

Database of Steel and Alloy (Marochnik)

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Characteristics for grade 40KH (40X).

Grade :	40KH (40X)
Substitute:	45X, 38XA, 40XH, 40XC, 40XΦ, 40XP
Classification :	Alloy structural steel
Equivalent grades:	Go here

Chemical composition in % for grade 40KH (40X)

C	Si	Mn	Ni	S	P	Cr	Cu
0.36 - 0.44	0.17 - 0.37	0.5 - 0.8	max 0.3	max 0.035	max 0.035	0.8 - 1.1	max 0.3

Temperature of critical points for grade 40KH (40X).

$A_{c1} = 743$, $A_{c3}(A_{cm}) = 782$, $A_{r3}(A_{rcm}) = 730$, $A_{r1} = 693$
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Mechanical properties under T=20°C for grade 40KH (40X)

Assortment	Dimension	Direct.	σ_B	σ_T	δ_5	ψ	KCU	Heat treatment
-	mm	-	MPa	MPa	%	%	kJ / m ²	-
Pipe, GOST 8731-87			657		9			
Pipe cooling strain, GOST 8733-74			618		14			
Bar, GOST 4543-71	Ø 25		980	785	10	45	590	Guenching 860°C, oil, Drawing 500°C, water,

Brinell hardness for 40KH (40X) (annealing), GOST 4543-71	HB 10 ⁻¹ = 217 MPa
Brinell hardness for 40KH (40X) , Pipe GOST 8731-87	HB 10 ⁻¹ = 269 MPa
Brinell hardness for 40KH (40X) , Pipe GOST 8733-74	HB 10 ⁻¹ = 217 MPa
Brinell hardness for 40KH (40X) , Bar GOST 10702-78	HB 10 ⁻¹ = 179 MPa

Technological properties for grade 40KH (40X)

Weldability:	hard weldability.
Flakes :	predisposed
Temper brittleness:	predisposed

Physical properties for grade 40KH (40X)

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	2.14			7820		210
100	2.11	11.9	46	7800	466	285
200	2.06	12.5	42.7	7770	508	346
300	2.03	13.2	42.3	7740	529	425
400	1.85	13.8	38.5	7700	563	528
500	1.76	14.1	35.6	7670	592	642
600	1.64	14.4	31.9	7630	622	780
700	1.43	14.6	28.8	7590	634	936
800	1.32		26	7610	664	1100
900			26.7	7560		1140

1000			28	7510		1170
1100			28.8	7470		120
1200				7430		1230
T	$E 10^{-5}$	$\alpha 10^6$	λ	ρ	C	$R 10^9$

Equivalent steels for grade 40KH (40X)

Warning! Indicated both exact and nearest equivalents.

USA	Germany	Japan	France	England	European	Italy	Belgium	Spain	China	Sweden	Bulgaria	Hungary	Poland	Romania	Czechia	Australia	South Korea
-	DIN,WNr	JIS	AFNOR	BS	EN	UNI	NBN	UNE	GB	SS	BDS	MSZ	PN	STAS	CSN	AS	KS
5135	1.7034	SCr435	37Cr4	37Cr4	1.7034	36CrMn4	37Cr4	37Cr4	35Cr	2245	37Cr4	37Cr4	38HA	40Cr10	14140	5132H	SCr435
5140	1.7035	SCr435H	38C4	41Cr4	1.7035	36CrMn5	41Cr4	38Cr4	38CrA		40Ch	41Cr4	40H	40Cr10q		5140	SCr435H
5140H	1.7045	SCr440	38C4FF	530A36	1.7039	37Cr4	45C4	38Cr4DF	40Cr		41Cr4	Cr2Z					SCr440
5140RH	37Cr4	SCr440H	41Cr4	530A40	37Cr4	38Cr4KB		41Cr4	40CrA			Cr3Z					SCr440H
G51350	41Cr4		42C4	530H36	37Cr4KD	38CrMn4KB		41Cr4DF	40CrH								
G51400	41CrS4		42C4TS	530H40	41Cr4	41Cr4		42Cr4	45Cr								
H51350	42Cr4			530M40	41Cr4KD	41Cr4KB		F.1201	45CrH								
H51400					41CrS4			F.1202	ML38CrA								
								F.1210	ML40Cr								
								F.1211									

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]

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, carbide 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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