

26-739



## SARA SAE ENGINEERING SPECIFICATION

SECTION SES - 26 - 739

ISSUE "A"

Rev "1"

EFF. DATE 20.10.2011

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### GENERAL SPECIFICATION FOR STEEL FORGING

#### **1.0 PURPOSE**

- 1.1 It is the purpose of this specification to list in a concise form the forging requirements for steel forgings for use in manufacture of Hammer Union and Ring Joint Gaskets used oil field services.
- 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 SCOPE**

- 2.1 This specification covers requirements of die-forgings and ring rolling in the annealed or normalized or tempered condition and to meet other requirements as specified.

#### **3.0 APPLICABLE DOCUMENTS**

- SARA SAE QA Sampling Plan SARA SAE/DOC/42 Rev'2'
- SES/QAD/MT-1/97 Rev'1' Test Method of MPI
- SES-26-701 Rev'0' Test Method of Liquid Penetrant Test
- ASTM A788 Standard Specification for Steel Forgings, General requirements
- Material Spec as per Purchase Order
- Relevant Forging Drawings

#### **4.0 CONDITION**

- 4.1 Forgings shall be supplied clean, free from scale meeting the requirements of this specification, the purchase order and the relevant forging drawing.

#### **5.0 VENDOR APPROVAL**

- 5.1 Prior to supplying the first article forging, prospective vendors shall submit a representative sample from the finish- die-set / ring rolling for evaluation and approval. The representative sample can be out of specified / non-specified material.
- 5.2 Prior to supply of bulk the prospective vendor shall submit first off samples of forgings / ring rolling out of the approved specified material for evaluation & approval.
- 5.3 After approval vendor shall make no changes in process without the written permission of SARA SAE and re-approval of first article sample, if desired by SARA SAE.



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### **6.0 PROCESS REQUIREMENTS**

- 6.1 forgings / ring rollings shall be produced only from the material heats approved by SARA SAE
- 6.2 Billets for forgings may be heated by induction or electric or oil fired furnace
  - 6.2.1 Heating shall not produce internal oxidation, sigma phase or grain growth exceeding Grain Size of 5 as per ASTM E112.
  - 6.2.2 Billet pre-heat temperature shall depend upon the material used.
  - 6.2.3 forgings shall be struck/ rolled so that the longitudinal axis of the starting billet coincides with the centerline of the forging / ring.
  - 6.2.4 Finished forgings / rings shall be hot trimmed.
  - 6.2.5 A min forging ratio of 3:1 shall be maintained for all die/free forgings and rings produced from bars/billets with predetermined forging ratio of min 3:1.

7.0 When specified on the PO, forgings shall be supplied in normalized or normalized and tempered condition as required.

### **8.0 FINISHED FORGING REQUIREMENTS**

- 8.1 forgings shall conform to the dimensions and tolerances specified on the relevant drawing referenced on the purchase order.
- 8.2 Finished forgings shall be clean, scale free, free of laps, seams, cracks, fins, scabs, excessive flash or other surface / injurious defects.
- 8.3 Forging surfaces shall be capable of meeting the requirements of MPT / DPT as applicable.

### **9.0 ACCEPTANCE**

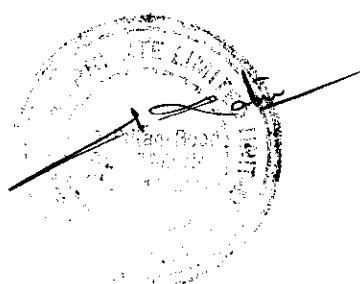
- 9.1 A lot shall consist of one part number forgings produced from one heat of respective material and forged (heat treated, if require) in identical conditions.
- 9.2 SARA SAE may inspect random samples from each lot to verify any or all the above requirements.
- 9.3 An AQL of 4 with an acceptance / rejection number as per SARA SAE QA Plan SARA SAE/DOC/42 Rev'2' shall be used for lot acceptance. Any non-conforming lot shall be rejected.
- 9.4 Individual forgings may also be rejected for non-conformance if any.

### **10.0 PACKING**

- 10.1 forgings shall be supplied in packages that protect against damages during shipment.

### **11.0 DOCUMENTATION REQUIRED**

- 11.1 Each shipment shall be accompanied by material certifications for each lot of material, the certifications must be positively relatable to the lot of material represented.
  - a) Mill certificate of raw material.
  - b) Chemical certificate for each lot of forging.



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- 11.2 Mechanical properties certification as per spec
- 11.3 Impact testing certification
- 11.4 Certification of heat treatment including cycle time, temperature, cooling media, hardness and graphs.
- 11.5 Calibration certificate of furnace.
- 11.6 Ultrasonic test report -- certification of raw material.

#### **12.0 TESTING TO BE CARRIED OUT BY SARA SAE**

- 12.1 At the time of lifting forgings re-verification of chemical properties.
- 12.2 Recheck of tensile strength, yield strength, elongation, reduction in area, hardness, impact testing and UT testing as per applicable spec.

