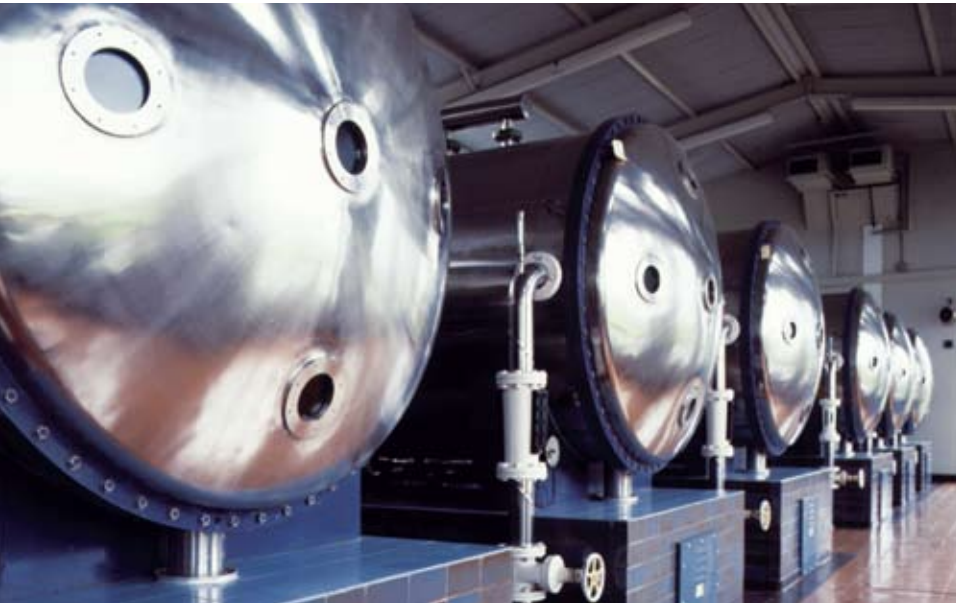




Activating Your Ideas

In Stainless Steel Plate Mill Plate

**OUTO
KUMPU**



Applications

Outokumpu produces hot-rolled plate in a variety of corrosion and heat resisting grades for applications in industries including:

- construction and architecture
- flue gas desulphurization
- biofuels
- power plants
- storage tanks and tank trailers
- desalination and water treatment
- pulp and paper
- food and beverage processing
- hydrometallurgy
- pharmaceuticals

Extreme Performance

The consumption of stainless steel — including plate — is growing faster than that of any other metal in the world. As a global leader in stainless steel, Outokumpu fuels this demand by supplying our customers with even better steels to meet their needs. Our hot rolled plate products are used in the most challenging environments, offering a combination of high strength, corrosion resistance, cost savings, and aesthetic appeal for customers in a wide range of industries.



Outokumpu offers a full range of austenitic, ferritic, and duplex grades including our proprietary duplex grade LDX 2101® which combines low nickel content with high mechanical strength.

North American Production

We recognize the need to be close to our customers to ensure that the process of purchasing stainless steel is as simple as possible. We meet this need through a responsive supply chain that includes our ISO 9001-2000-certified plate mill in New Castle, Indiana. Outokumpu quality and cost controls begin at our company-operated chromite mine and ferrochrome smelter in Europe. This quality is supported by our state-of-the-art melt shops that ensure superior control of product composition, structure, and inclusion pattern resulting in very clean steel. And in New Castle, our computer-controlled annealing furnaces — with uniform high volume water quench — ultimately produce the industry's highest quality plate mill plate in both standard and special grades.

For customers seeking fewer welds and lower total fabrication costs, the Outokumpu 120 Line produces some of the widest plate mill plate available to the industry at 120 inches wide, with lengths through 420 inches.

Our Flatness Guarantee

All of our plate meets or exceeds the tolerances of ASTM A 240 and ASME SA-240. Outokumpu is committed to supplying material with minimum deviations from a flat surface. To achieve this goal, we have installed the most modern leveling equipment, which includes one of the world's largest stretcher levelers dedicated to stainless steel. Our exacting internal standards provide our customers with an exceptionally flat plate to facilitate further processing.

Duplex and Special Grades

Outokumpu has a long tradition of leadership in the introduction of specialized grades of stainless steel. Our plate product line includes a full range of heat and corrosion resisting stainless steels in a wide range of grades, including:

- LDX 2101®, our proprietary lean duplex steel with superior strength and good resistance to corrosion and stress-corrosion cracking;
- 2205 Code Plus Two®, another duplex stainless steel for corrosion resistance, toughness, weldability, and high strength;
- 254 SMO®, used for over 20 years to provide longer material life in most corrosive environments; and
- 253 MA®, designed for use across a wide range of elevated temperatures while minimizing alloy costs.

Superior Performance with Duplex

Outokumpu is one of the world's largest producers of duplex stainless steels — which combine the best properties of austenitic and ferritic grades. The result is a product that — when compared to standard austenitic grades — offers almost twice the strength level; equal or superior pitting and crevice resistance; and greatly enhanced resistance to stress corrosion cracking. Outokumpu pioneered the development of duplex stainless steel with 2205 Code Plus Two®, followed by our super duplex Outokumpu 2507, which combines high tensile and impact strength with low thermal expansion and high conductivity.

LDX 2101® — Making Stainless Stronger

Outokumpu continues our pioneering developments with the introduction of a new duplex, LDX 2101®. This low alloy, general purpose duplex features the corrosion resistance of ASTM 304 — along with good stress-

PRODEC Plate vs. Conventional Plate

Compared with conventionally produced stainless steel, PRODEC machinable stainless steel offers significant benefits including:

- **faster machining — allowing higher speeds and feeds with either carbide or high speed steel tooling**
- **longer tool life**
- **better dimensional tolerances in machined parts**
- **superior machined surface quality and integrity**
- **reduced scrap losses**
- **consistent performance for on schedule production**

corrosion cracking resistance — but with twice the mechanical strength of 304 or 316L and only one-fifth the nickel content for better price stability. LDX 2101 has pitting resistance similar to 316L in most environments. The higher strength of LDX 2101 — equivalent to that of 2205 — also translates into thinner gauges for material cost savings for tanks and general construction.

PRODEC® for Enhanced Machinability

Produced exclusively by Outokumpu for over two decades, PRODEC (which stands for PRODUCTION Economy) is a premium quality of stainless steel designed for enhanced machinability and processed to provide uniform consistency of properties from plate to plate and heat to heat. Our PRODEC plate shows the same yield strength, tensile strength, elongation, hardness, and toughness as

conventionally produced plate. Yet its corrosion resistance is equal or superior to that of stainless steel of the same grade. PRODEC plate is available in 2205, 303, 304, 304L, 316, and 316L, and meets all requirements of ASTM, ASME, and other specifications. PRODEC plate applications range from paper machinery, vacuum processing, and equipment used in food and pharmaceutical processing, to end plates in commercial nuclear power plant reactors.

Technical Support

Choosing the right grade can offer substantial rewards. In this regard, our technical team assists users and fabricators in the selection, installation, operation, and maintenance of our stainless steel applications. We also offer end-users the opportunity to test materials on their own premises. This testing is supported by extensive testing in our state-of-the-art laboratory where our personnel can draw upon years of field experience with stainless steel to help customers make technically and economically correct materials decisions. Outokumpu is prepared to discuss individual applications and to provide data and experience as a basis for specific material selection and application. For assistance with technical questions, please call Outokumpu plate operations at 1.800.349.0023.

Specifications and Sizes

Standard Width/Length Tolerances for Processed Stainless Steel Plate

Shear tolerances on sizes up to 0.750 inches are normally +/-0.250 inches on width and length. Other tolerances are available upon application.

Plasma-cutting tolerances are ASTM A 480 Table A2.27 (See below)

2" and under $+^{3/8} -0$
 over 2" up to and including 3" $+^{1/2} -0$
 over 3" up to and including 6" $+^{3/4} -0$

Maximum Plate Size by Grade and Thickness

All dimensions are in inches

Table 1

Plate Thickness	Corrosion Resisting Grades						Duplex Grades			Heat Resisting Grades		
	304, 304H 304L, 316L	Prodec®	303	317L	317LM 317LMN	254 SMO® 904L	2205 Code Plus Two®	LDX 2101® 2304*	Outokumpu 2507	321 347	309S	253 MA®
0.187	96x420 120x420	96x420		96x320	96x320	96x320	96x320	96x320	96x320	96x420 120x420	96x320	96x320
0.25	96x420 120x420	96x420		96x320	96x320	96x320	96x320	96x320	96x320	96x420 120x420	96x320	96x320
0.312	96x420 120x420	96x420		96x320 120x420	96x320 120x420	96x320	96x320	96x320	96x320	96x420 120x420	96x320	96x320
0.375	96x420 120x420	96x420	96x420	96x420 120x420	96x420 120x420	96x360	96x420	96x420	96x420	96x420 120x420	96x420	96x420
0.5	96x420 120x420	96x420	96x420	96x420 120x420	96x420 120x420	96x360	96x420	96x420	96x420	96x420 120x420	96x420	96x420
0.625	96x420 120x420	96x420	96x420	96x420 120x420	96x420 120x420	96x360	96x420	96x420	96x420	96x420 120x420	96x420	96x420
0.75	96x420 120x420	96x420	96x415	96x420 120x420	96x420 120x420	96x360	96x420	96x420	96x420	96x420 120x420	96x420	96x420
1.0	96x420 120x420	96x420	96x310	96x395 120x320	96x395 120x320	96x270	96x395	96x420	96x360	96x360 120x290	96x420	96x395
1.25	96x420 120x360	96x420	96x240	96x360 120x290	96x360 120x290	96x215	96x360	96x420	96x300	96x300 120x230	96x420	96x360
1.5	96x420 120x300	96x390	96x200	96x300 120x240	96x300 120x240	96x150	96x300	96x420	96x245	96x245 120x200	96x420	96x300
1.75	96x340 120x250	96x320	96x170	96x260 120x210	96x260 120x210	96x130	96x260	96x400	96x200	96x200 120x170	96x340	96x260
2.0	96x290 120x220	96x290	96x150	96x220 120x180	96x220 120x180	96x110	96x220	96x390	96x180	96x180 120x145	96x290	96x220
2.25	96x320	96x320	96x130	96x200	96x200	96x105	96x200	96x320	96x320	96x220	96x200	96x200
2.5	96x300	96x300	96x120	96x180	96x180	96x100	96x180	96x300	96x300	96x196	96x180	96x180
2.75	96x280	96x280	96x110	96x160	96x160	96x96	96x160	96x280	96x280	96x175	96x160	96x160
3.0	96x240	96x240	96x100	96x150	96x150	96x90	96x150	96x240	96x240	96x160	96x150	96x150
3.5	96x210	96x210		96x210	96x210	96x75		96x210	96x210	96x135	96x210	96x140
4.0	96x190	96x185		96x185		96x65		96x180	96x180	96x120	96x190	96x120
4.25	96x180	96x175		96x175				96x170	96x170		96x180	
4.5	96x170	96x165		96x165				96x160	96x160		96x170	
4.75	96x160	96x155		96x155				96x155	96x153		96x160	
5.0	96x150	96x150		96x150				96x147	96x145		96x150	
5.25	96x145	96x143		96x143				96x140	96x139		96x145	
5.5	96x135	96x135		96x135				96x133	96x132		96x135	
5.75	96x130	96x130		96x130				96x127	96x127		96x130	
6.0	96x125	96x125		96x125				96x122	96x122		96x125	

* Sizes subject to slab availability - mill minimum may be required

Tolerances

Permitted Variations in Flatness of Plate Mill Plate

Table 2

Specified Thickness, t (inch)	Flatness Tolerance for Grades with Min Yield Strength	
	< 35 ksi	≥ 35 ksi
$\frac{3}{16} \leq t < \frac{1}{4}$	$\frac{7}{16}$ inch	$\frac{21}{32}$ inch
$\frac{1}{4} \leq t < \frac{3}{8}$	$\frac{3}{8}$ inch	$\frac{9}{16}$ inch
$\frac{3}{8} \leq t < 1$	$\frac{5}{16}$ inch	$\frac{15}{32}$ inch
$t \leq 1$	$\frac{1}{4}$ inch	$\frac{3}{8}$ inch

Tolerances apply to any 36 inches in any direction in the plane of the plate when plate rests on a flat surface with the concavity up. If the longer dimension is < 36 inches, the tolerance is not greater than 1/4 inch.

Reference ASTM A 480 Table 2.20

Standard Thickness Tolerances for Stainless Steel Plate (all dimensions are in inches)

Table 3

Thickness	Tolerance	
	≤ 84 Wide	> 84 to ≤ 120 Wide
0.187 to ≤ 0.375	+0.045	+0.050
	-0.010	-0.010
0.375 to ≤ 0.750	+0.055	+0.060
	-0.010	-0.010
0.750 to ≤ 1.000	+0.060	+0.065
	-0.010	-0.010
1.000 to ≤ 2.000	+0.070	+0.075
	-0.010	-0.010
2.000 to ≤ 3.000	+0.125	+0.150
	-0.010	-0.010
3.000 to ≤ 4.000	+0.150	+0.160
	-0.010	-0.010
4.000 to ≤ 6.000	+0.180	+0.200
	-0.010	-0.010
6.000 to ≤ 8.000	+0.235	+0.255
	-0.010	-0.010

Reference ASTM A 480 Table 2.17

Thickness is measured along the longitudinal edges of the plate at least 3/8", but not more than 3", from the edge.

Billing Weight for Mill Plate Products

Table 4

Thickness (inch)		Weight (lbs)	
Decimal	Fraction	Square Foot	Square Inch
0.1875	$\frac{3}{16}$	8.579	0.05958
0.2187	$\frac{7}{32}$	9.870	0.06854
0.2500	$\frac{1}{4}$	11.162	0.07750
0.3125	$\frac{5}{16}$	13.746	0.09546
0.3750	$\frac{3}{8}$	16.496	0.11456
0.4375	$\frac{7}{16}$	19.080	0.13250
0.5000	$\frac{1}{2}$	21.633	0.15044
0.5625	$\frac{9}{16}$	24.247	0.16838
0.6250	$\frac{5}{8}$	26.831	0.18633
0.6875	$\frac{11}{16}$	29.415	0.20427
0.7500	$\frac{3}{4}$	32.123	0.22308
0.8125	$\frac{13}{16}$	34.707	0.24102
0.8750	$\frac{7}{8}$	37.291	0.25897
0.9375	$\frac{15}{16}$	39.875	0.27691
1.0000	1	42.665	0.29628
1.1250	$1 \frac{1}{8}$	47.833	0.33217
1.2500	$1 \frac{1}{4}$	53.001	0.36806
1.3750	$1 \frac{3}{8}$	58.169	0.40395
1.5000	$1 \frac{1}{2}$	63.337	0.43984
1.7500	$1 \frac{3}{4}$	73.672	0.51161
2.0000	2	84.008	0.58339
2.1250	$2 \frac{1}{8}$	89.610	0.62229
2.2500	$2 \frac{1}{4}$	94.777	0.65817
2.5000	$2 \frac{1}{2}$	105.113	0.72995
2.7500	$2 \frac{3}{4}$	115.449	0.80173
3.0000	3	126.301	0.87709
3.1250	$3 \frac{1}{8}$	131.469	0.91298
3.2500	$3 \frac{1}{4}$	136.637	0.94887
3.5000	$3 \frac{1}{2}$	146.972	1.02064
3.7500	$3 \frac{3}{4}$	157.308	1.09242
4.0000	4	168.264	1.16850

*LDX 2101, PRODEC, 253 MA, and 254 SMO are trademarks of Outokumpu Stainless.
2205 Code Plus Two is a trademark of Outokumpu Stainless, Inc.*

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Outokumpu is a global leader in stainless steel. Our vision is to be the undisputed number one in stainless, with success based on operational excellence. Customers in a wide range of industries use our stainless steel and services worldwide. Being fully recyclable, maintenance-free, as well as very strong and durable material, stainless steel is one of the key building blocks for sustainable future.

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



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