Quality	**X39Cr13**	**Martensitic Stainless Steel**	*Technical card 2018*
Number	**1.4031**		*Lucefin Group*

Chemical composition

C%	**Si%** max	**Mn%** max	**P%** max	**S%** [a] max	**Cr%**	
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

[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**	**Subcritical annealing**	**Soft annealing +A**	
1480-1470	1200-930	790-730 air	780 slow cooling to a 630 after air	
Quenching +Q		**Tempering +T**	**Stress-relieving +SR**	**Stress-relieving +SR**
pre-heating at 850, then 1025 cooling oil/air		700-650 fast cooling in air	180 air (HRC 52)	550-200 air

MMA **welding –** AWS electrodes

pre-eheating *annealing after w.*

Difficult; address qualified electrodes producers

joint with steel

carbon	CrMo alloyed	stainless
E70 xx	E8015-B 2	E309-E308

cosmetic welding

E420

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

Chemical treatment ▪ *Pickling* (10 - 15% HNO_3)+ (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 **R**	**Rp** 0.2	**A%**	**Kv2** +20 °C	**HBW** [a]	[a] for information only
from	to	N/mm²	N/mm² 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 **R**	**HBW** [a]	**R**	**Rp** 0.2	**A%**	**Kv2** +20 °C
from	to	N/mm² max	max	N/mm²	N/mm² min	min	J min
	10 [b]	950	305	850-1100	700	7	-
10	16	950	305	850-1100	700	7	-
16	40	900	280	800-1050	650	8	12
40	63	840	260	800-1000	650	8	12
63	160	800	245	800-1000	650	10	12
		+A annealed material		+QT800 quenched and tempered material			

[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	
		-	-	-	-	245	+A annealed material

[a] 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**

X39Cr13 **n° 1.4031** martensitic stainless steel *Lucefin Group*

Thermal expansion	$10^{-6} \cdot K^{-1}$	►	10.5	11.0	11.5	12.0
Modulus of elasticity	longitudinal GPa	215	212	205	200	190
Poisson number	*v*	0,27-0,30 ~				
Electrical resistivity	$\Omega \cdot mm^2/m$	0.55				
Electrical conductivity	Siemens•m/mm²	1.82				
Specific heat	J/(Kg•K)	460				
Density	Kg/dm^3	7.70				
Thermal conductivity	W/(m•K)	30				
Relative magnetic permeability	μr	700-1000 ~				
°C		**20**	**100**	**200**	**300**	**400**

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

Corrosion resistance	Atmospheric		Chemical			**x** corrosive plastic, dilute nitric acid , weak organic acids
Fresh water	*industrial*	*marine*	*medium*	*oxidizing*	*reducing*	
x						

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

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

Diesel engine filter