
	<b>SARA SAE ENGINEERING SPECIFICATION</b>	
	<b>SECTION SES 26 – 765</b>	
	<b>REV NO “0”</b>	<b>ISSUE “A”</b>
	<b>EFF. DATE: 19.09.2013</b>	<b>Page 1 of 3</b>

**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

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## **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%.

<b>ELEMENTS</b>	<b>COMPOSITION RANGE (%)</b>
Carbon (C)	0.30
Manganese (Mn)	1.50 Max
Silicon (Si)	0.13 – 0.37 Max
Sulphur (S)	0.06 Max
Phosphorus (P)	0.05 Max

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**2.1.b) Mechanical Properties:** Mechanical property requirements are listed below. Each heat shall be tested and the listed mechanical properties shall be reported.

<b><u>MECHANICAL PROPERTIES</u></b>	<b>Size up to 4”</b>
TENSILE STRENGTH, KSI (Minimum)	75
YIELD 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 :

<b>Process</b>	<b>Atmosphere/Media</b>	<b>Temperature</b>	<b>Hold Time</b>
Normalize	Air	870°-920° C	1/2 Hour per Inch of Max Thickness
Hardening	Air	850°-880° C	1/2 Hour per Inch of Max Thickness
Quench	Water	38° C before Quenching 49° C After Quenching	3/4 Hour per Inch of Max Thickness
Tempering	Air	620°-655° C	1 Hour Minimum

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

### **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.