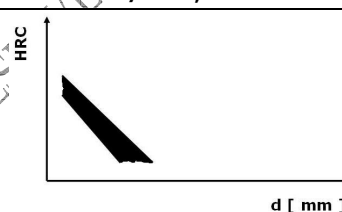


Alphanumeric designation	Numerical designation	Standard reference		Correspondences						Rev	Date
20MnB5	1.5530	EN 10083-3:1997		Germany	-	United Kingdom	-	GRANIT ENGINEERING graniteng.com			
				France	-	Spain	-				
				Italy	-	United States	-				
Chemical composition (% mass)	C	Si max	Mn	P max	S max	Cr	Mo	Ni	V	B	
heat	0,17-0,23	0,4	1,1-1,4	0,035	0,04	-	-	-	-	0,0008-0,005	
product	0,15-0,25	0,43	1,05-1,45	0,04	0,045	-	-	-	-	0,0005-0,0053	
PHYSICAL CHARACTERISTICS (T=20°C if not differently stated)											
Young modulus [N/mm²]	Poisson modulus	Bulk modulus [N/mm²]	Density [kg/dm³]	Linear thermal expansion coefficient [µm/m ° C]							
205000	0,29	140000	7,85	T=20°C	T=250°C	T=500°C	T=1000°C				
				-	-	-	-				
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MECHANICAL CHARACTERISTICS (T=20°C if not differently stated)											
Heat treatment state	Rod diameter [mm]	Rm [N/mm²]	Rp0.2 [N/mm²]	A5 [%]	KCU [J]	HB [N/mm²]					
SOFT ANNEALED		-				-					
ISOTHERMAL ANNEALED		-				-					
QUENCHED AND TEMPERED	≤16	900-1050	750 min	14 min	-	265-310					
	16 < d ≤40	750-900	600 min	15 min	60 min	222-265					
DESCRIPTION/APPLICATIONS				HARDENABILITY: MEDIUM/LOW; steel available in the class H							
Quench and tempering special MnB steel, where the B chemical element is added to increase the hardenability, characterized by medium tensile strength and medium/high toughness. It is suitable to the manufacture of components of maximum thickness equal to 32 mm meanly stressed (shafts, axles, screws, levers, connecting rods). It shows quite good workability for chip removal, forgeability and formability. Advised austenitic grain dimension > 5 according to UNI 3245 (similar to ASTM E 112-82) Thermochemically manageable according to CASEHARDENING 1.x Sizing and checking of effective hardening thickness according to DEEPHARDNESS 1.x and DEEPHARDNESS 2.x											
				WELDABILITY : MEDIUM/HIGH							
HEAT TREATMENT AND HOT PLASTIC DEFORMATION TEMPERATURES				ADVISED WELDING PROCESSES							
				SMAW B (basic); GMAW; GTAW; PAW; LBW*; EBW* (*on vacuum-sealed outgased steels)							
				ADVISED WELDING PROCEEDINGS							
				1. f.m. for high-tensile steels (EN 757; EN 12534)+ Tp + TB 2. f.m. for unalloyed steels (EN 499 ; EN 1668; EN 440) + Tp + TB							
				GENERAL PRECAUTIONS							
				▪ multipass welding ▪ HD reduction (≤ 5 optimum); reconditioning of electrodes ▪ edges cleaning ▪ reduction of the degree of the joint constraint ▪ Rd reduction							
				LEGEND							
				Tp : preheat minimum temperature[° C] ; HD : diffusible hydrogen [ml/100g] ; Rd : dilution rapport [%] ; d : combined thickness [mm] ; Q :heat input[kJ/mm] ; f.m. : filler metal; TB : temper beads ; PWHT : post-welding heat treatment							
	TEMPERATURE ° C	Cooling medium									
Hot plastic deformation	850-1100										
Normalization	900-940	air									
Soft annealing	660-710	air									
Isothermal annealing		-									
Hardening	880-920	water									
Tempering	400-600	air									

Minimum preheating temperatures : 20MnB5 EN 10083-3:1997							
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d [mm]	HD [ml/100g]	Q [kJ/mm]	Tp [° C]	d [mm]	HD [ml/100g]	Q [kJ/mm]	Tp [° C]
10	10	1	120	40	10	1	205
		2	110			2	195
		3	95			3	185
		4	85			4	170
	5	1	90		5	1	175
		2	80			2	165
		3	70			3	155
		4	55			4	140
	3	1	70		3	1	160
		2	60			2	145
		3	50			3	135
		4	40			4	125
20	10	1	160	50	10	1	220
		2	145			2	205
		3	135			3	195
		4	125			4	185
	5	1	130		5	1	190
		2	115			2	175
		3	105			3	165
		4	95			4	155
	3	1	110		3	1	170
		2	100			2	160
		3	90			3	150
		4	75			4	135
30	10	1	185	60	10	1	225
		2	175			2	215
		3	165			3	205
		4	155			4	190
	5	1	155		5	1	195
		2	145			2	185
		3	135			3	175
		4	125			4	160
	3	1	140		3	1	175
		2	125			2	165
		3	115			3	155
		4	105			4	145