Sara Sae

Engineering Standards/Specifications

Procedure No.
SES 26-710

Title

MATERIAL SPEC, CARBON STEEL PLATES, ASTM A-516 GR 70 FOR MINIMUM DESIGN TEMPERATURE OF -20°C (≤ 2" THICK) AND -40°C (> 2" THICK)

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	

Title

MATERIAL SPEC, CARBON STEEL PLATES, ASTM A-516 GR 70 FOR MINIMUM DESIGN TEMPERATURE OF -20°C (≤ 2" THICK) AND -40°C (> 2" THICK)

1.0 Scope:

1.1 This Specification covers carbon steel plates suitable for structural service. This material shall be used for low temperature service where third party inspection may be required.

2.0 APPLICABLE REQUIREMENTS AND SPECIFICATIONS

2.1 Applicable Specifications

2.1.1 ASTM A-20

2.1.2 ASTM A-435

2.1.3 ASTM A-516

2.1.4 ASTM A-577

2.1.5 ASTM A-578

2.1.6 ABS Rules for Building and Classing Steel Vessel, ABS Grade N

3.0 BASIS OF PURCHASE

3.1 Purchase Order shall include

3.1.1 SARA SAE Specification

3.1.2 SARA SAE part number

3.1.3 Dimensions: OD x Length or OD x ID x Height or W x H x L

3.1.4 Heat treating condition:

a) Plates shall be in the normalized condition.

3.1.5 Test temperatures at which Charpy V-Notch impact tests are to be conducted and the average impact values required.

4.0 CHEMISTRY REQUIREMENTS

4.1 The material must conform to the chemical composition given below:

Carbon	.28% max.
Manganese	.79 to 1.31%
Phosphorous	.035 max.
Sulfur	.04 max.
Silicon	.13 to .45%

5.0 MECHANICAL PROPERTIES

5.1 Mechanical properties obtained from a test coupon removed from plate shall meet the minimum requirements of paragraph 5.1.1 at the t/4 location. For plates up to 4" thick, the test coupon shall be the full thickness of the plate.

5.1.1 Mechanical properties required at the t/4 location of the test coupon:

Tensile Strength, psi	70,000 to 90,000
Yield Strength, psi (min.)	38,000
Elongation, 2" gauge length % min.	21
Elongation, 8" gauge length % min.	17

5.2 Impact Properties

5.2.1 The temperature for Charpy V-Notch tests are as shown in paragraph 5.2.4 for thickness of ≤ 2" and > 2"; other values, if appropriate, will be specified on the Purchase Order.

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

5.2.3 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.

5.2.4 The requirements for Charpy impact testing in the longitudinal direction shall be as follows:

Thickness	Thickness	Charpy V-Notch (Avg. of 3 Specimens)	Minimum Requirements For One Specimen Only
≤ 2"	-20°C	25 ft.-lbs.	18 ft.-lbs.
>2"	-40°C	25 ft.-lbs.	18 ft.-lbs.

5.3 Chemistry and mechanical properties obtained from a mill qualification report representing the same heat, reduction, and heat treating shall be acceptable.

6.0 HEAT TREATMENT

6.1 Plates shall be supplied in the normalized condition unless specified otherwise in the Purchase Order. If the purchase order specified quench and tempered condition, the plates shall be heat treated in accordance to the guidelines in ASTM A-516.

7.0 MARKINGS

7.1 The product 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 inspected for laps, seams, folds, and re-entry grains and those defects shall be ground out.

8.2 When surface defects are removed by grinding and the thickness is not reduced below that specified on the Purchase Order, the defective areas may be blended smooth. Care should be taken to assure that all of the defective zone has been removed by reinspecting the zone after grinding.

8.3 When surface grinding reduces the thickness below the specified minimum, the material shall be rejected.

9.0 SPECIAL REQUIREMENTS

9.1 Cleanliness

9.1.1 SARA SAE has the option to perform macro analysis of the plates to reveal the presence of segregation and non-metallic inclusions. The material shall show freedom from pipe, segregation, and injurious non-metallic inclusions.

9.2 Melting Process

9.2.1 The steel shall be made by the basic electric furnace process in which the molten metal may be vacuum treated prior to or during the pouring of the ingot in order to remove objectionable gases.

10.0 CERTIFICATION

10.1 A certification shall be provided to SARA SAE with each 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 Statement of heat treatment of the test coupon and mechanical properties to include Charpy V-Notch impact tests.

10.2.3 Certification of heat treatment to include time/temperature cycle.

10.2.4 Purchase Order Number.

10.3 In the event of partial shipment or bill, each event shall be accompanied by a certification. Traceability of components is required as to heat lot, heat treatment, and mechanical properties.

11.0 DIMENSIONS

11.1 The plate shall conform to the dimensions and tolerances specified on the SARA SAE drawing or Purchase Order.

12.0 DEVIATIONS

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12.1 Any deviation from this Specification shall be permitted only upon written approval from SARA SAE. SARA SAE Engineering shall be the final authority on any deviations.

13.0 SERIALIZATION

13.1 Materials/parts ordered to this Specification will require serialization by SARA SAE Quality Control.

13.2 Serialization not required when so specified by applicable Engineering drawing.