

<b>Quality</b>	<b>34CrMo4</b>
According to standards	<b>EN 10083-3: 2006</b>
Number	<b>1.7220</b>

## Chemical composition

C%	Si%	Mn%	P%	S%	Cr%	Mo%	Deviations allowed for analysis product
	max		max	max			
0,30-0,37	0,40	0,60-0,90	0,025	0,035	0,90-1,20	0,15-0,30	
± 0.02	+ 0.03	± 0.04	+ 0.005	+ 0.005	± 0.05	± 0.03	

For 34CrMoS4 n° 1.7226, S% 0.020-0.040 product deviations ± 0.005

## Temperature °C

Hot-forming	Normalizing	Quenching	Tempering	Stress-relieving			
1100-850	870 air	850 oil, polymer or water	550-650 air	50° under the temperature of tempering			
Soft annealing	Isothermal annealing	Spheroidizing	End quench hardenability test	Pre-heating welding		Stress-relieving after welding	
700 slowly 10 °C/h to 600, then air (HB max 223)	830 furnace cooling to 670, then air (HB 180-225)	735 furnace cooling	850 water	250		550 furnace cooling	
				<b>Ac1</b>	<b>Ac3</b>	<b>Ms</b>	<b>Mf</b>
				745	800	360	150

## Mechanical and physical properties

**Hot-rolled** mechanical properties in **quenched and tempered** condition EN 10083-3: 2006

size d / t		Testing at room temperature (longitudinal)						HB
mm		R	Rp 0.2	A%	C%	Kv		
from	to	N/mm <sup>2</sup>	N/mm <sup>2</sup> min.	min.	min.	J min.	for information	
	16/8	1000-1200	800	11	45		298-359	
16/8	40/20	900-1100	650	12	50	40	271-331	
40/20	100/60	800-950	550	14	55	45	240-286	
100/60	160/100	750-900	500	15	55	45	225-271	
160/100	250/160	700-850	450	15	60	45	213-253	

d = diameter t = thickness

**Table of tempering** values obtained at room temperature on rounds of Ø 10 mm after quenching at 850 °C in oil

<b>HB</b>		568	560	543	525	504	475	448	421	400	376	340	306	271	
<b>HRC</b>		55.5	55	54	53	51.5	49.5	47.5	45	43	40.5	36.5	32.5	28	
<b>R</b>	N/mm <sup>2</sup>	2100	2070	2020	1960	1850	1740	1610	1490	1380	1270	1130	1020	900	780
<b>Rp 0.2</b>	N/mm <sup>2</sup>	1340	1410	1530	1540	1520	1460	1400	1340	1230	1140	1040	930	820	680
<b>A</b>	%	8.0	8.2	9.0	9.6	10.0	10.4	10.8	11.0	11.4	12.2	14.0	17.5	20.0	21.8
<b>C</b>	%	29	32	37	43	47	48	49	50	52	54	60	65	68	70
<b>Kv</b>	J	27	28	31	34	31	28	27	28	32	42	75	94	127	148
Tempering at °C		<b>50</b>	<b>100</b>	<b>150</b>	<b>200</b>	<b>250</b>	<b>300</b>	<b>350</b>	<b>400</b>	<b>450</b>	<b>500</b>	<b>550</b>	<b>600</b>	<b>650</b>	<b>700</b>

### Data under fatigue +20 °C

+N		Cyclic yield strength, $\sigma_y'$
+QT	556	N/mm <sup>2</sup> low cycle number
+N		Cyclic strength exponent, n'
+QT	0.12	low cycle number
+N		Cyclic strength coefficient, K'
+QT	1198	N/mm <sup>2</sup> low cycle number

### Data under fatigue +20 °C

+N		Fatigue strength coefficient, $\sigma_f'$
+QT	1160	N/mm <sup>2</sup> low cycle number
+N		Fatigue strength exponent, b
+QT	-0.08	low cycle number
+N		Fatigue ductility exponent, c
+QT	-0.61	low cycle number

## 34CrMo4

Hot-rolled, quenched and tempered, **cold-drawn** +QT +C

**Cold-drawn** obtained from hot-rolled annealed +A +C

UNI 10233 pt.5:1993. Use only as reference

size mm		Testing at room temperature (longitudinal) <sup>e)</sup>				size mm		
from	to	R	Rp 0.2	A%	HB	from	to	max
		N/mm <sup>2</sup>	N/mm <sup>2</sup> min	min	for inform.			
5	10	1030-1320	850	7	311-384	5	10	290
10	16	1030-1300	830	7	311-380	10	16	280
16	25	920-1200	680	7	275-359	16	40	275
25	40	900-1180	650	8	271-354	40	100	270
40	100	800-1030	550	9	240-311			

<sup>e)</sup> values valid also for +QT+C+SL

**Cold-drawn** quenched and tempered +C +QT

**Cold-drawn** annealed +C +A

UNI 10233 pt.5:1993. Use only as reference

or  
annealed **peeled-reeled** +A +SH

size mm		Testing at room temperature (longitudinal) <sup>e)</sup>				size mm		
from	to	R	Rp 0.2	A%	HB	from	to	max
		N/mm <sup>2</sup>	N/mm <sup>2</sup> min	min	for inform.			
5	10	1000-1200	800	11	298-359	5	10	227
10	16	1000-1200	800	11	298-359	10	16	227
16	25	900-1100	650	12	271-331	16	40	223
25	40	900-1100	650	12	271-331	40	100	223
40	100	800-950	550	14	240-286			

<sup>e)</sup> values valid also for +C+QT+SL

**Forged** quenched and tempered EN 10250-3: 2001

size d / t mm		Testing at room temperature								
from	to	R	Rp 0.2	A% L	A% T	A% Q	Kv L	Kv T	Kv Q	HB
		N/mm <sup>2</sup> min	N/mm <sup>2</sup> min	min	min	min	J min	J min	J min	min
	100/70	800	550	14	14		45	45		240
100/70	250/160	700	450	15	10		40	22		213
250/160	500/330	650	410	16	12		33	17		200

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

Hardness after tempering.

size mm	Tempering at 530 °C			Tempering at 620 °C		
	≤ 200	> 200 ≤ 400	> 400	≤ 200	> 200 ≤ 400	> 400
<b>HB</b>	<b>280</b>	<b>265</b>	<b>250</b>	<b>250</b>	<b>220</b>	<b>200</b>

EN 10083-3: 2006 **Jominy test HRC** grain size 5 min.

mm distance from quenched extremity		1.5	3	5	7	9	11	13	15	20	25	30	35	40	45	50	H
<b>min</b>		49	49	48	45	42	39	36	34	30	28	27	26	25	24	24	normal
<b>max</b>		57	57	57	56	55	54	53	52	48	45	43	41	40	40	39	

# 34CrMo4

Temperature	Mod. of elasticity E long.	Thermal expansion	Specific heat capacity	Specific electric resistivity	Thermal conductivity
Testing at °C	GPa	10 <sup>-6</sup> • K <sup>-1</sup>	J/(Kg•K)	Ohm•mm <sup>2</sup> /m	W/(m•K)
-100	217	10.5	423		
0	213	11.4	456		
20	212	11.5	461	0.263	39.6
100	207	12.1	479	0.308	41.6
200	199	12.7	499	0.378	41.8
300	192	13.2	517	0.466	40.3
400	184	13.6	536	0.569	38.2
500	175	14.0	558	0.687	36.0
600	164	14.4	587	0.826	33.6

Density +20 °C

Kg/dm<sup>3</sup> Physical properties according to DIN SEW 310 (08/1992) standard

7.81

EUROPE EN	ITALY UNI	CHINA GB	GERMANY DIN	FRANCE AFNOR	U.K. B.S.	RUSSIA GOST	USA AISI/SAE
34CrMo4	34CrMo4	ML30CrMo	34CrMo4	34CD4		34HM	4135