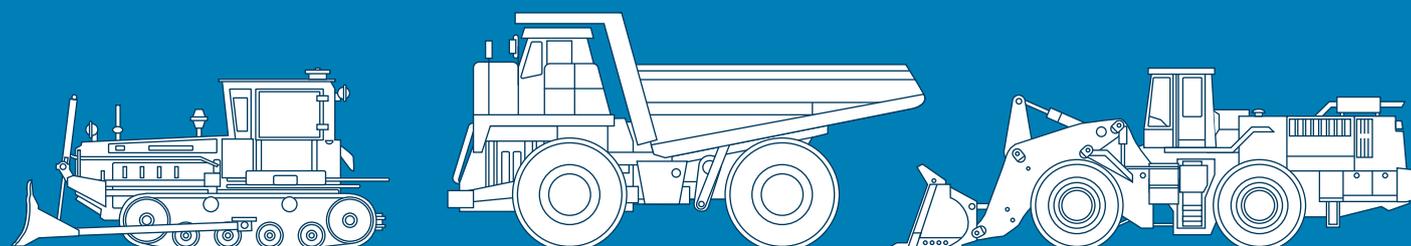




INTERPIPE

EXPERT PIPE SOLUTIONS FOR MECHANICAL ENGINEERING

MECHANICAL PIPES





Bringing machines to life

Just imagine today's life without energy...no lighting, no mechanisms, no electricity...Impossible! Energy is a cornerstone of 21st century and when we say energy we always mean mechanical engineering. Our customers whether involved in automotive or power generation, mining or shipbuilding industries are experts in the use of energy. They apply principles of energy to bring machines to life.

Working in close tandem with our customers, we have created a product designed to meet their specific needs. Understanding the production process and peculiarities of machine building companies, we can anticipate and respond to their ever changing needs and develop products that satisfy these new requirements.

We are focused on direct business with end-customers, i.e. business-to-business. That is why we are constantly improving our services, reducing delivery times and creating efficient channels of communication between Interpipe and its clients.

We do not only justify clients' expectations, we exceed them.

**Vera Smal,
Director of Tubular Sales
for Europe and Ukraine**

CONTENT

1 Mechanical pipes

- | | | |
|-----|----------------------|--|
| 1.1 | EN 10297 - 1 | Seamless circular steel tubes for mechanical and general engineering purposes. |
| 1.2 | EN 10294 - 1 | Hollow bars for machining: Non-alloy and alloy steels. |
| 1.3 | EN 10210 - 1, 2 | Hot finished structural hollow sections of non-alloy and fine grain steels. |
| 1.4 | EN 10220, DIN 1629 | Seamless circular tubes of non-alloy steels with special quality requirements. |
| 1.5 | EN 10220, DIN 1630 | Seamless circular tubes of non-alloy steels with very high quality requirements. |
| 1.6 | ASTM A 519 | Seamless Carbon and Alloy Steel Mechanical Tubing. |
| 1.7 | GOST 8731, GOST 8732 | Seamless hot-rolled steel tubes. |
| 1.8 | GOST 23270 | Hollow bars for mechanical applications. |
| 1.9 | GOST 8733, GOST 8734 | Seamless cold-rolled steel pipes. |

2 Precision steel tubes

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

3 Bearing tubes

- | | | |
|-----|--|----------------------------|
| 3.1 | | Bearing hot-rolled tubes. |
| 3.2 | | Bearing cold-rolled tubes. |

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.

Companies producing machinery use our 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 - one of the top ten largest manufacturers of seamless pipes in the world. In 2013 the company sold over 1 million tons of steel pipes.

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 Dnipropetrovsk region, one of the major industrial centers of Ukraine. The company continues to invest heavily in the development and modernization of its mills.

Interpipe has a vertically integrated business structure which includes 5 high efficient mills. Such structure allows controlling product quality at every stage: from manufacturing of raw materials to delivery of final products to customers.

Interpipe Vtormet Dnepropetrovsk, Ukraine



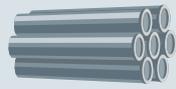

SCRAP PROCESSING

Interpipe Steel Dnepropetrovsk, Ukraine




STEEL PRODUCTION

Interpipe NTRP Dnepropetrovsk, Ukraine Interpipe Niko Tube Nikopol, Ukraine Interpipe NMPP Novomoskovsk, Ukraine

SEAMLESS STEEL PIPES AND RAILWAY WHEEL PRODUCTION

Selling to customers globally - key markets

 North American Interpipe	 Interpipe Middle East	 Interpipe Kazakhstan
 Interpipe Europe SA	 Interpipe M	 Interpipe Ukraine



PIPE PRODUCTS FOR DIVERSE APPLICATIONS

When 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' obtainment 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: Tour 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, NF A 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 is the basic document determining 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

In our business, investments play a crucial role in making decisions on the Company's future. Interpipe regularly invests in development of its production capacities, improvement of the output quality, and expansion of its product range. Currently we are carrying out a major investment program that will reinforce the Company's vertical integration, boost our capacity in production of high quality products, and enhance our operating efficiency in pipe and wheel production.

Interpipe Steel – state-of-the-art steel melting facility

In 2012 Interpipe commissioned an innovative electric steel melting facility Interpipe Steel. Its leading technology, labor conditions, and environmental protection standards, ensure that it represents a new phase in the industry. Total volume of investments in the mill amount to 700 million US dollars.

The turn-key construction of the mill has been carried out by Danieli Company – global leader in metallurgical equipment manufacturing. Danieli ensures the design, manufacturing, delivery, and assembly of the principal technological and ancillary equipment, buildings and communications of the new mill.

Interpipe Steel is the key project for Interpipe, designed to provide the Company's pipe and wheel production with its own steel billets. When the mill reaches its designed capacity rate of 1.32 million tons a year, the self-sufficiency in billets for Interpipe seamless pipes' production will rise to 90%.

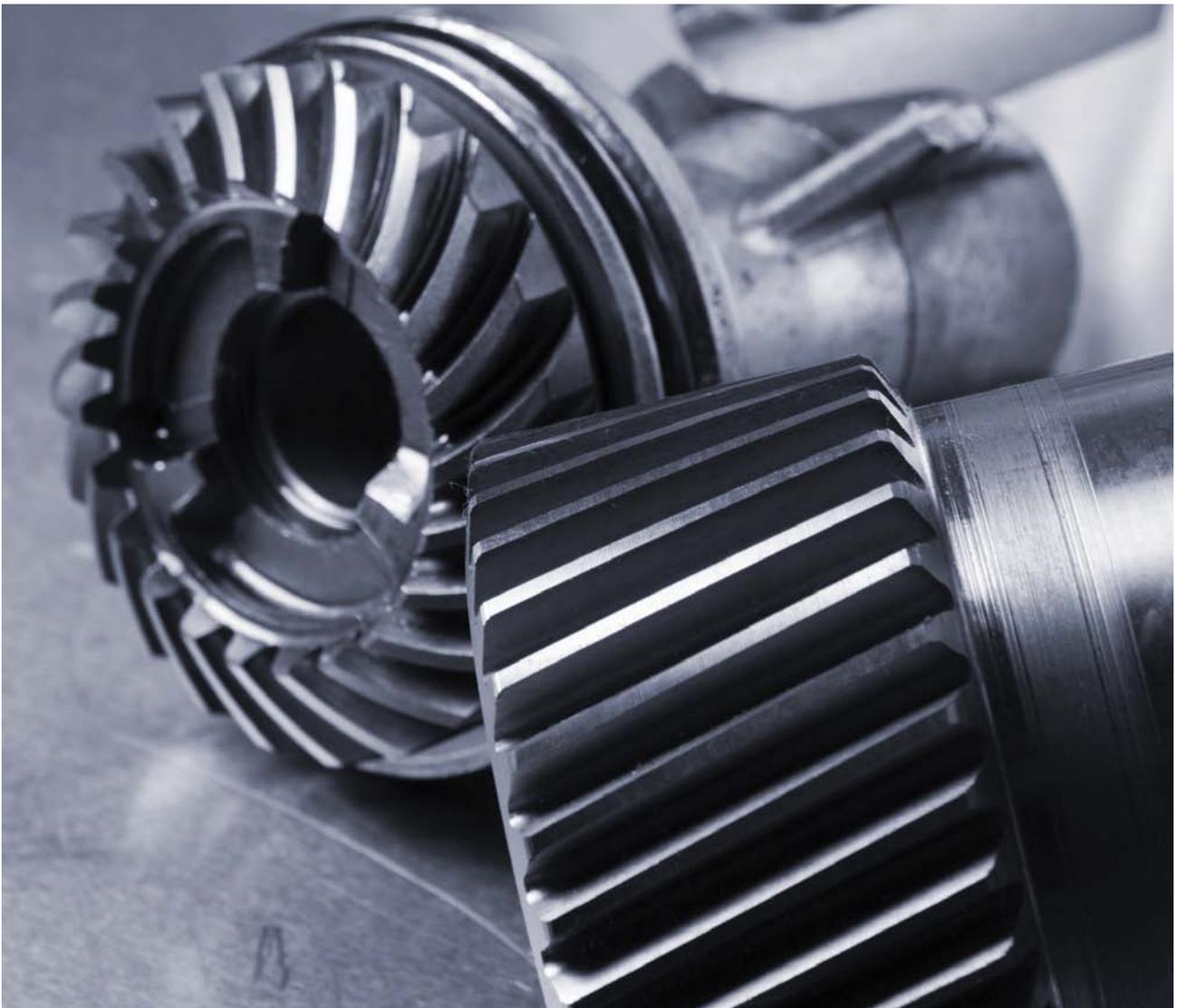


SEAMLESS PIPES FOR MECHANICAL APPLICATIONS EN 10297-1

Seamless circular steel tubes for mechanical and general engineering purposes

Chemical composition

Steel grade	Elements content, %												
	C	Si	Mn	P	S	Cr	Mo	Ni	Al	Cu	N	Nb	V
E235	≤0,17	≤0,35	≤1,2	≤0,030	≤0,035								
E275	≤0,21	≤0,35	≤1,4	≤0,030	≤0,035								
E315	≤0,21	≤0,30	≤1,5	≤0,030	≤0,035								
E355	≤0,22	≤0,55	≤1,6	≤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	≤0,4	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	≤0,5	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	≤0,6	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	≤0,5	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
25CrMo4	0,22-0,29	≤0,4	0,6-0,9	≤0,035	≤0,035	0,9-1,2	0,15-0,30						
34CrMo4	0,30-0,37	≤0,4	0,6-0,9	≤0,035	≤0,035	0,9-1,2	0,15-0,30						
42CrMo4	0,38-0,45	≤0,4	0,6-0,9	≤0,035	≤0,035	0,9-1,2	0,15-0,30						



Mechanical properties

Steel grade	Delivery condition	Yield strength, R_{eH} , N/mm ²			Tensile strength R_m , N/mm ²			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	<16	16< T_n ≤40	40< T_n ≤65	Longitudinal direction	Transverse direction	Longitudinal direction	Transverse direction		
		Not less											
E235	+AR or +N	235	225	215	360	360	360	25	23		-		
E275	+AR or +N	275	265	255	410	410	410	22	20		-		
E315	+AR or +N	315	305	295	450	450	450	21	19		-		
E355	+AR or +N	355	345	335	490	490	490	20	18		-		
E470	+AR	470	430	-	650	600	-	17	15		-		
E275K2	+N	275	265	255	410	410	410	22	20	40	27		
E355K2	+N	355	345	335	490	490	470	20	18	40	27		
E420J2	+N	420	400	390	600	560	530	19	17	27	20		
E460K2	+N	460	440	430	550	550	550	19	17	40	27		
E590K2	+QT*	590	540	-	700	650	-	16	14	40	27		
E730K2	+QT*	730	670	-	790	750	-	15	13	40	27		

Note:

* - at +QT conditions pipes with outside diameter ≥ 100 mm and wall thickness ≤ 28 mm can be produced.

Steel grade	Delivery condition	Yield strength, R_{eH} , N/mm ²				Tensile strength R_m , N/mm ²				Elongation A, %						Impact test, KV, J Test temperature +20°C						
		Wall thickness T_n , mm																				
		<8	8< T_n ≤20	20< T_n ≤50	50< T_n ≤80	<8	8< T_n ≤20	20< T_n ≤50	50< T_n ≤80	<8		8< T_n ≤20		20< T_n ≤50								
		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

Outside diameter	Wall thickness																													
	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	16,0	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	
33,7																														
38,0																														
42,4																														
48,3																														
51																														
57																														
60,3																														
63,5																														
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																														

Dimensional tolerances

Outside diameter, mm	Permissible deviation of Outside Diameter	Permissible deviation of Wall Thickness for WT/OD		
		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
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 _{0.2} , N/mm ²				Tensile strength R _m , N/mm ²				Elongation A, %	Impact test, KV, J Test temperature -20°C
		Wall thickness T _n , mm				Wall thickness T _n , mm					
		<16	16<T _n ≤25	25<T _n ≤40	40<T _n ≤50	<16	16<T _n ≤25	25<T _n ≤40	40<T _n ≤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

Note:

* - at +QT conditions pipes with outside diameter ≥100 mm and wall thickness ≤ 28 mm can be produced.

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 (mm)	Wall thickness, mm																			
	7	8	9	10	11	12	14,2	16	17,5	20	22,2	25	28	30	32	36	40	45	50	
82,5																				
83,9																				
101,6																				
108																				
114,3																				
127																				
133																				
139,7																				
152,4																				
159																				
168,3																				
177,8																				
193,7																				
203,0																				

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

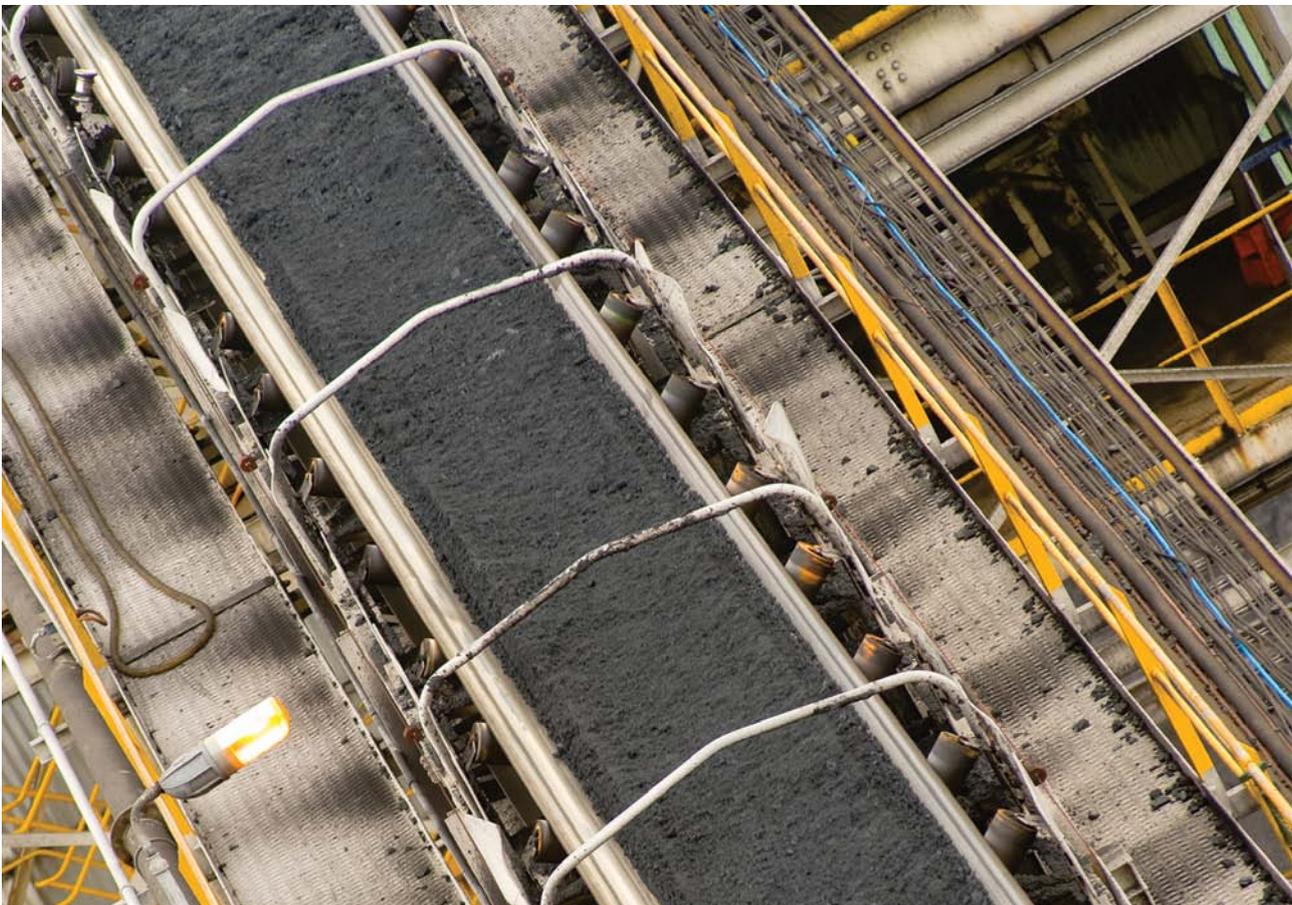
Hot finished structural hollow section of non-alloy and fine grain steels

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
S235JRH	0,17	0,20	-	1,40	0,040	0,040	0,009	0,37	0,39	0,41
S275JOH	0,20	0,22	-	1,50	0,035	0,035	0,009	0,41	0,43	0,45
S275J2H	0,20	0,22	-	1,50	0,030	0,030	-	0,41	0,43	0,45
S355JOH	0,22	0,22	0,55	1,60	0,035	0,035	0,009	0,45	0,47	0,50
S355J2H	0,22	0,22	0,55	1,60	0,030	0,030	-	0,45	0,47	0,50
S355K2H	0,22	0,22	0,55	1,60	0,030	0,030	-	0,45	0,47	0,50

Mechanical properties

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



Outside diameter, mm	3,2	4,0	5,0	6,3	8,0	10,0	12,5	14,2	16,0	20,0	25,0	30,0	32,0	36,0	40,0	45,0	50,0	55,0	60,0	65,0
33,7																				
42,4																				
48,3																				
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229,0																				
244,5																				
254,0																				
267,0																				
273,0																				
323,9																				
355,6																				
368,0																				

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.

EN 10220, DIN 1629

Seamless circular tubes of non-alloy steels with special quality requirements

Chemical composition

Steel grade	Elements content, %						
	C	Mn	Si	S	P	N*	Al
	Not more						
St 37.0	0.17	-	-	0.040	0.040	0,009	-
St 44.0	0.21	-	-	0.040	0.040	0.009	-
St 52.0	0.22	1.60	0.55	0.040	0.035	-	≥0.02

Note:

Exceeding the specified Nitrogen content exceeding is possible if for every 0,001% of Nitrogen the Phosphorus content goes down by 0,005 % from the specified value, but not more than 0,012% in heat analysis.



Mechanical properties

Steel grade	Yield strength, R_{eH} , N/mm ² For wall thickness, mm			Tensile strength R_m , N/mm ²	Elongation A, %	
	≤16	>16≤40	>40≤65		Longitudinal direction	Transverse direction
	Not less				Not less	
St 37.0	235	225	215	350-480	25	23
St 44.0	275	265	255	420-550	21	19
St 52.0	355	345	335	500-650	21	19

Hot-rolled

Outside diameter, mm	3,2	3,6	4,0	5,0	6,3	8,0	10,0	12,5	14,2	16,0	20,0	25,0	30,0	32,0	36,0	40,0	45,0	50,0	55,0	60,0	65,0	
33,7																						
42,4																						
48,3																						
60,3																						
76,1																						
88,9																						
101,6																						
114,3																						
139,7																						
168,3																						
177,8																						
193,7																						
219,1																						
244,5																						
273,0																						
323,9																						
355,6																						

Dimensional tolerances

Outside diameter, mm	Outside diameter permissible deviation
Up to 100	± 1 % (but not less than ±0.5 mm)
Above 100 up to 200	± 1 %
Above 200	± 1 %

Wall thickness permissible deviation								
For OD up to 130 mm			For OD above 130 mm and up to 320 mm and wall thickness S			For OD above 320 mm		
+ 15%	+ 12.5%	±9%	+ 17.5%	+ 15%	±12.5%	+ 20%	+ 15%	+ 12.5%
- 10%	- 10%		- 12.5%	- 10%		- 15%	- 12.5%	- 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 10220, DIN 1630

High-performance seamless circular unalloyed steel pipes

Chemical composition

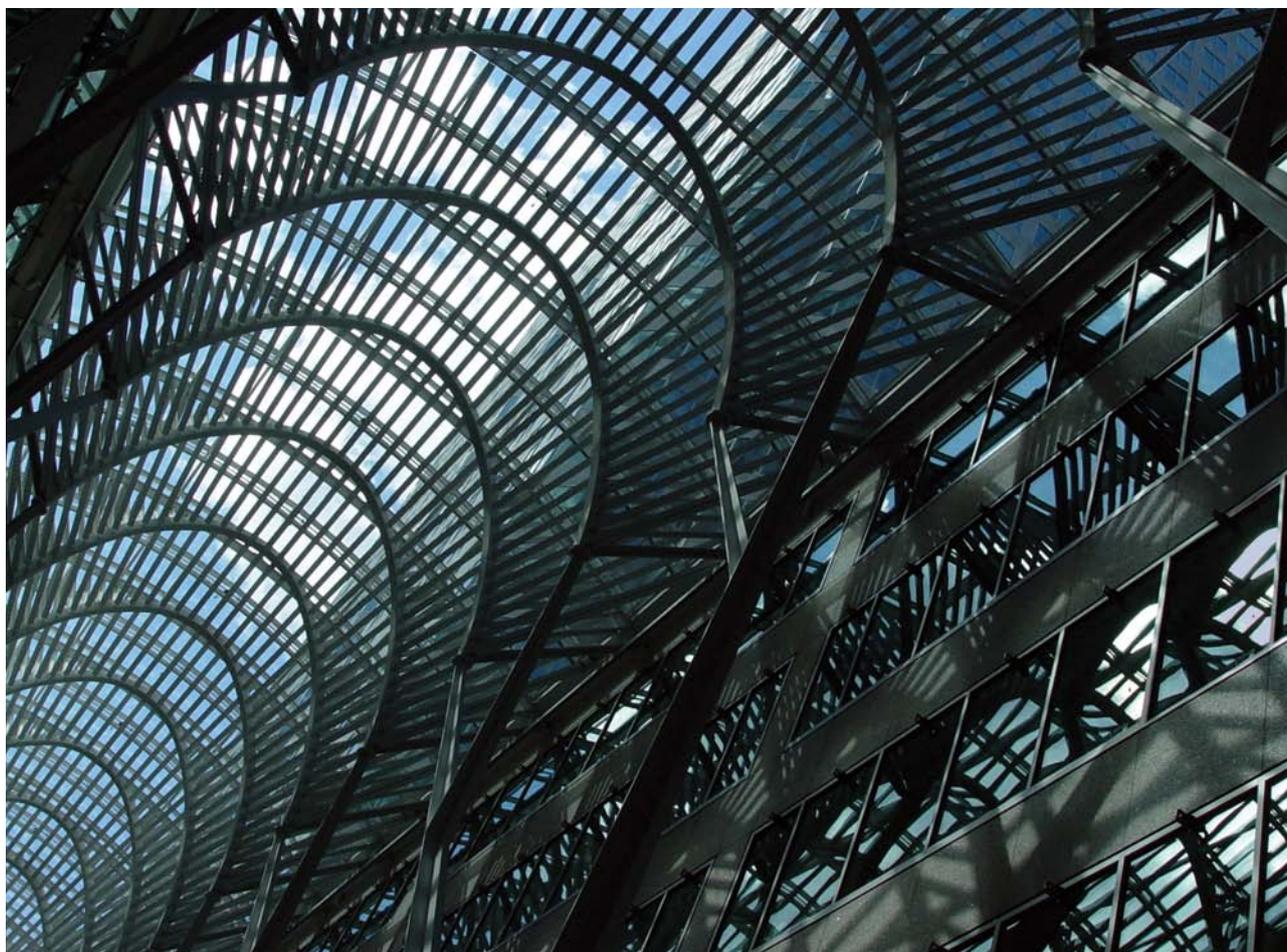
Steel grade	Elements content, %					
	C	Si	S	P	Mn	Al
	Not more					
St 37.4	0.17	0,35	0.040	0.040	≥0.35	≥0.02
St 44.4	0.20	0,35	0.040	0.040	≥0.40	≥0.02
St 52.4	0.22	0.55	0.040	0.035	≤1.60	≥0.02

Mechanical properties

Steel grade	Yield strength, R_{eH} , N/mm ² For wall thickness, mm			Tensile strength R_m , N/mm ²	Elongation A, %		Impact test, KV, J Test temperature +20°C	
	≤16	>16≤40	>40≤65		l	t	l	t
	Not less				Not less		Not less	
St 37.4	235	225	215	350-480	25	23	43	27
St 44.4	275	265	255	420-550	21	19	43	27
St 52.4	355	345	335	500-650	21	19	43	27

Note:

l – Longitudinal sample, t- transverse sample.



Outside diameter, mm	3,2	3,6	4,0	5,0	6,3	8,0	10,0	12,5	14,2	16,0	20,0	25,0	30,0	32,0	36,0	40,0	45,0	50,0	55,0	60,0	65,0	
33,7																						
42,4																						
48,3																						
60,3																						
76,1																						
88,9																						
101,6																						
114,3																						
139,7																						
168,3																						
177,8																						
193,7																						
219,1																						
244,5																						
273,0																						
323,9																						
355,6																						

Dimensional tolerances

Outside diameter, mm	Outside diameter permissible deviation	
	Pipe body	Pipe ends (100 mm from pipe end)
≤ 100	± 1% (not less than ±0,5 mm)	± 0,4 mm
100 < D ≤ 200	± 1%	± 0,5 %
> 200	± 1%	± 0,6 % (Permissible deviation might be referred to inside diameter upon agreement, but should take into account wall thickness deviation)

Wall thickness permissible deviation								
For OD up to 130 mm			For OD above 130 mm and up to 320 mm and wall thickness S			For OD above 320 mm		
WT up to 2 Sn	WT above 2 Sn up to 4 Sn	WT above 4 Sn	WT up to 0.05 D	WT above 0.05 D up to 0.11 D	WT above 0.11D	WT up to 0.05 D	WT above 0.05 D up to 0.9 D	WT above 0.9 D
+ 15% - 10%	+ 12.5 % 10 %	± 9 %	+ 17.5 % - 12.5 %	± 12.5 %	± 10 %	+ 20 % - 10 %	+ 15 % - 12.5 %	+ 12.5% - 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.

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



Wall thickness		0,280	0,310	0,350	0,390	0,430	0,470	0,555	0,620	0,688	0,780	0,870	0,980	1,102	1,181	1,250	1,410	1,570	1,771	1,968
inch	OD (mm)	7	8	9	10	11	12	14,2	16	17,5	20	22,2	25	28	30	32	36	40	45	50
3,250'	82,5																			
3,300'	83,9																			
4,000'	101,6																			
4,250'	108																			
4,500'	114,3																			
5,000'	127																			
5,250'	133																			
5,500'	139,7																			
5,980'	152,4																			
6,250'	159																			
6,610'	168,3																			
7,000'	177,8																			
7,630'	193,7																			
8,000'	203,0																			

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 up to 2.999 (76.19)	OD = 3.000 (76.20) - 5.999 (152.37)	OD = 6.00 (152.40) - 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 8731-74, GOST 8732-78

Seamless hot-rolled steel tubes

Chemical composition

Steel Grade	Elements content, %				S, P	Cu	Mo	Ni	Al
	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	0.07-0.15	0.17-0.37	1.20-1.60	-					
20G	0,17-0,24	0,17-0,37	0,70-1,00	-					
50G	0,48-0,56	0,17-0,37	0,70-1,00	-					
20H	0.17-0.23	0.17-0.37	0.50-0.80	0.70-1.00					
40H	0.36-0.44	0.17-0.37	0.50-0.80	0.80-1.10					
30HGSA	0,28-0,34	0,90-1,20	0,80-1,10	0,80-1,10					
15HM	0.11-0.18	0.17-0.37	0.40-0.70	0.80-1.10					
30HMA	0,26-0,34	0,17-0,37	0,40-0,70	0,80-1,10			0,15-0,25		
12HN2	0,09-0,16	0,17-0,37	0,30-0,60	0,60-0,90				1,50-1,90	
09G2S	≤0,12	0,50-0,80	1,30-1,70	≤0,30					
32HA	0.32- 0.35	0.17- 0.37	0.55-0.85	1.00-1.10	≤0.025	≤0.20		≤0.20	≥ 0.02

Mechanical properties

Grade designation	Tensile strength, σ_y , kgs/mm ² (MPa)	Yield strength, σ_y , kgs/mm ² (MPa)	Elongation, δ_5 , %	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	48 (470)	27 (265)	21	4,3	197
20G	46 (450)	28 (275)	24	4,5	179
50G	66 (650)	40 (390)	13	4,0	229
20H	44 (431)	29(284)	16	4,5	179
40H	67 (657)	36 (352)	9	3,7	269
30HGSA	70 (686)	41 (402)	11	4,0	229
15HM	44 (431)	23 (226)	21	4,5	179
30HMA	60 (588)	40 (392)	13	4,0	229
12HN2	55 (539)	40 (392)	14	4,2	207



Grade designation	Tensile strength, σ_b , MPa	Yield strength, σ_r , MPa	Percent elongation, δ_5 , %	Impact work, KCU, J/sm ²			
				Longitudinal direction			
				t=20°C	t=-40°C	t=-70°C	t=-60°C
Not less than							
09Г2С	450	325	21	59	39	29	29

Grade designation	Tensile strength, σ_B , MPa	Yield strength, σ_T , MPa	Percent elongation, δ_5 , %	Necking, Ψ , %	Impact work, KV, J, t=-20°C	Hardness, HB
	Not less than					
32XA*	830	730	12	40	27	269-311

Note:

* - Mechanical properties after quenching and tempering. Quenched and tempered pipes with outside diameter ≥ 100 mm and wall thickness ≤ 28 mm can be produced. Mechanical properties of pipes with other dimensions are defined on heat-treated samples.

Outside diameter, mm	Wall thickness																							
	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
32,0																								
33,7																								
38,0																								
42,0																								
42,4																								
45,0																								
48,3																								
50,0																								
51,0																								
57,0																								
60,0																								
60,3																								
63,5																								
70,0																								
73																								
76																								
83																								
89																								
95																								
102																								
108																								
114																								
121																								
127																								
133																								
140																								
146																								
152																								
159																								
168																								
180																								
194																								
203																								
219																								
245																								
273																								
299																								
325																								
351																								
356																								
377																								

Outside diameter, mm	Wall thickness																							
	19	20	22	24	25	26	28	30	32	34	35	36	38	40	42	45	48	50	56	60	63	65	70	
32,0																								
33,7																								
38,0																								
42,0																								
42,4																								
45,0																								
48,3																								
50,0																								
51,0																								
57,0																								
60,0																								
60,3																								
63,5																								
70,0																								
73																								
76																								
83																								
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102																								
108																								
114																								
121																								
127																								
133																								
140																								
146																								
152																								
159																								
168																								
180																								
194																								
203																								
219																								
245																								
273																								
299																								
325																								
351																								
356																								
377																								

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					
20H	0.17-0.23	0.17-0.37	0.50-0.80	0.70-1.00					
40H	0.36-0.44	0.17-0.37	0.50-0.80	0.80-1.10					
09G2S	≤0,12	0,50-0,80	1,30-1,70	≤0,30					

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 23270-89

Tube-billets 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	0.07-0.15	0.17-0.37	1.20-1.60	-					
20G	0,17-0,24	0,17-0,37	0,70-1,00	-					
50G	0,48-0,56	0,17-0,37	0,70-1,00	-					
20H	0.17-0.23	0.17-0.37	0.50-0.80	0.70-1.00					
40H	0.36-0.44	0.17-0.37	0.50-0.80	0.80-1.10					
30HGSA	0,28-0,34	0,90-1,20	0,80-1,10	0,80-1,10					
15HM	0.11-0.18	0.17-0.37	0.40-0.70	0.80-1.10					
30HMA	0,26-0,34	0,17-0,37	0,40-0,70	0,80-1,10			0,15-0,25		
12HN2	0,09-0,16	0,17-0,37	0,30-0,60	0,60-0,90				1,50-1,90	
09G2S	≤0,12	0,50-0,80	1,30-1,70	≤0,30					
32HA	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	0.35-0.42	0.20-0.45	0.30-0.60	1.35-1.65					



GOST 8733-74, GOST 8734-75

Seamless cold-formed steel tubes

Chemical composition

Steel Grade	Elements content, %					
	C, %	Si, %	Mn, %	Cr, % not more than	Mo	Ni
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	0.07-0.15	0.17-0.37	1.20-1.60	-		
20G	0,17-0,24	0,17-0,37	0,70-1,00	-		
50G	0,48-0,56	0,17-0,37	0,70-1,00	-		
20H	0.17-0.23	0.17-0.37	0.50-0.80	0.70-1.00		
40H	0.36-0.44	0.17-0.37	0.50-0.80	0.80-1.10		
30HGSA	0,28-0,34	0,90-1,20	0,80-1,10	0,80-1,10		
15HM	0.11-0.18	0.17-0.37	0.40-0.70	0.80-1.10		
30HMA	0,26-0,34	0,17-0,37	0,40-0,70	0,80-1,10	0,15-0,25	
12HN2	0,09-0,16	0,17-0,37	0,30-0,60	0,60-0,90		1,50-1,90
09G2S	≤0,12	0,50-0,80	1,30-1,70	≤0,30		

Mechanical properties

Grade designation	Tensile strength, σ_b , kgs/mm ² (MPa)	Yield strength, σ_s , kgs/mm ² (MPa)	Elongation, δ_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	48 (470)	27 (265)	21	4,3	197
20G	46 (450)	28 (275)	24	4,5	179
50G	66 (650)	40 (390)	13	4,0	229
20H	44 (431)	29(284)	16	4,5	179
40H	67 (657)	36 (352)	9	3,7	269
30HGSA	70 (686)	41 (402)	11	4,0	229
15HM	44 (431)	23 (226)	21	4,5	179
30HMA	60 (588)	40 (392)	13	4,0	229
12HN2	55 (539)	40 (392)	14	4,2	207

Grade designation	Tensile strength, σ_b , MPa	Yield strength, σ_s , MPa	Percent elongation, δ_s , %	Impact work, KCU J/sm ²			
				Longitudinal direction			
				t=20°C	t=-40°C	t=-70°C	t=-60°C
	Not less than						
09Г2С	450	325	21	59	39	29	29

	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	
32																					
34																					
36																					
38																					
40																					
42																					
45																					
48																					
50																					
51																					
53																					
54																					
56																					
57																					
60																					
63																					
65																					
68																					
70																					
73																					
75																					
76																					
80																					

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.

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

Steel tubes for precision applications:
Seamless cold-drawn tubes

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
E410	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

Steel designation	Delivery condition	Yield strength, R _{EH} , N/mm ²	Tensile strength R _m , N/mm ²	Elongation A, %	Impact test, KV, J
		Test temperature, -20°C Longitudinal direction			
Not less than					
E355	+SR	450	580	10	27
E355	+N	355	490-530	22	27
E410	+SR	590	690	12	27
E410	+N	410	550-700	22	27

Inside diameter, mm	Wall thickness					
	5 mm	6 mm	7,5 mm	10 mm	12,5mm	15 mm
50	60	62				
55	65	67	70	75		
60	70	72	75	80	85	
63	73	75	78	83	88	
65	75	77	80	85	90	
70	80	82	85	90	95	
75	85	87	90	95	100	
80	90	92	95	100	105	
85		97	100	105	110	115
90			105	110	115	120
95			110	115	120	125
100			115	120	125	130
105			120	125	130	135
110			125	130	135	140
115			130	135	140	145
120			135	140	145	
125			140	145		

The value inside boxes represents the OD.

Dimensional tolerances

Inside diameter permissible deviation				
-0.20 ÷ -0.45	-0.30 ÷ -0.70	-0.25 ÷ -0.55	-0.40 ÷ -0.70	-0.50 ÷ -0.90

Length supplied

- random from 4.5 up to 12.5 meters
- fixed within the random length range

Concentricity

The following concentricity values are guaranteed:

OUTSIDE DIAMETER	CONCENTRICITY
≤ 125 mm	0.06
> 125 mm	0.07

Concentricity is measured according to the formula:

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

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 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 _m , N/mm ²	Percent elongation A, %	Tensile strength R _m , N/mm ²	Yield strength, R _{EH} , N/mm ²	Necking A, %	Tensile strength R _m , N/mm ²	Upper yield strength, R _{EH} , N/mm ²	Percent elongation A, %
St 52	640	4	580	420	10	490-630	355	22

Inside diameter, mm	Wall thickness					
	5 mm	6 mm	7,5 mm	10 mm	12,5mm	15 mm
50	60	62				
55	65	67	70	75		
60	70	72	75	80	85	
63	73	75	78	83	88	
65	75	77	80	85	90	
70	80	82	85	90	95	
75	85	87	90	95	100	
80	90	92	95	100	105	
85		97	100	105	110	115
90			105	110	115	120
95			110	115	120	125
100			115	120	125	130
105			120	125	130	135
110			125	130	135	140
115			130	135	140	145
120			135	140	145	
125			140	145		

The value inside boxes represents the OD.

Dimensional tolerances

Inside diameter permissible deviation				
-0.20 ± -0.45	-0.30 ± -0.70	-0.25 ± -0.55	-0.40 ± -0.70	-0.50 ± -0.90

Length supplied

- random from 4.5 up to 12.5 meters
- fixed within the random length range

Concentricity

The following concentricity values are guaranteed:

OUTSIDE DIAMETER	CONCENTRICITY
≤ 125 mm	0.06
> 125 mm	0.07

Concentricity is measured according to the formula:

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

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

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- oiled internally and externally

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Marking

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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

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BEARING TUBES

Chemical composition

100Cr6												
C	Si	Mn	Cr	P	S	Mo	Cu	Al	Ti	Ni		
0.93-	0.15-	0.25-	1.35	Not more than								
1.05	0.35	0.45	1.60	0.025	0.015	0.10	0.30	0.050	0.003	0.15		
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

4.3 or 5.3 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:

220 - 320 HBS, according to ISO 6506-1:1999

Decarburization:

Hot rolled tubes // Pilled internal 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. 0,25 mm External surface – max. 0,25 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
82,1-90,0										
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										
170,1-180,0										

Cold rolled tubes size range:

Outside diameter	Wall thickness, mm					
	3,6-5,0	5,1-7,0	7,1-9,0	9,1-11,0	11,1-13,0	13,1-15,0
34,1-40						
40,1-50						
50,1-60						
60,1-70						
70,1-80						
80,1-83						

Dimensional tolerances

Diameter

Hot rolled tubes: $-0/+0,50+0,005 \times \text{Dimension}$

Cold rolled tubes: $-0/+0,40$

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 = $-0/+12\%$

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.

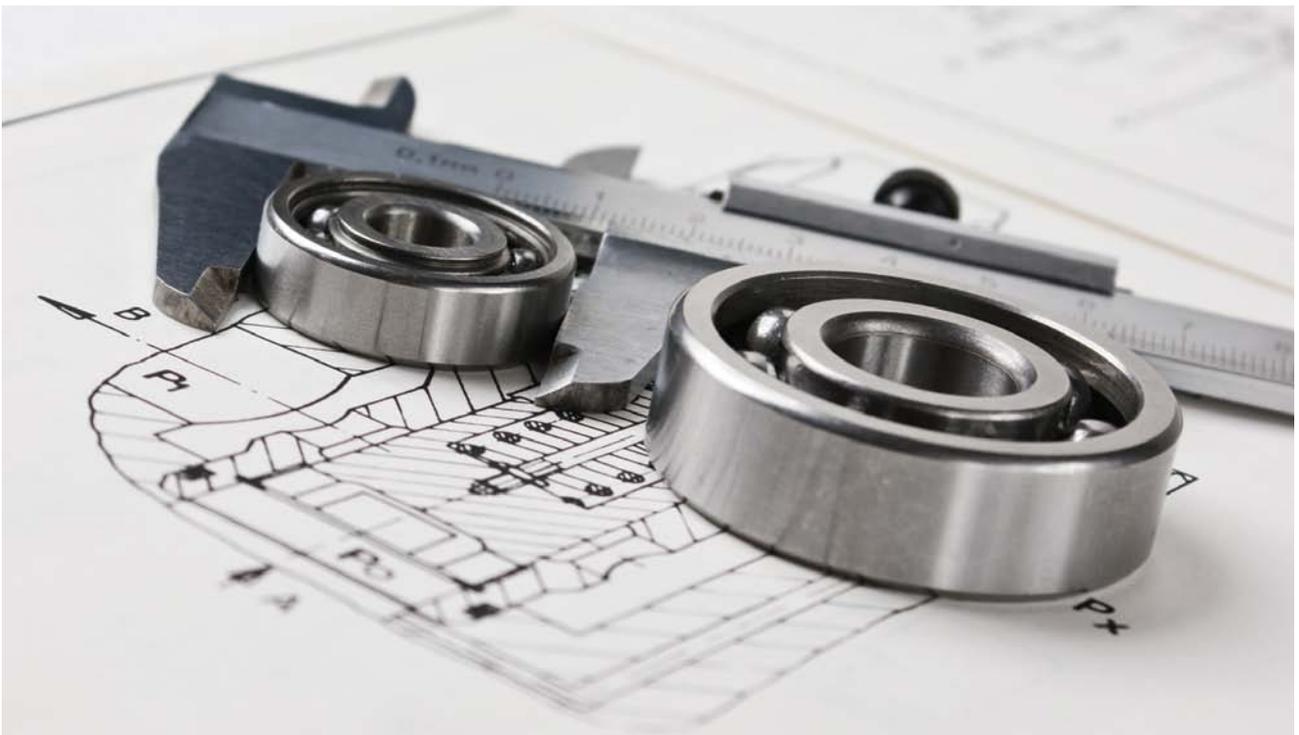
Marking

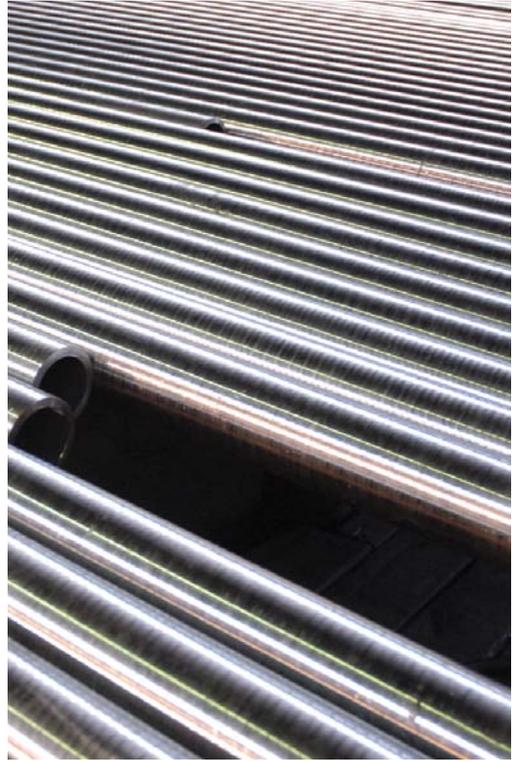
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Marking is paint and/or hard stenciled on the ends of pipes. The same data, as well as additional information per customer's request, is indicated on the bundle's tags.

Certification

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