

INCH-POUND

MIL-DTL-45912B

6 August 2013

SUPERSEDING

MIL-B-45912A

8 August 1969

DETAIL SPECIFICATION

BOLT, SELF-LOCKING, HEXAGON HEAD, STEEL

INACTIVE FOR NEW DESIGN AFTER 6 August 2013

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

1. SCOPE

1.1 Scope. This specification covers one type of steel, hexagon head, self-locking bolt.

1.2 Classification. The bolt shall be furnished in the following compositions:

Composition A – SAE Grade 5

Composition B – SAE Grade 8

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 of this standard. This section does not include documents cited in other sections of this standard or recommend 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 documents cited in sections 3, 4, or 5 of this standard, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications and standards 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.

FEDERAL STANDARDS

FED-STD-H28/2	Screw-Thread Standards for Federal Services Section 2
	Unified Inch Screw Threads- UN and UNR Thread Forms
FED-STD-H28/20	Screw-Thread Standards for Federal Services Section 20
	Inspection Methods for Acceptability of UN, UNR, UNJ, M and MJ Screw Threads

Comments, suggestions, or questions on this document should be addressed to Defense Supply Center Philadelphia (DSCP), ATTN: DSCP-NASA, 700 Robbins Avenue, Philadelphia, PA 19111-5096 or e-mail to dscpg&ispeccomments@dla.mil . 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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DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-DTL-16232 Phosphate Coating, Heavy, Manganese or Zinc Base

DEPARTMENT OF DEFENSE STANDARDS

MS35763 Bolt, Self-Locking, Hexagon Head, Steel, Grade 5,
UNC-2A and UNF-2A (Inactive for new design)

MS35764 Bolt, Self-Locking, Hexagon Head, Steel, Grade 8,
UNC-2A and UNF-2A (Inactive for new design)

(Copies of these documents are available online at <https://assist.dla.mil/quicksearch/> or from the Standardization Document 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.

AMERICAN SOCIETY FOR QUALITY (ASQ)

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

(Copies of this document are available from www.asq.org American Society for Quality Control, 600 North Plankinton Avenue, Milwaukee, WI 53203.)

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

SAE AMS-QQ-P-416 Plating, Cadmium (Electrodeposited)
SAE-J429 Fasteners, Externally Threaded, Mechanical and Material
Requirements for

(Copies of these documents are available from www.sae.org or the Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096-0001.)

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 Material. The bolts shall conform to the material composition of SAE Grade 5 or Grade 8 in accordance with SAE J429.

Composition A – SAE Grade 5 (MS35763)
Composition B – SAE Grade 8 (MS35764)

3.2 Design. The bolts shall conform to the design, dimensions and tolerances specified on MS35763 or MS35764 and in Figure 1 and Table I.

3.3 Protective finish. The bolts shall be cadmium plated or phosphate coated as specified on the applicable Military Standard. Cadmium plating shall conform to the requirements of Type II, Class 2 of SAE AMS-QQ-P-416. Zinc phosphate coating shall conform to the requirements of Type Z, Class 2 of MIL-DTL-16232.

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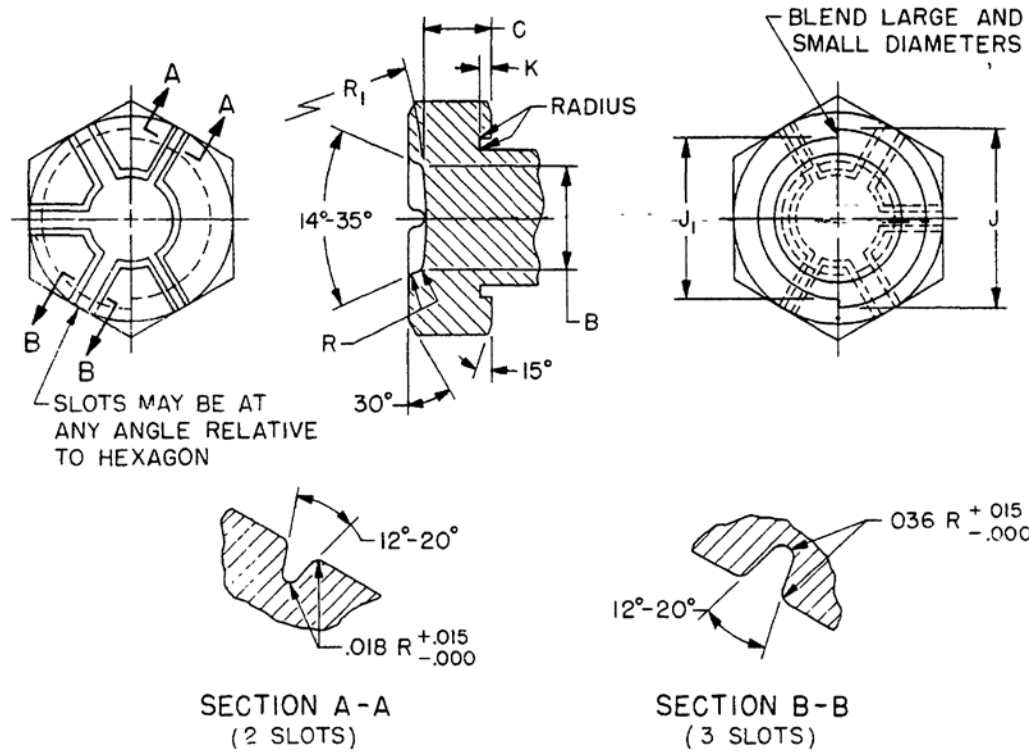


FIGURE 1. Head Design.

TABLE I. Head Dimensions.

Nominal Size			1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1	1-1/4
B	Recess Dia	Max	.166	.208	.250	.288	.332	.374	.416	.500	.584	.666	.834
		Min	.146	.188	.230	.268	.312	.354	.396	.480	.564	.646	.814
C	Checking Height	Max	.110	.145	.185	.205	.220	.260	.290	.335	.390	.455	.590
		Min	.090	.125	.165	.185	.200	.240	.270	.315	.370	.435	.570
J	Recess Dia	Max	.317	.396	.474	.536	.630	.693	.750	.875	1.000	1.125	1.380
		Min	.307	.386	.464	.526	.620	.683	.740	.865	.990	1.115	1.370
K	Recess Depth	Max	.007	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013
		Min	.004	.010	.010	.010	.010	.010	.010	.010	.010	.010	.010
J ₁	Recess Dia	Max	.312	.375	.437	.500	.562	.624	.687	.812	.937	1.062	1.312
		Min	.302	.365	.427	.490	.552	.614	.677	.802	.927	1.052	1.302
K	Recess Depth	Max	.007	.013	.013	.013	.013	.013	.013	.013	.013	.013	.013
		Min	.003	.006	.006	.006	.006	.006	.006	.006	.006	.006	.006
R	Radius	Max	.031	.031	.031	.031	.031	.031	.031	.031	.062	.062	.062
		Min	.018	.018	.018	.018	.018	.018	.018	.018	.031	.031	.031
R ₁	Radius	Max	2.00	2.00	2.00	2.00	2.00	2.00	3.50	3.88	4.62	6.88	19.88
		Min	1.50	1.50	1.50	1.50	1.50	1.50	3.00	3.38	4.12	6.38	19.38

NOTE: Wide slots in top of head located with wide recess on underside of head.
Narrow slots in top of head located with narrow recess.

3.3.1 Hydrogen embrittlement. Cadmium plated, Grade 8 bolts specified herein shall be subjected to SAE AMS-QQ-P-416 embrittlement relief requirement as follows:

<u>Time between plating and baking</u>	<u>Temperature for baking</u>	<u>Time for baking</u>
Shall not exceed 4 hours	375°F ± 25°F	23 hours minimum

In addition, the bolts shall be subjected to the embrittlement relief test of SAE AMS-QQ-P-416.

3.4 Mechanical properties. The mechanical properties of the bolts shall meet the requirements as specified in Table II (see 4.4.3 and 4.4.4).

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TABLE II. Mechanical Properties.

Composition	Properties	Bolt Size - Inches	
		Up to 1" Inclusive	Over 1"
A	Tensile Strength PSI Min	120,000	105,000
	Proof Load PSI	85,000	74,000
	Hardness Rockwell C Range	25-34	19-30
B	Tensile Strength PSI Min	150,000	150,000
	Proof Load PSI	120,000	120,000
	Hardness Rockwell C Range	32-38	32-38

3.5 Threads. Threads shall be UNC or UNF, class 2A, as specified on the applicable Military standard in accordance with FED-STD-H28/2. Acceptability of threads shall be in accordance with FED-STD-H28/20, system 22.

3.6 Head.

3.6.1 Head Taper. The taper of the head (angle between one side or sides of the head and the axis of the fastener) shall not exceed 2 degrees, with the specified width across the flats being the largest dimensions.

3.6.2 Bearing surface. The bearing surface of the head shall be at right angles to the axis of the body within 2 degrees for bolt sizes up to and including one inch and within 1 degree for bolt sizes larger than one inch. The bearing surface of the head shall be concentric with the axis of the body within 3 percent of the maximum width across the flats. The diameter of bearing surface shall be equal to 95 percent of maximum width across flats within plus or minus 5 percent.

4. VERIFICATION

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 in the contract or order, the supplier 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 supplies and services conform to prescribed requirements.

4.2 Sampling.

4.2.1 Lot Size. A lot shall consist of all bolts of the same size, composition, protective finish and thread produced under essentially the same conditions and submitted for inspection at one time.

4.2.2 Sampling for examination. A random sample of bolts shall be taken from each lot in accordance with Inspection Level II of ASQ Z1.4.

4.2.3 Sampling for tests. A random sample of bolts shall be taken from each lot in accordance with Table III. Any bolt which fails to pass any of the tests shall be a defective and cause for rejection of the entire lot represented.

TABLE III. Sample Size and Acceptance – Rejection Number for Test.

<u>Lot Size</u>	<u>Sample Size</u>	<u>AC</u>	<u>RE</u>
2 – 50	2	0	1
51 – 500	3	0	1
501 – 35000	5	0	1
35000 – over	8	0	1

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4.3 Examination. The sample bolts of 4.2.2 shall be examined as specified in Table IV. Any bolt which contains one or more defects shall be a defective.

TABLE IV. Classification of Defects.

<u>Categories</u>	<u>Defects</u>	<u>Inspection Method</u>
<u>Critical</u>	None	
<u>Major</u>		
101	Threads (3.5)	*SIE
102	Width across flats (3.2)	SIE
103	Undercut depth of head (3.2)	SIE
104	Slot and recess radius of head (3.2)	SIE
105	Bearing surface of head (3.6.2)	SIE
<u>Minor</u>		
201	Overall length (3.2)	SIE
202	Thread length (3.2)	SIE
203	Head height (3.2)	SIE
204	Body diameter (3.2)	SIE
205	Head taper (3.6.1)	SIE
206	Other dimensions (3.2)	SIE
207	Protective finish (3.3)	Visual

*SIE = Standard Inspection Equipment

4.4 Tests.

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

4.4.2 Protective finish. The contractor shall furnish certification that the protective finish conforms to the requirements of the specifications referenced in 3.3. When required by the procuring agency, the sample bolts shall be tested as specified in the protective finish specifications.

4.4.3 Proof load and tensile strength. The contractor shall furnish certification that the tensile strength and proof load bolts conform to the requirements specified in 3.4. When required by the procuring agency, the sample bolts specified in Table II shall be tested for hardness (see Table I). The Rockwell hardness shall be measured at mid-radius on a transverse section taken one diameter from the point of the bolt.

4.4.4 Hardness. The contractor shall furnish certification that the hardness conforms to the requirements specified in Table I. When required by the procuring agency, the sample bolts specified in Table II shall be tested for hardness (see Table I). The Rockwell hardness shall be measured at mid-radius on a transverse section taken one diameter from the point of the bolt.

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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 materiel 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 bolt covered by this specification is intended for use when a self-locking fastener is needed or where the reduction of fatigue failure is desired. Typical applications include uses as cylinder head bolts, flywheel housing bolts, connecting rod bolts, and as bearing cap screws. The bolt may be used in tapped holes or with nuts.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number and date of this specification.
- b. Title, number and date of applicable Military standard(s) (see 3.2).
- c. Applicable MS part number (see 3.2).
- d. Copies and distribution of test certifications.
- e. Packaging requirements (see 5.1).

6.3 Subject term (key word) listing.

Grade 5
Grade 8
SAE Grade 5
SAE Grade 8

6.4 Description. The bolt covered by this specification is a one piece, free-spinning type of self-locking bolt. Locking action is provided by a flexible diaphragm which is formed between the slotted segments of the upper part of the bolt head and the circular recess adjacent to the shank in the lower part of the head. This diaphragm acts as a controlled spring element when the head is wrenched against a rigid seat. When used as a bearing cap screw, the material which the head of the bolt seats should be hard enough to form a rigid seat.

6.5 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.

Custodian:
Army – AR
Air Force – 99

Preparing Activity:
DLA - IS

(Project 5306-2013-003)

Review Activity:
Army - MI

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