

Precision Steel Tubes

for industry and energy applications



MANNESMANN
PRECISION TUBES

A Member of the Salzgitter Group

The group

Mannesmann Precision Tubes is internationally active and a successful partner to the automotive industry, the manufacturing industry and the energy sector for high-quality, customized steel tubes and tubular components. Our locations in Germany, France, the Netherlands and Mexico form the basis for high delivery performance and customer satisfaction.



As one of the leading manufacturers of cold-drawn seamless and welded precision steel tubes as well as seamless hot-rolled tubes and tubular components, Mannesmann offers you a wide range of products and processes.

Everything from a single source

From steel production to precision steel tubes and components

Thanks to its integration into the Salzgitter Group, Mannesmann is able to represent the complete value chain for the production of tubes. Customer requirements are taken into account in a targeted manner through the consistent further development of products and processes.



Germany

Sales: Mülheim an der Ruhr, Administration: Hamm
Production: Bielefeld-Brackwede,
Burbach-Holzhausen, Hamm, Wickede, Zeithain



France

Production and Sales: Saint-Florentin,
Vitry-le-François



Netherlands

Production and Sales: Helmond



Mexico

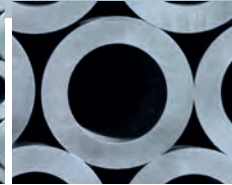
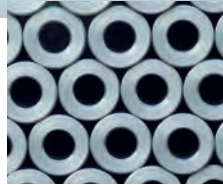
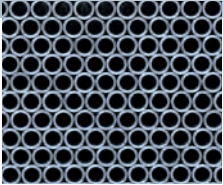
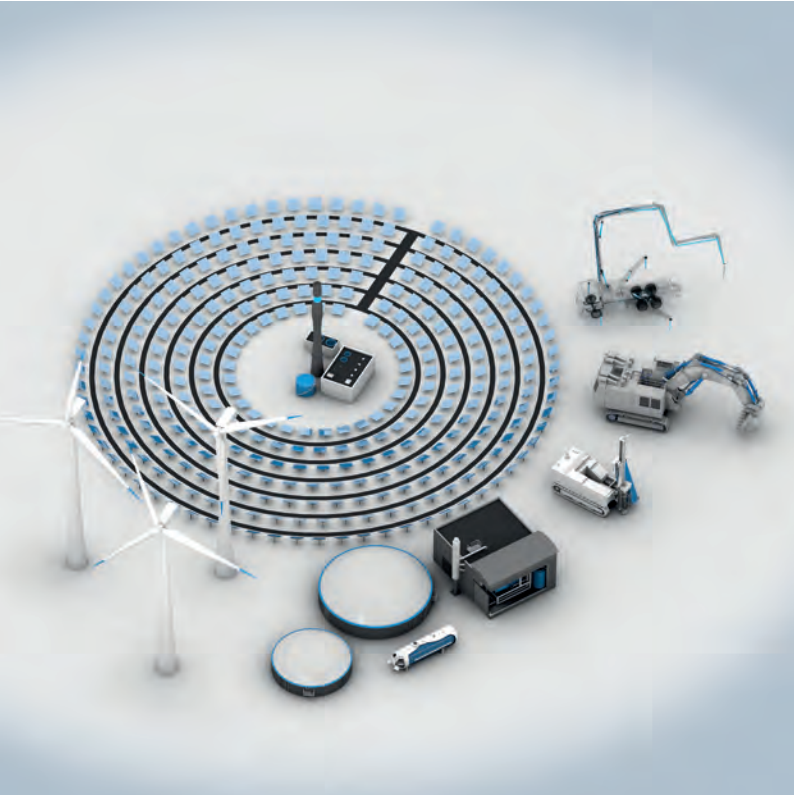
Production and Sales: Guadalajara

The Salzgitter Mannesmann Forschung is the central research company of the Salzgitter Group. It offers the group companies versatile support in: materials technology, forming and surface technology, application processes and nondestructive testing.






Industry and Energy

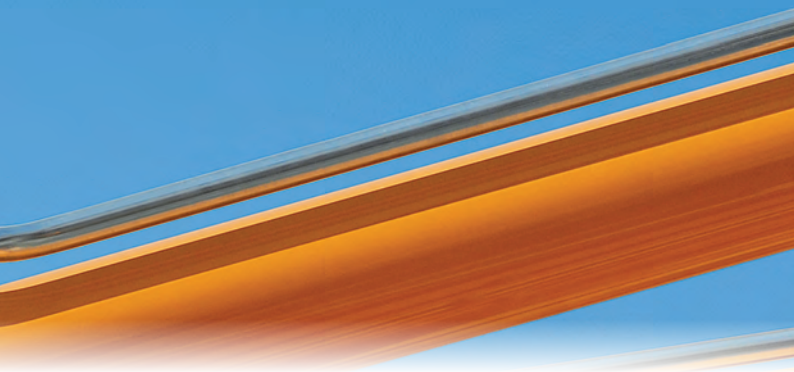
Steel Tubes for industry and energy applications

Mannesmann has many years of experience as a supplier for hydraulic and pneumatic applications as well as mechanical engineering. Our products can also be found in numerous applications of the energy industry and as drill rods for exploration.



Industry and Energy

	Domain	Application
	Hydraulic Machinery	Hydraulic Cylinders: HPZ Tubes, HP Tubes, HPS Tubes, HPK Tubes Hydraulic Lines: HPL Tubes
	Minerals and Geotechnical Exploration	Drill Rods Injection Anchors
	Heat Transfer and Renewables	Heat Exchanger Steam Generators Feedwater Heaters
	Oil and Gas	Green Tubes for Casing and Tubing, Progressive-Cavity Pumps (Stators)
	Mechanical Engineering	<i>Various</i>



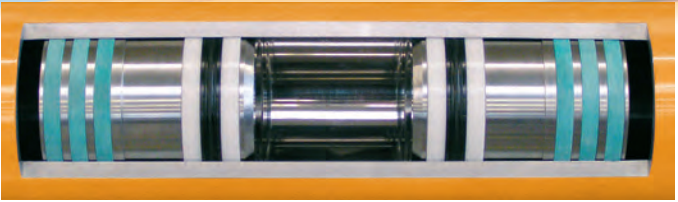
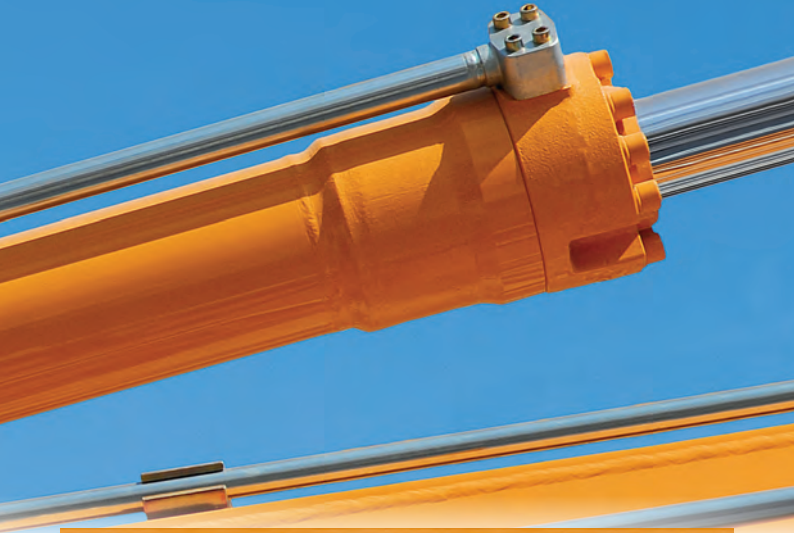
Precision Steel Tubes for Hydraulic Cylinders

Our precision steel tubes for hydraulic applications meet the most demanding requirements in terms of fatigue resistance and long-term safety to ensure reliable operation in the long term.

Cold-formed precision steel tubes are particularly suitable for use in hydraulic and pneumatic systems by their excellent properties:

- Free choice of continuous sizes
- High dimensional accuracy
- Fine surface quality
- Definable mechanical properties
- Increased variety of materials possible for seamless precision steel tubes

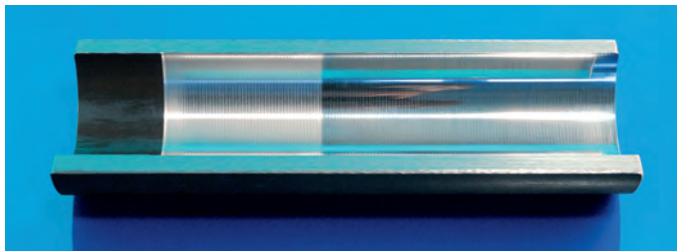
Hydraulic Machinery



Application	Cylinder barrels			Piston tubes	
Standard	EN 10305-1	EN 10216-1/ EN 10216-3	EN 10503-2	EN 10305-1	
Mannesmann designation	HPZ tubes	tubes for cylinder construction	HPS tubes	HPK tubes	tubes for cylinder construction
	HP tubes				
Delivery condition	+SR	+N/+QT	+C	+SR	+N/+QT

+SR – cold drawn and stress relieved, +N – normalised,
+QT – quenched and tempered, +C – cold finished, hard





HPZ tubes are seamless cold finished precision steel tubes in the delivery condition +SR for the manufacture of cylinder barrels.

HP tubes is a collective term used for cylinder barrel tubes that have been internally machined to a defined ISO tolerance, mainly by skiving and roller burnishing, or by honing.

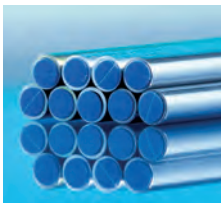
Their special features are:

- top-quality micro-finished inside surface
- low roughness values
- high profile bearing ratio
- favorable sliding properties

HPS tubes are welded cold finished precision steel tubes in the delivery condition +C for the manufacture of cylinder barrels. They provide a ready-to-use functional inside surface, smooth-drawn to ISO tolerances.

HPK tubes are seamless cold finished precision steel tubes in the +SR delivery condition for the manufacture of pistons, telescopic cylinders and linear guide elements.





Precision Steel Tubes for Hydraulic Lines

HPL tubes are seamless cold-drawn precision steel tubes predominantly used as pressure lines in hydraulically or pneumatically operated equipments.

Tube steel grades

Steel grade according to EN 10305-4	E 235, E 355
optimum corrosion protection	galvanised high performance passivation, Cr-VI-free according to 2000/53/EG
zinc coating thickness	8 – 12 μm
	12 – 15 μm
	15 – 18 μm
	18 – 22 μm
	22 – 25 μm
possible dimensions for zinc coating	up to 42 mm outside diameter (according to weight)*



Corrosion Protection for HPL Tubes

Mannesmann offers advanced surface protection concepts that reliably protect HPL tubes from corrosion.

Protection Cr (VI) free – on demand

Minimum resistance against white rust, straight tubes, E235

≥ 300 hours

Minimum resistance against red rust, straight tubes, E235

≥ 400 hours

Outside diameter	6 – 42 mm	0.236" – 1.653"
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Wall thickness	1 – 4 mm	0.039" – 0.157"
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MW-protect Cr (VI) free – on demand

Minimum resistance against white rust, straight tubes, E235

≥ 600 hours

Minimum resistance against red rust, straight tubes, E235

≥ 1,000 hours

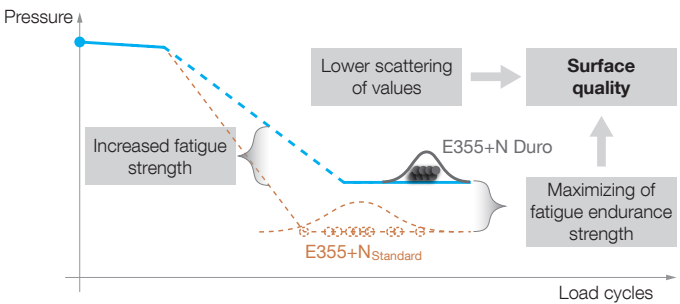
Outside diameter	10 – 20 mm	0.393" – 0.787"
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Wall thickness	1 – 2 mm	0.039" – 0.078"
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Seamless precision steel tubes for hydraulic and pneumatic power systems according to DIN EN 10305-4 and surface protection with test according to DIN EN ISO 9227 in connection with DIN EN ISO 2081.

HPL +N Duro for lightweight solutions

- High fatigue strength enables lightweight structures.
- Low scattering of fatigue results ensures high process stability during service.
- Failure-free surfaces guarantee optimized sealing connections.
- HPT tubes +N Duro in accordance with DIN EN 10305-4





Precision steel tubes for drill rods

Our DRILMAX® tubes for drill rods used in exploration drilling (e.g. Wireline) feature a unique combination of outstanding straightness, low residual stress levels and well-balanced mechanical properties. DRILMAX® tubes can be supplied in a variety of strength classes with yield strengths ranging from 550 MPa to 950 MPa. The maximum possible deviations of the drill rods from perfect straightness do not exceed 1 mm on 6 m. This constitutes a superlative. For your benefit.



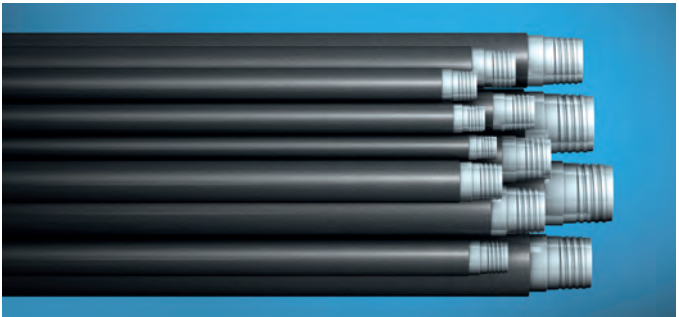
Geotechnical Exploration



Photo: 112955554 ©icrms, Driller in an open pit mine, www.stock.adobe.com

Thanks to their extremely low residual stresses, the tubes ensure robust and safe behavior during drilling operations. This minimizes the risk of string losses significantly.

DRILMAX® tubes are available in a wide range of dimensions. Their outstanding wear resistance ensures maximum reliability and safety in harsh service environments. DRILMAX® tubes are highly elastic and possess high mechanical strength due to their low residual stress level, and they only suffer minimum plastic deformation during drilling. In addition, our DRILMAX® tubes are also ideally suited for directional drilling (e.g. HDD).



Minerals and...





Comprehensive testing of DRILMAX® tubes

In order to prove compliance with the high requirements for drill rods, we subject our DRILMAX® tubes to extensive tests and provide you with appropriate certificates.

Product testing and checking, like

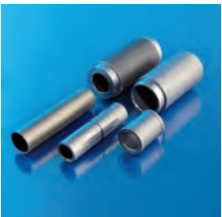
- heat and product chemical analysis
- dedicated straightness checking
- mechanical testing (tensile, hardness, ...)
- 100 % Eddy current e.g. ASTM E309

Specific tests upon request, like

- continuous OD checking
- residual stress measurement
- 100 % US e.g. ASTM E309 inspection
- micrographic inspection

Precision steel tubes for injection anchors

We provide seamless hot-rolled tubes as well as cold-drawn precision steel tubes for anchors to stabilize rock formations. The tubes are delivered ready for cold forming to profiled tubes.





Precision steel tubes for heat exchanger

Both our hot-finished tubes and cold-drawn precision steel tubes made of low-alloy C-steels and high-chromium steel grades (e.g. T9, T91, T11) are optimally designed to meet the requirement profile in the high-temperature range of power generation and industrial plants. The careful balance between cold forming and final heat treatment yields exceptional creep resistance.

The tubes can be customized to meet the stringent requirements of operational temperature and service conditions of **Feedwater Heaters** up to **Steam Generators**.

In addition to the circular inside and outside diameter geometries, profiled inside and/or outside surfaces can appreciably increase the heat exchanger capacity of precision steel tubes. Mannesmann develops customized process routes for individualized section geometries. Both straight and helical shapes are possible.



Heat Transfer and Renewables

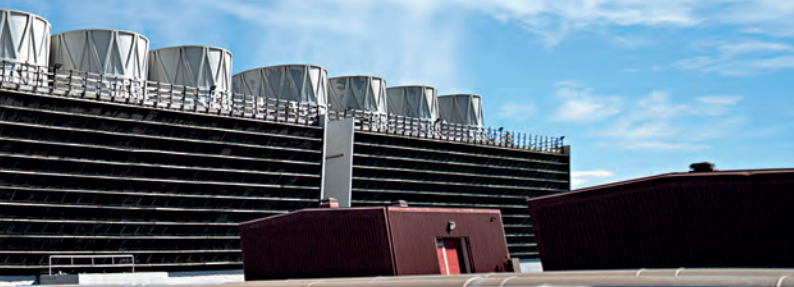


Photo: 66446691 ©deserttrends, Geothermal Power, www.stock.adobe.com

Heat exchanger tubes for renewables

Our tubes for the safe transmission of heat transfer media provide an important contribution towards the current change-over to power generation from renewable energy sources. Whether in biogas plants, geothermal power stations, solar fields or boilers – our steel tubes meet all the special requirements of the respective application area.

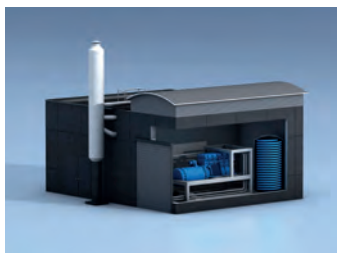
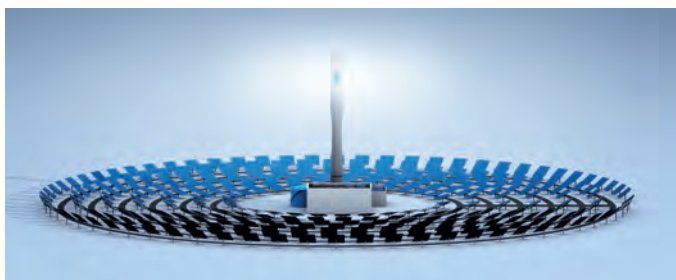






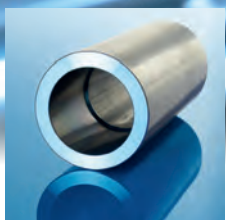
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Steel tubes for oil and gas applications

For use as casings and tubings, we supply steel tubes that have a track record of many years which we supply as **Green Tubes** for further processing for special purposes and service conditions. Our range of products in the oil and gas sector also extends to cold-drawn precision steel tubes for **Progressive-Cavity Pumps (Stators)** and solutions for exploration wells (see pages 14 – 17).

Our hot-rolled steel tubes are qualified seamless hollows for line pipe to ASTM or ASME, which are processed downstream and upstream and on- or offshore. This also includes tubes used in petrochemical plants (see pages 18 – 19).



Steel tubes for mechanical engineering

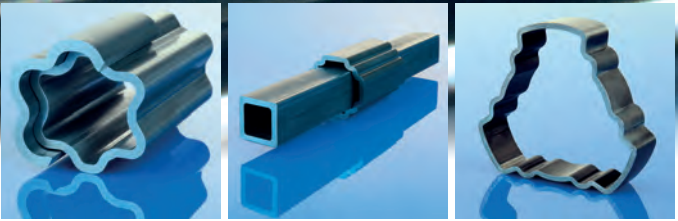
In the manufacture of machinery and plant facilities, our steel tubes and sections are suitable for a whole range of applications. We supply products with optimized property profiles, which are tailored perfectly to the customer's requirements from a wide range of dimensions, materials and shapes.

Tubes for machining

Cylindrical hollow parts for turning can be made from solid round steel or tubes – also available with customized pre-shaped geometries. Cost-effectiveness is further increased by small eccentricity and close external and internal dimensional tolerances.

The use of precision steel tubes results in the following economic advantages:

- Lower material consumption
- Saving of machining steps
- Shorter machining times
- Better utilisation of machinery
- Transport cost savings



Special tube shapes

We find customized solutions to your ideas for special tube shapes. In addition to classic geometric shapes (square, rectangular, round, oval and star-shaped), a huge variety of combinations and other shapes can be manufactured to customer drawings.



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