

Quality	X46CrS13	Martensitic	<i>Technical card 2018</i>
Number	1.4035	Stainless Steel	<i>Lucifin Group</i>

Chemical composition

C%	Si%	Mn%	P%	S%	Cr%	
0,43-0,50	max 1,00	max 2,00	max 0,040	0,15-0,35	12,5-14,0	EN 10088-3: 2014
± 0.02	+ 0.05	± 0.04	+ 0.005	± 0.02	± 0.15	

Product deviations are allowed

Temperature °C

Melting range	Hot-forming	Recrystallization +RA	Soft annealing +A	MMA welding – AWS electrodes <i>pre-heating annealing after w.</i>
1480-1460	1100-930	not suitable	850-750 slow cooling to 600, then air	not recommended
Quenching +Q	Tempering +T	Stress-relieving +SR	<i>joint with steel</i>	
1050-950 oil / air	675-625 fast cooling in air	200 air	carbon	CrMo alloyed stainless
				<i>cosmetic welding</i>

Transformation temperature during heating **Ac1** ~ 805, **Ac3** ~ 870 and during cooling **Ms** ~ 280, **Mf** ~ 130

Chemical treatment - Pickling (10 - 15% HNO₃) + (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		Testing at room temperature					
mm		R	Rp 0.2	A%	Kv ₂ +20 °C	HBW ^{a)}	a) for information only
from	to	N/mm ²	N/mm ² min	min	J min	max	
	63	800 max	-	-	-	245	+A annealed material

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

size		Testing at room temperature					
mm		R	HBW ^{a)}	R	Rp 0.2	A%	Kv ₂ +20 °C
from	to	N/mm ²	max	N/mm ²	N/mm ² min	min	J min
	10 ^{b)}	880	280	-	-	-	-
10	16	880	280	-	-	-	-
16	40	800	250	-	-	-	-
40	63	760	230	-	-	-	-

+A annealed material

a) for information only

b) in the range 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		Testing at room temperature					
mm		R	Rp 0.2	A%	Kv +20 °C	HB ^{a)}	
from	to	N/mm ²	N/mm ² 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 1000 °C in oil

For information, steel 1.4034 values are quoted

R	N/mm ²	1800	1700	1700	1690	1680	1640	1300	1000	840	750
Rp 0.2	N/mm ²	1400	1320	1300	1300	1290	1250	1000	700	600	550
A	%	6	8	8	9	9	10	11	13	16	16
Kv	J	14	20	18	14	12	12	14	20	28	40
Tempering	°C	200	300	350	400	450	500	550	600	650	700

Effect of **cold-working** (hot-rolled +A+C). Approximate values

R	N/mm ²	640	710	740	760	830	840	860	880	895	920
Reduction	%	0	8	10	15	18	20	22	24	26	30

Thermal expansion	$10^{-6} \cdot K^{-1}$	►	10.5	11.0	11.5	12.0
Modulus of elasticity	longitudinal GPa		215	212	205	190
Poisson number	ν		0.235			
Electrical resistivity	$\Omega \cdot mm^2/m$		0.55			
Electrical conductivity	Siemens $\cdot m/mm^2$		1.82			
Specific heat	J/(Kg \cdot K)		460			
Density	Kg/dm ³		7.70			
Thermal conductivity	W/(m \cdot K)		30			
Relative magnetic permeability	μ_r		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 weak acid, steam, ammonia, petroleum, organic material
Fresh water	<i>industrial</i>	<i>marine</i>	<i>medium</i>	<i>oxidizing</i>	<i>reducing</i>	
x						

Magnetic	yes
Machinability	high
Hardening	by quenching
Service temperature in air	continuous service up to 600 °C; intermittent service up to 700 °C

Europe	USA	USA	China	Russia	Japan	India	Republic of Korea
EN	UNS	ASTM	GB	GOST	JIS	IS	KS
X46CrS13							

Lifting pins

