

<b>Quality</b>	<b>X50CrMoV15</b>	<b>Martensitic</b>	<i>Technical card 2018</i>
Number	<b>1.4116</b>	<b>Stainless Steel</b>	<i>Lucefin Group</i>

### Chemical composition

C%	Si%	Mn%	P%	S% <sup>a)</sup>	Cr%	Mo%	V%	
	max	max	max	max				
0,45-0,55	1,00	1,00	0,040	0,030	14,0-15,0	0,50-0,80	0,10-0,20	EN 10088-3: 2014
± 0.02	+ 0.05	+ 0.03	+ 0.005	± 0.005	± 0.15	± 0.05	+ 0.03	

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	Full annealing	Soft annealing +A	MMA welding – AWS electrodes pre-heating	annealing after w.
1480-1460	1100-930	930-870 furnace	850-750 slow cooling	260	760-740
Isothermal annealing +I	Quenching +Q	Tempering +T	Stress-relieving +SR	joint with steel carbon CrMo alloyed stainless	
910-890 controlled cooling to 750, then air	1030-980 oil / polymer (HRC 55)	500-400 air	250-150 air	E70 xx	E8018-B 2 E309 – E308
				cosmetic welding E309	

Transformation temperature during heating **Ac1** ~ 880, **Ac3** ~ 920 and during cooling **Ms** ~ 280, **Mf** ~ 120

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

### 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>	a) for information only	
	N/mm <sup>2</sup>	N/mm <sup>2</sup>	min	J min	max		
	900 max	-	-	-	280	+A annealed material	

Table of tempering values at room temperature after quenching at 990 °C in oil

HB	543	518	512	518	512	525	496	381	301
HRC	54	52,5	52	52.5	52	53	51	41	32
Tempering °C	<b>200</b>	<b>250</b>	<b>300</b>	<b>350</b>	<b>400</b>	<b>450</b>	<b>500</b>	<b>550</b>	<b>600</b>

<b>Thermal expansion</b>	10 <sup>-6</sup> • K <sup>-1</sup>	▶	10.5	11.0	11.0	11.5
<b>Modulus of elasticity</b>	longitudinal GPa	215	212	205	200	190
<b>Poisson number</b>	v	0,27-0,30				
<b>Electrical resistivity</b>	Ω • mm <sup>2</sup> /m	0.65				
<b>Electrical conductivity</b>	Siemens•m/mm <sup>2</sup>	1.54				
<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>	μ <sub>r</sub>	700 ~				
<b>°C</b>		<b>20</b>	<b>100</b>	<b>200</b>	<b>300</b>	<b>400</b>

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

Corrosion resistance	Atmospheric		Chemical			x steam, petroleum, gasoline, alcohol, ammonia, organic material
Fresh water	<i>industrial</i>	<i>marine</i>	<i>medium</i>	<i>oxidizing</i>	<i>reducing</i>	
x			x			

<b>Magnetic</b>	yes
<b>Machinability</b>	mean
<b>Hardening</b>	by quenching
<b>Service temperature in air</b>	up to 760 °C

Europe	USA	USA	China	Russia	Japan	India	Republic of Korea
EN	UNS	ASTM	GB	GOST	JIS	IS	KS
X50CrMoV15			(7Cr17)	50Ch14MF	(SUS 440A)		