MATERIAL DATA SHEET MDS D43 Rev. 4

TYPE OF MATERIAL: Ferritic / Austenitic Stainless Steel, Type 22Cr duplex

PRODUCT	***STANDARD***	***GRADE***	***ACCEPT. CLASS***	***SUPPL. REQ.***
Wrought fittings	ASTM A 815 ASTM A 988	UNS S31803 UNS S32205	WP-W, WP-S or WP-WX	S7

1. SCOPE	This MDS specifies the selected options in the referred standard and additional requirements which shall be added or supersede the corresponding requirements in the referred standard.
2. QUALIFICATION	Manufacturers and the manufacturing process used for manufacturing of product to this MDS shall be qualified in accordance with NORSOK Standard M-650.
3. STEEL MAKING	The steel melt shall be refined with AOD or equivalent.
4. MANUFACTURING PROCESS	The manufacturing of products according to this MDS shall be carried out according to the M-650 qualified Manufacturing Procedure. The Hot Isostatic Pressed (HIP) process is an acceptable alternative manufacturing process.
5. HEAT TREATMENT	The fittings shall be solution annealed followed by water quenching. Fittings shall be placed in such a way as to ensure free circulation of air and water around each fitting during the heat treatment process including quenching.
6.CHEMICAL COMPOSITION	*UNS S31803:* N = 0.14 - 0.20 %
7. IMPACT TESTING	Charpy V-notch testing according to ASTM A 370 at - 46 °C is required for the thickness ≥ 6 mm. The minimum absorbed energy shall be 45 J average and 35 J single. Reduction factors for sub-size specimens shall be: 7.5 mm - 5/6 and 5 mm - 2/3. The notch location and number of specimen shall be: - Seamless fittings: One set, 3 specimens. - Welded fittings: Two sets, each 3 specimens, one located in base material and one in weld metal.
8. MICROGRAPHIC EXAMINATION	The micrographic examination shall cover the near surfaces and mid-thickness region of the fittings including the weld zone. The ferrite content shall be determined according to ASTM E 562 or equivalent and shall be within 35 - 55 % for base material and 35 - 65 % for weld metal. The microstructure, as examined at minimum 400 X magnification on a suitably etched specimen, shall be free from intermetallic phases and precipitates.
9. EXTENT OF TESTING	Tensile test, impact test hardness test and microstructure examination shall be carried out for each heat, heat treatment load within a wall thickness range of 5 mm and welded with the same WPS.
10. TEST SAMPLING	Samples for production testing shall realistically reflect the properties in the actual components. Test sampling shall be made from an actual fitting or from a prolongation thereof. Sketches shall be established showing location for extraction of test specimens.
11. WELDING	The PQR/WPQR shall be qualified in accordance with ASME IX or ISO 15614-1 and shall include the same examinations as for the production testing. The qualification shall be carried out on the same material grade (UNS number) as used in production. Change of specific make of welding consumables requires requalification.
12. NON DESTRUCTIVE TESTING	Supplementary requirement S7, liquid penetrant testing, shall apply to 10 % of seamless (from the test lot as defined above) and 100 % of welded fittings above NPS 2. The testing shall be carried out after calibration and pickling. For welded fittings the testing shall cover the weld only. The acceptance criteria shall be ASME VIII, Div. 1, Appendix 8. NDT operators shall be certified in accordance with EN 473 or equivalent.
13. SURFACE FINISH	White pickled. Machined surfaces do not require pickling.
14. REPAIR OF DEFECTS	Weld repair of base material is not acceptable. For repair of welds the same requirements to PQR/WPQR shall apply as for production welding.
15. MARKING	The component shall be marked to ensure full traceability to melt and heat treatment lot.

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16. CERTIFICATION	The material manufacturer shall have a quality system certified in accordance with ISO 9001 and the system shall have undergone a specific assessment for the relevant materials. The material certificate shall be in accordance with EN 10204 Type 3.1, and shall include the following information: - Manufacturer of the starting material for the finished product; - Steel melting and refining practice; Heat treatment condition (Solution annealing temperature and holding time shall be stated.)