Quality	**X39CrMo17-1**	**Martensitic Stainless Steel**	*Technical card 2018*
Number	**1.4122**		*Lucefin Group*

Chemical composition

C%	**Si%** max	**Mn%** max	**P%** max	**S%** [a] max	**Cr%**	**Mo%**	**Ni%** max	
0,33-0,45	1,00	1,50	0,040	0,030	15,5-17,5	0,80-1,30	1,00	EN 10088-3: 2014
± 0.02	+ 0.05	± 0.04	+ 0.005	± 0.005	± 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**	**Recrystallization +RA**	**Soft annealing +A**
1480-1465	1100-930	not suitable	850-750 air
Isothermal annealing +I	**Quenching +Q**	**Tempering +T**	
not suitable	1060-980 air / oil / polymer (HRC 48)	750-650 air	

MMA **welding –** AWS electrodes

pre-heating *annealing after w.*

Difficult; address qualified electrodes producers

joint with steel

carbon	CrMo alloyed	stainless
E309	E309	E309 – E308

cosmetic welding

E309

Transformation temperature during heating **Ac1** ~ 810, **Ac3** ~ 900 and during cooling **Ms** ~ 280, **Mf** ~ 130

Chemical treatment ▪ *Pickling* (15 - 25% HNO_3) + (1 - 8% 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 **R**	**Rp** 0.2	**A%**	**Kv2** +20 °C	**HBW** [a]	[a] for information only
from	to	N/mm²	N/mm² min	min (L)	J min (L)	max	
		900 max	-	-	-	280	+A annealed material
	60	750-950	550	12	15	-	+QT750 quenched and tempered
60	160	750-950	550	12	10	-	+QT750 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 **R**	**HBW** [a]	**R**	**Rp** 0.2	**A%**	**Kv2** +20 °C
from	to	N/mm² max	max	N/mm²	N/mm² min	min (L)	J min (L)
	10 [b]	1000	340	800-1050	650	8	-
10	16	1000	340	800-1050	600	8	-
16	40	980	310	750-1000	550	10	14
40	63	930	290	750-950	550	12	14
63	100	900	280	750-950	550	12	10
		+A annealed material		+QT750 quenched and tempered			

[a] for information only

[b] 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 **R**	**Rp** 0.2	**A%**	**Kv** +20 °C	**HB** [a]	
from	to	N/mm²	N/mm² min	min	J min	max	
		-	-	-	-	280	+A annealed material

[a] for information only

Table of tempering values at room temperature on rounds of Ø 20 mm after quenching at 1050°C in oil

HB	455	432	432	432	442	442	421	400	319
HRC	48	46	46	46	47	47	45	43	34
Tempering **°C**	**200**	**250**	**300**	**350**	**400**	**450**	**500**	**550**	**600**

Minimum values at high temperatures on +QT750 material EN 10088-3: 2014

Rp 0.2 N/mm²	540	535	530	520	510	490	470
Test at **°C**	**100**	**150**	**200**	**250**	**300**	**350**	**400**

X39CrMo17-1 **n° 1.4122** martensitic stainless steel *Lucefin Group*

Thermal expansion	$10^{-6} \cdot K^{-1}$	►	10.4	10.8	11.2	11.6
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				
Relative magnetic permeability	μr	700-1000 ~				
°C		**20**	**100**	**200**	**300**	**400**

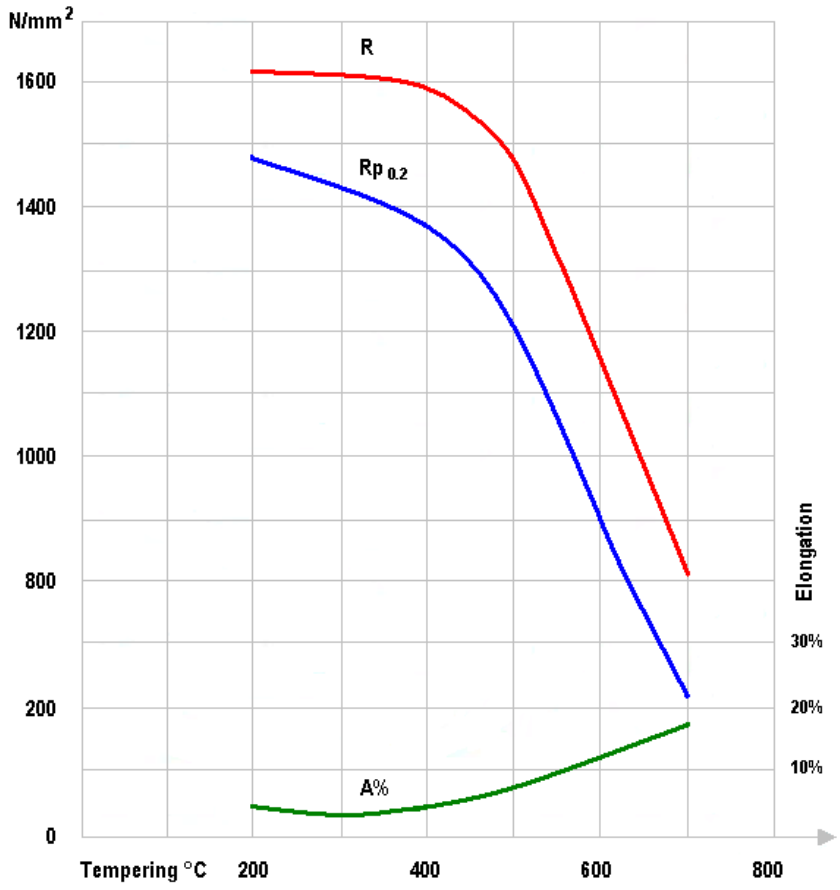
The symbol ► indicates temperature between 20 °C and 100 °C, 20 °C and 200 °C .....

Corrosion resistance	Atmospheric		Chemical			**x** organic and nitric acids
Fresh water	*industrial*	*marine*	*medium*	*oxidizing*	*reducing*	
x						

Magnetic	yes
Machinability	low
Hardening	by quenching
Service temperature in air	good resistance to oxidation and heat up to 500 °C

Europe EN	**USA** UNS	**USA** ASTM	**China** GB	**Russia** GOST	**Japan** JIS	**India** IS	**Republic of Korea** KS
X39CrMo17-1				40Ch16M			

Tempering diagram



Mechanical testing on rounds of Ø 20 mm after quenching at 1050°C in oil