B16 Case 11
To allow the use of Grade 91 Steel, 9%Cr-1%Mo (UNS K90901) A989/A989M-15 in ASME B16.34

Inquiry: May austenitized and tempered UNS K90901 material that meets the specification requirements of ASTM A989/A989M-15 for hot isostatically-pressed alloy steel powder metallurgy parts for high temperature service be used for ASME B16.34 valves?

Reply: Yes, provided the following additional requirements are met:

(a) The material shall be austenitized within the temperature range of 1,900°F to 1,975°F (1,040°C to 1,080°C), followed by air or accelerated cooling, and tempered within the range of 1,350°F to 1,470°F (730°C to 800°C).

(b) The maximum use temperature is 1,200°F (649°C). The supplementary requirement S-11, Uniaxial Fatigue Acceptance Test of ASTM A989/A989M-15 shall be performed for UNS K90901 parts intended for service above 1000°F (538°C).

(c) The maximum allowable powder size is 0.019 in. (0.5 mm), and the powder shall be produced by the gas atomization process.

(d) Following atomization, powders shall be stored under a positive nitrogen or argon atmosphere to minimize potential oxidation or contamination.

(e) In addition to a chemical composition analysis of the final blend powder, an analysis of a sample (component or compact) from each lot of parts shall be required.

(f) The material shall be examined using either the magnetic particle or liquid penetrant inspection method per ASTM A989/A989M-15, Supplementary Requirement S5 or S6.

(g) For purposes of welding procedure and performance qualification, this material shall be considered P-No. 15E.

(h) Weld repairs to the material shall be made with one of the following welding processes and consumables:

   (1) SMAW, SFA-5.5/SFA-5.5M E90XX-B9
   (2) SAW, SFA-5.23/SFA-5.23M EB9 + neutral flux
   (3) GTAW, SFA-5.28/SFA-5.28M ER90S-B9
   (4) FCAW, SFA-5.29/SFA-5.29M E91T1-B9

   In addition, the Ni + Mn content of all welding consumables shall not exceed 1.0%.

(i) Weld repairs to the material as a part of manufacture shall be made with welding procedures and welders qualified in accordance with ASME BPVC, Section IX.

(j) Repair by welding shall not exceed 10% of the part surface area and 33 1/3% of wall thickness of the finished part or 3/4 in. (19 mm), whichever is less, without prior approval of the purchaser.

(k) If during the manufacturing any portion of the component is heated to a temperature greater than 1,470°F (800°C), then the component shall be reaustenitized and retempered in its entirety in accordance with (a).

(l) The material UNS K90901 to ASTM A989/A989M-15 shall be considered in Material Group 1.15 as in Table 1 of ASME B16.34-2017.

(m) Pressure-Temperature ratings for Grade 91 (UNS K90901) in ASTM A989/A989M-15
(1) For B16.34-2017 use Pressure-Temperature ratings as tabulated for Standard and Special Class Pressure Rating Designation numbers 150, 300, 600, 900, 1500, 2500, and 4500 in Table 2-1.15 in metric units and in Mandatory Appendix VII in U.S. customary units. Ratings for Limited Class are determined by the method in Mandatory Appendix V for Grade 91.

(n) All other provisions of ASME B16.34 for applicable material, standard and class designation shall apply.

(o) This Case number shall be shown on the valve nameplate and Material Test Report (MTR) when ASTM A989/A989M material is used for construction of B16.34 valve bodies, bonnets or pressure containing parts.