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MILITARY SPECIFICATION

BOLT, EYE, SHOULDER

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

1. SCOPE

1.1 This specification covers a forged, shoulder type, threaded eye bolt.

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

Military

MIL-P-116 - Preservation, Methods of
MIL-H-3982 - Hardware (Fasteners and Related Items), Packaging and Packing for Shipment and Storage of

STANDARDS

Military

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-109 - Quality Assurance Terms and Definitions
MS51937 - Bolt, Eye-Shoulder

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

FSC 5306

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

American Society for Testing and Materials

ASTM-E112-61 - Metals, Test Methods (Except Chemical Analysis)

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.)

National Bureau of Standards

Handbook H28, Part 1 - Screw-Thread Standards for Federal Services

(Application for copies should be addressed to the Superintendent of Documents, Government Printing Office, Washington, D. C. 20401)

3. REQUIREMENTS

3.1 Material. Eye bolts shall be forged from forging quality steel having a grain size of ASTM 5 or finer as specified in American Society for Testing and Materials (ASTM)-E112-61. The sulphur content of the steel shall not exceed 0.05 percent, and the phosphorous content shall not exceed 0.04 percent. Welding to cover forging defects shall not be permitted.

3.2 Heat treatment. Eye bolts, after forging and before threading shall be normalized, normalized and tempered, or quenched and tempered for grain refinement, relief of forging stresses and development of mechanical properties. The finished eye bolts shall be descaled.

3.3 Dimensions and tolerances. The dimensions and tolerances of the eye bolts shall be as specified on Military Standard MS51937 or applicable drawings (see 6.5).

3.4 Threads

3.4.1 Series and class. Threads shall be unified coarse series, class 2A (UNC-2A), in accordance with Handbook H28, Screw Thread Standards for Federal Services.

3.4.2 Length of threads. The thread length shall be the distance from the point to the last full form thread as specified on MS51937 (see 6.5).

3.5 Protective coating. Unless otherwise specified, eye bolts shall not be painted or otherwise coated, when used for lifting.

3.6 Performance and product characteristics.

3.6.1 Proof load. The eye bolts shall be capable of withstanding the proof loads specified in Table I.

Table I. Proof Load

Size (Thread Diameter), Inches		Proof Load * Pounds, Minimum
1/4	(.250)	600
5/16	(.312)	1200
3/8	(.375)	2100
7/16	(.437)	3000
1/2	(.500)	3900
9/16	(.562)	4500
5/8	(.625)	6000
3/4	(.750)	9000
7/8	(.875)	10000
1	(1.000)	12000
1-1/8	(1.125)	15000
1-1/4	(1.250)	22500
1-1/2	(1.500)	27000
1-3/4	(1.750)	33000
2	(2.000)	39000

* The opposite ends of the diameter across the eye shall be marked with a prick punch prior to the proof load test as specified in 4.4.2. The proof load shall be that vertical load which can be applied without causing permanent deformation exceeding 0.01 inch between punch marks. Load shall be applied when the eyebolt is properly seated and shall be applied in the axis of the shank. (For safe working loads, see 6.4).

3.6.2 Breaking load. The eyebolts shall be capable of withstanding the breaking loads specified in Table II without breaking, cracking, or fracturing.

TABLE II. Breaking Load

Size (thread diameter), inches		Breaking load * pounds, minimum
1/4	(.250)	2000
5/16	(.312)	3400
3/8	(.375)	5000
7/16	(.437)	6900
1/2	(.500)	9200
9/16	(.562)	11830
5/8	(.625)	14700
3/4	(.750)	21700
7/8	(.875)	30000
1	(1.000)	39400
1-1/8	(1.125)	49600
1-1/4	(1.250)	63000
1-1/2	(1.500)	91300
1-3/4	(1.750)	123500
2	(2.000)	162500

* The breaking load table is to test the ultimate strength of the threaded shank of the eye bolt. Loads shall be applied when the eyebolt is properly seated and shall be applied in the axis of the shank.

3.7 Identification. Each eyebolt shall have the manufacturer's name or identification mark drop-forged into the material. Location of this identification on the eyebolt shall be at the manufacturer's option.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own facilities or any commercial laboratory 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.

4.1.1 Inspection terms and definitions. Inspection terms and definitions shall be as defined in MIL-STD-109.

4.2 Sampling for lot acceptance.

4.2.1 Inspection lot. A lot shall consist of all eyebolts of the same size and material, manufactured essentially under the same condition and offered for inspection at one time.

4.2.2 Sampling for examination. A random sample of eyebolts shall be taken from each lot in accordance with MIL-STD-105, Inspection Level II. The Acceptable Quality Levels (AQL) shall be as specified in Table III and shall apply to the group of defects and not to each defect.

4.2.3 Sampling for test. For the proof load test, a random sample of eyebolts shall be taken from each lot in accordance with MIL-STD-105, Inspection Level S3. The AQL shall be 1.5 percent defective.

4.2.4 Sampling for packaging and packing. Sampling for inspection of the requirements of Section 5 shall be in accordance with MIL-H-3982.

4.3 Examination.

4.3.1 Visual and dimensional. Each eyebolt taken at random as specified in 4.2.2 shall be examined to verify conformance with this specification. Examination shall be conducted as specified in Table III.

TABLE III. Classification of Defects

Categories		Defects	Inspection Method
Critical		None defined	
Major		AQL = 1.5 percent defective	
	101	Grain size, not as specified (3.1)	Test [1]
	102	Inside diameter of eye not as specified (3.3)	SIE [2]
	103	Diameter of shank not as specified (3.3)	SIE
	104	Eye section diameter not as specified (3.3)	SIE
	105	Diameter of shoulder not as specified (3.3)	SIE
	106	Over length not as specified (3.3)	SIE
	107	Length of shank not as specified (3.3)	SIE
	108	Height of shoulder not as specified (3.3)	SIE
	109	Threads, maximum pitch diameter not as specified (3.4.1)	Go Ring Gage
	110	Threads, minimum pitch diameter not as specified (3.4.1)	Lo Ring Gage
	111	Thread length not as specified (3.4.2)	SIE
	112	Missing identification (3.7)	Visual
	113	Grain size not as specified (3.1)	SIE
Minor		AQL = 4.0 percent defective	
	201	Finished eyebolts not descaled (3.2)	Visual

Note 1: See ASTM Handbook
2: Standard inspection equipment

4.3.2 Packaging and packing. Examination of packaging and packing shall be as specified in MIL-H-3982.

4.4 Test.

4.4.1 Material. The contractor shall furnish certification that the material meets the requirements specified in 3.1.

4.4.1.2 Grain size. Eyebolts shall be tested for grain size of ASTM 5, or finer, as specified in American Society for Testing Materials (ASTM)-E112-61.

4.4.2 Proof load. Each sample eyebolt, taken as specified in 4.2.3, shall be punch marked, as specified in Table I, and tested to determine compliance with 3.6.1. The eyebolt shall be screwed into a steel block secured in one jaw of the test machine and held to the other jaw by means of a steel pin passing through the eye of the eyebolt. The applicable load shall be applied. The steel test pin shall have a diameter not less than one half the nominal inside diameter of the eye of the eyebolt. $\left(\frac{ID}{2}\right)$ Acceptance or rejection of the lot shall be based upon the AQL specified in 4.2.3.

4.4.3 Breaking load. One eyebolt shall be taken at random from each inspection lot specified in 4.2.3 and subjected to a breaking load test to determine compliance with 3.6.2. The steel test pin shall have a diameter not smaller than 1/16 inch less than the nominal inside diameter of the eye of the eyebolt (ID-1/16 inch). Failure of the eyebolt shall be cause for test of two additional eyebolts also taken at random from the same lot. Failure of one or both of the second test samples shall reject the lot.

5. PREPARATION FOR DELIVERY

5.1 Preservation and packaging. Preservation and packaging shall be Level A or Level C as specified in MIL-H-3982, except Level A shall include the following requirement:

5.1.1 Unit package quantities.

1. Eyebolts up to 1 pound each - 25 per package.
2. Eyebolts over 1 pound to 3 pounds each - 10 per package.
3. Over 3 pounds each - bulk packed directly into shipping container (see 5.2).

5.2 Packing. Packing shall be in accordance with Level A, B, or C as specified in MIL-H-3982.

5.3 Marking. In addition to the marking required by the contract or order, packages and shipping containers shall be marked in accordance with MIL-H-3982.

6. NOTES

6.1 Intended use. The eyebolts covered by this specification are a standard commercial product used primarily for overhead load lifting.

6.2 Ordering data. Procurement documents should specify the following:

a. Title, number, and date of specifications.
b. Dimensions (see 3.3).
c. Level of protection required (see 5.1 and 5.2).
d. Protective coating, if applicable (see 3.5).
e. Drawing number, if required.
f. Proof-load and breaking-load (see 4.4.2 and 4.4.3).

6.3 Suggested contractual features When other sizes are required, the procurement documents shall include a reference to a drawing for these other sizes, as well as requirements for proof load and breaking load (see 3.6.1 and 3.6.2).

6.4 Safe working loads. For design purposes, the safe working loads are as specified on MS51937.

6.5 Military procurement. Whenever possible, Military use of eyebolts shall be limited to those sizes shown on MS51937.

6.6 Standard data. The requirements of this specification are in agreement with the requirements of the current American Standards Association (ASA) proposal for eyebolts as generated by (ASA) B18 Subcommittee 15.

Custodian:
Army - WC
Navy - SH
Air Force - 69

Reviewer activities:
Army - MO, MU, WC
Navy - SH
Air Force - 69
DSA - IS
NSA -

Preparing activity:
Army - WC

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User activities
Army - EL, MI, GL
Navy - YD, MC
Air Force - None