

***Seamless stainless tubes  
for hydraulic and  
instrumentation systems***





technical knowledge



integrated production



stock assortment



network of sales and service

## Reduce your lifecycle costs

*When selecting tubes for your hydraulic or instrumentation systems, some critical questions are often raised. For example, how knowledgeable are your suppliers about your process? How good are their products? If something goes wrong, how quickly can you get support or a replacement part?*

As a leading worldwide supplier of seamless stainless tubes in both straight lengths and coils, Sandvik is uniquely equipped to help you address these challenges. With more than 100 years of experience in producing stainless steel, we continue to support our customers with the following:



Sandvik's **technical knowledge** is based on a long tradition of R&D, which has resulted in a wide range of new products over the years. Combined with hands-on experience dealing with a variety of process environments, Sandvik and its representatives are equipped with the knowledge you need for the solution you want.



Our **integrated production** system ensures quality control through the entire manufacturing chain, from our steel melting plant to the finished product. Our quality standards help to ensure the long lifecycle of the tubes we deliver, as well as their traceability.



With a **wide stock assortment and distribution capacity**, we can deliver the product you want when you want it. Our tubes are end-capped and carefully packed to ensure you get the product you want in the same shape it left the mill.



And, finally, with an extensive **global network of sales and service** units, our representatives are locally available to help you find the most cost-effective long-term solution. You are in safe hands.



*“With Sandvik, you are putting yourself in safe hands.”*



## What makes a high-quality tube?

The tubes we manufacture and deliver for hydraulic and instrumentation systems are noted for their quality and low lifecycle costs for the following reasons:

- ✓ We control every step in the tube production process, ensuring **consistent quality** in our product.
- ✓ We have well equipped corrosion testing laboratories, used for research purposes and for control of the influence of the production procedures on the material, that result in a product that offers **high corrosion resistance**.
- ✓ **High surface smoothness and close dimensional tolerances** ensure there are no leakages when connecting straight tubes with couplings.
- ✓ All our products are characterized by the **ovality, eccentricity and controlled hardness** required for superior performance for hydraulic and instrumentation systems.

## Two delivery forms: straight lengths and coiled

In answer to our customers' needs, we have developed two primary delivery forms of seamless stainless tubes – straight lengths and coiled. Your choice will depend on your process environment and your requirements. We can help you arrive at the most cost-effective solution for your needs.

### THE SANDVIK GROUP

The Sandvik Group is a global high technology enterprise with 38,000 employees in 130 countries. Sandvik's operations are concentrated on three core businesses: Sandvik Tooling, Sandvik Mining and Construction and Sandvik Materials Technology – areas in which the group holds leading global positions in selected niches.

### SANDVIK MATERIALS TECHNOLOGY

Sandvik Materials Technology is a world-leading manufacturer of high value-added products in advanced stainless steels, special alloys, metallic and ceramic resistance materials, as well as process plants and sorting systems.

### QUALITY ASSURANCE

Sandvik Materials Technology has Quality Management Systems approved by internationally recognized organizations. We hold for example: the ASME Quality System Certificate as a Materials Organization; approval to ISO 9001, QS-9000 and PED 97/23/EC, as well as approvals from LRQA, JIS, TÜV and others as a materials manufacturer.

### ENVIRONMENT

Environmental awareness is an integral part of our business and is at the forefront of all activities within our operation. We hold ISO 14001 approval.







## Engineer your cost savings with coiled tubing

When you want to reduce the risk of leakages in your hydraulic and instrumentation system, consider **Sandvik seamless stainless steel coiled tubing**. By reducing the number of connections in your system, you make it easier to install, especially in vertical installation applications. Coiled tubing increases the integrity of the overall system, reducing not only the risk of leakage but maintenance costs as well.

Coiled tubing can be cut according to exact requirements. They are available in single coils or multiple coils orbitally welded together. Since lengths of coiled tubes can be cut according to need, there's less labor and no scrap. Together, all these benefits result in significant cost savings over time.

### A material of choice

Our coiled tubing is the material of choice for control lines and chemical injection lines, instrument lines, steam or electrically traced tubing, pre-insulated tubing, stack tubing and heater hose, among others.

Sandvik coiled tubing is supplied with a continuous line marked, bright annealed and buffed surface. Coils with special cleaning or coils with special ID surface can be supplied.

If required, the coiled tubing can be supplied with a PVC coated surface for double corrosion protection. Sandvik coiled tubing is packaged either level wound on wooden or steel reels, which are plastic wrapped, or loosely wound and strapped in individual cardboard boxes.

### Key advantages of Sandvik coiled tubing



**Fewer connections mean fewer couplings, which reduce the risk of leakage and the need for inspection and maintenance.**



**High degree of material utilization reduces scrap generation.**



**Compact packaging facilitates shipping and storage.**



**Improved system integrity enhances operational safety and security.**

## Coiled tubing – standard size range

### Instrumentation tubing – imperial sizes

Size inch		Single coil length * ft	Orbital welded length ft
1/8	x .020	1,300	
	x .028	1,300	
	x .035	1,300	
	x .049	1,300	
3/16	x .020	1,000	
	x .028	950	
	x .035	750	
	x .049	600	
1/4	x .035	1,220	36,551
	x .049	932	27,864
	x .065	765	22,903
3/8	x .035	771	23,100
	x .049	574	17,162
	x .065	456	13,661
	x .083	381	11,345
1/2	x .035	564	16,899
	x .049	413	12,411
	x .065	325	9,740
	x .083	266	7,949
5/8	x .035	446	13,313
	x .049	325	9,711
	x .065	253	7,565
	x .083	203	6,112
3/4	x .035	367	10,990
	x .049	266	7,982
	x .065	207	6,187

Other sizes and lengths available on request.

\* Minimum guaranteed length for TP 316/316L.

### Steel grades

Sandvik	ASTMTP	UNS	EN steel no.	W.-Nr.
3R12	304/	S30400/	1.4306/	1.4306/
	304L	S30403	1.4301	1.4301
3R60	316/	S31600/	1.4435	1.4435
	316L	S31603		
3R65	316/	S31600/	1.4404	1.4404
	316L	S31603		
6R35	321/	S32100/	1.4541/	1.4541/
	321H	S32109	1.4940	1.4878
5R75	316Ti	S31635	1.4571	1.4571
8R40	347/	S34700/	1.4550/	1.4550/
	347H	S34709	1.4912	
SAF 2205		S31803/	1.4462	1.4462
		S32205		
SAF 2304		S32304	1.4362	1.4362
SAF 2507		S32750	1.4410	
Sanicro 28		N08028	1.4563	1.4563
Sanicro 30	Alloy 800	N08800	1.4558	1.4558
Sanicro 41	Alloy 825	N08825		2.4858
Sanicro 70	Alloy 600	N06600		2.4816
		N04400		
		N02200		

Other steel grades may be produced on request.

### Hydraulic tubing – metric sizes

Size mm		Single coil length * m	Orbital welded length m
3.0	x 0.5	400	
	x 0.75	400	
	x 1.0	400	
3.5	x 0.5	400	
	x 0.75	400	
	x 1.0	350	
4.0	x 1.5	280	
	x 0.5	350	
	x 0.75	350	
6.0	x 1.0	300	
	x 1.5	230	
	x 1.0	362	10,828
8.0	x 1.2	314	9,399
	x 1.5	268	8,021
	x 1.0	258	7,734
10.0	x 1.2	222	6,635
	x 1.5	185	5,553
	x 1.0	201	6,016
12.0	x 1.2	171	5,127
	x 1.5	142	4,246
	x 1.0	164	4,922
	x 1.2	140	4,177
	x 1.5	115	3,437

Sizes above 12 mm – please inquire.

### Standards

ASTM: A213, A269, B163, B167, B668, A632, A789, A790

ASME: SA213, SB163, SB167, SB 668, SA789, SA790

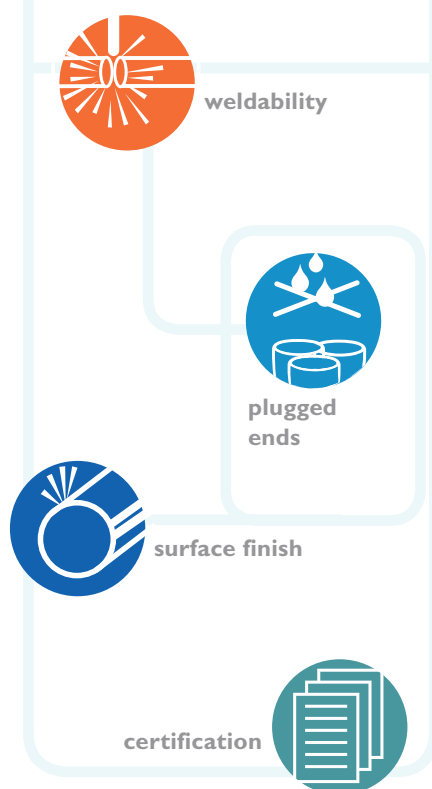
NACE: MR 0175

EN: 10216-5 TC1

DIN: 17458 TC1

Eddy Current or hydrostatic test at option of Sandvik.

## Key product features



# Get the best of straight-length tubes


*Sandvik seamless stainless tubes in straight lengths offer a number of specific benefits.*


The structure, corrosion resistance and mechanical properties of a steel product are carefully fine-tuned during **integrated production**. Sandvik 3R60 (TP 316/316L), for example, is a steel grade that contains a minimum of 2.5 percent molybdenum, which greatly improves resistance to corrosion in hydraulic and instrumentation systems.


Whether you are a designer, fabricator, distributor or the actual end-user, Sandvik delivers high-quality products, backed up by laboratory testing, that are **consistent from delivery to delivery**.


Sandvik offers one of the **widest varieties** of standard straight-length tube sizes and grades from stock. Upon request, we will manufacture special grades.

### Key product features:

 **Weldability.** Thanks to the controlled and consistent quality of our steel grades, Sandvik hydraulic tubes are very easy to weld. Sandvik also supplies a complete range of filler materials for welding.

 **Plugged ends.** From stock, all tubes with OD larger than 5 mm can be supplied with transport protection against inside contamination.

 **Surface finish.** Sizes OD up to and including 30 mm are supplied bright annealed. Outside diameters larger than 30 mm are supplied in the annealed and pickled condition.

 **Certification.** Testing performed according to the standard is reported in Material and Test Certificates issued by our Quality Assurance department.



## Testing of stock standard tubing in straight condition

Sandvik hydraulic and instrumentation tubing are tested according to the standards as follows.

Standard	Tests Chemical analysis	Tensile	Hardness	Flattening	Ring- expanding	Flaring	Corrosion	Hydrostatic
EN 10216-5 TC1 <sup>7)</sup>	S	S	—	S <sup>1)</sup>	S <sup>1)</sup>	—	— <sup>4)</sup>	T <sup>2)</sup>
NFA 49-117	S	S	S	S	—	S	S <sup>5a)</sup>	T <sup>2)</sup>
ASTM A269	S	—	S	—	—	S	— <sup>5)</sup>	T <sup>2)</sup>
ASTM A213	S <sup>3)</sup>	S	S	S	—	S	— <sup>5)</sup>	T <sup>2)</sup>
ASTM A789	S <sup>3)</sup>	S	S	—	—	S	—	T <sup>2)</sup>
ASTM B677	S	S	— <sup>6)</sup>	—	—	—	—	T <sup>2)</sup>
ASTM B668	S	S	— <sup>6)</sup>	—	—	S	—	T <sup>2)</sup>
ASTM A632	S	S	— <sup>6)</sup>	—	—	S	— <sup>5)</sup>	T

S = Sampling T = 100%

<sup>1)</sup> Either flattening or ring expanding test, depending on tube size.

<sup>2)</sup> Hydrostatic test is replaced by Eddy current test at option of Sandvik.

<sup>3)</sup> Also product analysis of a billet or tube from each heat.

<sup>4)</sup> Sandvik Materials Technology performs EN ISO 3651-2 Method A (DIN 50914).

<sup>5)</sup> Sandvik Materials Technology performs ASTM A262 PrE.

<sup>5a)</sup> Sandvik Materials Technology also performs ASTM A262 PrE.

<sup>6)</sup> Sandvik Materials Technology performs hardness test.

<sup>7)</sup> Also according to DIN 17458 TC1.

# Tubes in straight lengths – stock program

## Hydraulic tubing – metric sizes

Outside diameter mm	Wall thickness mm	Weight kg/m	3R12 TP 304/304L EN 1.4306 Max. working pressure in bar <sup>2)</sup>		3R60 TP 316/316L EN 1.4435		6R35 TP 321 EN 1.4541		5R75 TP 316Ti EN 1.4571	
			EN <sup>3)</sup>	ASME <sup>4)</sup>	EN	ASME	EN	ASME	EN	ASME
3	0.5	0.03			● 510	470				
	0.7	0.04			● 718	684				
6	1.0	0.13	● 470	470	● 510	470	● 522	470	● 550	470
	1.5	0.17			● 774	738			● 835	738
8	1.0	0.18	● 338	340	● 366	340	● 375	340	● 395	340
	1.5	0.24	● 541	537	● 587	537	● 600	537	● 633	537
	2.0	0.30	● 714	738	● 774	738	● 792	738		
10	1.0	0.23	● 263	267	● 286	267	● 292	267	● 308	267
	1.5	0.32	● 416	417	● 451	417	● 461	417	● 486	417
	2.0	0.40	● 585	577	● 635	577	● 649	577	● 684	577
12	1.0	0.28	● 216	220	● 234	220	● 240	220	● 252	220
	1.5	0.39	● 338	340	● 366	340	● 375	340	● 395	340
	2.0	0.50	● 470	470	● 510	470	● 522	470	● 550	470
14	1.0	0.33	● 183	186	● 198	186				
	1.5	0.47							● 332	288
	2.0	0.60	● 393	395	● 426	395	● 436	395	● 460	395
15	1.0	0.35	● 170	173	● 184	173				
	1.5	0.51	● 263	267	● 286	267	● 292	267	● 308	267
	2.0	0.65	● 363	366	● 394	366			● 425	366
16	1.0	0.38	● 158	162	● 172	162				
	1.5	0.54	● 245	249	● 266	249			● 287	249
	2.0	0.70	● 338	340	● 366	340	● 375	340	● 395	340
	2.5	0.85			● 473	437	● 484	437	● 510	437
	3.0	0.98							● 633	537
18	1.0	0.43	● 140	143	● 152	143				
	1.5	0.62	● 216	220	● 234	220	● 240	220	● 252	220
	2.0	0.80	● 296	299	● 321	299	● 328	299	● 346	299
	2.5	0.97							● 445	383
20	1.5	0.69	● 193	196	● 209	196				
	2.0	0.90	● 263	267	● 286	267			● 308	267
	2.5	1.09			● 366	340	● 375	340	● 395	340
	3.0	1.28					● 461	417	● 486	417
	4.0	1.60			● 635	577				
22	1.5	0.77	● 174	177	● 189	177	● 193	177	● 203	177
	2.0	1.00	● 237	241	● 257	241	● 263	241	● 278	241
25	1.5	0.88	● 152	155						
	2.0	1.15	● 206	210	● 224	210			● 242	210
	2.5	1.41	● 263	267	● 286	267			● 308	267
	3.0	1.65	● 322	326	● 350	326			● 377	326
28	1.5	1.00	● 135	138	● 146	138	● 149	138	● 158	132
	2.0	1.30	● 183	186	● 198	186	● 203	186	● 214	186
	2.5	1.60	● 233	236	● 252	236				
30	2.5	1.72			● 234	220				
	3.0	2.03	● 263	267	● 286	267			● 308	267
	4.0	2.60			● 394	366			● 425	366
35	2.0	1.65	● 144	147	● 156	147				
	2.5	2.03	● 183	186					● 214	186
	3.0	2.40	● 222	226	● 241	226				
38	2.0	1.80	● 132	135	● 143	135				
	3.0	2.63	● 203	207	● 221	207			● 238	207
	4.0	3.41			● 302	282			● 326	282
	5.0	4.13			● 388	360			● 419	360
42	2.0	2.00			● 129	122				
	3.0	2.93	● 183	186	● 198	186			● 214	186
50	5.0	5.63			● 286	267				

● Size in stock

Lengths: Stock standard length is 6000 mm. Random lengths min. 5 meters may also be included in a delivery from stock. Tubes in other lengths on request.

Line marking, example: SANDVIK 3R12 ASTM A-269 TP304/304L SMLS NDE 12.7 x 1.24 mm HT"number" LOT"number" QA-TUBE

## Instrumentation tubing – imperial sizes

Outside diameter	Wall thickness	Imperial size <sup>1)</sup>	Weight	3R12 TP 304/304L EN 1.4306		3R60 TP 316/316L EN 1.4435		2RK65 UNS N08904 EN 1.4539		SAF 2507 UNS S32750 EN 1.4410		Sanicro 28 UNS N08028 EN 1.4563	
				EN <sup>3)</sup>	ASME <sup>4)</sup>	EN	ASME	EN	ASME	EN	ASME	EN	ASME
mm	mm		kg/m	Max. working pressure in bar <sup>2)</sup>									
1.59	0.36	1/16" x 28 BWG	0.011			● 740	662						
	0.51		0.014			● 1008	961						
3.18	0.71	1/8" x 22 BWG	0.044			● 727	652						
	0.89		0.051			● 874	834						
4.76	0.89	3/16" x 20 BWG	0.086			● 585	536						
6.35	0.71	1/4" x 22 BWG	0.100			● 323	301						
	0.89		0.122	● 384	386	● 417	386	● 469	392	● 962	748		
	0.91		0.124	● 394	396	● 428	396	● 481	402				
	1.22		0.157	● 557	552	● 604	552	● 680	560				
	1.24		0.159	● 568	562	● 616	562	● 693	570	● 1421	1088		
	1.63		0.193	● 797	759	● 896	771						
7.94	0.89	5/16" x 20 BWG	0.157			● 324	302						
	0.91		0.160			● 332	310						
9.53	0.89	3/8" x 20 BWG	0.193	● 244	248	● 265	248	● 298	252	● 611	480		
	0.91		0.196	● 250	254	● 272	254	● 305	258				
	1.22		0.254			● 376	350	● 423	355				● 416 362
	1.24		0.257			● 383	356	● 431	361	● 884	689	● 424	368
	1.63		0.322			● 526	484	● 591	491			● 582	501
	1.65		0.326			● 534	490	● 600	498	● 1230	950	● 590	508
	2.03		0.381			● 686	619						
12.7	0.89	1/2" x 20 BWG	0.263	● 179	183	● 194	183	● 219	185	● 448	354		
	0.91		0.268	● 183	187	● 199	187	● 224	190				
	1.22		0.350	● 252	256	● 273	256	● 313	264				
	1.24		0.356	● 256	260	● 278	260	● 313	264	● 642	504		
	1.63		0.452	● 348	351	● 377	351	● 430	361			● 423	368
	1.65		0.456	● 353	355	● 383	355	● 430	361	● 882	688	● 423	368
	2.03		0.542			● 486	448	● 546	455				
15.88	1.22	5/8" x 18 SWG	0.448			● 214	201						
	1.24		0.454			● 218	205						
	1.63		0.582			● 294	275						
	1.65		0.588			● 298	278						
19.05	1.22	3/4" x 18 SWG	0.544			● 176	166						
	1.24		0.553			● 180	169			● 414	328		
	1.63		0.711			● 241	226						
	1.65		0.718			● 244	229						
	2.11		0.895			● 320	298						
	2.41		1.00			● 371	345						
25.4	1.22	1" x 18 SWG	0.739			● 130	123						
	1.24		0.750			● 132	125						
	1.65		0.981			● 179	169						
	2.11		1.23			● 233	219						
	2.41		1.39			● 270	252						
3.20	–	1.78			● 370	343							

● Size in stock

<sup>1)</sup> SWG = Standard Wire Gauge, BWG = Birmingham Wire Gauge

28 BWG = 0.014 inch    25 BWG = 0.020 inch    22 BWG = 0.028 inch    20 BWG = 0.035 inch    20 SWG = 0.036 inch    18 BWG = 0.049 inch    18 SWG = 0.048 inch  
 16 BWG = 0.065 inch    16 SWG = 0.064 inch    14 BWG = 0.083 inch    14 SWG = 0.080 inch    13 BWG = 0.095 inch    12 BWG = 0.109 inch    11 BWG = 0.120 inch

<sup>2)</sup> 1 bar = 0.1 MPa, 1 ksi = 6.895 MPa

<sup>3)</sup> EN 13480-3 at 50°C.

<sup>4)</sup> ASME B31.3 at 40°C. Max. allowed stress for 3R12 = 304 and for 3R60 = 316.

Calculated wall thickness tolerance -10%.



## Steel grades

Sandvik	Standards					Chemical composition (nominal), %						Mechanical properties		
	UNS/ ASTM TP	EN steel no.	SS	AFNOR	W.-Nr.	C	Cr	Ni	Mo	Others	Proof strength R <sub>p0.2</sub> MPa min.	Tensile strength R <sub>m</sub> MPa min.	Elong. A % min.	
3R12	304/304L	1.4306	2352	Z2CN18-10	1.4306	≤0.030	18.5	10	–	–	210	515–680	45	
3R60	316/316L	1.4435	2353	Z2CND17-13	1.4435	≤0.030	17.5	13	2.6	–	220	515–690	45	
6R35	321	1.4541	2337	(Z6CNT18-10)	1.4541	0.05	17.5	10.5	–	Ti	210	515–690	45	
5R75	316Ti	1.4571	2350	(Z6CNDT17-12)	1.4571	0.05	17	12	2.1	Ti	220	510–710	45	
SAF 2507	S32750	1.4410	2328	–	–	≤0.030	25	7	4	N	550	800–1000	25	
2RK65	N08904	1.4539	2562	Z1NCDU25-20-04	1.4539	≤0.020	20	25	4.5	Cu	230	520–720	35	
Sanicro 28	N08028	1.4563	2584	Z1NCDU31-27-03	1.4563	≤0.020	27	31	3.5	Cu	220	550–750	40	

Steel grades stated in our main catalogue, S-110, including titanium can be delivered on request.  
Sandvik, Sandvik SAF 2507 and Sanicro are trademarks owned by Sandvik AB.

## Tolerances

### Metric sizes

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

Size 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

Size OD, mm	Tolerances OD, mm	Wall thickness %
<4.76-2.38	+0.08/-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).

### Imperial sizes

#### Sandvik 3R12, 3R60 OD 6.35-25.4 mm according to DIN 2391/EN 10305-1

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

#### Sandvik 3R60

##### OD <6 mm, tolerances according to ASTM A632

Size 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

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

#### Sandvik SAF 2507 (UNS S32750)

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

## Standards

### Metric sizes

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

EN 10216-5 TC1  
PED 97/23/EC  
DIN 17458, TC1  
NFA 49-117  
ASTM A213-AW (average wall), ASTM A269.  
OD<6 mm acc to A632

#### Hydraulic tubing for 6R35 (TP 321) and 5R75 (TP 316Ti)

EN 10216-5 TC1  
PED 97/23/EC  
DIN 17458, TC1

### Imperial sizes

#### 2RK65 (UNS N08904)

ASTM B677/A269  
PED 97/23/EC EN 10216-5 TC1

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

ASTM A213-AW  
ASTM A269  
OD <6 mm ASTM A632  
PED 97/23/EC EN 10216-5 TC1

#### Sanicro 28 (UNS N08028)

ASTM B668  
PED 97/23/EC EN 10216-5 TC1

#### SAF 2507 (UNS S32750)

ASTM A789

***Sales and service all over the world***

[www.smt.sandvik.com/worldwide](http://www.smt.sandvik.com/worldwide)



Sandvik Materials Technology  
SE-811 81 Sandviken, Sweden, Phone +46 26-26 30 00, Fax +46 26-26 02 20  
[www.smt.sandvik.com](http://www.smt.sandvik.com)