Standard Specification for  
Steel Castings, Carbon, Suitable for Fusion Welding, for  
High-Temperature Service

This standard is issued under the fixed designation A 216/A216M; 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.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This specification2 covers carbon steel castings for valves, flanges, fittings, or other pressure-containing parts for high-temperature service and of quality suitable for assembly with other castings or wrought-steel parts by fusion welding.

1.2 Three grades, WCA, WCB, and WCC, are covered in this specification. Selection will depend upon design and service conditions, mechanical properties, and the high temperature characteristics.

1.3 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 the specification.

2. Referenced Documents

2.1 ASTM Standards:
A 488/A488M Practice for Steel Castings, Welding, Qualifications of Procedures and Personnel1
A 703/A703M Specification for Steel Castings, General Requirements, for Pressure-Containing Parts3
E 165 Test Method for Liquid Penetrant Examination4
E 709 Guide for Magnetic Particle Examination4

2.2 Manufacturers’ Standardization Society of the Valve and Fittings Industry Standard:
SP 55 Steel Castings for Valve, Flanges, and Fittings, and Other Components (Visual Method)5

3. General Conditions for Delivery

3.1 Material furnished to this specification shall conform to the requirements of Specification A 703/A 703M, including any supplementary requirements that are indicated in the purchase order. Failure to comply with the general requirements of Specification A 703/A 703M constitutes nonconformance with this specification. In case of conflict between the requirements of this specification and Specification A 703/A 703M, this specification shall prevail.

4. Ordering Information

4.1 The inquiry and order should include or indicate the following:
4.1.1 A description of the casting by pattern number or drawing (dimensional tolerances shall be included on the casting drawing),
4.1.2 Grade of steel,
4.1.3 Options in the specification, and
4.1.4 The supplementary requirements desired including the standards of acceptance.

5. Heat Treatment

5.1 All castings shall receive a heat treatment proper to their design and chemical composition.

5.2 Castings shall be furnished in the annealed, or normalized, or normalized and tempered condition unless Supplementary Requirement S15 is specified.

5.3 Heat treatment shall be performed after castings have been allowed to cool below the transformation range.

6. Temperature Control

6.1 Furnace temperatures for heat treating shall be effectively controlled by pyrometer.

7. Chemical Composition

7.1 The steel shall conform to the requirements as to chemical composition prescribed in Table 1.
8. Tensile Requirements

8.1 Steel used for the castings shall conform to the requirements as to tensile properties prescribed in Table 2.

9. Quality

9.1 The surface of the casting shall be examined visually and shall be free of adhering sand, scale, cracks, and hot tears. Other surface discontinuities shall meet the visual acceptance standards specified in the order. Visual Method SP-55 or other visual standards may be used to define acceptable surface discontinuities and finish. Unacceptable visual surface discontinuities shall be removed and their removal verified by visual examination of the resultant cavities.

9.2 When additional inspection is desired, Supplementary Requirements S4, S5, and S10 may be ordered.

9.3 The castings shall not be peened, plugged, or impregnated to stop leaks.

**SUPPLEMENTARY REQUIREMENTS**

The following supplementary requirements shall not apply unless specified in the purchase order. A list of standardized supplementary requirements for use at the option of the purchaser is included in Specification A 703/A 703M. Those which are ordinarily considered suitable for use with this specification are given below. Others enumerated in A 703/A 703M may be used with this specification upon agreement between the manufacturer and purchaser.
S1. Unspecified Elements

S2. Destruction Tests

S3. Bend Test

S4. Magnetic Particle Inspection

S5. Radiographic Inspection

S10. Examination of Weld Preparation

S10.1 The method of performing the magnetic particle or liquid penetrant test shall be in accordance with Practice E 709 or Practice E 165.

S11. Carbon Equivalent

S11.1 When specified on the order, the maximum carbon equivalent shall be:

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CE = C + \frac{Mn}{6} + \frac{Cr + Mo + V}{5} + \frac{Ni + Cu}{15} - 0.50
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S15. Quench and Temper Heat-Treatment