

MIL-H-85042A(AS)
 11 February 1983
 SUPERSEDING
 MIL-H-85042(AS)
 22 June 1976

MILITARY SPECIFICATION

HOOKS, BOMB RACK, GENERAL SPECIFICATION FOR

This specification is approved for use by the Naval Air Systems Command, Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers the manufacture and inspection of bomb rack hooks. The test limits of this specification define minimum acceptable capabilities.

1.2 Classification. Bomb rack hooks covered by this specification shall be of the following types:

Type I	BRU-12, BRU-14, BRU-15 and Aero 65 Series Bomb Rack Hooks
Type II	Aero 15 Series Bomb Rack Hook
Type III	Aero 7 and Aero 20 Series Bomb Rack Hooks
Type IV	Deleted
Type V	BRU-10 and BRU-11 (30-inch) Series Bomb Rack t-looks
Type VI	BRU-10 and BRU-11 (14-inch) Series Bomb Rack Hooks
Type VII	Aero 1A Adapter Hook (forward)
Type VIII	Aero 1A Adapter Hook (aft)
Type IX	Aero 27 (30-inch) Series Bomb Rack Hook
Type X	Aero 27 (14-inch) Series Bomb Rack Hook
Type XI	MK 8 Series Bomb Shackle Hook

Beneficial comments, (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to the Naval Air Engineering Center, Engineering Specifications and Standards Department (Code 93), Lakehurst, NJ 08733, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards and handbooks. Unless otherwise specified, the following Specifications, standards and handbooks of the issue listed in that issue of the Department of Defense Index of Specifications and Standards (DoDISS) specified in the solicitation form a part of this specification to the extent specified herein.

SPECIFICATIONS

MILITARY

MIL-I-6868	Inspection Process, Magnetic Particle
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STANDARDS

DOD-STD-100	Engineering Drawing Practices
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MIL-STD-129	Marking for Shipment and Storage
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MIL-STD-130	Identification Marking of U.S. Military Property
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MIL-STD-143	Specifications and Standards, order of Precedence for the Selection of
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MIL-STD-794	Parts and Equipment, Procedures for Packaging and Packing of
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MIL-STD-831	Test Reports, Preparation of
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2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications term a part of this specification to the extent specified herein.

DRAWINGS

Naval Air Systems Command

811AS999	Data List, Test Fixtures, Type I Hooks
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886AS100	Data List, Test Fixtures, Type II Hooks
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439AS250	Data List, Test Fixtures, Type III Hooks
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878AS400	Data List, Test Fixtures, Types V and VI Hooks
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881AS100	Data List, Test Fixtures, Types VII and VIII Hooks
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(Copies of specifications, standards, handbooks, drawings, and publications required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity as directed by the contracting officer.)

2.1.3 Order of precedence. In the event of a conflict between the text of this specification and this references cited herein, the text of this specification shall take precedence.

3. REQUIREMENTS

3.1 First article. The bomb rack hooks, hereinafter called hooks, furnished under this specification, shall be a product which has been inspected and passed the first article inspection specified herein (see 4.3).

3.2 Selection of specifications and standards. Specifications and standards for necessary commodities and services not specified herein shall be selected in accordance with MIL-STD-143.

3.3 Interchangeability. All hooks having the same part number shall be directly and completely interchangeable with each other with respect to installation and performance.

3.4 Identification of parts. All hooks shall be marked as specified on the drawing for the hook being procured in accordance with MIL-STD-130, if not specified on the drawings. The item identification and part number requirements of DOD-STD-100 shall govern the part number and changes thereto.

3.5 Construction. The construction of the hooks shall be in accordance with drawings for the hook being procured and as specified herein (see 6.2g).

3.5.1 Machining and grinding of hooks. Care shall be exercised during the machining of the hooks to prevent irregularities and tool marks on the hooks, especially in the throat area and inside the pivot hole. All grinding shall be longitudinal to the hook, and in no case across the throat of the hook,

3.6 Performance. The hooks satisfy all performance requirements when subjected to the following inspections in the order specified in Tables III and IV:

- a. Inspection, Hooks (4.6.1)
- b. Magnetic Particle Inspection (4.6.2)
- c. Ultimate Load (4.6.3)
- d. Dynamic Load (4.6.4)

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3.7 Prestressing of hooks. If required, to meet the dynamic loads (see 3.6), each hook, after final processing, may be subjected to a prestress load level (see 4.3.1 and 6.5) as determined and recommended by the contracting activity. Determined prestress load values shall be considered valid only for the particular heat of steel used in the manufacture of those hooks subjected to prestress determination. Any subsequent heat shall require determination of a new value. In the prestressing operation, the hook is to be held in a test fixture as specified in 2.1. This results in the load on the hook being concentrated on the lug bearing surface horizontally from the hook pivot hole centerline as shown in Table I. The prestress load on the hook shall be gradually increased for a period of 1 minute, held at the actual prestress load for a minimum of 1 minutes and a maximum of one and one half minutes, and gradually unloaded over a period of 1 minute. Following prestressing, the hook shall be subjected to the magnetic particle inspection specified in 4.6.2. Type IX and X hooks shall be prestressed as shown in Table 1.

3.8 Workmanship. The workmanship displayed in fabrication and assembly of the hooks shall be such as to assure, within design limitations, the ability Of the hooks to meet their performance requirements under all applicable environmental conditions specified herein. Unauthorized repair, welding, heavy burns, or parts assembled by introduction of high stresses not prescribed in the drawings, are typical signs of inferior workmanship and shall be cause for rejection. The standards of workmanship exhibited in the approved first article sample, subject to any qualification stated in the government's notice of approval, shall be determinative of the requirements of the contract relative to workmanship.

TABLE I. LOAD APPLICATION POINTS AND PRESTRESS LOADS.

HOOK TYPE	DISTANCE "X" IN INCHES ¹			PRESTRESS LOAD (POUNDS)
	ULTIMATE	DYNAMIC	PRESTRESS	
Type II	0.584	0.584	0.584	
Type III	0.800"	0.800	0.800	
Type IX	0.737	0.737	0.737	20,600
Type X	0.737	0.737	0.737	16,500
Type XI	0.437	0.437	0.437	

The values of Table I have no tolerances because they are direct functions of the test fixtures and the "X" distances will be properly met if the requirements of 4.5 are met.

1 See figure 1 for illustration of "X" distance

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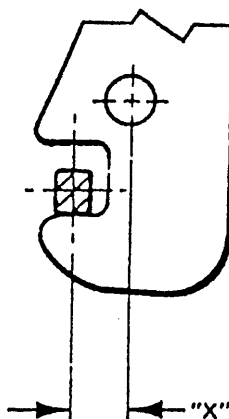


FIGURE 1. Measurement of "X" Distance.

4. QUALITY ASSURANCE PROVISIONS (See 6.4)

4.1 Responsibility of inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements as specified herein, Except as otherwise specified in the contract, the contractor may use his own 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 that the supplies and services conform to prescribed requirements.

4.2 Classification of inspection, The inspection of all types of hooks shall be classified as follows:

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

4.3 First article inspection. First article inspection shall consist of all of the inspections listed in Table III. First article inspection report format shall be in accordance with MIL-STD-831 (see 6.3).

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4.3.1 Sampling for first article inspection and prestress level. Unless otherwise specified, as soon as practicable after award of contract the contractor shall furnish hook samples to the approved government testing activity for first article test and the determination of a recommended prestress load level. The sample shall consist of the first 25 hooks manufactured on contract or purchase order. All samples shall be subjected to the tests specified in 4.6.1 and 4.6.2. Five samples shall be subjected to the test specified in 4.6.3. Twenty samples shall be used for establishing a recommended prestress load and shall be tested to verify acceptable fatigue life (see 3.7) in accordance with 4.6.4. For data purposes, measurements as to the amount of stretching in the hook as a result of the prestressing shall be made prior to the dynamic load test. No prestress loads are required for hook types I, V, VI, VII and VIII. Specific prestress load values for hook types IX and X are provided in Table I. Failure of the hooks to pass any of the first article inspections shall be cause for rejection (see 6.2.1).

4.4 Quality conformance inspections. Quality conformance inspections consist of those tests conducted on hooks submitted for acceptance under the contract or purchase order. Acceptance of hooks shall be on an inspection lot basis. Quality conformance inspection shall consist of the following inspections:

- a. Individual inspections (see 4.4.1)
- b. Sampling inspections (see 4.4.2)

Quality conformance inspection report format shall be in accordance with MIL-STD-831 (see 6.3).

4.4.1 Individual Inspections. Individual inspections are those inspections conducted on each hook submitted in accordance with inspections listed in Table IV, Group 1. Failure to pass any of these inspections shall be cause for rejection of the hook.

4.4.2 Sampling inspections. "A random sampling of three hooks shall be selected by the procuring activity from each production lot, which shall consist of 100 hooks or less, and shall be subjected to the inspections listed in Table IV, Groups 1 and 2. Groups 1 inspections shall be conducted prior to Group 2 inspections. Failure to pass these inspections shall be cause for rejection of the lot.

4.5 Inspection conditions. Unless otherwise specified, all inspections shall be performed under the following conditions:

- a. Room temperature. Room ambient $25 \pm 10^{\circ}\text{C}$ ($77 \pm 18^{\circ}\text{F}$) indicated.
- b. Humidity. Room ambient.

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- c. Load application. The following conditions shall apply when the hooks are subject to loading during prestressing (see 3.8 and 4.3.1), ultimate load (see 3.6) and dynamic load see (3.6):
 1. All tests shall be applied vertically downward, normal to the hook lug bearing surface.
 2. All test loads shall be applied using the applicable test fixtures (see 2.1).

NOTE

Type IX, X, and XI test fixture drawings shall be obtained from the contracting activity (see 6.2).

3. Prestress, ultimate and dynamic loads shall be applied as specified in Tables I and II.

4.6 Inspection methods. Unless otherwise specified, the following inspections shall be performed on all types of hooks in the sequence shown in Tables III and IV.

4.6.1 Inspection, hooks. Each hook produced shall be thoroughly examined to assure compliance with 3.5. Any of the following defects shall be cause for rejection of that hook and, at the discretion of the procuring activity, the entire related lot.

- a. One or more dimensions out of tolerance.
- b. Improper plating.
- c. Thickness of plating not in accordance with the specified tolerance.
- d. Improper hardness level.
- e. Finish not in accordance with the specified values.
- f. Packaging-not in accordance with contract or purchase order (see 5.).

4.6.2 Magnetic particle inspection. Each hook shall be subjected to magnetic particle inspections in accordance with MIL-I-6868. Magnetic particle inspections shall be performed after final machining, after heat treating, and after prestressing. Special attention shall be given to the throat area and pivot pin hole area of the hooks. Both the longitudinal and circular magnetization methods shall be used. A current of 2,000 amperes minimum shall be applied for the circular magnetization method using a copper bar at the pivot pin hole and throat. A 2,000 ampere current shall also be used for the longitudinal magnetization method. There shall be no evidence of cracks, seams, discontinuity of surface or other detrimental defects in any region of the hook, except for surface indentations on the lug bearing surface which occur as a result of the prestress operation. Cracks in the plating along the restress indentation line are acceptable. Chipping of the plating or any of the defects listed above shall be cause for rejection.

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TABLE II. ULTIMATE TENSION LOADS, DYNAMIC LOADS AND CYCLE RANGES.

HOOK TYPE	ULTIMATE LOADS (POUNDS)	REQUIRED CYCLES	DYNAMIC	
			LOW RANGE (POUNDS)	HIGH RANGE (POUNDS)
Type I	30,000	150,000	2,250	7,750
Type II	15,000	75,000	2,250	7,750
Type III	25,000	250,000	2,250	7,750
Type IV (Deleted)				
Type V	70,000	300,000	8,000	12,000
Type VI	50,000	150,000	8,000	12,000
Type VII	45,000	250,000	2,250	7,750
Type VIII	50,000	250,000	2,250	7,750
Type IX	28,000	250,000	2,250	7,750
Type X	20,000	150,000	2,250	7,750
Type XI	13,000	25,000	2,250	7,750

TABLE III. FIRST ARTICLE INSPECTIONS - SCHEDULE AND SEQUENCE¹.

TESTS	TEST PARAGRAPH	SEQUENCE AND NUMBER OF SAMPLES
Inspection, Hooks ²	4.6.1	All
Magnetic Particle Inspection	4.6.2	All
Ultimate Load	4.6.3	5
Dynamic Load	4.6.4	20

1 Inspection sequence is as listed in the table.

2 If prestressing is required, it shall be accomplished after hook inspection and prior to magnetic particle inspection.

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TABLE IV. QUALITY CONFORMANCE INSPECTIONS - SCHEDULE AND SEQUENCE).

TESTS	TEST PARAGRAPH	SEQUENCE AND NUMBER OF SAMPLES
<u>Group 1</u> ²		
Inspection, Hook	4.6.1	All
Magnetic Particle Inspection	4.6.2	All
<u>Group 2</u>		
Ultimate Load	4.6.3	3
Dynamic Load	4.6.4	4

¹ Inspection sequence is as listed in the table.

² Inspect all books.

³ These inspections are performed on 1/3 of sample hooks submitted.

⁴ These inspections are performed On 2/3 Of sample hook's submitted.

4.6.3 Ultimate Load test. The hook shall be installed within the appropriate test fixture in 4.5 and subjected to the test loadings as follows. Loading shall be applied gradually until the hook is supporting the appropriate tension load of Table II. This load shall be held for 60 seconds during which time there shall be no fracture of the hook. After holding the load as specified, the hooks shall be tested to destruction if ultimate strength data is required for prestress operations (see 6.5).

4.6.4 Dynamic load (fatigue life) test. The hook shall be installed within the appropriate test fixture in 4.5 and subjected to a "pull-pull" type test loading as follows. The hook shall be subjected to the required dynamic load cycles with the loads beginning at the low range, increasing to the high range, and reducing to the low range during each cycle. The cycling rate shall be 1,800 or 3,600 cycles per minute with a load versus time curve that is approximately sinusoidal. Failure of the hook to hold the dynamic loads throughout the required dynamic cycles shall be cause for rejection. Numbers of required cycles and loading ranges are given in Table II.

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5. PACKAGING

5.1 Hook preservation and packaging. Hook preservation and packaging shall be in accordance with levels A, B or C of MIL-STD-794 and as defined in the contract, without the use of preservation compound.

5.2 Marking. All shipping containers shall be marked in accordance with the requirements of MIL-STD-129 with the following information:

HOOK, BOMB RACK , P/N
 MILITARY SPECIFICATION NO. MIL-H-
 PRESERVED (DATE)
 DOMESTIC OR EXPORT PACKED (AS APPLICABLE)
 GOV'T ORDER NO. (OR CONTR. NO. IF ORDER NO. NOT ASSIGNED)
 NAME OF SUPPLIER (AND NAME OF MANUFACTURER IF NOT THE SAME)
 MANUFACTURER'S CODE IDENTIFICATION NUMBER

6. NOTES

6.1 Intended use. The hooks are used as integral parts of bomb racks or store suspension equipment for attachment of airborne stores to aircraft.

6.2 Information for contracting officer. Contracts or purchase orders shall specify the following:

- a. Title, number, revision letter and date of this specification.
- b. Selection of applicable levels of preservation, packaging and packing required.
- c. Samples subjected to sampling inspection shall not be considered or accepted as part of the contract or purchase order.
- d. Items of data required (see 6.3).
- e. Name and location of government approved test laboratory.
- f. Determine sampling test selection [see 4.4.2).
- g. Applicable data package for type(s) of hook(s) being procured (see 3.5).
- h. Name and location of government representative responsible for random selection of test samples (see 4.4.2).
- i. For Type IX, X, and XI hooks, name and location of activity to supply test fixture drawings.

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6.2.1 Contract or purchase order provision. Contracts or orders shall specify the following provision for first article inspection.

6.2.1.1 First article. When a first article is required for inspection and approval (see 3.1, 4.3.6.2 and 6.4), the contract or purchase order shall specify the following provision for first article inspection. When a contractor is in continuous production of hooks from contract to contract, consideration should be given to waive the first article inspections. If inspection is required, indicate:

- a. If first article inspections are conducted at the contractor's plant or a government approved laboratory, an inspection report shall be forwarded to the procuring activity for verification,
- b. That the approval of first article samples or the waiving of the first article inspection shall not relieve the contractor of his obligation to fulfill all other requirements of the specification and contract.

6.3 Contract data requirements. When this specification is used in an acquisition which incorporates a DD Form 1423, Contract Data Requirements List (CDRL), the data requirements identified below shall be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the approved CDRL incorporated into the contract. When the provisions of DAR 7-104.9 (n) (2) are invoked and the DD Form 1423 is not used, the data specified below shall be delivered by the contractor in accordance with the contract or purchase order requirements. Deliverable data required by this specification is cited in the following paragraphs.

Paragraph	Data Requirement	Applicable DID
4.3	First Article Inspection Reports	DI-T-5329 - Inspection Test Reports
4.4	Quality Conformance Inspection Reports	DI-T-5329 - Inspection Test Reports

(Data item descriptions related to this specification, and identified in section 6 will be approved and listed as such in DoD 5000.19L., Vol. II, AMSDL. Copies of data item ascriptions required by the contractors in connection with specific acquisition functions should be obtained from the Naval Publications and Forms Center or as directed by the contracting officer.)

6.4 Quality assurance definitions. Definitions for quality assurance terms are in accordance with MIL-STD-109.

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6.5 Purpose of prestressing. In order to secure a substantial increase in fatigue life types II, III, IX, X and XI hooks are prestressed. This benefits the suspension hook by Cold working the plating and the outer surface of metal, placing the surface fibers under residual compressive stress. The prestress load is generally 60 to 85 percent of the suspension hook's ultimate tensile strength.

6.6 Changes from previous issue. Asterisks are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Preparing Activity:
Navy - AS
Project No. 1095-N166

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c. Reason/Rationale for Recommendation:	
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7a. NAME OF SUBMITTER <i>(Last, First, MI) - Optional</i>	b. WORK TELEPHONE NUMBER <i>(Include Code) - Optional</i>
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