



Standard Specification for HIGH-STRENGTH LOW-ALLOY STRUCTURAL MANGANESE VANADIUM STEEL¹

This Standard is issued under the fixed designation A 441; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval.

This specification has been approved for use by agencies of the Department of Defense and for listing in the DoD Index of Specifications and Standards.

1. Scope

1.1 This specification covers high-strength low alloy structural steel shapes, plates, and bars for welded, riveted, or bolted construction but intended primarily for use in welded bridges and buildings where saving in weight or added durability are important. The atmospheric corrosion resistance of this steel is approximately twice that of structural carbon steel. This specification is limited to material up to 8 in. (203 mm) incl. in thickness.

NOTE 1—The values stated in inch-pound units are to be regarded as the standard.

2. General Requirements for Delivery

2.1 Material furnished under this specification shall conform to the applicable requirements of the current edition of Specification A 6 for General Requirements for Rolled Steel Plates, Shapes, Sheet Piling, and Bars for Structural Use.²

3. Process

3.1 The steel shall be made by one or more of the following processes: open-hearth, basic-oxygen, or electric-furnace.

4. Chemical Requirements

4.1 The heat analysis shall conform to the requirements prescribed in Table 1.

4.2 The steel shall conform on product analysis to the requirements prescribed in Table 1, subject to the product analysis tolerances in Specification A 6.

5. Tensile Requirements

5.1 The material as represented by the test specimens shall conform to the tensile properties prescribed in Table 2.

5.2 For material under $\frac{5}{16}$ in. (7.94 mm) in thickness or diameter, as represented by the test specimen, a deduction of 1.25% from the percentage of elongation in 8 in. or 200 mm specified in Table 2 shall be made for each decrease of $\frac{1}{32}$ in. (0.79 mm) of the specified thickness or diameter below $\frac{5}{16}$ in.

¹ This specification is under the jurisdiction of ASTM Committee A-1 on Steel, Stainless Steel and Related Alloys, and is the direct responsibility of Subcommittee A01.02 on Structural Steel for Bridges, Buildings, Rolling Stock, and Ships.

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² Annual Book of ASTM Standards, Part 4.

SUPPLEMENTARY REQUIREMENTS

Standardized supplementary requirements for use at the option of the purchaser are listed in Specification A 6. Those which are considered suitable for use with this specification are listed below by title.

S14. Bend Test.

S18. Maximum Tensile Strength.



TABLE 1 Chemical Requirements

	Heat Analysis, %
Carbon, max	0.22
Manganese	0.85-1.25
Phosphorus, max	0.04
Sulfur, max	0.05
Silicon, max	0.40
Copper, min	0.20
Vanadium, min	0.02

TABLE 2 Tensile Requirements

	Plates and Bars ^a				Structural Shapes ^b		
	For Thicknesses ¾ in. (19 mm) and under	For Thicknesses over ¾ to 1 ½ in. (19 to 38 mm), incl	For Thicknesses over 1 ½ to 4 in. (38 to 102 mm), incl	For Thicknesses over 4 to 8 in. (102 to 203 mm), incl	Groups 1 and 2	Group 3	Groups 4 and 5
Tensile strength min, psi (MPa) ^c	70 000 (485)	67 000 (460)	63 000 (435)	60 000 (415)	70 000 (485)	67 000 (460)	63 000 (435)
Yield point min, psi (MPa) ^c	50 000 (345)	46 000 (315)	42 000 (290)	40 000 (275)	50 000 (345)	46 000 (315)	42 000 (290)
Elongation in 8 in. or 200 mm, min, %	18 ^{d,e,f}	18 ^{e,f}	18 ^{e,f}	...	18 ^d	18	18
Elongation in 2 in. or 50 mm, min, %	...	21 ^{e,f}	21 ^{e,f}	21 ^{e,f}	21 ^g

^a For plates wider than 24 in. (610 mm), the test specimen is taken in the transverse direction. See 11.2 of Specification A 6.

^b See Specification A 6, Table A.

^c When the material is normalized the minimum yield point and minimum tensile strength required shall be reduced 5000 psi (35 MPa).

^d See 5.2.

^e Elongation not required to be determined for floor plate.

^f For plates wider than 24 in. (610 mm), the elongation requirement is reduced two percentage points.

^g For wide flange shapes over 426 lb/ft elongation in 2 in. or 50 mm of 19% minimum applies.

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