8630 MOD3, 110 KSI (758 MPA), FORGING/BARSTOCK, NON H2S COMPATIABLE, RESTRICTED MAX YIELD STRENGTH, MATERIALS ENGINEERING REVIEW AND APPROVAL REQUIRED

Rev	Reason of Change	Date	Made By	Reviewed By	Approved By	Status
0	Initial release	12-07-2018	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

Summary:

This specification covers 8630MOD3 forgings and forged bar stock with minimum yield strength of 110ksi (758MPa). This material is NOT suitable for exposure to produced fluids that may contain H_2S.

Material supplied to meet this specification will be difficult to obtain and may require specific sourcing to acquire.

1.0 SCOPE

This specification covers forgings and forged bar stock for subsea applications. This material is for high strength applications which are not exposed to produced fluids which may contain H_2S.

2.0 Reference Specifications

Documents	Descriptions
ASTM A255	Standard Test Methods for Determining Hardenability of Steel

3.0 Chemistry Requirements

The chemistry shall meet the requirements of Table 1.

Table 1: Required Chemistry. 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
Phosphorus	0.015
Sulfur	0.010
Nickel	0.75-0.90
Silicon	0.15-0.35
Vanadium	0.02
Copper	0.25
Titanium	0.06
Aluminum	0.035
Niobium (Columbium)	0.06
Nb+Ti+V	0.12

A minimum I.D. (Ideal Diameter) of 7.0" per M.A. Grossman Method (Ref: ASTM A255) is required for product made to this specification.

The value shall be calculated and reported for each heat.

4.0 Mechanical Properties

Test location, orientation and permitted QTC configurations are specified within an additional specification SES 26-590, SES 26-740 & SES 26-744. The material shall meet the mechanical requirements of the table 2

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

Tensile strength, min	130,000 psi (895 MPa)
Yield strength[1]	110,000 - 131,000 psi (758 - 900 MPa)
Elongation in 2" (51 mm) or 4D, min	15%
Reduction in area, min	35%
Brinell Hardness, raw	277-321 HBW
Brinell Hardness, final	269-321 HBW

[1] In the event measured yield strength is in the range 131,000 to 138,000 psi (900 to 951 MPa), individual components are acceptable if measured hardness of component does not exceed 300 HBW. Yield strengths above 138,000 psi (951 MPa) will not be accepted.

5.0 Heat Treatment

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	1575 ºF - 1650 ºF (850 ºC – 900 ºC)	30 Minutes / Inch of T, Minimum Time is 30 Minutes.
Quench	Polymer	104 ºF (40 ºC) - 158 ºF (70 ºC)	
	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	1050 ºF – 1200 ºF (565 ºC – 650 ºC)	1 hour per inch of maximum through thickness. One-hour Minimum.

Note: Maximum holding time shall not exceed Five times (5X) the maximum 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").

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).