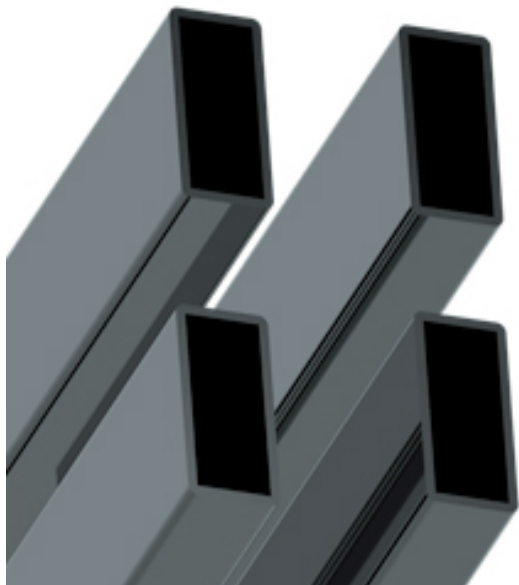


Optim HS 700 MH rectangular



Ruukki's extra-high-strength Optim HS hollow sections have been developed for advanced engineering workshop applications. The properties of Optim HS are at their best in highly stressed products that require high strength. Optim HS hollow sections are available in rectangular, square and round shapes.

Applications:

- Cranes
- Machinery frameworks
- Transport vehicles
- Load handling equipment
- Pumping equipment

Dimensions

Optim HS hollow sections can be delivered square and rectangular as cut-to-size, depending on the size up to 12 or 24 metres.

Recommended dimensions Outside dimensions H x B mm	Wall thickness T mm / Weight kg/m				
	3	4	5	6	8
50 x 30	3.24				
60 x 40	4.18	5.35			
70 x 50	5.13	6.6			
80 x 40	5.13	6.6			
80 x 60	6.07	7.86			
90 x 50	6.07	7.86			
100 x 50	6.54	8.49	10.3		
100 x 60	7.01	9.11			
120 x 60	7.95	10.4			
120 x 80	8.89	11.6			
140 x 80		12.9	15.8		
150 x 100		14.8	18.2	21.4	
160 x 80		14.1	17.4	20.5	
200 x 100			22.1	26.2	33.5
200 x 120			23.7	28	36
250 x 100			26	30.9	39.8
250 x 150			29.9	35.6	46.1
260 x 180				39.3	51.1
300 x 200				45	58.6
400 x 200				54.4	71.2

Other dimensions can be produced when agreed upon separately.

Minimum yield strength is 650 MPa and minimum tensile strength 700 MPa.

Processing instructions

Welding

There is no special requirement for welding of structures made with Optim HS hollow sections. The structures can be welded by all common welding procedures because the hollow sections are manufactured from thermomechanically hot-rolled steel. This is due to low carbon equivalents and levels of alloying that are low in relation to the strength of the hollow section. Elevated working temperatures are not needed under normal workshop conditions.

In such a high strength steel grade a narrow zone softer than the base material can be generated in the weld zone. However, in many cases it has no significant effect on the behaviour of the structure. The width of the softened zone can be restricted by avoiding the use of excess high arc energy. The longitudinal HF-weld seam of Optim HS 700 MH hollow sections with greater wall thicknesses may also have a softer zone.

Properties

Mechanical properties

Yield strength $R_{p0.2}$ MPa Minimum	Tensile strength R_m MPa Minimum	Elongation A_5 % Minimum	Impact test temperature °C ²⁾
700 ¹⁾	750 ¹⁾	12	-20

¹⁾ If relation between diameter/wall thickness of the circular hollow section is bigger than 25, minimum strength is 50 MPa lower. If relation between sides/wall thickness (H + B / T) of square or rectangular hollow sections is bigger than 40, minimum strength is 50 MPa lower.

²⁾ The impact energy requirement is minimum 27 J with a 10 x 10 mm² V-notch specimen in accordance with EN 10045-1.

Chemical composition

CEV = C + Mn/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15

Content %

C maximum	Si	Mn maximum	P maximum	S maximum	Al minimum	CEV maximum
0.10	0.15 – 0.25	2.00	0.02	0.01	0.015	0.41

In addition, niobium (Nb), vanadium (V), molybdenum (Mo) and titanium (Ti), or combinations of these, are used as microalloying.

Hot dip galvanising properties

The effect of hot dip galvanising on extra-high-strength steels has not been sufficiently studied so far. Therefore Ruukki does not recommend hot dip galvanising Optim HS 700 MH products.

Standards

Standard comparability

Steel grade	Dimensions	Technical delivery conditions
Optim HS 700 MH	EN 10219-2 ¹⁾	EN 10219-1

¹⁾ If wall thickness is < 6 mm, corner radius is 2-3 x T. If wall thickness is > 6 mm, the corner radius is 2.4 - 3.6 x T. (T is wall thickness of the hollow section).

Mechanical properties are tested longitudinally from the finished OPTIM HS hollow section.

Original standards must be used when making accurate comparisons.

If relation between diameter/wall thickness of the circular hollow section is bigger than 25, minimum strength is 50 MPa lower.

If relation between sides/wall thickness (H + B / T) of square or rectangular hollow sections is bigger than 40, minimum strength is 50 MPa lower.

Tolerances

Characteristic	Tolerances on dimensions and shapes based on the EN 10219-2 standard.
Outside dimensions B and H:	B, H < 100 mm: ±1%, with a minimum ±0.5 mm 100 mm ≤ B, H ≤ 200 mm: ±0.8% B, H > 200 mm: ±0.6%
Wall thickness (T):	-5% / +10%, with a minimum ±0.2 mm and maximum ±0.5 mm
External corner radius (R):	T ≤ 6 mm: 2.0 x T – 3.0 x T T > 6 mm: 2.4 x T – 3.6 x T
Squareness:	90° ± 1°
Concavity, convexity ¹⁾:	0.8%, with a minimum 0.5%
Twist (V):	2 mm + 0.5 mm/m
Straightness:	0.15% of hollow section length

¹⁾ The tolerance for convexity and concavity is independent of the tolerance for outside dimensions.

All external dimensions shall be measured at a distance of minimum 100 mm from the end.

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