

# Hot-rolled steel strip General

Technical Terms of Delivery

# Contents

<u>Introduction</u>	<u>4</u>
<u>Quality management system</u>	<u>5</u>
Comprehensive quality management	5
State-of-the-art testing techniques	5
<u>Selected steel grades</u>	<u>6</u>
<u>Available dimensions</u>	<u>7</u>
Hot-rolled steel strip in coils	7
Hot-rolled steel strip in slit coils	8
Cut shapes from hot-rolled steel strip	9
<u>Order quantities/Production units</u>	<u>10</u>
Hot-rolled steel strip and slit hot-rolled strip	10
Cut shapes from hot-rolled steel strip	11
Specific coil weight	12
Weights	14
Explanation of limit curve in available dimensions	14
<u>Surface</u>	<u>15</u>
Oiling	15
<u>Inspection and Testing</u>	<u>16</u>
<u>Labeling</u>	<u>17</u>

Weld seams	18
Packaging/transport/storage	19
General	19
Recommendations for transport and storage	20
General order information	21

# Introduction

These Technical Terms of Delivery provide a general overview of the product range of hot-rolled strip. They are based on the national and international standards as amended in January 2011. They contain information on the production program and serve as a guideline for ordering and processing. We are not limited to the indicated steel grades and standards. Inquiries for steel grades that comply with other standards are also welcome.

Our goal is to develop something new – to go beyond standard steels – and to continually offer high-quality products. Market requirements have reached levels that would exceed the scope of these Technical Terms of Delivery if we focused too much on details.

For this reason we ask that you address open questions to respective partners in the competent sales department or in the technical department for hot-rolled strip. Your contact partner will be happy to provide you with individual consultation.

# Quality management system

## Comprehensive quality management

The focus of the company philosophy at voestalpine Stahl GmbH is quality leadership in the interest of meeting customer and market requirements and legitimized expectations. As a consequence, comprehensive quality management is an essential element of our corporate strategy.

The quality management system of our company meets international quality management standards and is certified by Lloyds's Register QA Ltd./U.K. in accordance with ISO 9001 and ISO/TS 16949. Furthermore, the system complies with the special quality management requirements of our customers.

## State-of-the-art testing techniques

We use the most modern testing techniques/methods, laboratory information and management systems equipped with state-of-the-art technologies. The technical expertise of our testing and inspection laboratories is accredited in accordance with the international ISO/IEC 17025 and ISO/IEC 17020 standards certified by the national accreditation office of the Austrian Federal Ministry of Health, Family and Youth Affairs. The competency criteria stipulated by these standards emphasize the capability of the laboratory to provide precise and accurate testing and inspection data.

## Selected steel grades

### Mild, unalloyed steels for cold forming

These steels are generally delivered in accordance with EN 10111. They are used in applications in which formability is more important than strength.

### Mild, unalloyed steels for cold rolling

These steels are generally delivered in accordance with EN 1614, Part 1. They are used for cold rolling. Here, too, formability is more important than strength.

### Structural steels

These steels are included in EN 10025. They are generally used for mechanical engineering. The steels are characterized by minimum yield strength, a margin for tensile strength and minimum fracture elongation. The steels are used for light drawing stress, shaping and edging.

### alform® steels

#### - Unalloyed soft steels

#### - Micro-alloyed higher-strength steels

This steel series features excellent cold formability. alform® steels are provided with minimum yield strengths between 180 and 900 N/mm<sup>2</sup>. They are generally used for mechanical engineering. The alform® steel series is comprised of unalloyed mild, normalized-rolled and thermomechanically rolled steels.

### Case-hardening and heat-treatable steels

These steels are included in EN 10083 and EN 10084. They are used in cases where the finished parts are subject to heat treatment (e.g. case-hardening or tempering).

### Dual-phase steel DP 600

This steel grade is characterized by high tensile strength and good cold-formability. It is suitable for pressed parts (e.g. wheel disks).

### Line-pipe steel

We supply line-pipe steel based on API-5L X42 to X70 and according to customer specifications. Dimensions upon request.

## Available dimensions

In general in accordance with EN 10051. Narrower tolerances or tolerances according to other standards are subject to special agreement.

The exact available dimension limits are found in the graphs corresponding to the respective steel grades. As a rule, a symmetrical tolerance zone position is taken as the basis for the ordered thickness. Products made of hot-rolled strip are supplied in the following forms:

- Non-slit in coils, with mill edge or cut edge
- Longitudinally slit in coils with cut edge
- Cut shapes made of hot-rolled strip, with mill edge or cut edge

All products can be supplied in unpickled or pickled condition.

### Hot-rolled steel strip in coils

#### Types

Type (non-slit coils)	Thickness <sup>1)</sup> [mm]	Width <sup>1)</sup> [mm]
Unpickled, untrimmed	1.50 – 20.00	900 – 1600
Unpickled, trimmed	1.50 – 6.00	900 – 1600
Pickled, trimmed and untrimmed	1.50 – 12.00	900 – 1600

<sup>1)</sup> depending on the steel-grade-specific dimension limits

<b>Inside diameter:</b>	Non-machined standard	Standard	720 – 780 mm
	Pickled/trimmed	Standard	approx. 600 mm
		upon request	720 – 780 mm

**Outside diameter:** max. 2,000 mm

## Hot-rolled steel strip in slit coils

### Minimum width

Width < 600 mm pursuant to EN 10051

Thickness <sup>1)</sup> [mm]	Minimum width <sup>1)</sup> [mm] for material strengths Rm [N/mm <sup>2</sup> ]						
	≤ 400	≤ 500	≤ 600	≤ 700	≤ 800	≤ 900	≤ 1000
1.50 – 2.50	42	42	42	42	42	42	42
2.51 – 3.00	42	42	42	42	42	42	42
3.01 – 3.50	42	42	42	42	45	52	56
3.51 – 4.00	42	42	42	50	60	69	75
4.01 – 4.50	42	42	52	64	75	90	100
4.51 – 5.00	45	52	64	75	90	112	128
5.01 – 5.50	56	64	75	90	112	128	150
5.51 – 6.00	64	75	90	112	128	150	
6.01 – 6.50	75	90	112	128	150		
6.51 – 7.00	90	100	128	150			
7.01 – 7.50	112	112	150				
7.51 – 8.00	150	150	150				

<sup>1)</sup> The steel-grade-specific dimension limits for non-slit hot-rolled strip (width combination or thickness) must additionally be taken into consideration.

Narrower dimensions upon request.

**Inside diameter:**      Optionally approx. 500 or approx. 600 mm

**Outside diameter:**    max. 2,000 mm  
                                   max. 1,850 mm (for delivery with vertical axis hole)

## Cut shapes from hot-rolled steel strip

### Types

Type	Thickness <sup>1)</sup> [mm]	Maximum width <sup>1)</sup> [mm]	Maximum length [mm]
Unpickled, trimmed	1.50 – 5.00	1600	6000
Unpickled, untrimmed	3.00 – 20.00	1600	18000
Pickled, trimmed and untrimmed	1.50 – 2.99	1550 <sup>2)</sup>	6000
	3.00 – 5.10	1550 <sup>2)</sup>	18000
	5.11 – 12.00	1600	18000

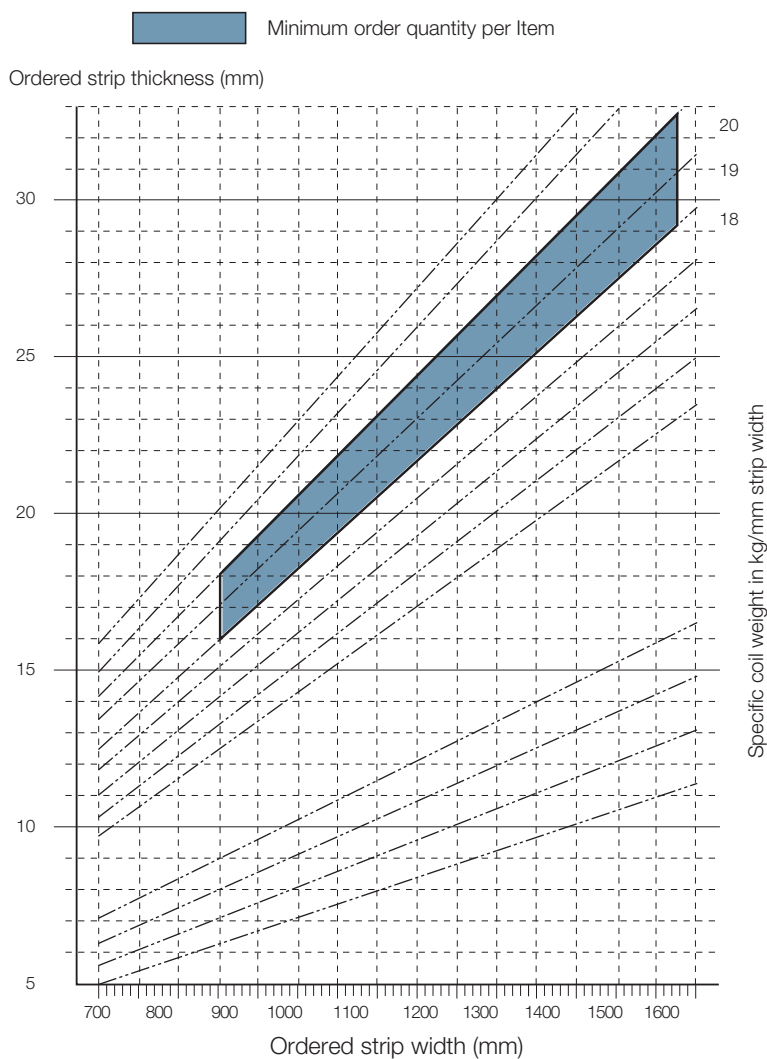
<sup>1)</sup> Depending on the steel-grade-specific dimension limits

<sup>2)</sup> Thicknesses > 1,550 mm only upon request.

# Order quantities/Production units

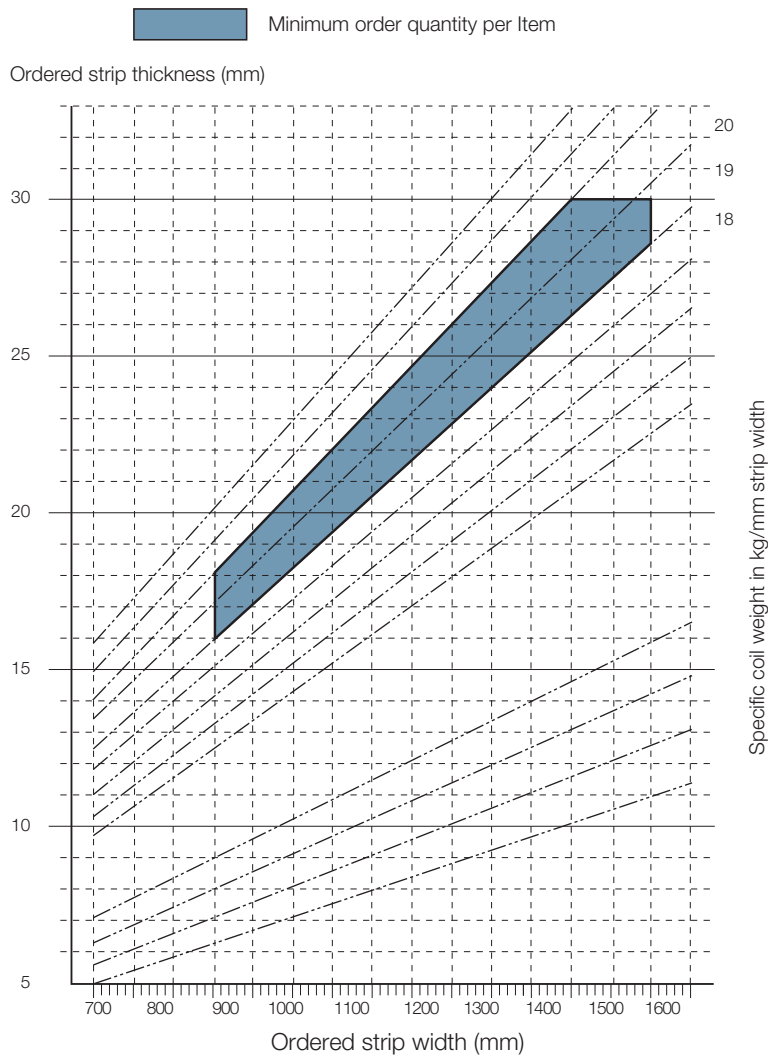
## Hot-rolled steel strip and slit hot-rolled strip

- The minimum order quantity per production unit is 1 coil production unit (approx. 20 kg/mm strip width) and/or its multiple.
- An order quantity per item below 18 kg/mm strip width is subject to special agreement.
- The coil weight must correspond to a production unit (approx. 20 kg/mm strip width).
- Coil weight requirements (minimum/maximum) with respect to the order quantity, outer diameter or specific coil weight must show a minimum difference of 2 kg/mm strip width.
- The general rule is to meet customer requirements with respect to maximum coil weight, although in rare cases weights may fall by 30% below the maximum.
- For each item, deviations in the order quantity by plus or minus 10% are allowed.



## Cut shapes from hot-rolled steel strip

- The minimum order quantity per production unit is 1 coil production unit (18–20 kg/mm strip width) and/or its multiple.
- An order quantity per item below 18 kg/mm strip width is subject to special agreement.
- For each item, deviations in the order quantity by plus or minus 10% are allowed.



# Specific coil weight

## Specific coil weight kg/mm strip width

with reference to outer/inner diameter

Specific coil weight kg/mm strip width				Specific coil weight kg/mm strip width			
OD	Inner diameter			OD	Inner diameter		
	500	600	720 – 780		500	600	720 – 780
700	1.45	0.78		1100	5.79	5.13	3.81
710	1.53	0.87		1110	5.92	5.26	3.95
720	1.62	0.96		1120	6.06	5.39	4.08
730	1.71	1.04		1130	6.19	5.53	4.22
740	1.80	1.13		1140	6.33	5.67	4.35
750	1.88	1.22		1150	6.47	5.81	4.49
760	1.98	1.31		1160	6.61	5.94	4.63
770	2.07	1.40	0.09	1170	6.75	6.09	4.77
780	2.16	1.50	0.19	1180	6.89	6.23	4.91
790	2.26	1.59	0.28	1190	7.03	6.37	5.06
800	2.35	1.69	0.38	1200	7.18	6.51	5.20
810	2.45	1.79	0.47	1210	7.32	6.66	5.35
820	2.55	1.88	0.57	1220	7.47	6.81	5.49
830	2.65	1.98	0.67	1230	7.62	6.95	5.64
840	2.75	2.08	0.77	1240	7.77	7.10	5.79
850	2.85	2.19	0.87	1250	7.92	7.25	5.94
860	2.95	2.29	0.98	1260	8.07	7.40	6.09
870	3.06	2.39	1.08	1270	8.22	7.56	6.24
880	3.16	2.50	1.19	1280	8.37	7.71	6.40
890	3.27	2.61	1.29	1290	8.53	7.87	6.55
900	3.38	2.71	1.40	1300	8.69	8.02	6.71
910	3.49	2.82	1.51	1310	8.84	8.18	6.87
920	3.60	2.93	1.62	1320	9.00	8.34	7.03
930	3.71	3.05	1.73	1330	9.16	8.50	7.19
940	3.82	3.16	1.85	1340	9.32	8.66	7.35
950	3.94	3.27	1.96	1350	9.48	8.82	7.51
960	4.05	3.39	2.07	1360	9.65	8.98	7.67
970	4.17	3.50	2.19	1370	9.81	9.15	7.84
980	4.28	3.62	2.31	1380	9.98	9.32	8.00
990	4.40	3.74	2.43	1390	10.15	9.48	8.17
1000	4.52	3.86	2.55	1400	10.31	9.65	8.34
1010	4.64	3.98	2.67	1410	10.48	9.82	8.51
1020	4.77	4.10	2.79	1420	10.65	9.99	8.68
1030	4.89	4.23	2.92	1430	10.83	10.16	8.85
1040	5.02	4.35	3.04	1440	11.00	10.34	9.02
1050	5.14	4.48	3.17	1450	11.17	10.51	9.20
1060	5.27	4.61	3.29	1460	11.35	10.69	9.37
1070	5.40	4.73	3.42	1470	11.53	10.86	9.55
1080	5.53	4.86	3.55	1480	11.70	11.04	9.73
1090	5.66	4.99	3.68	1490	11.88	11.22	9.91

## Specific coil weight in kg/mm strip width (continued)

with reference to outer/inner diameter

Specific coil weight kg/mm strip width			
OD	Inner diameter		
	500	600	720 – 780
1500	12.06	11.40	10.09
1510	12.24	11.58	10.27
1520	12.43	11.76	10.45
1530	12.61	11.95	10.64
1540	12.80	12.13	10.82
1550	12.98	12.32	11.01
1560	13.17	12.51	11.19
1570	13.36	12.70	11.38
1580	13.55	12.89	11.57
1590	13.74	13.08	11.76

1600	13.93	13.27	11.96
1610	14.13	13.46	12.15
1620	14.32	13.66	12.35
1630	14.52	13.85	12.54
1640	14.71	14.05	12.74
1650	14.91	14.25	12.94
1660	15.11	14.45	13.14
1670	15.31	14.65	13.34
1680	15.52	14.85	13.54
1690	15.72	15.06	13.74

1700	15.92	15.26	13.95
1710	16.13	15.47	14.15
1720	16.34	15.67	14.36
1730	16.54	15.88	14.57
1740	16.75	16.09	14.78
1750	16.96	16.30	14.99
1760	17.18	16.51	15.20
1770	17.39	16.73	15.41
1780	17.60	16.94	15.63
1790	17.82	17.15	15.84

1800	18.03	17.37	16.06
1810	18.25	17.59	16.28
1820	18.47	17.81	16.50
1830	18.69	18.03	16.72
1840	18.91	18.25	16.94
1850	19.14	18.47	17.16
1860	19.36	18.70	17.38
1870	19.58	18.92	17.61
1880	19.81	19.15	17.83
1890	20.04	19.37	18.06

Specific coil weight kg/mm strip width			
OD	Inner diameter		
	500	600	720 – 780
1900	20.27	19.60	18.29
1910	20.50	19.83	18.52
1920	20.73	20.06	18.75
1930	20.96	20.30	18.98
1940	21.19	20.53	19.22
1950	21.43	20.76	19.45
1960	21.66	21.00	19.69
1970	21.90	21.24	19.92
1980	22.14	21.48	20.16
1990	22.38	21.71	20.40

2000	22.62	21.96	20.64
2010	22.86	22.20	20.88
2020	23.10	22.44	21.13

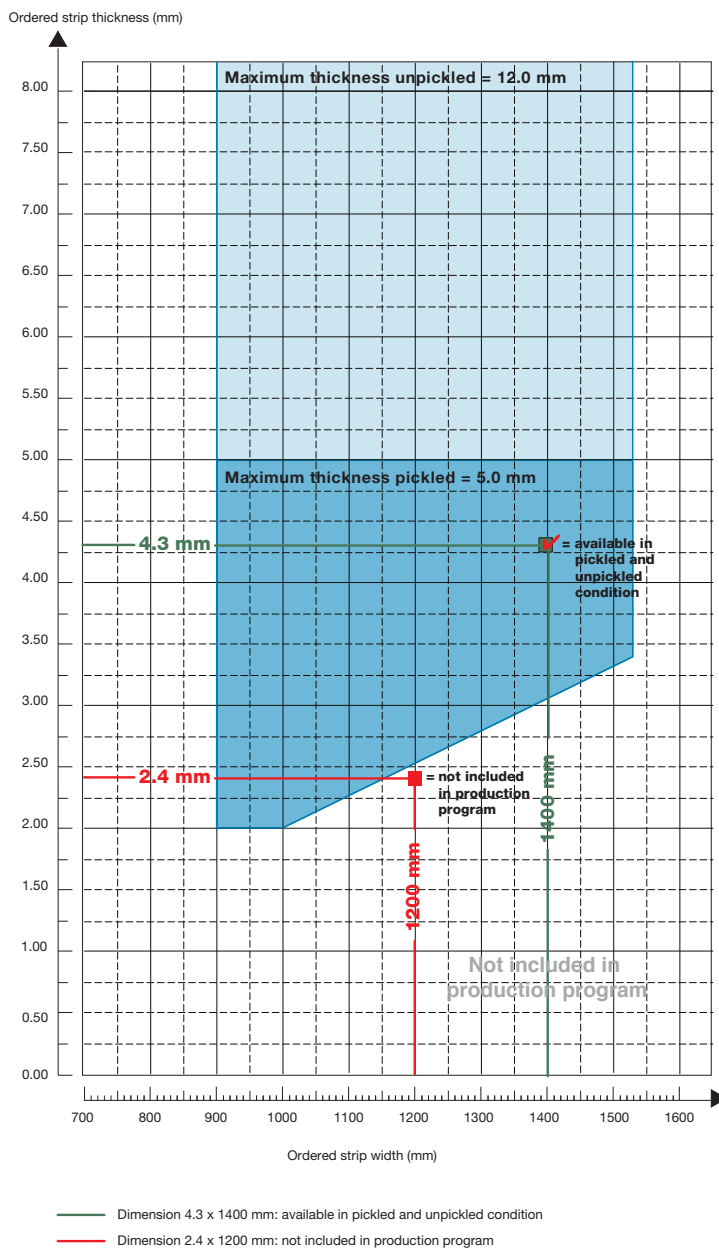
■ Minimum order quantity per item

## Weights

- Hot-rolled steel strip    32,000 kg max. per coil
- Cut shapes                    10,000 kg max. per packet

All available steel grades and dimensions can generally be supplied with a specific coil weight of up to a maximum of 20 kg/mm strip width.

## Explanation of limit curve in available dimensions



# Surface

Generally according to EN 10111, EN 10025 and EN 10163.

## Oiling

### Pickled material

The type of oiling is to be prescribed at the time of ordering. The following options are offered:

- Unoiled
- Slightly oiled
- Oiled
- Oiled edges
- Heavily oiled

As a rule, oiling is performed using an anticorrosive oil that can be removed with alkaline cleaning agents. Soluble roll oil may be applied for non-slit hot-rolled steel strip upon request. Material slightly oiled and oiled with anticorrosive oil is protected so that no corrosion occurs for a period of three months, provided compliance with the regulations contained in the section entitled "Packing, Transport and Storage". Formation of external rust films cannot be completely excluded, especially when packing consists of metal bands. No warranty is granted with respect to corrosion in unoiled material or material with oiled edges only.

### Unpickled material

As a rule, unpickled material is only supplied in unoiled condition.

## Inspection and Testing

Material test certificates, if required, must be requested at the time of the order in accordance with the regulations stipulated in EN 10204. With respect to test units, sampling and performance of inspection tests, the stipulations contained in the respective order standards and/or special agreements during ordering are applicable.

# Labeling

Standard marking consists of a tag per packing unit and indicates the following:

- Supplier
- Recipient
- Order number
- Strip number (identification number)
- Heat number
- Part or bundle number
- Steel grade
- Dimension
- Number of units
- Weight
- Date of production

Additional data or marking directly on the material (coil, package or bundle marking) is subject to agreement.

A color marking or a steel stamp (only  $\geq 5.0$  mm in thickness) is subject to agreement.

## Weld seams

Delivery of strips with weld seams is subject to agreement at the time of the order. Standard marking of the weld seam consists of a color marking on the strip surface. Other types of marking are subject to agreement.

# Packaging/transport/storage

## General

The desired mode of packing, the bundle or coil weight (package weight, if required) and additional requests with respect to packing, marking and loading are subject to agreement at the time of the order. See our catalog entitled "Packing of Flat-rolled Products" for possible packing types.

### Recommended types of packing

We recommend the following types of packing to protect the material against damage and dirt, but especially against corrosion, during transport and storage.

### Hot-rolled steel strip and slit hot-rolled strip

Type	Unpickled	Pickled, oiled	Pickled, unoiled
Zone 1	steel band	steel band	paper
Zone 2	steel band	paper	sheet
Zone 3	steel band	sheet	sheet

### Cut shapes from hot-rolled steel strip

Type	Unpickled	Pickled, oiled	Pickled, unoiled
Zone 1	single steel band	single steel band	paper
Zone 2	double steel band	paper	sheet
Zone 3	double steel band	sheet	sheet

Zone 1: Austria, Northern Italy, Switzerland, Southern Germany, Czech Republic, Slovakia, Slovenia, Hungary, Benelux countries, France

Zone 2: Other European countries without sea transport

Zone 3: Overseas countries such as USA, Egypt, India, etc.

Complaints arising from a lower quality of packing than that which is recommended will not be honored.

## Recommendations for transport and storage

- Transport and store under dry conditions
- Protect against wetness resulting from condensation (avoid large temperature gradients)
- Use proper support
- Avoid local pressure loads
- Keep storage times short

The material must be protected against any corrosion from salts, acids, lye or other substances containing these.

## General order information

Please indicate the following in your inquiries and/or orders:

- Steel grades, defined by standards or detailed specifications  
(e.g. mechanical properties and chemical composition)
- Dimensions, tolerances
- Material test certificates, if desired; acceptance conditions upon request
- Ordered quantities
- Processing, application, photo included where possible, sketch, drawing or sample
- Are the plates coated, how and with what?
- Preservation
- For coils
  - With or without weld seam
  - Inner diameter
  - Min./max. outer diameter,  
or min./max. coil weight or  
min/max. specific coil weight
  - Max. coil weight or  
min/max. kg/mm strip width
  - Max. package weight (packing unit)
  - Max. package width
- For sheets
  - Max. bundle weight
  - Max. bundle height (with or without pallets)
- Packaging
- Labeling, marking, stamping
- Type of transportation, forwarder, customs forwarder
- Type of truck or railcar, place of destination
- Mode of unloading, means of unloading and possible restrictions
- Terms of payment, duty paid or duty unpaid
- Desired delivery date

# Technically more advanced. Successful together.

**voestalpine Steel Division – the partner you can trust.**

High-quality materials are the basis for our products. We strive to be the best partner for our customers and want to provide them with the best-possible solution. We focus our expertise on two aspects:

The personal aspect, with dedicated and highly competent employees

The technical aspect, with high-quality methods, products and services.

The companies in the voestalpine Steel Division and their employees understand partnership to be the following:

- Understanding for their customers' business
- Expertise and reliability
- Responsibility for satisfactory project completion
- Partnerships based on trust

Many years of successful partnerships with our customers prove our point.

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**voestalpine**

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