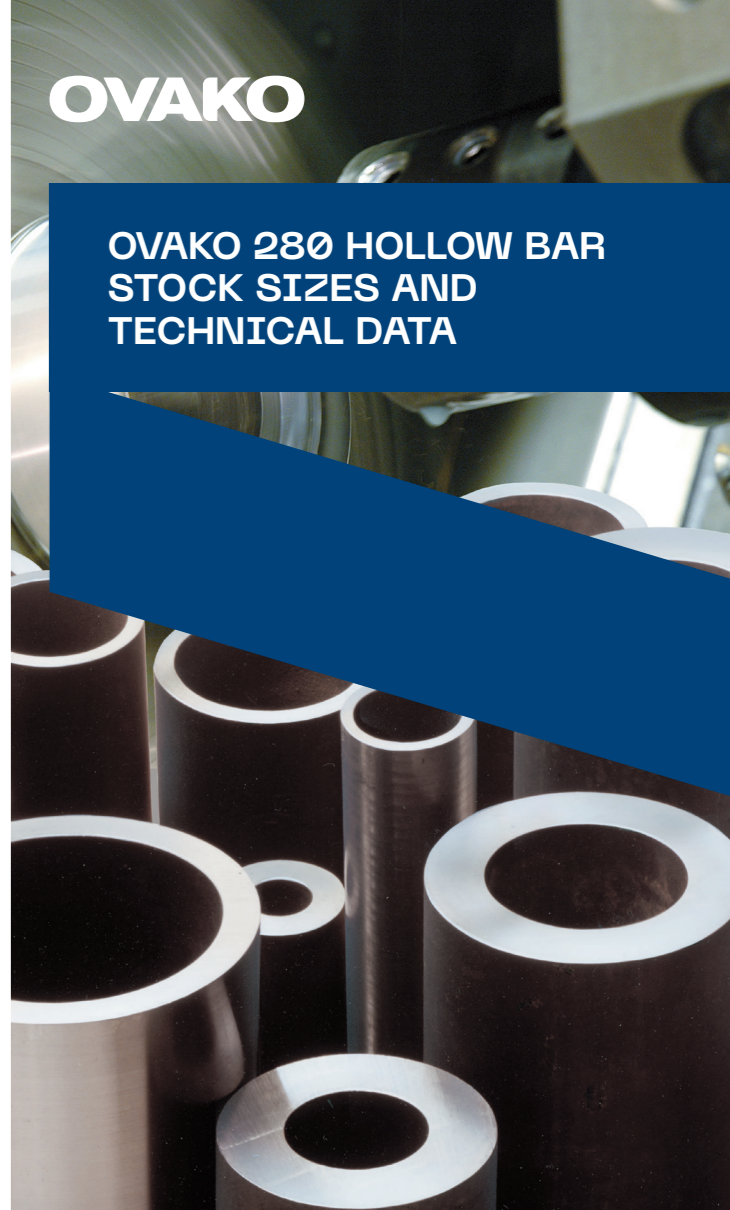




OVAKO 280 HOLLOW BAR STOCK SIZES AND TECHNICAL DATA



SALES OFFICES AND MANUFACTURING

- Asia Pacific**
+65 96 759 052
- Balkans, Greece and Cyprus**
+359 887 704733
- Benelux**
+31 546 588 360
- Bulgaria**
+359 887 704733
- China**
+86 21 3366 2787
- Czech Republic**
+43 2682 90832
- Finland**
+358 201 52155
- France**
+33 3 8054 1515
- Germany**
+49 211 25 040
- Hungary**
+36 30 914 1920
- Italy**
+39 51 690 0332
- North America**
+1 803 802 1500
- Poland**
+48 22 870 05 03
- Romania**
+40 721 29 52 98
- Scandinavia**
+46 (0) 591 60 000
- Slovakia**
+43 2682 90832
- United Kingdom**
+44 138 421 3940
- MANUFACTURING**
Ovako Sweden AB
SE-813 82 Hofors
Sweden
+46 290 250 00



Visit our website for further information about [Ovako 280 Hollow Bar](#).

The right is reserved to make alterations in dimensions and tolerances.

WELDING

Ovako 280T has good welding properties and can be welded with all conventional welding methods. The low carbon equivalent means that 280T can be welded without preheating up to fairly large dimensions.

- For the best results welding should be continuous, and the weld should be slowly cooled in ambient air conditions.
- If the welding is performed in a damp environment or if the temperature is below 5°C the preheating temperature should be increased by 25°C.
- To minimize the effects of a mixed zone, the chemical composition of the filler metal should be similar to that of the base material.
- Hydrogen content should not exceed 5 ml/100 g weld metal.
- Post-heating directly after welding also assists the removal of hydrogen. It should be performed at 200°C, directly after welding, holding for 5 min/mm material thickness, for at least one hour.

Recommended working temperatures for welding with ferritic consumables

Combined wall thickness, mm	
10	20 30 40 50 60 70 80
20°C	75°C 100°C 125°C 150°C

The recommended preheating temperatures are based upon a heat input around 1.7 kJ/mm and that the hydrogen content does not exceed 5 ml/100 g weld metal.

Typical filler metals

	ESAB	AWS	EN
MMA	OK 48.08	SFA/AWS A5.5 E8018-G	EN 499 E 46 5 1Ni B 32 HS
MIG/MAG	OK Autrod 12.64	SFA/AWS A5.18 ER70S-6	EN 440 G4Si1
SMAW	OK Tubrod 14.05	SFA/AWS A5.28 E70C-G	EN 758 T 42 4 Z MM 2 H10

HEAT TREATMENT

Ovako 280 tube is well suited for most commonly applied heat treatment processes. If properly executed, the result of the heat treatment will be very consistent, with small and predictable dimensional changes.

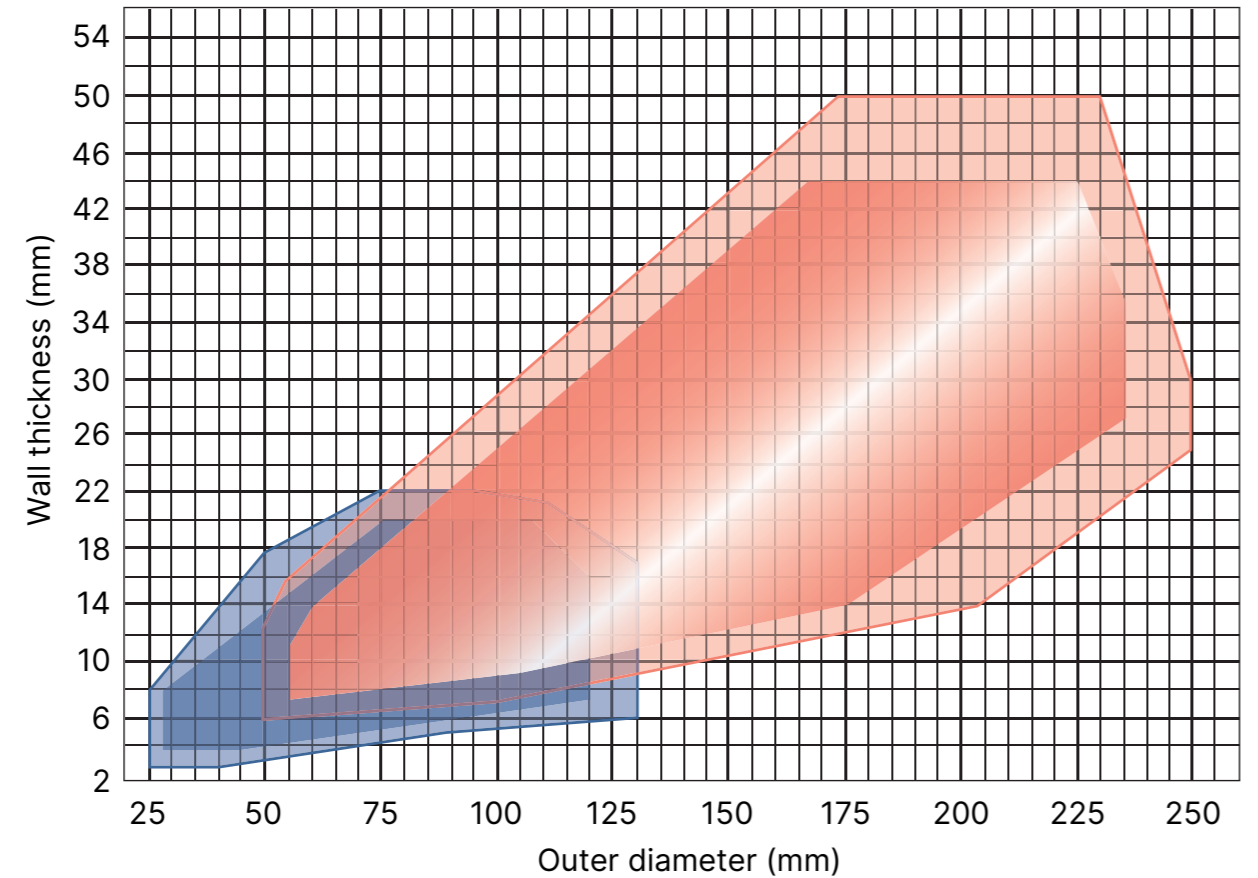
- Normalizing** 900–920°C. Cooling in air.
- Stress relieving** 550–600°C. Soaking time 1–2 hours. Cool with the furnace or in air.
- Quenching and tempering** 900–920°C. Quench in water and temper at around 500°C for 1 hour.
- Case hardening** Carburizing at 850–950°C. Quenching from 780–830°C in oil or step bath. Tempering at 50–200°C for 1 hour
- Normal surface hardness** 58–63 HRC.
- Nitriding** 500–520°C. Surface hardness around 650 HV. Also suitable for ion nitriding.

Mechanical properties after heat treatment

Condition/wall thickness mm	Yield strength R _{0.2} min MPa	Tensile strength R _m min, MPa	Elongation A ₅ min %	Hardness ca HB	Impact strength KV min at -40°C, J
Normalized					
≤ 16	440	600	23	190	27
16–25	420	580	20	180	27
> 25	400	560	19	180	27
Q/T					
- 30	600	700	18	260	27
> 30	570	670	16	225	27

TUBE PRODUCTS – SIZE RANGE

Is your desired dimension missing or do you want a tailor-made tube? See graph below for detailed information on our size range.



MECHANICAL PROPERTIES, HOT-ROLLED CONDITION

Wall thickness mm	Yield strength R _{0.2} min MPa	Tensile strength R _m min MPa	Elongation A ₅ min %	Hardness ca HB
≤ 25	500	670	17	225
> 25	470	650	17	220
E470	470	640	17	220

Tolerances, hot-rolled		Tolerances, cold worked*	
Outer diameter, OD tolerance mm			
≤ 80	± 0,4 mm	< 60	± 0,20 mm
> 80	± 0,5 % x OD	≥ 60	± 0,25 mm
Level 2	± 0,5 % x OD	Wall thickness mm	
Execution		Wall tolerance	Wall tolerance
Normal	± (5 % + 0,1 mm) (min ± 0,7 mm)	≤ 6	± 0,30 mm
E470		> 6 – < 8	± 0,35 mm
≤ 30 mm	± 12,5 %	≥ 8	± 0,40 mm
> 30 mm	± 10 %	* Stress relieved	

- Straightness** The maximum deviation from the straight line is 1 mm on a gauge length of 1,000 mm.
- Ovality** The ovality may amount to maximum 65 % of the total OD-tolerance.
- Finish turned size** Guaranteed finished turned size is valid up to a part length of max 3 x OD. For sizes with E470 tolerances the finished turned size is guaranteed up to a part length of max 600 mm.

Steel grades	VALID STEEL GRADES		REPLACED STEEL GRADES		
	Ovako	EN 10294	SS	DIN	AFNOR
	280	E 470	2142	20MnV6	20MV6

Chemical composition							
	C %	Si %	Mn %	P %	S %	Cr %	Ni %
min	0.16	0.20	1.40		0.020		
max	0.20	0.50	1.70	0.020	0.040	0.30	0.30

