

Strenx® Tube 960MH

General Product Description

Strenx® Tube 960MH is an HF-welded cold-formed structural hollow section made of hot-rolled high-strength steel with a minimum yield strength of 960 MPa.

Its high strength combined with naturally stiff form of welded hollow section enables construction of stronger and lighter structures. Strenx® Tube 960MH meets or exceeds the requirements of prEN 10219 (2016). Typical applications include load-bearing structures in the lifting, handling and transportation segments.

Strenx® Tube 960MH is available in circular, square and rectangular shapes. Other shapes and sizes are available upon request.

The maximum length of the tubes is 12-18 meters, depending on the size. Longer or cut-to-length tubes are available upon request.

It is not recommended to hot dip galvanize Strenx® Tube 960MH hollow sections.

Dimension Range

Strenx® Tube 960MH is available at circular, square and rectangular shapes.

Circular	114.3 - 244.5 mm
Square	100x100 - 200x200mm
Rectangular	120x80 - 250x150 mm
Wall thickness	4.0 - 6.0 mm
Mill length	6000 - 12 000/18 000 mm

Other shapes and sizes are available upon request.

Dimensions

Circular

Diameter	4.0mm (kg/m)	5.0mm (kg/m)	6.0mm (kg/m)
114.3 mm	10.9		
139.7 mm	13.4	16.6	19.8
168.3 mm	16.2	20.1	24.0
193.7 mm		23.3	27.8
219.1 mm		26.4	31.5
244.5 mm			35.3

Recommended minimum batch sizes on mill orders.

Minimum batch size, m 3000 1500 500	Metric weight, kg/m≤ 5 < 5..... ≤ 20 > 20.....
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Square

Height x Width	4.0mm (kg/m)	5.0mm (kg/m)	6.0mm (kg/m)
100 x 100 mm	11.6		
120 x 120 mm	14.1	17.4	20.5
140 x 140 mm	16.7	20.5	24.3
150 x 150 mm		22.1	26.2
160 x 160 mm		23.7	28.0
180 x 180 mm		26.8	31.8
200 x 200 mm			35.6

Recommended minimum batch sizes on mill orders.

Minimum batch size, m 3000 1500 500	Metric weight, kg/m≤ 5 < 5..... ≤ 20 > 20.....
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Rectangular

Height x Width	4.0mm (kg/m)	5.0mm (kg/m)	6.0mm (kg/m)
120 x 80 mm	11.6		
150 x 100 mm	14.8	18.2	21.5
160 x 80 mm	14.1	17.4	20.5
180 x 100 mm	16.7	20.5	24.3
200 x 100 mm		22.1	26.2
200 x 120 mm		23.7	28.0
250 x 100 mm		26.0	30.9
250 x 150 mm			35.6

Recommended minimum batch sizes on mill orders.

Minimum batch size, m	Metric weight, kg/m
3000 ≤ 5
1500	< 5..... ≤ 20
500	> 20.....

Mechanical Properties

Yield Strength Rp0.2 (min MPa)	Tensile Strength Rm (MPa)	Elongation A ₅ ²⁾ (min %)	Charpy-V -20°C 10x10 mm test specimen ¹⁾ (min J)
960	980 - 1250	6	40

Mechanical properties meet the requirements of prEN 10219 (2016).

The mechanical properties for rectangular hollow sections are tested by SSAB on the longer side of the cross section.

¹⁾ Impact testing according to EN ISO 148-1 is performed on thicknesses ≥ 6mm. The specified minimum value corresponds to a full-size specimen.

²⁾ The hollow sections with D/T < 15 (round) or (B + H)/2T < 12,5 (rectangular and square), the minimum value of elongation is reduced by 2.

Chemical Composition (ladle analysis)

C (max %)	Si (max %)	Mn (max %)	P (max %)	S (max %)	Al _{tot} (min %)	Nb (max %)	V (max %)	Ti (max %)
0.12	0.25	1.20	0.020	0.010	0.015	0.05 ¹⁾	0.050 ¹⁾	0.070 ¹⁾

Chemical composition meets or **exceeds** the requirements of prEN 10219 (2016).

In addition, boron (B), molybdenum (Mo), nickel (Ni) or copper (Cu) may be used as alloying elements either singly or in combination.

The steel is grain refined.

1) Sum of Nb, V and Ti = max 0.22%

Typical Carbon equivalent

Typical CET	0.28
Typical CEV	0.51

$$CET = C + \frac{Mn + Mo}{10} + \frac{Cr + Cu}{20} + \frac{Ni}{40}$$

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

Tolerances

Characteristic	Circular hollow sections Tolerances based on the requirements of EN 10219
Outside diameter (D) ¹⁾	±1%, however a minimum of ±0.5 mm and a maximum of ±10 mm
Out-of-roundness	2%, when D/T ≤ 100
Thickness (T)	When D ≤ 323.9 mm: -5%/+10%, with a minimum of ±0.2 mm and maximum ±0.5 mm When 355.6 ≤ D ≤ 406.4 mm ³⁾ : ±10%, when T ≤ 5 mm / ±0.5 mm, when T > 5 mm When D > 406.4 mm ³⁾ : ±10%, with a maximum of ±2 mm
Straightness	0.20% of total length and 3 mm over any 1 m length
Mass per unit length	Individual tube: ±6%
Mill length	0/+50 mm, 6000 ≤ L ≤ 12000 - 18000 mm (standard lengths 6000 & 12000 mm)
Exact length	Agreed at the time of enquiry and order

¹⁾ All external dimensions are measured with a minimum distance from the end of the section. The distance must be a minimum of 100 mm.

Characteristic	Square hollow sections Tolerances based on the requirements of EN 10219
Outside dimensions (B, H) ¹⁾	When B, H < 100 mm ±1 % minimum ±0.5 mm When 100 mm ≤ B, H ≤ 200 mm: ±0.8% When B, H > 200 mm: ±0.6%
Thickness (T)	-5%/ +10 %, with a minimum of ±0.2 mm and maximum ±0.5 mm
External corner profile	When T ≤ 6 mm: 2.0 x T-3.0 x T When 6 mm < T ≤ 10 mm: 2.5 x T-3.5 x T When T > 10 mm: 3.0 x T-4.0 x T
Squareness of side	90° ±1°
Concavity/convexity	0.8%, with a minimum of 0.5 mm
Twist	2 mm + 0.5 mm/m
Straightness	0.15% of total length and 3 mm over any 1 m length
Mass per unit length	Individual tube: ±6%
Mill length	0/+50 mm, 6000 ≤ L ≤ 12000 - 18000 mm (standard lengths 6000 & 12000 mm)
Exact length	Agreed at the time of enquiry and order

¹⁾ All external dimensions are measured with a minimum distance from the end of the section. The distance must be a minimum of 100 mm.

Characteristic	Rectangular hollow sections Tolerances based on the requirements of EN 10219
Outside dimensions (B, H) ¹⁾	When B, H < 100 mm ±1 % minimum ±0.5 mm When 100 mm ≤ B, H ≤ 200 mm: ±0.8% When B, H > 200 mm: ±0.6%
Thickness (T)	-5%/ +10 %, with a minimum of ±0.2 mm and maximum ±0.5 mm
External corner profile	When T ≤ 6 mm: 2.0 x T-3.0 x T When 6 mm < T ≤ 10 mm: 2.5 x T-3.5 x T When T > 10 mm: 3.0 x T-4.0 x T
Squareness of side	90° ±1°
Concavity/convexity	0.8%, with a minimum of 0.5 mm
Twist	2 mm + 0.5 mm/m
Straightness	0.15% of total length and 3 mm over any 1 m length
Mass per unit length	Individual tube: ±6%
Mill length	0/+50 mm, 6000 ≤ L ≤ 12000 - 18000 mm (standard lengths 6000 & 12000 mm)
Exact length	Agreed at the time of enquiry and order

¹⁾ All external dimensions are measured with a minimum distance from the end of the section. The distance must be a minimum of 100 mm.

Delivery Conditions

The tubes are cold formed and high frequency welded from thermomechanically rolled steel.

Fabrication and Other Recommendations

Welding, bending and machining

Strenx® Tube 960 MH has good weldability and it is suitable for thermal cutting. All the common welding methods are suitable with matching or undermatching consumables.

Tubes can also be sawed and machined with regular tools, but higher tool wear may occur. Bending of the tubes is also possible, for bending recommendations consult SSAB Tech Support.

It is not recommended to hot dip galvanize Strenx® Tube 960 MH hollow sections.

For information concerning fabrication, see SSAB's brochures on www.ssab.com or consult Tech Support, techsupport@ssab.com.

Appropriate health and safety precautions must be taken when bending, welding, cutting, grinding or otherwise working on the product.

Contact Information

www.ssab.com/contact