

<b>Quality</b>	<b>34CrNiMo6</b>	<b>Quenching and Tempering Steel</b>	<i>Technical card</i> <b>Lucefin Group</b> rev. 2018
According to standards	<b>ISO 683-2 : 2018</b>		
Number	<b>1.6582</b>		

### Chemical composition

C%	Si% <small>a)</small>	Mn%	P% max	S% max	Cr%	Mo%	Ni%	Cu% max	Product deviations are allowed
0,30-0,38 ± 0.03	0,10-0,40 ± 0.03	0,50-0,80 ± 0.04	0,025 + 0.005	0,035 ± 0.005	1,30-1,70 ± 0.05	0,15-0,30 ± 0.03	1,30-1,70 ± 0.05	0,40 + 0.05	

a) Steels may be supplied with a lower silicon content. In this case, alternative means of deoxidation shall be used

### Temperature °C

Hot-forming	Normalizing +N	Quenching +Q	Quenching +Q	Tempering +T	Stress-relieving +SR	
1100-900	860-870 air	860 oil or polymer	830 water	540-660 air	50° under the temperature of tempering	
Soft annealing +A	Isothermal annealing +I	Full annealing	End quench hardenability test	Pre-heating welding		Stress-relieving after welding
650-680 air (HB max 248)	850-900 cooling furnace to 500 then air	830-900 cooling furn. to 300	845 water	300 <b>Ac1</b> <b>Ac3</b> 715      770		600 furnace cooling <b>Ms</b> <b>Mf</b> 320      100

### Mechanical properties

**34NiCrMo6** Hot-rolled mechanical properties in quenched and tempered condition ISO 683-2: 2018

size d / t mm		Testing at room temperature (longitudinal)					
from	to	R N/mm <sup>2</sup>	Rp 0.2 N/mm <sup>2</sup> min.	A% min.	Z% min.	Kv <sub>2</sub> J min.	HBW <i>for information</i>
	16/8	1200-1400	1000	9	40	-	359-404
16/8	40/20	1100-1300	900	10	45	45	331-380
40/20	100/60	1000-1200	800	11	50	45	298-359
100/60	160/100	900-1100	700	12	55	45	271-331
160/100	250/160	800-950	600	13	55	45	240-286

d = diameter t = thickness

**Table of tempering** values obtained at room temperature on rounds of Ø 60 mm after quenching at 850 °C in oil

<b>HB</b>		525	500	468	450	371	344	319	271	240
<b>HRC</b>		53	51.5	49	46.5	40	37	34	28	22
<b>R</b>	N/mm <sup>2</sup>	1950	1850	1700	1500	1260	1150	1050	900	800
<b>Rp 0.2</b>	N/mm <sup>2</sup>	1450	1480	1450	1350	1180	980	950	700	680
<b>A</b>	%	10	10	10	12	13	13.4	18	20	22
<b>Z</b>	%	48	50	52	58	62	62	68	68	70
<b>Kv</b>	J	18	18	18	18	45	70	90	110	120
Tempering at °C		<b>100</b>	<b>200</b>	<b>300</b>	<b>400</b>	<b>500</b>	<b>550</b>	<b>600</b>	<b>650</b>	<b>700</b>

**LUCEFIN** experience: Forged round 520 mm quenched at 870 °C in water, tempered at 630 °C air

Depth from heat treated surface	Longitudinal Testing							HB
	R N/mm <sup>2</sup>	Rp 0.2 N/mm <sup>2</sup>	A %	Z %	Kv +20 °C J	Kv -40 °C J		
25 mm	930	828	18,6	64,0	-	110-118-118	279	
1/3 radius	900	750	15,4	60,0	-	48-44-45	271	
1/2 diameter	860	730	12,6	46,0	70-74-70	25-28-25	264	

**FATT** (fracture appearance transition temperature)

<b>°C</b>	<b>-70</b>	<b>-60</b>	<b>-40</b>	<b>-20</b>	<b>0</b>	<b>+20</b>	<b>+50</b>	<b>+80</b>	<b>+18</b>
% fibrosity	3	6	11	15	24	53	100	100	<b>FATT 50</b>
Kv average J	22	24	27	42	51	70	142	150	<b>68</b>

### Chemical composition %

															ppm		
C	Si	Mn	P	S	Cr	Mo	Ni	V	Cu	Sn	As	Sb	Al	H <sub>2</sub>	O <sub>2</sub>	N <sub>2</sub>	
0.36	0.23	0.64	0.006	0.003	1.62	0.28	1.60	0.05	0.16	0.006	0.007	0.004	0.018	1.30	34	70	

**34CrNiMo6** 1.6582 EN 10277: 2018

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Hot-rolled, annealed and <b>Cold-drawn</b> +A+C						hot-rolled annealed and <b>Peeled</b> +A+SH			
size mm		Testing at room temperature (longitudinal)				Testing at room temperature (longitudinal)			
from	to	R	Rp 0.2	A%	HBW	R	Rp 0.2	A%	HBW
		N/mm <sup>2</sup>	N/mm <sup>2</sup> min	min	max	N/mm <sup>2</sup> min	min	max	max
5 <sup>b)</sup>	10	-	-	-	308	-	-	-	-
10	16	-	-	-	298	-	-	-	-
16	40	-	-	-	293	-	-	-	248
40	63	-	-	-	288	-	-	-	248
63	100	-	-	-	288	-	-	-	248

<sup>b)</sup> for thickness < 5 mm, mechanical properties should be agreed before order placement.

Hot-rolled, quenched and tempered and <b>Cold-drawn</b> +QT+C						Hot-rolled, quenched and tempered and <b>Peeled</b> +QT+SH			
size mm		Testing at room temperature (longitudinal)				Testing at room temperature (longitudinal) <sup>a)</sup>			
from	to	R	Rp 0.2	A%	Kv <sub>2</sub> +20 °C	R	Rp 0.2	A%	Kv <sub>2</sub> +20 °C
		N/mm <sup>2</sup>	N/mm <sup>2</sup> min	min	J min	N/mm <sup>2</sup>	N/mm <sup>2</sup> min	min	J min
5 <sup>b)</sup>	10	1000-1200	770	8	-	-	-	-	-
10	16	1000-1200	750	8	-	-	-	-	-
16	40	1000-1200	720	9	-	1100-1300	900	10	40
40	63	1000-1200	650	10	-	1000-1200	800	11	45
63	100	1000-1200	650	10	-	1000-1200	800	11	45

<sup>c)</sup> for flats and special sections, tensile strength (R) may differ by ± 10%<sup>b)</sup> for thickness < 5 mm, mechanical properties should be agreed before order placement.<sup>a)</sup> values valid also for +C+QT**34CrNiMo6** 1.6582 **Forged** quenched and tempered UNI EN 10250-3: 2001

size d / t		Testing at room temperature						
from	to	R	Rp 0.2	A%	A%	Kv	Kv	HB
		N/mm <sup>2</sup> min	N/mm <sup>2</sup> min	min (L)	min (T)	J min (L)	J min (T)	min
	250/160	800	600	13	9	45	22	240
250/160	500/330	750	540	14	10	45	22	225
500/330	990/660	700	490	15	11	40	20	213

L = longitudinal T = tangential d = diameter t = thickness

ISO 683-2: 2018 **Jominy test HRC** grain size 5 min.

mm distance from quenched end	1.5	3	5	7	9	11	13	15	20	25	30	35	40	45	50	H
<b>min</b>	50	50	50	50	49	48	48	48	48	47	47	47	46	45	44	
<b>max</b>	58	58	58	58	57	57	57	57	57	57	57	57	57	57	57	

<b>Thermal Expansion</b>	10 <sup>-6</sup> • K <sup>-1</sup>	▶	11.1	12.1	12.9	13.5	13.9	14.1	
<b>Mod. of Elasticity</b> long.	MPa		220	205	195				
<b>Mod. of Elasticity</b> tang.	MPa		88	78	75	185	175		
<b>Specific Heat Capacity</b>	J/(Kg•K)		460		70	67			
<b>Thermal Conductivity</b>	W/(m•K)		38						
<b>Density</b>	Kg/dm <sup>3</sup>		7.85						
<b>Specific Electric Resist.</b>	Ohm•mm <sup>2</sup> /m		0.19						
<b>Electrical Conductivity</b>	Siemens•m/mm <sup>2</sup>								
<b>°C</b>			<b>20</b>	<b>100</b>	<b>200</b>	<b>300</b>	<b>400</b>	<b>500</b>	<b>600</b>

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

<b>Minimum service temperature</b>	from -40°C to max -70°C	<b>Maximum service temperature</b>	from +600 °C to max +650 °C
<b>Corrosion resistance</b>	Poor corrosion resistance; it is suggested to use protective coating	<b>Cold-working</b>	Easily cold-workable in its annealed condition; it has good ductility

EUROPE	ITALY	CHINA	GERMANY	FRANCE	U.K.	RUSSIA	USA
EN	UNI	GB	DIN	AFNOR	B.S.	GOST	AISI/SAE
34CrNiMo6	35NiCrMo6		34CrNiMo6	35NCD6	817M40	38Ch2N2MA	4340