



API 2H Grade 50 Steel Plate

Scope

API 2H Grade 50 steel plate is produced in accordance with the ninth edition (July 2007) of API's Specification 2H. This specification allows for the production of intermediate strength steel plate for use in welded construction of offshore structures. The superior properties of this grade are the result of tight controls of chemical composition and grain refinement resulting from the normalizing heat-treatment process.

API Monogram and Certification

SSAB's API 2H Grade 50 plate is licensed by the American Petroleum Institute to carry the API monogram. If desired, this grade can be multi-certified to ASTM A633 Grade C, ABS DH/EH 36, ASTM A537 Class 1 and MIL-S-22698 Rev. C.

Typical Applications

API 2H Grade 50 steel plates are intended for fabrication primarily by cold forming and welding. Plates produced to this specification are used for welded construction of offshore structures in selected critical sections that must exhibit good impact properties and resistance to fatigue and through-thickness or lamellar tearing. The primary use of these steels 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.

Weldability

The welding procedures used for these steels are of fundamental importance and users should consider welding consumables that avoid under-matched weld metal. These steels are amenable to fabrication and welding under both shipyard and offshore conditions.

Available Sizes

Thickness range: 0.375 to 3.000" (9.5 to 76.2 mm) except for multi-certified plates which are limited to 2.000" (50.8 mm).

Width range: 72.0 to 121.0" (1.83 to 3.07 m)

Length range: 240 to 600" (6.1 to 15.2 m). Inquire lengths less than 240" (6.1 m).

Flatness

Guaranteed to meet ½ ASTM A6 flatness tolerances.

Composition (wt. %; maximum levels shown where relevant)

| Element | C | Mn | P | S | Si | Cb | Ti |
|-------------|------|-------------|-------|-------|-------------|-------------|----------------------|
| Heat Anal. | 0.18 | 1.15 – 1.60 | 0.030 | 0.010 | 0.05 – 0.40 | 0.01 – 0.04 | 0.020 ^(b) |
| Prod. Anal. | 0.22 | | | 0.015 | 0.05 – 0.45 | | |



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| Element | Al _{tot.} | N | V |
|-------------|--------------------|----------------------|-----|
| Heat Anal. | 0.02 – 0.06 | 0.012 ^(c) | (d) |
| Prod. Anal. | | | |

^(b) Min. values, if any, shall be agreed and stated on order.

^(c) Nitrogen shall not be intentionally added.

^(d) Vanadium shall not be intentionally added without specific approval of purchaser, in which case the limiting values for heat and product analyses shall be agreed and stated on order.

Carbon Equivalent maximums

To 2" (50.8 mm) and over 2", CE requirements are 0.43 and 0.45 respectively.

Where: $CE = C + Mn/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15$

Mechanical Properties (transverse tests)

Yield Strength min., ksi (MPa)

t ≤ 2.5 in. (63.5 mm) 50 (345)

t > 2.5 in. (63.5 mm) 47 (324)

Tensile Strength min., ksi (MPa) 70 – 90 (483 - 620)

% Elongation in 2 in. (50 mm) min. 21

% Elongation in 8 in. (200 mm) min. 16

Charpy Impact Properties

One Charpy V-notch test, consisting of three transverse specimens, shall be made on each as-rolled slab. Due to the low carbon and sulfur contents, the energy of the full-size specimens will often exceed the limits of ASTM E23; therefore, sub-sized specimens are allowed per the following table:

| Specimen size | | Min. Avg. Energy | Min. Single Value | Test Temp. |
|---------------|----------|------------------|-------------------|------------|
| in. | mm | ft-lbs (J) | ft-lbs (J) | 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 | 5.0 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 | 5.0 x 10 | 15 (20) | 13 (18) | -80 (-62) |

Supplementary Requirements

By agreement between the purchaser and the 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



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Impact Tests), S12 (Notch Toughness Using Drop Weight), S13 (Surface Quality), and S14 (Thickness Tolerance).

Sales Contacts

For sales information, please call 877-722-2589 (Southern USA & Mexico), 800-340-5566 (Western & Central USA), 800-383-9031 (North Central USA), and 888-576-8530 (Northeast USA & Canada), or consult www.ssab.com