



20MnCr5

CASE-HARDENING STEELS

Reference standard: EN ISO 683-3:2022 (formerly EN 10084)

W.-Nr.	1.7147	AFNOR	20MC5
AISI	-	BS	-
UNI	20MnCr5	JIS	-
DIN	20MnCr5	Other	20CrMnH (GB/T 5216)

CHEMICAL COMPOSITION

C	Si	Mn	P	S	Cr	Cu
0.17-0.22 ±0.02	0.40 max ±0.03	1.10-1.40 ±0.06	0.025 max +0.005	0.035 max ±0.005	1.00-1.30 ±0.05	0.40 max +0.05

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

Maximum values unless a range is given

TEMPERATURE IN °C

Carburizing	Carburizing, direct hardening	Carburizing, special processes	Direct and simple hardening	Core hardening	Case hardening
880-980 °C	normally max 950 °C	1,020-1,050 °C	820-860 °C	860-900 °C	780-820 °C

Tempering	Jominy test-piece hardening	Quenchant	Annealing +A	Normalising +N	Hot working
150-200 °C, min 1 h	900 ±5 °C, min 30 min	not specified by the standard	cycle not specified	cycle not specified	not specified

The standard publishes neither the critical points AC1 and AC3 nor the Ms temperature.

MECHANICAL PROPERTIES

AFTER QUENCHING AND TEMPERING AT 200 °C - Minimum tensile strength EN ISO 683-3:2022 Annex C (informative): classification by diameter, not the as-delivered and not the carburized condition, not a requirement that can be claimed. Above 100 mm the standard gives no values		
Diameter (in mm)		Rm N/mm ² min
>	≤	
	16	1,200
16	40	900
40	100	700

HARDNESS IN THE DELIVERY CONDITION - Brinell HBW EN ISO 683-3:2022, Table 7. Independent of diameter					
	+S	+A	+TH	+FP	+N
HBW min	-	-	170	152	140
HBW max	255	217	217	201	201

+S improved shearability • +A annealed • +TH treated to a hardness range • +FP ferrite-pearlite structure • +N normalised

The standard sets no requirement for case hardness or case depth: the case is the result of the agreed treatment cycle.

For peeled bar the requirements of the grade standard apply: in the annealed condition the hardness is the same, 217 HBW max.

The treatment temperatures are given by the standard for guidance; the Jominy test temperature is the exception.

HARDENABILITY VALUES *													
	1.5	3	5	7	9	11	13	15	20	25	30	35	40
+H max.	49	49	48	46	43	42	41	39	37	35	34	33	32
+H min.	41	39	36	33	30	28	26	25	23	21	-	-	-
+HH min.	44	42	40	37	34	33	31	30	28	26	25	24	23
+HL max.	46	46	44	42	39	37	36	34	32	30	29	28	27

* Jominy in HRC to EN ISO 683-3:2022, Tables 5 and 6. Distance from the quenched end in mm. The restricted bands +HH and +HL are supplied by agreement at the time of order; +HH max coincides with +H max, +HL min with +H min.

Temperature	Elastic modulus GPa		Mean expansion
° C	E long	G tang	$10^{-6} K^{-1}$ (20 °C → T)
20	210	81	-
100			
200			
300			
400			