Quality	**X90CrMoV18**	**Martensitic Stainless Steel**	*Technical card*
Number	**1.4112**		*Lucefin Group*

Chemical composition

C%	**Si%** max	**Mn%** max	**P%** max	**S%** [a] max	**Cr%**	**Mo%**	**V%**	
0,85-0,95	1,00	1,00	0,040	0,015	17,0-19,0	0,90-1,30	0,07-0,12	EN 10088-1: 2005
± 0.03	+ 0.05	+ 0.03	+ 0.005	+ 0.003	± 0.2	± 0.05	± 0.03	

Product deviations are allowed

[a] 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**
1440-1420	1100-900	910-890 cooling 15 °C/h to 590, then air	840-780 slow cooling

Isothermal annealing	**Quenching**	**Tempering**	**Stress-relieving**
900-840 controlled cooling to 690, then air	1050-1000 oil / polymer (HRC 58)	550-450 air	350-100 air

MMA **welding –** AWS electrodes

pre-heating	*annealing after w.*
200-150	750-700

joint with steel

carbon	CrMo alloyed	stainless
E70 xx	E8018-B 2	E309 – E308

cosmetic welding

E309 special

Transformation temperature during heating **Ac1** ~ 790, **Ac3** ~ 870 and during cooling **Ms** ~ 280, **Mf** ~ 130

Mechanical properties

Hot-formed EN 10088-3: 2005 in conditions 1C, 1E, 1D, 1X, 1G, 2D

size mm		Testing at room temperature					
		R	**Rp** 0.2	**A**%	**Kv** +20 °C	**HB** [a]	[a] for information only
from	to	N/mm²	N/mm² min	min	J min	max	
	100					265	+A annealed material

Bars, typical values according to UNS S44003 steel 440B

size mm		Testing at room temperature									
		R	**Rp** 0.2	**A%**	**C%**	**HB**	**R**	**Rp** 0.2	**A%**	**C%**	**HB**
from	to	N/mm² min	N/mm² min	min	min	max	N/mm² min	N/mm² min	min	min	max
		738	427	18	35	269	827	655	9	20	285
		+A **hot-rolled** annealed					+A+C **cold-drawn**				

Forged (ASTM A 473-99 steel ASTM 440B)

size mm		Testing at room temperature						
		R	**Rp** 0.2	**A%**	**C%**	**Kv** +20 °C	**HB** [a]	
from	to	N/mm²	N/mm² min	min	min	J min	max	
							269	+A annealed material

[a] Only for guidance

Table of tempering values at room temperature after quenching at 1020 °C in oil

HB	595	560	543	525	525	371	311	279
HRC	57	55	54	53	53	40	33	29
Tempering **°C**	**100**	**200**	**300**	**400**	**500**	**600**	**650**	**700**

X90CrMoV18 **n° 1.4112** martensitic stainless steel *Lucefin Group*

Thermal expansion	$10^{-6} \cdot K^{-1}$ ►	10.4	10.8	11.2	11.6	11.9		
Modulus of elasticity	longitudinal GPa	215	212	205	200	190		
Poisson number	*v*	0,27-0,30 ~						
Electrical resistivity	$\Omega \cdot mm^2/m$	0.80						
Electrical conductivity	Siemens•m/mm²	1.25						
Specific heat	J/(Kg•K)	430						
Density	Kg/dm³	7.70						
Thermal conductivity	W/(m•K)	15.0						
Relative magnetic permeability	μr	700-1000 ~						
Temperature	**°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** steam, petroleum, gasoline, alcohol, food, fruit juices
Fresh water	*industrial*	*marine*	*medium*	*oxidizing*	*reducing*	
x						

Magnetic	yes
Machinability	difficult
Hardening	by quenching
Service temperature in air	not suitable for temperatures over 300 °C (stress relieving temperature)

Europe EN	**USA** UNS	**USA** ASTM	**China** GB	**Russia** GOST	**Japan** JIS	**India** IS	**Republic of Korea** KS
X90CrMoV18	S44003	**440B**	90Cr18MoV		SUS 440B		STS 440B

Knife

Dagger