# AISI-1020 MATERIAL SPECIFICATION FOR LOW CARBON STEEL

| Rev | Reason of Change | Date | Made By | Reviewed By | Approved By | Status |
|---|---|---|---|---|---|---|
| 0 | Initial release | 18-05-2018 | MN | AS | KKD | Released |

## 1. SCOPE

1.1. AISI-1020 carbon steel forgings and wrought shapes heat-treated to 36,000 PSI minimum yield strength for standard service.

1.2. Product forms covered by this specification are closed die, Open die and ring forgings.

## 2. REQUIREMENTS

2.1 The requirements of specification SES 26-590, SES 26-740 & SES 26-744 shall apply in addition to the following specific requirements.

2.2 It is the responsibility of raw material/metal supplier/machined parts supplier of carbon, low alloy and martensitic stainless steel to have practices and procedures in place to assure that raw materials/parts delivered do not have excessive amounts of residual magnetism. Excessive residual magnetism is defined as greater than 3 gauss. Residual magnetism can occur due to factors such as lifting with magnets, magnetic particle inspection or stray welding current. The supplier's procedures/testing methods will be subject to verification during supplier audits.

2.3 The raw material supplier shall assure that material does not receive with greater than background level of radioactivity.

3 **CHEMICAL COMPOSITION:** Chemical composition limits are listed below. An analysis of each heat of steel be 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.

| ELEMENTS | COMPOSITION RANGE (%) |
|---|---|
| Carbon (C) | 0.18-0.23 |
| Manganese (Mn) | 0.30-0.60 |
| Sulphur (S) | 0.05 (max.) |
| Phosphorus (P) | 0.04 max.) |

4.0 **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 | 70,000 PSI (783 Mpa) Min. * |
| Yield Strength | 36,000 PSI (248 Mpa) Min. * |
| Elongation | 21% Min. * |
| Hardness | 212 BHN (16 HRC) Max. * |

* These properties are not required for ring gaskets. Ring Gaskets shall have a maximum Hardness of 78 HRB (144 BHN).

5.0 **HEAT TREATMENT** :

| PROCESS | ATMOSPHERE/MEDIA | TEMPERATURE | TIME AT TEMPERATURE |
|---|---|---|---|
| Normalizing | Air | 1500°-1600° F (815° - 870° C) | ½ hour per inch of maximum through thickness. |
| Note: Maximum holding time shall not exceed Five times (5X) the minimum holding time. In all case, holding time shall not start until parts or materials have reached specified heat treatment temperature. The 5X rule does not apply to the separate QTC (e.g. ER 5"). | | | |
| Slow cool to room temperature. | | | |

6.0 **DOCUMENTATION REQURIED**:

6.1 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.

6.2 Certification of heat treatment including cycle time, temperature, cooling media, hardness and graphs.

6.3 Calibration certificate of furnace.