

**INCH-POUND**

MIL-DTL-6458H  
5 DECEMBER 2014  
 SUPERSEDING  
 MIL-DTL-6458G  
 9 JULY 2012

## DETAIL SPECIFICATION

### CHAIN ASSEMBLIES, SINGLE LEG, AIRCRAFT CARGO TIE DOWN

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

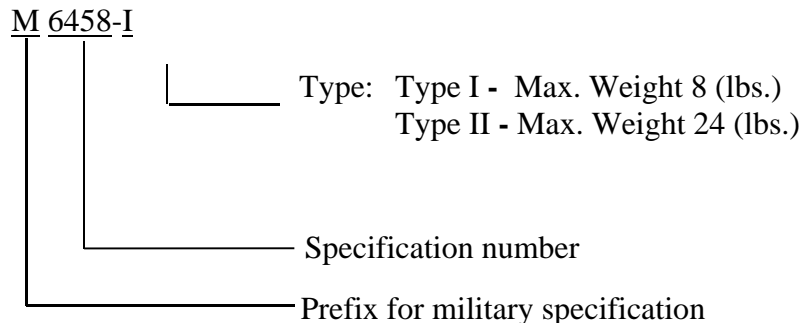
#### 1. SCOPE

1.1 Scope. This specification covers two types of flight safety critical aircraft cargo tie down chain assemblies. The chains described in this specification are to be used in conjunction with the tie down tensioners described in MIL-DTL-25959, where the Type I chain assembly is to be used with the Type I (styles A and B) and Type III tie down tensioners, and the Type II chain assembly is to be used with the Type II (styles A and B) and Type IV tie down tensioners.

1.2 Classification. Chain assemblies covered by this specification are of the following types:

Type I - 10,000 pound capacity  
 Type II - 25,000 pound capacity

1.3 Part or identifying number (PIN). The PIN to be used for chain assemblies acquired to this specification is created as follows:



Comments, suggestions, or questions on this document should be addressed to [SPEC99@us.af.mil](mailto:SPEC99@us.af.mil) or AFLCMC/WNZEB, Robins AFB GA 31098-1813. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <https://assist.dla.mil/>.

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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 documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specification, standards and handbooks. The following specifications, standards, 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 STANDARDS

MIL-STD-130	- Identification Marking of U.S. Military Property.
MIL-STD-810	- Environmental Engineering Considerations and Laboratory Tests.
MIL-STD-889	- Dissimilar Metals.

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

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.

## ASTM INTERNATIONAL

ASTM A304	Standard Specification for Carbon and Alloy Steel Bars Subject to End-Quench Hardenability Requirements.
ASTM A322	Standard Specification for Steel Bars, Alloy, Standard Grades.
ASTM A108	Standard Specification for Steel Bars, Carbon and Alloy, Cold-Finished.
ASTM C150/C150M	Standard Specification for Portland Cement
ASTM C778	Standard Specification for Standard Sand

(Copies of these standards may be found online at <http://www.astm.org/> or from: ASTM International, 100 Barr Harbor Drive, P.O. Box 700C, West Conshohocken PA 19428-2959.)

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### AMERICAN WELDING SOCIETY

AWS B1.11 - Guide for the Visual Examination of Welds.

(Copies of these standards may be found online at <http://www.aws.org/> or from American Welding Society, 550 N.W. LeJeune Road, P.O. Box 351040, Miami FL 33135.)

### SAE INTERNATIONAL

SAE-AMS-H-6875 - Heat Treatment of Steel Raw Materials.

(Copies of these standards may be found online at: <http://www.sae.org/> or from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001.)

### AMERICAN NATIONAL STANDARDS INSTITUTE

ANSI / ASQ Z1.4 - Sampling Procedures and Tables for Inspection by Attributes

(Copies of these standards may be found online at [www.ansi.org](http://www.ansi.org) or from American National Standards Institutes, 25 West 43<sup>rd</sup> Street, New York, NY 10036.)

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 First article. When specified (see [6.2](#)), a sample shall be subjected to first article inspection in accordance with [4.3](#).

### 3.2 Materials.

3.2.1 Metals. Metals shall be suitably treated to resist corrosion due to fuels, salt fog (spray), or atmospheric conditions likely to be met in storage or normal service. The chain assembly shall be made of alloy steel conforming to ASTM A 304, ASTM A 322, ASTM A 108 or equivalent, and heat treated to produce a chain of high tensile strength with resistance to impact loads.

3.2.2 Heat treatment. Heat treatment of steel parts shall be in accordance with SAE-AMS-H-6875.

3.2.3 Dissimilar metals. Unless suitably protected against electrolytic corrosion, dissimilar metals shall not be used in intimate contact with each other. Dissimilar metals are defined in MIL-STD-889.

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3.3 Chain assembly. The chain assembly shall be of the welded-link type consisting of a length of chain, a coupling link, and a hook constructed so that it forms a single unit without detachable parts. The weld on each link shall not interfere with attaching that link to or removing it from the adjuster tumble block (i.e. no sharp edges extending beyond links). Each link shall be capable of being attached to and removed from the adjuster tumble block, with a load applied, without the use of special tools. The chain assembly shall meet the strength, weight and dimensional requirements specified on [figure 1](#).

3.4 Hook. The hook shall be a grab type with dimensions as shown in figure 2 and shall engage chain links of the size specified on [figure 1](#). The hook shall be designed to permit fastening of one chain assembly to another of the same type to form a single branch system of two chain assemblies for extension purposes. The hooks shall meet the design strength requirements of the chain assemblies and shall not reduce the strength of the chain assembly into which it has been attached. The hook must fully engage the attaching chain link with the chain link in contact with radius R as specified on [figure 2](#) and without interference from adjoining links.

3.5 Recycled, recovered, environmentally preferable, or biobased materials. Recycled, recovered, environmentally preferable, or biobased materials should be used to the maximum extent possible, provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs.

### 3.6 Performance.

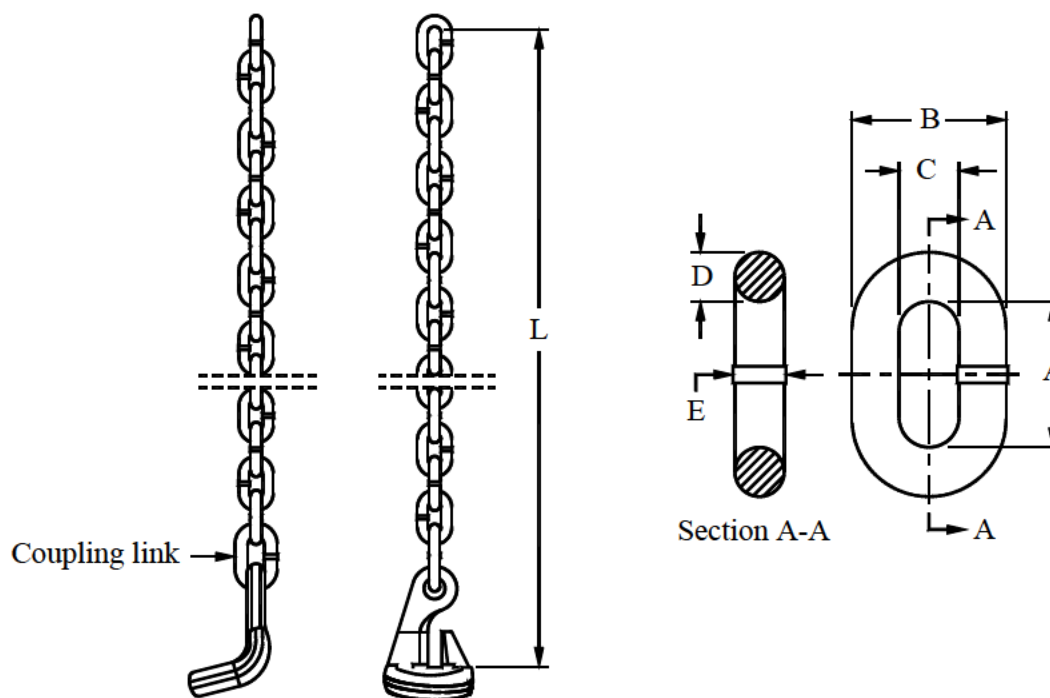
3.6.1 Proof load. When tested as specified (see [4.5.2](#) and [4.5.8](#)), the Type I chain assembly shall be capable of withstanding proof loads of 10,000 pounds, and the Type II chain assembly shall be capable of withstanding proof loads of 25,000 pounds. There shall be no evidence of failure, permanent deformation or subsequent malfunction of parts.

3.6.2 Ultimate load. When tested as specified (see [4.5.3](#)), the Type I chain assembly shall be capable of withstanding ultimate loads of 14,100 pounds and the Type II chain assembly shall be capable of withstanding ultimate loads of 35,250 pounds. Deformation, without rupture or visible cracks, will be permitted provided the chain remains flexible after removing the applied load.

3.6.3 Environmental characteristics. The chain assembly shall be fully operational and show no evidence of rust or corrosion when subjected to the salt fog (spray) testing (see [4.5.5](#)) and the sand and dust testing (see [4.5.7](#)). Any evidence of rust or corrosion will require an additional proof load test as specified in [4.5.8](#).

3.7 Interchangeability. All parts having the same manufacturer's part number shall be functionally and dimensionally interchangeable.

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Chain assembly			
Type	Design Strength (lbs.)	Max. Weight (lbs.)	Min. Length (inches)
I	14,100	8	108
II	35,250	24	108

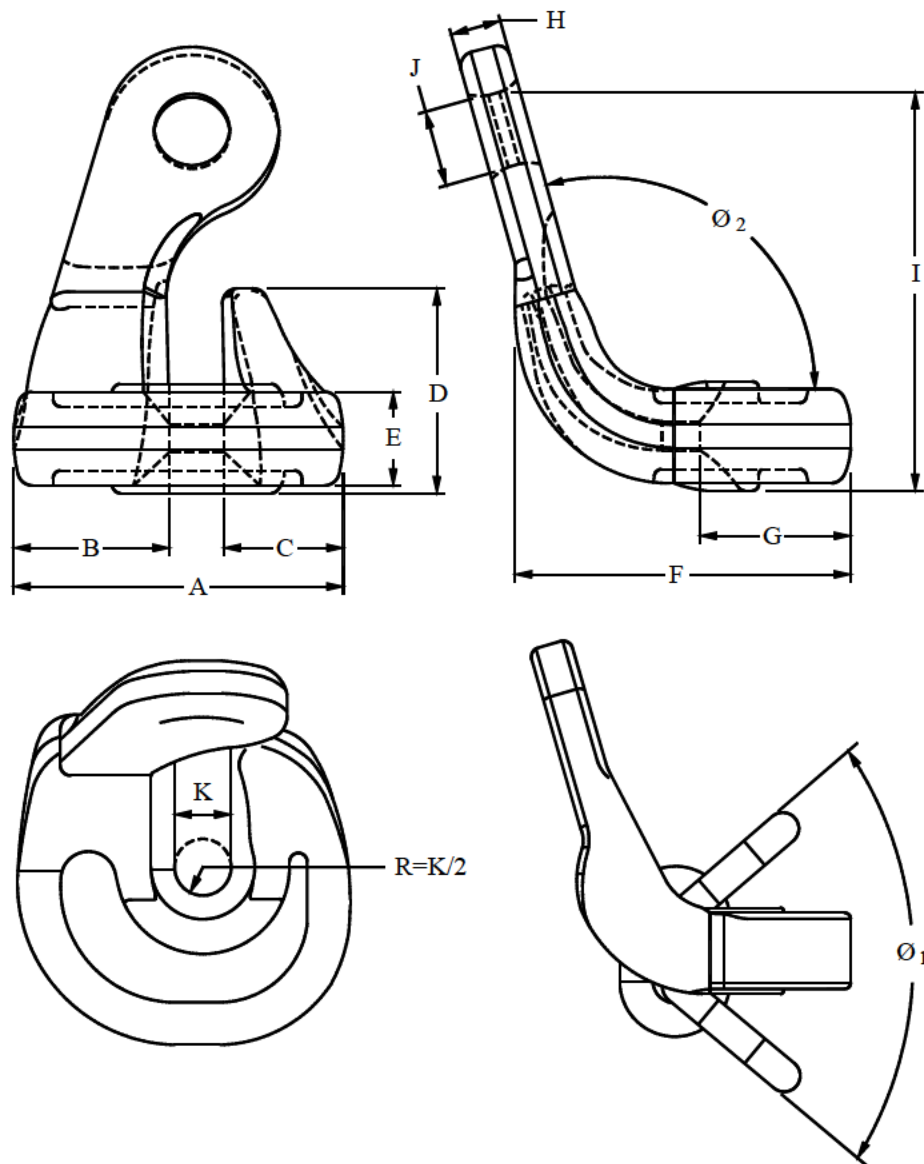
Coupling link dimensions (inches)													
Type	Inside length - A			Width				Bar size diameter - D			Weld diameter - E		
				Outside - B		Inside - C							
	Nominal	Min.	Max.	Min.	Max.	Min.	Max.	Nominal	Min.	Max.	Nominal	Min.	Max.
I	1.020	0.961	1.079	–	1.220	0.453	–	0.354	0.346	0.362	–	–	0.394
II	1.496	1.488	1.503	–	1.889	0.669	–	0.519	0.511	0.519	–	–	0.560

Chain link dimensions (inches)													
Type	Inside length - A			Width				Bar size diameter - D			Weld diameter - E		
				Outside - B		Inside - C							
	Nominal	Min.	Max.	Min.	Max.	Min.	Max.	Nominal	Min.	Max.	Nominal	Min.	Max.
I	0.923	0.923	0.941	–	0.975	0.374	0.394	0.281	0.275	0.281	–	–	0.307
II	1.456	1.417	1.503	–	1.515	0.535	–	0.472	0.464	0.472	–	–	0.502

Note: The "B" dimension includes the weld dimension "E".

Figure 1. Chain assembly – strength, weight and dimensional requirements.

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Type	A	B	C	D	E	F	G	H	I	J	K	R	$\varnothing_1$	$\varnothing_2$
I	2.266	1.047	0.844	1.359	0.650	2.250	1.031	0.359	2.657	0.515	0.375	0.188	50°	105°
II	3.425	1.368	1.368	1.968	1.102	3.780	1.673	0.590	3.661	0.866	0.610	0.305	75°	105°

Tolerances: A maximum; B, C, D, E, F, G and I approximate; H + 0.04/- 0 inch; J and K + 0.028/- 0.028;  $\varnothing_1$  and  $\varnothing_2$  approximate.

Figure 2. Grab hook dimensional requirements.

3.8 Finish. All steel parts with the exception of corrosion resistant steel shall be treated with a metallic-type coating that will provide a cathodic protective coating to the base metal. This protective coating shall not crack, peel, or flake during normal usage and shall withstand any adverse conditions to which the chain assembly will be subjected in accordance with this specification. The protective coating shall in no way prevent compliance with the performance requirements of this specification.

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3.9 Identification of product. The chain assembly shall be identified by a 2 dimensional data matrix applied to the hook portion assembly in such a manner as to minimize the potential for abrasion. The data matrix element shall be a machine-readable information (MRI) marking that is fully readable by either a fixed or portable reader, and when read by the reader will provide as a minimum in a clear text display, part number, national stock number (NSN), contract number and manufacturer's commercial and government entity (CAGE) code. The information need not be in a Unique Identification (UID) format unless serialization is required. The data matrix shall be affixed with a quality grade and size as deemed appropriate by the manufacturer to provide the required information and show no signs of corrosion or abrasion after being subjected to the salt fog (see 4.5.5), abrasion (see 4.5.6) and the sand and dust testing (see 4.5.7). (NOTE: Users of this specification should reference MIL-STD-130 for an in-depth understanding of identification marking and the MRI technology.)

3.10 Workmanship. The chain assembly shall be free from injurious imperfections that may impair appearance and serviceability. The welded chain shall be free from all surface discontinuities in accordance with AWS B1.11. Dimensions and tolerances not specified shall be consistent with standard industry practice.

#### 4. VERIFICATION

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

- a. First article inspection (see 4.3).
- b. Conformance inspection (see 4.4).

4.2 Test conditions. Unless otherwise specified, all tests required by this specification shall be made at standard ambient conditions in accordance with MIL-STD-810.

#### 4.3 First article inspection.

4.3.1 First article sample. The first article test sample shall consist of two chain assemblies of the type required that are representative of the production chain assemblies. The test samples shall undergo all of the tests specified in section 4.5 at a laboratory designated by the manufacturer under the supervision of the procuring activity.

4.4 Conformance inspection. Conformance inspection shall be in accordance with ANSI / ASQ Z1.4 and shall consist of the individual tests (see 4.4.1) for each unit produced, as well as the periodic sampling tests (see 4.4.2) if required by the procuring activity (see 6.2).

- a. Individual tests.
- b. Periodic sampling tests.

4.4.1 Individual tests. Each chain assembly shall be subjected to the examination of product and proof load test (see 4.5.1 and 4.5.2).

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4.4.2 Periodic sampling tests. The periodic sampling tests shall be in addition to the individual tests and shall consist of the tests specified in 4.5.3 and 4.5.4. The manufacturer shall select the type of sampling plan in accordance with ANSI /ASQ Z1.4. The sample size shall be selected in accordance with general inspection level I.

4.4.3 Rejection and retest. Failure of any item being tested and inspected will postpone final acceptance until the cause of rejection has been investigated and corrected for the entire contract quantity. Other than marking and minor workmanship issues as determined by the Government, items that have been tested and failed shall be discarded and not be reworked or delivered as part of any end item lot. If a new production lot is required, the lot will be tested using a tightened sample size in accordance with general inspection level II of ANSI / ASQ Z1.4.

4.5 Test methods.

4.5.1 Examination of product. Each chain assembly shall be inspected to determine compliance with the requirements specified herein with respect to material, dimensions, weight, protective coating, weld quality, marking and workmanship.

4.5.2 Proof load test. Each chain assembly shall be tested with the static load specified in [3.6.1](#) applied to the grab hook and chain links for 30 seconds without permanent deformation or damage when wrapped around a 6-inch diameter bar with the hook fastened into a link maintaining an included angle of  $30 \pm 5$  degrees.

4.5.3 Ultimate load test. Each sample chain assembly shall be subjected to the design strength test in accordance with the procedure in 4.5.2, except that the static load requirements shall be as specified in [3.6.2](#).

4.5.4 Hook test. Each sample chain assembly of the same type shall be joined as specified in [3.4](#) and subjected to a load equivalent to the design strength. The hook and adjoining links shall be examined under full load for positive engagement. There shall be no evidence of slippage or impending failure of the hook, coupling link, or chain.

4.5.5 Salt fog (spray) test. The first article sample chain assembly shall be subjected to salt fog (spray) test in accordance with MIL-STD-810. After completion of the test, the chain assembly shall show no evidence of rust or corrosion as specified in [3.6.3](#).

4.5.6 Abrasion test. The first article sample chain assembly and hook shall be subjected to being dragged across a concrete surface constructed using Portland Cement in accordance with ASTM C150/C150M. The dragging shall be conducted by securing the chain end of the assembly and pulling the hook end across the surface continuously at various angles and speeds including twists and turns for 30 minutes. The chain assembly and hook shall then be dragged through a sand pit in a similar manner as over the concrete floor for another 30 minutes. The sand composition shall be silica sand in accordance with MIL-STD-810 Method 510.5 and size No. 40 or larger in accordance with ASTM C-778. At the conclusion of the test, the 2 dimensional data matrix shall show no evidence of damage or abrasion and shall be readable by both the portable and fixed readers.



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4.5.7 Sand and Dust test. The first article sample chain assembly shall be subjected to the sand and dust test in accordance with MIL-STD-810 Method 510 (Procedure I – Blowing dust). The Air Velocity shall be at least 8.9 m/s to simulate desert-like conditions. After completion of the test, the chain assembly shall show no evidence of rust or corrosion as specified in [3.6.3](#).

4.5.8. Testing sequence. Accomplish all the tests in the sequence as shown from 4.5.2 through 4.5.7. Complete the testing with a final proof load test (see [4.5.2](#)) if there is any evidence of corrosion in the testing done in either 4.5.5, 4.5.6 or 4.5.7.

## 5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or acquisition 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 command. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contracting 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 chain assemblies covered by this specification are to be used in conjunction with MIL-DTL-25959 cargo tie down tensioners for securing vehicles and equipment in cargo type aircraft during flight and for mooring aircraft if done in accordance with an approved maintenance manual.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. Type of chain assembly required (see 1.2).
- c. The specific issue of individual documents referenced (see 2.2.1 and 2.3), if required.
- d. When first article is required (see 3.1).
- e. When periodic sampling tests are required (see 4.4).
- f. Packaging required (see 5.1).

6.3 Subject term (key word) listing.

2 dimensional data matrix  
 coupling link  
 hook  
 machine-readable information (MRI)  
 steel alloy

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6.4 Changes from previous issue. The margins of this specification are marked with vertical lines to indicate where changes from the previous issue were made. 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 and relationship to the previous issue.

## Custodians:

Army - AV  
Navy - AS  
Air Force - 84  
DLA- GS2

## Preparing Activity:

Air Force-84

## Review Activities:

Air Force - 11, 71

## Agent

Air Force- 99

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