OSTP – Outokumpu Stainless Tubular Products

Product Catalogue 2012

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Table of contents

Outokumpu in brief

Outokumpu is an international stainless steel company. Our vision is to be the undisputed number one in stainless, with success based on operational excellence.

Customers in a wide range of industries – from the process industry and industrial machinery to the building, construction and electrical industries, transportation, electronics and information technology, as well as catering and household – use our products, technologies and services worldwide. We are dedicated to helping our customers gain a competitive advantage by supplying a wide range of products such as plate, tailor blanks, coil, bar, stainless steel equipment, tubular products as well as technical support.

Outokumpu operates in some 30 countries and employs 6 700 people. In 2010, the Group's sales were EUR 4,23 billion, of which around 95% was generated outside Finland. Group headquarters are located in Espoo, Finland. The parent company, Outokumpu Oyj, has been listed on the Helsinki stock exchange since 1988.

The stainless tubes and fittings operations are organized under the joint-venture between Outokumpu and Tubinoxia:
OSTP – Outokumpu Stainless Tubular Products.

What makes Outokumpu special is total customer focus – all the way from R&D to delivery.
You have the idea! We offer the world´s best stainless steel, technical know-how and support.
We activate your ideas.

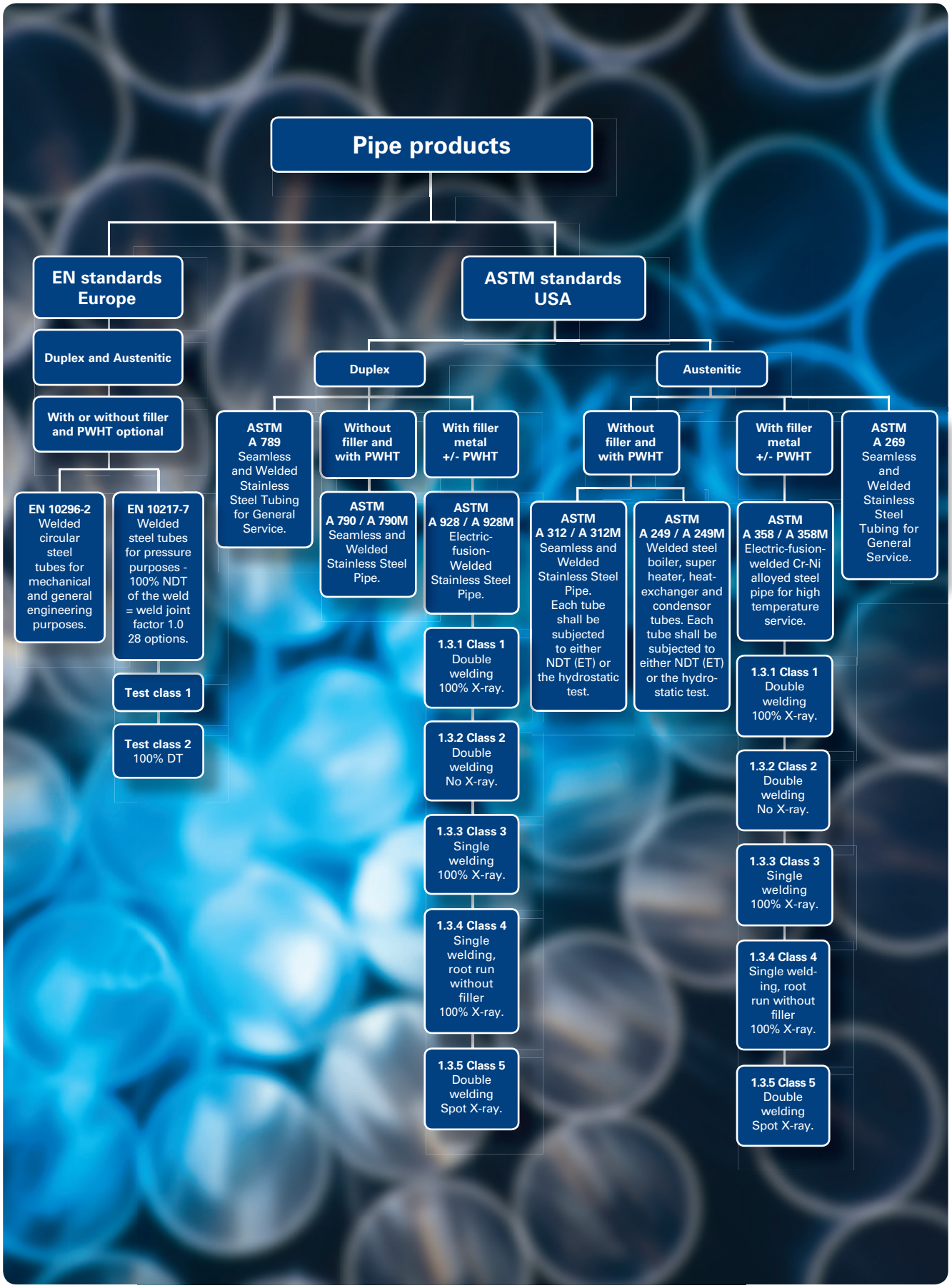
Operational excellence

OSTP focus on providing world class stainless steel process pipe and butt-welded fittings. With a network of distributors in more than 40 countries and modern, cost efficient production lines, OSTP provides clients with world-class knowledge and experience in welded stainless steel Tubes and Fittings.

OSTP is a joint-venture between Outokumpu Group and Tubinoxia. Outokumpu Group offers the broadest range of stainless steel products on the market. We can supply a wide variety of grades, dimensions and surface finishes through our worldwide network of sales offices and service centres.

Product standards

Product standards



Welded tubes and pipes

Europe
EN 10217-7
Welded steel tubes for pressure purposes.
Technical Delivery Conditions – Part 7: Stainless Steel Tubes.

The standard prescribes 100% non-destructive testing. This gives a design utilization of 100%, and a weld factor z = 1.0. Heat treatment may be omitted if agreed. The standard inspection is normally in accordance with EN 10204 3.1. OSTP tubes manufactured according to this standard, can be used in all PED categories. The standard has two test classes, Test Class 1 (TC1) and Test Class 2 (TC2). TC1 is the conventional test class, TC2 is used when specific requirements are demanded.

EN 10296-2
Welded circular steel tubes for mechanical and general engineering purposes.
Technical Delivery Conditions – Part 2: Stainless Steel Tubes.

Non-destructive testing of the weld is not mandatory. This gives a possible design utilization of 70%, and a weld factor z = 0.7. Heat treatment may be omitted if agreed. The standard inspection is normally in accordance with EN 10204 3.1. See additional information on page 76.

USA
Welded pipes
ASTM A 312/A 312M
(M means mm dimension)
Seamless and welded Austenitic stainless steel pipe.

This standard contains analysis regulations and strength requirements. In addition, certain regulations of ASTM A 999 apply as regards inspection and tolerances. The scope of the sampling inspection to be carried out in respect of technological inspection is stated. Hydrostatic or Eddy Current testing is to be carried out as a 100% inspection. Welding is to be without filler material and the pipes are to be heat treated. This gives joint quality factor 0.8.

ASTM A 358/A 358M
Electric-fusion-welded Austenitic chromium-nickel alloy steel pipe for high temperature service.

Pipes are welded with filler material and are sub-classified in categories 1-5, see below.

1.3.1 *Class 1* – Pipe shall be double welded by processes employing filler metal in all passes and shall be completely radiographed.

1.3.2 *Class 2* – Pipe shall be double welded by processes employing filler metal in all passes. No radiography is required.

1.3.3 *Class 3* – Pipe shall be single welded by processes employing filler metal in all passes and shall be completely radiographed.

1.3.4 *Class 4* – Same as Class 3 except that the weld pass exposed to the inside pipe surface may be made without the addition of filler metal (see 6.2.2.1 and 6.2.2.2).

1.3.5 *Class 5* – Pipe shall be double welded by processes employing filler metal in all passes and shall be spot radiographed.

ASTM A 790/A 790 M

Seamless and welded Ferritic/Austenitic stainless steel pipes.
This standard is similar to ASTM A 312, but intended for Duplex grades.

ASTM A 928/A 928M

Ferritic/Austenitic (Duplex) stainless steel pipe electric-fusion-welded with addition of filler metal.

This standard is similar to ASTM A 358, but intended for Duplex grades. Pipes are welded with filler material and are sub-classified in categories 1-5, see below.

1.3.1 *Class 1* – Pipe shall be double welded by processes employing filler metal in all passes and shall be completely radiographed.

1.3.2 *Class 2* – Pipe shall be double welded by processes employing filler metal in all passes. No radiography is required.

1.3.3 *Class 3* – Pipe shall be single welded by processes employing filler metal in all passes and shall be completely radiographed.

1.3.4 *Class 4* – Same as Class 3 except that the weld pass exposed to the inside pipe surface may be made without the addition of filler metal (see 6.2.2.1 and 6.2.2.2).

1.3.5 *Class 5* – Pipe shall be double welded by processes employing filler metal in all passes and shall be spot radiographed.

Welded tubes

ASTM A 249

Welded Austenitic steel boiler, superheater, heat-exchanger and condenser tubes.

ASTM A 269

Seamless and welded Austenitic stainless steel tubing for general service.

ASTM A 789

Seamless and welded Ferritic/Austenitic stainless steel tubing for general service.

Butt weld fittings

Europe

EN 10253-3

Butt-welding pipe fittings. Wrought Austenitic and Austenitic-Ferritic (Duplex) stainless steels without specific inspection requirements. See additional information on page 76.

EN 10253-4

Butt-welding pipe fittings. Wrought Austenitic and Austenitic-Ferritic (Duplex) stainless steels with specific inspection requirements. See additional information on page 76.

OSTP deliver normally Type A fittings as standard. Fittings of Type A have the same wall thickness at the welding ends and in the body of the fitting. Their resistance to internal pressure is less than of a straight pipe with the same dimensions and of the same steel grade. Fittings of Type B have increased wall thickness in the body of the fitting. They will, in general, withstand the same internal pressure as a straight pipe with the same dimensions and of the same steel grade.

USA

ASTM A 774

As-welded wrought Austenitic stainless steel fittings for general corrosive service at low and moderate temperatures.

ASTM A 403

Wrought Austenitic stainless steel piping fittings.

ASTM A 815

Wrought Ferritic, Duplex, martensitic stainless steel piping fittings.

Outokumpu Duralite™ LDX 2101® Piping System

Thinner walls, substantial weight reductions and real cost-savings. End-users now have a complete pipe and fittings program in high-strength LDX 2101® at their disposal. Increased stocks plus short lead-times and simple selection mean that they won't have to wait long to enjoy the benefits of this exceptional material.

Discover the advantages of Outokumpu Duralite™ LDX 2101® Piping System

OSTP now brings the process piping industry a better alternative to standard grade Austenitic pipework installations. Our new Outokumpu Duralite™ LDX 2101® Piping System is durable, corrosion-resistant and cost-effective. The switch from standard grade ISO or ANSI solutions to Outokumpu Duralite™ LDX 2101® is appealing to more and more customers seeking to benefit from its higher material strength compared with 304L / 316L.

For tubes that are loaded with internal pressure, wall thicknesses can be reduced by up to 50%, compared to standard Austenitic grades. Case studies show that this reduction can translate into significant weight reductions in pipe work systems, tanks and pressure vessels. Total installed cost-savings including ongoing maintenance expenses can also be reduced. An excellent grade choice for general pressure applications - storage tanks - water heaters - flexible tubes and construction applications.

Larger stocks, simpler selection, expert assistance

As expectations and demand for Outokumpu Duralite™ LDX 2101® Piping System increase, so have OSTP's stocks. A complete piping and fittings program in the range DN 15 - DN 600 is now available. All standard stock products are 16-bar pressure-rated at 50 °C according to EN 13480-3. Simplifying the product selection process for clients.

All standard stock materials are OD dimensioned according to ISO system, making interchangeability with ANSI systems, simple and practical for virtually all diameters (except DN 65 and DN 125). In addition, our experienced Application Engineers, whose early involvement in project design is appreciated by many end-users, are also ready to assist.

Features and benefits of Outokumpu Duralite™ LDX 2101®

- Good resistance to uniform, pitting and crevice corrosion (PRE 26). LDX 2101® has a better resistance than 1.4307 (304L). Equivalent to 1.4404 (316L) in most cases. In applications where higher corrosion properties are required, we can offer piping products in 2304/2205 (against order).
- Very high (typically R_m 650 MPa and $R_{p0.2}$ 450 MPa) mechanical strength leading to great opportunities for cost savings.
- High resistance to stress-corrosion cracking.
- Low Ni- and Mo-content for price stability.
- Excellent abrasive and erosion resistance.
- Good fatigue properties, weldability and machinability.
- Service temperature range - 40 °C to 250 °C.
- Duplex grades are easy to combine with other stainless steels as well as carbon steels.

An excellent grade choice for general pressure applications - storage tanks - water heaters - flexible tubes and construction applications.

✓ Large assortment of Outokumpu Duralite™ LDX 2101® Piping System Products now in stock
✓ Shorter supply lead times and simpler selection
✓ Thinner walls by up to 50% and substantial weight reductions

Standard stock product range
16-bar pressure rated at 50 °C

Tubes

DN	OD mm	WT mm	Kgs/m	Bar at 50°C	Weld factor z
15	21.3	1.5	0.74	333	1.0
20	26.9	1.5	0.95	264	1.0
25	33.7	1.5	1.21	211	1.0
32	42.4	1.5	1.54	167	1.0
40	48.3	1.5	1.76	147	1.0
50	60.3	1.5	2.21	118	1.0
65	76.1	1.5	2.80	93	1.0
80	88.9	1.5	3.28	80	1.0
100	114.3	1.5	4.24	62	1.0
125	139.7	1.5	5.19	51	1.0
150	168.3	1.5	6.27	42	1.0
	168.3	2	8.33	56	1.0
200	219.1	1.5	8.17	32	1.0
	219.1	2	10.87	43	1.0
250	273	2	13.57	35	1.0
300	323.9	2	16.12	29	1.0
350	355.6	2	17.71	27	1.0
400	406.4	2	20.25	23	1.0
450	457	3	34.12	22/31	0.7/1.0
500	508.0	3	37.94	20/28	0.7/1.0
600	610	3	45.57	16	0.7

Pressed Tees

DN	OD mm	WT mm	Kg	Bar at 50°C	Weld factor z
15	21.3	2	0.07	184	0.7
20	26.9	2	0.09	153	0.7
25	33.7	2	0.15	111	0.7
32	42.4	2	0.24	79	0.7
40	48.3	2	0.34	65	0.7
50	60.3	2	0.50	49	0.7
65	76.1	2	0.70	39	0.7
80	88.9	1.5/2.6	0.90	32	0.7
100	114.3	1.5/2.6	1.40	23	0.7
125	139.7	1.5/2.6	2.30	17	0.7
150	168.3	2/4	5.40	21	0.7
200	219.1	2/4	7.70	17	0.7
250	273	2/4	10.7	19	0.7
300	323.9	2/5	19.0	21	0.7
350	355.6	2/5	23.0	18	0.7
400	406.4	3/5	35.0	19	0.7

Pressed Collars

DN	OD mm	WT T1/T2	Kg	Bar at 50°C
15	21.3	1.5/2.5	0.03	40
20	26.9	1.5/2.5	0.05	40
25	33.7	1.5/2.5	0.07	40
32	42.4	1.5/2.5	0.08	40
40	48.3	1.5/2.5	0.11	40
50	60.3	1.5/2.5	0.15	40
65	76.1	1.5/2.5	0.20	40
80	88.9	1.5/2.5	0.26	25
100	114.3	1.5/3	0.37	16
125	139.7	1.5/3	0.47	16
150	168.3	1.5/3	0.56	16
200	219.1	2/3	0.80	16

Elbows 90 deg 1.5xD Rad

DN	OD mm	WT mm	Kg	Bar at 50°C	Weld factor z
15	21.3	1.5	0.03	188	0.7
20	26.9	1.5	0.04	134	0.7
25	33.7	1.5	0.07	109	0.7
32	42.4	1.5	0.11	85	0.7
40	48.3	1.5	0.15	76	0.7
50	60.3	1.5	0.26	62	0.7
65	76.1	1.5	0.41	69	1
80	88.9	1.5	0.58	60	1
100	114.3	1.5	0.99	47	1
125	139.7	1.5	1.52	38	1
150	168.3	2	2.93	43	1
200	219.1	2	5.10	33	1
250	273	2	7.95	26	1
300	323.9	2/3	16.9	33	1
350	355.6	2/3	21.7	31	1
400	406.4	2/3	28.4	27	1
450	457	3	36.0	17	0.7
500	508	3/4	59.1	20	0.7
600	610	3/4	85.3	17	0.7

Concentric and Eccentric Reducers
L=3*(D-d) Pressure for Ecc Reds is 10% less

DN	OD/Od	WT mm	Kg	Bar at 50°C	Weld factor z
15	21.3/17.2	1.5	0.01	340	1
20	26.9/21.3	1.5	0.02	266	1
25	33.7/21.3	1.5	0.04	210	1
32	42.4/33.7	1.5	0.04	165	1
40	48.3/33.7	1.5	0.07	144	1
50	60.3/48.3	1.5	0.07	115	1
65	76.1/60.3	1.5	0.12	91	1
80	88.9/60.3	1.5	0.24	77	1
100	114.3/88.9	1.5	0.29	60	1
125	139.7/114.3	1.5	0.36	49	1
150	168.3/114.3	1.5	0.86	42	1
200	219.1/168.3	1.5	1.11	21	0.7
250	273/219.1	2	1.98	23	0.7
300	323.9/273	2	2.27	22	0.7
350	355.6/323.9	2	1.61	17	0.7
400	406.4/323.9	2/3	6.79	23	0.7

Welded Pressed Collars

DN	OD mm	WT T1/T2	Kg	Bar at 50°C
250	273	2/4	1.58	16
300	323.9	2/4	1.90	16
350	355.6	2/4	2.93	16

Note!
Each fitting will be supplied taper board on the inside to match the thickness of the corresponding tube wall if the difference is greater that 0.5 mm between the standard products.

Pressure class table

Max working pressure for tube items only according to EN 13480-3.

OK for	40 bar
OK for	25 bar
OK for	16 bar
OK for	10 bar

NB	DN	OD mm		Wall mm	Wt/m Kgs	Condition	Weld Factor	20 °C	50 °C	100 °C	150 °C	200 °C
1/2″	15	21.3	x	1.5	0.74	HT	1	367	356	333	315	298
3/4″	20	26.9	x	1.5	0.95	HT	1	286	278	260	246	232
1″	25	33.7	x	1.5	1.21	HT	1	226	220	205	194	184
1 1/4″	32	42.4	x	1.5	1.54	HT	1	178	173	162	153	145
1 1/2″	40	48.3	x	1.5	1.76	HT	1	156	151	141	134	127
2″	50	60.3	x	1.5	2.21	HT	1	124	120	113	107	101
2 1/2″	65	76.1	x	1.5	2.80	HT	1	98	95	89	84	79
3″	80	88.9	x	1.5	3.28	HT	1	84	81	76	72	68
4″	100	114.3	x	1.5	4.24	NHT + filler	1	65	63	59	56	53
5″	125	139.7		1.5	5.19	NHT + filler	1	53	51	48	45	43
6″	150	168.3	x	1.5	6.27	NHT + filler	1	44	43	40	38	36
		168.3	x	2	8.33	NHT + filler	1	59	57	53	50	48
8″	200	219.1	x	1.5	8.17	NHT + filler	1	34	33	31	29	27
		219.1	x	2	10.9	NHT + filler	1	45	44	41	39	36
10″	250	273	x	2	13.6	NHT + filler	1	36	35	33	31	29
12″	300	323.9	x	2	16.1	NHT + filler	1	30	29	27	26	25
14″	350	355.6	x	2	17.7	NHT + filler	1	28	27	25	24	22
16″	400	406.4	x	2	20.3	NHT + filler	1	24	23	22	21	20
18″	450	457.2	x	3	34.1	NHT + filler	1	32	31	29	28	26
20″	500	508	x	3	37.9	NHT + filler	1	29	28	26	25	24
18″	450	457.2	x	3	34.1	NHT + filler	0.7	23	22	20	19	18
20″	500	508	x	3	37.9	NHT + filler	0.7	20	20	18	17	16
24″	600	609.6	x	3	45.6	NHT + filler	0.7	17	16	15	15	14
28″	700	711.2	x	3	53.2	NHT + filler	0.7	14	14	13	12	12
32″	800	812.8	x	4	81.0	NHT + filler	0.7	17	16	15	15	14
36″	900	914.4	x	4	91.2	NHT + filler	0.7	15	15	14	13	12

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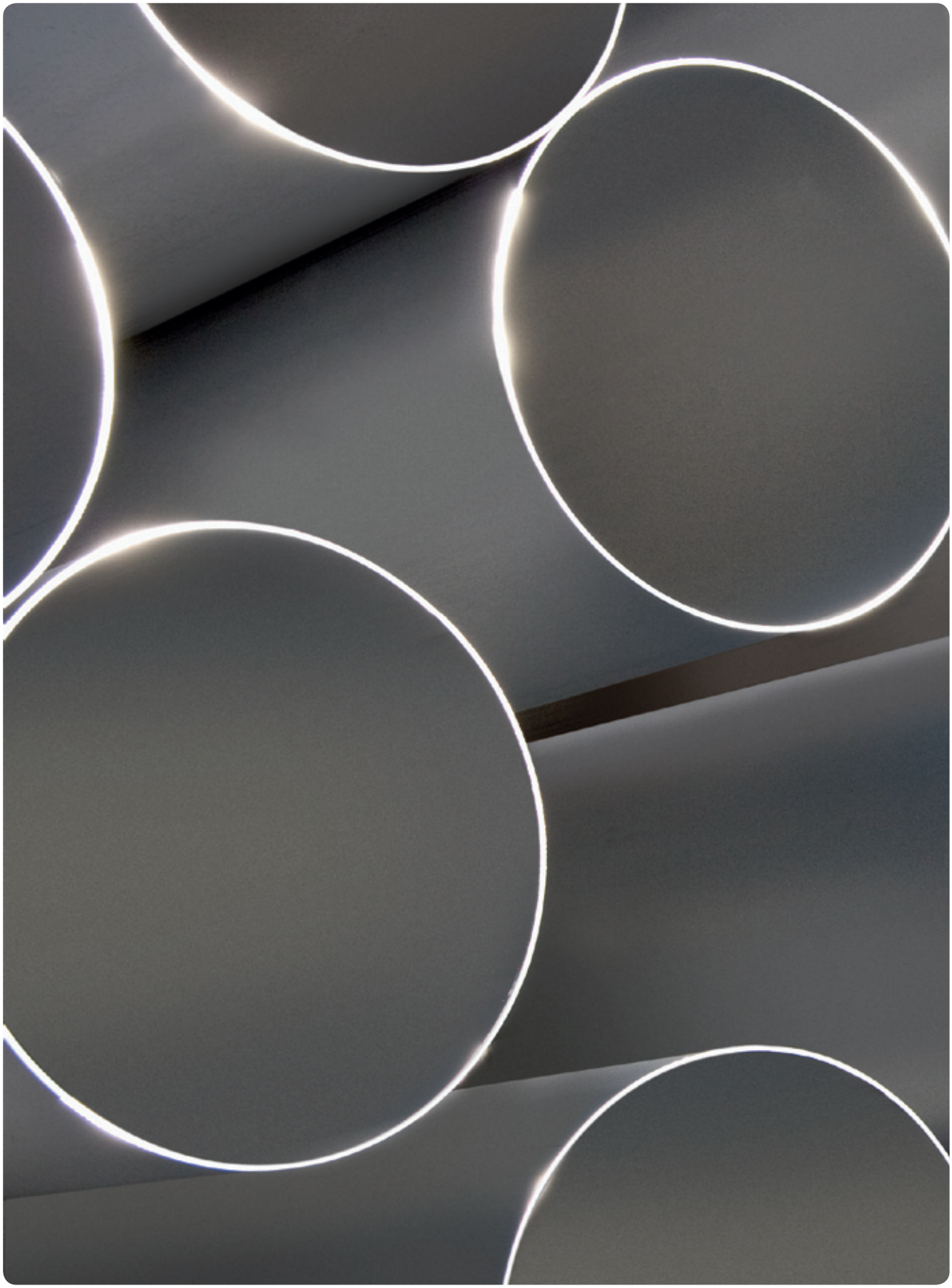


Welded tubes and pipes

The manufacturing, distribution and sales of welded stainless steel process pipes and heat exchanger tubes, require that the customers' needs regarding the safe conveyance of corrosive, flammable and toxic fluids and gases must be fulfilled. OSTP with tube mills in Storfors, Jakobstad and Riyadh offers from our extensive stock programme more than 600 different articles for all types of applications within the process industries.

Manufacturing units with in-line equipment of the highest technology in combination with a quality system approved according to EN ISO 9001:2008 form the basis for our high quality. All our European plants are approved to the European Pressure Equipment Directive PED 97/23/EC and are certified by TÜV to AD 2000-Merkblatt W0, which fulfils the highest quality requirements from customers. Our welding operators and processes for pipe production are also approved to release materials certified to ASTM/ASME.

We also offer round tubes for construction and decorative applications. This stock programme together with Outokumpus' distribution network secures a high availability and fast delivery service for any application. If thin or thick, big or small, long or short, corrosion-, acid- or heat resistant, in different applications, OSTP always has the right solution for your needs.

Process pipes

This type of piping is used primarily in the Pulp and Paper, Chemical and Petrochemical industries. Pipes in chemical tankers, and for handling of water such as in pipelines, Water & Waste Water Treatment (W & WWT) plants and desalination plants, are yet other important applicational areas for these products. We stock a wide range of pipes in three primary process pipe systems, ISO, ANSI and Metric Tru-Bore®.

Standard stock range

	ANSI A312, A358	Metric Tru-Bore® EN 10217-7, EN 10296-2	ISO EN 10217-7, EN 10296-2
OD	1/2" - 24" NB	18 mm - 808 mm	17.2 mm - 813 mm
WT	SCH 5S - SCH 80S	1.5 mm - 4 mm	1.6 mm - 4 mm

Production range

OD: 21.3 - 2032 mm (NPS 3/8-80)
Wall thickness: ≤ 50.8 mm (≤ 2")

Steel grade range

Austenitic / High-performance Austenitic / Lean Duplex / Duplex / Super Duplex and High-temperature grades.

Outokumpu Duralite™ LDX 2101® Piping System

OSTP's new Duralite™ LDX 2101® Piping System challenges standard grade Austenitic pipework designs. High strength plus good corrosion-resistance transform LDX 2101® into a weight and cost-saving pressure piping solution with wide application in Pulp & Paper, Oil & Gas, Chemical, W&WWT, Desalination, Transportation and Building & Construction. There are few limitations to what you can achieve with LDX 2101®. Our central stocks carry a complete standard product range from DN 15 to DN 600 meeting minimum 16-bar operating pressure at 50 °C. We also have stocks in DN 700/800/900 which are suitable for 14 bar (min) operating at 50 °C.

Surfaces

Tubes and pipes can be manufactured from strip or plate with different types of surface finishes which in addition can be influenced within one pre-material type also by thickness and grade.

The surface of the pre-material significantly influences the surface roughness of the final tube (given no further surface treatment like grinding / polishing / brushing etc). The surface finish is defined according to EN 10028-7:2007 (E) Table 6, see below.

Table 6 - Type of process route of sheet, plate and strip*

	Code**	Type of treatment	Surface finish	Notes
Hot rolled	1E	Hot rolled, heat treated, mechanically descaled	Free of scale	The type of mechanical descaling, e.g. coarse grinding or shot blasting, depends on the steel grade and the product, and is left to the manufacturer's discretion, unless otherwise agreed.
	1D	Hot rolled, heat treated, pickled	Free of scale	Usually standard for most steel types to ensure good corrosion resistance; also common finish for further processing. It is permissible for grinding marks to be present. Not as smooth as 2D or 2B.
Cold rolled	2E	Cold rolled, heat treated, mechanically descaled	Rough and dull	Usually applied to steels with a scale which is very resistant to pickling solutions. May be followed by pickling.
	2D	Cold rolled, heat treated, pickled	Smooth	Finish for good ductility, but not as smooth as 2B or 2R.
	2B	Cold rolled, heat treated, pickled, skin passed	Smoother than 2D	Most common finish for most steel types to ensure good corrosion resistance, smoothness and flatness. Also common finish for further processing. Skin passing may be by tension levelling.
	2R	Cold rolled, bright annealed***	Smooth, bright, reflective	Smoother and brighter than 2B. Also common finish for further processing.

*) Not all process routes and surface finishes are available for all steels.
**) First digit, 1 = hot rolled, 2 = cold rolled.
***) May be skin passed.

By experience we know approximately what surface roughness the coil material has before we start forming the coil into a tube that is fusion welded. The welding method and amount of bead working influence the surface roughness of the weld. Process pipes with wall thicknesses less than 2 mm are normally produced from cold rolled strip. The surface condition on the coil material these tubes are produced from is mainly 2D or 2E (brushed), depending on the grade, and have Ra-values of around 1.5 µm.

Process pipes with wall thicknesses 2-6 mm are generally produced from cold rolled strip descaled with shot blasting and then pickled (2E). These tubes have Ra-values between 2.0-5.0 µm. Process pipes with wall thickness above 6 mm are generally produced from hot rolled plate that has a Ra-roughness around 5 µm.

Surface roughness of strip, sheet and plate materials used for tubes and pipes

Product	Code	Ra µm	Tubular product
Cold rolled, pickled	2D	≤ 1.5	Pipe and heat exchanger tubes. < 2 mm wall
Cold rolled, shot blast, pickled	2E	2.0 - 5.0	Pipe and heat exchanger tubes. 2 - 6.35 mm wall
Hot rolled, pickled	1D	3.5 - 5.0	Pipe > 6.35 mm wall

Note that even if the Ra-value is the most common way to describe the roughness it is not always the most accurate. For example, a ground surface with an Ra-value of 0.8 µm does not look as shiny as an electro polished surface with Ra-value 0.8 µm.

Pressure guidance

The following pages list data for Tubes and Pipes and Butt Weld Fittings, giving guidance regarding design pressures for common OSTP tubular products and steel grades. The values should be regarded as rough indications only. Dimensioning of pipe systems is also dependant on external forces, thermal stress, static weight etc. Pipe systems with elbows, flanges, fastening, require often more detailed calculations.

OSTP will not be held responsible for any loss or damage caused by using this information!

Maximum allowable working pressure at 20˚C, according to EN 13480

Welded pipe from OSTP

Grades 1.4306, 1.4307 and 1.4541 (listed values)
For grades 1.4404, 1.4432, 1.4435, 1.4438, 1.4539 and 1.4571 multiply "bar-value" with 1.08. To give guidance ratings.

Table 1

Weld factor	Metric ID	Wall thickness, mm 1.5	2	2.5	3	4	5	6	7	8	9	10
1.0	-125	34										
1.0	150	28	38	48	57							
1.0	200	21	28	36	43	57						
1.0	250	17	23	28	34	46	57					
1.0	300		19	24	28	38	48					
1.0	350			20	24	33	41	49				
1.0	400				21	28	36	43	50			
0.7	450				13	18	22	27	32	36	41	45
0.7	500				12	16	20	24	28	32	36	40
0.7	600				10	13	17	20	23	27	30	33
0.7	700				8	11	14	17	20	23	26	29
0.7	800				7	10	12	15	18	20	23	25
0.7	900				7	9	11	13	15	18	20	22
0.7	1000					8	10	12	14	16	18	20
0.7	1100					7	9	11	13	14	17	18
0.7	1200					7	8	10	12	13	15	17
0.7	1300						8	9	11	12	14	15
0.7	1400						7	8	9	11	12	14
0.7	1500						7	8	9	11	12	13
0.7	1600							6	8	8	11	11

6 - 9 bar inside pressure
10 - 15 bar inside pressure
16 - 25 bar inside pressure
Limit for inside vacuum. Wall > 0.01 x OD

Table 2

Weld factor	ISO OD	Wall thickness, mm 2	2.6	3	3.2	3.6	4	5	6	7	8	9	10
1.0	-159	36											
1.0	168.3	34	44	51	55	62	69	86					
1.0	219.1	26	34	39	42	47	52	66	79				
1.0	273.0	21	27	31	33	38	42	53	64	74			
1.0	323.9	18	23	26	28	32	35	44	53	62	71		
1.0	355.6		21	24	26	26	32	40	48	56	65	72	
1.0	406.4		18	21	22	25	28	35	42	49	57	63	70
0.7	457			13	14	16	17	22	26	31	35	40	44
0.7	508			12	13	14	16	20	24	28	32	36	40
0.7	610			10	11	12	13	18	19	22	26	29	33
0.7	711			8	9	10	11	16	17	20	22	25	28
0.7	813			7	8	9	10	12	14	17	20	22	25
0.7	914					8	9	11	13	15	17	20	22
0.7	1016					7	8	10	12	14	16	18	20
0.7	1118						7	9	11	13	14	16	18
0.7	1219							8	10	11	13	14	16
0.7	1321							7	8	10	12	13	15
0.7	1422							7	8	10	11	13	14
0.7	1524								7	8	10	11	13
0.7	1626								7	8	10	11	12

6 - 9 bar inside pressure
10 - 15 bar inside pressure
16 - 25 bar inside pressure
Limit for inside vacuum. Wall > 0.01 x OD

Maximum allowable working pressure at 20˚C, according to EN 13480

Welded pipe from OSTP

Grades 1.4162 (LDX 2101®)

Table 3

Weld factor	Metric ID	Wall thickness, mm 1.5	2	2.5	3	4	5	6	7	8	9	10
1.0	-125	59	79	99	120	161						
1.0	150	49	66	83	99	133	168	202	235	269	302	336
1.0	200	37	49	62	74	99	125	150	175	200	225	250
1.0	250	28	39	49	59	79	99	119	139	158	178	198
1.0	300		33	41	49	66	83	100	116	133	149	166
1.0	350			35	42	56	71	85	99	114	128	142
1.0	400				37	49	62	74	87	99	112	124
0.7	450				23	31	38	46	54	62	69	77
0.7	500				21	28	34	41	48	55	62	70
0.7	600				17	23	29	34	40	46	51	58
0.7	700				15	20	25	29	34	39	44	49
0.7	800				13	17	21	26	30	34	39	43
0.7	900				11	15	19	23	27	29	35	38
0.7	1000					14	17	21	25	28	32	34
0.7	1100					12	16	19	22	25	29	31
0.7	1200					11	14	17	20	23	26	29
0.7	1300						13	16	19	21	24	26
0.7	1400						12	15	18	20	23	25
0.7	1500						11	14	16	18	21	23
0.7	1600							13	15	17	20	21

11 - 17 bar inside pressure
18 - 26 bar inside pressure
27 - 51 bar inside pressure
≥ 52 bar inside pressure
Limit for inside vacuum. Wall > 0.01 x OD

Table 4

Weld factor	ISO OD	Wall thickness, mm 2	2.6	3	3.2	3.6	4	5	6	7	8	9	10
1.0	-159	62											
1.0	168.3	59	76	88	94	106	106	149	179	209	242	268	298
1.0	219.1	45	59	68	72	81	91	114	137	160	184	205	228
1.0	273.0	36	47	54	58	65	72	91	109	127	147	164	182
1.0	323.9	30	39	46	49	55	61	76	91	106	123	137	152
1.0	355.6		36	41	44	50	55	69	83	97	112	124	138
1.0	406.4		33	36	39	44	48	61	73	85	98	110	122
0.7	457			23	24	27	30	38	46	53	61	68	106
0.7	508			20	22	24	27	34	41	48	55	61	68
0.7	610			17	18	20	23	28	34	39	45	50	57
0.7	711			14	15	17	19	24	29	34	39	43	49
0.7	813			12	13	15	17	21	25	29	34	38	42
0.7	914				12	13	15	19	23	27	30	34	38
0.7	1016					12	13	17	20	24	27	31	34
0.7	1118					11	12	15	18	21	25	27	31
0.7	1219					10	11	14	17	20	23	25	28
0.7	1321						10	13	16	18	21	23	26
0.7	1422							12	14	17	19	22	22
0.7	1524							11	13	15	18	20	23
0.7	1626							11	13	15	17	20	21

10 - 17 bar inside pressure
18 - 26 bar inside pressure
27 - 51 bar inside pressure
≥ 52 bar inside pressure
Limit for inside vacuum. Wall > 0.01 x OD

See Tables 1 and 2:

Example 1
Which dimension is necessary for a 1.4307-pipe with DN 450 and a design pressure of 16 bar at 20˚C?
Answer:
For Metric Tru-Bore® with z = 0.7 460 x 5 is necessary.
For Metric Tru-Bore® with z = 1.0 456 x 3 is OK.
For ISO with z = 0.7 457 x 5 is necessary.
For ISO with z = 1.0 457 x 3 is OK.

Example 2
Which dimension is necessary for a 1.4307-pipe with DN 450 and a design pressure of 16 bar including resistance to inside vacuum at 20˚C?
Answer:
For Metric Tru-Bore® 460 x 5 is necessary. Note! Independent of z-factor.
For ISO 457 x 5 is necessary. Note! Independent of z-factor.

OT 100
EN ISO 1127

DN	Series 1	Series 2	Series 3	Wall thickness mm 1.6	2.0	2.3	2.6	2.9	3.0	3.2	3.6	4.0
	OD, mm			Weight kg/m / Design pressure bar								
10	17.2			0.63/239								
15			18.0	0.66	0.80							
		19.0		0.70	0.85							
		20.0		0.74	0.90							
	21.3			0.79/193	0.97/242	1.09/278	1.22/314					
20			22.0	0.82	1.00	1.13	1.26					
		25.0		0.94	1.15	1.31	1.46					
			25.4	0.95	1.17	1.33	1.48					
	26.9			1.01/153	1.25/191	1.42/220	1.58/249	1.74/277				
25			30.0	1.14	1.40	1.59	1.78	1.97				
		31.8		1.21	1.49	1.70	1.90	2.10				
		32.0		1.22	1.50	1.71	1.91	2.11				
	33.7			1.28/122	1.59/153	1.81/176	2.02/199	2.23/222	2.30	2.44/244		
32			35.0	1.34	1.65	1.88	2.11	2.33	2.40	2.55		
		38.0		1.46	1.80	2.05	2.30	2.55	2.63	2.79		
		40.0		1.54	1.90	2.17	2.43	2.69	2.78	2.95		
	42.4			1.63/97	2.02/121	2.31/140	2.59/158	2.87/176	2.96	3.14/194	3.49/219	
40			44.5	1.72/93	2.13/116	2.43/133	2.72/150	3.02/168	3.11	3.31/185	3.68/208	
	48.3			1.87/85	2.32/107	2.65/123	2.97/139	3.29/155	3.40	3.61/171	4.03/192	
50		51.0		1.98	2.45	2.80	3.15	3.49	3.60	3.83	4.27	
			54.0	2.10	2.60	2.97	3.34	3.71	3.83	4.07	4.50	
		57.0		2.22	2.75	3.15	3.54	3.92	4.05	4.31	4.81	5.30
	60.3			2.35/68	2.92/85	3.34/98	3.75/111	4.16/124	4.30	4.57/137	5.11/154	5.63/171
65		63.5		2.48	3.08	3.52	3.96	4.40	4.54	4.83	5.39	5.95
		70.0		2.74	3.40	3.89	4.38	4.87	5.03	5.35	5.98	6.60
	76.1			2.98/54	3.71/68	4.25/78	4.79/88	5.31/98	5.49	5.84/108	6.53/122	7.21/135
80			82.5	3.24	4.03	4.61	5.20	5.77	5.97	6.35	7.10	7.85
	88.9			3.50/46	4.35/58	4.98/67	5.61/75	6.24/84	6.45	6.86/93	7.68/104	8.49/116
100		101.6		4.00	4.98	5.71	6.44	7.16	7.40	7.88	8.82	9.78
		108.0		4.26	5.30	6.08	6.85	7.63	7.89	8.39	9.40	10.4
	114.3			4.51/36	5.62/45	6.44/52	7.26/59	8.09/65	8.36	8.89/72	9.97/81	11.0/90
125		133.0		5.26	6.55	7.52	8.49	9.45	9.77	10.4	11.7	12.9
	139.7			5.53/29	6.89/37	7.90/42	8.91/48	9.92/53	10.3	10.9/59	12.3/66	13.6/74
150		159.0		6.30	7.85	9.02	10.2	11.3	11.7	12.5	14.0	15.5
	168.3			6.67/24	8.32/31	9.55/35	10.8/40	12.0/44	12.4	13.2/49	14.8/55	16.4/61
200	219.1				10.9/23	12.5/27	14.1/31	15.7/34	16.2	17.3/38	19.4/42	21.5/47
250	273.0				13.6/19	15.6/22	17.6/25	19.6/27	20.3	21.6/30	24.3/34	26.9/38
300	323.9				16.1/16	18.5/18	20.9/21	23.3/23	24.1	25.7/25	28.8/29	32.0/32
350	355.6						22.9/19	25.6/21	26.5	28.2/23	31.7/26	35.2/29
400	406.4						26.3/16	29.3/18	30.3	32.3/20	36.3/23	40.3/25
450	457							32.9/11*	34.1	36.3/13*	40.8/14*	45.3/16*
500	508							36.6/15	37.9	40.4/16	45.4/18	50.4/20
600	610							44.0/9*	45.6	48.6/9*	54.6/11*	60.6/12*
700	711											70.7/10*
800	813											81.0/9*
900	914											91.0/8*
1000	1016											101/6*
1100	1118											111/6*
1200	1219											122/6*

The table shows our production programme within the EN ISO 1127 standard.
Selected ISO-dimensions are stocked in following grades: EN 1.4307, 1.4404, 1.4432, 1.4541 and 1.4571. See tables on following pages.
DN 15 - DN 500 in accordance with EN 10217-7. Max. wall thickness T = 6.0 mm. DN 125 - DN 1200 in accordance with EN 10296-2 produced from plate.
NOTE: The pressure calculations in this table have been done according to 13480-3 and EN 10217-7 for DN 15 - DN 500, T_{max} = 6 mm, the steel grade is EN 1.4307, room temperature 20 °C.
) Pressures marked with are calculated according to 13480-3 and EN 10296-2 for DN 450, DN 600 - 1200, the steel grade is EN 1.4307, room temperature 20 °C.

OT 100
EN ISO 1127

DN	Series 1 OD, mm	Series 2 OD, mm	Wall thickness mm 4.5 Weight kg/m / Design pressure bar	5.0	6.0	7.1	8.0	8.8	10	11	12	14
80												
	88.9		9.50/130									
100		101.6	10.9									
		108.0	11.6									
	114.3		12.4/101	13.7/113								
125		133.0	14.5	16.0								
	139.7		15.2/83	16.8/92	20.1/110	23.5	26.4	28.8	32.4			
150		159.0	17.4	19.3	23.0	27.0	30.2	33.1	37.3			
	168.3		18.4/69	20.4/76	24.4/91	28.6/76*	32.1/86*	35.1/94*	39.6/107*	43.3		
200	219.1		24.2/53	26.8/59	32.0/70	37.7/58*	42.2/66*	46.3/72*	52.3/82*	57.3/90*	64.6/98*	
250	273.0		30.2/42	33.5/47	40.1/56	47.2/47*	53.0/53*	58.2/58*	65.8/66*	72.1/73*	81.4/78*	91.9/92*
300	323.9		36.0/36	39.9/40	47.7/47	56.3/39*	63.2/45*	69.4/49*	78.5/56*	86.1/61*	97.3/67*	110/77*
350	355.6		39.5/33	43.8/36	52.5/43	61.9/36*	69.6/41*	76.3/45*	86.5/51*	94.8/56*	108/60*	121/70*
400	406.4		45.2/29	50.2/32	60.1/38	70.9/31*	79.7/35*	87.5/39*	99.1/44*	109/49*	123/52*	139/60*
450	457		50.9/18*	56.5/20*	67.7/23*	79.9/28*	89.8/32*	98.7/35*	112/39*	123/43*	139/47*	157/55*
500	508		56.7/23	62.9/25	75.3/30	89.0/25*	100/28*	110/31*	125/35*	137/39*	155/42*	175/49*
600	610		68.2/13*	75.7/15*	90.6/18*	107/21*	121/24*	132/26*	150/30*	165/32*	187/35*	212/41*
700	711		79.5/11*	88.4/13*	106/15*	125/18*	141/20*	155/22*	175/25*	193/28*	218/30*	247/35*
800	813		91.0/10*	101/11*	121/12*	143/16*	161/18*	177/20*	201/22*	221/24*	250/26*	284/30*
900	914		102/9*	114/10*	136/11*	161/14*	181/16*	199/17*	226/20*	248/22*	282/24*	320/27*
1000	1016		114/8*	126/9*	152/10*	179/13*	202/14*	222/16*	252/18*	277/20*	314/21*	
1100	1118		125/7*	139/8*	167/9*	197/11*	222/13*	244/14*	277/16*	305/18*	346/19*	
1200	1219		137/7*	152/7*	182/8*	215/10*	242/12*	266/13*	302/15*	332/16*		

The table shows our production programme within the EN ISO 1127 standard.
Selected ISO-dimensions are stocked in following grades: EN 1.4307, 1.4404, 1.4432, 1.4541 and 1.4571. See tables on following pages.
DN 15 - DN 500 in accordance with EN 10217-7. Max. wall thickness T = 6.0 mm. DN 125 - DN 1200 in accordance with EN 10296-2 produced from plate.
NOTE: The pressure calculations in this table have been done according to 13480-3 and EN 10217-7 for DN 15 - DN 500, T_{max} = 6 mm, the steel grade is EN 1.4307, room temperature 20 °C.
) Pressures marked with are calculated according to 13480-3 and EN 10296-2 for DN 450, DN 600 - DN 1200, the steel grade is EN 1.4307, room temperature 20 °C.

EN ISO 1127

Outside diameter D	Tolerance on outside diameter D		Tolerance on wall thickness T	
	Tolerance class	Permissible deviation	Tolerance class	Permissible deviation
D≤168.3	D3	± 0.75% or ± 0.3 mm whichever is the greater	T3	± 10% or ± 0.2 mm whichever is the greater
	D4*	± 0.5% or ± 0.1 mm whichever is the greater		
D>168.3	D2	± 1.0%		

*) Option 20: Tolerance class D4 if specified (at extra cost).

Standard stock program

The tables below reflect the OSTP standard stock program only, other dimensions and grades are available against special production according to our manufacturing range and capabilities.
Please refer enquiries to mill customer service contacts for review and quotation.

ISO tubes - HT (design pressures shown in brackets)

Welded tubes, annealed and pickled.
In 6 m random lengths, PE (Plain Ends).
Manufactured and inspected according to EN 10217-7 TC1, weld factor z = 1.0.
Tolerances in accordance with EN ISO 1127 (OD ≤ 168.3 mm = D3/T3 and OD > 168.3 mm = D2/T3).
Stock standard dimensions and grades in the table below are marked with design pressures.
The design pressures are calculated in bar according to: EN 13480, EN 10217-7, grade, T = 20 °C, weld factor z = 1.0.

ISO - HT

OD mm	z	Wall mm	Weight kg/m	4307	4541	4571	4404	4432	Std Pks m
17.2	1.0	1.6	0.62	X (286)			X (298)		306
21.3	1.0	1.6	0.79	X (227)		XW (242)	X (237)	X (237)	348
21.3	1.0	2	0.97	X (289)	W (308)	XW (308)	X (301)	X (301)	348
21.3	1.0	2.6	1.22	X (387)		X (411)	X (403)		348
26.9	1.0	1.6	1.01	X (177)		XW (189)	X (185)	X (185)	306
26.9	1.0	2	1.25	X (225)	W (239)	XW (239)	X (234)	X (234)	306
26.9	1.0	2.6	1.58	X (299)		X (2318)	X (311)		306
33.7	1.0	1.6	1.29	X (140)			X (146)	X (146)	306
33.7	1.0	2	1.59	X (177)	W (188)	XW (188)	X (184)	X (184)	306
33.7	1.0	2.6	2.02		W (249)	W (249)			306
33.7	1.0	3.2	2.44	X (293)		X (312)	X (305)		306
42.4	1.0	1.6	1.63	X (110)			X (115)	X (115)	306
42.4	1.0	2	2.02	X (139)	W (148)	W (148)	X (145)	X (145)	306
42.4	1.0	2.6	2.59		W (195)	W (195)			306
42.4	1.0	3.2	3.14	X (228)		X (243)	X (238)		306
48.3	1.0	1.6	1.87	X (96)			X (100)	X (100)	222
48.3	1.0	2	2.32	X (121)	W (129)	X (129)	X (126)	X (126)	222
48.3	1.0	2.6	2.98		W (170)	W (170)			222
48.3	1.0	3.2	3.61	X (199)		X (211)	X (207)		222
60.3	1.0	1.6	2.35	X (77)			X (80)	X (80)	222
60.3	1.0	2	2.92	X (96)	W (103)	X (103)		X (100)	222
60.3	1.0	2.6	3.76		W (135)	W (135)			222
60.3	1.0	2.9	4.17			W (151)			222
60.3	1.0	3.6	5.11	X (178)		X (189)	X (185)		222
70.0	1.0	2	3.41	X (83)			X (86)	X (86)	174
76.1	1.0	1.6	2.98	X (60)				X (63)	222
76.1	1.0	2	3.71	X (76)	W (81)	X (81)		X (79)	222
76.1	1.0	2.3	4.25			X (93)			222
76.1	1.0	2.6	4.79		W (106)	W (106)			222
76.1	1.0	2.9	5.32		W (118)	W (118)			222
76.1	1.0	3.6	6.54	X (139)		X (148)	X (145)		222
88.9	1.0	2	4.35		W (69)	X (69)			114
88.9	1.0	2.3	4.99		W (79)	X (79)			114
88.9	1.0	2.6	5.62		W (90)	W (90)			114
88.9	1.0	2.9	6.24			W (101)			114
88.9	1.0	3.2	6.87			W (112)			114
88.9	1.0	4	8.50			X (141)			114
114.3	1.0	2	5.62		W (53)	X (53)			114
114.3	1.0	2.6	7.27		W (70)	X (70)			114
114.3	1.0	3	8.36		W (81)	W (81)			114
114.3	1.0	3.6	9.98			W (97)			60

X = Stock standard available as TC1.
XW = Stock standard available as TC1 and TC2/AD-W2.
W = Stock standard available as TC2/AD-W2.

ISO tubes - NHT (design pressures shown in brackets)

Welded tubes, pickled.
In 6 m random lengths, PE (Plain Ends).
OD ≤ 508 mm manufactured and inspected according to EN 10217-7 TC1, weld factor z = 1.0.
OD > 508 mm manufactured and inspected according to EN 10296-2, weld factor z = 0.7.
Tolerances in accordance with EN ISO 1127 (OD ≤ 168.3 mm = D3/T3 and OD > 168.3 mm = D2/T3).
Stock standard dimensions and grades in the table below are marked with design pressures.
The design pressures are calculated in bar according to: EN 13480, EN 10217-7 or EN 10296-2, T = 20 °C, actual weld factor z.

ISO - NHT

OD mm	z	Wall mm	Weight kg/m	4307	4541	4571	4404	4432	Std Pks m
21.3	1.0	1.6	0.79	X (227)			X (237)		348
21.3	1.0	2	0.97	X (289)		X(242)	X (301)		348
26.9	1.0	1.6	1.01	X (177)			X (185)		306
26.9	1.0	2	1.25	X (225)		X(239)	X (234)		306
33.7	1.0	1.6	1.29	X (140)			X (146)		306
33.7	1.0	2	1.59	X (177)		X(188)	X (184)		306
42.4	1.0	1.6	1.63	X (110)			X (115)		306
42.4	1.0	2	2.02	X (139)		X (148)	X (145)		306
48.3	1.0	1.6	1.87	X (96)			X (100)		222
48.3	1.0	2	2.32	X (121)		X (129)	X (126)		222
60.3	1.0	1.6	2.35	X (77)			X (80)		222
60.3	1.0	2	2.92	X (96)		X (103)	X (100)		222
76.1	1.0	1.6	2.98	X (60)					222
76.1	1.0	2	3.71	X (76)		X (81)	X (79)		222
88.9	1.0	1.6	3.50	X (52)				X (54)	114
88.9	1.0	2	4.35	X (65)		X (69)	X (67)	X (67)	114
88.9	1.0	2.6	5.62	X (85)			X (88)		114
88.9	1.0	3	6.45	X (98)				X (102)	114
114.3	1.0	1.6	4.52	X (40)				X (42)	114
114.3	1.0	2	5.62	X (50)		X (53)	X (52)	X (52)	114
114.3	1.0	2.6	7.27	X (66)		X (70)	X (68)		114
114.3	1.0	3	8.36	X (76)				X (79)	114
139.7	1.0	2	6.90	X (41)	X (44)	X (44)	X (43)	X (43)	84
139.7	1.0	2.6	8.93	X (53)	XW (57)	XW (57)	X (56)		84
139.7	1.0	3	10.3	X (62)	X (66)	X (66)		X (64)	84
139.7	1.0	4	13.6			X (88)			84
159.0	1.0	2	7.90	X (36)	X (38)	X (38)			84
159.0	1.0	3	11.7	X (54)		X (58)			84
159.0	1.0	4	15.5	X (76)					84
168.3	1.0	2	8.33	X (34)	X (36)	X (36)	X (35)	X (35)	108
168.3	1.0	2.6	10.8	X (44)	X (47)	XW (47)	X (46)		108
168.3	1.0	3	12.4	X (51)	X (54)	X (54)	X (53)	X (53)	72
168.3	1.0	4	16.5		X (73)	X (73)			72
219.1	1.0	2	10.9	X (26)	X (28)	X (28)	X (27)	X (27)	60
219.1	1.0	2.6	14.1	X (34)		X (36)	X (35)		60
219.1	1.0	3	16.2	X (39)	XW (42)	XW (42)	X (41)	X (41)	60
219.1	1.0	3.2	17.3	X (42)			X (44)		60
219.1	1.0	4	21.5		X (56)	X (56)			60
273.0	1.0	2	13.6	X (21)			X (22)	X (22)	72
273.0	1.0	2.6	17.6	X (27)			X (28)		72
273.0	1.0	3	20.3	X (31)	X (33)	XW (33)	X (33)	X (33)	48
273.0	1.0	3.2	21.6	X (33)			X (35)		48
273.0	1.0	4	26.9			X (45)			48
323.9	1.0	2	16.1	X (18)				X (18)	36
323.9	1.0	2.6	20.9	X (23)			X (24)		36
323.9	1.0	3	24.1	X (26)	X (28)	XW (28)	X (27)	X (27)	36
323.9	1.0	3.2	25.7	X (28)					36
323.9	1.0	4	32.0	X (35)		X (37)	X (37)		36
355.6	1.0	3	26.5	X (24)		X (26)	X (25)	X (25)	36
406.4	1.0	3	30.3	X (21)	X (22)	X (22)	X (22)	X (22)	24
406.4	1.0	4	40.3			XW (30)		X (29)	24
457	1.0	3	34.1	X (13)		X (14)	X (14)	X (14)	12
457	1.0	4	45.4					X (18)	12
508	1.0	3	37.9	X (17)		X (18)	X (17)	X (17)	12
508	1.0	4	50.5	X (22)		X (24)		X (23)	12
610	0.7	3	45.6	X (10)			X (10)	X (10)	12
610	0.7	4	60.7	X (13)				X (14)	12
711	0.7	4	70.8	X (11)			X (12)	X (12)	6
813	0.7	4	81.0	X (10)				X (10)	6

X = Stock standard available as TC1.
XW = Stock standard available as TC1 and TC2/AD-W2.

OT 110
Metric Tru-Bore®

DN	Outside diameter mm	Wall thickness mm 1.5	2.0	2.5	3.0	4.0	5.0	6.0	8.0	10	12
		Weight kg/m / Design pressure bar									
15	18	0.62/215	0.80/286								
	20	0.70/193	0.90/257	1.10/321							
20	22	0.77/176	1.00/234	1.22/292							
	23	0.81/168	1.05/224	1.28/280							
	25	0.88/154	1.15/206	1.41/257							
25	28	1.00/138	1.30/184	1.60/230							
	30	1.07/129	1.40/172	1.72/215	2.03/258						
	32	1.15/121	1.50/161	1.85/201	2.18/241						
	33	1.18/117	1.55/156	1.91/195	2.25/234						
32	35	1.26/110	1.65/147	2.03/184	2.40/220						
	38	1.37/102	1.80/135	2.22/169	2.63/202						
	40	1.45/97	1.90/129	2.35/161	2.78/193						
40	43	1.56/90									
	44.5	1.62/87	2.13/116	2.63/145	3.12/174						
	50	1.82/76	2.40/101	2.97/126	3.53/151						
50	51	1.86/76	2.45/101	3.04/126	3.61/151						
	53	1.93/73									
	54	1.97/72	2.60/95								
	57	2.08/68	2.75/90	3.41/113	4.06/135	5.31/181					
65	63.5	2.33/61	3.08/81	3.82/101	4.55/122	5.96/162					
	68	2.50/57	3.31/76								
	69		3.36/75								
	70	2.57/55	3.41/74	4.23/92	5.03/110	6.61/147					

DN	Inside diameter mm	Wall thickness mm 1.5	2.0	2.5	3.0	4.0	5.0	6.0	8.0	10	12
		Weight kg/m / Design pressure bar									
80	80	3.06/48	4.11/64	5.16/80	6.24/97						
100	100	3.81/39	5.11/51	6.42/64	7.74/77	10.4/103					
125	125	4.75/31	6.36/41	7.97/51	9.62/62	12.9/82					
150	150	5.69/26	7.61/34	9.55/43	11.5/51	15.4/69	19.4/86	23.4	31.6	40.0	48.6
200	200	7.57/19	10.1/26	12.7/32	15.3/39	20.4/51	25.7/64	31.0	41.6	52.5	63.6
250	250	9.45/15	12.6/21	15.8/26	19.0/31	25.4/41	31.9/51	38.4	51.6	65.0	78.7
300	300	11.3/13	15.1/17	18.9/21	22.8/26	30.5/34	38.2/43	45.9	61.6	77.6	93.7
350	350	13.2/11	17.6/15	22.1/18	26.5/22	35.5/29	44.4/37	53.4	71.6	90.1	109
400	400				30.3/19	40.5/26	50.7/32	60.9	81.7	103	124
450	450				34.0/12*	45.5/16*	57.0/20*	68.4/24*	91.7/32*	115/40*	139
500	500				37.8/15	50.5/21	63.2/26	76.0/31	102/29*	128/36*	154
600	600				45.3/9*	60.5/12*	75.8/15*	91.1/18*	122/24*	153/30*	184
700	700				52.8/8*	70.5/10*	88.3/13*	106/15*	142/21*	178/26*	214
800	800				60.3/7*	80.5/9*	101/11*	121/14*	162/18*	203/23*	244
900	900				67.8/6*	90.6/8*	113/10*	136/12*	182/16*	228/20*	274
1000	1000				75.4/5*	101/7*	126/9*	151/11*	202/14*	253/18*	304
1100	1100				82.9/5*	111/7*	138/8*	166/10*	222/13*	278/16*	334
1200	1200				90.4/5*	121/6*	151/8*	181/9*	242/12*	303/15*	364
1300	1300				97.9	131/6*	163/7*	196/8*	262/11*	328/14*	
1400	1400				105	141/5*	176/6*	211/8*	282/10*	353/13*	
1500	1500				113	151/5*	188/6*	226/7*	302/10*		
1600	1600				120	161/5*	201/6*	241/7*	322/9*		

Selected Metric Tru-Bore®-dimensions are stocked in following grades: EN 1.4307, 1.4404, 1.4432 and 1.4571. See tables on following pages.
DN 15 - DN 500 in accordance with EN 10217-7. Max. wall thickness T = 6.0 mm. DN 125 - DN 1600 in accordance with EN 10296-2 produced from plate.
Dimensions 44.5, 57, 63.5 and 70 are ISO dimensions.
NOTE: The pressure calculations in this table have been done according to 13480-3 and EN 10217-7 for DN 15 - DN 500, T_{max} = 6 mm, the steel grade is EN 1.4307, room temperature 20 °C.
) Pressures marked with are calculated according to 13480-3 and EN 10296-2 for DN 450, DN 600 - DN 1200, the steel grade is EN 1.4307, room temperature 20 °C.

Standard stock program

The tables below reflect the standard OSTP stock program only, other dimensions and grades are available against special production according to our manufacturing range and capabilities.
Please refer enquiries to mill customer service contacts for review and quotation.

Metric Tru-Bore® - NHT (design pressures shown in brackets)

Welded tubes, pickled.
In 6 m random lengths, PE (Plain Ends).
OD ≤ 512 mm manufactured and inspected according to EN 10217-7 TC1, weld factor z = 1.0.
OD > 512 mm manufactured and inspected according to EN 10296-2, weld factor z = 0.7.
Tolerances in accordance with EN ISO 1127 (OD ≤ 168.3 mm = D3/T3 and OD > 168.3 mm = D2/T3).
Stock standard dimensions and grades in the table below are marked with design pressures.
The design pressures are calculated in bar according to: EN 13480, EN 10217-7 or EN 10296-2, T = 20 °C, actual weld factor z.

Metric NHT

OD mm	z	Wall mm	Weight kg/m	4307	4571	4404	4432	Std Pks m
28.0	1.0	1.5	1.00	X (159)		X (165)		306
35.0	1.0	1.5	1.26	X (126)		X (131)		306
43.0	1.0	1.5	1.56	X (102)		X (106)		222
44.5	1.0	2	2.13	X (132)		X (138)		222
53.0	1.0	1.5	1.93	X (82)		X (85)		222
54.0	1.0	2	2.60	X (108)		X (113)		222
68.0	1.0	1.5	2.50	X (63)		X (66)		174
69.0	1.0	2	3.36	X (85)		X (89)		174
70.0	1.0	2	3.41	X (83)		X (86)		
83.0	1.0	1.5	3.06	X (54)		X (56)	X (56)	114
84.0	1.0	2	4.11	X (72)	X (77)	X (75)	X (75)	114
103.0	1.0	1.5	3.81	X (43)		X (45)	X (45)	114
104.0	1.0	2	5.11	X (57)	X (61)	X (60)	X (60)	114
106.0	1.0	3	7.74	X (87)		X (91)	X (91)	114
128.0	1.0	1.5	4.75	X (34)		X (36)	X (36)	96
129.0	1.0	2	6.36	X (46)	X (49)	X (48)	X (48)	96
153.0	1.0	1.5	5.69	X (28)		X (30)	X (30)	126
154.0	1.0	2	7.61	X (38)	X (40)	X (40)	X (40)	126
156.0	1.0	3	11.5	X (57)	X (61)	X (60)	X (60)	84
203.0	1.0	1.5	7.57	X (21)		X (22)		90
204.0	1.0	2	10.1	X (28)	X (30)	X (30)	X (30)	90
205.0	1.0	2.5	12.7	X (36)	X (38)	X (37)	X (37)	90
206.0	1.0	3	15.3	X (43)		X (45)	X (45)	60
254.0	1.0	2	12.6	X (23)	X (24)	X (24)	X (24)	72
255.0	1.0	2.5	15.8	X (28)	X (30)	X (30)	X (30)	48
256.0	1.0	3	19.0	X (34)		X (36)	X (36)	48
304.0	1.0	2	15.1	X (19)	X (20)	X (20)	X (20)	54
305.0	1.0	2.5	18.9	X (24)		X (25)	X (25)	54
306.0	1.0	3	22.8	X (28)	X (30)	X (30)	X (30)	36
355.0	1.0	2.5	22.0	X (20)		X (21)	X (21)	36
356.0	1.0	3	26.5	X (24)	X (26)	X (25)	X (25)	36
406.0	1.0	3	30.3	X (21)	X (23)	X (22)	X (22)	24
408.0	1.0	4	40.5	X (28)			X (30)	24
456.0	1.0	3	34.0	X (19)		X (20)	X (20)	12
458.0	1.0	4	45.5				X (26)	12
506.0	1.0	3	37.8	X (17)		X (18)	X (18)	12
508.0	1.0	4	50.5	X (23)		X (24)	X (24)	12
606.0	0.7	3	45.3	X (10)		X (10)	X (10)	12
608.0	0.7	4	60.5	X (13)		X (14)	X (14)	12
708.0	0.7	4	70.5	X (11)			X (12)	6
808.0	0.7	4	80.5	X (10)			X (10)	6

X = Stock standard.

Metric Tru-Bore® - HT (design pressures shown in brackets)

Welded tubes, annealed and pickled.
In 6 m random lengths, PE (Plain Ends).
Manufactured and inspected according to EN 10217-7 TC1, weld factor z = 1.0.
Tolerances in accordance with EN ISO 1127 (OD ≤ 168.3 mm = D3/T3 and OD > 168.3 mm = D2/T3).
Stock standard dimensions and grades in the table below are marked with design pressures.
The design pressures are calculated in bar according to: EN 13480, EN 10217-7, Grade, T = 20 °C, weld factor z = 1.0.

Metric HT

OD mm	z	Wall mm	Weight kg/m	4307	4404	4432	Std Pks m
18.0	1.0	1.5	0.62	X (254)	X (265)		306
20.0	1.0	1.5	0.69	X (227)	X (236)	X (236)	348
20.0	1.0	2	0.90	X (310)	X (323)	X (323)	348
25.0	1.0	1.5	0.88	X (179)	X (186)	X (186)	348
25.0	1.0	2	1.15	X (243)	X (253)	X (253)	348
28.0	1.0	1.5	1.00	X (159)	X (165)	X (165)	306
30.0	1.0	1.5	1.07	X (148)	X (154)		306
30.0	1.0	2	1.40	X (200)	X (208)	X (208)	306
35.0	1.0	1.5	1.26	X (126)	X (131)	X (131)	306
38.0	1.0	1.5	1.37	X (115)	X (120)	X (120)	306
38.0	1.0	2	1.80	X (156)	X (162)	X (162)	306
43.0	1.0	1.5	1.56	X (102)	X (106)	X (106)	222
44.5	1.0	2	2.13	X (132)	X (138)	X (138)	222
53.0	1.0	1.5	1.93	X (82)	X (85)	X (85)	222
54.0	1.0	2	2.60	X (108)	X (113)	X (113)	222
68.0	1.0	1.5	2.50	X (63)	X (66)	X (66)	174
69.0	1.0	2	3.36	X (85)	X (89)	X (89)	174

X = Stock standard available as TC1.

OT 120
ANSI/ASME B36.19M 2004

DN	NPS	OD mm	Sch 5S/5		Sch 10S		Sch 40S/STD		Sch 80S/XS	
			wt mm	kg/m	wt mm	kg/m /1)	wt mm	kg/m /1)	wt mm	kg/m
10	3/8	17.1			1.65	0.64				
15	1/2	21.3	1.65	0.81	2.11	1.01/172	2.77	1.29/231		
20	3/4	26.7	1.65	1.03	2.11	1.30/135	2.87	1.71/187	3.91	2.23
25	1	33.4	1.65	1.31	2.77	2.12/142	3.38	2.54/177	4.55	3.29
32	1 1/4	42.2	1.65	1.68	2.77	2.73/111	3.56	3.44/144	4.85	4.54
40	1 1/2	48.3	1.65	1.93	2.77	3.16/96	3.68	4.11/128	5.08	5.50
50	2	60.3	1.65	2.42	2.77	3.99/77	3.91	5.52/109	5.54	7.60
65	2 1/2	73.0	2.11	3.74	3.05	5.34/69	5.16	8.76/120	7.01	11.6
80	3	88.9	2.11	4.58	3.05	6.56/57	5.49	11.5/104	7.62	15.5
100	3 1/2	101.6	2.11	5.26	3.05	7.53/49	5.74	13.8/95	8.08	19.0
	4	114.3	2.11	5.93	3.05	8.49/44	6.02	16.3/88	8.56	22.7
125	5	141.3	2.77	9.61	3.40	11.7/39	6.55	22.1/77	9.53	31.4
150	6	168.3	2.77	11.5	3.40	14.0/33	7.11	28.7/70	10.97	43.2
200	8	219.1	2.77	15.0	3.76	20.3/28	8.18	43.2/62	12.70	65.6
250	10	273.0	3.40	23.0	4.19	28.2/25	9.27	61.2/56	12.70	82.8
300	12	323.9	3.96	31.7	4.57	36.5/23	9.53	75.0/48	12.70	98.9
350	14	355.6	3.96	34.9	4.78	42.0/22	9.53	82.6/44	12.70	109
400	16	406.4	4.19	42.2	4.78	48.1/19	9.53	94.7/38	12.70	125
450	18	457	4.19	47.5	4.78	54.1/17	9.53	107/34	12.70	141
500	20	508	4.78	60.2	5.54	69.7/18	9.53	119/31	12.70	157
550	22	559	4.78	66.3	5.54	76.8/16	9.53	131/28	12.70	174
600	24	610	5.54	83.8	6.35	96.0/17	9.53	143/25	12.70	190
	26	660					9.53	155	12.70	206
700	28	711					9.53	167	12.70	222
	30	762	6.35	120	7.92	150	9.53	180	12.70	238
800	32	813					9.53	192	12.70	254
	34	864					9.53	204	12.70	271
900	36	914					9.53	216	12.70	287
	38	965					9.53	228	12.70	303
1000	40	1016					9.53	240	12.70	319
	42	1067					9.53	252	12.70	335
1100	44	1118					9.53	264	12.70	351
	46	1168					9.53	276	12.70	367
1200	48	1219					9.53	289	12.70	384
								...*	...	
	52	1321					9.53	313	12.70	416
	54	1372					9.53	325	12.70	432
	56	1422					9.53	337	12.70	448
	60	1524					9.53	361	12.70	481
	64	1626					9.53	386	12.70	513
	68	1727					9.53	410	12.70	545
	72	1829					9.53	434	12.70	577
	76	1930					9.53	458	12.70	610
	80	2032					9.53	483	12.70	642

The table shows our production programme within the ANSI B36.19 standard.
Selected ANSI-dimensions are stocked in following grades: EN 1.4307/304L, 1.4404/316L, 1.4432/316L, 1.4462/2205 and 1.4547/254 SMO®. See tables on following pages.
The pressure calculations in this table are made according to ASME B31.3, ASTM 312 pipes with NPS 1/2"-24" SCH 10S and 40S. Steel grade is 304L at T = 38 °C.
*) Not standardised schedules within our product range.
1) Design pressure bar.

OT 120
ASME B36.10M 2004

DN	NPS	OD mm	Sch 10		Sch 20		Sch 30		Sch 40		Sch 60	
			wt mm	kg/m	wt mm	kg/m	wt mm	kg/m	wt mm	kg/m	wt mm	kg/m
10	3/8	17.1	1.65	0.64								
15	1/2	21.3	2.11	1.01			2.41	1.14	2.77	1.29		
20	3/4	26.7	2.11	1.30			2.41	1.47	2.87	1.71		
25	1	33.4	2.77	2.12			2.90	2.21	3.38	2.54		
32	1 1/4	42.2	2.77	2.73			2.97	2.92	3.56	3.44		
40	1 1/2	48.3	2.77	3.16			3.18	3.59	3.68	4.11		
50	2	60.3	2.77	3.99			3.18	4.55	3.91	5.52		
65	2 1/2	73.0	3.05	5.34			4.78	8.16	5.16	8.76		
80	3	88.9	3.05	6.56			4.78	10.1	5.49	11.5		
100	3 1/2	101.6	3.05	7.53			4.78	11.6	5.74	13.8		
100	4	114.3	3.05	8.49			4.78	13.1	6.02	16.3		
125	5	141.3	3.40	11.7					6.55	22.1		
150	6	168.3	3.40	14.0					7.11	28.7		
200	8	219.1	3.76	20.3	6.35	33.8	7.04	37.4	8.18	43.2	10.31	53.9
250	10	273.0	4.19	28.2	6.35	42.4	7.80	51.8	9.27	61.2	12.70	82.8
300	12	323.9	4.57	36.5	6.35	50.5	8.38	66.2	10.31	80.9	14.27	111
350	14	355.6	6.35	55.5	7.92	68.9	9.53	82.6	11.13	96.0	15.09	129
400	16	406.4	6.35	63.6	7.92	79.0	9.53	94.7	12.70	125	16.66	163
450	18	457	6.35	71.6	7.92	89.0	11.13	124	14.27	158	19.05	209
500	20	508	6.35	79.7	9.53	119	12.70	157	15.09	186	20.62	252
550	22	559	6.35	87.9	9.53	131	12.70	174			22.23	299
600	24	610	6.35	96.0	9.53	143	14.27	213	17.48	259	24.61	361
	26	660	7.92	129	12.70	206						
700	28	711	7.92	139	12.70	222	15.88	276				
	30	762	7.92	150	12.70	238	15.88	297				
800	32	813	7.92	160	12.70	254	15.88	317	17.48	348		
	34	864	7.92	170	12.70	271	15.88	337	17.48	370		
900	36	914	7.92	180	12.70	287	15.88	357	19.05	427		
			...*		...		...		...		...	
	38	965	7.92	190	14.27	340	15.88	377	17.48	415	19.05	451
1000	40	1016	7.92	200	14.27	358	15.88	398	17.48	437	19.05	476
	42	1067	11.13	294	14.27	376	15.88	418	17.48	459	19.05	500
1100	44	1118	11.13	308	14.27	394	15.88	438	17.48	482	19.05	524
	46	1168	11.13	322	14.27	412	15.88	458	17.48	504	19.05	548
1200	48	1219	11.13	337	14.27	430	15.88	478	17.48	526	19.05	572
	52	1321	11.13	365	14.27	467	15.88	519	17.48	570	19.05	621
	54	1372	11.13	379	14.27	485	15.88	539	17.48	593	19.05	645
	56	1422	11.13	393	14.27	503	15.88	559	17.48	615	19.05	669
	60	1524	11.13	422	14.27	539	15.88	600	17.48	659	19.05	718
	64	1626	11.13	450	14.27	576	15.88	640	17.48	704	19.05	766
	68	1727	11.13	478	14.27	612	15.88	680	17.48	748	19.05	815
	72	1829	11.13	507	14.27	648	15.88	721	17.48	793	19.05	863
	76	1930	11.13	535	14.27	684	15.88	761	17.48	837	19.05	911
	80	2032	11.13	563	14.27	721	15.88	802	17.48	882	19.05	960

The table shows our production programme within the ASME B36.10 standard.
Selected ANSI-dimensions are stocked in following grades: EN 1.4307/304L, 1.4404/316L, 1.4432/316L, 1.4462/2205 and 1.4547/254 SMO®. See tables on following pages.
*) Not standardised schedules within our product range.

OT 120
ASME B36.10M 2004

DN	NPS	OD mm	Sch 80		Sch 100		Sch 120		Sch 140		Sch 160		Sch XXS	
			wt mm	kg/m	wt mm	kg/m	wt mm	kg/m	wt mm	kg/m	wt mm	kg/m	wt mm	kg/m
10	3/8	17.1												
15	1/2	21.3												
20	3/4	26.7	3.91	2.23										
25	1	33.4	4.55	3.29										
32	1 1/4	42.1	4.85	4.54										
40	1 1/2	48.3	5.08	5.50										
50	2	60.3	5.54	7.60										
65	2 1/2	73.0	7.01	11.6										
80	3	88.9	7.62	15.5										
100	3 1/2	101.6	8.08	19.0										
100	4	114.3	8.56	22.7										
125	5	141.3	9.53	31.4										
150	6	168.3	10.97	43.2										
200	8	219.1	12.70	65.6	15.09	77.1	18.26	91.8						
250	10	273.0	15.09	97.4	18.26	116	21.44	135	25.40	157	28.58	175	25.40	157
300	12	323.9	17.48	134	21.44	162	25.40	190	28.58	211	33.32	242	25.40	190
350	14	355.6	19.05	161	23.83	198	27.79	228	31.75	257	35.71	286	25.40	210
400	16	406.4	21.44	207	26.19	249	30.96	291	36.53	338	40.49	371	25.40	242
450	18	457	23.83	258	29.36	314	34.93	369	39.68	415	45.24	466	25.40	274
500	20	508	26.19	316	32.54	387	38.10	448	44.45	516	50.01	573	25.40	307
550	22	559	28.58	380	34.93	458	41.28	535	47.63	610			25.40	339
600	24	610	30.96	449	38.89	556	46.02	650					25.40	372
			...*		...		...		...		...		...	
	26	660	30.96	488	38.10	593	41.28	640	44.45	685	50.80	775	25.40	404
700	28	711	30.96	527	38.10	642	41.28	692	44.45	742	50.80	840	25.40	436
	30	762	30.96	567	38.10	691	41.28	745	44.45	799	50.80	905	25.40	468
800	32	813	30.96	606	38.10	739	41.28	798	44.45	855	50.80	969	25.40	501
	34	864	30.96	646	38.10	788	41.28	850	44.45	912	50.80	1034	25.40	533

The table shows our production programme within the ASME B36.10 standard.
*) Not standardized schedules within our product range.

ANSI/ASME B36.19M

Stainless steel pipe NPS 1/8"– 30". Schedule 5S, 10S, 40S and 80S. Nominal diameters, wall thicknesses and wall thickness tolerances. The schedule numbers (e.g. 40) indicate different wall thickness series.
The letter "S" in the designation stands for stainless material.

As ANSI/ASME B36.19M is not complete, the standard for carbon steel tubes ASME B36.10M is used as a complement for stainless tubes. In this standard there is no "S" after the schedule figure. The sizes are stated in the following standard published by the American National Standards Institute.

ASME B36.10M

Welded and Seamless wrought steel pipe NPS 1/8"– 80". Schedule 10–160. Nominal diameters, wall thicknesses and weight per length unit.

The ANSI system is a national system that in applied throughout the world, and particularly in certain industries and areas and especially within the petrochemical and offshore sectors.

Standard stock program

The tables below reflect the standard OSTP stock program only, other dimensions and grades are available against special production according to our manufacturing range and capabilities.
Please refer enquiries to mill customer service contacts for review and quotation.

ANSI pipes - Standard grades (design pressures shown in brackets)

Welded pipes, annealed and pickled.
In 6 m random lengths, PE (BE as an additional option).
Sizes < 18"NB 100% ET tested in lieu of hydrostatic test.
18"NB and over hydrostatic tested.
Manufactured and inspected according to ASTM A312.
General product requirements and tolerances according to Standard Specification and ASTM A999.
Stock standard dimensions and grades in the table below are marked with design pressures.
The design pressures are calculated in bar according to: ASME B31.3, ASTM A312, grade, T = 38 °C (100 °F), joint quality factor Ej = 0.8.

A312

NB	Sch	OD mm	Ej	Wall mm	Weight kg/m	1.4307 304L	1.4404 316L	Std Pks m
1/2"	10S	21.3	0.8	2.11	1.01	X (172)	X (172)	348
1/2"	40S	21.3	0.8	2.77	1.29	X (231)	X (231)	348
3/4"	10S	26.67	0.8	2.11	1.30	X (135)	X (135)	306
3/4"	40S	26.67	0.8	2.87	1.71	X (180)	X (180)	306
1"	10S	33.4	0.8	2.77	2.12	X (142)	X (142)	306
1"	40S	33.4	0.8	3.38	2.54	X (176)	X (177)	306
1 1/4"	10S	42.16	0.8	2.77	2.73	X (111)	X (111)	306
1 1/4"	40S	42.16	0.8	3.56	3.44	X (145)	X (144)	306
1 1/2"	10S	48.28	0.8	2.77	3.16	X (96)	X (96)	222
1 1/2"	40S	48.28	0.8	3.68	4.11	X (130)	X (130)	222
2"	10S	60.33	0.8	2.77	3.99	X (77)	X (77)	222
2"	40S	60.33	0.8	3.91	5.52	X (109)	X (109)	222
2 1/2"	10S	73.03	0.8	3.05	5.34	X (69)	X (69)	222
3"	10S	88.9	0.8	3.05	6.56	X (57)	X (57)	114
3"	40S	88.9	0.8	5.49	11.5	X (104)	X (104)	114
4"	10S	114.3	0.8	3.05	8.50	X (44)	X (44)	114
4"	40S	114.3	0.8	6.02	16.3	X (88)	X (88)	60
6"	5S	168.3	0.8	2.77	11.5	X (27)	X (27)	108
6"	10S	168.3	0.8	3.40	14.0	X (33)	X (33)	108
6"	40S	168.3	0.8	7.11	28.7	X (70)	X (70)	36
8"	5S	219.1	0.8	2.77	15.0	X (21)	X (21)	60
8"	10S	219.1	0.8	3.76	20.3	X (28)	X (28)	60
8"	20	219.1	0.8	6.35	33.8	X (48)	X (48)	24
8"	40S	219.1	0.8	8.18	43.2	X (62)	X (62)	24
10"	5S	273	0.8	3.40	23.0	X (20)	X (20)	48
10"	10S	273	0.8	4.19	28.2	X (25)	X (25)	48
10"	20	273	0.8	6.35	42.4	X (38)	X (38)	24
10"	40S	273	0.8	9.27	61.2	X (56)	X (56)	12
12"	5S	323.9	0.8	3.96	31.7	X (20)	X (20)	18
12"	10S	323.9	0.8	4.57	36.5	X (23)	X (23)	18
12"	20	323.9	0.8	6.35	50.5	X (32)	X (32)	18
12"	40S	323.9	0.8	9.53	75.0	X (48)	X (48)	12
14"	10S	355.6	0.8	4.78	42.0	X (22)	X (22)	24
14"	10	355.6	0.8	6.35	55.5	X (29)	X (29)	12
16"	10S	406.4	0.8	4.78	48.1	X (19)	X (19)	24
16"	10	406.4	0.8	6.35	63.6	X (25)	X (25)	12
18"	10S	457.2	0.8	4.78	54.1	X (17)	X (17)	12
18"	10	457.2	0.8	6.35	71.7	X (23)	X (23)	12
20"	10S	508	0.8	5.54	69.7	X (18)	X (18)	12
20"	10	508	0.8	6.35	79.8	X (20)	X (20)	12
24"	10S	610	0.8	6.35	96.0	X (17)	X (17)	12

X = Standard stock.

ANSI pipes - Standard grades (design pressures shown in brackets)

Welded pipes, annealed and pickled.
In 6 m random lengths PE (BE as option), all hydrostatic tested.
Manufactured and inspected according to ASTM A358 Class 2.
(Can be upgraded to Class 1 or 5 according to thickness with additional X-raying at extra cost).
General product requirements and tolerances according to Standard Specification and ASTM A999.
Stock standard dimensions and grades in the table below are marked with design pressures.
The design pressures are calculated in bar according to: ASME B31.3, ASTM A358 Class 2, T = 38 °C (100 °F), joint quality factor Ej = 0.85 (higher ratings can be achieved by upgrading to other classes).

A358 Class 2

NB	Sch	OD mm	Ej	Wall mm	Weight kg/m	304L	316L	Std Pks m
6"	40S	168.3	0.8	7.11	28.7	X (85)	X (85)	N/A
8"	40S	219.1	0.8	8.18	43.2	X (75)	X (75)	N/A
8"	80S	219.1	0.8	12.70	65.6	X (137)	X (137)	N/A
10"	40S	273	0.8	9.27	61.2	X (68)	X (68)	N/A
10"	80S	273	0.8	12.70	82.7	X (109)	X (109)	N/A
12"	40S	323.9	0.8	9.53	75.0	X (59)	X (59)	N/A
12"	80S	323.9	0.8	12.70	98.8	X (79)	X (79)	N/A
14"	40S	355.6	0.8	9.53	82.5	X (54)	X (54)	N/A
16"	40S	406.4	0.8	9.53	94.6	X (47)	X (47)	N/A
18"	40S	457.2	0.8	9.53	107	X (42)	X (42)	N/A

X = Standard stock.

Standard stock program

The tables below reflect the standard OSTP stock program only, other dimensions and grades are available against special production according to our manufacturing range and capabilities.
Please refer enquiries to mill customer support contacts for review and quotation.

ANSI pipes - Special grades (design pressures shown in brackets)

Welded pipes, annealed and pickled.
In 6 m random lengths, PE (BE as an additional option).
Manufactured and inspected according to ASTM A790, A928, A358, A312.
General product requirements and tolerances according to Standard Specification and ASTM A999.
Stock standard dimensions and grades in the table below are marked with design pressures.
Design pressures in bar according to: ASME B31.3, actual Product Standard, Grade, T = 38 °C (100 °F), actual joint quality factor Ej.

A790 & A928 & A358							MDS-D42*		MDS-R12*		
NB	Sch	OD mm	Wall mm	Weight kg/m	A790 2205 Ej = 0,8	A928 Cl 1 2205 Ej = 1,0	A928 Cl 3 2205 Ej = 1,0	A928 Cl 1 2507 Ej = 1,0	A358 Cl 3 254 SMO® Ej = 1,0	Std Pks m
1"	10S	33.4	2.77	2.12	X (255)					N/A
1 1/4"	10S	42.16	2.77	2.73	X (199)					N/A
1 1/2"	10S	48.28	2.77	3.16	X (173)					N/A
2"	10S	60.33	2.77	3.99	X (137)					N/A
3"	10S	88.9	3.05	6.56	X (102)					N/A
4"	10S	114.3	3.05	8.50	X (79)					N/A
6"	10S	168.3	3.40	14.0	X (59)		X (74)		X (66)	N/A
6"	40S	168.3	7.11	28.7		X (158)		X (203)		N/A
8"	10S	219.1	3.76	20.3	X (50)		X (63)		X (56)	N/A
8"	40S	219.1	8.18	43.2		X (139)		X (179)		N/A
10"	10S	273	4.19	28.2	X (45)		X (56)		X (50)	N/A
10"	40S	273	9.27	61.2		X (126)		X (162)		N/A
12"	10S	323.9	4.57	36.5	X (41)		X (52)		X (46)	N/A
12"	40S	323.9	9.53	75.0		X (109)		X (140)		N/A
14"	10S	355.6	4.78	42.0	X (39)		X (49)		X (57)	N/A
16"	10S	406.4	4.78	48.1	X (34)		X (43)		X (38)	N/A
18"	10S	457.2	4.78	54.1			X (38)			N/A
20"	10S	508	5.54	69.7			X (40)			N/A
24"	10S	610	6.35	96.0			X (38)			N/A

*) Material Data Sheets according to no stock standard.
X = Standard stock.

Heavy wall pipe

Heavy Wall Pipe (HWP) is a niche product / segment within the process pipe market. Along with the HWP segment we also include what we call LOD Pipes (Larger Outer Diameter). These are pipes with an OD 16" and larger. The HWP usually have an OD / WT ratio that makes it "stronger" than the typical process pipe we produce. At OSTP we mainly produce HWP from sheet/plate in so called "batch production", which means that the pipes are produced one by one and not continuously from a coil. Within OSTP, pipes with T > 6 mm are normally classified as HWP. These pipes are normally made at our OSTP works in Storfors (pipes from plate).

HWP applications

- Oil & Gas
- Chemical
- Pulp & Paper
- Nuclear
- Any industry / application where a thick wall pipe is needed
- Petrochemical
- Water treatment (incl. desalination)
- Metallurgy
- Ship building

HWP characteristics

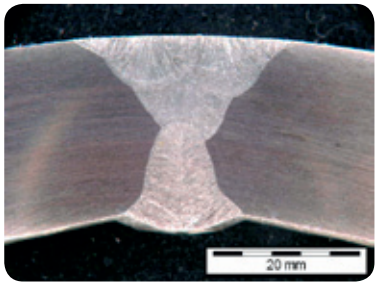
- Project oriented
- From 6 months up to 3 years from project start to delivery
- The products have to work in severe corrosive environments, high/low temperatures and high pressures
- Comprehensive specifications
- Many non-standard requirements
- Customer adapted

Typical HWP grades: Standard Austenitic-, High-performance Austenitic-, Duplex- and Super Duplex stainless steel grades.

Typical HWP specifications: For process pipes A 312, A 358, A 790, A 928, B673, EN10217-7, EN10296-2, AD 2000 W2, DIN 17455. For line pipes API5LC (API = American Petroleum Institute).

Typical HWP sizes:
OD: up to 2032 mm
WT: up to 35 mm
L: standard length 6 m r/l, special lengths from 1.5 – 12 m are available depending on requirements and pipe size.

Execution:
Longitudinally Plasma (PAW) or Submerged Arc Welded (SAW). TIG can be used for inside welding / remelting of the weld root. Use of filler metal, welding execution (single or double sided welded), annealing, DT (Destructive Testing) and NDT (None Destructive Testing), pickling etc. depend on the product size and the specification requirements. Different surface and packaging requirements are also available.



Weld cross-section of a 406 x 26 mm 1.4410 (2507) pipe.

Heavy Wall Pipe

OSTP has delivered 16 km of linepipe, about 2 600 tons, of high-strength Duplex stainless steel 2205 to the gas field Kela-2 in China.

Singapore Marina Bay Pedestrian Bridge is constructed using about 600 tons of Duplex stainless steel from Outokumpu, of which more than 300 tons are Heavy Wall Pipe from OSTP.

OT 153

Heat exchanger tubes

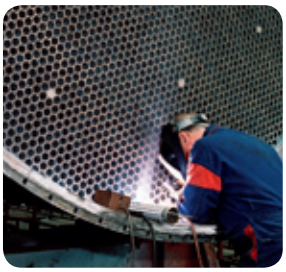
Typical applications are coolers, heaters, evaporators, condensers and recuperators in harsh environments. The tubes are supplied according to defined international standards as well as customer specific specifications in a large variety of steel grades and dimensions. They are made from strips, normally delivered in annealed condition in fixed lengths. Specific requirements on execution, tolerances, lengths, mechanical and corrosion properties are offered on request.

Technical information

Approvals:	PED 97/23/EC and AD2000 W0/TRB100.
Grades:	Austenitic / High-performance Austenitic / Lean Duplex / Duplex / Super Duplex and High-temperature grades.
Sizes:	Standard metric, imperial, and ISO outside diameters and wall thicknesses in the range: Tig welded OD 21.3 - 133 mm, WT 1.5 - 6.02 mm (depending on grade and D to T ratios) and in max lengths of 12 m, bead cold worked (BCW). Laser welded, OD 42,2 - 114.3 mm, WT 0.8 - 4.0 mm (depending on grade and D to T ratios) and in max lengths of 12 meter (no internal bead working, h = 0.15 mm max).
Product standards:	AD2000-W2, EN 10217-7, ASTM A 249, A 269, A 789 (according to grade).

Production size range

	Wall Thickness in mm											
OD mm	0.8	0.9/1.0	1.2	1.5	1.65	2.0/2.11	2.5/2.65	3.0/3.38	3.6	4.0	5.0	6.0
21.0 / 21.3				■	■	■	■					
23.0				■	■	■	■					
25.0 / 25.4				■	■	■	■					
26.7 / 26.9				■	■	■	■					
28.0				■	■	■	■					
30.0				■	■	■	■					
32.0				■	■	■	■					
33.0				■	■	■	■					
33.4 / 33.7				■	■	■	■	■				
35.0				■	■	■	■	■				
36.0				■	■	■	■	■				
38.0 / 38.1				■	■	■	■	■				
42.2 / 42.4	■	■	■	■	■	■	■	■	■	■		
43,0	■	■	■	■	■	■	■	■	■	■		
44.5	■	■	■	■	■	■	■	■	■	■		
48.3	■	■	■	■	■	■	■	■	■	■		
53.0	■	■	■	■	■	■	■	■	■	■		
54.0	■	■	■	■	■	■	■	■	■	■		
57.0				■	■	■	■	■	■			
60.3		■	■	■	■	■	■	■	■	■		
76.1		■	■	■	■	■	■	■	■	■	■	
83.0		■	■	■	■	■	■	■	■	■	■	
84.0		■	■	■	■	■	■	■	■	■	■	
86.0		■	■	■	■	■	■	■	■	■	■	
101.6				■	■	■	■	■	■	■	■	
103.0		■	■	■	■	■	■	■	■	■	■	
104.0		■	■	■	■	■	■	■	■	■	■	
106.0				■	■	■	■	■	■	■	■	
108.0				■	■	■	■	■	■	■	■	
114.3		■	■	■	■	■	■	■	■	■	■	■
123.0 / 127.0 / 129.0 /131.0 / 133.0				■	■	■	■	■	■	■	■	■



Austenitic grades: 1.4301 / 1.4306 / 1.4307 / 1.4541 / 1.4401 / 1.4404

Super Austenitic grades: 1.4438 / 1.4539 / 1.4547
Duplex & Lean Duplex grades: 1.4162 / 1.4362 / 1.4462 / 1.4410
High Resistant grades: 1.4845 / / 1.4835 / 1.4818

Note! Not all dimensions are available in all grades

First walkwaybridge in LDX 2101® crossing Likholefossen at Gaularfjell in Norway.

Circular hollow sections are used in various industries:

- Architecture, Building and Construction
- Machine and process equipment builders
- Decoration
- Automotive and transport

Grades: Austenitic, Duplex and Ferritic Stainless Steel.

Product Standards: EN 10296-2, A312, A358, A778, A790, A928, Mill standards etc.

Tolerances: According to requirements stated in the Product Standards.

Surfaces: As welded, pickled, ground or polished (with the support of external service routes).

Butt weld fittings

Butt weld fittings are manufactured from either tubes, sheet or strip depending on product and dimension.

Our mills in Molkom and Örnsköldsvik are approved suppliers to the European Pressure Equipment Directive PED 97/23/EC and certified to AD 2000 Merkblatt W0.

Our North American mill in Brockville is approved to ISO 9001:2000 and manufactures a complete range of stainless steel butt weld fittings according to applicable specifications of CRN (Canadian Registration Number) CSA B51 Clause 4.3, ASME (American Society of Mechanical Engineers) SA403, ASTM (American Society for Testing and Materials) A403, A815, ANSI (American National Standards Institute) B16.9, B16.25 and MSS (Manufacturers Standardization Society) MSS SP43.

For general use our fittings are delivered with welding factor z = 0.7 without special inspection according to EN 10253-3.
See additional information on page 80.

For the use in pressure equipment that require welding factor z = 1.0 we manufacture fittings with special inspection according to EN 10253-4. An extensive stock programme together with Outokumpu distribution net secures a high availability and fast delivery service for any application.

Our stock standard is based on EN 1.4307 and 1.4432 unless other information is given. Other grades may be manufactured on request. If you can't find what you need in our product range please do not hesitate to contact our sales department.
We can offer special products as well.

Tolerances on wall thickness T, according to EN 10253-3/4, symbols described on page 12 in the standard.

Diameter D	Wall thickness T	Permissible deviation Minus	Plus
D ≤ 610	All	- 12.5%	+ 15%
D > 610	≤ 10 mm	- 0.35 mm	+ 15%
	> 10 mm	- 0.50 mm	+ 15%

Tolerances on structural dimensions in mm

D	F-G-H-L	B	C	K
≤ 114.3	± 2	± 7	± 7	± 4
114.3 ≤ D ≤ 219.1	± 2	± 7	± 7	± 7
219.1 ≤ D ≤ 406.4	± 5	± 7	± 10	± 7
406.4 ≤ D ≤ 762	± 5	± 10	± 10	± 7
762 ≤ D ≤ 1219	± 10	± 10	± 10	± 10

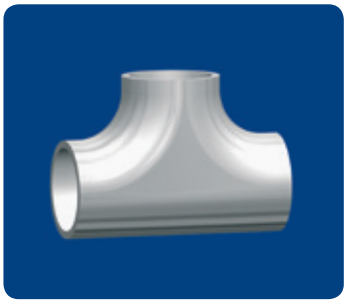
Tolerances according to EN 1092-1

Dimension	Flange type	Size	Tolerance mm
Outside diameter of neck A	35, 37	≤ DN 150 > DN 150	± 0.75% min ± 0.3 mm ± 1% min ± 3.0 mm
Wall thickness Sp	35, 37	≤ DN 600 > DN 600	- 12.5% / +15% - 0.5 / +15%
Outside diameter D	All	≤ DN 150 > DN 150 ≤ DN 500 > DN 500 ≤ DN 1200 > DN 1200 > DN 600	± 2.0 mm ± 3.0 mm ± 5.0 mm ± 7.0 mm
Length through hub H4, H5	35, 37	≤ DN 80 > DN 80 ≤ DN 250 > DN 250	± 1.5 ± 2.0 ± 3.0
Collar thickness F	35 37	≤ 18 mm > 18 mm ≤ 50 mm ≤ 5 mm thickness	± 1.0 mm ± 1.5 mm ± 0.2 mm
Facing diameter d1	All	≤ DN 250 > DN 250	+ 2.0 / - 1.0 + 3.0 / - 1.0

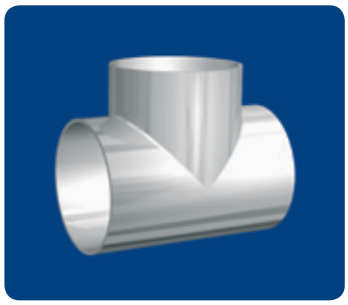
Butt Weld Fittings

Elbows
PAGE 41

Elbows long radius
PAGE 41



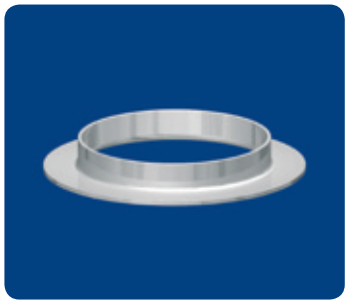
Tees
PAGE 46



Tees fabricated
PAGE 47

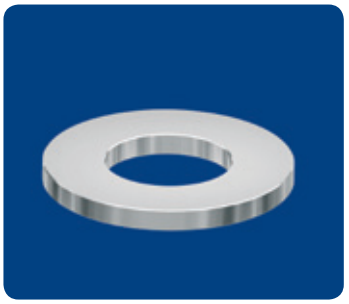
Reducers CC
PAGE 55

Reducers EC
PAGE 55

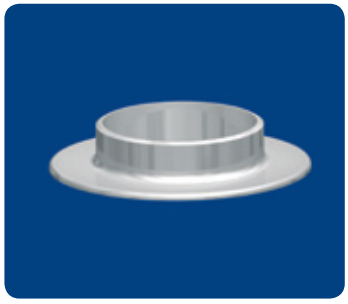


Pressed collars
PAGE 62

Weldring necks
PAGE 65



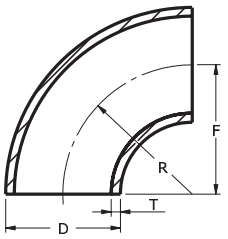
Weld-on plate collars
PAGE 69



Angle collars
PAGE 70

Caps
PAGE 71

Tube clamps
PAGE 73

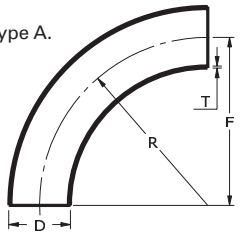


OT 200
ISO
Elbows 3D (R ~ 1.5 x D)

DN	D	R=F	Wall thickness T mm 1.6	2.0	2.3	2.5	2.6	2.9	3.0	3.2	4.0	5.0	6.0	Max T mm
			Weight kg/pce / Design pressure bar											
10	17.2	28.0	0.02/212*	0.03/273*										
15	21.3	27.5	0.03/157*	0.04/201*			0.05/271*							
20	26.9	28.5	0.04/112*	0.06/143*			0.07/192*							
25	33.7	38.0	0.08/95*	0.10/120*			0.12/153*							
32	42.4	47.5	0.12/71*	0.15/90*			0.19/119*							
40	48.3	57.0	0.16/63*	0.21/80*			0.26/105*							
50	60.3	76.0	0.27/51*	0.35/65*			0.44/85*	0.52/96*						
65	76.1	95.0		0.55/35**			0.73/47**	0.81/52**						
80	88.9	114.0		0.78/30**	0.90/35	0.98/39	1.01/40**	1.13/45**	1.17/47	1.24/50	1.51/63**	1.89/80		
100	101.6	152.0		1.20/28										
100	114.3	152.0		1.30/24**		1.75/30	1.94/32**	2.00/35**		3.29/39	4.11/49**			
125	139.7	190.0		2.10/20**		2.70/25	3.08/26**	3.10/29**			4.08/40			
150	168.3	229.0		3.00/16**		3.90/20	4.30/21**	4.50/24**			5.90/33**	7.40/42	8.80/50	14.0
200	219.1	305.0		5.20/12**		6.80/16**	7.50/16**	7.80/18			10.3/26**	12.8/32		17.0
250	273.0	381.0		8.00/14*			10.5/19*	12.1/21*			16.1/29*	20.1/26	24.0/31	25.0
300	323.9	457.0		11.6/11*			15.0/15*	17.3/17*			23.0/24*	28.7/22	34.3/26	23.0
350	355.6	533.0						22.2/15*			29.5/21*	36.8/19**	44.1/24	10.0
400	406.4	610.0						29.3/14*			38.6/20*	48.2/25*	57.6/21	20.0
450	457	686.0						36.8/9			48.9/12	61.0/15		13.0
500	508	762.0						45.4/8			60.4/11	75.4/14	90.3/17	25.0
600	610	914.0						65.4/6			87.1/9	109/11	130/14	25.0
700	711	1067.0									119/8	148/10	178/13	13.0
800	813	1219.0									156/7	195/9	232/11	20.0
900	914	1372.0									206/6	246/8	294/10	22.0
1000	1016	1524.0									243/6	304/7	365/9	22.0
1100	1118	1667.0									368/5	441/6		25.0
1200	1219	1800.0										438/6	526/7	19.0

*) Are calculated for grade EN 1.4307 at 20 °C according to EN10253-4 Type A.
**) Steel grades EN 1.4541 and EN 1.4571 are kept on stock according to EN 10253-4, pressure figures have to be multiplied by 1.43 (1.4541).
Unmarked pressure ratings are calculated for grade EN 1.4307 at 20 °C according to EN 10253-3 Type A.
All dimensions can with additional testing be delivered to meet EN 10253-4 Type A. This has to be confirmed when ordering.

Stock standard: EN 1.4307 and 1.4432

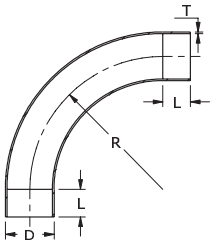


OT 201
ISO
Elbows 5D (R ~ 2.5 x D)

DN	D	R=F	Wall thickness T mm 2.0	2.6	2.9	3.0	3.2	4.0	5.0	6.0	8.0	Max T mm
			Weight kg/pce / Design pressure bar									
80	88.9	205	1.40/35			2.12/53						13
100	114.3	270	2.40/27			3.50/41						14
125	139.7	330	3.60/22	4.68/29		5.20/34		7.00/45				15
150	168.3	390		6.63/24		7.60/28		9.80/37				15
200	219.1	510	8.76/14			13.0/21		17.1/28				20
250	273.0	650				20.8/17		27.3/23	34.4/29			30
300	323.9	775				29.4/14		38.7/19	49.6/24			24
350	355.6	850				36.0/13		47.0/17	59.0/22			16
400	406.4	970				46.0/11		61.0/15	76.0/19			22
500	508	1245						98.0/12	122/15			22
600	610	1524							182/13	218/15	290/20	22
700	711	1778								297/14	395/19	20

The pressures are calculated for grade EN 1.4307 at 20 °C according to EN 10253-3 Type A.
All dimensions can with additional testing be delivered to meet EN 10253-4 Type A. This has to be confirmed when ordering.

Stock standard: EN 1.4307 and 1.4432

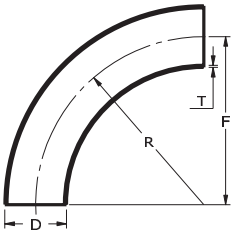


OT 205
ISO
Elbows with straight ends (R ~ 2 x D)

DN	D	R	L	Wall thickness T mm 1.6	2.0	2.3	2.6	2.9	3.2	3.6	4.0
				Weight kg/pce / Design pressure bar							
15	17.2	50	25	0.08/162		0.11/244					
	21.3	50	25				0.16/214				
20	26.9	50	25				0.20/159				
25	33.7	60	25						0.35/155		
32	42.4	85	30						0.60/123		
40	44.5	85	30		0.41/70			0.61/104			
	48.3	95	30						0.76/106		
50	57.0	110	40					1.00/80			
	60.3	120	40							1.33/95	
65	70.0	130	40					1.38/64			
	76.1	145	45					1.70/59		2.07/74	
80	88.9	170	50								3.14/70
100	101.6	195	55							3.70/55	
	108.0	205	55								4.45/57

The pressures are calculated for grade EN 1.4307 at 20 °C according to EN 10253-3 Type A.
All dimensions can with additional testing be delivered to meet EN 10253-4 Type A. This has to be confirmed when ordering.

Stock standard: EN 1.4307 and 1.4432

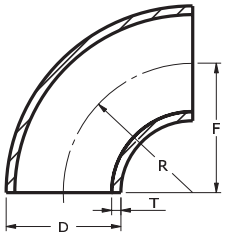


OT 213
Metric Tru-Bore®
Elbows 6 ID (R ~ 3 x ID)

DN = ID	D	R=F	Wall thickness T mm 2.0	2.5	3.0	4.0	5.0	6.0	8.0
			Weight kg/pce / Design pressure bar						
80	84/86	240	1.9/39		2.4/57				
100	104/106	300	2.4/31		3.7/46				
130	130/131	375		4.7/31	5.7/37				
150	155/156	450		6.7/26	8.2/31				
200	206/208	600			14.5/23	19.5/31			
250	256/258/260	750			22.5/19	30.5/26	37.8/31		
300	306/308/310	900			32.5/16	43.2/21	54.0/26		
350	356/358/360	1050			44.0/13	58.7/18	73.5/22		
400	406/408/410	1200			58.0/12	77.0/16	97.0/19		
450	456/458/460	1350			72.0/10	97.0/14	122/17		
500	506/508/510	1500			90.0/9	119/12	152/15		
600	606/608/610	1800			128/8	169/10	215/13		
700	710/712/716	2100					292/12	351/14	470/19
800	810/812/816	2400					304/16	381/12	458/17
900	910/912/916	2700					482/9	579/11	774/15

The pressures are calculated for grade EN 1.4307 at 20 °C according to EN 10253-3 Type A.
All dimensions can with additional testing be delivered to meet EN 10253-4 Type A. This has to be confirmed when ordering.

Stock standard: EN 1.4307 and 1.4432



OT 212
Metric Tru-Bore®
Elbows 3 ID (R ~ 1.5 x D)

DN	D	R=F	Wall thickness T mm 1.5	2.0	2.5	3.0	4.0	5.0	6.0	8.0	Max T mm
			Weight kg/pce / Design pressure bar								
15*	18.0	30	0.02/189								
	20.0	23		0.04/207							
20*	23.0	35	0.04/141								
	25.0	33		0.05/169							
25*	28.0	32.5	0.04/104								
	30.0	38		0.08/137							
32*	35.0	45	0.08/86	0.11/116							
	38.0	50	0.11/79	0.15/107							
40*	43.0	47.5	0.15/65								
	44.5***	60		0.19/92							
50*	53.0	73	0.16/57								
	54.0	73		0.21/75							
	57***	78				0.53/109					
65*	69.0	95		0.47/58							
80	79.0	113		0.80/36							
	84.0/86.0	123		0.90/34**		1.40/50					
100	104/106	150		1.20/27**		1.80/40**					
125	129/131	188		2.00/22**		3.00/32					
150	154/156	225		2.60/18**		3.90/27**					
200	204/205/206	300		4.80/14**	6.00/17**	7.30/20**					9
250	254/255/256	375		7.40/11*	9.20/14*	11.0/16*					6
300	304/306/308	450		10.7/9*		16.5/14*	22.0/18				7
350	356/358/360	525				22.5/12*	30.0/16	37.0/19			9
400	406/408/410	600				29.0/10*	38.0/14*	48.0/17			11
450	456/458/460	675				37.0/9	49.0/12	61.0/15			13
500	506/508/510	750				45.0/8	60.0/11	75.0/14			25
600	606/608/610	900				66.0/7	88.0/9	110/11			25
700	708/710/712	1050					117/8	147/10	177/13		13
800	808/810/812	1200					152/7	190/9	228/11		11
900	910/912	1350						238/8	286/10		22
1000	1010/1012	1500						298/7	357/9		22
1100	1110/1112/1116	1650						360/6	432/8	577/11	25

*) Are calculated for grade EN 1.4307 at 20 °C according to EN 10253-4 Type A.

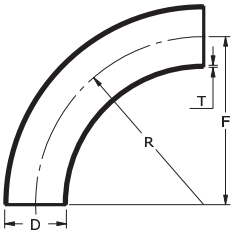
Stock standard: EN 1.4307 and 1.4432

**) Steel grades EN 1.4541 and EN 1.4571 are kept on stock according to EN 10253-4, pressure figures have to be multiplied by 1.43 (1.4541).

***) ISO-dimension OT 200.

Unmarked pressure ratings are calculated for grade EN 1.4307 at 20 °C according to EN 10253-3 Type A.
All dimensions can with additional testing be delivered to meet EN 10253-4 Type A. This has to be confirmed when ordering.

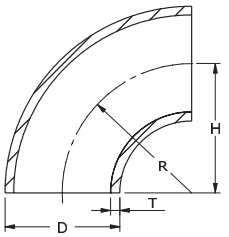
OT 214
Metric Tru-Bore®
Elbows ID + 100 (R ~ ID + 100)



DN	D	R=F	Wall thickness T mm 2.0	2.5	3.0	4.0	5.0	6.0	Max T mm
			Weight kg/pce / Design pressure bar						
80	84	180	1.20/37**						
100	104/106	200	1.60/29**		2.40/44				
125	129/131	225	2.40/23**		3.50/35				6
150	154/156/158	250	3.10/19**		4.60/29	6.10/38			
	160/162						7.60/46	9.12/55	6
200	204/205/206	300	4.80/14**	6.00/18**	7.30/21**				
	208/210					9.70/27	12.5/34		9
250	254/255/256	350	7.00/16*	8.70/20*	10.5/23*				
	258/260					14.0/22	17.5/27		10
300	304/305/306	400	9.60/13*	12.0/16*	14.4/15*				
	306/308/310				14.4/13	19.2/18	23.9/23		10
350	355/356/358	450		16.0/13*	19.0/16*	25.0/15			10
	360/362						32.0/19	38.0/23	10
400	406/408	500			24.0/14*	32.0/19*			11
	410/412						40.0/16	48.0/20	12
450	456/458	550			30.0/9	40.0/12			
	460/462						49.0/14	59.0/17	
500	506/508	600			37.0/8	48.0/10			
	510/512						60.0/13	72.0/15	
600	606/608	700			49.0/6	66.0/8			
	610/612						82.0/11	101/14	10
700	708/710/712	800				89.0/7	112/9	135/12	8
800	808/810/812	900				115/6	143/8	172/10	
900	908/910/912	1000				143/6	179/7	215/9	10
1000	1010/1012	1100					273/6	327/8	

*) Are calculated for grade EN 1.4307 at 20 °C according to EN 10253-4 Type A.
**) Steel grades EN 1.4541 and EN 1.4571 are kept on stock according to EN 10253-4.
Pressure figures have to be multiplied by 1.43 (1.4541). The pressures are calculated for grade EN 1.4307 at 20 °C according to EN 10253-3 Type A. All dimensions can with additional testing be delivered to meet EN 10253-4 Type A. This has to be confirmed when ordering.

Stock standard: EN 1.4307 and 1.4432



OT 226
ANSI
Elbows ASTM A 403 WPW/WPWX/WPS LR

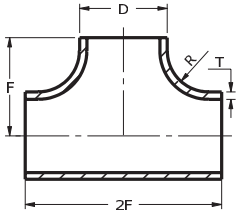
DN	NPS	D mm	R [2] mm	H mm	Sch 5S wt mm	Sch 5S kg/pce [1]	Sch 10S wt mm	Sch 10S kg/pce [1]	Sch 40S*** wt mm	Sch 40S*** kg/pce [1]	STD wt mm	STD kg/pce [1]
15**	1/2″	21.3	38	38			2.11	0.06/173	2.77	0.08/231		
20**	3/4″	26.7	38	38			2.11	0.06/130	2.87	0.09/178		
25*	1″	33.4	38	38			2.77	0.13/124	3.38	0.16/153		
32*	1 1/4″	42.2	48	48			2.77	0.21/98	3.56	0.25/127		
40*	1 1/2″	48.3	57	57			2.77	0.29/86	3.68	0.40/116		
50*	2″	60.3	76	76			2.77	0.49/71	3.91	0.71/101		
65*	2 1/2″	73.0	95	95	2.11	0.55/45	3.05	0.80/65	5.16	1.40/112		
80*	3″	88.9	114	114	2.11	0.80/37	3.05	1.20/53	5.49	2.18/97		
100*	3 1/2″	101.6	133	133	2.11	1.19/32	3.05	1.70/47	5.74	2.83/89		
	4″	114.3	152	152	2.11	1.33/29	3.05	2.10/42	6.02	4.17/83		
125	5″	141.3	190	190	2.77	2.95/31	3.40	3.63/38	6.55	6.86/73		
150*	6″	168.3	229	229	2.77	4.05/26	3.40	5.20/32	7.11	10.9/67		
200*	8″	219.1	305	305	2.77	7.00/20	3.76	10.1/27	8.18	21.5/6		
250*	10″	273.0	381	381	3.40	13.2/20	4.19	17.5/24	9.27	38.6/54		
300*	12″	323.9	457	457	3.96	23.5/19	4.57	27.0/2.2	9.53	59.4/47		
350	14″	355.6	533	533	3.96	30.0/18	4.78	36.3/22			9.53	70.3/44
400	16″	406.4	610	610	4.19	40.8/17	4.78	47.5/19			9.53	91.6/38
450	18″	457	686	686	4.19	51.8/15	4.78	58.6/17			9.53	122/34
500	20″	508	762	762	4.78	72.0/15	5.54	84.0/18			9.53	150/30
600	24″	610	914	914	5.54	127/15	6.35	141/17			9.53	211/25

The pressures in bar are calculated for grade TP 304L at 38 °C according to ASME B 31.3.
Weld joint quality factor Ej=1.0.
Reference to ASTM A 403/A 403M-06, ASTM A 815.
Table 1 Fitting classes for WP grades:

Class	Construction	NDT
S	Seamless	None
W	Welded	Radiography or ultrasonic
WX	Welded	Radiography

1) Design pressure bar.
2) LR - Long Radius.

Stock standard: 304/304L and 316/316L
DN 150 - DN 600 in Sch 10S 304/304L, 316/316L
Note! 304/304L is not stock standard for DN 15 - DN 65
*) Sch 10S EN 1.4462 (2205), EN 1.4547 (254 SMO®)
**) Sch 10S EN 1.4547 (254 SMO®)
***) DN 15 - DN 100 only in 316

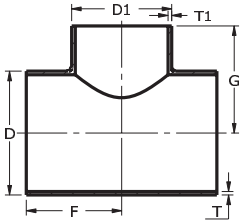


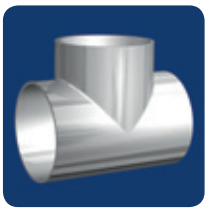
OT 300
ISO
Tees equal pressed

DN	D	F	2F	R	Wall thickness T mm 1.6	2.0	2.6	3.0	4.0	5.0	Max T mm
					Weight kg/pce / Design pressure bar						
10	17.2	25.0	50	14.0	0.04/91						
15	21.3	27.5	55	14.5		0.07/100					
20	26.9	28.5	57	12.5		0.09/85	0.10/120*	0.14/144*			
25	33.7	38.0	76	16.0		0.15/63	0.20/89*	0.23/107*			
32	42.4	47.5	95	21.5		0.24/45	0.31/64*	0.36/78*			
40	48.3	57.0	114	26.0		0.34/37	0.44/53*	0.51/64*	0.68/94*		
50	60.3	64.0	128	27.0		0.50/29	0.65/42*	0.75/51*	1.00/74*		
65*	76.1	76.0	152	27.0		0.70/23*	0.91/33*	1.05/40*	1.40/58*		
80*	88.9	86.0	172	30.0		0.90/19*	1.17/27*	1.35/33*	1.35/48*		
100*	114.3	105	210	35.0		1.40/14*	1.70/19*	2.10/24*	2.80/32*		
125*	139.7	124	248	40.0		2.30/10*	3.00/15*		4.60/24*		
150*	168.3	143	286	32.0			4.10/12*	4.80/15*	6.30/20*		
200*	219.1	178	356	50.0			6.60/8*	7.60/10*	10.2/13*		
250	273.0	216	432	60.0				10.0/8	14.0/11		13
300	323.9	254	508	70.0				15.0/6	19.0/9		13
350	355.6	279	558	72.0				18.0/5	23.0/8		13
400	406.4	305	610	90.0				28.0/4	28.0/6		13
450	457	343	686	100					36.0/5	45.0/8	19
500	508	381	762	105					55.0/7	55.0/7	19
600	610	432	864	110						72.0/5	19

*)The pressures are calculated for grade EN 1. 4307 at 20 °C according to EN 10253-4 Type A.
Unmarked pressure ratings are calculated for grade EN 1.4307 at 20 °C according to EN 10253-3 Type A.
All dimensions can with additional testing be delivered to meet EN 10253-4 Type A. This has to be confirmed when ordering.

Stock standard: EN 1.4307 and 1.4432



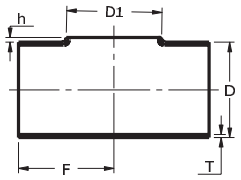


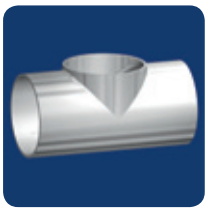
OT 301
ISO
Tees reducing fabricated (ISO 5251)

DN	D	D1	T=T1	F	G	Weight / pressure kg/pce / bar
100	114.3	76.1	3	105	95	1.90/36
		88.9	3	105	98	2.00/33
125	139.7	88.9	3	124	111	2.80/29
		114.3	3	124	117	2.90/25
150	168.3	114.3	3	148	130	3.90/22
		139.7	3	148	137	4.00/19
200	219.1	139.7	3	178	162	6.20/16
		168.3	3	178	168	6.40/14
250	273.0	168.3	3	216	194	9.30/12
		219.1	3	216	203	9.70/10
300	323.9	219.1	3	254	229	13.1/9
		273.0	3	254	241	13.6/8
350	355.6	273.0	3	279	257	16.1/7
		323.9	3	279	270	16.8/6
400	406.4	323.9	3	305	295	20.3/6
		355.6	3	305	305	20.8/6
450	457	406.4	3	343	330	26.0/5
		355.6	3	343	330	25.6/5
500	508	406.4	3	381	356	31.4/4
		457	3	381	368	32.3/4
600	610	457	3	432	419	42.4/3.6
		508	3	432	432	43.3/3

The pressures are calculated for grade EN 1.4307 at 20 °C according to EN 10253-3 Type A.
All dimensions can with additional testing be delivered to meet EN 10253-4 Type A. This has to be confirmed when ordering.

Fabricated on request.



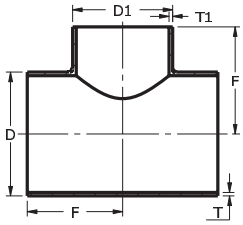


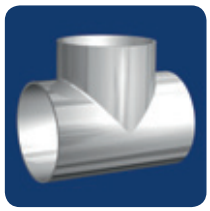
OT 302
ISO
Tees reducing and equal drawn

DN	D	D1	F	h	Wall thickness T mm 2.0	2.6	3.0	4.0	5.0	6.0
					Weight kg/pce / Design pressure bar*					
50	60.3	33.7	50	2	0.29					
		42.4			0.28					
		48.3		3	0.28					
		60.3			0.27					
65	76.1	42.4	65	2	0.47	0.59				
		48.3		3	0.47	0.59				
		60.3			0.46	0.58				
		76.1		4	0.45	0.56				
80	88.9	48.3	80	3	0.68	0.85				
		60.3			0.68	0.84				
		76.1		4	0.67	0.83				
		88.9		5	0.65	0.81				
100	114.3	60.3	100	3	1.10	1.37	1.64			
		76.1		4	1.09	1.36	1.63			
		88.9		5	1.08	1.35	1.61			
		114.3		7	1.05	1.31	1.57			
125	139.7	76.1	125	4	1.69	2.10	2.52			
		88.9		5	1.68	2.09	2.50			
		114.3		7	1.66	2.07	2.47			
		139.7		8	1.61	2.01	2.41			
150	168.3	88.9	150	5	2.45	3.05	3.65			
		114.3		7	2.43	3.03	3.62			
		139.7		8	2.39	2.99	3.58			
		168.3		10	2.33	2.91	3.49			
200	219.1	114.3	200	7		5.32	6.38	8.47	10.5	
		139.7		8		5.28	6.32	8.40	10.5	
		168.3		10		5.23	6.27	8.33	10.4	
		219.1		12		5.05	6.06	8.07	10.1	
250	273.0	139.7	250	8			9.96	13.2	16.5	
		168.3		10			9.89	13.2	16.4	
		219.1		12			9.74	13.0	16.1	
		273.0		13			9.41	12.5	15.6	
300	323.9	168.3	300	10			14.2	18.9	23.5	28.2
		219.1		12			14.0	18.7	23.3	27.9
		273.0		13			13.8	18.4	22.9	27.4
		323.9		15			13.4	17.9	22.3	26.7
350	355.6	219.1	350	12			18.2	24.2	30.1	
		273.0		13			17.9	23.8	29.6	
		323.9		15			17.6	23.4	29.2	
		355.6		17			17.3	23.0	28.7	
400	406.4	273.0	400	13			25.3	31.2		
		323.9		13			23.2	30.9		
		355.6		15			23.1	30.7		
		406.4		20			22.6	30.1		

*) Pressure ratings can be done if tube dimension connected to the branch is known.

Stock standard: EN 1.4432



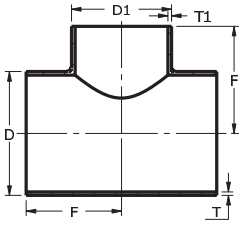


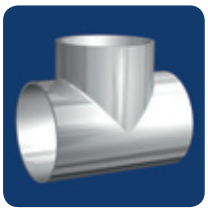
OT 303
ISO
Tees reducing and equal fabricated (SFS 4164)

DN	D	D1	F	Wall thickness T = T1 mm 2.0	2.6	3.0	4.0	5.0	6.0
				Weight kg/pce / Design pressure bar					
50	60.3	33.7	125	0.87/53	1.04/72	1.28/89			
		42.4		0.91/47	1.08/63	1.34/80			
		48.3		0.93/44	1.10/58	1.38/74			
		60.3		0.98/38	1.21/50	1.45/64			
65	76.1	42.4	140	1.23/41	1.48/53	1.72/67			
		48.3		1.26/38	1.50/50	1.86/63			
		60.3		1.31/33	1.55/44	1.94/55			
		76.1		1.37/28	1.70/38	2.03/47			
80	88.9	48.3	150	1.53/33	1.84/44	2.15/56			
		60.3		1.58/30	1.89/39	2.35/50			
		76.1		1.65/25	1.95/34	2.45/42			
		88.9		1.70/23	2.06/31	2.53/39			
100	114.3	60.3	160	2.07/25	2.50/33	3.07/41	3.91/60	4.74/80	
		76.1		2.13/22	2.56/28	3.17/36	4.19/52	5.00/70	
		88.9		2.18/19	2.60/27	3.25/33	4.29/49	5.09/64	
		114.3		2.27/16	2.83/22	3.83/28	4.47/41	5.55/55	
125	139.7	76.1	180	2.84/19	3.43/25	4.23/31	5.39/45	6.54/61	
		88.9		2.89/17	3.48/22	4.31/28	5.70/42	6.84/55	
		114.3		3.00/14	3.56/19	4.46/23	5.91/36	7.01/49	
		139.7		3.07/12	3.83/17	4.59/22	6.08/31	7.56/42	
150	168.3	88.9	200	3.76/14	4.56/23	5.61/25	7.18/36	8.73/49	10.4/61
		114.3		3.87/12	4.65/20	5.77/22	7.65/31	9.17/42	10.7/53
		139.7		3.97/11	4.95/17	5.92/19	7.86/28	9.32/38	11.2/47
		168.3		4.05/9	5.05/16	6.05/17	8.03/25	9.99/33	11.9/42
200	219.1	114.3	250		7.40/14	9.10/17	11.7/27	14.2/34	17.2/44
		139.7			7.80/12	9.30/16	12.4/23	14.9/31	17.4/39
		168.3			7.90/11	9.50/14	12.6/20	15.1/28	18.1/34
		219.1			8.20/9	9.80/11	13.0/17	16.2/23	19.4/30
250	273.0	139.7	300		11.3/11	13.6/12	17.5/20	21.3/52	25.7/33
		168.3			11.5/9	13.8/11	18.4/17	22.2/47	25.9/30
		219.1			11.9/8	14.2/9	18.9/14	22.6/39	27.2/25
		273.0			12.1/6	14.5/8	19.3/12	24.0/34	28.8/22
300	323.9	168.3	330		14.3/8	17.6/11	22.7/16	27.7/14	33.4/27
		219.1			14.5/6	18.0/9	24.0/12	28.8/17	33.0/22
		273.0			14.7/6	18.4/8	24.5/11	30.5/16	35.2/20
		323.9			15.5/5	18.5/6	26.7/9	30.8/14	36.9/17
350	355.6	219.1	360			21.4/8	27.4/12	34.4/16	40.3/22
		273.0				21.8/6	29.0/11	34.8/14	41.9/19
		323.9				22.2/6	29.5/9	36.8/12	44.0/17
		355.6				22.2/6	29.5/9	36.9/12	44.2/16
400	406.4	273.0	400			27.3/6	34.8/9	43.7/12	51.2/17
		323.9				27.7/5	36.8/8	44.0/12	53.1/16
		355.6				27.9/5	37.1/8	46.3/11	55.4/14
		406.4				27.9/5	37.2/8	46.5/9	55.7/12

The pressures are calculated for grade EN 1.4307 at 20 °C according to EN 10253-3 Type A.
All dimensions can with additional testing be delivered to meet EN 10253-4 Type A. This has to be confirmed when ordering.

Stock standard: EN 1.4307 and 1.4432



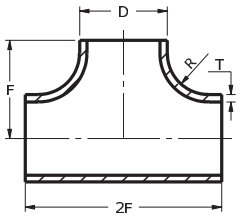


OT 303
ISO
Tees reducing and equal fabricated (SFS 4164)

DN	D	D1	F	Wall thickness T = T1 mm 3.0	4.0	5.0	6.0	8.0
				Weight kg/pce / Design pressure bar				
450	457	323.9	450	34.7/5	46.1/8	57.6/11		
		355.6		35.0/5	46.5/8	58.1/9		
		406.4		35.4/5	47.1/6	58.7/9		
		457		35.4/3	47.1/6	58.8/8		
500	508	355.6	500	42.8/5	56.9/6	68.6/9		
		406.4		43.5/5	57.6/6	71.9/8		
		457		43.7/3	58.2/6	72.6/8		
		508		43.6/3	58.2/5	72.7/8		
600	610	406.4	600		81.8/5	98.7/9	119/9	
		457			82.6/5	103/9	124/9	
		508			83.4/5	104/8	125/8	
		610			83.8/5	105/8	126/8	
700	711	457	700		111/5	134/6	162/12	
		508			112/5	135/6	163/12	
		610			113/3	136/5	170/11	
		711			114/3	134/5	171/9	
800	813	508	800		145/3	175/5	206/6	272/11
		610			147/3	177/5	213/6	293/9
		711			149/3	186/5	223/5	297/8
		813			149/3	186/3	223/5	298/8
900	914	610	900		184/3	230/5	276/6	367/8
		711			187/3	233/3	280/5	372/8
		813			189/1.5	236/3	283/5	377/6
		914			188/1.5	236/3	283/5	377/6
1000	1016	711	1000		229/3	286/3	342/5	456/6
		813			231/1.5	289/3	346/5	461/6
		914			234/1.5	292/3	350/3	466/6
		1016			233/1.5	291/3	349/3	465/5

The pressures are calculated for grade EN 1.4307 at 20 °C according to EN 10253-3 Type A.
All dimensions can with additional testing be delivered to meet EN 10253-4 Type A. This has to be confirmed when ordering.

Stock standard: EN 1.4307 and 1.4432



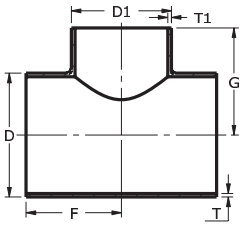
OT 310
Metric Tru-Bore®
Tees equal pressed

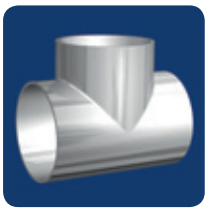
DN	D	F	2F	R	Wall thickness T mm 2.0	2.5	3.0	4.0	5.0	Max T m
					Weight kg/pce / Design pressure bar					
15	20	23	46	10.5	0.06/121					
20	25	33	66	15.5	0.11/85					
25	30	38	76	18.0	0.14/67					
32	38	50	100	24.0		0.30/64				
40	44.5*	60	120	28.0	0.35/39					
50	54	73	146	30.0	0.51/31					
50	57*	76	152	23.0			0.85/38			
65	69	80	160	27.5	0.70/25					
65*	76	80	160	30.5			1.10/36			
65*	79	80	160	32.0	0.75/19					
80*	84	80	160	30.0	0.80/20**	1.00/27**	1.20/35**			
100*	104	90	180	25.0	1.30/17**					
	105/106					1.80/23**	2.16/28**			
125*	129	115	230	40.0	2.10/12**					
	130/131					2.80/16**	3.36/20**			
150*	154	135	270	40.0	3.10/9**					
	155/156					4.00/13**	4.80/16**			
200*	205	175	350	57.0		6.10/8**				
	206						8.20/11**			
250	256	216	432	75.0			10.0/8			8
	258							13.0/12		
300	306	254	508	80.0			13.0/6			13
	308							19.0/9		
356	356	279	558	72.0			18.0/5			20
	358							23.0/8		
400	406	305	610	90.0			28.0/6			19
	408							28.0/6		
	410								36.0/9	
450	456	343	686	100			36.0/6			19
	458							36.0/6		
	460								45.0/7	
500	506	381	762	105			44.0/5			19
	508							44.0/5		
	510								55.0/6	
600	606	432	864	110			72.0/5			19
	508							72.0/5		
	610								72.0/5	

*) ISO-dimensions OT 300.

Stock standard: EN 1.4307 and 1.4432

**) The pressures are calculated for grade EN 1. 4307 at 20 °C according to EN 10253-4 Type A.
Unmarked pressure ratings are calculated for grade EN 1.4307 at 20 °C according to EN 10253-3 Type A.
All dimensions can with additional testing be delivered to meet EN 10253-4, Type A. This has to be confirmed when ordering.
Note! All tees DN 400-500 are produced from 4 mm plate. All tees DN 600 are produced from 5 mm plate.



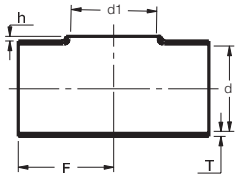


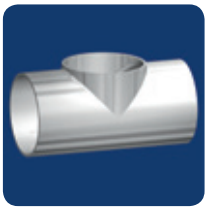
OT 311
Metric Tru-Bore®
Tees reducing fabricated

DN	D	D1	T = T1	F	G	Weight kg/pce / Design pressure bar
100	104	54	2.0	50	75	0.60/28
		84		80	90	1.00/22
125	129	84		80	102	1.20/19
		104		100	112	1.50/16
150	154	84		80	115	1.40/14
		104		100	125	1.80/9
200	204	104		100	150	2.30/11
		129		125	162	2.00/11
		154		150	175	3.60/9
	206	106	3.0	100	150	3.40/12
		131		125	162	4.40/11
		156		150	175	5.40/11
250	254	104	2.0	100	175	2.80/8
		154		150	200	4.40/8
		204		200	225	6.10/5
	256	106	3.0	100	175	4.20/17
		156		150	200	6.60/14
		206		200	225	9.10/11
300	304	154	2.0	150	225	5.10/6
		204		200	250	7.10/5
		254		250	275	9.10/5
	306	156	3.0	150	225	7.70/12
		206		200	250	10.6/9
		256		250	275	13.7/8
350	356	206		200	275	12.1/9
		256		250	300	15.6/8
		306		300	325	19.3/6
	358	208	4.0	200	275	16.2/12
		258		250	300	20.9/11
		308		300	325	25.8/9
400	406	256	3.0	250	325	17.5/6
		306		300	350	21.6/6
		356		350	375	25.8/5
	408	308	4.0	300	350	28.8/9
		258		250	325	23.4/11
		358		350	375	34.5/8
500	506	306	3.0	300	400	24.7/5
		356		350	425	30.6/5
		406		400	450	47.7/5
	508	308	4.0	300	400	34.8/8
		358		350	425	41.5/6
		408		400	450	48.5/6
600	606	506	3.0	500	550	53.8/3
	608	508	4.0	500	550	73.2/5
	610	510	5.0	500	550	91.5/6

The pressures are calculated for grade EN 1.4307 at 20 °C according to EN 10253-3 Type A.
All dimensions can with additional testing be delivered to meet EN 10253-4 Type A. This has to be confirmed when ordering.

Stock standard: EN 1.4307 and 1.4432



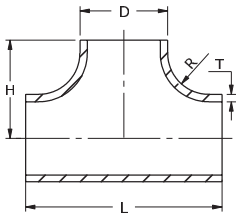


OT 312
Metric Tru-Bore®
Tees equal and reduced drawn

DN	d	d1	F	h	Wall thickness T mm 2.0	2.5	3.0	4.0	5.0	6.0
					Weight kg/pce / Design pressure bar*					
50	50	25	50	2	0.26					
		32			0.25					
		40		3	0.25					
		50			0.25					
65	65	32	65	2	0.43	0.54				
		40		3	0.43	0.54				
		50			0.42	0.53				
		65		4	0.41	0.52				
80	80	40	80	3	0.65	0.81				
		50			0.64	0.81				
		65		4	0.63	0.80				
		80		5	0.62	0.78				
100	100	50	100	3	1.00	1.26	1.52			
		65		4	1.00	1.25	1.51			
		80		5	0.99	1.24	1.49			
		100		7	0.97	1.22	1.47			
125	125	65	125	4	1.56	1.96	2.36			
		80		5	1.55	1.95	2.35			
		100		7	1.54	1.93	2.33			
		125		8	1.50	1.88	2.27			
150	150	80	150	5	2.24	2.81	3.38			
		100		7	2.23	2.79	3.36			
		125		8	2.20	2.76	3.32			
		150		10	2.15	2.70	3.26			
200	200	100	200	7		4.99	6.00	8.04	10.1	
		125		8		4.95	5.96	7.98	10.0	
		150		10		4.92	5.91	7.93	10.0	
		200		12		4.76	5.73	7.69	9.68	
250	250	125	250	8			9.35	12.5	15.7	
		150		10			9.30	12.5	15.6	
		200		12			9.16	12.3	15.4	
		250		13			8.88	11.9	15.0	
300	300	150	300	10			13.4	18.0	22.5	27.1
		200		12			13.3	17.8	22.3	26.8
		250		13			13.1	17.5	22.0	26.5
		300		15			12.7	17.1	21.4	25.8
350	350	200	350	12			18.2	24.3	30.5	
		250		13			18.0	24.0	30.1	
		300		15			17.8	23.7	29.8	
		350		17			17.3	23.1	29.0	
400	400	250	400	13			23.6	31.5		
		300		15			23.4	31.2		
		350		17			23.1	30.9		

*) Pressure ratings can be done if tube dimension connected to the branch is known.

Stock standard: EN 1.4432



OT 320
ANSI
Tees equal pressed
Tees ASTM A 403 WPW/WPWX/WPS

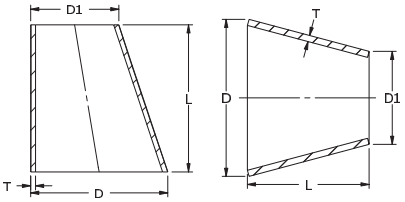
						Schedule			
						10S		40S/STD	
DN	NPS	D mm	L	H	R	Wall thickness T	/ Weight kg/pce /[1]	Wall thickness T	/ Weight kg/pce /[1]
15	1/2	21.3	50	25	12.0	2.11	0.08/133	2.77	0.11/194
20	3/4	26.7	58	29	14.0	2.11	0.11/99	2.87	0.20/152
25	1	33.4	76	38	17.0	2.77	0.30/107	3.38	0.30/141
32	1 1/4	42.2	96	48	16.0	2.77	0.05/85	3.56	0.63/119
40	1 1/2	48.3	114	57	20.0	2.77	0.70/69	3.68	0.90/102
50	2	60.3	128	64	25.0	2.77	0.80/50	3.91	1.20/81
65	2 1/2	73.0	152	76	20.0	3.05	1.36/49	5.16	2.30/100
80	3	88.9	172	86	28.0	3.05	1.80/36	5.49	3.20/81
100	4	114.3	210	105	30.0	3.05	2.62/26	6.02	5.10/67
125	5	141.3	248	124	38.0	3.40	4.60/23	6.55	9.40/56
150	6	168.3	286	143	45.0	3.40	6.30/18	7.11	16.1/50
200	8	219.1	356	178	50.0	3.76	11.4/15	8.18	51.0/43
250	10	273.0	432	216	60.0	4.19	27.1/12	9.27	53.1/38
300	12	323.9	508	254	70.0	4.57	38.0/11	9.53	77.0/31
350	14	355.6	558	279	72.0	4.78	46.0/10	9.53	93.0/28
400	16	406.4	610	305	90.0	4.78	57.0/8	9.53	116/23
450	18	457	686	343	100	4.78	73.0/7	9.53	147/19
500	20	508	762	381	105	5.54	111/8	9.53	182/17
600	24	610	864	432	110	6.35	149/7	9.53	254/13

The pressures are calculated for grade TP316 at 38 °C.
Reference to ASTM A 403/A 403M-06, ASTM A 815.
Table 1 Fitting classes for WP grades:

Class	Construction	NDT
S	Seamless	None
W	Welded	Radiography or ultrasonic
WX	Welded	Radiography

1) Design pressure bar.

Stock standard: Sch 10S size DN 15 - DN 100 and DN 150 in grade 316L, EN 1.4462 (2205) and DN 25 - DN 100 in grade EN 1.4547 (254 SMO®).

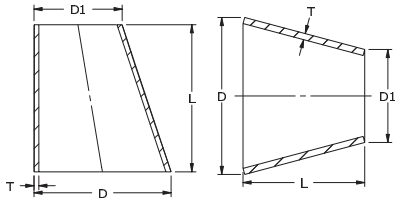


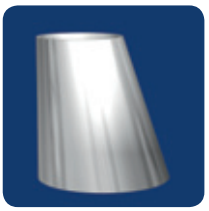
EC OT 430
CC OT 431
ISO
Reducers type CC, EC (ISO 5251)

DN	D	D1	L	Wall thickness T mm 2.0 Weight kg/pce / Design pressure bar for CC*	3.0	4.0
20	26.9	21.3	38	0.10/139		
25	33.7	21.3	51	0.10/109		
		26.9	51	0.10/109		
32	42.4	33.7		0.10/86		
40	48.3	33.7	64	0.10/75		
		42.4		0.10/75		
50	60.3	33.7	76	0.20/59		
		48.3		0.20/59		
65	76.1	48.3	90	0.30/46		
		60.3		0.30/47		
80	88.9	60.3	90	0.30/39		
		76.1		0.30/40		
100	114.3	76.1	102	0.50/30		
		88.9		0.50/31		
125	139.7	88.9	127	1.10/25		
		114.3		1.10/25		
150	168.3	88.9	140	1.00/20		
		114.3		1.00/21		
		139.7		1.10/21		
200	219.1	139.7	152	1.30/15		
		139.7			2.00/23	
		168.3		1.50/15		
		168.3			2.20/23	
250	273.0	168.3	178	2.00/12		
		168.3			3.00/18	
		219.1		2.20/13		
		219.1			3.30/19	
300	323.9	168.3	203		3.70/16	
		219.1			4.20/16	
		273.0			4.60/16	
350	355.6	219.1	330		7.00/15	
		273.0			7.70/15	
		323.3			8.40/15	
400	406.4	273.0	356		9.00/13	
		323.9			9.70/13	
		355.6			10.2/13	
450	457	323.9	381		11.2/11	
		355.6			11.5/11	
		406.4			12.4/11	
500	508	355.6	508		16.4/11	
		406.4			17.4/11	
		457			18.3/11	
600	610	406.4	508			25.7/10
		457				27.0/10
		508				28.3/10

*) for EC reducers the pressure is appr. 10% lower.
The pressures are calculated for grade EN 1.4307 at 20 °C according to EN 10253-3 Type A.
All dimensions can with additional testing be delivered to meet EN 10253-4 Type A. This has to be confirmed when ordering.

Stock standard: EN 1.4307 and 1.4432



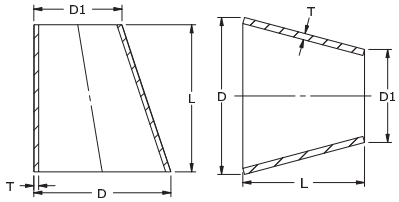


EC OT 400
CC OT 401
ISO
Reducers type CC, EC 3 x (D-D1) (SFS 4162, EN 10253-3)

DN	D	D1	L	Wall thickness T mm 2.0	2.5	3.0	4.0	5.0	6.0	8.0	10
				Weight kg/pce / Design pressure bar for CC*							
15	21.3	13.7	23	0.02/176							
		17.2	12	0.01/176							
20	26.9	13.7	40	0.04/137							
		17.2	29	0.03/137							
		21.3	17	0.02/137							
25	33.7	17.2	50	0.06/108							
		21.3	37	0.05/108							
		26.9	20	0.03/108							
32	42.4	21.3	63	0.10/85							
		26.9	46	0.08/85							
		33.7	26	0.05/85							
40	48.3	21.3	81	0.14/74							
		26.9	63	0.11/74							
		33.7	43	0.09/74							
		42.4	17	0.04/74							
50	60.3	21.3	117	0.24/59							
		26.9	99	0.21/59	0.26/74						
		33.7	79	0.18/59	0.22/74						
		42.4	53	0.13/59	0.16/74						
		48.3	36	0.10/59	0.12/74	0.14/90					
65	76.1	26.9	148	0.38/47							
		33.7	126	0.34/47	0.42/59	0.50/90					
		42.4	100	0.29/47	0.36/59	0.43/90					
		48.3	82	0.25/47	0.31/59	0.37/90					
		60.3	47	0.16/47	0.20/59	0.23/90					
80	88.9	33.7	165	0.51/40							
		42.4	138	0.45/40	0.55/50	0.66/60					
		48.3	120	0.41/40	0.50/50	0.60/60					
		60.3	85	0.31/40	0.39/50	0.46/60					
		76.1	38	0.16/40	0.19/50	0.23/60					
100	114.3	42.4	216	0.85/31							
		48.3	195	0.78/31	0.97/39	1.16/46	1.53/62				
		60.3	160	0.69/31	0.86/39	1.03/46	1.35/62				
		76.1	113	0.53/31	0.66/39	0.79/46	1.05/62				
		88.9	75	0.38/31	0.47/39	0.56/46	0.74/62				
125	139.7	60.3	235	1.17/25	1.45/32	1.74/38	2.29/51				
		76.1	188	1.01/25	1.26/32	1.50/38	1.98/51				
		88.9	151	0.86/25	1.07/32	1.28/38	1.69/51				
		114.3	75	0.46/25	0.59/32	0.71/38	0.94/51				
150	168.3	76.1	273	1.67/21	2.07/26	2.48/32	3.23/42				
		88.9	235	1.51/21	1.88/26	2.25/32	2.97/42				
		114.3	160	1.13/21	0.82/26	0.98/32	1.29/42				
		139.7	85	0.66/21	0.82/26	0.98/32	1.29/42				
200	219.1	88.9	385	2.97/16	3.70/20	4.43/24	5.86/32	7.28/40			
		114.3	310	2.59/16	3.23/20	3.86/24	5.12/32	6.36/40			
		139.7	235	2.12/16	2.64/20	3.16/24	4.18/32	5.20/40			
		168.3	150	1.46/16	1.82/20	2.18/24	2.89/32	3.59/40			

*) for EC reducers the pressure is appr. 10% lower.
The pressures are calculated for grade EN 1.4307 at 20 °C according to EN 10253-3 Type A.
All dimensions can with additional testing be delivered to meet EN 10253-4 Type A. This has to be confirmed when ordering.

Stock standard: EN 1.4307 and 1.4432

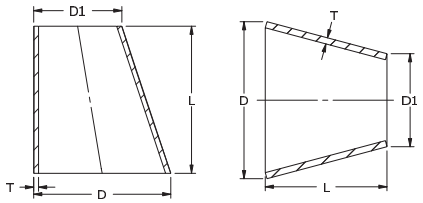


EC OT 400
CC OT 401
ISO
Reducers type CC, EC 3 x (D-D1) (SFS 4162, EN 10253-3)

DN	D	D1	L	Wall thickness T mm 2.0	2.5	3.0	4.0	5.0	6.0	8.0	10
				Weight kg/pce / Design pressure bar for CC*							
250	273	114.3	470	4.57/13	5.70/16	6.82/19	9.05/25	11.3/32	13.4/39		
		139.7	395	4.10/13	5.11/16	6.12/19	8.11/25	10.1/32	12.1/39		
		168.3	310	3.44/13	4.29/16	5.14/19	6.82/25	8.48/32	10.1/39		
		219.1	160	1.98/13	2.47/16	2.96/19	3.93/25	4.89/32	5.85/39		
300	323.9	139.7	545	6.36/11	7.93/13	9.49/16	12.6/21	15.7/27	18.7/33		
		168.3	461	5.71/11	7.13/13	8.53/16	11.3/21	14.1/27	16.9/33		
		219.1	310	4.24/11	5.29/13	6.34/16	8.42/21	10.5/27	12.5/33		
		273	151	2.27/11	2.84/13	3.40/16	4.51/21	5.62/27	6.72/33		
350	355.6	168.3	554	7.31/10	9.12/12	10.9/15	14.5/19	18.1/15	21.6/29		
		219.1	404	5.85/10	7.30/12	8.75/15	11.6/19	14.5/15	17.3/29		
		273	244	3.87/10	4.83/12	5.78/15	7.69/19	9.58/15	11.5/29		
		323.9	94	1.61/10	2.01/12	2.41/15	3.20/19	3.99/15	4.78/29		
400	406.4	219.1	554		10.9/11	13.1/13	17.4/17	21.6/21	25.9/26	34.3/35	
		273	395		8.45/11	10.1/13	13.5/17	16.8/21	20.1/26	26.6/35	
		323.9	244		5.61/11	6.73/13	8.59/17	11.2/21	13.3/26	17.7/35	
		355.6	150		3.60/11	4.20/13	5.74/17	7.16/21	8.57/26	11.4/35	
450	457	273	545			15.0/11	20.0/15	25.0/19	29.8/23	39.5/31	
		323.9	395			11.7/11	15.5/15	19.3/19	23.1/23	24.4/31	
		355.6	301			9.30/11	12.3/15	15.3/19	18.4/23	24.4/31	
		406.4	150			4.90/11	6.51/15	8.12/19	9.73/23	12.9/31	
500	508	323.9	545			17.1/10	22.8/14	28.4/17	34.0/21	45.1/27	
		355.6	451			14.7/10	19.6/14	24.4/17	29.2/21	38.1/27	
		406.4	301			10.4/10	13.9/14	17.3/17	20.7/21	25.5/27	
		457.2	150			5.48/10	7.29/14	9.09/17	10.9/21	14.5/27	
600	610	355.6	752			27.5/9	36.5/11	45.6/14	54.6/17	74.5/23	
		406.4	601			23.1/9	30.8/11	38.4/14	45.9/17	61.0/23	
		457	451			18.2/9	24.2/11	30.2/14	36.2/17	48.1/23	
		508	301			12.7/9	17.0/11	21.2/14	25.3/17	33.7/23	
700	711	406.4	902			38.2/7	50.8/10	63.4/13	75.9/16	101/21	126/27
		457	752			33.3/7	44.3/10	55.3/13	66.2/16	88.0/21	110/27
		508	601			27.8/7	37.0/10	46.1/13	55.2/16	73.4/21	91.5/27
		610	301			15.1/7	20.1/10	25.0/13	30.0/16	40.0/21	50.0/27
800	813	457	1053			50.7/7	67.5/9	84.2/11	101/14	134/19	167/24
		508	902			45.2/7	60.1/9	75.0/11	90.0/14	120/19	149/24
		610	601			32.4/7	43.2/9	53.9/11	64.5/14	85.8/19	107/24
		711	301			17.4/7	23.2/9	28.9/11	34.7/14	46.1/19	57.5/24
900	914	508	1203			64.9/6	86.4/8	108/10	129/12	172/17	214/15
		610	902			52.1/6	69.4/8	86.7/10	104/12	138/17	172/15
		711	601			37.1/6	49.4/8	61.6/10	73.8/12	98.2/17	122/15
		813	301			19.7/6	26.3/8	32.8/10	39.3/12	52.3/17	65.2/15
1000	1016	610	1203			74.2/5	98.8/7	123/9	148/11	197/15	245/19
		711	902			59.1/5	78.7/7	98.3/9	118/11	157/15	195/19
		813	601			41.7/5	55.6/7	69.4/9	83.1/11	111/15	138/19
		914	301			22.1/5	29.4/7	36.7/9	44.0/11	58.5/15	73.0/19
1100	1118	711	1203			84.1/5	112/7	140/8	168/10	223/13	278/17
		813	909			66.7/5	88.8/7	111/8	133/10	177/13	221/17
		914	609			47.0/5	62.7/7	78.2/8	93.8/10	125/13	156/17
		1016	308			25.0/5	33.3/7	41.6/8	49.8/10	66.3/13	82.7/17
1200	1219	813	1205			93.0/4	124/6	155/7	185/9	247/13	308/16
		914	905			73.3/4	97.7/6	122/7	146/9	195/13	243/16
		1016	604			51.3/4	68.3/6	85.3/7	102/9	136/13	170/16
		1118	296			26.3/4	35.0/6	43.8/7	54.3/9	69.8/13	87.2/16

*) for EC reducers the pressure is appr. 10% lower.
The pressures are calculated for grade EN 1.4307 at 20 °C according to EN 10253-3 Type A.
All dimensions can with additional testing be delivered to meet EN 10253-4 Type A. This has to be confirmed when ordering.

Stock standard: EN 1.4307 and 1.4432

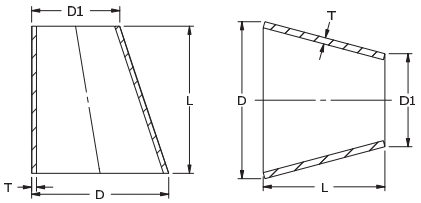


EC OT 410
CC OT 411
Metric Tru-Bore®
Reducers CC, EC 3 x (D-D1), half angle 9.5°

DN	D	D1	L	Wall thickness T mm 1.5	2.0	2.5	3.0	4.0	5.0	6.0
				Weight kg/pce / Design pressure bar for CC*						
20	25	17	24	0.02/109	0.02/148					
		20	15	0.01/109	0.02/148					
25	28	20	24	0.02/97						
		23	15	0.01/97						
	30	20	30	0.03/90	0.05/114					
		25	15	0.02/90	0.03/114					
	32	20	36		0.05/114					
		25	21		0.03/114					
	33	23	30	0.03/81						
		28	15	0.02/81						
32	38	20	54	0.06/70						
		25	39	0.05/70						
		28	30	0.04/70						
		30	24	0.03/70						
	40	20	60		0.10/90					
		25	45		0.08/90					
		28	36	0.05/67						
		32	24		0.05/90					
40	43	25	54	0.09/62						
		28	45	0.08/62						
		33	30	0.04/62						
	44	30	42		0.09/81					
	50	25	75		0.15/71	0.19/90	0.23/109			
50	54	25	87		0.17/66					
		30	72		0.16/66					
		32	54		0.12/71	0.15/90	0.18/109			
		34	60		0.13/66					
		38	48		0.11/66					
		40	42	0.09/49						
		44	30		0.07/66	0.09/83	0.11/100			
65	65	32	99		0.25/54	0.32/68	0.39/83			
		40	75		0.21/54	0.26/68	0.32/83			
		50	45		0.14/54	0.17/68	0.21/83			
	69	30	117		0.29/51					
		38	93		0.25/51					
		44	75		0.20/51					
		54	45		0.13/51					
	70	54	48		0.15/50					

*) for EC reducers the pressure is appr. 10% lower.
The pressures are calculated for grade EN 1.4307 at 20 °C according to EN 10253-3 Type A.
All dimensions can with additional testing be delivered to meet EN 10253-4 Type A. This has to be confirmed when ordering.

Stock standard: EN 1.4307 and 1.4432

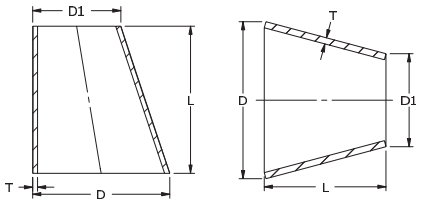


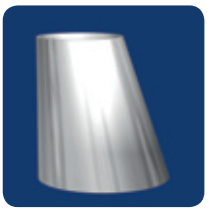
EC OT 410
CC OT 411
Metric Tru-Bore®
Reducers CC, EC 3 x (D-D1), half angle 9.5°

DN	D	D1	L	Wall thickness T mm 1.5	2.0	2.5	3.0	4.0	5.0	6.0
				Weight kg/pce / Design pressure bar for CC*						
80	79	54	75		0.30/44					
	80	40	120		0.38/44	0.48/55	0.58/66			
		50	90		0.31/44	0.39/55	0.47/66			
		65	45		0.17/44	0.21/55	0.26/66			
	84	44	120		0.48/42					
		54	90		0.38/42					
		69	45		0.17/42					
100	100	50	150		0.59/35	0.74/44	0.89/53	1.20/71		
		65	105		0.45/35	0.57/44	0.68/53	0.92/71		
		80	60		0.28/35	0.35/44	0.42/53	0.57/71		
125	125	65	180		0.89/28	1.11/35	1.34/42	1.81/56		
		80	135		0.72/28	0.90/35	1.08/42	1.46/56		
		100	75		0.44/28	0.55/35	0.66/42	0.89/56		
150	150	80	210		1.25/23	1.57/27	1.89/35	2.54/47		
		100	150		0.97/23	1.21/27	1.46/35	1.96/47		
		125	75		0.53/23	0.67/27	0.80/35	1.08/47		
200	200	100	300		2.31/17	2.90/22	3.49/26	4.69/35	5.90/44	
		125	225		1.88/17	2.36/22	2.83/26	3.80/35	4.78/44	
		150	150		1.35/17	1.69/22	2.03/26	2.73/35	3.43/44	
250	250	125	375		3.61/14	4.52/17	5.44/20	7.29/28	9.16/35	11.1/42
		150	300		3.08/14	3.85/17	4.64/20	6.21/28	7.80/35	9.41/42
		200	150		1.73/14	2.17/17	2.60/20	3.49/28	4.38/35	5.28/42
300	300	150	450		5.19/11	6.50/14	7.81/17	10.5/23	13.1/29	15.8/35
		200	300		3.84/11	4.81/14	5.78/17	7.74/23	9.71/29	11.7/35
		250	150		2.11/11	2.64/14	3.18/17	4.25/23	5.33/29	6.42/35
350	350	200	450		6.33/10	7.92/12	9.53/14	12.8/20	16.0/25	19.3/30
		250	300		4.60/10	5.76/12	6.92/14	9.26/20	11.6/25	14.0/30
		300	150		2.49/10	3.12/12	3.75/14	5.01/20	6.28/25	7.56/30
400	400	250	450			9.35/10	11.2/13	15.0/17	18.8/22	22.7/26
		300	300			6.71/10	8.06/13	10.8/17	13.5/22	16.3/26
		350	150			3.59/10	4.32/13	5.77/17	7.23/22	8.70/26

*) for EC reducers the pressure is appr. 10% lower.
The pressures are calculated for grade EN 1.4307 at 20 °C according to EN 10253-3 Type A.
All dimensions can with additional testing be delivered to meet EN 10253-4 Type A. This has to be confirmed when ordering.

Stock standard: EN 1.4307 and 1.4432



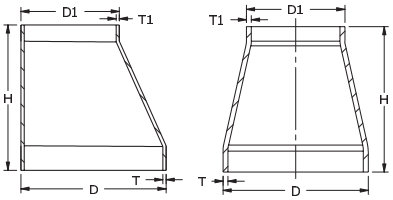


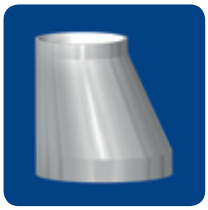
EC OT 410
CC OT 411
Metric Tru-Bore®
Reducers CC, EC 3x(D-D1), half angle 9.5˚

DN	D	D1	L	Wall thickness T mm 3.0	4.0	5.0	6.0	8.0	10
				Weight kg/pce / Design pressure bar for CC*					
450	450	300	450	13.0/11	17.3/15	21.7/19	26.1/23		
		350	300	9.20/11	12.3/15	15.4/19	18.6/23		
		400	150	4.90/11	6.50/15	8.20/19	9.8/23		
500	500	300	600	18.4/10	24.6/14	30.8/17	37.1/21		
		350	450	14.7/10	19.6/14	24.6/17	29.5/21		
		400	300	10.4/10	13.8/14	17.3/17	20.8/21		
		450	150	5.50/10	7.30/14	9.10/17	11.0/21		
600	600	350	750	27.3/8	36.5/11	45.7/14	54.9/17	73.6/23	
		400	600	23.0/8	30.7/11	38.5/14	46.2/17	61.9/23	
		450	450	18.1/8	24.2/11	30.3/14	36.4/17	48.7/23	
		500	300	12.6/8	16.9/11	21.1/14	25.4/17	34.0/23	
700	700	400	900	37.9/7	50.6/10	63.4/13	76.2/16	102/22	128/27
		450	750	33.0/7	44.1/10	55.2/13	66.4/16	88.8/22	111/27
		500	600	27.6/7	36.8/10	46.1/13	55.4/16	74.1/22	92.9/27
		600	300	14.9/7	19.9/10	24.9/13	30.0/16	40.1/22	50.2/27
800	800	450	1050	50.2/6	67.1/9	84.0/11	101/14	135/19	169/24
		500	900	44.8/6	59.8/9	74.8/11	90.0/14	120/19	151/24
		600	600	32.1/6	42.9/9	53.7/11	64.5/14	86.3/19	108/24
		700	300	17.2/6	23.0/9	28.0/11	34.5/14	46.2/19	57.9/24
900	900	500	1200	64.2/6	85.8/8	107/10	129/12	173/17	216/21
		600	900	51.6/6	68.9/8	86.2/10	104/12	138/17	174/21
		700	600	36.7/6	49.0/8	61.3/10	73.7/12	98.4/17	123/21
		800	300	19.5/6	26.0/8	32.6/10	39.1/12	52.3/17	65.5/21
1000	1000	600	1200	73.4/5	98.0/7	123/9	147/11	197/15	247/19
		700	900	58.5/5	78.0/7	97.7/9	117/11	157/15	196/19
		800	600	41.3/5	55.1/7	68.9/9	82.8/11	111/15	139/19
		900	300	21.8/5	29.1/7	36.4/9	43.7/11	58.4/15	73.1/19
1100	1100	700	1200	82.5/4	110/6	138/8	166/10	221/13	277/17
		800	900	65.3/4	97.2/6	109/8	131/10	175/13	219/17
		900	600	45.8/4	61.2/6	76.5/8	92.0/10	123/13	154/17
		1000	300	24.1/4	32.1/6	40.2/8	48.3/10	64.5/13	80.7/17
1200	1200	800	1200	91.7/6	122/6	153/7	184/9	246/12	308/16
		900	900	72.2/6	96.3/6	120/7	145/9	193/12	242/16
		1000	600	50.4/6	67.3/6	84.1/7	101/9	135/12	169/16
		1100	300	26.3/6	35.2/6	44.0/7	52.8/9	70.5/12	88.3/16

*) for EC reducers the pressure is appr. 10% lower.
The pressures are calculated for grade EN 1.4307 at 20 °C according to EN 10253-3 Type A.
All dimensions can with additional testing be delivered to meet EN 10253-4 Type A. This has to be confirmed when ordering.

Stock standard: EN 1.4307 and 1.4432



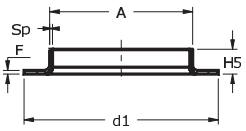


EC OT 420
CC OT 421
ANSI
Reducers CC, EC, ASTM A 403 WPS/WPW/WPWX

Dim. NPS	D	D1	H	T	T1	Weight kg/pce /1)
3/4″x 1/2″	26.7	21.3	38	2.11	2.11	0.10
1″x 3/4″	33.4	26.7	51	2.77	2.11	0.13
1″x 1/2″		21.3		2.77	2.11	0.12
1 1/4″x 1″	42.2	33.4		2.77	2.77	0.18
1 1/4″x 3/4″		26.7		2.77	2.11	0.18
1 1/4″x 1/2″		21.3		2.77	2.11	0.17
1 1/2″x 1 1/4″	48.3	42.2	64	2.77	2.77	0.21
1 1/2″x 1″		33.4		2.77	2.77	0.20
1 1/2″x 3/4″		26.7		2.77	2.11	0.20
2″x 1 1/2″	60.3	48.3	76	2.77	2.77	0.31
2″x 1 1/4″		42.2		2.77	2.77	0.30
2″x 1″		33.4		2.77	2.77	0.28
2 1/2″x 2″	73.0	60.3	89	3.05	2.77	0.47
2 1/2″x 1 1/2″		48.3		3.05	2.77	0.44
2 1/2″x 1 1/4″		42.2		3.05	2.77	0.43
3″x 2 1/2″	88.9	73.0		3.05	3.05	0.59
3″x 2″		60.3		3.05	2.77	0.55
3″x 1 1/2″		48.3		3.05	2.77	0.51
4″x 3″	114.3	88.9	102	3.05	3.05	0.87
4″x 2 1/2″		73.0		3.05	3.05	0.83
4″x 2″		60.3		3.05	2.77	0.78
5″x 4″	141.3	114.3	127	3.40	3.05	1.49
5″x 3″		88.9		3.40	3.05	1.45
6″x 5″	168.3	141.3	140	3.40	3.40	2.08
6″x 4″		114.3		3.40	3.05	1.95
6″x 3″		88.9		3.40	3.05	1.82
8″x 6″	219.1	168.3	152	3.76	3.40	3.19
8″x 4″		114.3		3.76	3.05	3.01
10″x 8″	273.0	219.1	178	4.19	3.76	5.20
10″x 6″		168.3		4.19	3.40	5.00
12″x 10″	323.9	273.0	203	4.57	4.19	7.98
12″x 8″		219.1		4.57	3.76	7.67

1) Design pressure bar.

Stock standard: Sch 10S size DN 15 - DN 100 and DN 150 in grade 316, EN 1.4462 (2205) and DN 25 - DN 100 in grade EN 1.4547 (254 SMO®).

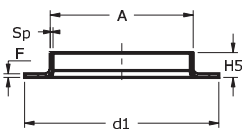


OT 500
ISO
Collars PN10-PN16 in accordance with EN 13480 and EN 1092-1

DN	A	Sp	F	d1	H5	Weight kg/pce / Design pressure bar EN 13480 [1]	EN 1092-1 type 37 [2]
10	17.2	2.0	2.5	40	7	0.02/16	0.02/16
15	21.3	2.0	2.5	45	7	0.03/16	0.03/16
20	26.9	2.0	3.0	58	8	0.06/16	0.06/16
		3.0	4.0		8	0.07/16	
25	33.7	2.0	3.0	68	10	0.08/16	0.08/16
		3.2	4.0		10	0.10/16	
32	42.4	2.0	3.0	78	12	0.10/16	0.10/16
		3.2	4.0		12	0.13/16	
40	44.5	2.0	3.0	88	17	0.14/16	0.14/16
	48.3	2.0	3.0		15	0.13/16	0.13/16
		3.2	4.0		15	0.17/16	
50	57.0	3.0	4.0	102	18	0.23/16	
	60.3	2.0	3.0		20	0.18/16	0.18/6
		3.2	4.0		20	0.23/16	0.23/16
65	76.1	2.0	3.0		20	0.24/16	0.24/6
		3.2	4.0		20	0.32/16	
80	88.9	2.0	3.0	138	25	0.31/16	
		3.2	4.0		25	0.42/16	0.42/16
100	114.3	2.0	2.5		25	0.31/10	
		3.2	4.0		25	0.49/16	0.49/16
125	139.7	2.0	2.5		25	0.39/10	
		3.2 (3.5)*	4.0		25	0.64/16	0.64/16
150	168.3	2.0	2.5	212	25	0.47/10	
		3.0	3.5		25	0.64/10	
		3.2 (3.5)*	4.0		25	0.73/10	0.73/10
		4.0	5.0		25	0.93/16	
200	219.1	2.0	2.5	268	30	0.67/6	
		3.2	4.0		30	1.06/10	

1) Design pressure is calculated for grade EN 1.4307 at 20 °C and fulfils the requirements in EN 13480, Part 2, Part 3 and Part 5, EN 13445-3. Full face gasket with thickness ≥ 1.0 mm. Gasket factor 3.50 and design seating stress ≥ 45 Mpa. See also appendix H in EN13445-3.
2) Collars according to EN 1092-1 are calculated according to EN 1591-1.
The designation of a EN 1092-1 DN 50 collar is: Collar EN 1092-1/37/60.3x2/PN16/1.4432/LotNo.
*) Corresponds to thickness S acc. to EN 1092-1.

Stock standard: EN 1.4307 and 1.4432

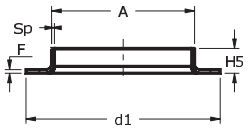


OT 500
ISO
Collars welded and pressed

DN	A	F=Sp	d1	H5	Weight kg/pce / Design pressure bar
250	273.00	3	320	31	1.18/6
		4		31	1.58/10
300	323.90	3	378	35	1.50/4
		4		35	1.90/10

The pressures are calculated for grade EN 1.4307 at 20 °C. Full face gasket with thickness ≥ 1.5 mm. Gasket factor 2.85 and design seating stress ≥ 30 Mpa. See also appendix H in EN 13445-3.

Stock standard: EN 1.4307 and 1.4432

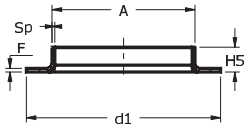


OT 509
ISO
Collars welded and pressed (long neck)

DN	A	Sp=F	d1	H5	Weight kg/pce / Design pressure bar
250	273	3	320	70	1.96/10
300	323.9	3	378	68	2.26/10

The pressures are calculated for grade En 1.4307 at 20 °C. Full-face gasket with thickness ≥1.5 mm. Gasket factor 4.94 and design seating stress 90 MPa. Se also Appendix H in EN 13445-3.
Note! To obtain the pressure ratings in the table the collars are dimensioned for special flanges that have less bore diameter and chamfer, and the other measures are at least the same as corresponding EN 1092-1 flanges type 02.

Stock standard: EN 1.4307 and 1.4432

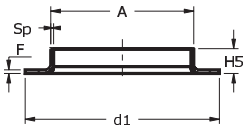


OT 510
Metric Tru-Bore®
Collars according to EN 13480 and EN 1092-1

DN	A	Sp	F	d1	H5	Weight kg/pce / Design pressure bar EN 13480 [1]	EN 1092-1 type 37 [2]
10	16	2.0	2.5	45	8	0.03/16	0.03/16
15	20	2.0	3.0	45	9	0.04/16	0.04/16
20	25	2.0	3.0	58	10	0.06/16	0.06/16
25	28	2.0	3.0	68	12	0.08/16	0.08/16
	30	2.0	3.0		12	0.08/16	0.08/16
32	38	2.0	3.0	78	14	0.11/16	0.11/16
	40	2.0	3.0		14	0.11/16	0.11/16
50	51	2.0	2.5	102	18	0.15/16	0.15/10
	54	2.0	3.0		18	0.18/16	0.18/10
65	64	2.0	2.5		18	0.14/16	
	69	2.0	3.0	122	20	0.25/16	0.25/10
	70	2.0	3.0		20	0.25/16	0.25/10
	71	3.0	4.0	124	20	0.35/16	
	74	2.0	3.0		22	0.26/16	0.26/10
	76	3.0	4.0		22	0.34/16	
	79	2.0	3.0	138	23	0.32/16	0.32/10
DN = ID							
80	81	3.2	4.0	138	23	0.42/16	0.42/16
	84	2.0	3.0		24	0.32/16	0.32/10
	86	3.2	4.0		24	0.42/16	0.42/16
100	102	2.0	2.5	158	27	0.33/10	
	104	2.0	2.5		27	0.33/10	
	106	3.2	4.0		27	0.52/16	0.52/10
	108	4.0	5.0		27	0.68/25	
125	129	2.0	2.5	188	27	0.44/6	
	131	3.0	4.0		27	0.69/16	
	133	4.0	5.0		27	0.91/16	
150	154	2.0	2.5	212	27	0.51/2.5	
	156	3.0	4.0		27	0.80/10	
	158	4.0	5.0		27	1.00/16	
200	204	2.0	2.0	268	26	0.56/2.5	
	206	3.0	3.0		26	0.83/6	
	208	4.0	4.0		26	1.10/10	

1) Design pressure is calculated for grade EN 1.4307 at 20 °C and fulfils the requirements in EN 13480, Part 2, Part 3 and Part 5, EN 13445-3. Full face gasket with thickness ≥1.0 mm. Gasket factor 3.50 and design seating stress ≥45 Mpa. See also appendix H in EN13445-3.
2) Collars according to EN 1092-1 are calculated according to EN 1591-1.
The designation of a EN 1092-1 DN 50 collar is: Collar EN 1092-1/37/54x2/PN10/1.4432/LotNo.

Stock standard: EN 1.4307 and 1.4432

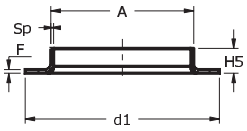


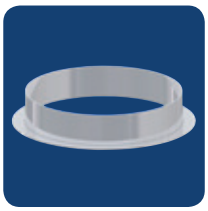
OT 510
Metric Tru-Bore®
Collars welded and pressed

DN	A	Sp=F	d1	H5	Weight kg/pce / Design pressure bar
250	255	2.5	320	31	1.00/4
	256	3.0	320	31	1.20/6
300	305	2.5	370	35	1.75/4
	306	3.0	370	35	1.50/4
350	355	2.5	430	43	1.60/4
	356	3.0	430	43	2.20/4
400	406	3.0	482	43	2.50/2
	408	4.0	482	43	3.30/4
450	456	3.0	532	45	2.90/2
	458	4.0	532	45	3.80/4
500	506	3.0	585	45	3.20/2
	508	4.0	585	45	4.20/4
600	606	3.0	685	45	3.70/2
	608	4.0	685	45	4.90/4

The pressures are calculated for grade En 1.4307 at 20 °C.
Full-face gasket with thickness ≥1.5 mm. Gasket factor 4.94 and design seating stress 90 MPa.
Se also Appendix H in EN 13445-3.

Stock standard: EN 1.4307 and 1.4432



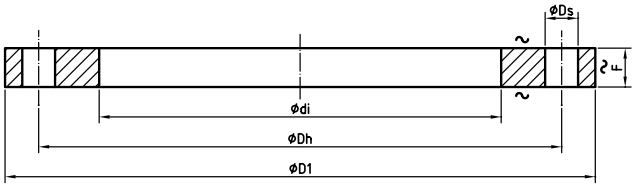


OT 519
Metric Tru-Bore®
Collars welded and pressed (long neck)

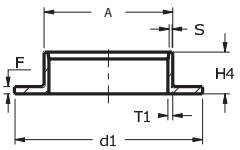
DN	A	Sp=F	d1	H5	Weight kg/pce / Design pressure bar
250	256	3	320	65	1.90/16*
300	306	3	370	55	2.00/16*
350	356	3	430	55	2.50/16*
400	408	4	482	65	4.20/10*
500	508	4	585	75	5.70/10*
600	608	4	685	80	7.20/10*

The pressures are calculated for grade En 1.4307 at 20 °C.
Full-face gasket with thickness 1.5 mm. Gasket factor 4.94 and design seating stress 90 MPa.
Se also Appendix H in EN 13445-3.
*) Note! To obtain the pressure ratings in the table the collars are dimensioned for special flanges that have less bore diameter and chamfer, and the other measures are at least the same as corresponding EN 1092-1 flanges type 02.

Stock standard: EN 1.4307 and 1.4432



Loose flanges NOMEKO 254DH							
Dim. (mm)	D1±2 (mm)	Dh±1 (mm)	di (mm)	Ds±0.6 (mm)	Screw	No. screw	F^{+3}_{-2} (mm)
256	395	350	269^{0}_{-1}	22	M20	12	26
306	445	400	$330^{0}_{-1.5}$	22	M20	12	26
356	505	460	$369^{0}_{-1.5}$	22	M20	16	30
408	565	515	$425^{0}_{-1.5}$	26	M20	16	34
508	670	620	$524^{0}_{-1.5}$	26	M20	20	40
608	780	725	$624^{0}_{-1.5}$	30	M20	20	45

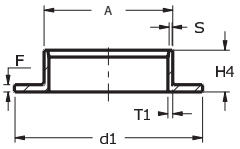


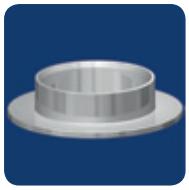
OT 502
ISO
Weldring necks PN 10 in accordance with EN 13480 (SSG 7465; EN 1092-1 Type 35; SFS 4167)

DN	A	d1	H4	F	S	T1	Weight kg/pce
15-32	Use PN 40 (SSG 7468)						
40-250	Use PN 16 (SSG 7466)						
300	323.9	370	68	12	3.2	8.0	6.80
350	355.6	430	68	13	3.2	8.0	9.50
400	406.4	482	72	14	3.2	8.0	11.6
450	457	532	72	15	3.6	8.0	15.0
500	508	585	75	16	4.0	8.0	15.9
600	610	685	80	18	5.0	10	23.0
	700	711	80	20	6.3	10	30.9

Use with loose flange according to EN 1092-1 type 02. See illustration on page 75.

Stock standard: EN 1.4432 and EN 1.4301





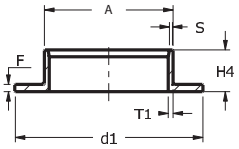
OT 502
ISO
Weldring necks PN 16 in accordance with EN 13480 (SSG 7466; EN 1092-1 Type 35; SFS 4168)

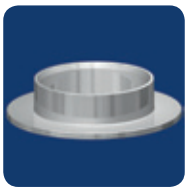
DN	A	d1	H4	F	S	T1	Weight kg/pce
15-40	Use PN 40 (SSG 7468)						
50	60.3	102	45	8.0	2.0	3.0	0.53
65	76.1	122	45	8.0	2.0	4.0	0.70
80	88.9	138	50	8.0	2.0	4.0	1.00
100	114.3	158	52	10	2.0	4.0	1.30
125	139.7	188	55	10	2.0	5.0	1.90
150	168.3	212	55	10	2.0	6.0	2.40
200	219.1	268	62	11	2.6	6.0	3.90
250	273.0	320	70	12	3.2	8.0	5.80
300	323.9	378	78	14	4.0	10	9.50*
350	355.6	438	82	18	4.0	10	15.2*
400	406.4	490	85	20	5.0	12	18.7*
450	457	550	87	22	5.0	12	24.4*
500	508	610	90	22	6.3	12	29.1*
600	610	725	95	24	8.0	12	40.3*

Use with loose flange according to EN 1092-1 type 02. See illustration on page 75.

Stock standard: EN 1.4432 and EN 1.4301

*) No stock standard



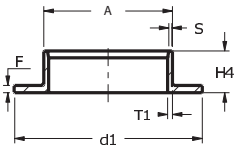


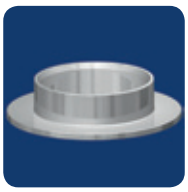
OT 502
ISO
Weldring necks PN 25 in accordance with EN 13480 (SSG 7467; EN 1092-1 Type 35; SFS 4169)

DN	A	d1	H4	F	S	T1	Weight kg/pce
15-100	Use PN 40 (SSG 7468)						
125	139.7	188	68	16	3.2	6	2.70*
150	168.3	218	75	18	3.2	8	3.50*
200	219.1	278	80	18	3.2	8	6.60*
250	273.0	335	88	18	5.0	10	10.0*
300	323.9	395	92	20	6.3	10	15.3*
350	355.6	450	100	22	6.3	12	20.8*
400	406.4	505	110	24	8	14	28.6*
450	457	555	110	26	8	15	34.4*
500	508	615	125	28	10	16	45.8*
600	610	720	115	30	10	18	61.0*

Use with loose flange according to EN 1092-1 type 02. See illustration on page 75.

*) No stock standard





OT 502
ISO
Weldring necks PN 40 in accordance with EN 13480 (SSG 7468; EN 1092-1 Type 35; SFS 4170)

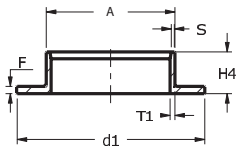
DN	A	d1	H4	F	S	T1	Weight kg/pce
15	21.3	45	38	5	2.0	3.0	0.09
20	26.9	58	40	6	2.0	3.0	0.17
25	33.7	68	40	7	2.0	3.0	0.26
32	42.4	78	42	8	2.0	3.0	0.36
40	48.3	88	45	8	2.0	3.0	0.45
50	60.3	102	48	10	2.6	4.0	0.69*
65	76.1	122	52	11	2.6	5.0	1.10*
80	88.9	138	58	12	2.6	6.0	1.60*
100	114.3	162	65	14	3.2	6.0	2.40*
125	139.7	188	68	16	3.2	6.0	3.20*
150	168.3	218	75	18	4.0	8.0	4.60*
200	219.1	285	88	20	5.0	10	8.80*
250	273.0	345	105	22	6.3	12	14.4*
300	323.9	410	115	25	8.0	12	20.7*
350	355.6	465	125	28	8.0	14	30.7*
400	406.4	535	135	32	10	16	45.4*
450	457.0	560	**	**	**	**	**
500	508.0	615	**	**	**	**	**
600	610.0	735	**	**	**	**	**

Use with loose flange according to EN 1092-1 type 02. See illustration on page 75.

Stock standard: EN 1.4432 and EN 1.4301

*) No stock standard

**) Specified by the customer, no stock standard

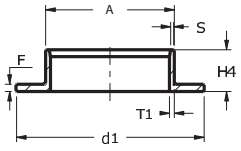


OT 512
Metric Tru-Bore®
Weldring necks PN 10 in accordance with EN 13480 (EN 1092-1 Type 35M; SSG 7365)

DN	A	d1	H4	F	S	T1	Weight kg/pce
20-250	Use PN 16 (SSG 7366)						
300	316	370	60	12	3.0	8.0	6.80
350	366	430	60	12	3.5	8.0	9.50
400	416	482	65	12	3.5	8.0	11.6*
450	466	532	70	15	3.5	8.0	15.0*
500	518	585	75	15	4.0	9.0	15.9*
600	620	685	80	15	4.0	10	23.0*
700	724	800	90	15	4.5	12	30.9*
800	826	905	100	15	5.0	13	41.5*
900	916	1005	110	18	6.0	15	50.0*
1000	1016	1110	120	18	8.0	18	58.9*
1200	1220	1330	130	22	10	18	93.2*

Use with loose flange according to EN 1092-1 type 02. See illustration on page 75.

Stock standard: EN 1.4432
*) No stock standard

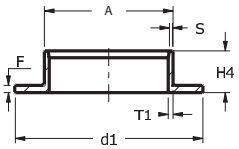


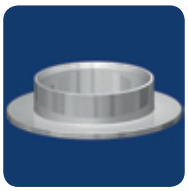
OT 512
Metric Tru-Bore®
Weldring necks PN16 in accordance with EN 13480 (EN 1092-1 Type 35M; SSG 7366)

DN	A	d1	H4	F	S	T1	Weight kg/pce
20	24	58	40	6.0	2.0	2.0	0.17*
25	29	68	40	6.0	2.0	2.0	0.26*
32	36	78	40	6.0	2.0	2.0	0.36*
40	44	88	45	6.0	2.0	2.0	0.45
50	54	102	45	8.0	2.0	2.0	0.53
65	70	122	45	8.0	2.5	2.5	0.70
80	86	138	50	10	3.0	3.0	1.00
100	108	158	50	10	3.0	4.0	1.30
125	135	188	50	10	3.0	5.0	1.90
150	160	212	50	10	3.0	5.0	2.40
200	214	268	65	10	3.0	7.0	3.90
250	266	320	65	12	3.5	8.0	5.80
300	320	370	65	12	4.0	10	9.50*
350	370	430	70	15	4.5	10	15,2*
400	424	482	80	15	5.0	12	18.7*
450	474	532	85	15	5.0	12	24.4*
500	524	585	95	18	5.0	12	29.1*
600	628	685	100	18	6.0	14	40.3*
700	728	795	110	20	10	14	45.2*
800	832	900	110	22	12	16	59.9*
900	936	1000	115	24	12	18	75.6*
1000	1036	1115	130	32	15	18	106.45*
1200	1244	1330	130	32	15	22	130.5*

Use with loose flange according to EN 1092-1 type 02. See illustration on page 75.

Stock standard: EN 1.4432
*) No stock standard



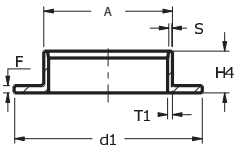


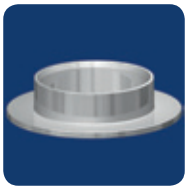
OT 512
Metric Tru-Bore®
Weldring necks PN 25 in accordance with EN 13480 (EN 1092-1 Type 35M; SSG 7367)

DN	A	d1	H4	F	S	T1	Weight kg/pce
20-150	Use DN 20-150 (SSG 7370)						
200	219	278	65	12	5.0	9	6.60*
250	274	335	75	15	6.5	10	10.0*
300	325	390	80	16	7.5	11.5	15.3*
350	374	450	85	18	5.0	12	20.8*
400	427	505	95	18	6.0	13.5	28.6*
450	480	555	105	20	8.0	15	34.4*
500	530	615	115	22	8.0	15	45.8*
600	636	720	115	24	12	18	61.0*
700	730	820	**	**	**	**	**
800	830	930	**	**	**	**	**
900	936	1030	**	**	**	**	**

Use with loose flange according to EN 1092-1 type 02. See illustration on page 75.

*) No stock standard
**) Specified by the customer, no stock standard





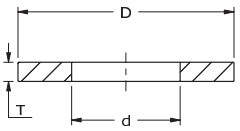
OT 512
Metric Tru-Bore®
Weldring necks PN 40 in accordance with EN 13480 (EN 1092-1 Type 35M; SSG 7370)

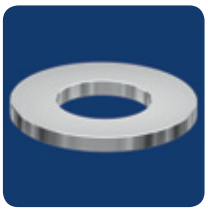
DN	A	d1	H4	F	S	T1	Weight kg/pce
20	26	58	40	6	2.5	3.0	0.17
25	31	68	40	6	2.5	3.0	0.26
32	39	78	40	6	2.5	3.5	0.36
40	47	88	45	8	2.5	3.5	0.45*
50	58	102	45	8	2.5	4.0	0.69*
65	74	122	45	10	2.5	4.5	1.10*
80	89	138	55	10	2.5	4.5	1.60*
100	110	162	55	10	3.0	5.0	2.40*
125	137	188	55	12	3.5	6.0	3.20*
150	164	218	65	12	4.0	7.0	4.60*
200	220	285	85	20	6.0	10	8.80*
250	274	345	100	22	8.0	12	14.4*
300	330	410	110	24	9.0	15	20.7*
350	380	465	120	30	10	15	20.7*
400	440	535	130	30	12	20	45.4*
450	490	560	135	30	12	20	39.0*
500	540	615	140	35	15	20	49.0*
600	648	735	150	40	15	24	118.4*

Use with loose flange according to EN 1092-1 type 02. See illustration on page 75.

Stock standard: EN 1.4432
*) No stock standard

OT 501
ISO
Weld-on plate collars

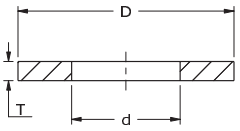


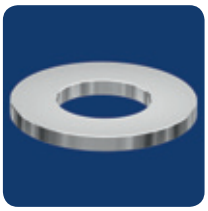


DN	d	D	T	Weight kg/pce
10	17.7	40	6.0	0.05
15	21.8	45	6.0	0.06
20	27.4	58	6.0	0.10
25	34.2	68	6.0	0.14
32	43.0	78	6.0	0.16
40	48.8	88	6.0	0.21
50	60.8	102	8.0	0.35
65	76.6	122	8.0	0.48
80	89.4	138	10	0.70
100	115.5	158	10	0.75
125	140.7	184	10	0.90
150	169.3	212	10	1.04
200	220.1	268	10	1.50

Stock standard: EN 1.4404 ≤ DN 80
EN 1.4432 > DN 80

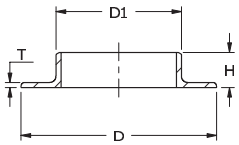
OT 511
Metric Tru-Bore®
Weld-on plate collars

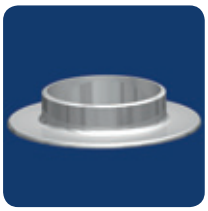




DN	d	D	T	Weight kg/pce
10	15.0	40	6.0	0.05
15	20.5	45	6.0	0.06
20	25.5	58	6.0	0.10
25	30.5	68	6.0	0.14
32	39.0	78	6.0	0.17
40	45.0	88	6.0	0.22
50	55.0	102	8.0	0.38
65	70.0	122	8.0	0.50
70	75.0	122	10	0.59
75	80.0	138	10	0.79
80	85.0	138	10	0.75
100	105.0	158	10	0.88
125	130.0	184	10	1.10
150	155.0	212	10	1.30
200	205.0	268	10	1.90
250	255.0	320	12	2.80
300	306.0	370	12	3.30
350	356.0	430	12	4.40
400	406.0	482	12	5.10
450	456	532	15	7.10
500	508	585	15	8.00

Stock standard: EN 1.4404 ≤ DN 80
EN 1.4432 > DN 80

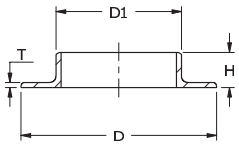


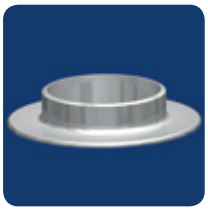


OT 503
ISO
Angle collars

DN	D1	T	D	H	Weight kg/pce / Design pressure bar
200	219.1	4	271	28	1.20/10
250	273.0	4	320	28	1.40/10
300	323.9	4	376	28	1.80/10
350	355.6	4	410	28	2.10/6
400	406.4	4	480	38	3.30/6
450	457	4	530	38	3.50/6
500	508	5	590	48	5.70/6
600	610	5	690	48	7.20/6

The pressures are calculated for grade EN 1.4307 at 20 °C. Stock standard: EN 1.4432
Full face gasket with thickness ≥0.5 mm. Gasket factor 4.94 and design seating stress ≥90 Mpa.
See also appendix H in EN 13445-3.
Loose flange for dimension DN 200 - 300 and DN 500 - 600 SS 2049/DIN 2642/EN 1092-1 type 02 can be used.
For DN 350-450 use SS 2049/DIN2642.



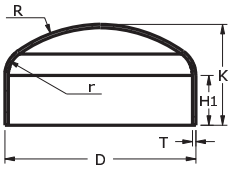


OT 513
Metric Tru-Bore®
Angle collars

DN	D1	T	D	H	Weight kg/pce / Design pressure bar
200	208	4	260	28	1.10/10
250	258	4	310	28	1.40/10
300	308	4	360	28	1.70/10
350	358	4	410	28	2.00/6
400	408	4	480	38	3.20/6
450	458	4	530	38	3.30/6
500	510	5	590	48	5.50/6
600	610	5	690	48	6.80/6
700	710	5	785	48	8.30/4
800	810	5	885	48	9.40/4

The pressures are calculated for grade EN 1.4307 at 20 °C. Stock standard: EN 1.4432
Full face gasket with thickness ≥0.5 mm. Gasket factor 4.94 and design seating stress ≥90 Mpa.
See also appendix H in EN 13445-3.
Loose flange for dimension DN 200 - 300 and DN 500-600 SS 2049/DIN 2642/EN 1092-1 type 02 can be used.
For DN 350 - 450 use SS 2049/DIN2642.

OT 60
ISO
Caps, ISO 5251, EN 10253-4

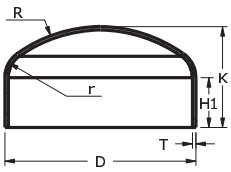


D	T	R	r	K	H1	Weight kg/pce / Design pressure bar
33.7	2.0	27	5	38	25	0.08/100*
48.3	2.0	32	6	38	25	0.10/100
60.3	2.0	48	9	38	22	0.14/60
76.1	2.0	60	11	38	18	0.17/50
88.9	2.0	64	12	51	26	0.28/80*
88.9	3.0	64	12	51	26	0.42/100
114.3	2.0	88	17	64	34	0.45/60*
114.3	3.0	88	17	64	34	0.67/100
139.7	3.0	112	21	76	40	1.00/40
168.3	3.0	130	26	89	44	1.42/40
219.1	3.0	175	34	102	45	2.26/25
273.0	3.0	215	42	127	56	3.40/16
273.0	4.0	215	42	127	56	4.52/30*
323.9	4.0	250	50	152	68	6.40/25
355.6	4.0	285	57	165	70	7.72/20*
406.4	4.0	325	65	178	71	9.73/20*
457	4.0	365	73	203	83	12.1/16*
508	4.0	406	80	229	92	15.1/16*
610	4.0	488	98	267	108	18.2/14*

The pressures are calculated according to EN 13445-3 for grade EN 1.4432 at 20 °C.

Stock standard: EN 1.4432
*) No stock standard.

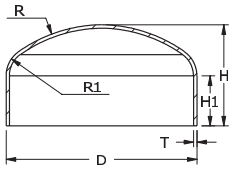
OT 61
Metric Tru-Bore®
Caps, SMS 482; SSG 1369



D	T	R	r	K	H1	Volume Litres	Weight kg/pce / Design pressure bar
54	2.0	40	8	25	10	0.02	0.10/80
84	2.0	64	13	38	15	0.1	0.20/50
86	3.0	64	13	38	15	0.1	0.30/80*
104	2.0	80	16	44	15	0.1	0.30/40
106	3.0	80	16	44	15	0.1	0.40/60*
129	2.0	100	20	50	15	0.3	0.40/30
131	3.0	100	20	50	15	0.3	0.60/50*
154	2.0	120	24	56	15	0.5	0.50/25
156	3.0	120	24	56	15	0.5	0.80/40*
204	2.0	160	32	74	20	1.0	0.90/20*
206	3.0	160	32	74	20	1.0	1.30/25
208	4.0	160	32	74	20	1.0	1.70/40*
254	2.0	200	40	86	20	2.0	1.30/16*
256	3.0	200	40	86	20	2.0	2.00/25
258	4.0	200	40	86	20	2.0	2.60/25*
306	3.0	240	48	100	20	3.5	2.70/20
308	4.0	240	48	100	20	3.5	3.60/25*
356	3.0	280	56	115	20	5.6	3.70/16
358	4.0	280	56	115	20	5.6	4.90/20*
406	3.0	320	65	128	20	8.7	4.70/16
408	4.0	320	65	128	20	8.7	6.30/20*
456	3.0	360	72	140	20	14.0	6.30/12*
458	4.0	360	72	140	20	14.0	7.80/16*
506	3.0	400	80	152	20	19.0	7.20/12*
508	4.0	400	80	152	20	19.0	9.60/16*
606	3.0	480	96	180	20	30.0	12.7/10*
608	4.0	480	96	180	20	30.0	13.5/12*
708	4.0	560	112	205	20	46.0	18.2/12*
710	5.0	560	112	205	20	46.0	24.8/15*

The pressures are calculated according to EN 13445-3 for grade EN 1.4432 at 20 °C.

Stock standard: EN 1.4432
*) No stock standard.

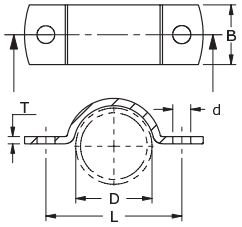


OT 62
ANSI
Caps

N.P.S.	D	SCH	T	R1	R	H	H1	Weight kg/pce /Design pressure bar
1 1/2″	48.3	10S	2.77	7	34	38	24	0.14/190
1 1/2″	48.3	40S	3.68	7	33	38	24	0.23/265
2″	60.3	10S	2.77	9	44	38	21	0.17/147
2″	60.3	40S	3.91	8	42	38	20	0.27/219
2 1/2″	73.0	10S	3.05	11	54	38	18	0.25/133
2 1/2″	73.0	40S	5.16	10	50	38	17	0.45/242
3″	88.9	10S	3.05	13	66	51	26	0.40/107
3″	88.9	40S	5.49	12	62	51	26	0.71/206
4″	114.3	10S	3.05	17	87	64	33	0.65/82
4″	114.3	40S	6.02	16	82	64	32	1.22/172
5″	141.3	10S	3.40	22	108	76	38	1.02/73
5″	141.3	40S	6.55	21	103	76	36	1.84/149
6″	168.3	10S	3.40	26	129	89	44	1.36/61
6″	168.3	40S	7.11	25	123	89	42	3.23/134
8″	219.1	10S	3.76	34	169	102	44	2.49/51
8″	219.1	40S	8.18	32	162	102	42	5.67/117
10″	273.0	10S	4.19	42	212	127	55	4.90/46
10″	273.0	40S	9.27	41	204	127	52	9.21/106
12″	323.9	10S	4.57	50	252	152	66	6.53/42
12″	323.9	40S	9.53	49	244	152	64	13.1/91
14″	355.6	10S	4.78	55	277	165	71	8.16/40
14″	355.6	STD	9.53	54	269	165	69	16.2/82
16″	406.4	10S	4.78	63	317	178	71	14.5/35
16″	406.4	STD	9.53	62	310	178	69	22.0/71
18″	457	10S	4.78	72	358	203	83	18.0/31
18″	457	STD	9.53	70	350	203	81	27.0/63
20″	508	10S	5.54	80	398	229	95	27.2/32
20″	508	STD	9.53	78	391	229	93	34.0/56
24″	610	10S	6.35	96	478	267	106	34.5/31
24″	610	STD	9.53	95	473	267	105	44.5/47

Stock standard: 316/316L

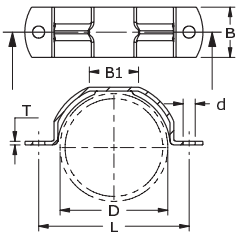
OT 74
ISO/Metric
Tube clamps



DN	Tube size D	B	L	d	T	Bolt size
10	14–18	25	40	7.5	2	M6 x 20
15	20–22	25	44	7.5	2	M6 x 20
20	23–24	25	46	7.5	3	M6 x 20
	25–28	25	52	7.5	3	M6 x 20
25	30–33.7	25	57	7.5	3	M6 x 20
32	35–38	25	63	7.5	3	M6 x 20
32-40	42.4–44.5	30	69	7.5	3	M6 x 20
40	48.3	30	73	7.5	3	M6 x 20
350	353–356	50	413	18	4	M16 x 50
400	404–406	50	464	18	4	M16 x 50
450	454–458	50	515	18	4	M16 x 60
500	504–508	50	567	18	4	M16 x 60
600	604–608	50	669	18	4	M16 x 65
700	711	50	770	18	4	M16 x 65

Stock standard: EN 1.4404

OT 74
ISO/Metric
Tube clamps



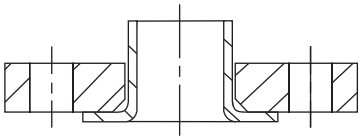
DN	Tube size D	B	L	d	T	B1	Bolt size
50	53–54	40	87	9.5	3	20	M8 x 25
	57–60.3	40	91	9.5	3	20	M8 x 25
65	68–70	40	100	9.5	3	22	M8 x 25
70	73–76.1	40	120	9.5	3	22	M8 x 25
80	82–84	40	131	9.5	3	30	M8 x 25
	88.9	40	120	9.5	3	30	M8 x 25
100	102–106	40	148	12	3	30	M10 x 25
	114.3	40	156	12	3	30	M10 x 35
125	127–131	40	177	12	3	30	M10 x 25
	139.7	40	186	12	3	30	M10 x 35
150	152–156	40	198	12	3	30	M10 x 25
	168.3	40	206	12	4	30	M10 x 35
200	202–206	40	244	15	4	30	M12 x 35
	219.1	40	262	15	4	30	M12 x 35
250	252–256	40	298	15	4	30	M12 x 50
	273	40	316	15	4	30	M12 x 50
300	302–306	50	369	18	4	38	M16 x 50
	323.9	50	390	18	4	38	M16 x 50

Stock standard: EN 1.4404


OUTOKUMPU
OUTOKUMPU

Flange joints

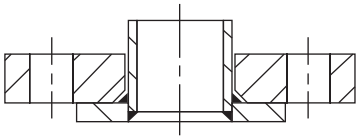
The most common joints are illustrated by the following drawings referring to EN 1092-1. Flange connections according to ASME B 16.9 look similar.



Type 02 and 37 according to EN 1092-1

Loose flange – pressed collar joint

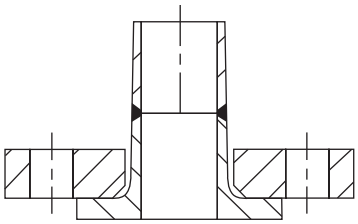
The inside diameter (ID) should be 3-7 mm larger than the outside diameter (OD) of the tube or neck, depending on size.



Type 02 and 32 according to EN 1092-1

Loose flange – weld-on collar plate joint

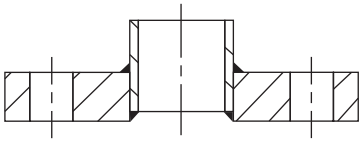
The inside diameter (ID) of the flange should be 3-7 mm larger than the outside diameter (OD) of the tube, depending on size.



Type 02 and 35 according to EN 1092-1

Loose flange – weld-neck collar joint

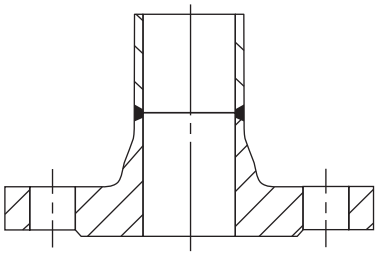
The inside diameter (ID) of the flange should be 3-7 mm larger than the outside diameter (OD) of the stub, depending on size. Stub ends are available in a variety of types. If stub type is specified when ordering, the appropriate ID of the flange can be more easily selected or turned down from standard sizes.



Type 01 according to EN 1092-1

Plate flange for welding – tube joint

The inside diameter (ID) of the flange should be 0.5-2.0 mm larger than the outside diameter (OD) or the tube, depending on size.



Type 11 according to EN 1092-1

Weld-neck flange – tube joint

The relationship between the diameter of the tube and the diameter of the flange is given in the dimension tables.

Technical information regarding OSTP products in Pressure Equipment Directive 97/23/EC (PED) applications

Tubes and fittings produced and supplied by OSTP according to EN 10217-7 and EN 10253-4 respectively are PED-compliant.

As all European OSTP manufacturing & production systems satisfy the requirements of the Pressure Equipment Directive 97/23/EC, tubes and fittings with joint coefficients of z = 0.7 and 0.85, produced and supplied according to EN 10296-2 and EN 10253-3 respectively, also fulfil the PED essential safety requirements, which qualifies them for use in PED category I-IV applications.

It is the responsibility of the equipment designers/manufacturers to ensure that the correct technical products are used for the required applications.

For any further technical queries or additional information, please contact our application engineers.

General key information at enquiry stage

Tubes and pipes (Process pipes – HEX - HWP):

- Product Standard (e.g. EN 10217-7, ASTM A 358/A 358M)
- Dimension (OD, WT, Length). For HEX tubes also length tolerances
- Dimensional Standard (ISO, ANSI, Metric Tru-Bore®)
- Steel grade (e.g. EN 1.4404 / TP 316L)
- Quantity (m). For HEX tubes number of tubes. Also quantity tolerances
- Delivery time, address (goods), address (documents), conditions
- Type of Inspection certificate (e.g. 3.1 acc. to EN 10204, 3.2 acc. to EN 10204)
- Type of packing, if different from OSTP mill standard
- Additional options:
  - NHT, HT (Not Heat Treated, Heat Treated)
  - NDT, DT (None Destructive Testing, Destructive Testing)
  - Weld factor z, joint quality factor Ej
  - End preparation BE (Bevelled Ends)
  - Tolerances (e.g. D4/T3 acc. to EN ISO 1127)
  - Surface condition on raw material (e.g. 2B, 2E, 2D)
  - Sub classes (e.g. ASTM A 358/A 358M Class 3)
  - For HEX tubes details regarding internal weld bead requirements if applicable
  - If it is a Project - Project Name and Application / Segment
  - Etc.

Note! Some options can already be required in the Product Standard.

Butt weld fittings:

- Product type (e.g. elbow, tee, reducer)
- Product Standard (eg. EN 10253-3, EN 10253-4, ASTM A 403/A 403M)
- Dimension (OD, WT)
- Dimensional Standard (ISO, ANSI, Metric Tru-Bore®)
- Steel grade (EN 1.4404 / TP 316L)
- Quantity (pieces)
- Delivery time, address (goods), address (documents), conditions
- Type of Inspection certificate (3.1 acc. to EN 10204, 3.2 acc. to EN 10204 etc.)
- Type of packing if different from OSTP mill standard
- Additional options
  - NHT, HT (Not Heat Treated, Heat Treated)
  - NDT, DT (None Destructive Testing, Destructive Testing)
  - Welding factor z, joint quality factor Ej
  - End preparation BE (Bevelled Ends)
  - Tolerances (e.g. D4/T3 acc. to EN ISO 1127)
  - Surface condition (e.g. 2B,2D)
  - Sub class (e.g. WP-WX)
  - If it is a Project - Project Name and Application / Segment
  - Etc.

Note! Some options can already be required in the Product Standard.

General key information at enquiry stage

Circular hollow sections:

- Dimension (e.g. OD 139.7x3 mm)
- Standard length 6 m or fixed lengths
- Product Standard (e.g. EN 10296-2)
- Outside finishes: as welded, pickled, ground or polished
- Steel grade (e.g. EN 1.4404 / TP 316L)
- Quantity (m)
- Delivery time, address (goods), address (documents), conditions
- Type of packing, if different from OSTP mill standard
- Additional options:
  - NDT, DT (e.g. 100% ET)
  - Tolerances (e.g. D3/T3 acc. to EN ISO 1127)
  - If it is a Project - Project Name and Application / Segment
  - Etc.

Contact OSTP customer service for additional information!

Product and dimension standards

Tubes and pipes

Product	Product standard	Dimension standard
Process pipes	EN 10217-7 EN 10296-2 AD 2000 W2 ASTM A 312 ASTM A 358 ASTM A 409 ASTM B 673 ASTM A 778 ASTM A 790 ASTM A 928	EN ISO 1127 SSG 1361 ASME B36.19 ASME B36.10
Heat exchanger tubes	EN 10217-7 ASTM A 249 ASTM A 269 ASTM A 789 ASTM B 674 AD 2000 W2	EN ISO 1127 SSG 1361 ANSI B36.19 Imperial DIN 28180
Circular hollow sections	Mill std. EN 10296-2 ASTM A 312 ASTM A 790	Mill std. EN ISO 1127 ASME B36.19 ASME B36.10
Decorative	EN 10296-2	EN ISO 1127

Tolerances according to EN ISO 1127

Tolerance class	Tolerance on outside diameter		
D_1	± 1.5%	with ± 0.75	mm min
D_2	± 1%	with ± 0.5	mm min
D_3	± 0.75%	with ± 0.3	mm min
D_4	± 0.5%	with ± 0.1	mm min

The tolerances on outside diameter include ovality.

Tolerance class	Tolerance on thickness		
T_1	± 15%	with ± 0.6	mm min
T_2	± 12.5%	with ± 0.4	mm min
T_3	± 10%	with ± 0.2	mm min
T_4	± 7.5%	with ± 0.15	mm min
T_5	± 5%	with ± 0.1	mm min

The tolerances on thickness include eccentricity.

Butt weld fittings

Product	Product standard	Dimension standard
Elbows	ASTM A 403 ASTM A 403 WP-S ASTM A 815 Mill std. EN 10253-3 EN 10253-4	EN ISO 1127 ASME B16.9 Mill std. ISO 5251 SSG 1362
Reducers	ASTM A 403 ASTM A 403 WP-S EN 10253-3 EN 10253-4	EN ISO 1127 ASME B16.9 ISO 5251 SSG 1364 Mill std. (SFS 4162)
Tees	ASTM A 403 ASTM A 403 WP-S EN 10253-3 EN 10253-4	EN ISO 1127 ASME B16.9 ISO 5251 SSG 1363 Mill std.
Collars	EN 1092-1 Mill std.	EN ISO 1127 (SFS 4167) (SFS 4168) (SFS 4169) (SFS 4170) SSG 1366 EN 1092-1 Mill std.
Weldring necks	EN 1092-1	EN ISO 1127 EN 1092-1
Caps	EN 10253-3 EN 10253-4 ASTM A403 WP-S	EN ISO 1127 ISO 5251 ASME B16.9 SSG 1369

Dimension standards (for information only)

ISO 4200 Nominal diameter	SSG 1361 Tab 3-4	EN ISO 1127 Outer Diameter mm Serie				ANSI B36,19M		Imperial OD		Hygienic OD	Hydraul OD
DN	OD mm	1	2	3	Old	NPS	mm	mm	Inch	mm	mm
4	6		6					6.35	1/4		6
6			8					9.35	3/8		8
8	10	10.2					10.3				
	12	13.5	10 121			1/8 1/4	13.7	12.7	1/2		10 12
10											15
	16	17.2	16	14	14	3/8	17.1	15.88	5/8		16
15											18
	20	21.3	19 20	18	20	1/2	21.3	19.05	3/4	18/19	20
20										22/23	22
	25	26.9	25	22 25.4	25	3/4	26.7	25.4	1	25	25
25										28/29	28
	30	33.7	31.8 32	30	30	1	33.4	31.75	1 1/4	32	30
32											
	38	42.4	38 40	35	38	1 1/4	42.2	38.1	1 1/2	34/35 38 40/41	38
40	43/44	48.3		44.5	44.5	1 1/2	48.3	44.5	1 3/4		50
50			51					50.8	2	51	
	53/54		57	54						52/53	
		60.3			57	2	60.3				60
65			63.5								
			70							63.5	
								63.5	2 1/2	70	
								76.2	3	76.1	65
80	83/84	88.9		82.5		3	88.9	88.9	3 1/2	85	
100	103/104		101.6		108		101.6	101.6	4	101.6	
		114.3				3 1/2 4	114.3	114.3	4 1/2	104	
125	128/129						127.0	127.0	5	129	
		139.7			133	5	139.7	139.7	5 1/2		
150	154				159			152.4		154	
		168.3				6	168.3		6		
200	204										
		219.1				8	219.1				
250	254										
					267						
		273				10	273.0				
300	305										
		323.9				12	323.9				
350	355	355.6				14	355.6				
					368						
400	406	406.4				16	404.6				
					419						
450		457				18	457				
500	506/508	508				20	508				
						22	559				
600	606/608	310				24	610				
						26	660				
700	706/708	711				28	711				
						30	762				
800	806/808	813				32	813				
						34	864				
900	906/908	914				36	914				
						38	965				
1000		1016				40	1016				
						42	1067				
1100						44	1118				
						46	1168				
1200						48	1219				
						52	1321				
1400						56	1422				
						60	1524				
1600						64	1626				
						68	1727				
1800						72	1829				
						76	1930				
2000						80	2032				

AISI	American Iron and Steel Institute
ANSI	American National Standard Institute
API	American Petroleum Institute
ASME	American Society for Mechanical Engineers
ASTM	American Society for Testing and Materials
AV	Arbetsmiljöverket
BCW	Bead Cold Worked
BE	Bevelled Ends
BS	British Standard
BWG	Birmingham Wire Gauge
CCT	Critical Crevice Temperature
CPT	Critical Pitting Temperature
DIN	Deutsche Institut für Normen
DN	Nominell Diameter, Nenn Weite
DNV	Det Norske Veritas
DR/L	Double Random Lengths (12 m)
EN	Europa Norm
EFW	Electric Fusion Welding
ERW	Electric Resistance Welding (HF)
ET (= EC)	Eddy Current
GTAW	Gas Tungsten Arc Welding (same as TIG and WIG)
HF	High Frequency welding
HT	Heat Treated
IGC-test	Intergranular Corrosion test
ID	Inside Diameter
ISO	International Standardization Organization
JIS	Japanese Standard
LBW	Laser Beam Welding
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
NB	Nominal Bore
NF	Norme Francaise
NHT	Not Heat Treated
NP	Nominal Pressure
NPS	Nominal Pipe Size
NS	Norsk Standard
NDT	Non Destructive Testing
OD	Outside Diameter
PAW	Plasma Arc Welding
PE	Plain Ends
PED	Pressure Equipment Directive
PN	Pressure Number
QA	Quality Assurance
R/L	Random Lengths (6 m)
RN-78	Rörledningsnormer -78
RSEW-HF	High frequency resistance seam welding (same as HF)
SAW	Submerged Arc Welding
Sch	The "Schedule" designation tells you how thick the wall is for any size of pipe with the higher schedule numbers meaning a thicker wall.
SEP	Stahl Eisen Prüfblatt
SEW	Stahl Eisen Werkstoffblatt
SIS	Swedish Standard Institute
SSG	Standard Solutions Group
SW	Seam Welding
SWG	British Standard Wire Gauge
TIG	Tungsten Inert Gas
TÜV	Technische Überwachungs-Verein
UNS	Unified Numbering System
UP	= SAW = Submerged Arc Welding
Vd TÜVWb	Vereinigung der TÜV-Werkstoffblatt
WIG	Wolfram Inert Gas (German TIG)
W.-Nr.	Werkstoffnummer
97/23/EC	Pressure Equipment Directive 97/23/EC of the European Parliament and of the Council of 29 May 1997 on the approximation of the laws of the Member States concerning pressure equipment.

Stainless steel grades

Standard grades

Outokumpu	EN	ASTM	Typical C	Cr	Minimum Ni	Mo	Others	SS	DIN	Stock standard Pipe/Fittings
4301	1.4301	(304)	0.04	17.0	8.5	-		2333	1.4301	
4307	1.4307	304L	0.02	18.0	8.0	-		(2352)	(1.4306)	ANSI/ISO/Metric
4541	1.4541	321	0.04	17.0	9.0	-	Ti	2337	1.4541	ISO
4306	1.4306	304L	0.02	18.0	10.0	-		2352	1.4306	
4401	1.4401	316	0.04	16.5	10.0	2.0		(2347)	(1.4401)	
4404	1.4404	316L	0.02	16.5	10.0	2.0		(2348)	(1.4404)	ANSI/ISO/Metric
4571	1.4571	316Ti	0.04	16.5	10.5	2.0	Ti	2350	1.4571	ISO/Metric
4436	1.4436	316	0.04	16.5	10.5	2.5		2343	(1.4436)	
4432	1.4432	316L	0.02	16.5	10.5	2.5		2343	(1.4435)	ISO/Metric
4435	1.4435	316L	0.02	17.0	12.5	2.5		2353	1.4435	
4438	1.4438	317L	0.02	18.0	13.0	3.0		2367	1.4438	

The compositions comply with EN, which not always comply exactly with the old national standards.
Old SS and DIN-designations within brackets specifies a slightly higher Ni-content, that is insignificant for the corrosion resistance.

Wet corrosion resistant grades

Outokumpu	EN	ASTM	C	Cr	Typical Ni	Mo	N	Other	SS	DIN	Stockpipe
Duplex											
LDX 2101®	1.4162	S32101	0.03	21.5	1.5	0.3	0.22	5,5 Mn	-		Duralite™
2304	1.4362	S32304	0.02	23.0	4.8	0.3	0.10		2327	1.4362	
LDX 2404™	1.4662	S82441	0.02	24.0	3.6	1.6	0.27	3 Mn			
2205	1.4462	S32205	0.02	22.0	5.7	3.1	0.17		2377	1.4462	ANSI
2507	1.4410	S32750	0.02	25.0	7.0	4.0	0.27		2328	-	
Austenitic											
904L	1.4539	N08904	0.01	20.0	25.0	4.3	0.06		2562	1.4539	
254 SMO®	1.4547	S31254	0.01	20.0	18.0	6.1	0.20		2378	-	ANSI
654 SMO®	1.4652	S32654	0.01	24.0	22.0	7.3	0.50	3 Mn, Cu		-	

Heat and creep resistant grades

Outokumpu	EN	ASTM	C	Cr	Typical Ni	Si	N	SS	DIN
4948	1.4948	304H	0.05	18.1	8.3	-	0.06	2333	1.4948
4878	1.4878	321	0.05	17.3	9.1	-	0.01	2337	1.4878
153 MA™	1.4818	S30415	0.05	18.5	9.5	1.3	0.15	2372	-
253 MA®	1.4835	S30815	0.09	21.0	11.0	1.6	0.17	2368	-
4828	1.4828	-	0.04	20.0	12.0	2.0	0.04	-	1.4828
4833	1.4833	309S	0.06	22.3	12.6	-	0.08	-	1.4833
4845	1.4845	310S	0.05	25.0	20.0	-	0.04	2361	1.4845

These grades are available as heat exchanger tubes in minimum quantities.
For other types of tube and pipe the availability is more limited and each inquiry will be evaluated individually.

Ferritic grade

Outokumpu	EN	ASTM	C	Typical Cr	Mo	Ti	No	DIN
4003	1.4003	S40977	0.02	11.0	-	-	-	1.4003

Mechanical and physical properties

The stresses are valid for welded tubes and fittings made from welded tubes or hot rolled plate.

Designations			Strength at 20°C EN min values					Strength at high temperatures EN min values N/mm²								Coefficient of linear expansion	Thermal conduct.
			$R_{p0.2}$	$R_{p1.0}$	R_m	A5		$R_{p0.2}$				$R_{p1.0}$				20-100°C	20°C
Outokumpu	EN	ASTM	N/mm²	N/mm²	N/mm²	%	°C*	20°C	100°C	200°C	400°C	20°C	100°C	200°C	400°C	x10⁻⁶/°C	W/m°C
4301	1.4301	304	210	250	520	45		210	157	127	98	250	191	157	125	16	15
4541	1.4541	321	200	240	500	40		200	176	157	125	240	208	186	156	17	15
4307	1.4307	304L	200	240	500	45		200	147	118	89	240	181	147	116	17	15
4306	1.4306	304L	200	240	500	45		200	147	118	89	240	181	147	116	17	15
4401	1.4401	316	220	260	520	45		220	177	147	115	260	211	177	144	16	15
4404	1.4404	316L	220	260	520	45		220	166	137	108	260	199	167	135	16	15
4408	1.4408	316		210	440	30			170	135	105		170	135	105	15.8	15.8
4571	1.4571	316Ti	220	260	520	40		220	185	167	135	260	213	196	164	16	15
4436	1.4436	316	220	260	530	40		220	177	147	115	260	211	177	144	16	15
4432	1.4432	316L	220	260	520	45		220	165	137	108	260	200	165	135	16	15
4435	1.4435	316L	220	260	520	45		220	165	137	108	260	200	165	135	16	15
4438	1.4438	317L	220	260	520	40		220	175	155	125	260	205	185	155	16	14
LDX 2101®	1.4162	S32101	450		650	30	-40	450	380	330						13	15
LDX 2404™			480		680	25	-40	480	385	325						13	15
2304	1.4362	S32304	400		630	25	-40	400	330	280						13	15
2205	1.4462	S32205	460		640	25	-40	460	360	315						13	15
2507	1.4410	S32750	530		730	20	-40	530	450	400						13	15
904L	1.4539	N08904	220	260	520	35		220	205	175	125	260	235	205	155	16	12
254 SMO®	1.4547	S31254	300	340	650	40		300	230	190	160	340	270	225	190	16.5	14
654 SMO®			430	460	750	40		430	350	315	295	470	390	355	330	15	11
								EN–$R_{p1.0}$ 100,000h N/mm²				EN–R_m 100,000h N/mm²					
								600°C	700°C	800°C	900°C	600°C	700°C	800°C	900°C	20-800°C	
4878	1.4878	321	190	230	500	40						65	22	10		19	15
4845	1.4845	310S	210	250	500	35						80	18	7	3	18.5	15
153 MA™	1.4818	S30415	290	330	600	40		80	26	9	3	88	35	14	5	19	15
253 MA®	1.4835	S30815	310	350	650	40		80	26	11	6	88	35	15	8	19	15

Proof strength at elevated temperatures in the solution annealed condition.

NOTE! For steel grade EN 1.4162, LDX 2101®, EN 1.4462 (2205) the figures are expressed in R_m.
The figures in the table refer to EN 10217-7, EN 10253-4, except steel grades 1.4408 and 1.4162.

Steel Grade	1.4436	1.4301	1.4307	1.4432	1.4404	1.4541	1.4571	1.4539	1.4408	1.4162	1.4462
T	$R_{p\,1.0}$	$R_{p\,1.0}$	$R_{p\,1.0}$	$R_{p\,1.0}$	$R_{p\,1.0}$	$R_{p\,1.0}$	$R_{p\,1.0}$	$R_{p\,1.0}$	$R_{p\,1.0}$	R_m	R_m
Design	N/mm²	N/mm²	N/mm²	N/mm²	N/mm²	N/mm²	N/mm²	N/mm²	N/mm²	N/mm² *	N/mm²
20 °C	240	230	215	225	225	235	245	250	210	650	640
100 °C	211	191	181	199	199	208	218	235	170	590	590
150 °C	191	172	158	181	181	196	206	220	153	560	570
200 °C	177	157	145	167	167	186	196	205	135	540	550
250 °C	167	145	137	157	157	177	186	190	125	627	540
300 °C	156	135	127	145	145	167	175	175	115		
350 °C	150	129	121	139	139	161	169	165	-		
400 °C	144	125	116	135	135	156	164	155	105		
450 °C	141	122	112	130	130	152	160	145			
500 °C	139	120	109	128	128	149	158	140			
550 °C	137	120	108	127	127	147	157	135			

Sample: OT 100 Process pipe ISO dimension 457 x 3.0 in steelgrade EN 1.4307 according to EN 10217-7.
Design pressure at 20 °C is 1.6 MPa.
Design pressure at 250 °C is then 0.637 x 1.6 = 1.0 Mpa.
*) 1.4162 (LDX 2101®) is not yet included in any EN standard. For pressure purpose PMA is used.
Please contact our R&D or application engineers for more information.

Conversion factors

1Pa = 0.00001 bar
1kPa = 0.01 bar
1Mpa = 10 bar

Selection of a stainless steel grade

Stainless steels are used mainly due to their corrosion resistance, but also thanks to their excellent mechanical properties, formability, weldability and appearance. There are several aspects to consider at material selection before the choice finally can be decided. Earlier experience is an important factor in order to put together a group of candidate materials. The next step is to investigate the availability of the specified product forms, dimensions, standards, minimum quantities etc. when the order is placed, but also the availability for future construction or maintenance. Other factors are cost for material and construction, expected lifetime and approvals.

Corrosion resistance

Stainless steels are resistant thanks to the invisible passive layer consisting of chromium- and iron oxides that forms spontaneously in contact with oxidants. With increasing amounts of Cr the corrosion resistance increases. Molybdenum (Mo) is an alloy that is added because it has a 3.3 times higher effect than Cr, in order to prevent pitting and crevice corrosion. Nitrogen (N) is also added in the modern developed stainless steels, and its effect on corrosion resistance is 16 times that of Cr. A number calculated from the Pitting Resistance Equivalent PRE indicates the pitting corrosion resistance of an alloy. PRE = %Cr+3.3x%Mo+16x%N.

Outokumpu	Cr	Mo	N	PRE
Cr-Ni	18.0	–		18
Cr-Ni-Mo	17.0	2.1		23
Cr-Ni-2.5Mo	17.0	2.6		25
LDX 2101®	21.5	0.3	0.22	26
2304	23.0	0.3	0.10	26
LDX 2404™	24.0	1.6	0.27	33
2205	22.0	3.1	0.17	35
904L	20.0	4.3	0.06	35
2507	25.0	4.0	0.27	43
254 SMO®	20.0	6.1	0.20	43

Factors influencing the corrosivity

The risk for corrosion attack on stainless steels in waters increases when following parameters increase. For decreasing pH-values below 7 the risk for corrosion increase.

- Temperature °C
- Chloride content ppm Cl^-
- Oxygen content ppm O_2
- Chlorination ppm ClO_2
- pH-value

Recommended maximum chloride contents (ppm or mg/l) at different temperatures and normal conditions. pH = 6-8, O_2= 4-8 ppm, chlorination <1 ppm.

Temp, °C	Cr-Ni	Cr-Ni-Mo	904 L 2205	254 SMO® 2507
20	400	1000	14500	35000
30	350	750	11500	28000
40	300	600	9500	22000
50	200	450	7500	18000

Stainless steel grades for different waters at ambient temperatures

Drinking water:	4307, 4404, LDX 2101®
Polluted water:	4432, LDX 2101®
Brackish water:	2205
Deaerated seawater:	2205
Fresh seawater, offshore:	254 SMO®, 2507
Desalination SWRO:	254 SMO®, 2507

Design of dimension and grade

Pipe systems have to be designed according to the valid safety and design regulation. In most European countries the Pressure Equipment Directive 97/23/EC is mandatory, and in many other countries ASME B31.1 or B31.3 are used. The user is however free to select the dimension standard and grade. Using pipe systems with thinner walls and/or grades with higher strength makes significant weight and cost savings. Pipe systems designed with Metric Tru-Bore® and/or ISO are lighter compared to pipe systems designed with ANSI dimensions. By using thin walled pipe made from any of the high strength Duplex stainless steels, as substitute for the Austenitic standard grades, more cost saving is possible.

Pressure calculation tool is available at www.outokumpu.com, select ”Products”, ”Tools” and ”Pressure Calculation”.

Calculation of loss of pressure due to friction

Stainless steels are not sensitive for high water velocity. Water speeds exceeding 20 m/sec are not a problem. The stainless surface is corrosion resistant and durable, and will remain the same through the years. The friction coefficient can be set to 0.04 for standard pipe products, and down to 0.004 for hygienic tubes with a higher surface finish, for fittings the friction coefficient can be set to 0.2-0.4 for a 90° elbow and for a tee to 0.5 - 3.0.

Tools for calculating loss of pressure is available at www.outokumpu.com, select ”Products”, ”Tools” and ”Pressure Drop Calculation”.

Our main certifications and approvals

OSTP is proud of its reputation as a reliable supplier and a manufacturer of high quality products. In addition to satisfied customers, the proof of this can be seen in our quality certifications.

These are our main certifications:

- We deliver according to PED 97/23/EC and have a quality system for the manufacturing of pressure equipment components and for manufacturing components.
- Our Quality Systems are certified in accordance with the EN ISO 9001, Quality Management System Standard and EN ISO 14001, Environmental Management System Standard, OHSAS 18001, Occupational Health and Safety Management System.
- OSTP is certified according to AD2000-W0 approved by TÜV Nord e.V.
- OSTP is approved by most of the common notified bodies.

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