	CPC ENGINEERING SPECIFICATION	
	SECTION SOP	Doc. No. CES-26-104
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**AISI316/316L, 30 KSI (207 MPA), FORGINGS/ BARSTOCK/RING GASKETS,
... LIMITED TO 200 F (93 C) AND 1.5 PSIA (10.2 KPAI MAXIMUM H2S**

Rev	Reason of Change	Date	Prepared By	Reviewed By	Approved By	Status
0	Initial issue	02-02-2024	PK	USR	JG	Released

Summary:


This specification covers bar stock and forgings for any application.

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 °F (93 °C) without materials engineering approval.

The above environmental limitations are not applicable to ring gaskets.



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MATERIAL SPECIFICATION AISI SS316 STAINLESS STEEL


1.0 PURPOSE

- 1.1 It is the purpose of this material specification to list in concise form of the material requirement for AISI SS 316 bar stock, forgings for Ring Joint Gaskets.
- 1.2 Product forms covered by this specification are Rolled Ring or Ring forgings for Gaskets.
- 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 martensitic stainless steel to have practices and procedures in place to assure that raw materials/parts 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 CPC does not receive material with greater than background level of radioactivity.

2.0 REQUIREMENTS

- 2.1 The requirements of specification CES 26-128, CES 26-110 & CES 26-144 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 %.



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ELEMENTS	COMPOSITION. RANGE (%)
Carbon (C)	0.08 (max.)
Manganese (Mb)	2.00 (max.)
Silicon (Si)	1.00 (max.)
Sulphur (S)	0.03 (max.)
Phosphorus (P)	0.045 (max.)
Nickel (Ni)	10.0-14.0
Chromium (Cr)	16.0-18.0
Molybdenum (Mo)	2.00-3.00
Iron (Fe)	Balance

2.1.2 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.)
Aluminum (Al)	0.055 (max.)
Nitrogen (N)	0.010 (max.)
Hydrogen (H)	0.010 (max.)
Niobium (Columbium) + Titanium +Vanadium	0.12 (max.)
Boron	0.0005 (max.)

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	75,000 (517 MPa) Min. *
YIELD STRENGTH, PSI	30,000 (207 MPa) Min. *
ELONGATION IN 2" Gage Length	40 % Min. *
REDUCTION IN AREA	50% Min. *
BRINELL HARDNESS	237 BHN Max. *

* These properties are not required for ring gaskets. Ring Gaskets shall have a maximum Hardness of **83 HRB**.



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4.0 HEAT TREATMENT: - Heat treatment (Solution Annealing)

PROCESS	ATMOSPHERE/MEDIA	TEMPERATURE	TIME AT TEMPERATURE
Annealing	Air	1900-2050 °F (1040-1120 °C)	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: Ring gaskets manufactured from 304 stainless steel, 316 stainless steel, nickel alloy UNS N08825, or other CRA materials with an austenitic microstructure shall be solution annealed and quenched to maintain the required microstructure as the last stage of material processing prior to final machining.

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 CPC.

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

6.0 TESTING TO BE CARRIED OUT BY CPC

6.1 Recheck hardness.

6.2 NDT: - LPT to be performed after machining on 2% of lot size.

7.0 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.

