

Quality	31CrMoV9	Nitriding Steel	<i>Technical card Lucefin Group rev. 2018</i>
According to standard	UNI EN 10085: 2003		
Number	1.8519		

Chemical composition

C%	Si% max	Mn%	P% max	S% max	Cr%	Mo%	Ni%	V%	Product deviations are allowed
0,27-0,34	0,40	0,40-0,70	0,025	0,035	2,30-2,70	0,15-0,25	-	0,10-0,20	
± 0.02	+ 0.03	± 0.04	+0.005	+ 0.005	± 0.10	± 0.03	-	± 0.02	

Temperature °C

Hot-forming	Stress-relieving after machining	Quenching +Q	Quenching +Q	Tempering +T	Final stress-relieving +SR		
1050-850	550-580 air	850-880 polymer	840-870 water	580-700 air	50° under the temperature of tempering		
Soft annealing +A	Nitrocarburizing	Nitriding		Pre-heating welding	Stress-relieving after welding		
680-720 air (HB max 248)	570-580	500-520		300	550 furnace cooling		
				Ac1	Ac3	Ms	Mf
				760	820	350	130

Mechanical properties

Hot-rolled mechanical properties in **quenched and tempered** condition UNI EN 10085: 2003

size mm		Testing at room temperature (longitudinal)						Surface hardness in quenched and tempered and nitrided condition HV 1
from	to	R N/mm ²	Rp 0.2 N/mm ² min.	A% min.	Kv J min.	HB <i>for information</i>		
16	40	1100-1300	900	9	25	331-380		
40	100	1000-1200	800	10	30	298-359		
100	160	900-1100	700	11	35	271-331	800	
160	250	850-1050	650	12	40	253-319		

Table of tempering values obtained at room temperature on rounds of Ø 10 mm after quenching at 880 °C in oil (for information)

HB		486	486	468	448	421	362	240
HRC		50,5	50,5	49	47.5	45	39	23
R	N/mm ²	1800	1790	1710	1600	1480	1210	800
Rp 0.2	N/mm ²	1520	1500	1480	1400	1280	1020	700
A	%	10	10	10	10.2	11	13.8	18
Z	%	50	53	54	54	54.5	60	68
Kv	J	40	42	32	32	42	100	120
Tempering °C		100	200	300	400	500	600	700

Nitriding. Hardness HV, at different depths and stays

stay time h.	30	750	540	430	410	400	380	380
	90	830	750	640	530	430	410	410
120	790	730	660	600	540	460	400	
180	800	760	700	640	580	550	420	
depth	mm	0,15	0,25	0,35	0,45	0,55	0,65	1,0

31CrMoV9

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Cold-drawn				Hot-rolled + Peeled					
size mm		Testing at room temperature (longitudinal)				Testing at room temperature (longitudinal)			
		R	Rp 0.2	A%	HB	R	Rp 0.2	A%	HB
from	to	N/mm ²	N/mm ² min	min		N/mm ²	N/mm ² min	min	
No indications from reference standards					No indications from reference standards				

Forged mechanical properties in quenched and tempered condition UNI EN 10085: 2003

size mm		Testing at room temperature (longitudinal)				
		R	Rp 0.2	A%	Kv	HB
from	to	N/mm ²	N/mm ² min	min	J min	<i>for information</i>
	100	1000-1200	800	10	30	298-359
100	160	900-1100	700	11	35	271-331
160	250	850-1050	650	12	40	253-319

Jominy test HRC. Use only as reference

mm distance from quenched end										
mm	2	8	12	16	20	30	40	50	60	70
HRC	51	50	50	49	48	46	44	42	41	41

Thermal Expansion	10 ⁻⁶ • K ⁻¹	▶	11.1	12.1	12.9	13.5	13.9	14.1	
Mod. of Elasticity long.	GPa		210	205	195	185	175		
Mod. of Elasticity tang.	GPa		80	78	75	71	67		
Specific Heat Capacity	J/(Kg•K)		460						
Thermal Conductivity	W/(m•K)		42						
Density	Kg/dm ³		7.85						
Specific Electric Resist.	Ohm•mm ² /m		0.19						
Electrical Conductivity	Siemens•m/mm ²		5.26						
°C			20	100	200	300	400	500	600

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

Europe	ITALY	CHINA	GERMANY	FRANCE	U.K.	RUSSIA	USA
EN	UNI	GB	DIN	AFNOR	B.S.	GOST	AISI/SAE
31CrMoV9	31CrMoV9		31CrMoV9	31CrMoV9	31CrMoV9		