SIDERTICINO ACCIAI SPECIALI

TECHNICAL DATASHEET

39NiCrMo3

QUENCHED AND TEMPERED STEELS

W.n°	1.6510	**AFNOR**	40NCD3
AISI	9840	**BS**	-
UNI	39NiCrMo3	**JIS**	-
DIN	36CrNiMo4	**Other**	UNE F1282

Reference standard: EN ISO 683-2:2018

CHEMICAL COMPOSITION

C	Si	Mn	P	S	Cr	Mo	Ni
0.35-0.43 ±0.02	0.40 ±0.03	0.50-0.80 ±0.04	0.025 max + 0.005	0.035 max + 0.005	0.60-1.00 ±0.05	0.15-0.25 ±0.03	0.70-1.00 ±0.05

Average chemical composition in %

Can be supplied with a lead (Pb) addition of 0.15 to 0.35% for improved machinability.

TEMPERATURE IN °C

Hot working	Normalising +N	Hardening +Q	Hardening +Q	Tempering +T	Stress relieving +SR
1,100-900 °C	860 °C in air	850 °C in oil or polymer	840 °C in water	550-650 °C in air	50 °C below the tempering temperature

Machinability annealing +A	Isothermal annealing +I	Full annealing	Jominy test-piece hardening	Preheating for welding	Post-weld stress relieving
700 °C in air (max 240 HB)	820 °C, furnace cooling down to 650 °C then air (195-240 HB)	820 °C in air (max 235 HB)	850 °C in water	300 °C (~ 285 HB in the as-rolled state)	550 °C, furnace cooling

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	Rp 0.2 N/mm² min	A% min	Z% min	Kv J min	HB
Over	Up to						
-	16/8	980-1,180	785	11	40	-	295-354
16/8	40/20	930-1,130	735	11	40	35	278-339
40/20	100/60	880-1,080	685	12	45	40	263-327
100/60	160/100	830-980	635	12	50	40	249-295
160/100	250/160	740-880	540	13	50	40	224-263

TEMPERING TABLE
Values at room temperature on Ø 10 mm round bar after quenching in oil at 850 °C

R N/mm²	2,160	2,070	1,950	1,820	1,700	1,580	1,500	1,430	1,340	1,220	1,100	950	800
Rp 0.2 N/mm²	1,440	1,520	1,540	1,520	1,490	1,440	1,370	1,290	1,220	1,110	980	830	670
HB	577	560	525	496	468	442	426	409	390	362	336	286	240
HRC	56	55	53	51	49	47	45.5	44	42	39	36	30	22.5
A %	8.0	9.8	10.4	10.6	10.7	10.8	11.0	11.5	12.5	13.8	16.0	19.0	22.0
Z %	30	42	48	52	53	53	54	55	56	57	60	63	68
Kv J	28	31	32	28	28	27	27	28	36	46	86	114	128
°C	100	150	200	250	300	350	400	450	500	550	600	650	700

ANNEALED AND COLD-DRAWN +A+C - Longitudinal tensile test at 20 °C - EN ISO 683-7:2024					
Diameter (in mm)		R N/mm² min	Rp 0.2 N/mm² min	A% min	HB max
Over	Up to				
5**	10	-	-	-	295
10	16	-	-	-	290
16	40	-	-	-	285
40	63	-	-	-	280
63	100	-	-	-	280

HOT-ROLLED, ANNEALED, PEELED AND ROLLER-BURNISHED EN ISO 683-7:2024 - Longitudinal tensile test at 20 °C			
R N/mm² min	Rp 0.2 N/mm² min	A% min	HB
-	-	-	-
-	-	-	-
-	-	-	240
-	-	-	240
-	-	-	240

QUENCHED AND TEMPERED, COLD-DRAWN +QT+C - Longitudinal tensile test at 20 °C - EN ISO 683-7:2024					
Diameter (in mm)		R N/mm²	Rp 0.2 N/mm² min	A% min	HB for info.
Over	Up to				
5	10	980-1,180	735	8	295-354
10	16	930-1,130	700	8	278-339
16	40	930-1,130	700	9	278-339
40	63	880-1,080	625	10	263-327
63	100	880-1,080	600	10	263-327

QUENCHED AND TEMPERED, COLD-DRAWN +C +QT EN ISO 683-7:2024 - Longitudinal tensile test at 20 °C			
R N/mm²	Rp 0.2 N/mm² min	A% min	HB for info.
-	-	-	-
-	-	-	-
930-1,130	735	11	278-339
880-1,080	735	12	263-327
880-1,080	735	12	267-327

* Values also valid for + Cold-drawn and Quenched-tempered (+C+QT)

FORGED QUENCHED AND TEMPERED - Tensile and impact test at 20 °C UNI 7874:1979 for reference								
Diameter (in mm)		R N/mm²	Rp 0.2 N/mm² min	A% L min	A% T min	Kv L J min	Kv T min	HB
Over	Up to							
-	100	880-1,080	685	12	-	40	-	263-327
100	250	685-835	540	13	12	30	25	209-250
250	500	655-805	490	15	14	30	25	201-241
500	1,000	635-785	440	16	15	25	-	195-234
1,000	-	590-740	390	15	14	25	-	176-224

L = longitudinal | T = tangential

HARDENABILITY VALUES Jominy in HRC EN ISO 683-2:2018 (minimum grain size G5 per UNI 3245), distance from the quenched end in mm															
	1.5	3	5	7	9	11	13	15	20	25	30	35	40	45	50
Min	52	51	50	49	48	46	44	43	39	36	34	33	32	31	30
Max	60	60	59	58	58	57	57	56	55	52	51	49	48	46	45

Temperature	Elastic modulus GPa		Thermal expansion
° C	E long	G tang	$(m/m^*K)^*10^{-6}$ °C
20	210	80	
100	-	-	11.2