MATERIAL DATA SHEET MDS C12 Rev. 4

TYPE OF MATERIAL: Carbon Steel Type 235LT

PRODUCT	***STANDARD***	***GRADE***	***ACCEPT. CLASS***	***SUPPL. REQ.***
Castings	ASTM A 352	LCC	-	S4
				Page 1 of 2

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. CHEMICAL COMPOSITION	C ≤ 0.22 %; S ≤ 0.025 %; P ≤ 0.030 %; CE = C+Mn/6+(Cr+Mo+V)/5+(Cu+Ni)/15 ≤ 0.43
3. HEAT TREATMENT	During heat treatment components shall be placed in such a way as to ensure free circulation around each component during the heat treatment process including possible quenching operation.
4. IMPACT TESTING	The minimum absorbed energy for full size specimens shall be 27 J average and 20 J single.
5. EXTENT OF TESTING	One set of tensile and impact test is required for each melt and heat treatment load. A test lot shall not exceed 5000 kg.
6. TEST SAMPLING	Samples for mechanical testing shall realistically reflect the properties in the actual components. For castings with weight 250 kg or more the test block shall be integrally cast or gated onto the castings and shall not be removed from the castings until after the final quality heat treatment. Thickness of the test block shall be equal to the thickness of the actual components up to a maximum thickness of 100 mm. For flanged components the largest flange thickness is the ruling section. Dimensions of test blocks and location of test specimens within the test blocks are shown in figures 1 and 2 for integral and gated test blocks respectively. The test specimens shall be taken within the cross hatched area. Distance from end of test specimen to end of test block shall minimum be T/4. During any PWHT the test block shall be tack welded onto the casting.

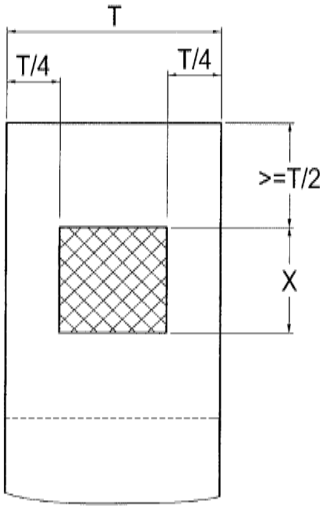

Fig.1 - Integral test block

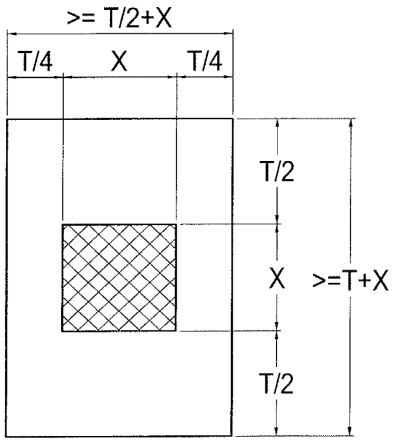

Fig. 2 - Gated test block

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7. NON DESTRUCTIVE TESTING

NDT operators shall be certified in accordance with EN 473 or equivalent.

Magnetic Particle testing:

- Supplementary requirement S4 shall apply to all surfaces (including internal surfaces) of all castings.
- The testing shall be carried out after final machining.
- The acceptance criteria shall be to ASME VIII, Div. 1, Appendix 7.

Radiographic testing (RT):

- Castings shall be RT in accordance with ASME VIII div.1 appendix 7.
- The number of castings to be tested per lot shall be according to table below.

Extent of RT based on pressure class and valve size:

Pressure Class:		*≤ 150*	*300*	*600*	*900*	*1500*	*≥ 2500*
Extent of RT	10%	≥ 10”	≥ 10”	≥ 2”	≥ 2”	≥ 2”	≥ 2”
	100%	Not applicable	Not applicable	≥ 20”	≥ 16”	≥ 6”	≥ 6”

- Pilot cast of each pattern shall be 100 % RT.
- Castings shall be tested in the critical areas as defined by ASME B16.34, abrupt changes in sections and at the junctions of risers, gates or feeders to the casting.
- The acceptance criteria shall be to ASME VIII, Div. 1, Appendix 7.
- When spot examination (10%) is specified, minimum one casting in any order shall be tested.
- If one test fails, two more components shall be tested, and if any of these two fail all items represented shall be tested.

8. REPAIR OF DEFECTS

A cast plate shall be used in the qualification of the repair welding procedure.

The repair welding procedure shall be qualified in accordance with ASTM A 488 or ISO 11970 and this MDS.

9. MARKING

The component shall be marked to ensure full traceability to melt and heat treatment lot.

10. 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 issued in accordance with EN 10204 Type 3.1, and shall include the following information:

- Heat treatment condition (For QT condition austenitisation and tempering temperature and quenching medium shall be stated.)