8630, 75 KSI (517 MPA), FORGING/BARSTOCK, H2S COMPATIBLE

Rev	Reason of Change	Date	Made By	Reviewed By	Approved By	Status
1	Tempering Temp	09-05-2013	USR	J Gulati	KKD	Released
2	Quenching media temperature requirements amended & retention period added in clause 6.7 added as per API 6A 21st edition	03-10-2019	MN	USR	AS	Released

Summary: This specification covers 8630 MOD3 steel forgings or bar stock with minimum yield strength of 75 Ksi (517MPa). This material is compatible with H2S service.

1.0 Scope

This specification covers 8630 MOD3 steel forgings or forged bar stock with minimum yield strength of 75 Ksi (517MPa). This material is compatible with H2S service. Note this material is typically not available for diameters less than 5 inch in diameter.

2.0 Referenced Specifications

Document	Description
API 6A/ISO 10423	Specification for Wellhead and Christmas Tree Equipment
NACE MR0175/ISO15156	Petroleum and natural gas industries - Materials for use in H_2S-containing environments in oil and gas production

3.0 Chemistry Requirements

The chemistry shall meet the requirements listed in Table 1.

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

Elements	Wt. Percentage (%)
Carbon	0.25-0.33
Manganese	0.70-1.10
Chromium	0.85-1.00
Molybdenum	0.35-0.45
Nickel	0.75-0.90
Silicon	0.15-0.35
Phosphorus	0.025
Sulfur	0.025
Vanadium	0.06
Copper	0.25
Titanim	0.06
Aluminum	0.035

4.0 Mechanical Properties

The material shall meet the mechanical requirements of table 2.

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

Tensile Strength	95,000 psi (655 MPa)
Yield Strength	75,000 psi (517 MPa)
Elongation in 2", 4D	17%
Reduction of area	35%
Brinell Hardness (raw)	207-237 HBW
Brinell Hardness (finished part)	197-237 HBW

4.1 Charpy V-notch Impact testing: Impact testing shall be performed at -60 ºC (-76 °F) Average 27 joules each set of three specimens with minimum of 20 joules of one specimen. Similarly, no more then one of the three test results shall be below the required minimum average.

5.0 Heat Treatment :

PROCESS	ATMOSPHERE/MEDIA	TEMPERATURE	TIME AT TEMPERATURE
Normalized	Air	1598 ºF – 1697 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 (Ref. Note 1& 2)	Air	1562 ºF - 1652 ºF (850 ºC – 900 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.

	Polymer	50 ºF (10 ºC) minimum before quenching (See note 3)

Quench baths shall permit complete immersion of material, provide for adequate circulation of the media or agitation of material, and provide a means for indicating the temperature of the media. Baths shall be adequate to produce the required properties in the most massive material to be quenched. There shall be at least one gallon of quenchant per pound of material quenched. Location of Quenching Equipment - Quenching equipment shall be located in such a manner and handling facilities shall function with sufficient speed to prevent the initiation of transformation or sensitization prior to quenching. Quenching shall take place in less than 60 seconds from the time the heat treatment load exits the furnace.

Temper	Air	1220 ºF – 1325 ºF (660 ºC – 720 ºC).	1 hour per inch of maximum through thickness. One hour Minimum.

Cooling after tempering shall be air cooling or faster (By Water). Furnace cooling is not permitted. For heavy cross sections, rapid cooling after tempering may improve impact properties. The minimum tempering temperatures must be met in all cases to ensure that later steps of manufacturing,

Note: Maximum holding time shall not exceed Five times (5X) the minimum holding time. In all case, holding time shall not start until parts or materials have reached specified heat treatment temperature. The 5X rule does not apply to the separate QTC (e.g. ER 5")

Note 1: The short blasting shall be carried out after normalizing & Tempering if applicable.

Note 2: The austenitizing temperature shall be less then the normalizing temperature.

Note 3: The minimum start temperature of 50 ºF (10 ºC) for polymer Quenchant shall be followed except when a lower minimum start temperature is permitted for a specific quenchant by the quenchant manufacturer. The start temperature shall be documented for all products.

5.1 Continuous Heat Treatment

Screw, walking-beam, pusher furnaces, mesh or cast link type furnaces utilized for continuous heat treatment are permitted. Continuous induction, electrical resistance or infra-red heat treatment is not permitted. Times outside the specified ranges may be used, as long as the minimum time at temperature is 15 minutes per inch of thickness. Tempering temperature minimum shall be met. Other thermal operations may use temperatures outside the ranges specified. Mechanical properties shall be met on a prolongation or sacrificial part.

6.0 DOCUMENTATION REQUIRED

6.1 Each shipment shall be accompanied by material certifications for each lot of material, the certifications must be positively relatable to the lot of material represented.
a) Mill certificate of raw material.
b) Chemical certificate for each lot of forging.
6.2 Mechanical properties certification as per section 4.0
6.3 Impact testing certification as per section 4.1
6.4 Certification of heat treatment including cycle time, temperature, cooling media, hardness and graphs.
6.5 Calibration certificate of furnace.
6.6 Ultrasonic test report certification of raw material.
6.7 Suppliers shall retain heat treat charts in a secure area for a period of no less than 10 years (e.g. electronic or paper).

7.0 TESTING TO BE CARRIED OUT BY SARA SAE

7.1 At the time of lifting forgings re-verification of chemical properties.
7.2 Recheck of tensile strength, yield strength, elongation, reduction in area, hardness, impact testing and UT testing.
7.3 100% MPI testing after machining.