

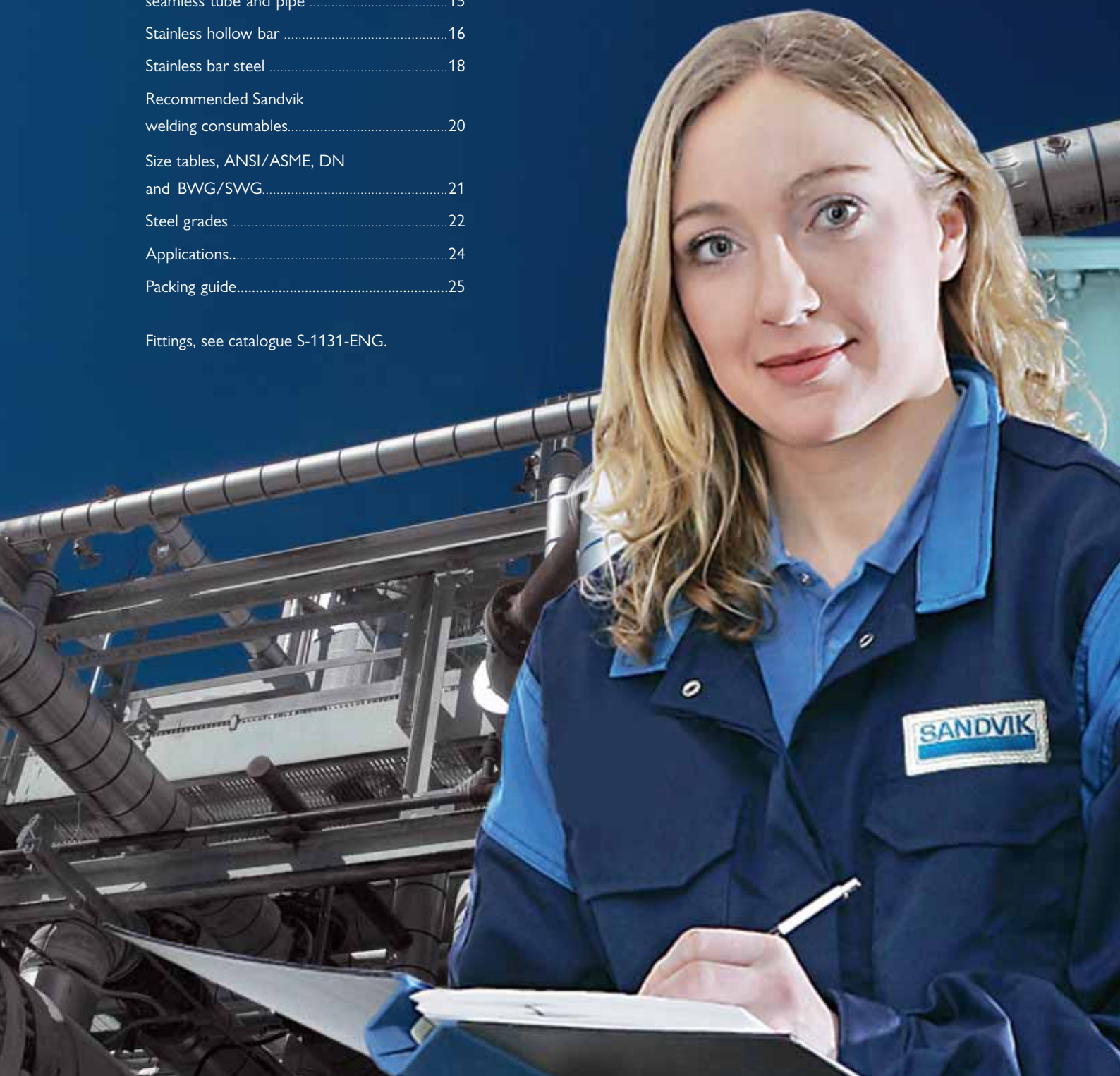
***Sandvik pipe – tube – bar – hollow bar
stock program in stainless***



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Fittings, see catalogue S-1131-ENG.





Make Sandvik your materials partner – the perfect choice in stainless

Combining steelmaking expertise, materials knowledge and worldwide applications experience means that Sandvik meets the demands of many different markets.

Just what the market needs

Continuous and close contact with our customers, combined with our own market research, makes us very well aware of market requirements regarding service, product range, finishes and materials.

Plenty of choice

We have a wide range of stainless, seamless tube available from stock. On request we can also supply you with a large number of specially made sizes from our extensive manufacturing program. This is backed up by other stainless products, such as welded tube, fittings, bar, sheet and welding consumables. Whether you need a single tube length or materials for a complete tubing installation.

Look for more information in these catalogues



S-120 ENG
Sandvik duplex stainless steels



S-TU036-B ENG
Boiler tubes for coal-fired power plants



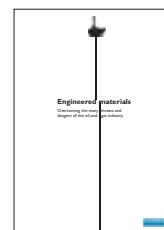
S-1305 ENG
Steam cracking tubes for efficient ethylene production



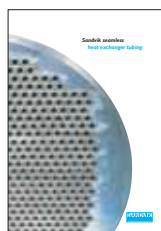
S-121 ENG
Composite tubes - metallurgically bonded



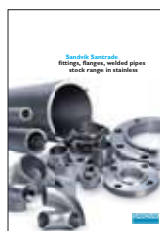
S-153 ENG
Seamless stainless tubes for hydraulic and instrumentation systems



S-GE004-B ENG
Engineered materials. Overcoming the many threats and dangers of the oil and gas industry.



S-154 ENG
Seamless heat exchanger tubing



S-1131-ENG
Fittings, flanges, welded pipes - stock range in stainless



S-236 ENG
Stainless welding products



S-TU008 ENG
Shape it to your needs - coiled tubing



S-130 ENG
Stainless tubes for high temperature applications



S-02909 ENG
Product handbook - Sanmac solid and hollow bar

Hydraulic tubing

● Size in stock ○ In stock on customer order. Other sizes are available on mill order quantity.

Outside diameter	Wall thickness	Weight	Sandvik 3R12 TP 304/304L EN 1.4306	Sandvik 3R60 TP 316/316L EN 1.4435	Sandvik 6R35 TP 321 EN 1.4541	Sandvik 5R75 TP 316Ti EN 1.4571
mm	mm	kg/m				
3	0.5	0.031		●		
	0.7	0.040		●		
6	1.0	0.125	●	●	●	●
	1.5	0.169		●		●
8	1.0	0.175	●	●	●	●
	1.5	0.244	●	●		●
	2.0	0.300	●	●	○	
10	1.0	0.225	●	●	●	●
	1.5	0.319	●	●	○	●
	2.0	0.400	●	●	○	●
12	1.0	0.275	●	●	●	●
	1.5	0.394	●	●	●	●
	2.0	0.500	●	●	○	●
14	1.0	0.325	●	●		
	1.5	0.467				●
	2.0	0.600	●	●		●
15	1.0	0.350	●	●		
	1.5	0.506	●	●		●
	2.0	0.650	●	●		●
16	1.0	0.375	●	●		
	1.5	0.544	●	●		●
	2.0	0.700	●	●	○	●
	2.5	0.844		●	○	●
18	1.0	0.425	●	●		
	1.5	0.619	●	●	○	●
	2.0	0.800	●	●	○	●
	2.5	0.966				●
20	1.5	0.694	●	●		
	2.0	0.900	●	●		●
	2.5	1.094		●	○	●
	3.0	1.271			○	●
	4.0	1.600		●		
22	1.5	0.769	●	●	○	●
	2.0	1.000	●	●	○	●
25	1.5	0.877	●			
	2.0	1.150	●	●		●
	2.5	1.407	●	●		●
	3.0	1.650	●	●		●
28	1.5	0.994	●	●	○	●
	2.0	1.300	●	●	○	●
	2.5	1.594	●	●		
30	2.5	1.719		●		
	3.0	2.025	●	●		●
	4.0	2.601		●		●
35	2.0	1.650	●	●		
	2.5	2.022	●			●
	3.0	2.401	●	●		

Cont.

Outside diameter	Wall thickness	Weight	Sandvik 3R12 TP 304/304L EN 1.4306	Sandvik 3R60 TP 316/316L EN 1.4435	Sandvik 6R35 TP 321 EN 1.4541	Sandvik 5R75 TP 316Ti EN 1.4571
mm	mm	kg/m				
38	2.0	1.800	●	●		
	3.0	2.626	●	●		●
	4.0	3.401		●		●
	5.0	4.126		●		●
42	2.0	2.000		●		
	3.0	2.926	●	●		●
50	5.0	5.627		●		

Tolerances

Sandvik 3R12, Sandvik 3R60, 6R35 and 5R75
OD 6–42 mm, DIN 2391/EN 10305-1

OD mm	Tolerances OD, mm	Wall thickness %
6–30	+/-0.08	+/-10
32–40	+/-0.15	+/-10
42	+/-0.20	+/-10

Sandvik 3R60

OD <6 mm, tolerances according to ASTM A632

OD mm	Tolerances OD, mm	Wall thickness %
<6–4.76	+0.10/-0	+/-10
<4.76–2.38	+0.08/-0	+/-10
<2.38	+0.05/-0	+/-10

Sandvik 3R60 with OD above 42 mm

OD +/-0.50%, but min +/-0.1 mm (D4), WT +/-10%,
but min +/-0.2 mm (T3).

Standards

Sandvik 3R12 (TP 304/304L) and
Sandvik 3R60 (TP 316/316L)

DIN 17458, TC1

NFA 49-117

ASTM A213-AW (average wall), ASTM A269.

PED 97/23/EC

EN 10216-5 TC1

OD<6 mm acc to A632

Sandvik 6R35 (TP 321) and 5R75 (TP 316Ti)

DIN 17458, TC1

PED 97/23/EC

EN 10216-5 TC1

Instrumentation tubing

Outside diameter	Wall thickness	Imperial size 1)	Weight	Sandvik 3R12 TP 304/304L EN 1.4306	Sandvik 3R60 TP 316/316L EN 1.4435	Sandvik 2RK65 UNS N08904 EN 1.4539	Sandvik SAF 2507 UNS S32750 EN 1.4410	Sandvik Sanicro 28 UNS N08028 EN 1.4563
mm	mm		kg/m					
1.59	0.36	1/16" x 28 BWG	0.011		●			
	0.51	25 BWG	0.014		●			
3.18	0.71	1/8" x 22 BWG	0.044		●			
	0.89	20 BWG	0.051		●			
4.76	0.89	3/16" x 20 BWG	0.086		●			
6.35	0.71	1/4" x 22 BWG	0.100		●			
	0.89	20 BWG	0.122	●	●	●	●	
	0.91	20 SWG	0.124	●	●	●		
	1.22	18 SWG	0.157	●	●	●		
	1.24	18 BWG	0.159	●	●	●	●	
	1.63	16 SWG	0.193		●	●		
	1.65	16 BWG	0.194		●	●	●	
7.94	0.89	5/16" x 20 BWG	0.157		●			
	0.91	20 SWG	0.160		●			
9.53	0.89	3/8" x 20 BWG	0.193	●	●	●	●	●
	0.91	20 SWG	0.196	●	●	●		●
	1.22	18 SWG	0.254		●	●		●
	1.24	18 BWG	0.257		●	●	●	●
	1.63	16 SWG	0.322		●	●		●
	1.65	16 BWG	0.326		●	●	●	●
	2.03	14 SWG	0.381		●			
	2.11	14 BWG	0.391		●			
12.7	0.89	1/2" x 20 BWG	0.263	●	●	●	●	
	0.91	20 SWG	0.268	●	●	●		
	1.22	18 SWG	0.350	●	●	●		
	1.24	18 BWG	0.356	●	●	●	●	
	1.63	16 SWG	0.452	●	●	●		●
	1.65	16 BWG	0.456	●	●	●	●	●
	2.03	14 SWG	0.542		●	●		
	2.11	14 BWG	0.559		●	●		
15.88	1.22	5/8" x 18 SWG	0.448		●			
	1.24	18 BWG	0.454		●			
	1.63	16 SWG	0.582		●			
	1.65	16 BWG	0.588		●			
19.05	1.22	3/4" x 18 SWG	0.544		●			
	1.24	18 BWG	0.553		●		●	
	1.63	16 SWG	0.711		●			
	1.65	16 BWG	0.718		●			
	2.11	14 BWG	0.895		●			
	2.41	13 BWG	1.00		●			
	2.77	12 BWG	1.13		●			
25.4	1.22	1" x 18 SWG	0.739		●			
	1.24	18 BWG	0.750		●			
	1.65	16 BWG	0.981		●			
	2.11	14 BWG	1.23		●			
	2.41	13 BWG	1.39		●			
	3.20	–	1.78		●			

¹⁾ SWG = Standard Wire Gauge, BWG = Birmingham Wire Gauge

Tolerances

Sandvik 3R12 and Sandvik 3R60

OD 6.35–25.4 mm according to DIN 2391/EN 10305-1

OD mm	Tolerances OD, mm	Wall thickness %
6.35–25.4	+/-0.08	+/-10

Sandvik 3R60

OD <6 mm, tolerances according to ASTM A632

OD mm	Tolerances OD, mm	Wall thickness %
<6–4.76	+0.10/-0	+/-10
<4.76–2.38	+0.08/-0	+/-10
<2.38	+0.05/-0	+/-10

Sandvik 2RK65 and Sandvik Sanicro 28

OD mm	Tolerances OD, mm	Wall thickness %
≤25.4	+/-0.10	+/-10

Sandvik SAF 2507

OD mm	Tolerances OD, mm	Wall thickness %
≤19.05	+/-0.13	+/-10

Standards

IMPERIAL SIZE

Sandvik 3R12 (TP 304/304L) and Sandvik 3R60 (TP 316/316L)

ASTM A213-AW

ASTM A269

OD <6 mm ASTM A632

PED 97/23/EC EN 10216-5 TC1

Sandvik 2RK65 (UNS N08904)

ASTM A269

PED 97/23/EC EN 10216-5 TC1

Sandvik Sanicro 28 (UNS N08028)

ASTM B668

PED 97/23/EC EN 10216-5 TC1

Sandvik SAF 2507 (UNS S32750)

ASTM A789

PED 97/23/EC EN 10216-5 TC1

Pipe in sizes according to ANSI/ASME

Pipe is stocked against ANSI/ASME B36.19.

● = Cold-worked pipe

■ = Hot-worked pipe

OD	Wall thickness	Nominal size		Weight	Sandvik 3R12 TP 304L EN 1.4306	Sandvik 3R65 TP 316L EN 1.4404	Sandvik SAF 2205 UNS S31803/S32205 EN 1.4462	Sandvik SAF 2507 UNS S32750 EN 1.4410	Sandvik 2RK65 UNS N08904 EN 1.4539	Sandvik Sanicro 28 UNS N08028 EN 1.4563
mm	mm			kg/m						
13.72	1.65	1/4"	Sch 10S	0.50	●	●				
	2.24		Sch 40S	0.64	●	●				
	3.02		Sch 80S	0.81	●	●				
17.15	1.65	3/8"	Sch 10S	0.64	●	●				
	2.31		Sch 40S	0.86	●	●				
	3.20		Sch 80S	1.12	●	●				
21.34	2.11	1/2"	Sch 10S	1.02	●	●		●	● **	
	2.77		Sch 40S	1.29	●	●	●	●	● **	●
	3.73		Sch 80S	1.65	●	●	●			
	4.78 ¹⁾		Sch 160	1.98		●				
26.67	2.11	3/4"	Sch 10S	1.30	●	●	●		● **	
	2.87		Sch 40S	1.71	●	●	●	●	● **	●
	3.91		Sch 80S	2.23	●	●	●			
	5.56 ¹⁾		Sch 160	2.94		●				
33.40	2.77	1"	Sch 10S	2.13	■	■	■	■	● **	
	3.38		Sch 40S	2.54	■	■	■	■	● **	●
	4.55		Sch 80S	3.29	■	■	■	■		
	6.35 ¹⁾		Sch 160	4.30	■	■				
42.16	2.77	1 1/4"	Sch 10S	2.73	■	■	■	■	● **	●
	3.56		Sch 40S	3.44	■	■	■		● **	
	4.85		Sch 80S	4.53	■	■				
	6.35 ¹⁾		Sch 160	5.69	■	■				
48.26	2.77	1 1/2"	Sch 10S	3.16	■	■	■	■	●	●
	3.68		Sch 40S	4.11	■	■	■	■	●	●
	5.08		Sch 80S	5.49	■	■	■	■		
	7.14 ¹⁾		Sch 160	7.35		■				
60.33	2.77	2"	Sch 10S	3.99	■	■	■	■	●	●
	3.91		Sch 40S	5.52	■	■	■	■	●	●
	5.54		Sch 80S	7.60	■	■	■	■		
	8.74 ¹⁾		Sch 160	11.29	■	■	■			
73.03	3.05	2 1/2"	Sch 10S	5.35	■	■	■		●	
	5.16		Sch 40S	8.77	■	■	■		●	
	7.01		Sch 80S	11.59	■	■	■			
	9.53 ¹⁾		Sch 160	15.15		■				
88.90	3.05	3"	Sch 10S	6.56	●	●	●	●	●	●
	5.49		Sch 40S	11.47	■	■	■	■	●	●
	7.62		Sch 80S	15.51	■	■	■			
	11.13 ¹⁾		Sch 160	21.67	■	■	■			
101.60	3.05	3 1/2"	Sch 10S	7.53	●	●				
	5.74		Sch 40S	13.78	■	■				
	8.08		Sch 80S	18.92	■	■				
114.30	3.05	4"	Sch 10S	8.50	●	●	●	●		
	6.02		Sch 40S	16.32	■	■	■	■	●	●
	8.56		Sch 80S	22.67	■	■	■			
	13.49 ¹⁾		Sch 160	34.05	■	■	■			

Cont.

OD	Wall thickness	Nominal size	Weight	Sandvik 3R12 TP 304L EN 1.4306	Sandvik 3R65 TP 316L EN 1.4404	Sandvik SAF 2205 UNS S31803/S32205 EN 1.4462	Sandvik SAF 2507 UNS S32750 EN 1.4410	Sandvik 2RK65 UNS N08904 EN 1.4539	Sandvik Sanicro 28 UNS N08028 EN 1.4563
mm	mm		kg/m						
141.30	6.55	5"	Sch 40S	22.10	■	■			
	9.53		Sch 80S	31.44	■	■			
	15.88 ¹⁾		Sch 160	49.87	■	■			
168.28	3.4	6"	Sch 10S	14.04	●	●			
	7.11		Sch 40S	28.69	■	■	■	■	
	10.97		Sch 80S	43.21	■	■			
	14.27		Sch 120	54.75			■		
	18.26 ¹⁾		Sch 160	68.59	■	■	■		
219.08	8.18	8"	Sch 40S	43.20	■	●	●	●	
	12.7		Sch 80S	65.63	■	■			
	18.23		Sch 120	91.30			■		
	23.01 ¹⁾		Sch 160	112.97	■	■	■		

¹⁾ ASME B36.10

** Tested acc to ASTM A312 and AD2000-W2 Einbaurohre TÜV BI. 421 incl. hot tensile test at +400°C.

Tolerances

For ASTM A312 and ASTM A790, acc. to ASTM A999

Size mm	OD mm
10.3–48.3	+0.4/-0.8
>48.3–114.3	±0.8
>114.3–219.1	+1.6/-0.8

Tolerances on wall thickness

Size mm	Wall thickness %	TH/OD Ratio
10.3–73.03	+20/-12.5	All
88.90–219.10	+22.5/-12.5	Less or equal to 0.05
88.90–219.10	+15/-12.5	Above 0.05

According to ASTM B-668 (B-829)

Valid for Sandvik Sanicro 28. Pipe is stocked with average wall.

Size mm	OD mm	Wall thickness average wall %	min. wall %
≤48.26	+/-0.19	+/-10	+22/-0
>48.26–88.9	+/-0.25	+/-10	+22/-0
>88.9–114.0	+/-0.38	+/-10	+22/-0
>114.01–	+/-0.51	+/-10	+22/-0

Standards

Sandvik 3R12 (TP 304L), 3R65 or Sandvik 3R60 (TP 316L)

ASTM A312 incl. corrosion test acc. to ASTM A262 Pr.E.

NACE MR-0175/ISO 15156

NFA 49-117, tolerances and leak test acc. to

ASTM A312/A999.

NORSOK MDS-S01 (TP 316L)

Sandvik SAF 2205 (UNS S31803/S32205) and SAF 2507 (UNS S32750)

ASTM A790 incl. corrosion test acc. to ASTM G-48 Method A (Sandvik SAF 2205 at 25°C, Sandvik SAF 2507 at 50°C, both for 24 h)

NORSOK MDS D-41 (Sandvik SAF 2205)

NORSOK MDS D-51 (Sandvik SAF 2507)

Sandvik 2RK65 (UNS N08904)

ASTM A312

Sizes marked ** are also tested acc. to AD2000-W2 Einbaurohre

TÜV BI. 421 incl. hot tensile test at +400°C

Sandvik Sanicro 28 (UNS N08028)

ASTM B668 average wall

Tube in metric sizes

In addition to standard grades below, steel grades listed on page 22 can be supplied.

● = Cold-worked tube

■ = Hot-worked tube

Outside diameter	Wall thickness	Inside diameter nom.	ISO thread	Weight	Sandvik 3R12 TP 304L EN 1.4306	Sandvik 3R60 TP 316L EN 1.4435	Sandvik 5R75 TP 316Ti EN 1.4571
mm	mm	mm		kg/m			
13.5	2.35	8.8	1/4"	0.66		●	
17.2	2.35	12.5	3/8"	0.87		●	
21.3	1.6	18.1		0.79		●	
	2.0	17.3		0.97			● *
	2.65	16.0	1/2"	1.24	●	●	● *
26.9	1.6	23.7		1.01		●	
	2.0	22.9		1.24			● *
	2.65	21.6	3/4"	1.61		●	● *
	3.2	20.5		1.90			● *
30.0	2.0	26.0		1.40		●	
33.7	2.0	29.7		1.59		●	● *
	2.6	28.5		2.03			● *
	3.25	27.2		2.48		■	■ *
	4.05	25.6		3.01			■
38.0	2.6	32.8		2.31		●	
42.4	2.0	38.4		2.01			● *
	3.25	35.9	1 1/4"	3.19		■	■
44.5	2.0	40.5		2.13		●	
	2.9	38.7		3.02		■	
48.3	2.0	44.3		2.32		●	
	2.6	43.1		2.98		■	
	3.25	41.8	1 1/2"	3.67		■	■
50.0	5.0	40.0		5.61			■ *
51.0	2.6	45.8		3.15		●	
54.0	2.0	50.0		2.60		●	
57.0	2.9	51.2		3.93		■	
60.3	2.0	56.3		2.92		●	
	2.6	55.1		3.76		●	● *
	2.9	54.5		4.17			■
	3.65	53.0	2"	5.18		■	■
63.5	2.6	58.3		3.97		●	
70.0	2.9	64.2		4.87		●	
76.1	2.0	72.1		3.71		●	
	2.9	70.3		5.32		●	● *
88.9	3.6	81.7		7.69		●	
	4.05	80.8	3"	8.61		■	■
101.6	3.6	94.4		8.83		●	
108.0	4.0	100.0		10.42		●	
114.3	3.6	107.1		9.95			● *
	4.5	105.3	4"	12.37		■	
121.0	4.0	113.0		11.72		●	
133.0	4.0	125.0		12.92	●	●	
159.0	4.5	150.0		17.41		●	

* = Tested against AD2000-W2 + EN 10216-5 (Ultrasonic testing included) TC1 or TC2 depending on size.

Tolerances

For tube in metric sizes. According to EN ISO 1127

Condition	Outside diameter	Wall thickness
Cold-worked tube	±0.75%, but min. ±0.3 mm (D3)	±10%, but min. ±0.2 mm (T3)
Hot-worked tube	±1.0%, but min. ±0.5 mm (D2)	±12.5%, but min. ±0.4 mm (T2) ¹⁾

¹⁾ Valid for wall thicknesses min. 4 mm and where the ratio between wall thickness and outside diameter is min. 1:10. The tolerance for other sizes is ±15%, but min. ±0.6 mm (T1).

Standards

Sandvik 3R12 (TP 304L), Sandvik 3R60 (TP 316L)

SS 219711 (condition 22, i.e. 3R12 = SS 2352-22)

DIN 17458, TC1

NFA 49-117

PED 97/23/EC EN 10216-5 TC1

Sandvik 5R75 (TP 316Ti)

DIN 17458, TC1

PED 97/23/EC EN10216-5 TC1

Sizes marked * are tested acc. to AD2000-W2 + EN10216-5 (incl. ultrasonic test) TC1 or TC2 depending on size

Tube and pipe for high temperatures

● = Cold-worked ■ = Hot-worked

Outside diameter	Wall thickness	Nominal size		Weight	Sandvik 4C54 TP 446-1	Sandvik 253 MA UNS S30815	Sandvik 353 MA UNS S35315	Sandvik Sanicro 31HT UNS N08811/N08810 EN 1.4959	Sandvik 7RE10 TP 310H
mm	mm			kg/m					
13.5	2.35			0.656					●
17.15	2.31	3/8"	Sch 40S	0.858	● *	●			●
	3.20		Sch 80S	1.12		●			
21.3	2.65			1.24	● **				●
21.34	2.11	1/2"	Sch 10S	1.01			● *		
	2.77		Sch 40S	1.29		●	● *	● *	●
22	2			0.954	●				
26	4.0			2.20	●				
26.67	2.11	3/4"	Sch 10S	1.30		●			
	2.87		Sch 40S	1.71		●	● *	● *	●
26.9	2.65			1.61	●				●
33.40	3.38	1"	Sch 40S	2.54		■	● *	■ *	■
	4.55		Sch 80S	3.29		■			■
33.7	3.25			2.48	■ *				■
42.16	3.56	1 1/4"	Sch 40S	3.44		■ *	■ *	■	■
42.4	3.25			3.19	■ *				■
44.5	3.0			3.12	■ *				
48.26	2.77	1 1/2"	Sch 10S	3.15		■ *			
	3.68		Sch 40S	4.11		■ *	■	■	■
	5.08		Sch 80S	5.49		■			■
48.3	3.25			3.67	■ *				■
60.3	3.65			5.18	■ *				■
60.33	2.77	2"	Sch 10S	3.99		■ *			
	3.91		Sch 40S	5.52		■ *	■	■	■
	5.54		Sch 80S	7.60	■				■
73.03	5.16	2 1/2"	Sch 40S	8.77		■			■
76.1	3.65			6.62	■ *				■
88.9	4.05			8.60	■ *				
88.90	5.49	3"	Sch 40S	11.5		■	■		
114.30	6.02	4"	Sch 40S	16.3		■			■
168.28	7.11	6"	Sch 40S	28.7		■			■

* are stocked in double random lengths.
** are stocked in both standard random lengths and double random lengths.

Standards

Sandvik 4C54 (TP 446-1)
ASTM A268 (tube)
Sandvik 253 MA (UNS S30815) and 353 MA (UNS S35315)
ASTM A312 (pipe)
Sandvik Sanicro 31HT (UNS N08811/N08810)
ASTM B407

Sandvik 7RE10 (TP 310H)
ASTM A312
DIN 17458, PK1
NFA 49-117
SEW470
NACE MR0175/ISO 15156

Tolerances

Sandvik 4C54 and 7RE10, according to EN ISO 1127

Condition	Outside diameter	Wall thickness
Cold-worked tube	±0.75%, but min. ±0.3 mm (D3)	±10% (T3), but min. ±0.2 mm
Hot-worked tube	±1.5%, but min. ±0.75 mm (D1)	±15% (T1), but min. ±0.6 mm

Sandvik 253 MA and 353 MA, according to ASTM A312/A999

Size mm	Outside diameter mm
10.3–48.3	+0.4/-0.8
(48.3)–114.3	±0.8
(114.3)–219.1	+1.6/-0.8

Sandvik Sanicro 31HT, according to ASTM B407

Size mm	Outside diameter mm	Wall thickness %
Cold-worked: 15.8–38.1	±0.19	±10.0
Hot-worked:		
Tolerances according to ASTM A999, see table Sandvik 253 MA and 353 MA.		

Tolerances on wall thickness (Sandvik 253 MA and 353 MA)

Size mm	Wall thickness %	TH/OD Ratio
10.3–73.03	+20/-12.5	All
88.90–219.10	+22.5/-12.5	Less or equal to 0.05
88.90–219.10	+15/-12.5	Above 0.05

Sandvik produces stainless steel boiler tubes. For further information, see brochure S-TU036-B-ENG.

Composite tubes for steam boiler applications

Outside diameter		Total minimum wall thickness		Weight	Sandvik 3R12/4L7 TP 304L/ SA-210 A1	Sandvik San. 28/4L7 UNS N08028/ SA-210 A1	Sandvik San. 38/4L7 UNS N08825 Mod./ SA-210 A1	Sandvik San. 67/4L7 UNS N06690/ SA-210A1	Sandvik 3RE28/ TP310 San. 28/ UNS N08028 on HT8/HT7 SA-213T22/T91
mm	inch	mm	inch	kg/m					
38	1 1/2"	5.0	0.197"	4.36	●	●		●	
44.5	1 3/4"	5	0.197"	5.36		●			
50.8	2"	5.08	0.200"	6.15	●	●	●	●	●
63.5	2 1/2"	6.53	0.257"	9.8	●	●	●	●	●
76.2	3"	6.58	0.259"	12.1	●		●	●	

Other sizes can be produced to order – contact Sandvik.

Grades

Sandvik	ASTM/UNS	W.-Nr.	EN
Outside stainless component			
3R12	304L	1.4306	1.4306
Sandvik Sanicro 28	UNS N08028	1.4563	1.4563
Sandvik Sanicro 38	UNS N08825 Mod.	2.4858	2.4858
3RE28	310	1.4845	1.4845
Sandvik Sanicro 67	UNS N06690	–	2.4642
Inside component			
4L7	ASME SA-210 Gr A1	1.0405	1.0425/ P265GH
3Mo1	–	1.5415 (16Mo3)	1.5415
HT7	ASME SA-213 T91	1.4903/ X10CrMoVNb9-1	1.4903
HT8	ASME SA-213 T22	1.7380/ 10CrMo9-10	1.7380

Specifications

Sandvik spec. 7-1-0009 (4L7)

Sandvik spec. 7-1-1169 (HT8)

Sandvik spec. 7-1-1288 (HT7)

Welding and bending

For welding and bending recommendations please contact Sandvik.

Heat exchanger and evaporator tubes

Sandvik Materials Technology has an extensive manufacturing program for seamless heat exchanger tubes covering most types of standard austenitic, duplex (austenitic-ferritic) and high alloy austenitic stainless steels. Our main size range, produced in

imperial and metric dimensions, includes outside diameters from 12 mm up to 40 mm. Special sizes can be made to order. Tubes are supplied in straight lengths up to 30 meters or as U-bends.

Titanium and zirconium seamless tube and pipe

The titanium and zirconium grades are at the top of our manufacturing program for tube and pipe. Selected for environments and applications where stainless grade properties are not sufficient, the available size range covers mainly from 9.53 mm up to 38.1 mm (3/8" up to 1 1/2") outer diameter, wall thicknesses from 0.7 mm up to 5 mm and lengths up to 15 meters. The major application for titanium and zirconium tubing is heat exchanger tubes with outer diameters of 19.05 and 25.4 mm and various wall thicknesses. The main technical specifications are ASTM B338 and ASME SB338.

Titanium and zirconium tube and pipe is manufactured to direct customer order only and not normally held as standard stock. However, some surplus tubing from manufacture is put into stock and it is, therefore, sometimes possible to deliver small quantities, in common sizes, at short notice.

There are around 35 different titanium grades specified by ASTM and ASME, numbered from Grade-1 upwards. Grade-2, pure unalloyed titanium, with medium mechanical strength (approx. 316L equivalent) is the most common grade for heat exchanger applications in refineries, chemical plants and sea water cooling.

Zirconium 702 (pure unalloyed, medium strength zirconium) is the most important zirconium grade for heat exchangers in chemical plants. The most common applications are acetic acid, formic acid, methyl methacrylate, sulfuric acid, nitric and citric acid and as the innercomponent in bimetallic urea stripper tubing. The main technical specifications are ASTM B338 and ASME SB338.

Type of product	Grade(s): *	Tolerances according to
Titanium tubes and pipes	Ti and Ti alloys Grades : 1,2,3,4,7,9,11,12,16,17,26 and 28.	ASTM B338, ASME SB338 DIN 17861 D3/T3 or closer
Zirconium tubes and pipes	Zirconium 702 (Zr-702)	ASTM B523/ASME SB523 DIN 2462 D3/T3 or closer

* Contact the sales organisation in Sandviken/Sweden for further information and details.

Stainless hollow bar

Grades – stock program

Sandvik

Sanmac 304/304L EN 1.4301/1.4307

Sanmac 316/316L EN 1.4401/1.4404

Sanmac 4571 EN 1.4571

are available in sizes shown in the table.

Sanmac SAF 2205 EN 1.4462

is available in sizes marked *

Lengths

Hollow bar is delivered in lengths ranging from 2.5 to 6.5 m, depending on diameter and grade. Lengths down to 1 m may be included in the delivery.

We also offer a cutting service. Cut lengths can be delivered to your individual requirements, which offer easier handling and storage, less waste and reduced transportation costs. Your local Sandvik sales representative will be pleased to give you further information about this service.

Tolerances

Outside diameter: +2/-0 %, but minimum +1/-0 mm.

Inside diameter: +0/-2 %, but minimum +0/-1 mm.

Inside diameter for sizes 230 and 300 mm: +0.5/-0 mm

Outside diameter	Inside diameter	Average weight	Guaranteed component sizes ¹⁾			
			Chucked true to the OD		Chucked true to the ID	
mm	mm	kg/m	Max. OD mm	Min. ID mm	Max. OD mm	Min. ID mm
32	20	4.2	31.0	21.9	30.1	21.0
	16	5.1	31.0	18.0	30.0	17.0
36	25	4.5	35.0	26.9	34.1	26.0
	20	5.9	35.0	22.0	34.0	21.0
	16	6.8	35.0	18.1	33.9	17.0
40	28	5.5	39.0	29.9	38.1	29.0
	25	6.5	39.0	27.0	38.0	26.0
	20	7.8	39.0	22.1	37.9	21.0
45	32	6.7	44.0	33.9	43.1	33.0
	28*	8.2	44.0	30.0	43.0	29.0
	20	10.5	44.0	22.2	42.8	21.0
50	36	8.0	49.0	38.0	48.0	37.0
	32	9.7	49.0	34.1	47.9	33.0
	25*	12.1	49.0	27.2	47.8	26.0
56	40	10.2	55.0	42.0	54.0	41.0
	36	12.1	55.0	38.1	53.9	37.0
	28*	15.2	55.0	30.3	53.7	29.0
63	50	9.9	62.0	51.9	61.1	51.0
	45	12.2	62.0	47.0	61.0	46.0
	40*	15.4	62.0	42.2	60.8	41.0
	36	17.3	62.0	38.3	60.7	37.0
	32*	19.0	62.0	34.4	60.6	33.0
71	56	12.9	69.9	58.0	68.9	57.0
	45*	19.6	69.9	47.3	68.6	46.0
	40	22.3	69.9	42.4	68.5	41.0
	36*	24.1	69.9	38.5	68.4	37.0
75	60	13.7	73.8	62.0	72.8	61.0
	50	21.1	73.8	52.2	72.6	51.0
	40*	26.0	73.8	42.5	72.3	41.0
80	63	16.4	78.8	65.0	77.8	64.0
	50*	25.3	78.8	52.4	77.4	51.0
	45	28.3	78.8	47.5	77.3	46.0
	40*	30.9	78.8	42.6	77.2	41.0
85	67	18.5	83.7	69.1	82.6	68.0
	55	26.8	83.7	57.4	82.3	56.0
	45	33.5	83.7	47.6	82.1	46.0
90	71	20.6	88.6	73.1	87.6	72.1
	63*	27.1	88.6	65.3	87.3	64.0
	56	32.3	88.6	58.5	87.1	57.0
	50*	36.1	88.6	52.6	87.0	51.0
95	67	29.9	93.5	69.3	92.2	68.0
	50*	42.1	93.5	52.7	91.8	51.0
100	80	24.4	98.5	82.3	97.4	81.2
	71*	32.7	98.5	73.4	97.2	72.1
	63*	39.2	98.5	65.5	97.0	64.0
	56	42.3	98.5	58.7	96.8	57.0
106	80*	32.3	104.4	82.5	103.1	81.2
	71*	40.6	104.4	73.5	103.0	72.1
	63	47.1	104.4	65.7	102.7	64.0
	56*	52.1	104.4	58.9	102.5	57.0
112	90	30.2	110.3	92.5	109.2	91.4
	80*	40.6	110.3	82.6	108.9	81.2
	71	48.8	110.3	73.7	108.7	72.1
	63*	55.3	110.3	65.8	108.5	64.0

¹⁾ The values indicated are valid for lengths less than 2.5 times the outside diameter.

* Sanmac SAF 2205 stock sizes

Outside diameter	Inside diameter	Average weight	Guaranteed component sizes ¹⁾			
			Chucked true to the OD		Chucked true to the ID	
mm	mm	kg/m	Max. OD mm	Min. ID mm	Max. OD mm	Min. ID mm
118	90*	39.0	116.2	92.7	114.9	91.4
	80*	49.4	116.2	82.8	114.6	81.2
	71	57.6	116.2	73.8	114.5	72.1
	63*	64.2	116.2	66.0	114.2	64.0
125	100	38.3	123.1	102.7	121.9	101.5
	90*	49.8	123.1	92.8	121.7	91.4
	80	60.2	123.1	82.9	121.4	81.2
	71*	68.5	123.1	74.0	121.2	72.1
132	106*	42.0	130.0	108.8	128.8	107.6
	90*	61.1	130.0	93.0	128.4	91.4
	80	71.5	130.0	83.1	128.1	81.2
	71	79.7	130.0	74.2	127.9	72.1
140	112*	47.8	137.9	115.0	136.6	113.7
	100*	63.3	137.9	103.1	136.3	101.5
	90	74.9	137.9	93.2	136.1	91.4
	80	85.2	137.9	83.3	135.8	81.2
150	125	47.4	147.7	128.1	146.5	126.9
	106*	74.2	147.7	109.3	146.0	107.6
	95	87.7	147.7	98.4	145.7	96.4
	80*	103.3	147.7	83.6	145.3	81.2
160	132	56.2	157.6	135.3	156.3	134.0
	122	71.6	157.6	125.4	156.0	123.8
	112*	85.8	157.6	115.5	155.8	113.7
	90*	112.9	157.6	94.0	155.2	91.4
170	140*	63.8	167.4	143.5	166.0	142.1
	130	80.2	167.4	133.6	165.8	132.0
	128**	80.8	167.4	131.6	165.7	130.0
	118	98.4	167.4	121.7	165.5	119.8
	106	114.7	167.4	109.8	165.2	107.6
	100	122.3	167.4	103.9	165.0	101.5
180	150	68.4	177.3	153.6	176.0	152.3
	140	86.1	177.3	143.7	175.7	142.1
	125*	110.0	177.3	128.9	175.3	126.9
	100	144.4	177.3	104.1	174.7	101.5
190	160*	73.0	187.1	163.8	185.7	162.4
	150	91.9	187.1	153.9	185.5	152.3
	140	109.9	187.1	144.0	185.3	142.1
	132*	123.0	187.1	136.0	185.1	134.0
200	160*	97.6	197.0	164.0	195.4	162.4
	150	117.0	197.0	154.1	195.2	152.3
	140	134.0	197.0	144.2	194.9	142.1
212	170*	109.0	208.8	174.2	207.2	172.6
	130*	182.0	208.8	134.6	206.2	132.0
224	180	121.0	220.6	184.4	218.9	182.7
	140	199.0	220.6	144.8	217.9	142.1
236	190	133.0	232.4	194.6	230.7	192.9
	150*	216.0	232.4	155.0	229.7	152.3
250	200*	153.0	246.2	204.9	244.3	203.0
275	200	247.0	270.6	205.5	268.4	203.1
300	200	340.0	295.5	206.1	292.4	203.1
340	200	507.0	334.9	207.1	330.8	203.1
380	230	609.0	374.3	237.8	369.5	233.5
400	300	478.0	394.0	307.6	390.9	304.5
420	300	585.0	413.7	308.6	410.1	304.5

¹⁾ The values indicated are valid for lengths less than 2.5 times the outside diameter.

²⁾ The leakage test is deferred to the finished component.

* Sanmac SAF 2205 stock sizes

** Applies to Sanmac SAF 2205 only.

Other dimensions >420 mm OD but max 485 mm OD are available from production.

For latest information, please refer to www.smt.sandvik.com

Test certification for hollow bar in stock

Sanmac 304/304L, EN 1.4301/1.4307

Sanmac 316/316L, EN 1.4401/1.4404

DIN 17456²⁾, DIN 17458 TC1²⁾,

NFA 49-317,

PED 97/23/EC, EN 10216-5 TC1

IC-test EN ISO 3651-2A in delivery

condition.

NACE MR-0175/ISO 15156

Large diameters, OD 275 mm and greater

ASTM A479, ASTM A276

ASME SA479

EN 10088-3

NACE MR 0175/ISO 15156

IC-test ASTM A262 Pr. E

Sanmac 4571, EN 1.4571

DIN 17456²⁾, DIN 17458 TC1²⁾,

NFA 49-317,

PED 97/23/EC, EN 10216-5 TC1

IC-test EN ISO 3651-2A in delivery condition.

Sanmac SAF 2205, EN 1.4462

Heat analysis and mechanical properties acc. to Sandvik data sheet.

Corrosion test acc to ASTM G 48, Method A.

Impact test (t ≥ 6 mm)

Micrographic test (400X)

NACE MR 0175/ISO 15156

IC = Intergranular Corrosion.

Stainless bar steel

○ Produced to order, minimum quantity 10 metric tons ● Annealed, peel turned, burnished ■ Annealed, peel turned ◆ Annealed, rough machined

Dia- meter	Weight	Sanmac 304/304L EN 1.4307	Sanmac 316/316L EN 1.4404	Sanmac 4571 EN 1.4571	Sanmac 4435 EN 1.4435	Sanmac SAF 2205 EN 1.4462	Sandvik SAF 2507 EN 1.4410	Sandvik Sanicro 28 EN 1.4563
mm	kg/m							
20.00	2.5	●	●			●	●	●
25.00	3.9	●	●			●	●	○
30.00	5.5	●	●	●		●	●	○
35.00	7.6	●	●	●		●	●	○
40.00	9.9	●	●	●		●	●	○
45.00	12.5	●	●	●		●	●	○
50.00	15.4	●	●	●		●	●	●
55.00	19.0	●	●	●		●	●	○
60.00	22.2	●	●	●		●	●	○
65.00	26.0	●	●	●		●	●	○
70.00	30.2	●	●	●		●	●	○
75.00	34.7	●	●	●	○	●	●	○
80.00	39.5	●	●	●	●	●	●	○
85.00	44.6	●	●	●	○	●	●	○
90.00	49.9	●	●	●	●	●	●	○
95.00	55.6	●	●	●	○	●	●	○
100	61.7	●	●	●	●	●	●	●
105	68.0	●	●	●	○	●	○	○
110	74.6	●	●	●	●	●	●	○
115	81.5	●	●	●	○	●	●	○
120	88.8	●	●	●	○	●	●	○
125	96.3	●	●	●	●	●	●	○
130	104	●	●	●	○	●	●	○
135	112	●	●	●	○	●	●	○
140	121	●	●	●	●	●	●	○
145	130	○	●	●	○	●	●	○
150	139	●	●	●	●	●	●	●
155	149	○	●	●	○	●	○	○
160	158	●	●	●	●	●	●	○
165	168	●	●	●	○	●	●	○
170	178	●	●	●	○	●	●	○
175	189	○	●	●	○	●	○	○
180	200	●	●	●	●	●	●	○
185	211	●	●	●	○	●	●	●
190	223	●	●	●	○	●	○	○
200	247	●	●	●	●	●	●	○
205	260						●	
210	272	●	●	●	○	●	●	○
215	285	○	○	●	○	○	○	○
220	298	●	●	●	○	●	●	○
225	312	●	●	●	○	●	●	○
230	326	●	●	●	○	●	●	○
240	355	●	●	●	○	●	●	○
250	385	●	●	●	●	●	●	○
260	417	●	●	●	○	●		
270	450	○	●	●	○	●		
280	483	○	●	●	○	○		
285	501	●	●	●	○	●		
300	555	●	●	●		●		
320	631		■	■				
325	651	■	■	■		■		

Cont.

○ Produced to order, minimum quantity 10 metric tons ● Annealed, peel turned, burnished ■ Annealed, peel turned ◆ Annealed, rough machined

Dia-meter	Weight	Sanmac 304/304L EN 1.4307	Sanmac 316/316L EN 1.4404	Sanmac 4571 EN 1.4571	Sanmac 4435 EN 1.4435	Sanmac SAF 2205 EN 1.4462	Sandvik SAF 2507 EN 1.4410	Sandvik Sanicro 28 EN 1.4563
mm	kg/m							
340	713	●	○					
350	755	■	■	■		■		
375	867		◆	●		●		
400	987	●	◆	◆		●		
425	1114	○	◆	●		◆		
450	1249	●	◆			◆		

Stock grades

Sandvik	EN	W.-Nr	UNS	AISI
Sanmac 304/304L	1.4301/ 1.4307	1.4301	S30400/S30403	Type 304/304L
Sanmac 316/316L	1.4401/ 1.4404	1.4401/ 1.4404	S31600/S31603	Type 316/316L
Sanmac 4435	1.4435	1.4436/ 1.4435	S31600/S31603	Type 316/316L
Sanmac 4571	1.4571	1.4571	S31635	Type 316Ti
Sanmac SAF 2205	1.4462	1.4462	S31803/S32205	–
Sandvik SAF 2507	1.4410	–	S32750	–
Sandvik Sanicro 28	1.4563	1.4563	N08028	–

All bar grades fulfill the requirements of PED 97/23/EC.

Chemical compositions

Sandvik	Nominal chemical compositions, %				
	C	Cr	Ni	Mo	Others
Sanmac 304/304L	≤0.030	18.5	8.5	–	–
Sanmac 316/316L	≤0.030	17	10.5	2.1	–
Sanmac 4435	≤0.030	17.5	12.5	2.6	–
Sanmac 4571	0.03	17	11	2.1	Ti
Sanmac SAF 2205	≤0.030	22	5.5	3.2	N
Sandvik SAF 2507	≤0.030	25	7	4	N
Sandvik Sanicro 28	≤0.020	27	31	3.5	Cu

Tolerances for mm-sizes

Diameter, mm	Tolerances, mm
20–35	-0 / +0.15
40–45	-0 / +0.16
50–70	-0 / +0.19
75–95	-0 / +1.00
100–285	-0 / +1.50
290–350	-0 / +2.00
360–500	-0 / +3.00

Standards

Sandvik	Size range, mm
Sanmac: 304/304L, 316/316L, SAF 2205	
EN 10088-3	20–450
EN 10272	20–250*
ASTM A479, SA 479	20–450**
NACE MR 0175	independent of size
Sanmac: 304/304L, 316/316L, 4435, 4571	
EN 10088-3	75–450
EN 10272	75–250
AD2000-W2	75–250**
ASTM A479, SA 479	75–450
Sandvik Sanicro 28	
EN 10088-3	20–185
EN 10272	20–185
Sandvik SAF 2507	
EN 10088-3	20–250
EN 10272	20–160
ASTM A 479, SA 479	20–250

* Sandvik SAF 2205 20–160 mm
** Sizes >250 mm must be upgraded via TÜV.

Lengths

Diameter, mm	Lengths, m
20–70	3.5–4.5
75–160	5–7
163–250	5–6
254–450	3–5

Surface conditions

Surface conditions	R _a μm Typical value	Size Ø mm
Peel turned, burnished	1	20–285
Peel turned	2	>285–350
Rough machined	5	>350

Certificate status according to EN 10204/3.1

For further technical information, see page 22 and our websites
www.smt.sandvik.com/sanmac and www.smt.sandvik.com/techcenter

Welding consumables for welding in Sandvik stainless steels and nickel alloys

Parent metal TP/ UNS	EN Steel number	Sandvik	Sandvik filler metals for joining ¹⁾		Covered electrode
			Wire for MIG and TIG welding	Wire and flux for submerged- arc welding	
Austenitic stainless grades					
304	1.4301	5R10	19.9.LSi	19.9.L/10SW ²⁾	19.9.LR/LB
304L	1.4306	3R12	19.9.LSi	19.9.L/10SW ²⁾	19.9.LR/LB
321	1.4541	6R35	19.9.NbSi	19.9.Nb/15W	19.9.NbR
347	1.4550	8R40	19.9.NbSi	19.9.Nb/15W	19.9.NbR
316L/316	1.4435/1.4436	Sandvik 3R60	19.12.3.LSi	19.12.3.L/10SW ²⁾	19.12.3.LR ³⁾ /LRHD
316H	–	6LR62	19.12.3.NbSi/19.12.3.Nb	19.12.3.Nb/15W	19.12.3.NbR
–	1.4571	5R75	19.12.3.NbSi	19.12.3.Nb/15W	19.12.3.NbR
317L	(1.4438)	3R64	19.13.4.L	19.13.4.L/10SW ²⁾	–
310S	1.4845	7RE10	25.20.C	25.20.C/50SW	25.20.B
Special purpose grades					
S32304	1.4362	Sandvik SAF 2304	23.7.L/22.8.3.L	23.7.L/22.8.3.L/15W	22.9.3.LR/LB
S31803	1.4462	Sandvik SAF 2205	22.8.3.L/22.8.3.LSi	22.8.3.L/15W	22.9.3.LR/LB
S32750	1.4410	Sandvik SAF 2507	25.10.4.L	25.10.4.L/15W	25.10.4.LR
S30815	1.4893	253 MA ⁴⁾	22.12.HT	22.12.HT/15W	22.12.HTR
S35315	1.4854	353 MA ⁴⁾	28.34.HT	–	28.34.HTB
S31002	1.4335	2RE10	25.20.L	25.20.L/15W	25.20.LR
S31050	1.4466	2RE69	25.22.2.LMn	25.22.2.LMn/31S	25.22.2.LMnB
N08904	1.4539	2RK65	20.25.5.LCu	20.25.5.LCu/15W	20.25.5.LCuR
N08028	1.4563	Sandvik Sanicro 28	27.31.4.LCu	27.31.4.LCu/15W	27.31.4.LCuR
S31254	1.4547	254 SMO ⁴⁾	Sanicro 60	Sanicro 60/50SW	Sanicro 60
600	2.4816	Sandvik Sanicro 70	Sanicro 72HP	Sanicro 72HP/50SW	Sanicro 71
800	1.4558	Sandvik Sanicro 30	Sanicro 72HP	Sanicro 72HP/50SW	Sanicro 71

Filler metals for joining stainless steels with carbon steels

Wire electrodes and filler wire/rods

Sandvik 24.13.Si	Specially suited for MIG welding.
Sandvik 24.13.L	
Sandvik 24.13.LHF	Allow high dilution with the parent metal.
Sandvik 18.8.Mn	Gives austenitic weld metal which will work harden.
Sandvik 29.9	Austenitic-ferritic structure. High strength.
Sandvik 22.15.3.L	Gives Mo-alloyed weld metal.

¹⁾ For surfacing see the brochure S-236.

²⁾ Also 10S and 15W.

³⁾ Also LRV version available.

⁴⁾ Registered trademark owned by Outokumpu Stainless

Technical data may be changed without further notice.

Size tables, ANSI/ASME and DN

NB	OD	Schedule 5 S		Schedule 10 S		Schedule 40 S		Schedule 80 S		Schedule 160 ¹⁾		Schedule XX-strong ¹⁾	
inch	mm	mm	kg/m	mm	kg/m	mm	kg/m	mm	kg/m	mm	kg/m	mm	kg/m
1/8"	10.3			1.24	0.281	1.73	0.371	2.41	0.476				
1/4"	13.7			1.65	0.498	2.24	0.643	3.02	0.809				
3/8"	17.2			1.65	0.640	2.31	0.858	3.20	1.12				
1/2"	21.3	1.65	0.814	2.11	1.01	2.77	1.29	3.73	1.65	4.78	1.98	7.47	2.59
3/4"	26.7	1.65	1.033	2.11	1.30	2.87	1.71	3.91	2.23	5.56	2.94	7.82	3.69
1"	33.4	1.65	1.31	2.77	2.12	3.38	2.54	4.55	3.29	6.35	4.30	9.10	5.53
1 1/4"	42.2	1.65	1.67	2.77	2.73	3.56	3.44	4.85	4.53	6.35	5.69	9.70	7.88
1 1/2"	48.3	1.65	1.925	2.77	3.15	3.68	4.11	5.08	5.49	7.14	7.35	10.16	9.69
2"	60.3	1.65	2.424	2.77	3.99	3.91	5.52	5.54	7.60	8.74	11.29	11.07	13.65
2 1/2"	73.0	2.11	3.75	3.05	5.34	5.16	8.77	7.01	11.6	9.53	15.15	14.02	20.71
3"	88.9	2.11	4.58	3.05	6.56	5.49	11.5	7.62	15.5	11.13	21.67	15.24	28.11
3 1/2"	101.6	2.11	5.26	3.05	7.53	5.74	13.8	8.08	18.9				
4"	114.3	2.11	5.93	3.05	8.50	6.02	16.3	8.56	22.7	13.49	34.05	17.12	41.66
5"	141.3	2.77	9.61	3.40	11.74	6.55	22.1	9.53	31.4	15.88	49.87	19.05	58.31
6"	168.3	2.77	11.48	3.40	14.0	7.11	28.7	10.97	43.2	18.26	68.59	21.95	80.43
8"	219.1	2.77	15.00	3.76	20.27	8.18	43.2	12.70	65.5	23.01	113.01	22.22	109.57
10"	273.1	3.40	22.96	4.19	28.21	9.27	61.23	12.70	82.79	28.58	174.90	25.40	157.51
12"	323.9	3.96	31.72	4.57	36.54	9.53	74.93	12.70	98.95	33.32	242.53	25.40	189.81
14"	355.6	3.96	34.9	4.78	41.9								
16"	406.4	4.19	49.2	4.78	48.1								
18"	457.2	4.19	47.5	4.78	54.2								
20"	508.0	4.78	60.2	5.54	69.9								
24"	609.6	5.54	83.9	6.35	96.0								

NB	OD	Schedule 20 ¹⁾		Schedule 120 ¹⁾		DN	DIN 2440, for threading		DIN 2633, Welding neck flanges	
inch	mm	Wall mm	kg/m	mm	kg/m		OD mm	Wall mm	Tube OD Group 1, mm	Tube OD Group 2, mm
4"	114.3			11.13	28.8	6	10.2	2.0		
5"	141.3			12.70	40.9	8	13.5	2.35		
6"	168.3			14.27	55.0	10	17.2	2.35	17.2	14
8"	219.1	6.35	33.8	18.26	91.8	15	21.3	2.65	21.3	20
10"	273.1	6.35	42.4	21.44	135.1	20	26.9	2.65	26.9	25
12"	323.9	6.35	50.4	25.40	189.8	25	33.7	3.25	33.7	30
14"	355.6	7.92	68.9	27.79	228.1	32	42.4	3.25	42.4	38
16"	406.4	7.92	79.0			40	48.3	3.25	48.3	44.5
18"	457.2	7.92	89.1			50	60.3	3.65	60.3	57
20"	508.0	9.53	118.9			65	76.1	3.65	76.1	
24"	609.6	9.53	143.3			80	88.9	4.05	88.9	
						100	114.3	4.5	114.3	108
						125	139.7	4.85	139.7	133
						150	165.1	4.85	168.3	159
						175			193.7	
						200			219.1	
						250			273	267
						300			323.9	
						350			355.6	368
						400			406.4	419

¹⁾ ANSI/ASME B36.10

Gauge	BWG Birmingham / Stubs Iron Wire and Sheets inch	mm	SWG Imperial / Legal Standard Wire gauge inch	mm
11	0.1200	3.048	0.1160	2.946
12	0.1090	2.769	0.1040	2.642
13	0.0950	2.413	0.920	2.337
14	0.0830	2.108	0.0800	2.032
16	0.0650	1.651	0.0640	1.626
18	0.0490	1.245	0.0480	1.219
20	0.0350	0.889	0.0360	0.914
22	0.0280	0.711	0.0280	0.711
25	0.0200	0.508	0.0200	0.508
28	0.0140	0.356	0.0148	0.376

Here is a digest of two German specifications showing DN. These tables are given for guidance only. (The fittings catalogue S-1131-ENG gives further information about DIN 2633.)

Alternations in the program may be made without further notice

Steel grades

Standard manufacturing program

Designation Sandvik	Chemical composition (nominal), %					Standards* UNS	ASTM TP	EN Steel number
	C	Cr	Ni	Mo	Others			
Austenitic stainless steels (prefix standard THT, TST, TST-E or THE)								
3R12	≤0.030	18.5	10	–	–	S30403/S30400	304L/304	1.4306/1.4301
Sandvik 3R60	≤0.030	17.5	13	2.6	–	S31603/S31600	316L/316	1.4435/1.4436
3R65	≤0.030	17	11.5	2.1	–	S31603/S31600	316L/316	1.4404/1.4401
6R35	0.05	17.5	10.5	–	Ti	S32100/S32109	321/321H	1.4541/1.4940
5R75	0.05	17	12	2.1	Ti	S31635	316Ti	1.4571
3R19	≤0.030	18.5	9	–	N	S30453	304LN	1.4311
3R64	≤0.030	18.5	14.5	3.1	–	S31703	317L	1.4438**
3R68	≤0.030	17	13	4.1	N	–	–	1.4439
8R40	0.06	17.5	11	–	Nb	S34700/S34709	347/347H	1.4550/1.4912
3R60 U.G.	≤0.020	17.5	14	2.6	–	S31603	316L	1.4435
Duplex stainless steels (prefix standard THT, TST, TST-E or THE)								
Sandvik SAF 2205	≤0.030	22	5	3.2	N	S31803/S32205	–	1.4462
Sandvik SAF 2507	≤0.030	25	7	4	N	S32750	–	1.4410
Sandvik SAF 2304	≤0.030	22.5	4.5	–	N	S32304	–	1.4362
3RE60	≤0.030	18.5	4.5	2.6	Si, N	S31500	–	1.4424
High-alloy austenitic stainless steels and nickel alloys (prefix standard THT, TST, TST-E or THE)								
2RK65	≤0.020	20	25	4.5	Cu	N08904	–	1.4539
Sandvik Sanicro 28	≤0.020	27	31	3.5	Cu	N08028	–	1.4563
2RE10	≤0.015	24.5	20	–	–	S31002	–	1.4335
2RE69	≤0.020	25	22	2.1	N	S31050	–	1.4466
254 SMO	≤0.020	20	18	6.1	N, Cu	S31254	–	1.4547
Sandvik Sanicro 30	≤0.030	20	32	–	Ti,Al	N08800	Alloy 800	1.4558
Sandvik Sanicro 41	≤0.030	20	38.5	2.6	Cu,Ti	N08825	Alloy 825	–
Sandvik Sanicro 69	0.02	30	60	–	Fe	N06690	Alloy 690	2.4642**
High temperature grades (prefix standard THR)								
2C48	0.09	23.5	–	–	N	S44600	446-2	–
4C54	≤0.20	26.5	–	–	N	S44600	446-1	1.4749**
5R10	0.04	18.5	9.5	–	–	S30400/S30409	304/304H	1.4301/1.4948
6LR62	0.05	17	11.5	2.1	–	S31600/S31609	316, 316H	1.4401
8R41	0.06	16.5	13	–	Nb	–	–	1.4961
7RE10	0.06	24.5	21	–	–	S31008/S31009	310S, 310H	1.4845**
253 MA	0.08	21	11	–	Si,N,Ce	S30815	–	1.4835**
353 MA	0.07	25	35	–	Si,N,Ce	S35315	–	1.4854**
Sandvik Sanicro 31HT	0.07	20.5	30.5	–	Ti,Al	N08811/N08810	–	1.4959
8RE18	0.07	22.5	14	–	–	S30908/S30909	309S, 309H	1.4833**
Esshete 1250	0.1	15	9.5	1.0	Mn,V,Nb,B	S21500	–	1.4982
Sandvik Sanicro 61	0.03	23	60	–	Al	N06601	–	–
Sandvik Sanicro 70	≤0.05	16.5	72.5	–	Fe	N06600	Alloy 600	–
Special grades for machining (prefix standard THB or MBR)								
Sanmac 304/304L	≤0.030	18.5	9	–	–	S30400/S30403	304/304L	1.4301/1.4307
Sanmac 316/316L	≤0.030	16.5	11	2.1	–	S31600/S31603	316/316L	1.4401/1.4404
Sanmac 4435	≤0.030	17.5	12.5	2.6	–	S31600/S31603	316/316L	1.4436/1.4435
Sanmac 4571	0.03	17	12.5	2.1	Ti	S31635	316Ti	1.4571
Sanmac SAF 2205	≤0.030	21.5	4.5	3.2	N	S31803	–	1.4462
10RE51	0.04	26	5	1.3	–	S32900	–	1.4460
Sanmac 4305	≤0.035	17.5	9	–	S	S30300	303	1.4305

¹⁾ Valid for SEW 470

²⁾ DIN 17459

³⁾ Sanicro 31H

⁴⁾ NFA 49-317 with min 45% can be fulfilled.

⁵⁾ Valid for SEW 400.

⁶⁾ 1.4465 can be certified.

* In brackets, nearest equivalent steel grade.

** Not applicable for tube and pipe. Only for information.

W.-Nr.	SS	AFNOR	Pressure purpose		Mechanical properties		Elongation A %, min.
			PED ⁷⁾ EN 10216-5	ASME	Proof strength R _{p0.2} , MPa, min.	Tensile strength R _m , MPa	
Austenitic stainless steels							
1.4306/1.4301	2352/2333	Z2CN18-10	X	X	210	515–680	45
1.4435/1.4436	2353/2343	Z2CND17-13	X	X	220	515–690	45
1.4404/ 1.4401	2348	Z2CND17-12	X	X	220	515–690	45
1.4541/1.4878 ¹⁾	2337	(Z6CNT18-10)	X	X	210	515–690	45
1.4571	2350	(Z6CNDT17-12)	X	–	220	510–710	45
1.4311	2371	(Z2NC18-10AZ)*	X	X	270	550–750	35
(1.4438)*	2367	(Z3CND19-15-04)**	–	X	220	515–690	35
1.4439	–	–	X	–	290	580–800	35
1.4550	2338	Z6CNNb18-10	X	X	220	515–690	35
1.4435	–	(Z2CND17-12)*	X	X	190	490–690	40
Duplex stainless steels							
1.4462	2377	Z2CND22-05-03	X	X	485	680–880	25
–	2328	–	X	X	550	800–1000	25
1.4362	2327	Z2NC23-04AZ	X	X	400	600–820	25
1.4417	2376	Z2CND18-05-03	X	X	450	700–880	30
High-alloy austenitic stainless steels and nickel alloys							
1.4539	2562	Z1NCDU25-20-04	X	X	230	520–720	35
1.4563	2584	Z1NCDU31-27-03	X	X ⁸⁾	220	550–750	40
1.4335	–	Z2CN25-20	X	–	210	500–670	35
1.4466 ⁶⁾	–	Z1CND25-22AZ	X	X	270	580–780	30
(1.4529)*	2378	Z1CNDU20-18-06AZ	X	X	310	655–850	35
1.4558	–	–	X	X ⁸⁾	205	520–690	30
2.4858	–	–	–	X	175	≥520	30
2.4642	–	NC30FE(RCCM)	–	X	240	≥585	30
High temperature grades							
–	–	–	–	–	275	≥450	20
1.4749	2322	–	–	X	275	500–700	20
1.4301	2333	Z6CN18-09	X	X	210	515–690	45
1.4401	–	Z6CND17-12	–	–	205	515–790	45
1.4961	–	–	X	–	205	510–690	35
1.4845	2361	Z12CN25-20	–	X	220	515–750	35
(1.4893)	2368	–	–	X ⁸⁾	310	650–850	40
–	–	–	–	–	260	≥600	35
1.4959 ²⁾ 1.4876 ²⁾³⁾	–	–	X	X ⁸⁾	170	500–700	35
1.4833	–	–	–	X	205	≥515	35
–	–	–	X	–	230	540–740	35
–	–	–	–	–	205	≥550	30
2.4816	–	–	–	X	245	≥560	35
Special grades for machining							
1.4301	2352/2333	Z2CN18-10/Z6CN18-09	X	X	210	515–680	40 ⁴⁾
1.4401/1.4404	2347/2348	Z2CND17-12	X	X	220	515–690	40 ⁴⁾
1.4436/1.4435	2343/2353	Z2CND17-13	X	X	220	515–690	40 ⁴⁾
1.4571	2350	–	X	–	220	510–710	35
1.4462	2377	Z2CND22-05-03	X	X	450	680–880	25
1.4460 ⁵⁾	2324	–	–	X	485	620–800	20
1.4305	2346	–	–	–	215	500–700	45

⁷⁾ Pressure Equipment Directive 97/23/EC

⁸⁾ Also Code Case exist

Typical applications

Austenitic stainless steels

These steels have a wide range of applications in piping, heat exchangers, hydraulic systems and other equipment for the chemical, petrochemical, pulp and paper and food processing industries. The Mo-alloyed grades have higher resistance to general corrosion in non-oxidising acids and to pitting and crevice corrosion.

Ti- and Nb-alloyed grades have good strength at high temperatures.

Sandvik 3R60 U.G. is used for high pressure pipe for the urea industry.

3R68 has improved corrosion resistance compared to 316L and 317L and is often used for heat exchanger tubing.

Duplex stainless steels

Considerably higher strength and lower thermal expansion compared with austenitic grades. Very high corrosion resistance in chloride-containing solutions and weak organic acids. Sandvik SAF 2507 has superior corrosion resistance in seawater. Used for offshore oil and gas exploration and heat-exchangers. Duplex steels have a maximum service temperature of 250–300°C.

High-alloy austenitic stainless steels and nickel alloys

Sandvik 2RK65 – Phosphoric and sulphuric acid, chloride bearing environments, refineries and petrochemical plants.

Sandvik Sanicro 28 – Very good resistance to all kinds of corrosion. Wide range of appl. incl. oil/gas industry, excellent performance in phosphoric acid.

Sandvik 2RE10 – Strongly oxidising acids, e.g. nitric acid.

Sandvik 2RE69 – Fertilizer industry, urea strippers. Superior to Sandvik 3R60 U.G.

Sandvik 254 SMO – Higher strength, very good resistance to pitting corrosion in seawater and brackish water.

Sandvik Sanicro 30 – Nuclear PWR steam generators.

Sandvik Sanicro 41 – Refinery applications, (superheater tubes), very good resistance to stress corrosion cracking in basic and acid environments.

Sandvik Sanicro 69 – Nuclear PWR steam generator.

High temperature grades

Sandvik 4C54 – Sulphurous gases, recuperators, thermocouple protection tubes. Ferritic. Up to 1100°C in air.

Sandvik 7RE10 – Good oxidation resistance. Up to 1100°C in air.

Sandvik 253 MA – Very versatile; furnace tubes, recuperators, heat treatment furnaces. Up to 1150°C in air.

Sandvik 353 MA – Ethylene and petrochemical furnace tubes, recuperator tubes. Up to 1175°C in air.

Sandvik Sanicro 31HT – Furnace tubes, pigtails and headers for synthesis gas production, fluidised bed combustion. Up to 1100°C in air.

Sandvik 8RE18 – Recuperators. Up to 1000°C in air.

Sandvik Esshete 1250 – Superheater and reheater tubes in power plants.

Sandvik Sanicro 70 – Vinyl chloride plants, furnaces. Up to 1175°C in air.

Special grades for machining

Sandvik Sanmac grades have excellent machinability due to optimised non-metallic inclusions, chemical composition and microstructure.

Packing guide – Tube



10 Bundled

- 00 No additional product protection
- 01 Plastic plugs



11 Plastic foil

- 00 No additional product protection
- 01 Plastic plugs



30 PP flute - Corrugated board of plastic and plastic in the end of the tube bundle

- 00 Plastic in the ends
- 01 Plastic plugs
- 10 Plastic foil between tube layers
- 20 Inside of bundle lined with plastic



40 Flexible cardboard wrap reinforced with strips of masonite and plastic in the end of the tube bundle

- 00 Plastic in the ends
- 01 Plastic plugs
- 10 Plastic foil between tube layers
- 20 Inside of bundle lined with plastic



50 Wooden case

- 00 No additional product protection
- 01 Plastic plugs
- 02 Drying agent
- 10 Plastic foil between tube layers
- 20 Interior of case lined with plastic foil



52 Wooden case - extra strapping with steel band

- 00 No additional product protection
- 01 Plastic plugs
- 02 Drying agent
- 10 Plastic foil between tube layers
- 20 Interior of case lined with plastic foil

Alternative packing choices

May replace above mentioned variants depending on product size, length and quantity



U-profile of laminated paper



Pallet

Sales and service all over the world

Argentina

SANDVIK ARGENTINA S.A.
Buenos Aires
Phone 011-4484 32 41, Fax 011-4482 46 19

Australia

SANDVIK AUSTRALIA Pty. Ltd.
Wetherill Park, N.S.W. 2164
Phone 02-98 28 05 00, Fax 02-98 28 05 05

Austria

SANDVIK IN AUSTRIA Ges.m.b.H.
Wien
Phone 1-277 370, Fax 1-277 37-225

Belgium

SANDVIK BENELUX B.V.
Bruxelles
Phone 02-702 98 00, Fax 02-726 03 69

Brazil

SANDVIK DO BRASIL S.A.
Sao Paulo – SP
Phone 11-5696 54 00, Fax 11-5696 54 65

SANDVIK DO BRASIL, PU WIRE
Mogi Guaçu – SP
Phone 19-3861 98 31, Fax 19-3861 98 51

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SANDVIK BULGARIA Ltd
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Phone 02-958 12 31, Fax 02-958 12 48

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Wire 800-359-9444, Fax 800-438-3365
Strip 800-253-2437, Fax 616-926-2718

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