AISI 410 STAINLESS STEEL FORGED OR HOT ROLLED BARS 75,000 MINIMUM YIELD TO NACE 0175/ISO 15156-2 FOR STANDARD SERVICE, IMPACT TESTED AT -20 DEG. F OR LOWER 27J/18J

Rev	Reason of Change	Date	Made By	Reviewed By	Approved By	Status
1	Hardness Change	09-05-2013	USR	J Gulati	KKD	Released

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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 410 stainless steel for standard service.

1.2 AISI 410 stainless steel forgings and hot rolled bars heat-treated to 75,000 PSI minimum yield strength for standard service.

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.

2.0 REQUIREMENTS

2.1 The requirements of specification S.E.S. 26-590 shall apply in addition to the following specific requirements.

2.1. A) 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)	0.15 (max.)
Manganese (Mn)	1.00 (max.)
Silicon (Si)	0.55 (max.)
Sulphur (S)	0.025 (max.)
Phosphorus (P)	0.025 (max.)
Nickel (Ni)	0.75 (max.)
Chromium (Cr)	11.5-13.5
Molybdenum (Mo)	0.20 (max.)
Iron (Fe)	Balance

2.1. B) 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	95,000 PSI (655 MPa) Min.
YLELD STRENGTH	75,000 PSI (517 MPa) Min.
ELONGATION IN 2" Gage Length	17 % Min.
REDUCTION IN AREA	35% Min.
BRINELL HARDNESS (kg/mm²)	197-237 BHN

2.1. C) Impact Testing: Impact property requirements are listed below. Each heat shall be tested and the listed impact properties shall be reported. In no case shall an individual impact value fall below two-thirds of that required as a minimum average value. Similarly, no more than one of the three test results shall be below the required minimum average value.

Specimen Size (mm)	CVN (mm)	Temperature	Avg. Impact Value minimum	Min. req. for one specimen only	CVN Orientation
10x10x55	2.0	-20 °F	27 Joules	18 Joules	Longitudinal

3.0 Melt practice: The steel shall be made by the electric furnace process with subsequent vacuum treatment (EFVD). Steel made by Vacuum Induction Melting (VIM), Vacuum Arc Remelting (VAC), or Electro Slag Remelting (ESR) shall also be acceptable

3.1 Condition: All product shall be normalized (N) then quenched (Q) and tempered (T) (N+Q&T), except that normalizing shall not be required for the following:
3.1.1 Forgings with a reduction ratio of 4:1 or greater;
3.1.2 Rolled tubing or extruded tubing with a wall thickness of 3" or less;
3.1.3 Bar stock with a diameter of 7" or less.

4.0 Heat Treatment: - Material shall be supplied in the heat treated condition and must meet the minimum properties of section 2.0. Material shall be Austenitized, Quenched and Double tempered condition.

PROCESS	MEDIA	TEMPERATURE	TIME AT TEMPERATURE
Austenitize	Air or Nitrogen	1750-1850 ºF (955-1010 ºC)	½ hour per inch of maximum through thickness. One hour minimum
Quenching	Oil	100 ºF (38 ºC) at the start of quench	120ºF Max. at the completion of the quench
1st Tempering	Air	1255 ºF (663 ºC) minimum.	1 hour for the first inch of thickness + 1/2 hour for each additional inch of minimum through Thickness. Cool to ambient temperature in Air.
2nd Tempering	Air	1200-1230 ºF (649-665 ºC)	1 hour for the first inch of thickness + 1/2 hour for each additional inch of minimum through Thickness. Cool to ambient temperature in Air.

5.0 Documentation Required:-

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