



<b>Quality</b>	<b>X17CrNi16-2</b>	<b>Martensitic</b>	<i>Technical card 2018</i>
Number	<b>1.4057</b>	<b>Stainless Steel</b>	<i>Lucefina Group</i>

## Chemical composition

C%	Si%	Mn%	P%	S% <sup>a)</sup>	Cr%	Ni%	
	max	max	max	max			
0,12-0,22	1,00	1,50	0,040	0,030	15,0-17,0	1,50-2,50	EN 10088-3: 2014
± 0.01	+ 0.05	+ 0.04	+ 0.005	± 0.005	± 0.20	+ 0.07	

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	MMA welding – AWS electrodes
1510-1430	1200-930	790-670 air	750-680 furnace cooling 10 °C/h to 600, then air	<i>pre-heating</i> 350 <i>annealing after w.</i> 750
Isothermal annealing +I	Quenching +Q	Tempering +T	Stress-relieving +SR	joint with steel
not suitable	1030-980 oil / polymer / air (HRC 45 ~)	670-600 fast cooling in air	250-210 air	carbon CrMo alloyed stainless E60–E309 E8016-B 2 E309-E308 <i>cosmetic welding</i> E309 special

Transformation temperature during heating **Ac1** ~ 725, **Ac3** ~ 815 and during cooling **Ms** ~ 145

**Chemical treatment** - *Pickling* (15 - 25% HNO<sub>3</sub>) + (1 - 8% 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	
		950 max	-	-	-	295	+A annealed material
	60	800-950	600	14	25	-	+QT800 quenched and tempered material (+T 780-800 °C)
60	160	800-950	600	12	20	-	+QT900 quenched and tempered material (+T 780-800 °C)
	60	900-1050	700	12	16	-	+QT900 quenched and tempered material (+T 600-670)
60	160	900-1050	700	10	15	-	+QT900 quenched and tempered material (+T 600-670)

**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	N/mm <sup>2</sup>	N/mm <sup>2</sup> min	min (L)	J min (L)
	10 <sup>b)</sup>	1050	330	850-1100	750	7	-
10	16	1050	330	850-1100	700	7	-
16	40	1000	310	800-1050	650	9	25
40	63	950	295	800-1000	650	12	25
63	160	950	295	800-950	650	12	16
		+A annealed material		+QT800 quenched and tempered material			

<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 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%	A%	Kv +20 °C	Kv +20 °C	HB	
from	to	N/mm <sup>2</sup>	N/mm <sup>2</sup> min	min (L)	min (T)	J min (L)	J min (T)	max	
	250	1000 max	-	-	-	-	-	295	+A annealed
	250	800-950	600	10	8	20	15	-	+QT800 quenched and tempered
	250	900-1050	700	10	8	15	10	-	+QT900 quenched and tempered

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

R	N/mm <sup>2</sup>	1580	1490	1460	1440	1400	1360	1250	1080	910	800
Rp 0.2	N/mm <sup>2</sup>	1290	1240	1220	1190	1130	1060	980	860	780	690
A	%	14	15	15	14	14	15	16	17	18	19
Kv	J	20	22	27	18	10	18	27	30	34	38
Tempering	°C	200	300	350	400	450	500	550	600	650	700

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

R	N/mm <sup>2</sup>	836	900	910	930	945	965	990	1000	1020
Rp 0.2	N/mm <sup>2</sup>	720	754	792	820	804	880	910	920	950
A	%	23	18	16	14	14	14	14	13	13
Reduction	%	0	7	8	10	12	14	17	18	20

Minimum values at high temperatures, quenched and tempered material EN 10088-3: 2014

Rp 0.2	N/mm <sup>2</sup>	515	495	475	460	440	405	355	+QT800
Rp 0.2	N/mm <sup>2</sup>	565	525	505	490	470	430	375	+QT900
Test at	°C	100	150	200	250	300	350	400	

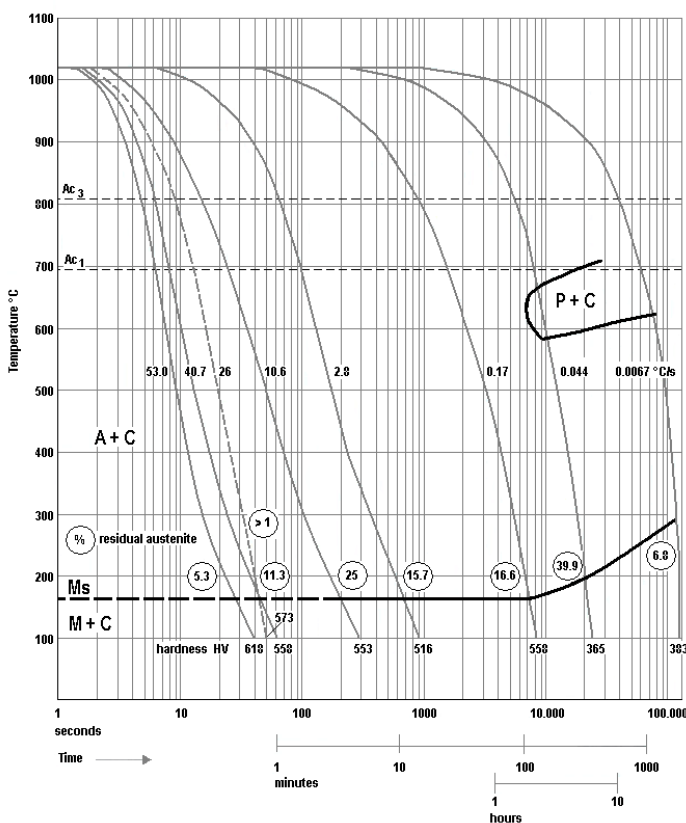
Thermal expansion	10 <sup>-6</sup> • K <sup>-1</sup>	▶	10.0	10.5	10.5	10.5			
Modulus of elasticity	longitudinal GPa		215	212	205	190			
Poisson number	ν		0.144	0.138					
Electrical resistivity	Ω • mm <sup>2</sup> /m		0.70						
Electrical conductivity	Siemens•m/mm <sup>2</sup>		1.43						
Specific heat	J/(Kg•K)		460		500	590	720	860	
Density	Kg/dm <sup>3</sup>		7.70						
Thermal conductivity	W/(m•K)		25						
Relative magnetic permeability	μr		700-1100 ~						
°C			20	100	200	300	400	600	800

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

Corrosion resistance	Atmospheric		Chemical			x nitric acid, alkaline water and well water
	Fresh water	industrial marine	medium	oxidizing	reducing	
x	x	x	x			

Magnetic	yes
Machinability	good in annealed condition, mean for quenched and tempered material
Hardening	by quenching
Service temperature in air	continuous service up to 750 °C; intermittent service up to 800 °C

Europe	USA	USA	China	Russia	Japan	India	Republic of Korea
EN	UNS	ASTM	GB	GOST	JIS	IS	KS
X17CrNi16-2	S43100	431	1Cr17Ni2	14Ch17N2	SUS 431	15Cr16Ni2	STS 431



Continuous Cooling Transformations  
AISI 431 steel

austenitization 1040 °C