



## Plate

### HPS 50W: Steels for Bridges

ASTM A709-01 first added grade HPS 50W. This high performance bridge steel has the identical chemistry as HPS 70W. It will most often be produced by as-rolled or control-rolled practices. ASTM A709 also allows it to be Thermo-Mechanical Controlled Processed (TMCP), with or without accelerated cooling, normalized, quenched and tempered or stress relieved. HPS 50W is produced to the same Charpy V-Notch requirements, independent of zone.

#### Tensile Requirements

Yield strength (minimum)	50 ksi (345 MPa)
Tensile strength (minimum)	70 ksi (485 MPa)
Elongation in 2" (50 mm) minimum	21%

#### Charpy V-Notch Impact Toughness Requirements (FCM - Fracture Critical Member)

Non FCM	20 ft.-lbs. Min. @ +10°F (27 J @ -12°C) (all Zones)
FCM	30 ft.-lbs. Min. @ +10°F (41 J @ -12°C) (all Zones)

#### Chemical Composition Requirements (Identical to HPS 70W)

Element	Composition %
Carbon (C)	0.11 Max.
Manganese (Mn)	1.10 - 1.35
Phosphorus (P)	0.020 Max.
Sulfur (S)	* 0.006 Max.
Silicon (Si)	0.30 - 0.50
Copper (Cu)	0.25 - 0.40
Nickel (Ni)	0.25 - 0.40
Chromium (Cr)	0.45 - 0.70
Molybdenum (Mo)	0.02 - 0.08
Vanadium (V)	0.04 - 0.08
Aluminum (Al)	0.01 - 0.04
Nitrogen (N)	0.015 Max.

\* All HPS 50W is calcium treated for sulfide shape control

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#### Application

HPS 50W has been used in bridges where a high level of Charpy V-Notch toughness is required. Initial production levels have given Charpy V-Notch toughness levels well above the minimum requirements. It is normally not required to use HPS 50W in hybrid designs with HPS 70W; most often use of 50W is sufficient.

#### Size Availability

1/2 to 4 in. (13 - 102 mm) thick; up to 1500 in. (38.1 m) long (if heat treated, length restrictions of 50 ft. (15.2 m) max. may apply); widths to over 150 in. (3.81 m) depending on overall weight; refer to ArcelorMittal USA Plate offices.

#### Welding

Because HPS 50W is produced to a lower carbon content than 50W, it is expected to be more weldable. Research work has been underway at LeTourneau University to document this with popular welding practices. HPS 50W should be welded with the identical practices as Grade 50W at this time. Any changes in this position will be posted at: <http://www.steel.org/Content/NavigationMenu/Construction/Bridges/Bridges.htm>

#### Approval

The ASTM specification A709-01 and later versions allow HPS 50W. The AASHTO Specification M270-02 and later versions allow HPS 50W.

#### Information

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