

Database of Steel and Alloy (Marochnik)

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[Home](#) [European steel grades](#) [Steel and Alloy](#) [Search](#) [Equivalent grades](#) [Grading](#) [GOST Standard](#) [Contacts](#)

YOU HERE: [Steel and Alloy](#) -> [Tool steel](#)

Characteristics for grade R9 (P9).

Grade :	R9 (P9)
Substitute:	P18
Classification :	High speed tool steel
Equivalent grades:	Go here

Chemical composition in % for grade R9 (P9)

C	Si	Mn	Ni	S	P	Cr	Mo	W	V	Co
0.85 - 0.95	max 0.5	max 0.5	max 0.4	max 0.03	max 0.03	3.8 - 4.4	max 1	8.5 - 9.5	2.3 - 2.7	max 0.5

Temperature of critical points for grade R9 (P9).

$A_{c1} = 820$, $A_{c3}(A_{cm}) = 870$, $A_{r3}(A_{rcm}) = 780$, $A_{r1} = 740$, $M_n = 180$

Mechanical properties under $T=20^{\circ}\text{C}$ for grade R9 (P9)

Assortment	Dimension	Direct.	σ_B	σ_T	δ_5	ψ	KCU	Heat treatment
-	mm	-	MPa	MPa	%	%	kJ / m^2	-
			840	490	10	29	260	As-delivered state
Band annealed , GOST 2283-79	0.1 - 4		880					

Brinell hardness for R9 (P9) (annealing) ,

$HB\ 10^{-1} = 255\ \text{MPa}$

Physical properties for grade R9 (P9)

T	$E\ 10^{-5}$	$\alpha\ 10^6$	λ	ρ	C	$R\ 10^9$
Grade	MPa	1/Grade	Watt/(m·Grade)	kg/m^3	$\text{J}/(\text{kg}\cdot\text{Grade})$	Ohm·m
20	2.2			8300		380
100			23			417
200			25			505
300			26			600
400			28			695
500			30			790
600			31			900

700						1020
800						1160
900						1170
T	$E \cdot 10^{-5}$	$\alpha \cdot 10^6$	λ	ρ	C	$R \cdot 10^9$

Equivalent steels for grade R9 (P9)

Warning! Indicated both exact and nearest equivalents.

Czechia
CSN
422992

Specification :**Mechanical properties :**

- σ_B - Tensile strength , [MPa]
 σ_T - Yield stress , [MPa]
 δ_5 - Specific elongation at fracture , [%]
 ψ - Reduction of area , [%]
KCU - Impact strength , [kJ / m²]
HB - Brinell hardness , [MPa]

Physical properties :

- T** - Test temperature , [Grade]
E - Young modulus , [MPa]
 α - Coefficient of linear expansion (range 20° - T) , [1/Grade]
 λ - Thermal (heat) condition coefficient , [Watt/(m·Grade)]
 ρ - Density , [kg/m³]
C - Specific heat (range 20° - T) , [J/(kg·Grade)]
R - Electrical resistance , [Ohm·m]

Database of steels and alloys (Marochnik) contains information about chemical composition and properties more then 2500 steels and alloys (stainless steel, alloy steel, carbone steel, structural steel, tool steel, cast iron, aluminum alloy, titanium alloy, copper alloy, nickel alloy, magnesium alloy and others).
 Helpfull for specialists in grade technology, structural engineer, mechanical engineer, metallurgy and metal trader

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