MATERIAL SPECIFICATION FOR INCOLOY 825 NICKLE BASE ALLOY SPIN CAST FOR RING JOINT GASKET

Rev	Reason of Change	Date	Prepared By	Reviewed By	Approved By	Status
2	Documentation requirement added.	20.10.2011	KKM	USR	KKD	Released
3	Quenching media temperature requirements amended & clause 6.4 added as per API 6A 21st edition.	04-10-2019	MN	USR	AS	Released

1.0 URPOSE

1.1 It is the purpose of this material specification to list in concise form of the material requirement for INCOLOY 825.

1.2 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.

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.

2.2 It is the responsibility of raw material/metal supplier/machined parts supplier of carbon, low alloy and martensitic stainless steel to have practices and procedures in place to assure that raw materials/parts delivered to Sara Sea 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.

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

3.0 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.

ELEMENTS	COMPOSITION RANGE (%)
Carbon (C)	0.05 (max.)
Manganese (Mn)	1.00 (max.)
Silicon (Si)	0.50 (max.)
Sulphur (S)	0.03 (max.)
Nickel (Ni)	38.0 – 46.0
Chromium (Cr)	19.5 – 23.5
Molybdenum (Mo)	2.5 – 3.5
Aluminum (Al)	0.20 (max.)
Titanium	0.6 – 1.2
Copper (Cu)	1.5 – 3.0
Iron (Fe)	Balance

3.1 Elements that are not included in the application material specification but that may have been intentionally added by the mill shall be reported and are limited as follows. Total residuals must not exceed 1%.

ELEMENTS	COMPOSITION RANGE (%)
Vanadium (V)	0.08 (max.)
Nitrogen (N)	0.010 (max.)
Hydrogen (H)	0.010 (max.)
Boron	0.0005 (max.)

4.0 HEAT TREATMENT: - Heat treatment shall also apply in addition to the following specific requirements.

PROCESS	ATMOSPHERE/MEDIA	TEMPERATURE	TIME AT TEMPERATURE
Annealing	Air	1700-1950 ºF (927-1065 ºC)	½ hour per inch of maximum through thickness. One hour minimum.
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")			
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	

4.1 HARDNESS:

Rockwell "B" Hardness – 83 HRB Max
Brinell Hardness –160 BHN Max

5.0 MARKING: Each Piece or component shall be identified with the heat number or traceability marked on the exterior with low stress dot stamps. When used for Ring Gaskets, each piece shall also be stamped with the designation "I - 825".

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 Certification of heat treatment including cycle time, temperature, cooling media, hardness and graphs.

6.3 Calibration certificate of furnace.

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