MATERIAL SPECIFICATION

TERCEL
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Description	Thick walled tubular with 56,600 psi min yield strength. (Substitute for API 5L X56 Line Pipe)			TR No.:	MS-0016
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Prepared By:	M Wardley	Approved By:	G Marr	Rev:	A
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1. General

This specification covers thick wall tubular pipe with a minimum yield strength of 56,600 psi (390 MPa). These materials are suitable for products where API5L X56 line pipe is called up. This specification may also be used where lower line pipe grades are called up (i.e. X52 or X46), and where casing of grade J55 or K55 is called-up.

This specification is only to be used to supply products where the required wall section (thickness) exceeds that available from API 5L or API 5CT tubulars.

Line pipe may have additional specified requirements; such as Product Specification Level (PSL) and Delivery Condition. This specification may be used to provide products for PSL1 or PSL2, and in the following delivery conditions; R, N or Q.

Material meeting the requirements of this specification also meets the requirements for sour service as specified by NACE MR-0175.

When there is an apparent conflict between this specification and a referenced specification, this specification shall govern.

2. Reference Specification

API 5L	Specification for Line Pipe
API 5CT	Specification for Casing and Tubing
API 1104	Welding of Pipelines and Related Facilities
ASNT SNT-TC-1A	Personnel Qualification and Certification in Non-destructive Testing
ASTM A370	Mechanical Testing of Steel Products
ASTM A751	Test Methods, Practices and Terminology for Chemical Analysis of Steel Products
ASTM E10	Standard Test Methods for Brinell Hardness of Metallic Materials
ASTM E18	Standard Test Methods for Rockwell Hardness of Metallic Materials
ASTM E23	Standard Test Methods for Notched Bar Impact Testing of Metallic Materials
ASTM E165/E165M	Standard Practice for Liquid Penetrant Examination
ASTM E213	Standard Practice for Ultrasonic Testing of Metal Pipe and Tubing
ASTM E709	Standard Guide for Magnetic Particle Examination
BS EN 10204	Metallic Materials. Types of Inspection Documents
NACE MR0175	Sulfide Stress Cracking Resistant Metallic Materials for Oilfield Equipment

3. Melt Practice and Condition

Steels made to this specification shall be electric furnace melted. The steel shall be produced using melt and refining practices proven capable of producing fine grained steels that are free from deleterious effects.

Pipe furnished to this specification shall be either seamless or welded.

4. Chemical Analysis

Material may be supplied in any one of the following specifications and chemical analyses:

EN10225 S420

	C	Si	Mn	P	S	Cr	Mo	Ni	Al	Cu	N	Nb	Ti	V	Nb+V
Min		0.15		0.02	0.01				0.015						
Max	0.14	0.55	1.65	0.02	0.01	0.25	0.25	0.7	0.055	0.3	0.01	0.04	0.025	0.08	0.09

20MnV6

	C	Si	Mn	P	S	V
Min		0.10	1.3			0.1
Max	0.22	0.50	1.7	0.035	0.035	0.2

MecaVal147M

	C	Si	Mn	P	S	V
Min						0.08
Max	0.22	0.35	1.6	0.030	0.040	0.15

5. Mechanical Properties

The following table denotes the mechanical requirements for all grades:

YIELD STRENGTH (Min)		YIELD STRENGTH (Max)		TENSILE STRENGTH (Min)		TENSILE STRENGTH (Max)		ELONG (Min)	HARDNESS (max)
psi	MPa	psi	MPa	psi	MPa	psi	MPa	%	HRc
56600	390	79000	545	71100	490	110200	760	17	22

The ratio of Yield/UTS shall not exceed 0.93

6. Quality Requirements

The heat identification and heat treatment lot traceability shall be maintained through all stages of processing.

The material shall be free from cracks, laps seams or other defects. Weld repair is not permitted.

Material certification shall be prepared for each heat and heat treatment lot of material. Material certification shall be provided in accordance with BS EN 10204 Type 3.1. As a minimum the certification shall contain the following: statement of compliance with this specification, chemical analysis results, mechanical test results, heat/heat treat batch identification and purchase order number.

7. Specifications and Vendors

The following specifications would be generally acceptable:

- EN10225 S420
- 20MnV6
- MecaVal 147M