

Datasheet: EN 1.4404/316L – Austenite Hot rolled Sheets - Stainless Steel Alumeco ApS 21-11-2024					Internal alloy name:1.4404 Alloy type:Acid-resistance Austenite Chemical Symbol:X2CrNiMo17-12-2 EN:EN 1.4404 AISI:316L UNS:S31603 SS:2348 JIS:SUS316L GB:S31603																									
Main usage: - Food processing industry - Petrochemical equipment - Chemical and pharmaceutical industry - Construction sector - Automotive and aerospace industry - Electronical equipment				Important norms and literature: General Standards: EN 10088-1: List of stainless Steel Geometric Tolerance: EN 9444-2: Continuously hot-rolled stainless steel – Tolerances on dimensions and form – Part 2: Wide strip and plate/sheet Bending Tolerance: DIN 6935:2011-10: Cold bending of flat rolled steel Product standards: EN 10088-2: Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes Surface condition: EN 10088-2: Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes EN 10088-3: Technical delivery conditions for semi-finished products, bars, rods, wire, sections and bright products of corrosion resisting steels for general purposes EN 10028-7: Flat products made of steels for pressure purposes - Part 7: Stainless steels																										
Main properties: - Great weldability - High corrosion resistance to non-oxidising acids and chlorine-containing materials - Good formability, both cold and hot - Higher thermal expansion and lower heat conductivity compared to other carbon steels																														
Chemical composition in %: EN 10088-1 <table><tr><td>C</td><td>Si</td><td>Mn</td><td>P</td><td>S</td><td>Cr</td><td>Mo</td><td>Ni</td><td>Remarks</td><td>Rest</td></tr><tr><td>≤ 0,030</td><td>≤ 1,00</td><td>≤ 2,00</td><td>≤ 0,045</td><td>≤ 0,030*</td><td>16,5-18,5</td><td>2,0-2,5</td><td>10,0-13,0</td><td>N ≤ 0,10</td><td>Fe</td></tr></table> * For machinability, a controlled sulfur content of 0,015%-0,030% is recommended & permitted. For weldability a controlled sulfur content of 0,008%- 0,030% is recommended & permitted. For polishability, a controlled sulfur content of 0,015% is recommended.											C	Si	Mn	P	S	Cr	Mo	Ni	Remarks	Rest	≤ 0,030	≤ 1,00	≤ 2,00	≤ 0,045	≤ 0,030*	16,5-18,5	2,0-2,5	10,0-13,0	N ≤ 0,10	Fe
C	Si	Mn	P	S	Cr	Mo	Ni	Remarks	Rest																					
≤ 0,030	≤ 1,00	≤ 2,00	≤ 0,045	≤ 0,030*	16,5-18,5	2,0-2,5	10,0-13,0	N ≤ 0,10	Fe																					
Mechanical properties: EN 10088-3 <table><tr><td>Dim. range (mm)</td><td>Temper</td><td>Rm MPa</td><td>Rp_{0,2} MPa</td><td>Rp_{1,0} MPa</td><td>Elongation (Longitudinal) A%</td><td>Impact energy (Longitudinal) KV₂</td><td>Hardness* HB</td></tr><tr><td>3-12</td><td>Hot rolled</td><td>530 - 680</td><td>Min. 220</td><td>Min. 260</td><td>40</td><td>100</td><td>Max. 215</td></tr></table> * Information values only;											Dim. range (mm)	Temper	Rm MPa	Rp _{0,2} MPa	Rp _{1,0} MPa	Elongation (Longitudinal) A%	Impact energy (Longitudinal) KV ₂	Hardness* HB	3-12	Hot rolled	530 - 680	Min. 220	Min. 260	40	100	Max. 215				
Dim. range (mm)	Temper	Rm MPa	Rp _{0,2} MPa	Rp _{1,0} MPa	Elongation (Longitudinal) A%	Impact energy (Longitudinal) KV ₂	Hardness* HB																							
3-12	Hot rolled	530 - 680	Min. 220	Min. 260	40	100	Max. 215																							
Physical properties: <table><tr><td>Density g/cm³</td><td>Electrical resistivity Ω mm² / m</td><td>Thermal conductivity W/m K</td><td>Thermal expansion (µm m⁻¹ K⁻¹)</td><td>Specific heat (J kg⁻¹ K⁻¹)</td><td>E - modulus (N / mm²)</td><td>Magnetizable</td><td>PREN (Min.)</td></tr><tr><td>8,0</td><td>0,75</td><td>15</td><td>16,0</td><td>500</td><td>200.000</td><td>No</td><td>16,5</td></tr></table>											Density g/cm ³	Electrical resistivity Ω mm ² / m	Thermal conductivity W/m K	Thermal expansion (µm m ⁻¹ K ⁻¹)	Specific heat (J kg ⁻¹ K ⁻¹)	E - modulus (N / mm ²)	Magnetizable	PREN (Min.)	8,0	0,75	15	16,0	500	200.000	No	16,5				
Density g/cm ³	Electrical resistivity Ω mm ² / m	Thermal conductivity W/m K	Thermal expansion (µm m ⁻¹ K ⁻¹)	Specific heat (J kg ⁻¹ K ⁻¹)	E - modulus (N / mm ²)	Magnetizable	PREN (Min.)																							
8,0	0,75	15	16,0	500	200.000	No	16,5																							
Typical Alumeco products with this alloy Hot rolled - Dim: 3-12 mm x Length 1000/1250/1500/(2000) mm																														
Surface definition: Hot rolled (HR) – 1D <table><tr><td>Surface finish</td><td>Free of scale</td></tr><tr><td>Type of process route</td><td>Hot rolled, heat treated, pickled.</td></tr><tr><td>Notes</td><td>Usually standard for most steel types to ensure good corrosion resistance; also common finish for further processing. It is permissible for grinding marks to be present. Not as smooth as 2D or 2B.</td></tr><tr><td>Typical Roughness Ra</td><td>3,26 µm</td></tr></table>											Surface finish	Free of scale	Type of process route	Hot rolled, heat treated, pickled.	Notes	Usually standard for most steel types to ensure good corrosion resistance; also common finish for further processing. It is permissible for grinding marks to be present. Not as smooth as 2D or 2B.	Typical Roughness Ra	3,26 µm												
Surface finish	Free of scale																													
Type of process route	Hot rolled, heat treated, pickled.																													
Notes	Usually standard for most steel types to ensure good corrosion resistance; also common finish for further processing. It is permissible for grinding marks to be present. Not as smooth as 2D or 2B.																													
Typical Roughness Ra	3,26 µm																													

Tolerances for cold rolled sheets for EN 1.4404:

Tolerances on specified thickness for hot-rolled wide strip and sheet/plate		
Specified thickness t (mm)	Tolerances on specified thickness for nominal width of	
	$w \leq 1400$	$1400 < w \leq 2500$
$t \leq 2,0$	$\pm 0,22$	$\pm 0,27$
$2,0 < t \leq 2,5$	$\pm 0,23$	$\pm 0,30$
$2,5 < t \leq 3,0$	$\pm 0,26$	$\pm 0,31$
$3,0 < t \leq 4,0$	$\pm 0,29$	$\pm 0,34$
$4,0 < t \leq 5,0$	$\pm 0,31$	$\pm 0,36$
$5,0 < t \leq 6,0$	$\pm 0,34$	$\pm 0,38$
$6,0 < t \leq 8,0$	$\pm 0,38$	$\pm 0,40$
$8,0 < t \leq 10,0$	$\pm 0,42$	$\pm 0,44$
$10,0 < t \leq 13,0$	$\pm 0,46$	$\pm 0,48$
$t > 13,0$	The tolerances have to be agreed upon at the time of enquiry and order	

* Values are referred from Table 1 of EN 9444-2

Permitted thickness differences within one coil for hot-rolled wide strip intended for cold rolling			
Specified thickness t (mm)	Permitted thickness differences for width of strip		
	$w \leq 1200$	$1200 < w \leq 1500$	$1500 < w \leq 2500$
$t \leq 2,0$	0,20	0,24	0,28
$2,0 < t \leq 3,0$	0,22	0,27	0,33
$3,0 < t \leq 13,0$	0,28	0,32	0,40

* Values are referred from Table 2 of EN 9444-2

Tolerance on width for hot-rolled wide strip and sheet/plate with mill (as rolled) or with trimmed (slit) edges	
Tolerance (mm)	
Mill edges	Trimmed edges
+ 20 0	+ 5 0

* Values are referred from Table 3 of EN 9444-2

Length tolerances for sheet/plate	
Specified length l (mm)	Tolerances (mm)
$l \leq 2000$	+ 10 0
$2000 \leq l < 20000$	+ 0,005 * l 0
$l \geq 20000$	To be agreed

* Values are referred from Table 4 of EN 9444-2

Tolerances on flatness for sheet/plate		
Specified thickness t (mm)	Specified width w	Tolerances on flatness
$t \leq 13,0$	$600 \leq w \leq 1200$	23
	$1200 \leq w \leq 1500$	30
	$w > 1500$	38

* Values are referred from Table 5 of EN 9444-2

Cold bending of flat rolled steel according to DIN 6935:2011

To obtain uniform bends on bending rails, it is recommended that only bending radii from the series below be selected. The values printed in bold are to be preferred. (Dimensions in millimetres)

<i>r</i>	1	1,2	1,6	2	2,5	3	4	5	6	8	10	12	16	20	25	28	32	36	40	45	50	63	80	100
----------	---	-----	-----	---	-----	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	-----

* Values are referred from DIN 6935:2011-10

Minimum permissible bending radius *r* according to DIN 6935:2011

Steel Grades	For bending transverse or parallel to the rolling direction	Minimum permissible bending radius <i>r</i> for thicknesses <i>s</i> (mm)															
		<i>s</i>	1	1,5	2,5	3	4	5	6	7	8	10	12	14	16	18	
		≤	<	<	<	<	<	<	<	<	<	<	<	<	<	<	
		1	≤	≤	≤	≤	≤	≤	≤	≤	≤	≤	≤	≤	≤	≤	
		1	1,5	2,5	3	4	5	6	7	8	10	12	14	16	18	20	
S 355 J2	Transverse	1,6	2,5	4	5	6	8	10	12	16	20	25	32	36	45	50	
	Parallel	1,6	1,6	4	5	8	10	12	16	20	25	32	36	40	50	63	

* Values are referred from Table 1 of DIN 6935:2011-10 (S = Structural; XXX = Min. yield strength in MPa; J2 = Steel sub-grade).

Permissible deviations for minimum bending radii *r* according to DIN 6935:2011

Steel Grades	Permissible deviations for minimum bending radii <i>r</i> for thicknesses <i>s</i>		
	≤ 3	3 < <i>s</i> ≤ 8	8 < <i>s</i> ≤ 20
S 355 JR	+ 1	+ 2	+ 3
	0	0	0

* Values are referred from Table 2 of DIN 6935:2011-10