MATERIAL DATA SHEET			**MDS X02**	**Rev. 3**
TYPE OF MATERIAL: High Strength Low Alloyed Steel Type AISI 4140				
PRODUCT	***STANDARD***	***GRADE***	***ACCEPT. CLASS***	***SUPPL. REQ.***
Forgings	ASTM A 788	AISI 4140	-	S18

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. NOTE: Not suitable for sour service applications with the specified tensile properties.
2. MANUFACTURING	The forgings shall be finished hot-worked.
3. HEAT TREATMENT	The forgings shall be austenitised, liquid quenched and tempered. Components shall be placed in such a way as to ensure free circulation around each component during the heat treatment process including quenching.
4. CHEMICAL COMPOSITION	According to ASTM A 29, AISI 4140
5. TENSILE TESTING	Minimum yield strength: $R_{eh} \geq 515$ MPa Minimum tensile strength: $R_M \geq 690$ MPa Minimum elongation: $A \geq 15$ %
6. IMPACT TESTING	Charpy V-notch testing is required according to ASTM A 370 at - 46 °C. The notch shall be perpendicular to the surface. The minimum absorbed energy for full size specimens shall be 42 J average and 30 J single.
7. HARDNESS TESTING	Except when only one forging is produced, a minimum of two forgings shall be hardness tested per batch or continuous run to ensure that forgings are within the hardness limits 328 HB or 35 HRC.
8. EXTENT OF TESTING	One set of tensile and impact test shall be carried out for each melt, section thickness +/- 25 % and heat treatment load.
9. TEST SAMPLING	Samples for production testing shall realistically reflect the properties in the actual components. For products forged by open die and/or by ring rolling method the test specimen shall be obtained from a sacrificial forging or from an integral prolongation. For products forged by closed die method the test specimen shall be obtain from a sacrificial product. The test specimen shall be taken at T/4 thickness or deeper position where T is the maximum heat treated thickness and its mid-length shall be at least T or 100 mm, whichever is less, from any second heat treated surface. Sketches shall be established showing type, size of test sample and locations for extraction of test specimens.
10. NON DESTRUCTIVE TESTING	Supplementary Requirement, S18, magnetic particle tested, shall apply to all forgings. The acceptance criteria shall be to ASME VIII, Div. 1, Appendix 6.
11. REPAIR OF DEFECTS	Weld repair is not acceptable.
12. MARKING	The component shall be marked to ensure full traceability to melt and heat treatment lot.
13. 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.)