Datasheet:

EN 1.4401/316 – Austenite
Cold rolled Sheets - Stainless Steel

Alumeco ApS
21-11-2024

Internal alloy name:	**1.4401**
Alloy type:	**Acid-resistance Austenite**
Chemical Symbol:	**X5CrNiMo17-12-2**
EN:	**EN 1.4401**
AISI:	**316**
UNS:	**S31600**
SS:	**2347**
JIS:	**SUS316**
GB:	**S31608**

Main usage:

- Food processing industry.
- Brewery, chemical & petrochemical equipment.
- Boat fittings, nuts & bolts, springs.
- Building and Construction sector
- Overland transport tankers

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

Important norms and literature:

General Standards:
EN 10088-1: List of stainless Steel

Product standards:
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

Geometric Tolerance:
EN 9445-2: Continuously cold-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

Surface condition:
EN 10088-2: Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes

Chemical composition in %: EN 10088-1

C	Si	Mn	P	S	Cr	Mo	Ni	Remarks	Rest
≤ 0,07	≤ 1,00	≤ 2,00	≤ 0,045	≤ 0,030*	16,5-18,5	2,0-2,5	10,0-13,5	N ≤ 0,10	Fe

*** 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.**

Mechanical properties: EN 10088-3

Dim. range (mm)	Temper	Rm MPa	$Rp_{0,2}$ MPa	$Rp_{1,0}$ MPa	Elongation (Longitudinal) A%	Impact energy (Longitudinal) KV_2	Hardness* HB
0,5-6	Cold rolled	530 - 680	Min. 240	Min. 270	40	100	Max. 215

*** Information values only;**

Physical properties:

Density g/cm³	Electrical resistivity Ω mm² / m	Thermal conductivity W/m K	Thermal expansion (µm m^{-1} K^{-1})	Specific heat (J kg^{-1} K^{-1})	E - modulus (N / mm²)	Magnetizable	PREN (Min.)
8,0	0,75	15	16,0	500	200.000	No	16,5

Typical Alumeco products with this alloy

- **Cold rolled - Dim: 0,5-6 mm x Length 1000/1250/1500/(2000) mm**

Surface definition: Cold rolled (CR) – 2B

Surface finish	Smoother than 2D.
Type of process route	Cold rolled, heat treated, pickled, skin passed.
Notes	Most common finish for most steel types to ensure good corrosion resistance, smoothness and flatness. Also common finish for further processing. Skin passing may be by tension levelling.
Typical Roughness *Ra*	**For 1 mm:** 0,13 µm; **For 5 mm:** 0,52 µm

Tolerances for cold rolled sheets for EN 1.4401:

Tolerances on specified thickness for cold-rolled wide strip, plate/sheet cut from cold-rolled wide strip, slit cold-rolled wide strip and cut lengths obtained from slit cold-rolled wide strip

Specified thickness t (mm)	Normal tolerances for a rolled width of (mm) $w \leq 2100$	Special tolerances (S) for a rolled width of		
		$w \leq 1000$	$1000 < w \leq 1300$	$1300 < w \leq 2100$
$0{,}30 \leq t < 0{,}50$	± 0,04	± 0,25	± 0,030	-
$0{,}50 \leq t < 0{,}60$	± 0,05	± 0,030	± 0,035	-
$0{,}60 \leq t < 0{,}80$	± 0,05	± 0,035	± 0,040	-
$0{,}80 \leq t < 1{,}00$	± 0,06	± 0,040	± 0,045	± 0,050
$1{,}00 \leq t < 1{,}20$	± 0,07	± 0,045	± 0,045	± 0,050
$1{,}20 \leq t < 1{,}50$	± 0,08	± 0,050	± 0,055	± 0,060
$1{,}50 \leq t < 2{,}00$	± 0,09	± 0,055	± 0,060	± 0,070
$2{,}00 \leq t < 2{,}50$	± 0,10	-	-	-
$2{,}50 \leq t < 3{,}00$	± 0,12	-	-	-
$3{,}00 \leq t < 4{,}00$	± 0,14	-	-	-
$4{,}00 \leq t < 5{,}00$	± 0,15	-	-	-
$5{,}00 \leq t < 6{,}00$	± 0,15	-	-	-
$6{,}00 \leq t \leq 8{,}00$	± 0,17	-	-	-

* Values are referred from Table 1 of EN 9445-2

Tolerances on specified thickness for cold-rolled wide strip, plate/sheet cut from cold-rolled wide strip, slit cold-rolled wide strip and cut lengths obtained from slit cold-rolled wide strip

Specified thickness t (mm)	Normal tolerances for a specified width of (mm)			Special tolerances (S) for a rolled width of		
	$w \leq 1000$	$1000 < w \leq 1300$	$1300 < w \leq 2100$	$w \leq 1000$	$1000 < w \leq 1300$	$1300 < w \leq 2100$
$t < 0{,}30$	± 0,030	-	-	± 0,030	-	-
$0{,}30 \leq t < 0{,}40$	± 0,04	± 0,04	-	± 0,030	± 0,035	-
$0{,}40 \leq t < 0{,}50$	± 0,04	± 0,04	-	± 0,035	± 0,035	-
$0{,}50 \leq t < 0{,}60$	± 0,045	± 0,05	-	± 0,035	± 0,035	-
$0{,}60 \leq t < 0{,}80$	± 0,05	± 0,05	-	± 0,040	± 0,040	-
$0{,}80 \leq t < 1{,}00$	± 0,055	± 0,06	± 0,07	± 0,040	± 0,050	± 0,050
$1{,}00 \leq t < 1{,}20$	± 0,06	± 0,07	± 0,08	± 0,050	± 0,055	± 0,060
$1{,}20 \leq t < 1{,}50$	± 0,08	± 0,08	± 0,10	± 0,055	± 0,060	± 0,060
$1{,}50 \leq t < 2{,}00$	± 0,08	± 0,09	± 0,11	± 0,065	± 0,070	± 0,080
$2{,}00 \leq t < 2{,}50$	± 0,09	± 0,11	± 0,13	-	-	-
$2{,}50 \leq t < 3{,}00$	± 0,11	± 0,13	± 0,15	-	-	-
$3{,}00 \leq t < 4{,}00$	± 0,14	± 0,15	± 0,16	-	-	-
$4{,}00 \leq t < 5{,}00$	± 0,15	± 0,17	± 0,19	-	-	-
$5{,}00 \leq t < 6{,}00$	± 0,17	± 0,20	± 0,23	-	-	-
$6{,}00 \leq t \leq 8{,}00$	± 0,17	± 0,22	± 0,25	-	-	-

* Values are referred from Table 2 of EN 9445-2

Tolerance on width with mill edges obtained from cold-rolled wide strip: EN 9445-2

Tolerance for a specified width of (mm)	
$600 \leq w < 1000$	$1000 \leq w \leq 2100$
+ 25 0	+ 30 0

* Values are referred from Table 3 of EN 9445-2

Tolerance on width with trimmed mill edges obtained from cold-rolled wide strip: EN 9445-2

Specified thickness t (mm)	Normal tolerances for a specified width of (mm)					Special tolerances (S) for a specified width of (mm)		
	$w \leq 125$	$125 < w \leq 250$	$250 < w \leq 600$	$600 < w \leq 1000$	$1000 < w \leq 2100$	$w \leq 125$	$125 < w \leq 250$	$250 < w \leq 600$
$t \leq 1{,}00$	+ 0,5 0	+ 0,5 0	+ 0,7 0	+ 1,5 0	+ 2,0 0	+ 0,3 0	+ 0,3 0	+ 0,6 0
$1{,}00 \leq t < 1{,}50$	+ 0,7 0	+ 0,7 0	+ 1,0 0	+ 1,5 0	+ 2,0 0	+ 0,4 0	+ 0,5 0	+ 0,7 0
$1{,}50 \leq t < 2{,}50$	+ 1,0 0	+ 1,0 0	+ 1,2 0	+ 2,0 0	+ 2,5 0	+ 0,6 0	+ 0,7 0	+ 0,9 0
$2{,}50 \leq t < 3{,}50$	+ 1,2 0	+ 1,2 0	+ 1,5 0	+ 3,0 0	+ 3,0 0	+ 0,8 0	+ 0,9 0	+ 1,0 0
$3{,}50 \leq t \leq 8{,}0$	+ 2,0 0	+ 2,0 0	+ 2,0 0	+ 4,0 0	+ 4,0 0	-	-	-

* Values are referred from Table 4 of EN 9445-2

Tolerance on length for plate/sheet cut from cold-rolled wide strip and for cut lengths obtained from slit cold-rolled wide strip: EN 9445-2

Specified length *l* (mm)	Tolerances (mm)	
	Normal	Special
l ≤ 2000	+ 5 0	+ 3 0
2000 < *l*	+ 0,0025*/* 0	+ 0,0015*/* 0

* Values are referred from Table 5 of EN 9445-2

Tolerance on flatness for plate/sheet obtained from cold-rolled wide strip and cut lengths obtained from slit cold-rolled wide strip: EN 9445-2

Measured as maximum deviation from a flat horizontal surface, with the product lying under its own mass on a flat surface, the maximum deviation from flatness is the maximum distance between the lower surface of the product and the flat horizontal surface.

Flatness tolerance *l* ≤ 3000 mm		Flatness tolerance *l* > 3000 mm	
Normal	**Special**	**Normal**	**Special**
f ≤ 10 mm	*f* ≤ 7 mm	*f* ≤ 12 mm	*f* ≤ 8 mm

* Values are referred from Section 13 of EN 9445-2

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)

r	**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 *r* for thicknesses *s* (mm)														
		s ≤ 1	1 < *s* ≤ 1,5	1,5 < *s* ≤ 2,5	2,5 < *s* ≤ 3	3 < *s* ≤ 4	4 < *s* ≤ 5	5 < *s* ≤ 6	6 < *s* ≤ 7	7 < *s* ≤ 8	8 < *s* ≤ 10	10 < *s* ≤ 12	12 < *s* ≤ 14	14 < *s* ≤ 16	16 < *s* ≤ 18	18 < *s* ≤ 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 = Structual; 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 *r* for thicknesses *s*		
	≤ 3	3 < *s* ≤ 8	8 < *s* ≤ 20
S 355 JR	+ 1 0	+ 2 0	+ 3 0

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