

Database of Steel and Alloy (Marochnik)

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Characteristics for grade 12KH13 (12X13).

Grade :	12KH13 (12X13) (1X13)
Substitute:	20X13
Classification :	Corrosion-resistant high-temperature steel
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Chemical composition in % for grade 12KH13 (12X13)

C	Si	Mn	Ni	S	P	Cr
0.09 - 0.15	max 0.8	max 0.8	max 0.6	max 0.025	max 0.03	12 - 14

Temperature of critical points for grade 12KH13 (12X13).

$Ac_1 = 730$, $Ac_3(Ac_m) = 850$, $Ar_3(Arc_m) = 820$, $Ar_1 = 700$

Mechanical properties under T=20°C for grade 12KH13 (12X13)

Assortment	Dimension	Direct.	σ_B	σ_T	δ_5	ψ	KCU	Heat treatment
-	mm	-	MPa	MPa	%	%	kJ / m ²	-
Pipe hot strain, GOST 9940-81			392		21			
Pipe cooling strain, GOST 9941-81			392		22			
Bar, GOST 18968-73			620	440-610	20	60	780	Normalizing and drawing
Bar, GOST 18907-73			490-780		16			
Bar, GOST 5949-75		longitudinal	590	410	20	60	880	Guenching 1000 - 1050°C, air, Drawing 700 - 790°C, air,
Wire, GOST 18143-72			490-740		16-20			
Forging, GOST 25054-81	to 600	longitudinal	617	392	15-18	40-50	490-740	Guenching and drawing
Sheet trick, GOST 7350-77			650	250	15			Annealing
Sheet trick, GOST 7350-77			490	345	21			Guenching and drawing
Sheet thin, GOST 5582-75			440		21			

Brinell hardness for 12KH13 (12X13) (quenching, tempering), GOST 25054-81	HB 10 ⁻¹ = 187 - 229 MPa
Brinell hardness for 12KH13 (12X13) (annealing), Bar GOST 5949-75	HB 10 ⁻¹ = 121 - 197 MPa
Brinell hardness for 12KH13 (12X13) (annealing), Bar GOST 18907-73	HB 10 ⁻¹ = 121 - 187 MPa
Brinell hardness for 12KH13 (12X13) (normalize, tempering), Bar GOST 18968-73	HB 10 ⁻¹ = 192 - 229 MPa

Technological properties for grade 12KH13 (12X13)

Weldability:	limited weldability.
Temper brittleness:	predisposed

Physical properties for grade 12KH13 (12X13)

T	E 10 ⁻⁵	α 10 ⁶	λ	ρ	C	R 10 ⁹
Grade	MPa	1/Grade	Watt/(m·Grade)	kg/m ³	J/(kg·Grade)	Ohm·m
20	2.17			7720		506
100	2.12	10.2	28	7700	473	584
200	2.06	11.2	28	7670	487	679
300	1.98	11.4	28	7640	506	769
400	1.89	11.8	28	7620	527	854
500	1.8	12.2	27	7580	554	938
600		12.4	26	7550	586	1021
700		12.7	26	7520	636	1103
800		13	25	7490	657	
900		10.8			666	
1000		11.7				
T	E 10 ⁻⁵	α 10 ⁶	λ	ρ	C	R 10 ⁹

Equivalent steels for grade 12KH13 (12X13)

Warning! Indicated both exact and nearest equivalents.

USA	Germany	Japan	France	England	European	Italy	Spain	China	Sweden	Poland	Czechia
-	DIN, WNr	JIS	AFNOR	BS	EN	UNI	UNE	GB	SS	PN	CSN
403	1.4006	SUS410	410F20	403S17	1.4006	X10Cr13	F.3401	1Cr13	2302	1H13	17021
410	1.4021	SUS410S	Z10C13	410C21	1.4021	X12Cr13	X10Cr13	2Cr13		2H13	17022
S41000	X10Cr13	SUS410TB	Z10C14	410S2	X10Cr13	X20Cr13					
	X12CM3	SUS410TK	Z12Cr13	410S21	X12Cr13						
	X12Cr13	SUS420J1	Z13C13	420S37	X20Cr13						
	X20Cr13			ANC1A							
	X7Cr13										

Specification :**Mechanical properties :**

- σ_B** - Tensile strength , [MPa]
σ_T - Yield stress , [MPa]
δ₅ - 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]

Weldability :

- without limitations** - welding is done without heating and subsequent heat treating
- limited weldability** - welding is possible under heating up to 100-120 grade and subsequent heat treating
- hard weldability** - obtaining the quality welding needs the additional operations: heating up to 200-300 grade; the heat treating is annealing

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

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