FORGING AISI 1040-1042 API 6A, 60 KSI & H2S SERVICE

Rev	Reason of Change	Date	Made By	Reviewed By	Approved By	Status
0	Initial release	12-12-2016	MN	AS	KKD	Released
1	Quenching media temperature requirements amended & retention period added in clause 6.0 added as per API 6A 21st edition.	03-10-2019	MN	USR	AS	Released

1.0 Scope

This specification covers medium carbon forgings, bar stock and mill shapes suitable for H2S service. This material is not field weldable.

2.0 Reference Specifications

Documents	Descriptions
ASTM A370	Standard Test Methods and Definitions for Mechanical Testing of Steel Products
NACE MR0175/ISO 15156	Petroleum and natural gas industries - Materials for use in H2S-containing environments in oil and gas production

3.0 Chemical Requirements

The chemistry shall conform to the limits of Table 1.

Table 1: Chemical Requirements. (All are maximums unless otherwise noted)

Elements	Wt. Percentage (%)
Carbon	0.44
Manganese	0.60 - 0.90
Phosphorus	0.040
Sulfur	0.040

4.0 Mechanical Properties

Material shall meet the requirements listed in Table 2.

Table 2: Mechanical Properties. (All are minimums unless otherwise noted)

Tensile Strength	85,000 psi (585 MPa)
Yield Strength	60,000 psi (450 MPa)
Elongation in 2" or 4D	18%
Reduction of Area	35%
Brinell Hardness (forgings, raw)	184-229 HBW
Brinell Hardness (bar stock, mill shape)	184-237 HBW
Brinell Hardness (finished)	174-237 HBW

5.0 Heat Treatment

Heat treatment shall be in accordance with the requirement listed in Table 3.

Table 3: Acceptable Heat Treat Procedures

PROCESS	ATMOSPHERE/MEDIA	TEMPERATURE	TIME AT TEMPERATURE
Normalized	Air	1600 ºF – 1700 ºF (870 ºC – 925 ºC)	30 Minutes / Inch of T, Minimum Time is 30 Minutes.
Still air cool to below 400 degrees F (204 degrees C) before further processing			
Austenitize	Air	1525 ºF - 1625 ºF (830 ºC – 885 ºC)	30 Minutes / Inch of T, Minimum Time is 30 Minutes.
Quench	Water	The temperature of quenching medium shall not exceed 100 °F (38 °C) at the start of the quench nor exceed 49°C (120°F) at any time during the quench cycle.	
Temper	Air	1150 ºF – 1275 ºF (620 ºC – 690 ºC).	1 hour per inch of maximum through thickness. One hour Minimum.

6.0 Workmanship

Material shall be inspected in accordance with part report (DBI). Material shall be free of injurious defects that are detrimental to the integrity of the final product, such as laps, scabs, cracks and exogenous inclusions.

Suppliers shall retain heat treat charts in a secure area for a period of no less than 10 years (e.g. electronic or paper).