

<b>Quality</b>	<b>X30Cr13</b>	<b>Martensitic</b>	<i>Technical card 2018</i>
Number	<b>1.4028</b>	<b>Stainless Steel</b>	<i>Lucefin Group</i>

### Chemical composition

C%	Si%	Mn%	P%	S% <sup>a)</sup>	Cr%	
	max	max	max	max		
0,26-0,35	1,00	1,50	0,040	0,030	12,0-14,0	EN 10088-3: 2014
± 0.02	+ 0.05	± 0.04	+ 0.005	± 0.003	± 0.15	

Product deviations are allowed

<sup>a)</sup> for improving machinability, it is allowed a controlled sulphur content of 0,015 % - 0,030 %; for polishability, it is suggested a controlled sulphur content of max 0,015 %

### Temperature °C

Melting range	Hot-forming	Subcritical annealing	Soft annealing +A	Full annealing	MMA welding – AWS electrodes		
1490-1480	1200-930	790-730 air	825-745 air	not suitable	pre-heating      annealing after w.		
					300	750	
Isothermal annealing +I	Quenching +Q	Tempering +T	Tempering +T	Stress-relieving +SR	joint with steel		
not suitable	1080-980 oil/air	200-150 fast cooling in air (HRC 50 ~)	675-625 air (HRC 24-31)	300-200 air	carbon	CrMo alloyed	stainless
					E70 xx	E8018-B 2	E309 – E308
					cosmetic welding		
					E309 – E420		

Transformation temperature during heating **Ac1** ~ 785, **Ac3** ~ 885 and during cooling **Ms** ~ 280, **Mf** ~ 130

**Chemical treatment** = Pickling (10 - 15% HNO<sub>3</sub>) + (0,5-1,05% HF) hot or cold

### Mechanical properties

**Heat-treated material** EN 10088-3: 2014 in conditions 1C, 1E, 1D, 1X, 1G, 2D

size		Testing at room temperature					
mm		R	Rp 0.2	A%	Kv <sub>2</sub> +20 °C	HBW <sup>a)</sup>	<sup>a)</sup> for information only
from	to	N/mm <sup>2</sup>	N/mm <sup>2</sup> min	min (L)	J min (L)	max	
		800 max	-	-	-	245	+A annealed material
	160	850-1000	650	10	12	-	+QT850 quenched and tempered

**Bright bars of heat-treated material** EN 10088-3: 2014 in conditions 2H, 2B, 2G, 2P

size		Testing at room temperature						
mm		R	HBW <sup>a)</sup>		R	Rp 0.2	A%	Kv <sub>2</sub> +20 °C
from	to	N/mm <sup>2</sup>	max	max	N/mm <sup>2</sup>	N/mm <sup>2</sup> min	min (L)	J min (L)
	10 <sup>b)</sup>	950	305		900-1050	700	7	-
10	16	950	305		900-1150	650	7	-
16	40	900	280		850-1100	650	9	12
40	63	840	260		850-1050	650	9	12
63	160	800	245		850-1000	650	10	15
		+A annealed material			+QT850 quenched and tempered			

<sup>a)</sup> for information only

<sup>b)</sup> in the range of 1 mm ≤ d < 5 mm, values are valid only for rounds – the mechanical properties of non round bars of < 5 mm of thickness have to be agreed at the time of request and order

**Forged** UNI EN 10250-4: 2001

size		Testing at room temperature					
mm		R	Rp 0.2	A%	Kv +20 °C	HB	
from	to	N/mm <sup>2</sup>	N/mm <sup>2</sup> min	min (L)	J min (L)	max	
		800 max	-	-	-	245	+A annealed material
	160	850-1000	650	10	-	-	+QT850 quenched and tempered

**Table of tempering** values at room temperature on rounds of Ø 10 mm after quenching at 1000°C in oil

<b>R</b>	N/mm <sup>2</sup>	1700	1650	1630	1630	1620	1600	1350	1000	850	800
<b>Rp 0.2</b>	N/mm <sup>2</sup>	1400	1380	1360	1350	1340	1300	1100	790	650	600
<b>A</b>	%	9	10	10	9	9	10	11	12	15	18
<b>Kv</b>	J	18	20	18	14	12	12	16	22	32	40
<b>Tempering</b>	°C	<b>200</b>	<b>300</b>	<b>350</b>	<b>400</b>	<b>450</b>	<b>500</b>	<b>550</b>	<b>600</b>	<b>650</b>	<b>700</b>

Effect of **cold-working** (hot-rolled +A+C). Approximate values

<b>R</b>	N/mm <sup>2</sup>	700	780	850	900	950	1000	-	-	-
<b>Rp 0.2</b>	N/mm <sup>2</sup>	500	620	680	720	750	780	800	880	960
<b>A</b>	%	20	13	12	11	11	11	10	10	10
<b>Reduction</b>	%	<b>0</b>	<b>10</b>	<b>20</b>	<b>30</b>	<b>40</b>	<b>50</b>	<b>60</b>	<b>70</b>	<b>80</b>

X30Cr13 n° 1.4028 martensitic stainless steel

Lucefin Group

Thermal expansion	$10^{-6} \cdot K^{-1}$	▶	10.5	11.0	11.5	12.0	12.6	
Modulus of elasticity	longitudinal GPa		215	212	205	200	190	
Poisson number	$\nu$		0.235	0.210				
Electrical resistivity	$\Omega \cdot mm^2/m$		0.65					
Electrical conductivity	Siemens·m/mm <sup>2</sup>		1.54					
Specific heat	J/(Kg·K)		460					
Density	Kg/dm <sup>3</sup>		7.70					
Thermal conductivity	W/(m·K)		30					
Relative magnetic permeability	$\mu_r$		700-1000 ~					
°C			20	100	200	300	400	600

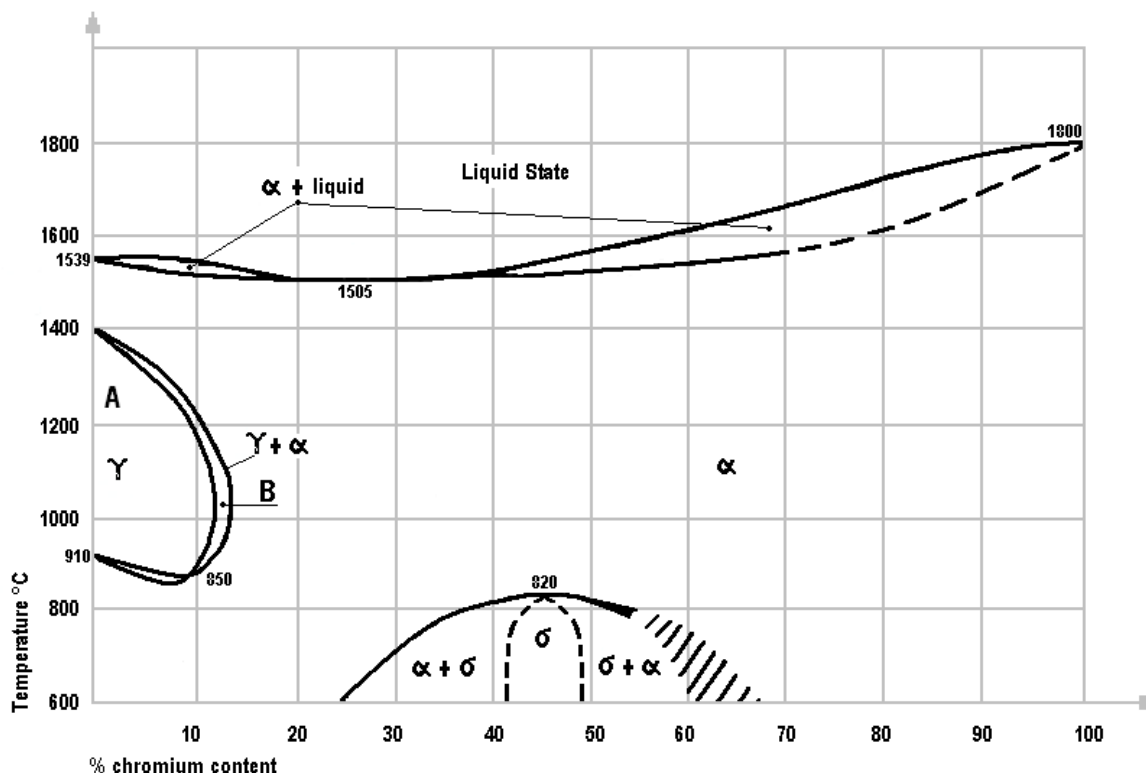
The symbol ▶ indicates between 20 °C and 100 °C, 20 °C and 200 °C .....

<b>Corrosion resistance</b>	Atmospheric		Chemical			x rust, diluted nitric acid, weak organic acids
Fresh water	<i>industrial</i>	<i>marine</i>	<i>medium</i>	<i>oxidizing</i>	<i>reducing</i>	
x						

<b>Magnetic</b>	yes
<b>Machinability</b>	excellent
<b>Hardening</b>	by quenching
<b>Service temperature in air</b>	continuous service up to 650 °C; intermittent service up to 750 °C

<b>Europe</b>	<b>USA</b>	<b>USA</b>	<b>China</b>	<b>Russia</b>	<b>Japan</b>	<b>India</b>	<b>Republic of Korea</b>
EN	UNS	ASTM	GB	GOST	JIS	IS	KS
X30Cr13	(S42000)	(420)	3Cr13	30Ch13	SUS 420J2	(X30Cr13)	STS 420J2

Iron – Chromium alloys diagram



Inside zone A, with the chromium content lower than 0.12%, the stable phase is usually called austenite.

Inside zone B, next to the "pocket", ferrite (delta or alpha) is stable.

The sigma phase ( $\sigma$ ) is deleterious due to the toughness and the resistance to corrosion.