

API 2H Grade 50

Normalized Carbon-Manganese Structural Steel Plate

General Product Description

API 2H Grade 50 is an intermediate-strength, normalized, structural steel plate used in the welded construction of offshore structures. API 2H Grade 50 has a minimum yield strength of 50 ksi [345 MPa] and a minimum transverse Charpy V-notch impact toughness of 30 ft-lbf [41 J] at -40°F [-40°C]. SSAB is an API Licensee under the API Monogram Program. This product can be multi-certified to ASTM A633 Grade C, ABS DH/EH 36, ASTM A537 Class 1 and MIL-S-22698 Rev C in thicknesses to 2" [50.8 mm].

Applications: API 2H Grade 50 is intended primarily for use in offshore structures in critical portions that must exhibit good impact toughness and resistance to plastic fatigue loading and lamellar tearing. The primary use of API 2H Grade 50 is in tubular joints, stiffened plate construction and other intersections where portions of the plates will be subjected to tension in the through-thickness (Z) direction.

Dimensions: The following API 2H Grade 50 plate sizes are available:

Thickness: 0.375" - 3.00" (9.5 mm – 76.2 mm)

Width: 72" - 123" (1,829mm - 3,124 mm)

Length: 240" - 600" (6.10m – 15.24 m)

Mechanical Properties

Tensile Testing is performed transverse direction according to API 2H requirements. The minimum values are tabulated below:

Thickness, t in. [mm]	0.2% YS ksi [MPa], min.	UTS ksi [MPa]	Elongation in 2" [50 mm], min. %	Elongation in 8" [200 mm], min. %
t≤2.50 [63.5]	50 [345]	70 to 90 [483-620]	21	16
t>2.50 [63.5]	47 [324]	70 to 90 [483-620]	21	16

Charpy V-Notch Impact Testing is performed using transverse specimens in accordance with ASTM A370. The producer has the option of testing sub-size specimens to any of the combinations of specimen size, energy requirement, and test temperature as shown below:

Specimen Size in.	Specimen Size, mm	Minimum Average Energy ft-lb [J]	Minimum Single Value Energy ft- lb [J]	Test Temperature °F [°C]
0.394 x 0.394	10 x 10	30 [41]	25 [34]	-40 [-40]
0.295 x 0.394	7.5 x 10	30 [41]	25 [34]	-40 [-40]
0.197 x 0.394	5 x 10	30 [41]	25 [34]	-40 [-40]
0.295 x 0.394	7.5 x 10	23 [31]	19 [26]	-50 [-46]
0.197 x 0.394	5 x 10	15 [20]	13 [18]	-80 [-62]

Chemical Composition (wt %, max. unless indicated)

	C	Mn	P	S	Si	Al	Cb	Ti ¹	N ²	V ²	CEV t≤2"	CEV t>2"
Heat	0.18	1.15- 1.60	0.030	0.010	0.05- 0.40	0.02- 0.06	0.01- 0.04	0.020	0.012		0.43	0.45
Product	0.22			0.015	0.05- 0.45							

1. Minimum value, if any, shall be as agreed upon and stated on the order.

2. Shall not be intentionally added.

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$$\text{Carbon Equivalent: } CEV = C + \frac{Mn}{6} + \frac{Cr+Mo+V}{5} + \frac{Ni+Cu}{15}$$

Tolerances

Thickness, width, and length tolerances for API 2H Grade 50 steel plate are in accordance with the requirements of ASTM A6. The flatness tolerance for as-supplied product is ½ ASTM A6.

Delivery Condition

API 2H Grade 50 is supplied in the normalized condition.

Fabrication and Other Recommendations

Weldability: Welding of API 2H Grade 50 shall be performed in accordance with the applicable welding code. In the absence of a specified welding code, the following suggested minimum preheat and interpass temperatures and welding consumables are provided. Special welding consumables and welding procedures may be required to match the base metal toughness. Low hydrogen practices are strongly recommended, including the removal of surface moisture.

Welding Process	Thickness, in [mm]	Minimum Preheat and Interpass Temperature	Consumables
Shielded Metal Arc (SMAW)	Up to 1.5" [38.1]	50°F [10°C]	AWS E7015-X, E7016-X, E7018-X
	>1.5" [38.1] to 2.5" [63.5]	150°F [65°C]	
	>2.5" [63.5]	225°F [110°C]	
Gas Metal Arc (GMAW)	Up to 1.5" [38.1]	50°F [10°C]	AWS ER70S-X
	>1.5" [38.1] to 2.5" [63.5]	150°F [65°C]	
	>2.5" [63.5]	225°F [110°C]	
Submerged Arc (SAW)	Up to 1.5" [38.1]	50°F [10°C]	AWS F7XX-EXXX-XX
	>1.5" [38.1] to 2.5" [63.5]	150°F [65°C]	
	>2.5" [63.5]	225°F [110°C]	
Flux Cored Arc (FCAW)	Up to 1.5" [38.1]	50°F [10°C]	AWS E7XTX-X
	>1.5" [38.1] to 2.5" [63.5]	150°F [65°C]	
	>2.5" [63.5]	225°F [110°C]	

Supplementary Requirements

By agreement between the purchaser and plate manufacturer, the following Supplementary Requirements may be specified on the purchase order: S1 (Ultrasonic Examination), S2 (Notch Toughness Test at Lower Temperature), S3 (Individual Plate Testing), S4 (Through-Thickness [Z-Direction] Testing), S5 (Low Sulfur Steel for Improved Through-Thickness Properties), S7 (Low Nitrogen Content for Improved Notch Toughness in Strain-Hardened Condition), S8 (Strain-Aged Charpy V—Notch Impact Tests), S12 (Notch Toughness Using Drop Weight), S13 (Surface Quality) and S14 (Thickness Tolerance)