

Quality	50CrMo4
According to standards	EN 10083-3: 2006
Number	1.7228

Chemical composition							
C%	Si%	Mn%	P%	S%	Cr%	Mo%	Deviations allowed for analysis product
0,46-0,54 ± 0.02	max 0,40 + 0.03	0,50-0,80 ± 0.04	max 0,025 + 0.005	max 0,035 + 0.005	0,90-1,20 ± 0.05	0,15-0,30 ± 0.03	

Temperature °C							
Hot-forming	Normalizing	Quenching	Quenching	Tempering	Stress-relieving		
1100-850	860 air (HB ~ 321)	860 oil or polymer	840 water	540-680 air	50° under the temperature of tempering		
Soft annealing	Isothermal annealing	Spheroidizing	End quench hardenability test	Pre-heating welding		Stress-relieving after welding	
720 air (HB max 248)	790 furnace cooling to 660, then air (HB max ~ 222)		850 water	300		550 furnace cooling	
				Ac1	Ac3	Ms	Mf
				720	760	320	100

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)					
mm		R	Rp 0.2	A%	C%	Kv	HB
from	to	N/mm ²	N/mm ² min.	min.	min.	J min.	for information
	16/8	1100-1300	900	9	40		331-380
16/8	40/20	1000-1200	780	10	45	30	298-359
40/20	100/60	900-1100	700	12	50	30	271-331
100/60	160/100	850-1000	650	13	50	30	253-298
160/100	250/160	800-950	550	13	50	30	240-286

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

HB	448	421	390	353	327	294	264
HRC	47.5	45	42	38	35	31	27
R N/mm ²	1620	1490	1350	1185	1070	960	880
Rp 0.2 N/mm ²	1370	1270	1165	1060	930	840	785
A %	7.0	10.0	12.0	13.0	13.5	15.5	20.0
C %		30	40	49	57	60	60
Kv J	26	28	28	38	94	146	166
Tempering at °C	400	450	500	550	600	650	700

Data under fatigue +20 °C			Fatigue data +20 °C		
+N		Cyclic yield strength, σ_y'	+N		Fatigue strength coefficient, σ_f'
+QT	700	N/mm ² low cycle number	+QT	1642	N/mm ² low cycle number
+N	-	Cyclic strength exponent, n'	+N		Fatigue strength exponent, b
+QT	0.13	low cycle number	+QT	-0.09	low cycle number
+N		Cyclic strength coefficient, K'	+N		Fatigue ductility exponent, c
+QT	1568	N/mm ² low cycle number	+QT	-0.71	low cycle number

Data under fatigue +20 °C	
+N	Fatigue strength coefficient, σ_f'
+QT	490 N/mm ² high cycle number

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Hot-rolled, quenched and tempered, **cold-drawn** +QT +C
UNI 10233 pt.5:1993. Use only as reference

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

size		Testing at room temperature (longitudinal) ^{e)}					size		
mm		R	Rp 0.2	A%	HB	mm		HB	
from	to	N/mm ²	N/mm ² min	min	for info.	from	to	max	
5	10	1130-1420	950	5	339-406	5	10	308	
10	16	1130-1400	930	5	339-404	10	16	298	
16	25	1020-1300	800	6	306-380	16	40	293	
25	40	1000-1280	780	6	298-375	40	100	288	
40	100	900-1180	700	8	271-354				

^{e)} Values valid also for +QT+C+SL

Cold-drawn quenched and tempered +C +QT
UNI 10233 pt.5:1993

Cold-drawn annealed +C +A or
annealed **peeled-reeled** +A +SH

size		Testing at room temperature (longitudinal) ^{e)}					size		
mm		R	Rp 0.2	A%	HB	mm		HB	
from	to	N/mm ²	N/mm ² min	min	for inform.	over	to	max	
5	10	1100-1300	900	9	331-380	5	10	252	
10	16	1100-1300	900	9	331-380	10	16	252	
16	25	1000-1200	780	10	298-359	16	40	248	
25	40	1000-1200	780	10	298-359	40	100	248	
40	100	900-1100	700	12	271-331				

^{e)} Values valid also for +C+QT+SL

Forged quenched and tempered EN 10250-3: 2001

size d / t		Testing at room temperature							
mm		R	Rp 0.2	A%	A%	Kv +20 °C	Kv +20 °C	Kv +20 °C	HB
from	to	N/mm ²	N/mm ²	L	T	L	T	Q	min
		min	min	min	min	J min	J min	J min	min
	250/160	800	550	13	9	25	14		240
250/160	500/330	750	540	14	10	20	12		225
500/330	750/500	700	490	15	11	15	10		213

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

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

distance in mm from quenched end

	1.5	3	5	7	9	11	13	15	20	25	30	35	40	45	50	H
min	58	58	57	55	54	53	51	48	45	41	39	38	37	36	36	normal
max	65	65	64	64	63	63	63	62	61	60	58	57	55	54	54	

Temperature Mod. of elasticity GPa

Thermal expansion

Testing at °C	E long.	G tang.	10 ⁻⁶ .K ⁻¹
20	210	80	
100			11.1
200			12.1
300			12.9
400			13.5
500			13.9
600			14.1

Specific heat capacity	Density	Thermal conductivity	Specific electric resist.	Electrical conductivity
J/(Kg.K)	Kg/dm ³	W/(m.K)	Ohm.mm ² /m	Siemens.m/mm ²
460	7.85	42	0.19	5.26



50CrMo4



EUROPE EN	ITALY UNI	CHINA GB	GERMANY DIN	FRANCE AFNOR	U.K. B.S.	RUSSIA GOST	USA AISI/SAE
50CrMo4		ZG50CrMo	50CrMo4			50HM	4150