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17-4PH Stainless Steel – DH1150 Condition – 105 ksi Min. Yield Strength

1.1 SCOPE

1.1 This specification pertains to UNS S17400 precipitation hardening stainless steel bars, forgings and components in the DH1150 condition. The requirements for the DH1150 condition are included in this specification. Material meeting the requirements of this specification meets the requirements of NACE MR0157 and shall exhibit a minimum yield strength of 105 ksi. This stainless steel is used primarily for wet CO₂ type environments where moderate strength levels are required; this material has limited resistance to cracking in H₂S containing environments. When there is an apparent conflict or difference between this specification and a referenced specification, this specification shall govern.

2.2 REFERERNCED SPECIFICATION

- 2.1 ASTM A370: Mechanical Testing of Steel Products
- 2.2 ASTM A388: Recommended Practice for Ultrasonic Examination of Heavy Steel Forgings
- 2.3 ASTM E18: Test Methods for Rockwell and Rockwell Superficial Hardness of Metallic Materials
- 2.4 GOST 5632: Requirements to Chemical Composition for High-Alloy Steel and Corrosion-Proof, Heat-Resisting and heat Treated Alloys
- 2.5 NACE Standard MR0175: Sulfide Stress Cracking Resistant Metallic Materials for Oilfield Equipment.

3.3 MATERIAL PROPERTIES

3.1 Chemical Composition: The chemical composition shall meet the requirements of UNS number S17400 as listed in the table below:

Element	C	Mn	Ni	Cu	Nb	Cr	Si	P	S
Min.	---	---	3.00	3.00	0.15	15.0	---	---	---
Max.	0.07	1.00	5.00	5.00	0.45	17.5	1.00	0.030	0.030

3.2 Mechanical Properties: The mechanical properties at the mid-wall or mid-radius location tested in accordance with ASTM A370 shall meet the requirements listed in the Table below:

	Yield Strength Ksi (MPa)	Tensile Strength Ksi (MPa)	Elongation	Reduction	Hardness Rockwell C
Min.	105.0 (724)	135.0 (931)	16%	45%	28
Max.	---	160.0 (1103)	---	---	33

3.3 Melt Practice: Steels made to this specification shall be electric furnace melted. The steel shall be produced using melt and refining practices proven capable of producing steels that are free from deleterious defects.

3.4 Condition: The Steel shall be furnished in the DH1150 condition.

3.5 Heat Treat Requirements for DH 1150 Condition: The following Table summarizes the temperature cycle requirements

Process Step	Temperature Range	Time at Temperature	Atmosphere
Solution Anneal	1900°F ± 25°F (1040°C ± 15°C)	½ hour – see notes 1,2 And 3	Water, polymer, oil, inert gas or air
Precipitation Hardening	1150°F ± 25°F (620°C ± 15°C)	4 hours minimum See notes 1 & 3	Inert gas or air
Precipitation Hardening	1150°F ± 25°F (620°C ± 15°C)	4 hours minimum See note 1	Inert gas or air
Note 1 : At temperature does not include time required to ensure that part(s) have reached and stabilized at the set temperature			
Note 2: Time s generally calculated by adding 30 minutes to 30 minutes per inch of metal thickness (bar diameter or tube wall thickness).			
Note 3: A required cooling to below 90°F (32°C) is required prior to the next process step being performed.			

4.0 QUALITY, INSPECTION AND TEST REQUIREMENTS

4.1 Traceability: The heat identification shall be maintained through all stages of processing. All parts shall be traceable to the heat treat batch and heat lot.

4.2 Visual Inspection: The bar and shaped products shall be free cracks, laps, seams or other defects. All parts containing these defects shall be considered discrepant and are cause for rejection.

4.3 Straightness Tolerance: Maximum deviation in any 5feet shall be 1/8".

4.4 Test Requirements: The tests required with frequency are defined in the following Table:

Test Required	Test Frequency	Method & Acceptance Reference
Tensile Properties	Once per heat & heat treat batch	Paragraph 3.2 or S21
Surface Hardness	Once, each length or piece	Paragraph 3.2
Composition	Once per heat	Paragraph 3.1
Volumetric Inspection	100% each length or piece	When required by Supplement 1
Impact Toughness	One set per heat & heat treat batch	When Required by S2, S4, S26, OR S46
Surface Inspection	100% visual	Paragraph 5.2