AISI 316, 36 KSI (248 MPA), FORGINGS & MILL SHAPES, H2S COMPATIBLE

Rev	Reason of Change	Date	Made By	Reviewed By	Approved By	Status
0	Initial release	16-03-2018	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 AISI 316 (UNS S31600) barstock and mill shapes with minimum yield strength of 36,000 psi (248 MPa).

This material is compatible with H2S service up to and including a maximum partial pressure of 1.5 psi (10.2 kPa).

This material is not suitable for service where chlorides are present at temperatures above 200 ºF (93 ºC) without materials engineering approval.

1.0 PURPOSE

1.1 This specification covers stainless steel bar stock, forgings and mill shapes for H2S and CO2 service.

1.2 This material is compatible with H2S service up to and including a maximum partial pressure of 1.5 psi (10.2 KPa).

1.3 This material specification is intended to aid the purchasing department in procuring and the vendor in supplying a material which meets the needs of its intended use, and the quality control department in the inspection and release of incoming material.

1.4 It is the responsibility of raw material/metal supplier/machined parts supplier of carbon, low alloy and martens tic stainless steel to have practices and procedures in place to assure that raw materials/parts delivered to FMC do not have excessive amounts of residual magnetism. Excessive residual magnetism is defined as greater than 3 gauss. Residual magnetism can occur due to factors such as lifting with magnets, magnetic particle inspection or stray welding current. The supplier's procedures/testing methods will be subject to verification during supplier audits.

1.5 The raw material supplier shall assure that Sara Sae does not receive material with greater than background level of radioactivity.

2.0 REQUIREMENTS

2.1 The requirements of specification SES 26-590, SES 26-740 & SES 26-744 shall apply in addition to the following specific requirements.

2.1.1 **Chemical composition**: Chemical composition limits are listed below. An analysis of each heat of steel is made by the manufacturer, preferably from a ladle sample taken at or near the time of pouring. The listed elements shall be reported in weight percent. Reporting of residual elements is not required, but total residuals must not exceed 1%.

ELEMENTS	COMPOSITION RANGE (%)
Carbon (C)	0.08 (max.)
Manganese (Mn)	2.00 (max.)
Silicon (Si)	1.00 (max.)

Sulphur (S)	0.025 (max.)
Phosphorus (P)	0.025 (max.)
Nickel (Ni)	10.0-14.0
Chromium (Cr)	16.0-18.0
Molybdenum (Mo)	2.00-3.00

3.0 Mechanical Properties: Mechanical property requirements are listed below. Each heat shall be tested and the listed mechanical properties shall be reported.

MECHANICAL PROPERTIES	RANGE
TENSILE STRENGTH, PSI	80,000 (551 MPa) Min.
YLELD STRENGTH, PSI	36,000 (248 MPa) Min.
ELONGATION IN 2" Gage Length	30 % Min.
REDUCTION IN AREA	45% Min.
BRINELL HARDNESS	140- 237 BHN Max.

4.0 HEAT TREATMENT: - Heat treatment

PROCESS	ATMOSPHERE/MEDIA	TEMPERATURE	TIME AT TEMPERATURE
Normalizing	Air	1900-2050 ºF (1040-1120 ºC)	1/2 hour per inch of maximum through Thickness. One hour minimum
Quenching	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.	

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")

5.0 DOCUMENTATION REQUIRED:-

Each shipment shall be accompanied by material certifications for each lot of material, certifications must be positively relatable to the lot of material represented.
Recheck of Chemical properties to be carried out by Sara Sae.

6.0 WORKMANSHIP

Material shall be inspected in accordance with part QA Plan. 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).