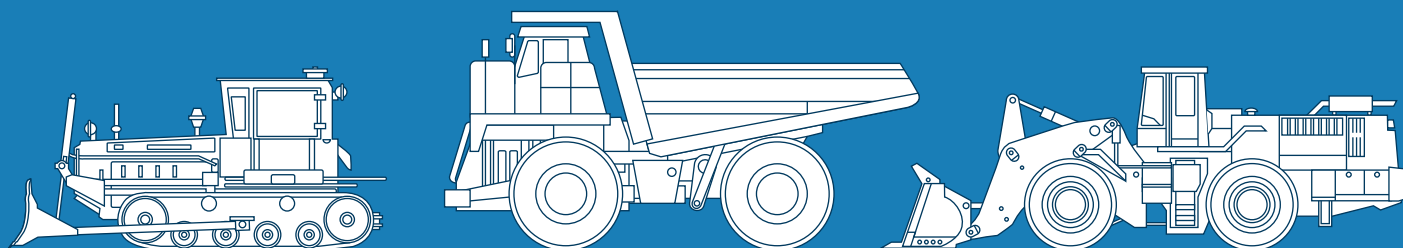




# EXPERT PIPE SOLUTIONS FOR MECHANICAL ENGINEERING

## MECHANICAL PIPES





# CONTENT

## 1 Mechanical pipes

1.1	EN 10297 - 1	Seamless circular steel tubes for mechanical and general engineering purposes	8
1.2	EN 10294 - 1	Hollow bars for machining: Non-alloy and alloy steels	11
1.3	EN 10210 - 1, 2	Hot finished structural hollow sections of non-alloy and fine grain steels	13
1.4	ASTM A 519	Seamless Carbon and Alloy Steel Mechanical Tubing	15
1.5	GOST 23270	Hollow bars for mechanical applications	17
1.6	GOST 8733, GOST 8734	Seamless cold rolled steel pipes	20

## 2 Precision steel tubes

2.1	EN 10305 -1	Seamless cold-drawn steel tubes for precision applications	22
2.2	DIN 2391 - 1, 2	Seamless precision steel tubes	25

## 3 Bearing tubes

3.1		Bearing hot rolled tubes	27
3.2		Bearing cold rolled tubes	28

# EXPERT PIPE SOLUTIONS FOR MECHANICAL ENGINEERING

Our product strategy in the mechanical pipes sector is defined by a thorough market analysis and investigation of our clients' needs in the automotive, shipbuilding and power generation industries.

The company produces machinery use products as basic elements for the manufacture of vehicles of different configurations, hydraulic cylinders, bearings, steam generators, mining equipment and high-precision parts of aeronautical engineering and cars.

Basic car components for vehicles are manufactured from our products



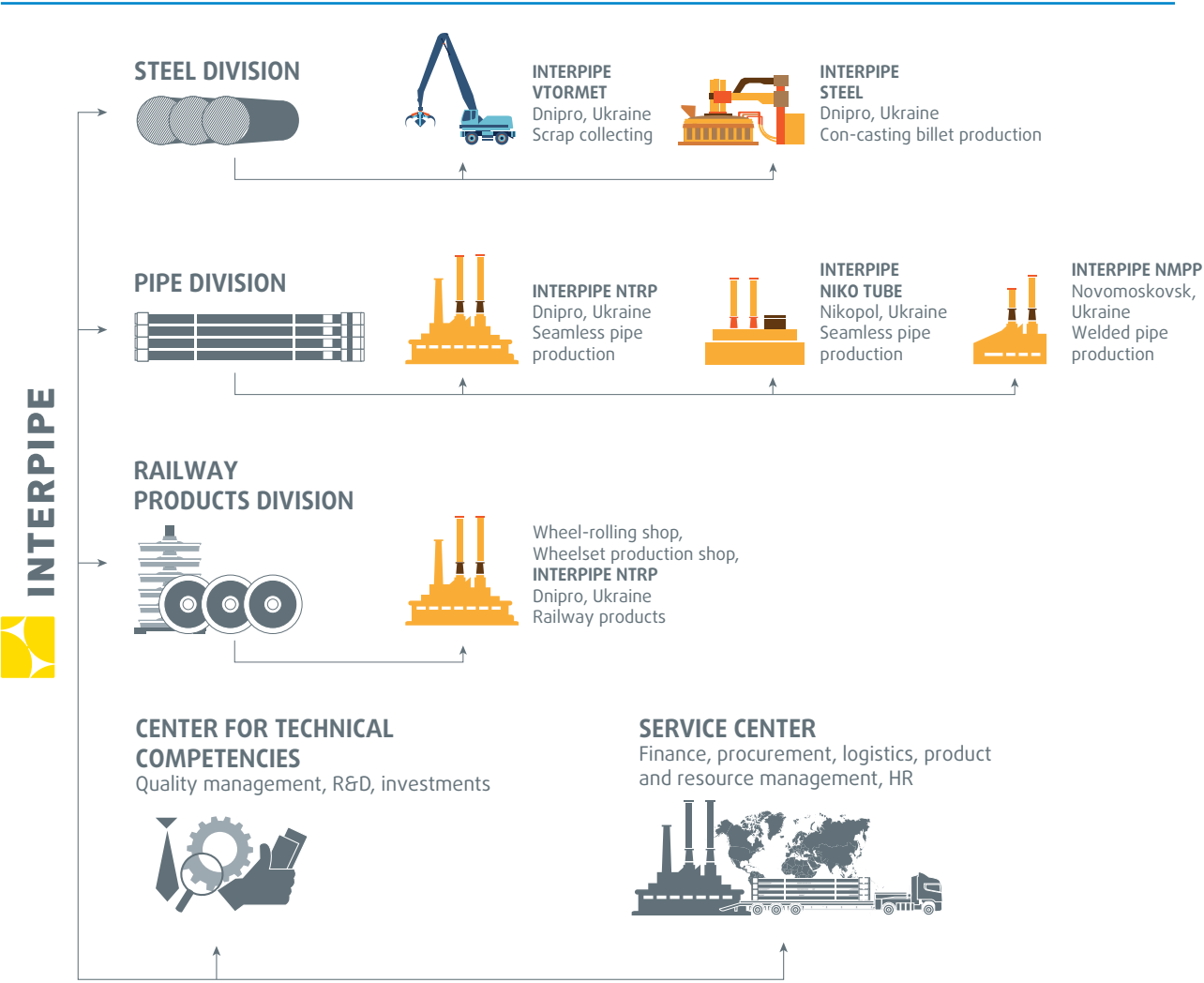
# INTERPIPE IS A GLOBAL STEEL PIPE PRODUCER AND SUPPLIER

Interpipe is a global steel pipe producer for all major application – oil & gas exploration and transportation, power generation, machanical and structural use.

The company’s products are supplied to 80 countries all over the world through a chain of commercial offices located in Ukraine, Russia, Kazakhstan, Europe, the USA and the Middle East.

Interpipe structure includes production facilities located in Dnipro region, one of the major industrial centers of Ukraine. The company continues to invest heavily in the development and modernization of its mills.

Interpipe includes 3 operating divisions – Steel, Pipe and Railway Products. The company controls product quality at every stage: from manufacturing of raw materials to delivery of final products to customers.



## SELLING TO CUSTOMERS GLOBALLY – KEY MARKETS



# PIPE PRODUCTS FOR DIVERSE APPLICATIONS

Designing any of its products, Interpipe is always focused on exact customer requirements and the field of its application. Our products are used throughout the world in diverse applications - from mining, heavy machinery to automobile industries. We design and produce steel pipes for special customers' needs.

## Hydraulic cylinders

Tube is a key element of any hydraulic machinery device. Interpipe produces precision seamless cold drawn tubes suitable for the manufacturing of hydraulic cylinders. The tubes are produced with close tolerances out of easily weldable steel. Such tubes undergo special treatment to guarantee good machinability. Upon the request from our customers tubes may be produced quite close to the finished product dimensions.  
**Application: motocranes, tractors and trucks**



## Bearings

Interpipe tubes perfectly meet the requirements of the advanced automotive industry. The close tolerances of steel tubes in diameter and thickness, exceptional concentricity and a smooth finish, both inside and outside, facilitate engineers' attainment of uniform flow under controlled temperature and pressure. Its excellent low temperature properties ensure smooth hardening in the process of cold working.  
**Application: car components**



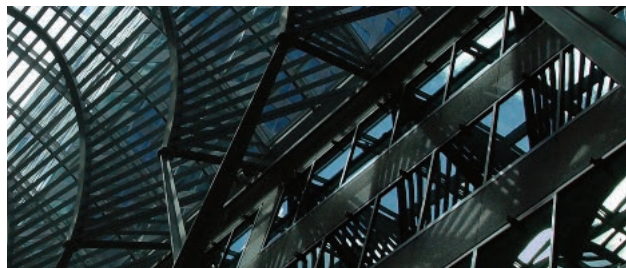
## Mining equipment

Interpipe products are used in mining explorations. For these applications, Interpipe supplies seamless tubes for engineering purposes, where the critical factors are weight control and high stress resistance are the critical factors. These types of tubes have high-performance steel characteristics, ensured by the heat treatment. Our products are used for applications where the ratio between mass and space occupied is especially critical.  
**Application: powered roof supports, hydraulic pit props**



## Cranes and agricultural engineering

Interpipe product range covers engineering applications where such factors as weight control and high stress resistance are of top priority. Our seamless pipes are used in lifting and load handling systems and as components of lift arms in mobile cranes. High-strength seamless steel pipes are also used in agricultural construction. This type of pipes has high-tensile properties and flexibility and may be designed and produced with any heights and strengths.  
**Application: Tower cranes, tractors and harvesters**



## Rollers

The tube material and tube diameter determine the load capacity and operation of conveyor rollers. Interpipe product range includes tubes for different application rollers. The Company ensures good machinability and excellent concentricity of the product.  
**Application: conveyor rollers, tubes for textile, paper, and printing industries, steel plant rollers**



## Downhole equipment

Being focused on satisfying the needs of oil and gas companies Interpipe offers a range of products for downhole equipment. Our products are applied in diverse hostile environments as basic elements for submerged pumps and engines. Pipes used for downholes are made of steel sustaining high gravity or pressures. These pipes have close tolerances and high straightness.  
**Application: submerged pumps**





# QUALITY-FOCUSED OPERATIONS

Interpipe considers quality control as the key part of its production activities, exceeding customer needs. The quality of our products is approved by international standards – EN, ASTM, ISO and GOST.

## Quality of structural steel grades: even texture, high weldability and good machinability

Interpipe has in-house steel billets production, ensuring steel quality control and continuous monitoring of its parameters. High quality characteristics of steel are provided by the subsequent processing at the out-of-furnace steel treatment complex. The ladles with metal are delivered in turn to the furnace ladle unit, where the metal finishing and refining take place. Steel blowing in the ladle by argon along with the refining process ensure low content of phosphorus and sulphur in the finished metal and uniform distribution of other elements. Degassing process is carried out by removing hydrogen, nitrogen and oxygen dissolved in metal at the vacuum degassing unit simultaneously with argon blowing.



As a result, these fine-grain structural steel grades are characterised by maximal yield strength rate, good weldability and high resistance to brittle cracking. These grades are used mainly for hydraulic engineering, heavy machinery, shipbuilding and crane constructions.

## Quality management system

Interpipe mills are certified in accordance with Quality management system ISO 9001 and also have certification for energy industry - API Q1. Every mill has quality manual that determines quality policy.

Environmental management system is certified according to ISO 14001. Occupational health and safety of the personnel are certified according to the requirements of OHSAS 18001 standard.



## Ongoing investments program

Interpipe regularly invests in development of its production capacities, improvement of the output quality, and expansion of its product range. Interpipe is focused on providing the high quality product at short delivery time for each client. Interpipe has been conducting extensive improvement program, which included launch of in-house steel melting complex Interpipe Steel, installation of various new NDE systems, finishing lines and hydro testing equipment on the mills, improvement of heat treatment technologies.



## Interpipe Steel: In-house steel production

In 2012, Interpipe commissioned a new electric steel melting complex – Interpipe Steel. The capacity of the mill is 1.32 mln tons of steel billets. Total investment has reached \$700 million. Currently Interpipe Steel is the biggest electric steel melting mill in Eastern Europe.

Interpipe Steel represents new phase in the steel industry due to leading European technology, labor conditions and environmental protection standards. The turn-key construction of the mill has been carried out by Danieli Company – global leader in metallurgical equipment manufacturing.

Innovative DANIELI technologies on Interpipe Steel:

- Electric arc furnace
- Twin tank vacuum degasser
- Twin position ladle furnace
- Two continuous casting machines

In 2014 Interpipe Steel started to export steel billets as finished products. The main production uses are:

- forgings (rings, shafts, pulleys, flanges, fittings and for space industry)
- railway products
- pipes for mechanical, industrial and oil&gas application

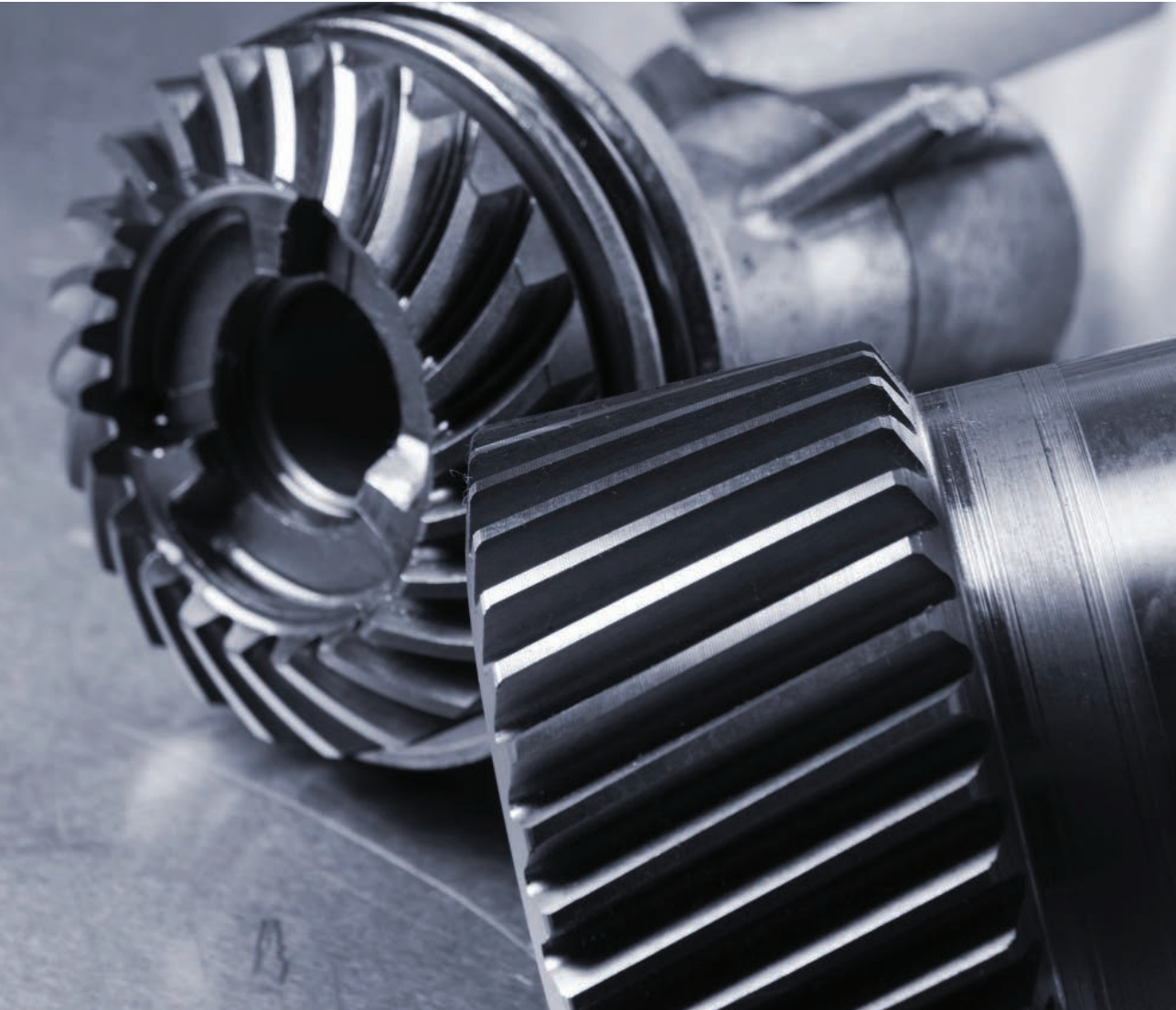
Interpipe Steel continuously develops range of steel grades according to international standards and customers' requirements.



# EN 10297-1 SEAMLESS PIPES FOR MECHANICAL APPLICATIONS

## Chemical composition

Steel grade	Elements content, %												
	C	Si	Mn	P	S	Cr	Mo	Ni	Al	Cu	N	Nb	V
E235	≤0,17	≤0,35	≤1,20	≤0,030	≤0,035								
E275	≤0,21	≤0,35	≤1,40	≤0,030	≤0,035								
E315	≤0,21	≤0,30	≤1,50	≤0,030	≤0,035								
E355	≤0,22	≤0,55	≤1,60	≤0,30	≤0,035								
E470	0,16-0,22	0,10-0,50	1,30-1,70	≤0,030	≤0,035				≥ 0,010		≤ 0,020	≤ 0,07	0,08-0,15
E275K2	≤0,20	≤0,40	0,50-1,40	≤0,030	≤0,035	≤0,030	≤0,010	≤0,030	≥ 0,020	≤0,035	≤ 0,015	≤ 0,05	≤ 0,05
E355K2	≤0,20	≤0,50	0,90-1,65	≤0,030	≤0,035	≤0,030	≤0,010	≤0,050	≥ 0,020	≤0,035	≤ 0,015	≤ 0,05	≤ 0,12
E420J2	0,16-0,22	0,10-0,50	1,30-1,70	≤0,030	≤0,035	≤0,030	≤0,080	≤0,040	≥ 0,010	≤0,030	≤ 0,020	≤ 0,07	0,08-0,15
E460K2	≤0,20	≤0,60	1,00-1,70	≤0,030	≤0,035	≤0,030	≤0,010	≤0,080	≥ 0,020	≤0,070	≤ 0,025	≤ 0,05	≤ 0,02
E590K2	0,16-0,22	0,10-0,50	1,30-1,70	≤0,030	≤0,035	≤0,030	≤0,080	≤0,040	≥ 0,010	≤0,030	≤ 0,020	≤ 0,07	0,08-0,15
E730K2	≤0,20	≤0,50	1,40-1,70	≤0,030	≤0,035	≤0,030	0,30-0,45	0,30-0,70	≥ 0,020	≤0,020	≤ 0,020	≤ 0,05	≤ 0,12
C22E	0,17-0,24	≤0,40	0,40-0,70	≤0,035	≤0,035								
25CrMo4	0,22-0,29	≤0,40	0,60-0,90	≤0,035	≤0,035	0,9-1,2	0,15-0,30						
34CrMo4	0,30-0,37	≤0,40	0,60-0,90	≤0,035	≤0,035	0,9-1,2	0,15-0,30						
42CrMo4	0,38-0,45	≤0,40	0,60-0,90	≤0,035	≤0,035	0,9-1,2	0,15-0,30						
C15E	0,12-0,18	≤0,40	0,30-0,60	≤0,035	≤0,035								





## Mechanical properties

Steel grade	Delivery condition	Yield strength, $R_{EH}$ N/mm <sup>2</sup>				Tensile strength $R_m$ N/mm <sup>2</sup>				Elongation A, %		Impact test, KV, J	
		Wall thickness $T_n$ , mm				Wall thickness $T_n$ , mm						Test temperature -20°C	
		<16	16< $T_n$ ≤40	40< $T_n$ ≤65	65< $T_n$ ≤80	<16	16< $T_n$ ≤40	40< $T_n$ ≤65	65< $T_n$ ≤100	Longi-tudinal direction	Transverse direction	Longi-tudinal direction	Transverse direction
		Not less											
E235	+AR or +N	235	225	215	205	360	360	360	340	25	23	-	-
E275	+AR or +N	275	265	255	245	410	410	410	380	22	20	-	-
E315	+AR or +N	315	305	295	280	450	450	450	420	21	19	-	-
E355	+AR or +N	355	345	335	315	490	490	490	470	20	18	-	-
E470	+AR	470	430	-	-	650	600	-	-	17	15	-	-
E275K2	+N	275	265	255	245	410	410	410	380	22	20	40	27
E355K2	+N	355	345	335	315	490	490	470	470	20	18	40	27
E420J2	+N	420	400	390	370	600	560	530	500	19	17	27	20
E460K2	+N	460	440	430	410	550	550	550	520	19	17	40	27
E590K2	+QT*	590	540	480	455	700	650	570	520	16	14	40	27
E730K2	+QT*	730	670	620	580	790	750	700	680	15	13	40	27

Steel grade	Delivery condition	Yield strength, R <sub>EH</sub> N/mm²			Tensile strength Rm, N/mm²			Elongation A, %				Impact test, KV, J Test temperature -20°C				
		Wall thickness Tn, mm														
		<16	16<Tn≤40	40<Tn≤80	<16	16<Tn≤40	40<Tn≤80	<16		16<Tn≤40		<8	8<Tn≤20		20<Tn≤60	
								l	t	l	t	l	l	t	l	t
		Not less														
C22E	+N	240	210	210	430	410	410	24	22	25	23	50	50	32	40	27

Steel grade	Delivery condition	Yield strength, R <sub>EH</sub> N/mm²				Tensile strength R <sub>m</sub> N/mm²				Elongation A, %								Impact test, KV, J Test temperature +20°C				
		Wall thickness T <sub>n</sub> , mm																				
		<8	8<T <sub>n</sub> ≤20	20<T <sub>n</sub> ≤50	50<T <sub>n</sub> ≤80	<8	8<T <sub>n</sub> ≤20	20<T <sub>n</sub> ≤50	50<T <sub>n</sub> ≤80	<8		8<T <sub>n</sub> ≤20		20<T <sub>n</sub> ≤50		50<T <sub>n</sub> ≤80		<8	8<T <sub>n</sub> ≤20		20<T <sub>n</sub> ≤50	
			l	t	l		t	l	t	l	t	l	t	l	t	l	l	t	l	t		
Not less																						
25CrMo4	+QT*	700	600	450	400	900	800	700	700	12	10	14	12	15	13	16	14	45	50	32	50	32
34CrMo4	+QT**	800	650	550	500	1000	900	800	750	11	9	12	10	14	12	15	13	35	40	25	45	27
42CrMo4	+QT	900	750	650	550	1100	1000	900	800	10	8	11	9	12	10	13	10	30	35	22	35	22

### Note:

l – Longitudinal sample, t – Transversal sample

\* - at +QT conditions pipes with outside diameter ≥100 mm and wall thickness ≤ 28 mm may be produced, for pipes with other dimensions +QT conditions are modeled on samples.

\*\* - pipes are supplied at +AR conditions, +QT conditions are modeled on samples.

\*\*\*- - pipes are supplied at +A conditions, +QT conditions are modeled on samples.

## Cold rolled

OD (mm)	Wall thickness, mm													
	3,6	4,0	4,5	5,0	5,6	6,3	7,1	8,0	8,8	10,0	11,0	12,5	14,2	16,0
33,7														
35,0														
38,0														
40,0														
42,4														
44,5														
48,3														
51,0														
54,0														
57,0														
60,3														
63,5														
70,0														
73,0														
76,1														
82,2														

## Hot rolled

OD	Wall thickness																																				
	2,6	2,9	3,2	3,6	4,0	4,5	5,0	5,4	5,6	6,3	7,1	8,0	8,8	10,0	11,0	12,5	14,2	16,0	17,5	20,0	22,2	25,0	28,0	30,0	32,0	36,0	40,0	42,0	45,0	50,0	55,0	60,0	65,0	70	75,0		
33,7																																					
38,0																																					
42,4																																					
48,3																																					
51																																					
57																																					
60,3																																					
63,5																																					
70																																					
73,0																																					
76,1																																					
82,5																																					
88,9																																					
101,6																																					
108,0																																					
114,3																																					
121,0																																					
127,0																																					
133,0																																					
139,7																																					
141,3																																					
152,4																																					
159,0																																					
168,3																																					
177,8																																					
193,7																																					
203,0																																					
219,1																																					
229,0																																					
244,5																																					
273,0																																					
298,5																																					
323,9																																					
355,6																																					
368,0																																					
406,4																																					
419 (426)																																					

## Dimensional tolerances

Outside diameter, mm	Permissible deviation of Outside Diameter	Permissible deviation of Wall Thickness		
		OD/WT < 0,025	0,025 < OD/WT ≤ 0,05	OD/WT > 0,05
≤ 219,1	± 1% or 0,5 mm – the greatest value	± 12,5 % or ± 0,4 mm – the greatest value		
> 219,1	± 1%	± 20%	± 15%	± 12,5%

## Lengths

Pipes are supplied with lengths according to standard requirements.  
Any lengths different from the standard ones are subject to additional negotiations.

## Protection

Pipes are supplied:

- black and bare
- external varnished with black or clear lacquer
- oiled

Upon request pipes ends are protected with plastic caps.

## Marking

Pipes are supplied with marking according to standards and customer requests.  
Marking is painted and/or hard stenciled on pipes ends. The same data, as well as additional information according to customer's request, are indicated on the bundle tags.

## Certification

Pipes are supplied with 3.1. inspection certificate, in conformity with EN 10204.

# EN 10294-1

## Hollow bars for machining: Non alloy and alloy steels

### Chemical composition

Steel grade	Elements content, %												
	C	Si	Mn	S	V	P	Cr	Ni	Mo	Cu	Al	Nb	Ti
						Not more							
E355	≤0.22	≤0.5	≤1.5	0,015-0,050	≤0,10	0,045	0.30	0,40	0,08	0,30	0,06	0,05	0,05
20MnV6	0,16-0,22	0,10-0,50	1,30-1,70	0,015-0,050	0,08-0,15	0,045	0,30	0,40	0,08	0,30	0,06	0,07	0,05

### Mechanical properties

Steel grade	Delivery condition	Yield strength, R <sub>EH</sub> N/mm²				Tensile strength Rm, N/mm2				Elongation A,%	Impact test, KV, J
		Wall thickness Tn, mm				Wall thickness Tn, mm					Test temperature -20°C
		<16	16<Tn≤25	25<Tn≤40	40<Tn≤50	<16	16<Tn≤25	25<Tn≤40	40<Tn≤50		
		Not less than									
E355	+AR	355	345	335	335	490	490	470	470	18	-
	+N	355	345	335	335	490	490	470	470	20	27
20MnV6	+AR	470	460	430	430	650	620	600	550	17	-
	+N	420	400	380	380	600	560	530	530	19	27
	+QT	590	540	480	480	700	650	570	570	16	40



## Cold rolled

OD (mm)	Wall thickness, mm													
	3,6	4,0	4,5	5,0	5,6	6,3	7,1	8,0	8,8	10,0	11,0	12,5	14,2	16,0
33,7														
35,0														
38,0														
40,0														
42,4														
44,5														
48,3														
51,0														
54,0														
57,0														
60,3														
63,5														
70,0														
73,0														
76,1														
82,5														

## Hot rolled

OD (mm)																	
	9,5	10	11	12,5	14,2	16	17,5	20	22,2	25	28	30	32	36	38,0	40	45
82,5																	
88,9																	
101,6																	
108																	
114,3																	
127																	
133																	
139,7																	
152,4																	
159																	
168,3																	
177,8																	
193,7																	

Note:  
Order placement for pipe of intermediate dimensions not listed in the datasheet should be previously agreed with the mill

## Dimensional tolerances

Outside diameter permissible deviation		Wall thickness permissible deviation	
OD ≤ 75	± 0,5 mm	OD ≤ 180 mm, WT ≤ 15 mm	±12,5 % or ±0,4 mm - the greatest value
75 < OD ≤ 180	± 0,75 mm	WT > 15	± 10 %
OD > 180	± 1 %	OD > 180 mm, WT ≤ 30 mm	±12,5 %
		WT > 30 mm	± 10 %

## Lengths

Pipes are supplied with lengths according to standard requirements.  
Any lengths different from the standard ones are subject to additional negotiations.

## Protection

Pipes are supplied:

- black and bare
- external varnished with black or clear lacquer
- oiled

Upon request pipes ends are protected with plastic caps.

## Marking

Pipes are supplied with marking according to standards and customer requests.  
Marking is painted and/or hard stenciled on pipe ends. The same data, as well as additional information according to customer's request, are indicated on the bundle tags.

## Certification

Pipes are supplied with 3.1. inspection certificate, in conformity with EN 10204.

# EN 10210-1, 2

## Hollow sections for steel construction made of unalloyed and fine grain steels

### Chemical composition

Steel grade	Elements content, %, max.							Maximal carbon equivalent value CEV %			
	C For nominal wall thickness, mm		Si	Mn	P	S	N	For nominal wall thickness, mm			
	≤40	>40						≤16	>16 ≤40	>40 ≤65	> 65≤ 120
S235JRH	0,17	0,20	-	1,40	0,040	0,040	0,009	0,37	0,39	0,41	0,44
S275JOH	0,20	0,22	-	1,50	0,035	0,035	0,009	0,41	0,43	0,45	0,48
S275J2H	0,20	0,22	-	1,50	0,030	0,030	-	0,41	0,43	0,45	0,48
S355JOH	0,22	0,22	0,55	1,60	0,035	0,035	0,009	0,45	0,47	0,50	0,53
S355J2H	0,22	0,22	0,55	1,60	0,030	0,030	-	0,45	0,47	0,50	0,53
S355K2H	0,22	0,22	0,55	1,60	0,030	0,030	-	0,45	0,47	0,50	0,53

Steel grade	Elements content, %														Maximal carbon equivalent value CEV %	
	C max	Si max	Mn	P max	S max	Nb max	V max	Al min	Ti max	Cr max	Ni max	Mo max	Cu max	N max	For nominal wall thickness, mm	
															≤ 16	> 16 ≤ 65
S275NH	0,20	0,40	0,50-1,40	0,035	0,030	0,050	0,08	0,020	0,03	0,30	0,30	0,10	0,35	0,015	0,40	0,40
S355NH	0,20	0,50	0,90-1,65	0,035	0,030	0,050	0,12	0,020	0,03	0,30	0,50	0,10	0,35	0,020	0,43	0,45

### Mechanical properties

Steel grade	Yield strength, R <sub>SH</sub> MPa Not less				Tensile strength R <sub>m</sub> , MPa		Elongation A, % Not less			Impact test, KV, J Not less		
	Nominal wall thickness, mm									Test temperature, °C		
	≤16	>16 ≤40	>40 ≤63	>63	<3	>3 <100	≤40	>40 ≤63	>63	-20	0	+20
	Not less											
S235JRH	235	225	215	215	360-510	360-510	26	25	24	-	-	27
S275JOH	275	265	255	245	430-580	410-560	23	22	21	-	27	-
S275J2H	275	265	255	245	430-580	410-560	23	22	21	27	-	-
S355JOH	355	345	335	325	510-680	470-630	22	21	20	-	27	-
S355J2H	355	345	335	325	510-680	470-630	22	21	20	27	-	-
S355K2H	355	345	335	325	510-680	470-630	22	21	20	40	-	-

Steel grade	Yield strength, R <sub>eh</sub> MPa Not less			Tensile strength R <sub>m</sub> , MPa		Elongation A, % Not less		Impact test, KV, J Not less	
	Nominal wall thickness, mm			Nominal wall thickness, ≤65 mm		Test temperature, °C			
	≤16	>16 ≤40	>40 ≤65			longitudinal	transverse	-50	-20
S275NH	275	265	255	370-510		24	22	-	40
S355NH	355	345	335	470-630		22	20	27	-





## Dimensions

Outside diameter	Wall thickness																																		
	2,6	3,2	3,6	4,0	4,5	5,0	5,6	6,3	7,1	8,0	8,8	10,0	11,0	12,5	14,2	15,0	16,0	17,0	17,5	20,0	22,2	25,0	28,0	30,0	32,0	36,0	40,0	45,0	50,0	55,0	60,0	65,0	70,0	75,0	
33,7																																			
35,0																																			
38,0																																			
40,0																																			
42,4																																			
44,5																																			
48,3																																			
51,0																																			
54,0																																			
57,0																																			
60,3																																			
63,5																																			
70,0																																			
73,0																																			
76,1																																			
82,5																																			
85,0																																			
88,9																																			
95,0																																			
101,6																																			
108,0																																			
114,3																																			
121,0																																			
127,0																																			
133,0																																			
139,7																																			
141,3																																			
146,0																																			
152,4																																			
159,0																																			
168,3																																			
177,8																																			
193,7																																			
203,0																																			
219,1																																			
229,0																																			
244,5																																			
254,0																																			
267,0																																			
273,0																																			
298,5																																			
305,0																																			
323,9																																			
330,0																																			
340,0																																			
343,0																																			
355,6																																			
368,0																																			
406,4																																			
419,0																																			
426,0																																			

## Dimensional tolerances

Outside diameter permissible deviation	Wall thickness permissible deviation
±1 % (but not less than ±0.5 mm and not more than ±10 mm)	- 10 %, + 15%

## Lengths

Pipes are supplied with lengths according to standard requirements.  
Any lengths different from the standard ones are subject to additional negotiations.

## Protection

Pipes are supplied:  
- black and bare  
- external varnished with black or clear lacquer  
- oiled  
Upon request pipes ends are protected with plastic caps.

## Marking

Pipes are supplied with marking according to standard and customer request.  
Marking is painted and/or hard stenciled on pipe ends. The same data, as well as additional information according to customer's request, are indicated on the bundle tags.

## Certification

Pipes are supplied with 3.1. inspection certificate, in conformity with EN 10204.

# ASTM A 519

## Seamless Carbon and Alloy Steel

### Mechanical Tubing

#### Chemical composition

Steel grade	Elements content, %							
	C	Mn	P	S	Si	Ni	Cr	Mo
1026	0.22-0.28	0.60-0.90	≤0.025%	≤0.025%				
4130	0.28-0.33	0.40-0.60	≤0.025%	≤0.025%	0.15-0.35	-	0.80-1.10	0.15-0.25
4140	0.38-0.43	0.75-1.0	≤0.025%	≤0.025%	0.15-0.35	-	0.80-1.10	0.15-0.25

#### Typical Tensile Properties and Hardness

Grade Designation	Delivery condition	Tensile strength		Yield strength		Elongation A, %	Hardness, HRB
		ksi	MPa	ksi	MPa		
		Not less					
1026	HR	55	379	35	241	25	60
	CW	75	517	65	448	5	80
	SR	70	483	55	379	8	75
	A	53	365	30	207	25	57
	N	55	379	36	248	22	60
4130	HR	90	621	70	483	20	89
	SR	105	724	85	586	10	95
	A	75	517	55	379	30	81
	N	90	621	60	414	20	89
4140	HR	120	855	90	621	15	100
	SR	120	855	100	689	10	100
	A	80	552	60	414	25	85
	N	120	855	90	621	20	100

HR- hot-rolled, CW- cold-worked, SR- stress relieved, A - annealed, N- normalized



## Hot rolled

Wall thickness								
inch		0,500	0,625	0,750	0,875	1,000	1,250	1,500
OD (inch)	OD (mm)	12,7	15,88	19,05	22,23	25,4	31,75	38,1
4,000	101,6							
4,250	107,95							
4,500	114,3							
4,750	120,65							
5,000	127							
5,250	133,35							
5,500	139,7							
5,750	146,05							
5,980	152,4							
6,250	158,75							
6,500	165,1							
6,750	171,45							
7,000	177,8							
7,250	184,15							
7,500	190,5							

**Note:**  
Order placement for pipes made of alloy steel and intermediate pipe dimensions not listed in the datasheet should be previously agreed with the mill

## Dimensional tolerances

Outside diameter, inch (mm)	Outside diameter permissible deviation, inch (mm)	
	more	less
Up to 2.999 (76.17)	0.020 (0.51)	0.020 (0.51)
3.000-4.499 (76.20-114.27)	0.025 (0.64)	0.025 (0.64)
4.500-5.999 (114.30-152.37)	0.031 (0.79)	0.031 (0.79)
6.000-7.499 (152.40-190.47)	0.037 (0.94)	0.037 (0.94)
7.500-8.999 (190.50-228.57)	0.045 (1.14)	0.045 (1.14)
9.000-10.750 (228.60-273.05)	0.050 (1.27)	0.050 (1.27)

Wall thickness as a percentage outside diameter	Wall thickness permissible deviation		
	OD < 2.999 (76.19)	3.000 (76.20) < OD < 5.999 (152.37)	6.00 (152.40) < OD < 10.750 (273.05)
Less than 15	+/- 12.5 %	+/- 10.0 %	+/- 10.0 %
15 and more	+/- 10.0 %	+/- 7.5 %	+/- 10.0 %

## Lengths

Pipes are supplied with lengths according to standard requirements.  
Any lengths different from the standard ones are subject to additional negotiations.

## Protection

Pipes are supplied:

- black and bare
- external varnished with black or clear lacquer
- oiled

Upon request pipes ends are protected with plastic caps.

## Marking

Pipes are supplied with marking according to standards and customer requests.  
Marking is painted and/or hard stenciled on pipe ends. The same data, as well as additional information according to customer's request, are indicated on the bundle tags.

## Certification

Pipes are supplied with 3.1. inspection certificate, in conformity with EN 10204.

# GOST 23270-89

## Seamless pipes for mechanical treatment

### Chemical composition

Steel Grade	Elements content, %								
	C, %	Si, %	Mn, %	Cr, % not more than	S, P	Cu	Mo	Ni	Al
10	0.07-0.14	0.17-0.37	0.35-0.65	0.15					
20	0.17-0.24	0.17-0.37	0.35-0.65	0.25					
35	0.32-0.40	0.17-0.37	0.50-0.80	0.25					
45	0.42-0.50	0.17-0.37	0.50-0.80	0.25					
10G2 (10Г2)	0.07-0.15	0.17-0.37	1.20-1.60	-					
20G (20Г)	0,17-0,24	0,17-0,37	0,70-1,00	-					
20H (20Х)	0.17-0.23	0.17-0.37	0.50-0.80	0.70-1.00					
40H (40Х)	0.36-0.44	0.17-0.37	0.50-0.80	0.80-1.10					
30HGSA (30ХГСА)	0,28-0,34	0,90-1,20	0,80-1,10	0,80-1,10					
09G2S (09Г2С)	≤0,12	0,50-0,80	1,30-1,70	≤0,30					
32HA (32ХА)	0.32- 0.35	0.17- 0.37	0.55-0.85	1.00-1.10	≤0.025	≤0.20		≤0.20	≥ 0.02
38H2MUA (38Х2МЮА)	0.35-0.42	0.20-0.45	0.30-0.60	1.35-1.65					
15HM (15ХМ)	0,11-0,18	0,17-0,37	0,40-0,70	0,80-1,10					
30HMA (30ХМА)	0,26-0,34	0,17-0,37	0,40-0,70	0,80-1,10			0,15-0,25		
12HN2 (12ХН2)	0,09-0,16	0,17-0,37	0,30-0,60	0,60-0,90				1,50-1,90	



## Mechanical properties

Grade designation	Tensile strength, $\sigma_b$ , kgs/mm <sup>2</sup> (MPa)	Yield strength, $\sigma_y$ , kgs/mm <sup>2</sup> (MPa)	Elongation, $\delta_s$ , %	Brinell hardness (wall thickness >10 mm)
	Not less than			Hardness number HB, not more than
10	36 (353)	22 (216)	24	137
20	42 (412)	25 (245)	21	156
35	52 (510)	30 (294)	17	187
45	60 (588)	33 (323)	14	207
10G2 (10Г2)	48 (470)	27 (265)	21	197
20G (20Г)	46 (450)	28 (275)	24	179
20H (20Х)	44 (431)	29( 284)	16	179
40H (40Х)	67 (657)	36 (352)	9	269
30HGSА (30ХГСА)	70 (686)	41 (402)	11	229
15HM (15ХМ)	44 (431)	23 (226)	21	179
30HMA (30ХМА)	60 (588)	40 (392)	13	229
12HN2 (12ХН2)	55 (539)	40 (392)	14	207

Grade designation	Tensile strength, $\sigma_r$ , MPa	Yield strength, $\sigma_y$ , MPa	Percent elongation, $\delta_s$ , %	Impact test, KCU J/sm <sup>2</sup>			Impact test, KCV, J/sm <sup>2</sup>
				Longitudinal direction			
				t=20°C	t=-40°C	t=-70°C	t=-60°C
				Not less than			
09G2S (09Г2С)	450	325	21	59	39	29	29

Grade designation	Tensile strength, $\sigma_B$ , MPa	Yield strength, $\sigma_T$ , MPa	Percent elongation, $\delta_5$ , %	Necking, $\Psi$ , %	Impact test, KV, J t=-20°C	Hardness, HB
	Not less than					
32HA (32XA)*	830	730	12	40	27	269-311

\* - Mechanical properties after quenching and tempering. Quenched and tempered pipes with outside diameter  $\geq 100$  mm and wall thickness  $\leq 8$  mm can be produced. Mechanical properties of pipes with other dimensions are defined on heat-treated samples.

## Mechanical properties on heat-treated samples

Steel designation	Tensile strength, $\sigma_B$ , MPa (kgs/mm <sup>2</sup> )	Percent elongation, $\delta_s$ , %	Necking for wall thickness more than 5 mm, $\Psi$ , %	Impact toughness for wall thickness more than 12 mm, $a_k$ , kgs/sm <sup>2</sup>	Brinell hardness (imprint diameter), mm
	Not more than				
38H2MUA (38X2M0A)	980 (100)	14	50	9	3,4-3,7

Hot rolled

[illegible]



Outside diameter, mm			Wall thickness																																															
	2,6	2,8	3	3,2	3,5	4	4,5	5	5,5	6	6,5	7	7,5	8	8,5	9	9,5	10	11	12	13	14	15	16	17	18	19	20	22	24	25	26	28	30	32	34	35	36	38	40	42	45	48	50	56	60	63	65	70	
114																																																		
121																																																		
127																																																		
133																																																		
140																																																		
146																																																		
152																																																		
159																																																		
168																																																		
180																																																		
194																																																		
203																																																		
219																																																		
245																																																		
273																																																		
299																																																		
325																																																		
351																																																		
356																																																		
377																																																		
406																																																		
426																																																		

### Dimensional tolerances

Outside diameter, mm	Permissible deviation of outside diameter	
	Enhanced accuracy	Usual accuracy
Less than 50	± 5 mm	± 5 mm
50 – 219	± 0,8 %	± 1,0 %
More than 219	± 1,0 %	± 1,25 %

Outside diameter, mm	Wall thickness, mm	Permissible deviation for wall thickness	
		Enhanced accuracy	Usual accuracy
Less than 219	S ≤ 15	± 12,5 %	+12,5/-15 %
	15 < S ≤ 30	+10/-12,5 %	±12,5%
	S > 30	± 10	+10/-12,5 %
More than 219	S ≤ 15		+12,5/-15,0 %
	15 < S ≤ 30		±12,5 %
	S > 30		+10,0/-12,5%

### Lengths

Pipes are supplied with lengths according to standard requirements.  
Any lengths different from the standard ones are subject to additional negotiations.

### Protection

Pipes are supplied:

- black and bare
- external varnished with black or clear lacquer
- oiled

Upon request pipes ends are protected with plastic caps.

### Marking

Pipes are supplied with marking according to standards and customer requests.  
Marking is painted and/or hard stenciled on pipe ends. The same data, as well as additional information according to customer’s request, are indicated on the bundle tags.

### Certification

Pipes are supplied with 3.1. inspection certificate, in conformity with EN 10204.

# GOST 8733-74, GOST 8734-75

## Seamless cold rolled steel tubes

### Chemical composition

Steel Grade	Elements content, %			
	C, %	Si, %	Mn, %	Cr, % not more than
10	0.07-0.14	0.17-0.37	0.35-0.65	0.15
20	0.17-0.24	0.17-0.37	0.35-0.65	0.25
35	0.32-0.40	0.17-0.37	0.50-0.80	0.25
45	0.42-0.50	0.17-0.37	0.50-0.80	0.25
10G2 (10Г2)	0.07-0.15	0.17-0.37	1.20-1.60	-
20G (20Г)	0.17-0.24	0.17-0.37	0.70-1.00	-
20H (20Х)	0.17-0.23	0.17-0.37	0.50-0.80	0.70-1.00
40H (40Х)	0.36-0.44	0.17-0.37	0.50-0.80	0.80-1.10
30HGSA (30ХГСА)	0.28-0.34	0.90-1.20	0.80-1.10	0.80-1.10
09G2S (09Г2С)	≤0.12	0.50-0.80	1.30-1.70	≤0.30

### Mechanical properties

Grade designation	Tensile strength, $\sigma_b$ , kgs/mm <sup>2</sup> (MPa)	Yield strength, $\sigma_s$ , kgs/mm <sup>2</sup> (MPa)	Elongation, $\delta_s$ , %	Brinell hardness (wall thickness 10 mm)	
	Not less than			Imprint diameter, mm, not less than	Hardness number HB, not more than
10	36 (353)	22 (216)	24	5,1	137
20	42 (412)	25 (245)	21	4,8	156
35	52 (510)	30 (294)	17	4,4	187
45	60 (588)	33 (323)	14	4,2	207
10G2 (10Г2)	48 (470)	27 (265)	21	4,3	197
20G (20Г)	46 (450)	28 (275)	24	4,5	179
20H (20Х)	44 (431)	29 (284)	16	4,5	179
40H (40Х)	67 (657)	36 (352)	9	3,7	269
30HGSA (30ХГСА)	70 (686)	41 (402)	11	4,0	229

Grade designation	Tensile strength, $\sigma_v$ , MPa	Yield strength, $\sigma_1$ , MPa	Percent elongation, $\delta_s$ , %	Impact test, KCU J/sm <sup>2</sup>			Impact test, KCV, J/sm <sup>2</sup>
				Longitudinal direction			
				t=20°C	t=-40°C	t=-70°C	t=-60°C
	Not less than						
09G2S (09Г2С)	450	325	21	59	39	29	29



## Cold rolled

Outside diameter, mm	Wall thickness																					
	3	3,5	4	4,5	5	5,5	6	6,5	7	7,5	8	8,5	9	9,5	10	11	12	12,5	13	14	15	16
32																						
34																						
36																						
38																						
40																						
42																						
45																						
48																						
50																						
51																						
53																						
54																						
56																						
57																						
60																						
63																						
65																						
68																						
70																						
73																						
75																						
76																						
80																						

Note:  
Order placement for pipe of intermediate dimensions not listed in the datasheet should be previously agreed with the mill

## Dimensional tolerances

Outside diameter, mm	Outside diameter permissible deviation	Wall thickness	Wall thickness permissible deviation
	Enhanced accuracy		Enhanced accuracy
30 - 50	± 0.4 mm	Up to 5 mm	± 10 %
≥ 50	± 0.8%	Above 5 mm	± 8 %

## Lengths

Pipes are supplied with lengths according to standard requirements.  
Any lengths different from the standard ones are subject to additional negotiations.

## Protection

Pipes are supplied:  
- black and bare  
- external varnished with black or clear lacquer  
- oiled  
Upon request pipes ends are protected with plastic caps.

## Marking

Pipes are supplied with marking according to standards and customer requests.  
Marking is painted and/or hard stenciled on pipe ends. The same data, as well as additional information according to customer's request, are indicated on the bundle tags.

## Certification

Pipes are supplied with 3.1. inspection certificate, in conformity with EN 10204.

# EN 10305-1 COLD DRAWN SEAMLESS STEEL TUBES FOR HYDRAULIC CYLINDERS

## Chemical composition

Steel designation	Elements content, %						
	C max	Si max	Mn max	P max	S max	V max	Al min
E355	0.22	0.55	1.60	0.025	0.025		0,02
E460	0,16-0.22	0,10-0.55	0,30-1.70	0.025	0.025	0,08-0.15	0,01-0,06



Mechanical properties at t=20±2 °C

Steel designation	Delivery condition	Yield strength, R <sub>EH</sub> N/mm <sup>2</sup>	Tensile strength R <sub>m</sub> N/mm <sup>2</sup>	Elongation A, %	Impact test, KV, J
		Not less than			
E355	+SR	450	580	15	27
E355	+N	355	490-530	22	27
E460	+SR	620	700	15	27
E460	+N	460	560-700	22	27

Inside diameter, mm	Wall thickness, mm					
	5	6	7,5	10	12,5	15
50						
55						
60						
65						
70						
75						
80						
85						
90						
95						
100						
105						
110						
115						
120						
125						
130						
135						
140						
145						
150						

Dimensional tolerances

Inside diameter tolerance						
-0,2/-0,50	-0,2/-0,50	-0,4/-0,7	-0,25/-0,55	0,3/-0,7	-0,5/-1,0	-0,5/-0,9

Pipes can be supplied with tolerances according to customer request.

Length supplied

- random from 4.5 up to 12 meters
- fixed within the random length range

Concentricity

The following concentricity values are guaranteed:

OUTSIDE DIAMETER	CONCENTRICITY, NOT MORE THAN, %
≤ 125 mm	5
> 125 mm	7

Concentricity is measured according to the formula:

$$\frac{(WT_{max} - WT_{min})}{(WT_{max} + WT_{min})}$$

Where WTmax and WTmin are understood to be measured on the same tube cross-section.



## Ovality

Ovality is guaranteed within the diameter tolerances.

## Straightness

Local deviation from straight line max 1 mm per each meter length.

Total deviation from straightness:

max 3.5 mm for tubes with lengths of less than 6 m; for tubes with lengths greater than 6 m, the tolerance will be increased by 0.5 mm for each 1 m over 6 m.

## Protection

Pipes are supplied:

- black and bare
- oiled internally and externally

Upon request pipes ends are protected with plastic caps

## Marking

Pipes are supplied with marking according to standards and customer requests.

Marking is painted and/or hard stenciled on pipe ends. The same data, as well as additional information according to customer's request, are indicated on the bundle tags.

## Certification

Pipes are supplied with 3.1. inspection certificate, in conformity with EN 10204.



# DIN 2391-1, 2 Seamless precision steel tubes

## Chemical composition

Steel designation	Elements content, %				
	C max	Si max	Mn max	P max	S max
St 52	0.22	0.55	1.60	0.025	0.025

## Mechanical properties at t=20±2°C

Steel designation	Delivery condition							
	BK		BKS			NBK		
	Tensile strength R <sub>m</sub> , N/mm <sup>2</sup>	Elongation A, %	Tensile strength R <sub>m</sub> , N/mm <sup>2</sup>	Yield strength, R <sub>0.2</sub> N/mm <sup>2</sup>	Elongation A, %	Tensile strength R <sub>m</sub> , N/mm <sup>2</sup>	Upper yield strength, R <sub>0.2</sub> N/mm <sup>2</sup>	Percent elongation A, %
	Not less		Not less			Not less		
St 52	640	4	580	420	10	490-630	355	22

Inside diameter, mm	Wall thickness, mm					
	5	6	7,5	10	12,5	15
50						
55						
60						
65						
70						
75						
80						
85						
90						
95						
100						
105						
110						
115						
120						
125						
130						
135						
140						
145						
150						

## Dimensional tolerances

Inside diameter tolerance						
-0,2/-0,50	-0,2/-0,50	-0,4/-0,7	-0,25/-0,55	0,3/-0,7	-0,5/-1,0	-0,5/-0,9

Pipes can be supplied with tolerances according to customer request.

## Length supplied

- random from 4.5 up to 12 meters
- fixed within the random length range

## Concentricity

The following concentricity values are guaranteed:

OUTSIDE DIAMETER	CONCENTRICITY, NOT MORE THAN, %
≤ 125 mm	5
> 125 mm	7

Concentricity is measured according to the formula:

(WTmax - WTmin)

(WTmax + WTmin)

Where  $WT_{max}$  and  $WT_{min}$  are understood to be measured on the same tube cross-section.

## Ovality

Ovality is guaranteed within the diameter tolerances.

## Straightness

Local deviation from straight line max 1mm per each meter length.

Total deviation from straightness:

max 3.5 mm for tubes with lengths of less than 6 m; for tubes with lengths greater than 6 m, the tolerance will be increased by 0.5 mm for each 1 m over 6 m.

## Protection

Pipes are supplied:

- black and bare
- oiled internally and externally

Upon request pipes ends are protected with plastic caps.

## Marking

Pipes are supplied with marking according to standards and customer requests.

Marking is painted and/or hard stenciled on pipe ends. The same data, as well as additional information according to customer's request, are indicated on the bundle tags.

## Certification

Pipes are supplied with 3.1. inspection certificate, in conformity with EN 10204.

# BEARING TUBES

## Chemical composition

100Cr6								
C	Si	Mn	Cr	P	S	Mo	Cu	Al
0.93-	0.15-	0.25-	1.35	Not more then				
1.05	0.35	0.45	1.60	0.025	0.015	0.10	0.30	0.050
Tolerances - C +/-0.03%, Si +/-0.03%, Mn +/-0.04%, P,S +0.005%, Cr +/-0.05%, Mo +/-0.03%, Al +0.010%, Cu +0.03%, O - max 0.0015%.								

## Macro-inclusions

The content of macro-inclusions shall not exceed a length of 2.5 mm per dm² as measured by the blue fracture test. The maximum length for a single inclusion shall not exceed 3 mm.

## Micro-inclusions

Heat check according to ISO 4967:1998 (E), Method A.  
The micro-inclusion rating can be made on the sample of bar with a reduction ratio of minimum 1:10 or maximum 1:60 for continuously cast material.  
The micro-inclusion rating shall not exceed the limits specified below.

Inclusion type	Thin	Heavy
A	2.0	1.5
B	1.5	0.5
C	0.0	0.0
D	1.0	0.5
DS		1.5



## Microstructure

In accordance to SEP 1520

## Pearlite amount

PA ≤ 3.0.

## Carbide size

2.1 to 2.3.

## Carbide network

4.2 or 5.2 maximum respectively

## Carbide segregation

6.2 and 7.3 maximum respectively

## Hardness

Hot-rolled tubes:

170 - 210 HBS, according to ISO 6506-1:1999

Cold rolled tubes:

250 - 320 HBS, according to ISO 6506-1:1999

## Decarburization:

Hot rolled tubes // Pilled external surface

Internal surface – max. 0,5 mm. External surface – 0 mm.

Hot rolled tubes // Not Pilled

Internal surface – max. 0,5 mm. External surface – 0,5 mm.

Cold rolled tubes // Internal surface – max. 0,3 mm External surface – max. 0,4 mm.

## Hot rolled tubes size range:

Outside diameter	Wall thickness, mm																						
	8,0-9,0	9,1-10,0	10,1-11,0	11,1-13,0	13,1-15,0	15,1-17,0	17,1-19,0	19,1-21,0	21,1-23,0	23,1-25,0	25,1-27,0	27,1-29,0	29,1-30,0	30,1-31,0	31,1-32,0	32,1-33,0	33,1-34,0	34,1-35,0	35,1-36,0	36,1-37,0	37,1-38,0		
80,1-90,0																							
90,1-100,0																							
100,1-110,0																							
110,1-120,0																							
120,1-130,0																							
130,1-140,0																							
140,1-150,0																							
150,1-160,0																							
160,1-170,0																							
170,1-183,0																							

## Cold rolled tubes size range:

Outside diameter	Wall thickness, mm					
	4,5-5,0	5,1-7,0	7,1-9,0	9,1-11,0	11,1-13,0	13,1-15,0
36,0-40						
40,1-50						
50,1-60						
60,1-70						
70,1-81,2						

Note:

Pipes less than 36 mm outside diameter can be produced upon agreement with the mill



## Dimensional tolerances

### Diameter

Hot rolled filled tubes:  $-0/+0,2$  mm  
Hot rolled unfilled tubes:  $-/+1\%$   
Cold rolled tubes:  $-0/+0,40$  mm

### Wall Thickness

Hot rolled tubes:

Dimension / Wall thickness	Tolerance (mm)
OD/WT < 11	$-0/+15\%$
OD/WT = 11-12,5	$-0/+20\%$
OD/WT > 12,5	$-0/+25\%$

Cold rolled tubes:  $-0/+12\%$  or to be agreed between customer and producer.

### Straightness

Any deviation from a straight line must not exceed  $0.001 \times$  the measured length.  
The measured length must be minimum 1000 mm.

### Out-of-roundness

Maximum 80% of the OD tolerance range.

### Protection

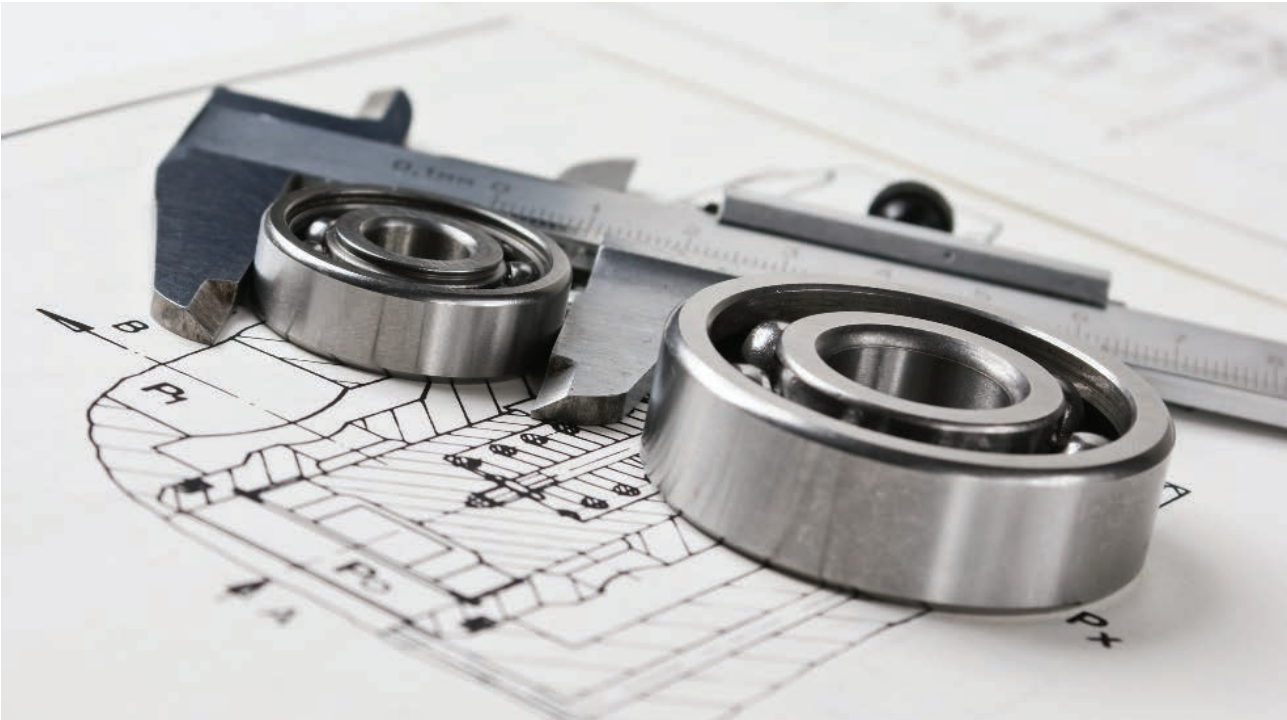
Pipes are supplied:  
- black and bare  
- oiled internally and externally  
Upon request pipes ends are protected with plastic caps.

### Marking

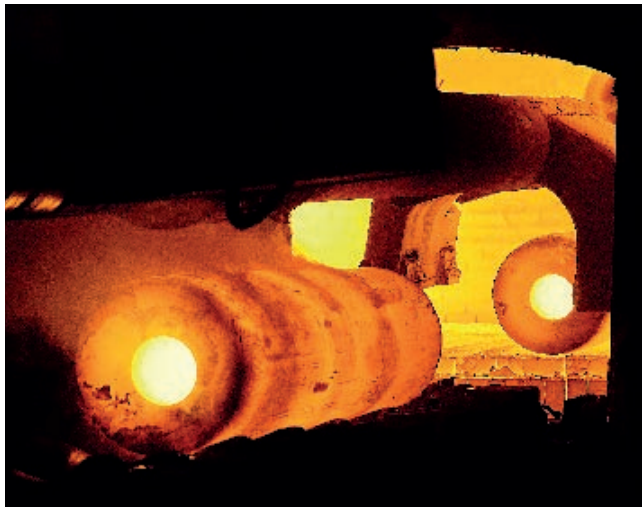
Pipes are supplied with marking according to standard and customer request.  
Marking is paint and/or hard stenciled on the ends of pipes. The same data, as well as additional information per customer's request, is indicated on the bundle's tags.

### Certification

Pipes are supplied with 3.1. inspection certificate, in conformity with EN 10204.









**Interpipe Europe**

Via San Salvatore 13 - P.O. Box 745  
CH-6902 Paradiso - Lugano, Switzerland  
Tel.: **+41 91 261 39 00**  
Fax: **+41 91 261 39 01**  
E-mail: **info@eu.interpipe.biz**

**Interpipe Central Trade**

Corneliusstrasse 34,  
60325 Frankfurt-am-Main, Germany  
Tel.: **+49 695 050 25 850**

**Interpipe Middle East**

Office №: LB191008, P.O. Box 262810,  
Jebel Ali, Dubai - UAE  
Tel.: **+971 4 885 7411**  
Fax: **+971 4 885 7412**  
E-mail: **info@ae.interpipe.biz**

**North American Interpipe**

1800 West Loop South, Suite 1350,  
Houston, Texas, 77027 - USA  
Tel.: **+1 713 333 0333**  
Fax: **+1 713 333 0330**  
E-mail: **info@us.interpipe.biz**

**Interpipe M**

10, Presnenskaya naberezhnaya  
123317 Moscow, Russia  
Tel.: **+7 495 933 29 29**  
Fax: **+7 495 933 29 27**  
E-mail: **info@ru.interpipe.biz**

**Interpipe Ukraine**

1A, Pysarzhevskogo street  
49000 Dnepropetrovsk, Ukraine  
Tel.: **+380 56 736 60 06**  
Fax: **+380 562 389 482, 389 580**  
E-mail: **info@ua.interpipe.biz**  
**www.interpipe.biz**