



SURFACE VEHICLE STANDARD	J429	MAY2014
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Superseding J429 APR2013		
Mechanical and Material Requirements for Externally Threaded Fasteners		

RATIONALE

Allow higher S and P percentages in alloy steel than allowed in Table 2 for manufacturing Grade 8 screws and bolts by hot forging or machining from bar. As an example, this enables producers of Grade 8 bolts and screws to use SAE 4140 steel that might not otherwise be acceptable for hot forging and machining from bar. The S and P values in Table 2 must be adhered to for all cold formed fasteners.

1. SCOPE

This SAE Standard covers the mechanical and material requirements for inch-series steel bolts, screws, studs, screws for sems¹, and U-bolts² in sizes to 1-1/2 in. inclusive.

The term “stud” as referred to herein applies to a cylindrical rod of moderate length threaded on either one or both ends or throughout its entire length. It does not apply to headed, collared, or similar products which are more closely characterized by requirements shown herein for bolts.

The mechanical properties included in Table 1 were compiled at an ambient temperature of approximately 20 °C (68 °F). These properties are valid within a temperature range which depends upon the material grade used and thermal and mechanical processing. Other properties such as fatigue behavior, corrosion resistance, impact properties, etc., are beyond the scope of this document and responsibility for ensuring the acceptability of the product for applications where conditions warrant consideration of these other properties shall be borne by the end user.

¹ Sems - Screw and washer assemblies

² U-bolts covered by this SAE Standard are those used primarily in the suspension and related areas of vehicles. For specification purposes, this standard treats U-bolts as studs. Thus, wherever the word "studs" appears, "U-bolts" is also implied. (The “U” configuration might not sustain a load equivalent to two bolts or studs of the same size and grade; thus, actual load-carrying capacity of U-bolts should be determined by saddle load tests.)

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2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

SAE J403	Chemical Compositions of SAE Carbon Steels
SAE J404	Chemical Compositions of SAE Alloy Steels
SAE J409	Product Analysis - Permissible Variations from Specified Chemical Analysis of a Heat or Cast of Steel
SAE J411	Carbon and Alloy Steels
SAE J417	Hardness Tests and Hardness Number Conversions
SAE J1268	Hardenability Bands for Carbon and Alloy H Steels

2.1.2 ASME Publications

Available from American Society of Mechanical Engineers, 22 Law Drive, P.O. Box 2900, Fairfield, NJ 07007-2900, Tel: 973-882-1170, www.asme.org.

ASME B18.2.1	Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws (Inch Series)
ASME B18.18	Inspection and Quality Assurance for Fasteners

2.1.3 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM E18	Test Methods for Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials
ASTM F606	Test Methods for Determining the Mechanical Properties of Externally Threaded Fasteners, Washers, Direct Tension Indicators, and Rivets
ASTM F788/F788M	Standard Specification for Surface Discontinuities of Bolts, Screws, and Studs Inch and Metric Series
ASTM F1470	Guide for Fastener Sampling for Specified Mechanical Properties and Performance Inspection
ASTM F2328	Test Method for Determining Decarburization and Carburization in Hardened and Tempered Threaded Steel Bolts, Screws, and Studs

2.2 Related Publications

The following publications are provided for information purposes only and are not a required part of this SAE Standard.

2.2.1 SAE Publication

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

SAE J995 Mechanical and Material Requirements for Steel Nuts

3. DESIGNATIONS

3.1 Designation System

Grades are designated by numbers where increasing numbers represent increasing tensile strength and by decimals of whole numbers where decimals represent variations at the same strength level. The grade designations are given in Table 1.

3.2 Grades

3.2.1 Bolts and screws are normally available in Grades 1, 2, 5, 5.2, 8, and 8.2 (see Appendix A).

3.2.2 Studs are normally available in Grades 1, 2, 4, 5, 8, and 8.1.

3.2.3 Grade 5.1 is applicable to sems which can be heat treated following assembly of the washer on the screw, and to products without assembled washer.

4. MATERIALS AND PROCESSES

4.1 Steel Characteristics

4.1.1 All fasteners shall be made of steel conforming to the chemical composition requirements in Table 2 for each grade.

4.1.2 Refer to SAE J403, J404, or J1268 for the chemical composition limits of standard steel grades. Other standard and non-standard steels not defined by the above standard are acceptable if the resultant fasteners comply with all of the requirements in this standard. For Grades 5, 5.1, 5.2, 8, 8.1, and 8.2 the maximum content of bismuth, selenium, tellurium, or lead each shall be 0.02%.

4.1.3 Alloy and medium carbon steels with additive boron for manufacturing Grades 8 and 8.2 fasteners shall be fine grained steel with sufficient hardenability to provide hardness equivalent to 90% minimum martensite at the center of a transverse section one diameter from the threaded end of the fastener after quenching. Minimum as-quenched hardness required for steels in the carbon range 0.15 to 0.55% is shown in Table 3.