



STRENX TUBE 960MH

General Product Description

Advanced high-strength structural hollow sections

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 | 76.1 - 219.1 mm |
| Square | 70x70- 160x160 mm |
| Rectangular | 80x60- 200x120 mm |
| Wall thickness | 4.0- 6.0 mm |
| Mill length | 6000- 12 000/18 000 mm |

Other shapes and sizes are available upon request.

STRENX TUBE 960MH

Dimensions

Circular

| Diameter | 4.0mm (kg/m) | 5.0mm (kg/m) | 6.0mm (kg/m) |
|----------|--------------|--------------|--------------|
| 76.1 mm | 7.11 | | |
| 88.9 mm | 8.38 | | |
| 101.6 mm | 9.63 | | |
| 108 mm | 10.3 | | |
| 114.3 mm | 10.9 | | |
| 133 mm | 12.7 | | |
| 139.7 mm | | 16.6 | 19.8 |
| 168.3 mm | | 20.1 | 24.0 |
| 193.7 mm | | 23.3 | 27.8 |
| 219.1 mm | | | 31.5 |

Square

| Height x Width | 4.0mm (kg/m) | 5.0mm (kg/m) | 6.0mm (kg/m) |
|----------------|--------------|--------------|--------------|
| 70 x 70 mm | 7.86 | | |
| 80 x 80 mm | 9.11 | | |
| 90 x 90 mm | 10.37 | | |
| 100 x 100 mm | 11.63 | 14.24 | 16.74 |
| 120 x 120 mm | 14.14 | 17.38 | 20.51 |
| 140 x 140 mm | 16.65 | 20.52 | 24.28 |
| 150 x 150 mm | | 22.09 | 26.16 |
| 160 x 160 mm | | 23.66 | 28.04 |

Rectangular

| Height x Width | 4.0mm (kg/m) | 5.0mm (kg/m) | 6.0mm (kg/m) |
|----------------|--------------|--------------|--------------|
| 80 x 60 mm | 7.86 | | |
| 90 x 50 mm | 7.86 | | |
| 100 x 50 mm | 8.49 | | |
| 100 x 60 mm | 9.11 | | |
| 120 x 50 mm | 9.74 | | |
| 120 x 60 mm | 10.37 | | |
| 120 x 80 mm | 11.63 | 14.24 | |
| 150 x 100 mm | 14.77 | 18.17 | 21.45 |
| 160 x 80 mm | 14.14 | 17.38 | 20.51 |
| 200 x 100 mm | | 22.09 | 26.16 |
| 200 x 120 mm | | 23.66 | 28.04 |

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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

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| 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.

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| Characteristic | Rectangular hollow sections Tolerances based on the requirements of EN 10219 |
|---|--|
| Outside dimensions (B, H) ¹⁾ | When B, H < 100 mm $\pm 1\%$ minimum ± 0.5 mm When 100 mm \leq B, H \leq 200 mm: $\pm 0.8\%$ When B, H > 200 mm: $\pm 0.6\%$ |
| Thickness (T) | -5%/ +10 %, with a minimum of ± 0.2 mm and maximum ± 0.5 mm |
| External corner profile | When T \leq 6 mm: 2.0 x T–3.0 x T When 6 mm < T \leq 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° $\pm 1^\circ$ |
| 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: $\pm 6\%$ |
| Mill length | 0/+50 mm, 6000 \leq L \leq 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.

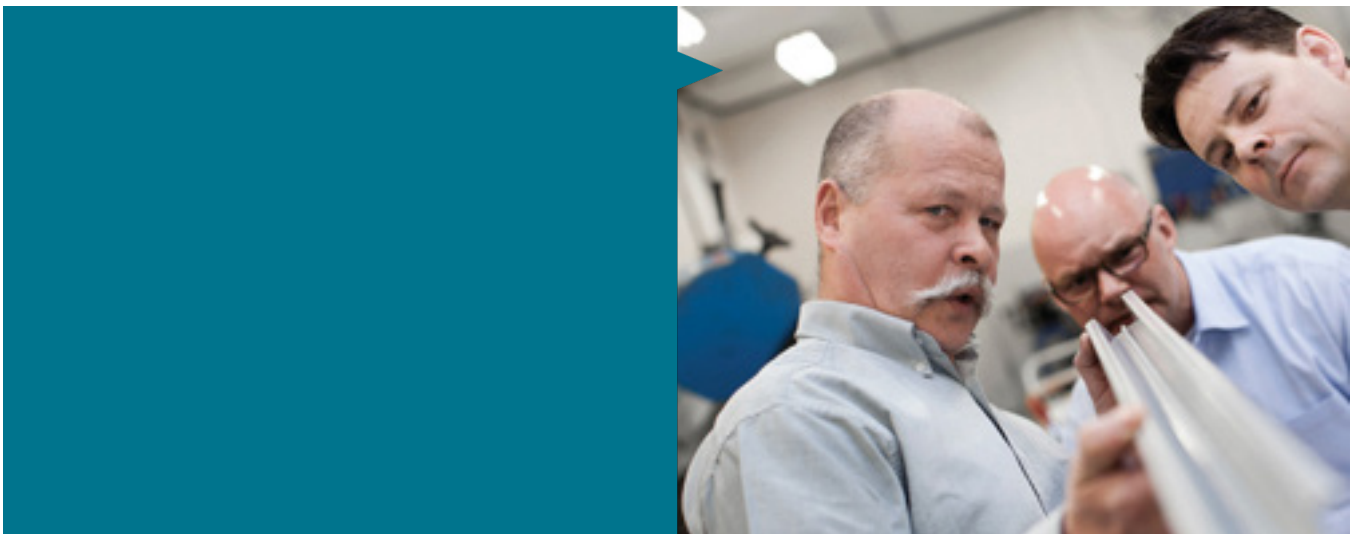
Tubes can also be sawed and machined with regular tools, but higher tool wear may occur. Bending of the tubes is also possible, for bending recommendations consult SSAB Tech Support.

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.

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