

<b>Quality</b>	<b>X39Cr13</b>	<b>Martensitic</b>	<i>Technical card 2018</i>
Number	<b>1.4031</b>	<b>Stainless Steel</b>	<i>Lucefin Group</i>

### Chemical composition

C%	Si%	Mn%	P%	S% <sup>a)</sup>	Cr%	
	max	max	max	max		
0,36-0,42	1,00	1,00	0,040	0,030	12,5-14,5	EN 10088-3: 2014
± 0.02	+ 0.05	+ 0.03	+ 0.005	± 0.005	± 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	MMA welding – AWS electrodes
1480-1470	1200-930	790-730	780 slow cooling to a 630 after air	<i>pre-heating annealing after w.</i>
		air		Difficult; address qualified electrodes producers
Quenching +Q	Tempering +T	Stress-relieving +SR	Stress-relieving +SR	<i>joint with steel</i>
pre-heating at 850, then 1025 cooling oil/air	700-650 fast cooling in air	180 air (HRC 52)	550-200 air	carbon CrMo alloyed stainless
				E70 xx E8015-B 2 E309-E308
				<i>cosmetic welding</i>
				E420

Transformation temperature during heating **Ac1** ~ 825, **Ac3** ~ 930 and during cooling **Ms** ~ 255, **Mf** ~ 105

**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 mm	Testing at room temperature					
from to	R	Rp 0.2	A%	Kv <sub>2</sub> +20 °C	HBW <sup>a)</sup>	<sup>a)</sup> for information only
	N/mm <sup>2</sup>	N/mm <sup>2</sup> min	min	J min	max	
	800 max	-	-	-	245	+A annealed material
160	800-1000	650	10	12	-	+QT800 quenched and tempered

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

size mm	Testing at room temperature					
from to	R	HBW <sup>a)</sup>	R	Rp 0.2	A%	Kv <sub>2</sub> +20 °C
	N/mm <sup>2</sup>	max	N/mm <sup>2</sup>	N/mm <sup>2</sup> min	min	J min
10	950	305	850-1100	700	7	-
16	950	305	850-1100	700	7	-
40	900	280	800-1050	650	8	12
63	840	260	800-1000	650	8	12
160	800	245	800-1000	650	10	12
	+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 of thickness have to be agreed at the time of request and order

### Forged

size mm	Testing at room temperature					
from to	R	Rp 0.2	A%	Kv +20 °C	HB <sup>a)</sup>	
	N/mm <sup>2</sup>	N/mm <sup>2</sup> min	min	J min	max	
	-	-	-	-	245	+A annealed material

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

**Table of tempering** values at room temperature on rounds of Ø 10 mm after quenching at 1020 °C in oil

HB	496	482	489	504	512	442	381	336	327	286
HRC	51	50	50.5	51.5	52	47	41	36	35	30
Tempering °C	200	300	350	400	450	500	550	600	650	700

<b>Thermal expansion</b>	$10^{-6} \cdot K^{-1}$	►	10.5	11.0	11.5	12.0
<b>Modulus of elasticity</b>	longitudinal GPa		215	212	205	190
<b>Poisson number</b>	$\nu$		0,27-0,30 ~			
<b>Electrical resistivity</b>	$\Omega \cdot mm^2/m$		0.55			
<b>Electrical conductivity</b>	Siemens•m/mm <sup>2</sup>		1.82			
<b>Specific heat</b>	J/(Kg•K)		460			
<b>Density</b>	Kg/dm <sup>3</sup>		7.70			
<b>Thermal conductivity</b>	W/(m•K)		30			
<b>Relative magnetic permeability</b>	$\mu_r$		700-1000 ~			
<b>°C</b>			<b>20</b>	<b>100</b>	<b>200</b>	<b>300</b> <b>400</b>

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

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

<b>Magnetic</b>	yes
<b>Machinability</b>	mean
<b>Hardening</b>	by quenching
<b>Service temperature in air</b>	continuous service up to 620 °C; intermittent service up to 735 °C

Europe	USA	USA	China	Russia	Japan	India	Republic of Korea
EN	UNS	ASTM	GB	GOST	JIS	IS	KS
X39Cr13	(S42000)	(420)	4Cr13	(40Ch13)		(X40Cr13)	

Diesel engine filter

