



42CrMo4

QUENCHED AND TEMPERED STEELS

Reference standard: EN ISO 683-2:2018

W.-Nr.	1.7225	AFNOR	42CD4
AISI	4140	BS	708M40
UNI	42CrMo4	JIS	-
DIN	42CrMo4	Other	UNE F1252

CHEMICAL COMPOSITION

C	Si	Mn	P	S	Cr	Mo	Cu
0.38-0.45 ±0.03	0.10-0.40 ±0.03	0.60-0.90 ±0.04	0.025 + 0.005	0.035 ±0.005	0.90-1.20 ±0.05	0.15-0.30 ±0.03	0.40 + 0.05

Cast analysis composition, % by mass | Second row: permissible deviations of the product analysis

Also available with a Pb addition of 0.15% to 0.35% on request.

TEMPERATURE IN °C

Hot working	Normalising +N	Hardening +Q	Hardening +Q	Tempering +T	Stress relieving +SR
1,100-850 °C	870 °C in air (~ 190 HB)	860 °C in oil or polymer	820 °C in water	540-680 °C in air	50 °C below the tempering temperature
Machinability annealing +A	Isothermal annealing +I	Spheroidizing annealing +AC	Jominy test-piece hardening	Preheating for welding	Post-weld stress relieving
720 °C, cooling 15 °C/h down to 600 °C then air (max 241 HB)	820 °C, furnace cooling down to 670 °C then air (180-240 HB)	760-775 °C, slow furnace cooling (max 200 HB)	840 °C in water	300 °C	550 °C, furnace cooling

Critical points: AC1 745 • AC3 790 • Ms 335 • Mf 120 °C

MECHANICAL PROPERTIES

HOT-ROLLED - Longitudinal tensile test at 20 °C Mechanical properties in the quenched and tempered condition, EN ISO 683-2:2018							
Diameter/thick. (in mm)		R N/mm²	ReH N/mm² min	A% min	Z% min	KV2 J min	HBW
>	≤						
-	16/8	1,100-1,300	900	10	40	-	331-380
16/8	40/20	1,000-1,200	750	11	45	35	298-359
40/20	100/60	900-1,100	650	12	50	35	271-331
100/60	160/100	800-950	550	13	50	35	240-286
160/100	250/160	750-900	500	14	55	35	225-271

ReH = upper yield strength; where no marked yield occurs, Rp 0.2 applies | KV2 = Charpy V-notch impact energy, 2 mm striker radius, average of 3 test pieces

TEMPERING TABLE *													
R N/mm²	2,200	2,180	2,030	1,910	1,800	1,700	1,590	1,480	1,350	1,220	1,100	980	880
Rp 0.2 N/mm²	1,520	1,600	1,620	1,590	1,560	1,510	1,440	1,340	1,230	1,110	1,000	870	710
HRC	57	56.5	54.5	52.5	51	49	47	45	42	39	36	31	27
HB	595	586	550	518	496	468	442	421	390	362	336	294	264
A %	-	7.0	9.5	10.0	10.0	10.0	10.4	11.0	12.0	13.5	15.8	19.0	21.5
Kv J	24	27	28	27	26	26	26	27	31	42	75	114	135
°C	100	150	200	250	300	350	400	450	500	550	600	650	700

* Test condition: Ø 10 mm round bar quenched in oil at 850 °C. Reference values at room temperature; the impact row is a product value, test piece not specified

ANNEALED AND COLD-DRAWN +A+C - Longitudinal tensile test at 20 °C EN ISO 683-7:2024					
Diameter (in mm)		R N/mm ²	Rp 0.2 N/mm ² min	A% min	HBW max
>	≤				
5	10	-	-	-	300
10	16	-	-	-	290
16	40	-	-	-	285
40	63	-	-	-	280
63	100	-	-	-	280

QUENCHED AND TEMPERED, COLD-DRAWN +QT+C - Longitudinal tensile test at 20 °C EN ISO 683-7:2024*				
Diameter (in mm)		R N/mm ²	Rp 0.2 N/mm ² min	A% min
>	≤			
5	10	1,000-1,200	770	8
10	16	1,000-1,200	750	8
16	40	1,000-1,200	720	9
40	63	900-1,100	650	10
63	100	900-1,100	650	10

FORGED QUENCHED AND TEMPERED - Longitudinal tensile and impact test at 20 °C EN 10250-3:1999								
Diameter/thick. (in mm)		R N/mm² min	ReH N/mm² min	A% L min	A% T min	KV2 L J min	KV2 T J min	HBW min
>	≤							
	250/160	750	500	14	10	30	16	225
250/160	500/330	700	460	15	11	27	14	213
500/330	750/500	600	390	16	12	22	12	178

L = longitudinal | T = tangential | * For flats and special sections the tensile strength may differ by ±10% | ** Value also valid for +C +QT

HARDENABILITY VALUES *															
	1.5	3	5	7	9	11	13	15	20	25	30	35	40	45	50
Min	53	53	52	51	49	43	40	37	34	32	31	30	30	29	29
Max	61	61	61	60	60	59	59	58	56	53	51	48	47	46	45

* Jominy in HRC EN ISO 683-2:2018 (minimum grain size G5 per UNI 3245), distance from the quenched end in mm

Temperature	Elastic modulus GPa		Mean expansion
° C	E long	G tang	10 ⁻⁶ K ⁻¹ (20 °C → T)
20	210	81	-
100	205	78	11.1
200	195	75	12.1
300	185	70	12.9
400	175	67	13.5
500	-	-	13.9

HOT-ROLLED, ANNEALED, PEELED AND ROLLER-BURNISHED EN ISO 683-7:2024 - Longitudinal tensile test		
Diameter (in mm)		HBW max
>	≤	
16	40	241
40	63	241
63	100	241

QUENCHED AND TEMPERED, PEELED EN ISO 683-7:2024 - Longitudinal tensile test					
Diameter (in mm)		R N/mm ²	Rp 0.2 N/mm ² min	A% min	KV2 J min
>	≤				
16	40	1,000-1,200	750	11	35
40	63	900-1,100	650	12	35
63	100	900-1,100	650	12	35