified intervals determined by the qualifying activity, the manufacturer must be able to demonstrate that the company still has the capabilities and facilities necessary to produce the QML items in accordance with this specification and in accordance with the provisions governing qualification specified in SD-6.

4.3 Conformance inspection. The conformance inspection shall consist of:

- a. Examination of product (see 4.5.1).
- b. Proof load test (see 4.3.2.2).
- c. Breaking strength (see 4.6.1.1).

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4.3.1 Inspection lot. An inspection lot of wire rope assemblies shall consist of the number of assemblies of the same materials and wire rope diameter produced consecutively by the same swaging machine, or series of progressive swaging machines, and submitted for inspection at the same time under one contract or order.

4.3.2 Sampling. Identical sample assemblies may be used for the examination of product and mechanical tests.

4.3.2.1 Mechanical tests. Assemblies to be inspected shall be chosen from the inspection lot by random sampling. One sample from each lot will be selected for mechanical test. For longer assemblies or lots of five assemblies or less, a representative sample of the same terminal and cable size approximately 2 feet long shall be made during the production run.

4.3.2.2 Proof load test. All wire rope assemblies shall be proof load tested in accordance with paragraph 3.7. Prior to application of the load, the assembly shall have a slippage indicator applied in accordance with 3.8. Any slippage of the wire rope in the terminals shall be cause for rejection of that item.

4.4 Certification. When specified in the contract or order, a certificate of conformance for compliant wire rope assemblies shall be forwarded to the Contracting Officer. Unless otherwise specified, the certificate of conformance will contain the following information:

- a. Manufacturer's name and address.
- b. Customer's name and address.
- c. Manufacturer's CAGE code.
- d. A list of components used in the fabrication of the wire rope assembly and the names and addresses of the companies supplying these components.
- e. Lot number and date of manufacture.
- f. Product (wire rope assembly) description.
- g. A statement certifying wire rope assembly conformance to this specification.
- h. The name and title of the company official approving the certificate of conformance.
- i. A clear written depiction of any exceptions to the specification requirements as stated in the contract or order.

4.5 Examinations.

4.5.1 Examination of product. Samples shall be examined to determine conformance to the applicable drawing and requirements not covered by the tests in 4.6.

4.6 Tests.

4.6.1 Mechanical tests.

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4.6.1.1 Breaking strength. The wire rope assembly test sample shall be subjected to a load not less than that specified in paragraph 3.5. The manner in which the load shall be applied to the fitting end of the terminal shall be governed by the design of the fitting. Breaking of the wire rope before reaching the specified load and/or any signs of failure in the terminal shall be cause for rejection of the lot represented by the test sample.

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. Although the swaged wire rope assemblies covered by this specification are typically intended for general aircraft use, they may also be used for other non-aerospace applications.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. MS or NAS part number of terminals, size and type of wire rope desired and length of the assembly, or the applicable detail drawing number (see 3.2).
- c. 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 QML-6117 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 VEB, 8000 Jefferson Davis Highway, Richmond, VA 23297-5616 or STDZNMGT@dla.mil.

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6.4 Subject term (key word) listing.

Proof load

Swaging

6.5 Changes from previous issue. The margins of this specification are marked with vertical lines to indicate modifications generated by this amendment. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations.

Custodians:

Army - CR

Navy - AS

Air Force - 71

DLA - GS

Preparing Activity:

DLA - GS5

(Project 1640-2020-001)

Review Activities:

Army - MI

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/>.