



Designation: A 769/A 769M – 00

Standard Specification for Carbon and High-Strength Electric Resistance Welded Steel Structural Shapes¹

This standard is issued under the fixed designation A 769/A 769M; 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. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This specification covers carbon and high-strength steel shapes of structural quality fabricated by the electric-resistance welding process from coils.

1.2 The size range covered is described in nominal dimensions for columns, beams, and tees.

	Size Range, in. (mm)
Web thickness	0.060 to 0.375 [1.5 to 10]
Flange thickness	0.060 to 0.500 [1.5 to 12.7]
Overall depth	2.00 to 24.00 [50 to 600]
Flange width	0.50 to 12.00 [12.7 to 300]

1.3 These shapes are intended for two classes of application:

1.3.1 *Class 1*—General structural use where static loading predominates.

1.3.2 *Class 2*—Structural use where fatigue loading occurs and is a principal design consideration.

NOTE 1—**Caution**—Because of the absence of smooth, integral, large radius fillets at the junctions of the webs and the flanges (see Fig. 1), fatigue limits of resistance welded shapes in torsion, lateral loading, and flexure are usually lower than those for hot-rolled shapes of similar size and material. Users should consult shape fabricators for recommended values of fatigue limits for each specific use, material, and size in cases where dynamic loading is a principal design consideration.

1.4 When the steel is to be welded, it is presupposed that a welding procedure suitable for the grade of steel and intended use or service will be utilized. See Appendix X3 of Specification A 6/A 6M for information on weldability.

1.5 The values stated in either inch-pound units or SI units are to be regarded separately as standard. Within the text, the SI units are shown in brackets. The values stated in each system are not exact equivalents. Therefore, each system must be used independently of the other. Combining values from the two systems may result in nonconformance with this specification.

1.6 The following safety hazards caveat pertains only to the test methods portion, Section 10, of this specification: *This*

standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

2. Referenced Documents

2.1 ASTM Standards:

A 6/A6M Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling²

A 370 Test Methods and Definitions for Mechanical Testing of Steel Products³

A 568/A568M Specification for Steel, Sheet, Carbon, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for³

A 700 Practices for Packaging, Marking, and Loading Methods for Steel Products for Domestic Shipment⁴

2.2 American Welding Society Standard:

AWS Specification D 1.1, Structural Welding Code⁵

3. Ordering Information

3.1 Orders for material under this specification should include the following, as required, to describe the desired material adequately:

- 3.1.1 Quantity (total number of feet (metres) or lengths),
- 3.2 ASTM designation and year of issue, grade, and class,
- 3.3 Shape and size,
- 3.4 Length of each piece,
- 3.5 Information on intended application,
- 3.6 Other special requirements, and
- 3.7 Required certification and test reports.

4. Materials and Manufacture

4.1 The shapes shall be fabricated from coils by the electric-resistance welding process. All components of a shape shall be furnished to the same grade unless otherwise specified.

¹ This specification is under the jurisdiction of ASTM Committee A01 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, Vol 01.04.

³ Annual Book of ASTM Standards, Vol 01.03.

⁴ Annual Book of ASTM Standards, Vol 01.05.

⁵ Available from American Welding Society, 550 N. W. LaJeune Rd., Miami, FL 33135.

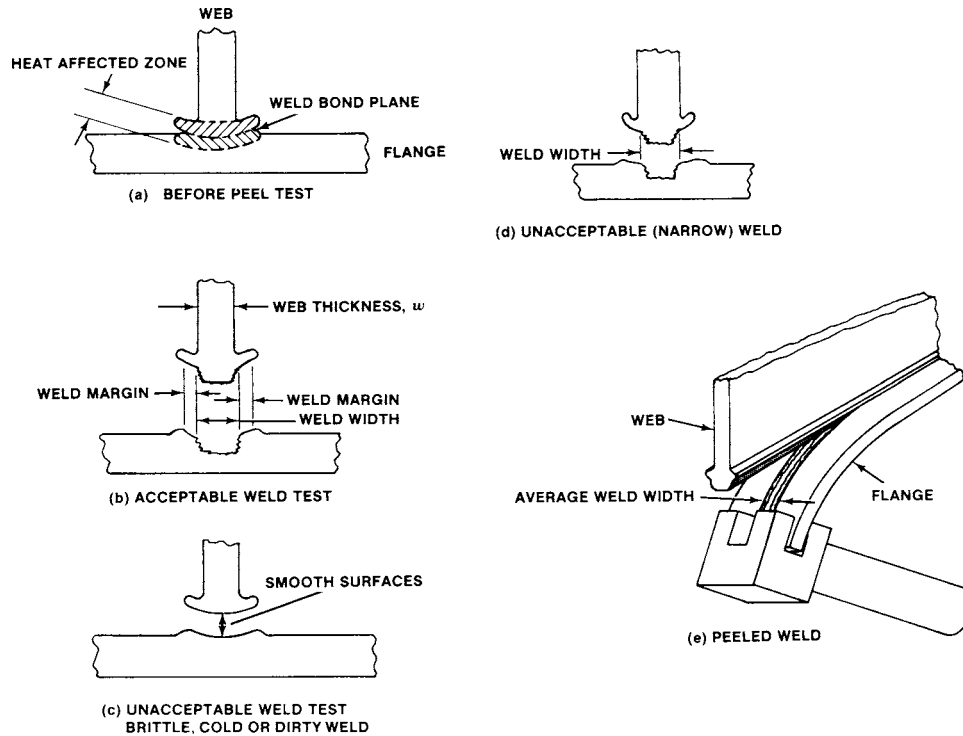


FIG. 1 Appearance of Peel Test Criteria

4.2 For Class 1 shapes the average width of weld at the joint to the flange shall be more than 110 % of the nominal web thickness (see Fig. 1(b)). The acceptability of coil-splice welds in webs and flanges shall be subject to negotiation between the purchaser and the fabricator.

4.3 For Class 2 shapes the average width of weld at the joint to the flange shall be more than 130 % of the nominal web thickness (see Fig. 1(b)). Coil-splice welds shall not be permitted.

4.4 Flash caused by welding will not be removed unless indicated on the purchase order.

5. Chemical Composition

5.1 An analysis of each heat of steel shall be made by the steel manufacturer. The chemical composition thus determined shall conform to the requirements of Table 1, subject to the product analysis tolerances in Specification A 6/A 6M for plate steels or Specification A 568/A 568M for sheet steels. Heat analysis reports shall be furnished by the shape fabricator upon request.

TABLE 1 Chemical Requirements^A

General Limitations, %	
Carbon	0.20 max
Manganese	0.30 min to 1.50 max
Phosphorus	0.035 max
Sulfur	0.04 max

^AThe choice and use of alloying elements (combined with carbon, manganese, phosphorus, and sulfur within the limits prescribed) to provide the specified mechanical properties, or to enhance the atmospheric corrosion resistance, or both, may vary with manufacturer and thickness of material. Elements commonly added include: boron, chromium, copper, molybdenum, nickel, silicon, vanadium, titanium, zirconium, and columbium. The heat analysis, including the alloying elements intentionally added, shall be reported to the purchaser.

5.2 The steel supplier, shape fabricator, and the shape purchaser shall establish a chemical composition, which will assure the purchaser of the desired properties while providing the shape fabricator with material that is weldable by the electric-resistance welding process.

6. Tension Test

6.1 The material as represented by the test specimen shall conform to the requirements of tensile properties prescribed in Table 2.

6.2 The shape fabricator shall furnish, upon request, test reports of tensile properties determined in accordance with Sections 8, 9, and 10.

7. Permissible Variations in Dimensions

7.1 Unless otherwise agreed upon by the shape fabricator and the purchaser, dimensional variations shall conform to Specification A 6/A 6M (13.3 and Tables 16 to Tables 24 inclusive) for shapes of similar dimensions. Thicknesses of the shape components shall be based on nominal thicknesses conforming to Specification A 6/A 6M (Table 1, plate) or Specification A 568/A 568M (Tables 4 and Tables 5, sheet). Nominal thickness shall be defined as the minimum thickness specified plus one half the allowable thickness tolerance as shown in the tables. The nominal weight per foot of the shape shall be calculated based on the nominal thickness and allowable variations in weight shall be equivalent to allowable variations in thickness.

8. Number of Tests

8.1 *Tension Tests:*