Sara Sae

Engineering Standards/Specifications

Procedure No.
SES 26-709

Title

MATERIAL SPEC, ALLOY STEEL PLATE AISI 4130-ULTRASONICALLY INSPECTED FOR STANDARD AND H_2S SERVICE – LOW TEMPERATURE SERVICE (HB 197-135)

V.P. of Manufacturing	V.P. of Engineering	V.P. of QA/QC	V.P. of Sales/ Marketing	Revision Description	Release Date	Rev. Ltr

Written By	Revised By	

SARA SAE PRIVATE LIMITED
Mohabewala Industrial Area
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DEHRADUN
(INDIA)

Title

MATERIAL SPEC, ALLOY STEEL PLATE AISI 4130-ULTRASONICALLY INSPECTED FOR STANDARD AND H_2S SERVICE – LOW TEMPERATURE SERVICE (HB 197-135)

1.0 SCOPE

1.1 This Specification covers the requirements for liquid quenched and tempered low alloy steel plate intended for use in pressure containing components provided the principal stresses do not occur perpendicular to the plate's rolling direction (short transverse direction). The components covered by this Specification shall be hot rolled, normalized, austenitized, liquid quenched and tempered to meet the requirements of Section 5.0. The material shall be suitable for hydrogen sulfide service in conformance with NACE MR-01-75 standard.

1.2 Plate material shall be purchased ultransonically inspected with Charpy Impact Testing.

2.0 APPLICABLE REQUIREMENTS AND SPECIFICATIONS

2.1 AISI 4130

2.2 UNS G41300

3.0 BASIS OF PURCHASE

3.1 The Purchase Order shall include the following:

3.1.1 SARA SAE Specification.

3.1.2 Size of plate: Thickness x with x length.

3.1.3 Heat treatment as purchased: hot rolled and normalized.

4.0 CHEMISTRY REQUIREMENTS

4.1 The AISI 4130 material is to conform to the requirements for chemical composition prescribed below:

Carbon, %	0.28 to 0.33
Manganese, %	0.40 to 0.60
Phosphorous, %	.025 max.
Sulfur, %	.025 max.
Silicon, %	0.15 to 0.35
Chromium, %	0.80 to 1.10

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Molybdenum, %	0.15 to 0.25
Nickel, residual, %	0.80 max.
Copper, residual, %	0.30 max.

5.0 MECHANICAL PROPERTIES

5.1 Mechanical properties taken from a test coupon removed from the plate shall meet the minimum requirements at the t/4 location. For plate thicknesses from 3/4" to 4", each side of the test coupon shall be equal to the plate thickness and the length equal to 6". For plate thicknesses over 4", the test coupon shall be removed and machined to 4" x 4" x 8" prior to heat treatment and heat treated per Paragarph 6.1.

5.2 If the plate is ordered in other than the quenched and tempered condition, the test coupon used to determine the mechanical properties shall be heat treated as per Section 6.1. The test coupon shall meet the following minimum requirements at the t/4 location:

Tensile Strength, psi (min.)	95,000
Yield Strength, psi (min.)	75,000
Elongation, 2" gauge length, % (min.)	18
Reduction in area, % (min.)	35
Brinell Hardness Before Final Machining, HB	207-237
Brinell Hardness After Final Machining, HB	197-237

5.3 Impact Properties

5.3.1 The temperature at which the Charpy V-Notch tests are to be conducted and the required impact values are as shown in Paragraph 5.3.4; other values, if appropriate, will be specified on the Purchase Order.

5.3.2 The test specimens should be sampled from a t/4 location where "t" is the thickness of the test coupon.

5.3.3 Unless otherwise specified, the Charpy V-Notch specimens are to be oriented in the longitudinal direction, with the notch machined such that it is perpendicular to the material surface (from which t/4 is measured).

5.3.4 The requirements for Charpy Impact Testing shall be as follows:

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Temperature	Charpy V-Notch (Avg. of 3 Specimens)	Minimum Requirements for One Specimen Only	Lateral Expansion Min.
-26°F (-32°F)	31 ft.-lbs. (42J)	24 ft.-lbs. (32.5J)	0.015"

5.4 The surface hardness of the test bar shall be reported.

5.5 Chemistry and mechanical properties obtained from a mill qualification report, representing the same heat lot and final heat treatment response of the material is acceptable.

6.0 HEAT TREATMENT

6.1 The plate shall be hot rolled followed by normalizing at 1700°F ± 25°(cool in still air). After rough machining, if required, the plate shall be fully austenitized at 1600-1650°F, water quenched and tempered at 1200°F minimum to meet the requirements of Section 5.0.

7.0 MARKINGS

7.1 The wrought products shall be marked by steel stamping with the Purchase Order number, the alloy, and mill heat number.

8.0 INSPECTION

8.1 The product shall be ultrasonically inspected for lamination. No laminations will be accepted.

9.0 SPECIAL REQUIREMENTS

9.1 The steel shall be made by the basic electric furnace process to low sulfur and phosphorous in which the molten metal may be vacuum or AOD treated prior to or during the pouring of the ingot in order to remove objectionable gases, particularly hydrogen. Vacuum-arc remelting or electroslag remelting are also permissible melting processes. The material shall be treated to fine grain melting practice.

10.0 CERTIFICATION

10.1 A certification shall be provided to SARA SAE with shipment. In addition, the original and a copy will be provided to the SARA SAE Purchasing Department.

10.2 The following information is mandatory on the certified record:

10.2.1 Mill chemical analysis.

10.2.2 Mechanical properties of the test coupon as stipulated in Section 5.0.

10.2.3 Certification of the heat treatment with the time and temperature cycle the plate and test coupon have received. Hardness of the plate will also be reported.

10.2.4 Purchase Order number.

10.3 In the event of partial shipment or billing, each shipment shall be accompanied by a certification.

11.0 DIMENSIONS

11.1 Any deviation from this Specification shall be permitted only upon written approval from SARA SAE.

12.0 LOT NUMBERS

12.1 Materials/parts ordered to this Specification will require a lot number issued by SARA SAE Quality Control.