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Standard Specification for Rivets, Steel, Structural¹

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1. Scope

1.1 This specification covers three grades of steel rivets in diameters from $\frac{1}{2}$ to $1\frac{1}{2}$ in. inclusive, for structural fabricating purposes. The grades are as follows:

Grade	Description
1	Carbon steel rivets for general purpose use
2	Carbon manganese steel rivets for use with high strength carbon and high strength low alloy structural steels
3	Weathering steel rivets

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

2. Referenced Documents

2.1 *ASTM Standards*:²

[A751 Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products](#)

[D3951 Practice for Commercial Packaging](#)

[F606/F606M Test Methods for Determining the Mechanical Properties of Externally and Internally Threaded Fasteners, Washers, and Rivets \(Metric\)](#) ~~F0606, F0606M~~ [Direct Tension Indicators, and Rivets](#)

[F1470 Practice for Fastener Sampling for Specified Mechanical Properties and Performance Inspection](#)

[G101 Guide for Estimating the Atmospheric Corrosion Resistance of Low-Alloy Steels](#)

2.2 *ASME Standard*:

[B 18.1.2 Large Rivets \(\$\frac{1}{2}\$ Inch Nominal Diameter and Larger\)](#)³

3. Ordering Information

3.1 Orders for rivets under this specification shall include:

3.1.1 Quantity (number of pieces of rivets),

3.1.2 Name of product, including head type,

3.1.3 Dimensions including nominal diameter and length,

3.1.4 Supplementary Requirement S1, if required (see [8.1.2](#)),

3.1.5 Test report, if required (see [14.1](#)),

3.1.6 Additional package marking, if required (see [17.2](#)),

3.1.7 ASTM designation, including grade and date of issue, and

3.1.8 Any special requirements.

Example—10 000 pieces, Steel Button Head Rivets, $\frac{1}{2}$

\times 1 in., Test Report Required, ASTM A502, Grade 1,

dated _____ .

4. Materials and Manufacture

4.1 *Process*—The steel for rivets shall be made by the open-hearth, basic-oxygen, or electric-furnace process.

¹ This specification is under the jurisdiction of ASTM Committee F16 on Fasteners and is the direct responsibility of Subcommittee F16.02 on Steel Bolts, Nuts, Rivets and Washers.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Available from American Society of Mechanical Engineers (ASME), ASME International Headquarters, Three Park Ave., New York, NY 10016-5990, http://www.asme.org.

4.2 *Heading*—Rivets shall be made by the hot or cold heading process. It is expected that these rivets ordinarily will be hot driven.

5. Chemical Composition

5.1 Grade 1 and Grade 2 rivets shall conform to the heat analysis requirements given in **Table 1**.

5.2 Grade 3 rivets shall be weathering steel and shall conform to Class A or Class B chemical composition specified in **Table 1**. The selection of the composition, A or B, shall be at the option of the rivet manufacturer. See Guide **G101** for methods of estimating the atmospheric corrosion resistance of low alloy steels.

5.3 Application of heats of steel to which bismuth, selenium, tellurium, or lead has been intentionally added shall not be permitted. Compliance with this requirement shall be based on a statement on the steel certificate indicating that these elements were not intentionally added.

5.4 Product analysis made on finished rivets representing each lot shall conform to the product analysis requirements specified in **Table 1**, as applicable. Product Analysis is not applicable to Grade 1 rivets made from rimmed steel or merchant quality bars.

6. Mechanical Properties

6.1 The rivets shall conform to the hardness requirements shown in **Table 2**.

6.2 Brinell hardness shall be measured at only one point. Rockwell hardness shall be measured at three points, equally spaced about the axis of the rivet, and the hardness shall be taken as the arithmetic average of the three measurements.

7. Dimensions

7.1 Dimensions of rivets, unless otherwise specified, shall conform to those of one of the head types provided in ASME B 18.1.2.

8. Number of Tests and Retests

8.1 *Hardness*:

8.1.1 The requirements of this specification shall be met in continuous mass production for stock, and the manufacturer shall make sample inspections to ensure that the product conforms to the specified hardness requirements. Additional tests of individual shipments of material are not ordinarily contemplated. Individual heats of steel are not necessarily identified in the finished product.

8.1.2 Additional hardness tests of individual shipments of rivets are not ordinarily required. When required, Supplementary Requirement S1 shall be specified.

8.2 *Head Bursts and Duds*:

8.2.1 From each lot, the number of tests and the acceptance/rejection criteria for cracks (bursts) and duds shall be in accordance with Practice **F1470** using the sampling level characteristic specified for Surface Discontinuities.

9. Specimen Preparation

9.1 Rivets used for testing shall be heat treated in the following manner prior to testing:

9.1.1 *Grade 1*—Normalize by air cooling from above the transformation range.

TABLE 1 Chemical Requirements

	Grade 1		Grade 2		Grade 3 ^{A,B}			
					Class A		Class B	
	Heat Analysis, %	Product Analysis, ^C %	Heat Analysis, %	Product Analysis, %	Heat Analysis, %	Product Analysis, %	Heat Analysis, %	Product Analysis, %
Carbon	0.13–0.25	0.11–0.27	0.19–0.30	0.16–0.33	0.10–0.19	0.09–0.20	0.20 max	0.21 max
Manganese	0.30–0.90	0.27–0.93	1.20–1.65	1.14–1.71	0.90–1.25	0.86–1.29	0.75–1.25	0.71–1.29
Phosphorus, max								
acid	0.06	0.070	0.06	0.070	...	...	...	...
basic	0.04	0.048	0.04	0.048	0.04	0.045	0.04	0.045
Sulfur, max	0.05	0.058	0.05	0.058	0.05	0.055	0.05	0.055
Silicon	...	...	0.10–0.35	0.08–0.37	0.15–0.35	0.13–0.37	0.15–0.35	0.13–0.37
Nickel	...	...	...	...	...	...	0.25–0.50	0.22–0.53
Chromium	...	...	...	...	0.40–0.65	0.37–0.68	0.40–0.70	0.37–0.73
Copper	...	...	...	...	0.25–0.40	0.22–0.43	0.20–0.40	0.17–0.43
Copper, when copper bearing steel is specified, min	0.20	0.18	0.20	0.18	...	...	...	...
Vanadium	...	...	...	...	0.02–0.10	0.01–0.11	0.01–0.10	0.11 max

^A A and B are classes of material used for Grade 3 rivets. Selection of a class shall be at the option of the rivet manufacturer.

^B See 5.2.

^C Product analysis is not applicable to rivets made from rimmed steel or merchant quality bars.