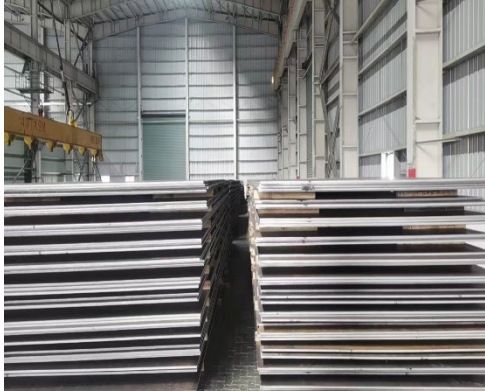


## SA- 516 Grade 70



### Steel Description

The SA- 516 specification is the *Standard Specification for Pressure Vessel Plates, Carbon Steel, for Moderate- and Lower Temperature Service (ASME Boiler and Pressure Vessel Code - An International Code SECTION II MATERIALS, 2021 Edition)* for plates with the intended service in welded pressure vessels where improved notch toughness is important. ASME SA-516 70 steel plates are made from carbon-manganese steels and the steel plates are produced to pressure vessel quality (PVQ) standards as prescribed in ASME SA-20/SA-20M 2023 edition (*Specification for General Requirements for Steel Plates for Pressure Vessels, ASME 2023 Edition*). The ASME specification is also identical with ASTM Specification A20/A20M 2023 Edition.

### Industrial Applications

Standard industrial applications are pressure vessels designed for moderate and lower-temperature service requiring excellent notch toughness, such as the API 650 and API 620 storage tanks, which are outlined under the latest **ASME Boiler and Pressure Vessel Code**. Its welding procedures are also prescribed under **American Welding Society**.

### Dimension Range

Grade	Product	Thickness (mm)	Width (mm)	Length (mm)
70	plates	6.35 - 406.4	1600 – 4000	6000 - 22000

Apart from the above, our steel mills can also meet your customized requirements and sizes, depending on the minimum quantity and methods of shipment.

Our SA-516 70 steel plate is supplied in the normalized condition. The normalizing temperature is 900 - 950 °C, and steel plate must be left in the furnace after temperature equalizing for approximately 1 minute per millimeter of thickness of the plate. As a result, it offers good cold-forming and hot-forming properties without negatively affecting the material properties.

The fine-grained structural steel of SA-516 70 steel plate can be perfectly welded, both manually and using automatic equipment, by means of all known welding processes. To give the structure of the product greater homogeneity, our SA-516 Grade 70 steel can also be supplied vacuum degassed.

**TABLE 1 Chemical Requirements**

Elements	Composition, %			
	Grade 55 [Grade 380]	Grade 60 [Grade 415]	Grade 65 [Grade 450]	Grade 70 [Grade 485]
Carbon, max: <sup>a, b</sup>				
½ in. [12.5 mm] and under	0.18	0.21	0.24	0.27
Over ½ in. to 2 in. [12.5 to 50 mm], incl	0.20	0.23	0.26	0.28
Over 2 in. to 4 in. [50 to 100 mm], incl	0.22	0.25	0.28	0.30
Over 4 to 8 in. [100 to 200 mm], incl	0.24	0.27	0.29	0.31
Over 8 in. [200 mm]	0.26	0.27	0.29	0.31
Manganese: <sup>b</sup>				
½ in. [12.5 mm] and under:				
Heat analysis	0.60–0.90	0.60–0.90 <sup>c</sup>	0.85–1.20	0.85–1.20
Product analysis	0.55–0.96	0.55–0.96 <sup>c</sup>	0.79–1.30	0.79–1.30
Over ½ in. [12.5 mm]:				
Heat analysis	0.60–1.20	0.85–1.20	0.85–1.20	0.85–1.20
Product analysis	0.55–1.30	0.79–1.30	0.79–1.30	0.79–1.30
Phosphorus, max <sup>a</sup>	0.025	0.025	0.025	0.025
Sulfur, max <sup>a</sup>	0.025	0.025	0.025	0.025
Silicon:				
Heat analysis	0.15–0.40	0.15–0.40	0.15–0.40	0.15–0.40
Product analysis	0.13–0.45	0.13–0.45	0.13–0.45	0.13–0.45

<sup>a</sup> Applies to both heat and product analyses.

<sup>b</sup> For each reduction of 0.01 percentage point below the specified maximum for carbon, an increase of 0.06 percentage point above the specified maximum for manganese is permitted, up to a maximum of 1.50 % by heat analysis and 1.60 % by product analysis.

<sup>c</sup> Grade 60 plates ½ in. [12.5 mm] and under in thickness may have 0.85–1.20 % manganese on heat analysis, and 0.79–1.30 % manganese on product analysis.

**TABLE 2 Tensile Requirements**

	Grade			
	55 [380]	60 [415]	65 [450]	70 [485]
Tensile strength, ksi [MPa]	55–75 [380–515]	60–80 [415–550]	65–85 [450–585]	70–90 [485–620]
Yield strength, min, <sup>a</sup> ksi [MPa]	30 [206]	32 [220]	35 [240]	38 [260]
Elongation in 8 in. [200 mm], min, % <sup>b</sup>	23	21	19	17
Elongation in 2 in. [50 mm], min, % <sup>b</sup>	27	25	23	21

<sup>a</sup> Determined by either the 0.2 % offset method or the 0.5 % extension-under-load method.

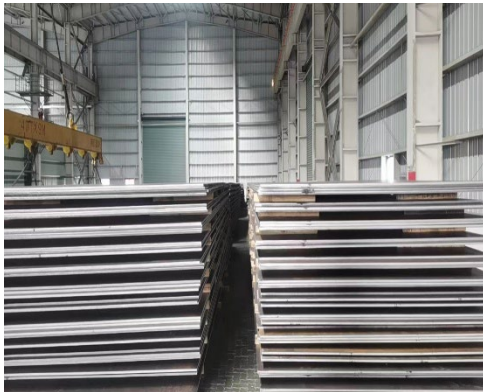
<sup>b</sup> See Specification A20/A20M for elongation adjustment.

Our SA-516 70 steel plate production will also be undergoing vacuum treatment and our production analysis is as follows:

- a) S3. Simulated Post-Weld Heat Treatment of Mechanical
- b) Test Coupons,
- c) Additional Tension Test,
- d) Charpy V-Notch Impact Test,
- e) Drop Weight Test (for Material 0.625 in. [16 mm] and over in Thickness),
- f) High-Temperature Tension Test,

- g) Ultrasonic Examination in accordance with Specification according to ASME SA435/SA435M 2021 Edition,
- h) Magnetic Particle Examination,
- i) Ultrasonic Examination in accordance with Specification ASME SA577/SA577M 2021 Edition,
- j) Ultrasonic Examination in accordance with Specification ASME SA578/SA578M 2021 Edition, and,
- k) Vacuum Carbon-Deoxidized Steel.

## SA- 516 Grado 70



### Descripción del acero

La especificación SA-516 es la norma estándar para placas de recipientes a presión, de acero al carbono, para usos a temperaturas moderadas y bajas (**ASME Boiler and Pressure Vessel Code - An International Code SECTION II MATERIALS, 2021 Edition**) para placas con el uso previsto en recipientes soldados a presión, donde es importante mejorar la resistencia de la muesca. Las placas de acero ASME SA-516 70 están fabricadas de aceros al carbono-manganeso y las placas de acero se producen según los estándares de calidad de recipientes a presión (PVQ) según lo estipulado en ASME SA-20/SA-20M edición 2023. (*Specification for General Requirements for Steel Plates for Pressure Vessels, ASME 2021 Edition*). La norma ASME también es idéntica a la especificación ASTM A20/A20M edición 2021.

### Aplicaciones industriales

Las aplicaciones industriales estándar son recipientes a presión diseñados para usos a temperaturas moderadas y bajas que requieren una excelente resistencia a las muescas, como los tanques de almacenamiento **API 650** y **API 620**, que se describen en el más reciente **Código ASME para calderas y recipientes a presión**. Sus procedimientos de soldadura también están establecidos por la **American Welding Society**.

### Rango de dimensiones

Grado	Producto	Espesor (mm)	Ancho (mm)	Longitud (mm)
70	placa	6.35 - 406.4	1600 – 4000	6000 - 22000

Además, nuestras fábricas de acero también pueden cumplir con sus requisitos y tamaños personalizados, según la cantidad mínima y el método de envío.

Nuestra placa de acero SA-516 70 se suministra bajo las normas establecidas. La temperatura establecida es de 900 - 950 °C y la placa de acero debe dejarse en el horno después de igualar la temperatura durante aproximadamente 1 minuto por milímetro de espesor de la placa. Como resultado, ofrece buenas propiedades de conformado en frío y en caliente, sin afectar negativamente las propiedades del material.

El acero estructural de grano fino de la placa de acero SA-516 70 puede soldarse perfectamente, tanto manualmente como mediante equipos automáticos, mediante todos los procesos de soldadura conocidos. Para dotar de mayor homogeneidad a la estructura del producto, nuestro producto en acero SA-516 Grado 70 también se puede suministrar desgasificado al vacío.

**TABLE 1 Chemical Requirements**

Elements	Composition, %			
	Grade 55 [Grade 380]	Grade 60 [Grade 415]	Grade 65 [Grade 450]	Grade 70 [Grade 485]
Carbon, max: <sup>a, b</sup>				
½ in. [12.5 mm] and under	0.18	0.21	0.24	0.27
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Over 8 in. [200 mm]	0.26	0.27	0.29	0.31
Manganese: <sup>b</sup>				
½ in. [12.5 mm] and under:				
Heat analysis	0.60–0.90	0.60–0.90 <sup>c</sup>	0.85–1.20	0.85–1.20
Product analysis	0.55–0.98	0.55–0.98 <sup>c</sup>	0.79–1.30	0.79–1.30
Over ½ in. [12.5 mm]:				
Heat analysis	0.60–1.20	0.85–1.20	0.85–1.20	0.85–1.20
Product analysis	0.55–1.30	0.79–1.30	0.79–1.30	0.79–1.30
Phosphorus, max <sup>a</sup>	0.025	0.025	0.025	0.025
Sulfur, max <sup>a</sup>	0.025	0.025	0.025	0.025
Silicon:				
Heat analysis	0.15–0.40	0.15–0.40	0.15–0.40	0.15–0.40
Product analysis	0.13–0.45	0.13–0.45	0.13–0.45	0.13–0.45

<sup>a</sup> Applies to both heat and product analyses.

<sup>b</sup> For each reduction of 0.01 percentage point below the specified maximum for carbon, an increase of 0.06 percentage point above the specified maximum for manganese is permitted, up to a maximum of 1.50 % by heat analysis and 1.60 % by product analysis.

<sup>c</sup> Grade 60 plates ½ in. [12.5 mm] and under in thickness may have 0.85–1.20 % manganese on heat analysis, and 0.79–1.30 % manganese on product analysis.

**TABLE 2 Tensile Requirements**

	Grade			
	55 [380]	60 [415]	65 [450]	70 [485]
Tensile strength, ksi [MPa]	55–75 [380–515]	60–80 [415–550]	65–85 [450–585]	70–90 [485–620]
Yield strength, min, <sup>a</sup> ksi [MPa]	30 [205]	32 [220]	35 [240]	38 [260]
Elongation in 8 in. [200 mm], min, % <sup>b</sup>	23	21	19	17
Elongation in 2 in. [50 mm], min, % <sup>b</sup>	27	25	23	21

<sup>a</sup> Determined by either the 0.2 % offset method or the 0.5 % extension-under-load method.

<sup>b</sup> See Specification A20/A20M for elongation adjustment.

Nuestra producción de placas de acero SA-516 70 también se someterá a un tratamiento al vacío y nuestro análisis de producción es el siguiente:

- l) Tratamiento de mecánica, con simulado de calor post-soldadura,
- m) Prueba con cupones de acero,
- n) Prueba de tensión,
- o) Prueba de impacto Charpy con muesca en V,
- p) Prueba de caída de peso (para espesor de material de 0,625 pulg. [16 mm] y más),

- q) Prueba de tensión a alta temperatura,
- r) Examen ultrasónico de acuerdo a la norma ASME SA435/SA435M edición 2021,
- s) Examen de partículas magnéticas,
- t) Examen ultrasónico de acuerdo a la norma ASME SA577/SA577M edición 2021,
- u) Examen ultrasónico de acuerdo a la norma ASME SA578/SA578M edición 2021, y
- v) Acero desoxidado al carbono, al vacío.