

Technical information

Cold drawn precision steel tubes according to EN 10305-1 (DIN 2391)

Seamless cold drawn precision steel tubes according to EN 10305-4 (DIN 2391/C)

Welded cold drawn precision steel tubes according to EN 10305-2 (DIN 2393)

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

Measurement deviations

For cold drawn / hard tubes +C does the tolerances with regard to deformation due to heat treatment greater as shown in the table alongside

Measurement tables EN 10305-1 and -4 -, refer to page 152.

Measurement tables EN 10305-2 -, refer to page 153.

Wall thickness (T) Outer diameter (D)	Values according to the measurement table
≥ 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

Straightness

Straightness deviation may in general be 0.15% of the length, for tubes with outside diameter greater than 15 mm. Tubes with outside diameter up to an including 15 mm are delivered straightened in the best possible way.

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.

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 (m)	Permitted deviation %
≤ 500	+/- 15%
> 500	+/- 10%

Ordered quantity (Pieces)	Permitted deviation %
≤ 500	+ 20%
$> 500 \leq 2000$	+ 15%
> 2000	+ 10%

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Special welded tubes (SPECIAL 07/ZISTA 07)

Delivery condition

Designation	EN 10305 -1, 2, 4	Explanation	Earlier designation
Cold drawn / hard	+C	No heat treatment after last cold drawing process. The tubes therefore only have low formability.	BK
Cold drawn / soft	+ LC	After the last heat treatment there is a light cold drawing. With proper subsequent processing, the tube could be bent, expanded within certain limits.	BKW
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 swafless formed or machined within certain limits	BKS
Annealed	+ A	After the final cold drawing processes the tubes are annealed in a controlled atmosphere or under vacuum.	GBK
Normalised	+ N	The tubes are annealed above the upper transformation point in a controlled atmosphere or under vacuum.	NBK

Steel qual	Type	Delivery condition	Chemical composition					Mechanical Properties		
			C max. %	Si max. %	Mn max. %	P max. %	S max. %	Yield strength R _{eH} MPa	Tensile strength R _m MPa	Extension A ₅ min. %
E195	welded	+C	0.15	0.30	0.60	0.025	0.025	-	min. 460	6
		+N	0.15	0.30	0.60	0.025	0.025	205	310-410	28

Areas of use

Refrigerator industry

- Refrigerators
- Freezers

Automotive industry

- Purging systems
- Tubes for oil and water
- Lubrication system
- Dip sticks

Material in accordance with EN 10305

EN 10305												
Steel qual	Norm	Type	Delivery condition	Chemical composition					Mechanical Properties			
				C max. %	Si max. %	Mn max. %	P max. %	S max. %	Yield strength R _{eH} MPa	Tensile strength R _m MPa	Extension A ₅ min. %	Former Designation
E195	EN 10305-2	Welded cold drawn	+C	0.15	0.35	0.7	0.025	0.025	-	420	6	St 34-2
			+N	0.15	0.35	0.7	0.025	0.025	195	300-440	28	
E235	EN 10305-1	Seamless	+C	0.17	0.35	1.2	0.025	0.025	-	480	6	St 35
			+N	0.17	0.35	1.2	0.025	0.025	235	340-480	25	
E235	EN 10305-2	Welded cold drawn	+C	0.17	0.35	1.2	0.025	0.025	-	490	6	St 37-2
			+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	St 37.4
E355	EN 10305-1	Seamless	+C	0.22	0.55	1.6	0.025	0.025	-	640	4	St 52
			+N	0.22	0.55	1.6	0.025	0.025	355	490-630	22	
E355	EN 10305-2	Welded cold drawn	+C	0.22	0.55	1.6	0.025	0.025	-	640	4	St 52-3
			+N	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	St 52.4