Designation: ~~A216/A216M – 16~~ A216/A216M – 18

Endorsed by Manufacturers Standardization Society
of the Valve and Fittings Industry
Endorsed by American Foundrymen's Society
Used in USDOE-NE Standards

Standard Specification for Steel Castings, Carbon, Suitable for Fusion Welding, for High-Temperature Service[1]

This standard is issued under the fixed designation A216/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 U.S. Department of Defense.

1. Scope*

1.1 This specification[2] 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~~ 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~~ high-temperature characteristics.

1.3 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in ~~non-conformance~~nonconformance with the standard.

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[3]
A488/A488M Practice for Steel Castings, Welding, Qualifications of Procedures and Personnel
A703/A703M Specification for Steel Castings, General Requirements, for Pressure-Containing Parts
A985/A985M Specification for Steel Investment Castings General Requirements, for Pressure-Containing Parts

2.2 ~~*Manufacturers'*~~ *Manufacturers Standardization Society of the Valve and Fittings Industry Standard:*[4]
SP 55 Steel Castings for Valve, Flanges, and Fittings, and Other Components (Visual Method)

3. General Conditions for Delivery

3.1 Except for investment castings, castings furnished to this specification shall conform to the requirements of Specification A703/A703M, including any supplementary requirements that are indicated in the purchase order. Failure to comply with the general requirements of Specification A703/A703M constitutes nonconformance with this specification. In case of conflict between the requirements of this specification and Specification A703/A703M, this specification shall prevail.

3.2 Steel investment castings furnished to this specification shall conform to the requirements of Specification A985/A985M, including any supplementary requirements that are indicated in the purchase order. Failure to comply with the general requirements of Specification A985/A985M constitutes nonconformance with this specification. In case of conflict between the requirements of this specification and Specification A985/A985M, Specification A985/A985M shall prevail.

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[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 A01.18 on Castings.

Current edition approved ~~March 1, 2016~~July 1, 2018. Published ~~March 2016~~July 2018. Originally approved in 1939. Last previous edition approved in ~~2014~~2016 as ~~A216/A216M – 14~~A216/A216M – 16.~~ε1~~. DOI: ~~10.1520/A0216_A0216M-16.~~10.1520/A0216_A0216M-18.

[2] For ASME Boiler and Pressure Vessel Code applications, see related Specification SA-216/SA-216M in Section II of that code.

[3] 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.

[4] Available from Manufacturers Standardization Society of the Valve and Fittings Industry (MSS), 127 Park St., NE, Vienna, VA 22180-4602, http://www.mss-hq.com.

***A Summary of Changes section appears at the end of this standard**

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,

4.1.4 Whether the castings are to be produced using the investment casting process, and

4.1.5 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.

TABLE 1 Chemical Requirements

NOTE 1—All values are maximums.

Element	Composition, %		
	Grade WCA UNS J02502	Grade WCB UNS J03002	Grade WCC UNS J02503
Carbon	0.25[A]	0.30[B]	0.25[C]
Manganese	0.70[A]	1.00[B]	1.20[C]
Phosphorus	0.035	0.035	0.035
Sulfur	0.035[D]	0.035[D]	0.035[D]
Silicon	0.60	0.60	0.60
Specified residual elements:			
Copper	0.30	0.30	0.30
Nickel	0.50	0.50	0.50
Chromium	0.50	0.50	0.50
Molybdenum, max	0.20	0.20	0.20
Vanadium	0.03	0.03	0.03
Total of these specified residual elements[E]	1.00	1.00	1.00

TABLE 1 Chemical Requirements[A]

Material Grade UNS	Element, %									
	Carbon	Manganese	Phosphorus	Sulfur[B]	Silicon	Nickel[C]	Chromium[C]	Molybdenum[C]	Copper[C]	Vanadium[C]
WCA[D] J02502	0.25	0.70	0.035	0.035	0.60	0.50	0.50	0.20	0.30	0.03
WCB[D] J03002	0.30	1.00	0.035	0.035	0.60	0.50	0.50	0.20	0.30	0.03
WCC[D] J02503	0.25	1.20	0.035	0.035	0.60	0.50	0.50	0.20	0.30	0.03

[A] All values are maximums.

[B] For lower maximum sulfur content, see Supplementary Requirement S52.

[C] Specified Residual Elements—Except when Supplementary Requirement S50 is specified, the total content of these elements is 1.00 % maximum.

[D] For each reduction of 0.01 % below the specified maximum carbon content, an increase of 0.04 % manganese above the specified maximum will be permitted up to a maximum of ~~1.10 %.~~1.10 % for WCA, 1.28 % for WCB, and 1.40 % for WCC.

~~[B] For each reduction of 0.01 % below the specified maximum carbon content, an increase of 0.04 % Mn above the specified maximum will be permitted up to a maximum of 1.28 %.~~

~~[C] For each reduction of 0.01 % below the specified maximum carbon content, an increase of 0.04 % manganese above the specified maximum will be permitted to a maximum of 1.40 %.~~

~~[D] For lower maximum sulfur content, see Supplementary Requirement S52.~~

~~[E] Not applicable when Supplementary Requirement S11 is specified.~~