

# Seamless cold drawn steel tubes

Heléns stock seamless, welded cold drawn tubes or specially welded tubes in normalized or cold drawn / hard delivery qualities. The heat treated tubes are used in constructions where there is a demand on formability. In parts where the machinability is the most important thing the cold draw / hard tubes are used. The seamless tubes are also stocked in zinc coated condition and are then used in applications where corrosion resistance is important.

## COLD DRAWN PRECISION STEEL TUBES

Cold drawn (+C) mechanical precision steel tubes produced according to EN 10305-1 have tight tolerances and a smooth surface finish. We stock the tubes in quality E235, which is a carbon steel with a very good weld- and machinability. Standard lengths of our stocked material is 5-7 m. Certificate according to EN 10204/3.1 can be supplied upon request.

### PRODUCT INFORMATION

OD	WALL	KG/M
4.00	1.00	0.070
5.00	1.00	0.100
6.00	0.75	0.100
6.00	1.00	0.123
7.00	1.00	0.150
8.00	0.75	0.130
8.00	1.00	0.170
8.00	1.50	0.240
8.00	2.00	0.300
9.00	1.00	0.200
10.00	1.00	0.220
10.00	1.50	0.310
10.00	1.75	0.360
10.00	2.00	0.400
10.00	2.50	0.460
10.00	3.00	0.520
10.00	3.50	0.560
11.00	1.50	0.350
11.00	2.00	0.440
12.00	0.50	0.140
12.00	1.00	0.270
12.00	1.50	0.390

OD	WALL	KG/M
12.00	2.50	0.590
12.00	3.00	0.670
13.00	1.00	0.300
14.00	1.00	0.320
14.00	1.50	0.460
14.00	1.75	0.530
14.00	2.00	0.590
14.00	2.50	0.710
14.00	3.00	0.810
15.00	1.00	0.350
15.00	1.50	0.500
15.00	2.00	0.640
15.00	3.00	0.890
16.00	1.50	0.540
16.00	2.00	0.690
16.00	2.50	0.830
16.00	3.00	0.960
16.00	3.50	1.080
16.00	4.00	1.180
18.00	1.50	0.610
18.00	2.00	0.790
18.00	3.00	1.110

OD	WALL	KG/M
18.00	3.50	1.250
18.00	4.00	1.380
18.00	4.50	1.498
18.00	5.00	1.600
19.00	2.00	0.840
19.00	3.00	1.180
20.00	1.00	0.470
20.00	1.50	0.680
20.00	2.00	0.890
20.00	2.50	1.080
20.00	3.00	1.250
20.00	3.50	1.420
20.00	4.00	1.580
20.00	4.50	1.720
20.00	5.00	1.850
20.00	6.00	2.070
21.00	2.50	1.140
21.00	3.00	1.330
22.00	1.50	0.760
22.00	2.50	1.200
22.00	3.00	1.410
22.00	3.50	1.600
22.00	4.00	1.780
22.00	4.50	1.940
22.00	5.00	2.100
24.00	1.50	0.830
24.00	x 2.00	1.090
24.00	3.50	1.770
24.00	4.00	1.970
24.00	5.00	2.343
25.00	1.50	0.870
25.00	2.00	1.130
25.00	2.50	1.390
25.00	3.00	1.630
25.00	3.50	1.860
25.00	4.00	2.070
25.00	4.50	2.280
25.00	5.00	2.470
25.00	5.50	2.645
25.00	6.00	2.810
26.00	1.50	0.910
26.00	2.00	1.180
26.00	3.00	1.700
26.00	5.00	2.590
27.00	2.00	1.230
27.00	3.00	1.780
27.00	5.00	2.710
28.00	2.00	1.280
28.00	2.50	1.570

OD	WALL	KG/M
28.00	3.00	1.850
28.00	3.50	2.120
28.00	4.00	2.370
28.00	4.50	2.608
28.00	5.00	2.840
30.00	1.50	1.050
30.00	2.00	1.380
30.00	2.50	1.700
30.00	3.00	2.000
30.00	3.50	2.290
30.00	4.00	2.570
30.00	4.50	2.830
30.00	5.00	3.080
30.00	6.00	3.550
30.00	8.00	4.341
32.00	1.50	1.130
32.00	2.00	1.480
32.00	2.50	1.820
32.00	3.00	2.150
32.00	4.00	2.760
32.00	5.00	3.330
32.00	6.00	3.847
34.00	2.00	1.580
34.00	3.00	2.290
34.00	4.00	2.960
35.00	1.50	1.240
35.00	2.00	1.630
35.00	2.50	2.000
35.00	3.00	2.370
35.00	3.50	2.720
35.00	4.00	3.060
35.00	4.50	3.390
35.00	5.00	3.700
35.00	6.00	4.290
36.00	2.00	1.680
36.00	3.00	2.440
36.00	5.00	3.820
38.00	2.50	2.190
38.00	3.00	2.590
38.00	4.00	3.350
38.00	5.00	4.070
40.00	1.50	1.420
40.00	2.00	1.870
40.00	2.50	2.310
40.00	3.00	2.740
40.00	3.50	3.150
40.00	4.00	3.550
40.00	4.50	3.940
40.00	5.00	4.320

OD	WALL	KG/M
40.00	6.00	5.030
40.00	7.00	5.696
42.00	2.00	1.970
42.00	3.00	2.890
42.00	5.00	4.560
42.00	6.00	5.330
45.00	1.50	1.610
45.00	2.00	2.120
45.00	2.50	2.620
45.00	3.00	3.110
45.00	4.00	4.040
45.00	5.00	4.930
48.00	4.00	4.340
50.00	1.50	1.790
50.00	2.00	2.370
50.00	2.50	2.930
50.00	3.00	3.480
50.00	3.50	4.010
50.00	4.00	4.540
50.00	5.00	5.550
50.00	6.00	6.510
55.00	2.00	2.610
55.00	2.50	3.240
55.00	3.00	3.850
55.00	5.00	6.170
60.00	1.50	2.160

OD	WALL	KG/M
60.00	2.00	2.861
60.00	4.00	5.520
60.00	4.50	6.159
60.00	5.00	6.780
60.00	6.00	7.990
62.00	2.00	2.960
65.00	1.50	2.350
65.00	2.00	3.110
65.00	3.00	4.590
65.00	5.00	7.400
70.00	2.00	3.350
70.00	3.00	4.960
70.00	4.00	6.510
70.00	5.00	8.020
75.00	2.00	3.600
75.00	3.00	5.330
75.00	5.00	8.630
80.00	2.00	3.850
80.00	3.00	5.700
80.00	4.00	7.500
80.00	5.00	9.250
85.00	2.50	5.090
90.00	5.00	10.480
95.00	5.00	11.100
100.00	2.00	4.830
100.00	5.00	11.710

## SEAMLESS HYDRAULIC TUBES

Manufactured according to EN 10305-4. These tubes are used in hydraulic and pneumatic applications. We stock these tubes in E235 quality as standards, but E355 can be offered in a few dimensions, but only in phosphated finish. Both phosphated and non-phosphated tubes are tested for leakage using eddy current testing. The tubes are stocked in fabrication lengths of 6000 mm. A certificate according to EN 10204/3.1 can be obtained on request

### PRODUCT INFORMATION

OD	WALL	KG/M	E235*	E355*	E235**
4.00	0.50	0.043			×
4.00	1.00	0.070			×
5.00	1.00	0.100			×
6.00	1.00	0.120			×
6.00	1.50	0.166			×
6.00	2.00	0.190			×
7.00	1.00	0.148			×
8.00	1.00	0.170			×
8.00	1.00	0.172	×		
8.00	1.50	0.240			×

OD	WALL	KG/M	E235*	E355*	E235**
8.00	2.00	0.296			×
10.00	1.00	0.220	×	×	×
10.00	1.50	0.310	×		×
10.00	2.00	0.395			×
10.00	2.00	0.400	×		
10.00	2.50	0.460			×
12.00	1.00	0.270	×		×
12.00	1.50	0.388			×
12.00	1.50	0.390	×		
12.00	2.00	0.490	×	×	×

OD	WALL	KG/M	E235*	E355*	E235**
12.00	2.50	0.590	X	X	
13.00	1.00	0.321			X
14.00	1.00	0.321	X		X
14.00	1.50	0.460	X		X
14.00	2.00	0.590	X		X
15.00	1.00	0.350	X		X
15.00	1.50	0.500	X	X	X
15.00	2.00	0.640	X	X	X
15.00	2.50	0.770		X	X
16.00	1.00	0.370	X		X
16.00	1.50	0.540			X
16.00	1.50	0.540	X		
16.00	2.00	0.691			X
16.00	2.00	0.690	X	X	
16.00	2.50	0.830	X	X	X
16.00	3.00	0.960	X		X
18.00	1.00	0.419	X		X
18.00	1.50	0.610	X		X
18.00	2.00	0.790	X	X	X
18.00	3.00	1.110			X
19.00	1.50	0.650	X		
20.00	1.00	0.470	X		X
20.00	1.50	0.684	X		X
20.00	2.00	0.888			X
20.00	2.00	0.890	X	X	
20.00	2.50	1.080	X	X	X
20.00	3.00	1.250	X	X	X
22.00	1.00	0.518	X		X
22.00	1.50	0.758			X
22.00	1.50	0.760	X		
22.00	2.00	0.990	X	X	X
22.00	2.50	1.202			X
22.00	2.50	1.200	X	X	
22.00	3.00	1.410	X		X
22.00	3.50	1.597	X		
22.00	4.00	1.780			X
25.00	1.00	0.590	X		X
25.00	1.50	0.870	X		X
25.00	2.00	1.134			X
25.00	2.00	1.130	X	X	
25.00	2.50	1.390	X		X
25.00	2.50	1.387		X	
25.00	3.00	1.628	X	X	X
25.00	4.00	2.070			X
25.00	4.00	2.071	X	X	
26.00	1.50	0.910			X

\*Phosphated

\*\*Non-phosphated

OD	WALL	KG/M	E235*	E355*	E235**
28.00	1.50	0.980			X
28.00	1.50	0.980	X		
28.00	2.00	1.280	X	X	X
28.00	2.50	1.572	X		X
28.00	3.00	1.850	X	X	X
30.00	1.50	1.050	X		X
30.00	2.00	1.380	X	X	X
30.00	2.50	1.700	X		
30.00	3.00	2.000	X	X	X
30.00	4.00	2.570	X		X
30.00	4.00	2.565		X	
32.00	1.50	1.130	X		X
32.00	2.00	1.480	X		X
32.00	3.00	2.150	X		X
32.00	4.00	2.760		X	X
35.00	1.50	1.240	X		X
35.00	2.00	1.628			X
35.00	2.00	1.630	X		
35.00	3.00	2.370	X	X	X
35.00	5.00	3.699	X		X
38.00	1.50	1.350	X		X
38.00	2.00	1.776	X		X
38.00	2.50	2.188	X		
38.00	4.00	3.354			X
38.00	4.00	3.350	X		
38.00	4.00	3.354		X	
38.00	5.00	4.069	X	X	X
42.00	2.00	1.970	X	X	X
42.00	3.00	2.890	X		X
42.00	3.00	2.885		X	
42.00	4.00	3.750	X		
50.00	1.50	1.790			X
50.00	2.00	2.370	X		X
50.00	3.00	3.480	X		X
50.00	5.00	5.549	X	X	
50.00	6.00	6.510	X	X	X
60.00	3.00	4.220	X		
60.00	4.00	5.524	X		X
60.00	5.00	6.780	X		
60.00	5.00	6.782			
63.00	3.00	4.439			
65.00	8.00	11.245			X
70.00	1.50	2.534			X
75.00	3.00	5.327			X
90.00	4.00	8.480			X

## ZINC COATED HYDRAULIC TUBES

Manufactured according to EN 10305-4. The zinc coated hydraulic tubes are used in hydraulic and pneumatic applications. We stock these tubes in E235 and E355 qualities. The zinc layer can be offered in two thickness variants, min 12 my or min 25 my which is then either yellow chromated or CR + VI free thicklayer passivated. In the near future the yellow chromated surface treatment will be substituted with CR + VI free thicklayer passivation due to increased environmental demands. All variants are tested for leakage using eddy current testing. The tubes are stocked in fabrication lengths of 6000 mm. A certificate to EN 10204/3.1 can be obtained on request.

### PRODUCT INFORMATION

OD	WALL	KG/M	Cr + VI FRI 12 MY	Cr + VI FRI 25 MY	ZISTA SEAL
4.00	1.00	0.070			X
6.00	1.00	0.120		X	X
6.00	1.50	0.166			X
6.00	2.00	0.190			X
6.35	0.70	0.100		X	
8.00	0.80	0.142		X	
8.00	1.00	0.170	X	X	X
8.00	1.50	0.240	X		X
8.00	2.00	0.296			X
9.53	1.00	0.210		X	
10.00	1.00	0.220	X		X
10.00	1.50	0.310	X		X
10.00	2.00	0.395			X
10.00	2.50	0.460			X
12.00	1.00	0.270	X		X
12.00	1.20	0.319		X	
12.00	1.50	0.388	X	X	X
12.00	2.00	0.490	X		X
12.00	2.50	0.590			X
12.00	3.00	0.666			X
14.00	1.00	0.321			X
14.00	1.50	0.460			X
14.00	2.00	0.590			X
14.00	2.50	0.709			X
14.00	3.00	0.814			X
15.00	1.00	0.350	X		X
15.00	1.50	0.500	X	X	X
15.00	2.00	0.640	X		X
15.00	2.50	0.770			X
15.88	1.50	0.530		X	
16.00	1.00	0.370			X
16.00	1.50	0.540	X	X	X
16.00	2.00	0.691	X		X
16.00	2.50	0.830			X
16.00	3.00	0.960			X
18.00	1.00	0.419			X
18.00	1.50	0.610	X		X
18.00	2.00	0.790	X		X
18.00	2.50	0.960			X

OD	WALL	KG/M	Cr + VI FRI 12 MY	Cr + VI FRI 25 MY	ZISTA SEAL
18.00	3.00	1.110			X
20.00	1.50	0.684		X	X
20.00	2.00	0.888	X		X
20.00	2.50	1.080	X		X
20.00	3.00	1.250			X
20.00	3.50	1.424			X
22.00	1.00	0.518			X
22.00	1.50	0.758		X	X
22.00	2.00	0.990	X		X
22.00	2.50	1.202			X
22.00	3.00	1.410			X
22.00	3.50	1.597			X
25.00	1.50	0.870			X
25.00	2.00	1.134	X		X
25.00	2.50	1.390	X		X
25.00	3.00	1.628	X		X
25.00	4.00	2.070			X
28.00	1.50	0.980	X		X
28.00	2.00	1.280	X		X
28.00	2.50	1.572	X		X
28.00	3.00	1.850			X
30.00	2.00	1.380			X
30.00	2.50	1.700			X
30.00	3.00	2.000	X		X
30.00	4.00	2.570	X		X
30.00	35.00	3.083			X
35.00	2.00	1.628			X
35.00	2.50	2.004			X
35.00	3.00	2.370			X
35.00	4.00	3.060			X
35.00	5.00	3.699			X
38.00	2.00	1.776			X
38.00	2.50	2.188			X
38.00	3.00	2.590			X
38.00	4.00	3.354	X		X
38.00	5.00	4.069			X
42.00	2.00	1.970			X
42.00	3.00	2.890			X
42.00	5.00	4.562	X		

### SURFACE

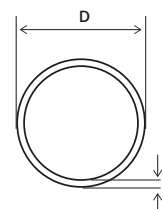
In accordance with the manufacturing method, the tubes shall have a smooth outer and inner surface. Due to the manufacturing method surface defects such as depressions, pores and longitudinal scratches are permitted.

### SURFACE TREATMENT

The tubes can be supplied surface treated according to EN 10305-4.

### TOLERANCE

For heat treated tubes according to EN 10305-1, OD tolerance according to table is applicable.



OD	TOLERANCE +/- (MM)
4 - 30	0.08
32 - 40	0.15
42 - 50	0.2
55 - 60	0.25
65 - 70	0.3
75 - 80	0.35
85 - 90	0.4
95 - 100	0.45
110 - 120	0.5
130 - 140	0.7
150 - 160	0.8
170 - 180	0.9
190 - 200	1

T / D	VALUES ACCORDING TO THE MEASUREMENT TABLE
$\geq 0.05$	1 x the value in the measurement table
$0.05 > T/D \geq 0.025$	1.5 x the value in the measurement table
$< 0.025$	2 x the value in the measurement table

WALL TOLERANCE	
+/- 10 % or at least +/- 0.1 mm	10305-1 / - 4

### STRAIGHTNESS | EN 10305-1, MECHANICAL TUBES

For tubes with  $OD > 15 \leq 260$  mm and minimum length of 1000 mm. the deviation from straightness shall not exceed:

$$0.0015 \times L \quad \text{for } R_e H \leq 500 \text{ Mpa}$$

$$0.0020 \times L \quad \text{for } R_e H > 500 \text{ Mpa}$$

In both cases. the deviation from straightness over 1000 mm length shall not exceed 3 mm.

### STRAIGHTNESS | EN 10305-4

For tubes with  $OD > 15$  mm and minimum length of 1000 mm, the deviation from straightness shall not exceed  $0.0015 \times L$ . For tubes greater than 1000 mm, the deviation straightness shall not exceed 3 mm. Tubes with  $OD < 15$  mm are supplied without any straightness guarantee. Applies for EN 10305-1, -4.

### TUBE ENDS

Tubes are cut wherever possible perpendicular to tube axis. However, diametrical changes as well as local wall thickness deformation can occur when cutting. This does not apply to fixed lengths. Special machining of ends can be arranged after agreement.

ORDERED QUANTITY (M)	PERMITTED DEVIATION %
$\leq 500$	+/- 15
$> 500$	+/- 10

**TOLERANCE OF DELIVERED QUANTITIES**

Delivery of quantities less than or exceeding the ordered quantity is dependant on the ordered number of meters per dimension and is permitted according to the table alongside. With fixed lengths, delivery of quantities less than ordered is not allowed. Delivery of quantities greater than ordered is allowed according to the table alongside.

ORDERED QUANTITY (PIECES)	PERMITTED DEVIATION %
≤ 500	20
> 500 ≤ 2000	15
> 2000	10

**DELIVERY CONDITION**

DESIGNATION	EN 10305-1, -4	EXPLANATION
Cold drawn	+C	No heat treatment after last cold drawing process. The tubes therefore only have low formability.
Stress-relieved annealed	+SR	After the final cold drawing process the tubes are heat treated. The reduction of inherent stress allows the tube, with proper subsequent processing, to be swarfless formed or machined within certain limits
Normalised	+N	The tubes are annealed above the upper transformation point in a controlled atmosphere or under vacuum.

**MATERIAL IN ACCORDANCE WITH EN 10305**

STEEL QUALITY	NORM	TYPE	DELIVERY CONDITION	CHEMICAL COMPOSITION					MECHANICAL PROPERTIES		
				C MAX%	SI MAX%	MN MAX%	P MAX%	S MAX%	YIELD STRENGTH R <sub>eh</sub> MPa	TENSILE STRENGTH R <sub>M</sub> MPa	EXTENSION A <sub>5</sub> MIN%
E235	EN 10305-1	Seamless	+C	0.17	0.35	1.2	0.025	0.025	-	480	6
			+N	0.17	0.35	1.2	0.025	0.025	235	340-480	25
E235	EN 10305-4	Seamless	+N	0.17	0.35	1.2	0.025	0.015	235	340-480	25
E355	EN 10305-1	Seamless	+N	0.22	0.55	1.6	0.025	0.025	355	490-630	22
			+C	0.22	0.55	1.6	0.025	0.025	355	490-630	22
E355	EN 10305-4	Seamless	+N	0.22	0.55	1.6	0.025	0.015	355	490-630	22