MATERIAL SPECIFICATION FOR ASTM A-694 Gr. F60 FOR FORGED BAR BLANKS AND CLOSED DIE FORGING

Rev	Reason of Change	Date	Made By	Reviewed By	Approved By	Status
0	New	19-09-2013	USR	J Gulati	KKD	Released
1	Quenching media temperature requirements amended & clause 3.0 added as per API 6A 21st edition.	04-10-2019	MN	USR	AS	Released

MATERIAL SPECIFICATION FOR ASTM A-694 Gr. F60 FOR FORGED BAR BLANKS AND CLOSED DIE FORGING

1.0 PURPOSE

1.1 It is the purpose of this material specification to list in concise form of the material requirement for ASTM A-694 Grade F60

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 S.E.S. 26-590 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)	0.3
Manganese (Mn)	1.50 Max
Silicon (Si)	0.13 – 0.37 Max
Sulphur (S)	0.06 Max
Phosphorus (P)	0.05 Max

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	Size up to 4"
TENSILE STRENGTH, KSI (Minimum)	75
YLELD STRENGTH, KSI (Minimum)	60
ELONGATION IN 2" Gage Length	20 % Min
REDUCTION IN AREA	28 % Min
HARDNESS	197 BHN Max

2.1.c) Heat Treatment : Heat Treatment temperatures and Time as per below options :

Process	Atmosphere/Media	Temperature	Hold Time
Normalize	Air	870º-920º C	1/2 Hour per Inch of Max Thickness
Hardening	Air	850º-880º C	1/2 Hour per Inch of Max Thickness
Quench	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	
Tempering	Air	620º-655º C	1 Hour Minimum

2.1.d) Impact Properties : Charpy V-Notch Impact requirement at -29° C, 20 J average with single value not less than 13 J.

3. 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.
Suppliers shall retain heat treat charts in a secure area for a period of no less than 10 years (e.g. electronic or paper).