

## Steel grade

Material No.	PREMIUM 1045
AISI	1045
Search for alternatives in the ABRAMS STEEL GUIDE	<a href="http://www.abrams-steelguide.com/alternatives/1045">www.abrams-steelguide.com/alternatives/1045</a>

## Shapes



Precision Ground Flat Stock Metric [GFSM reg]  
regular – acc. to DIN\*59350  
L: 500 mm  
L: 1,000 mm

\*DIN: Deutsche Industrie Norm (German Industry Standard)

## Chemical composition AISI 1045 (reference value %)

C	Si	Mn	P	S
0.42 - 0.5	0.15 - 0.4	0.6 - 0.8	0 - 0.03	0 - 0.03

## Physical properties

Hardness (delivery condition)	max. 190 HB			
Tensile strength $R_m$ (as received condition)	approx. 94.2 KSI			
Working hardness	max. 54 HRC (surfacehardness)			
Thermal expansion coefficient $10^{-6}m/(m \cdot K)$	68 - 212°F	68 - 392°F	68 - 572°F	68 - 752°F
	12.5	13.0	13.6	14.1
Thermal conductivity $W/(m \cdot K)$	68°F	662°F		
	44.9	41.6		

## Technical properties

Unalloyed tool steel with excellent machining properties for unhardened parts (e.g. fixture construction), due to its carbon proportion (0.45 %) it can be hardened, but has a low depth of hardening. Shallow depth case-hardening steel with a hard surface and a tough core.

## Applications

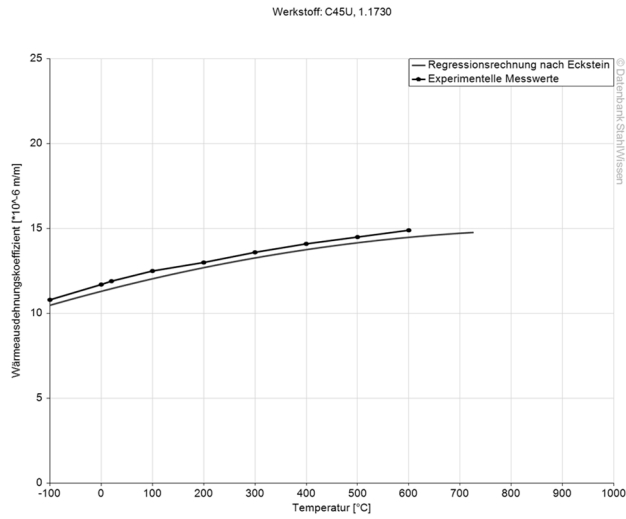
Mechanical engineering, construction materials, jigs, base plates, molding frames, small dies, hand tools, simple knives, sledges, pliers, forks, hatchets, axes, shears, screwdrivers, chisels.

## Heat treatment

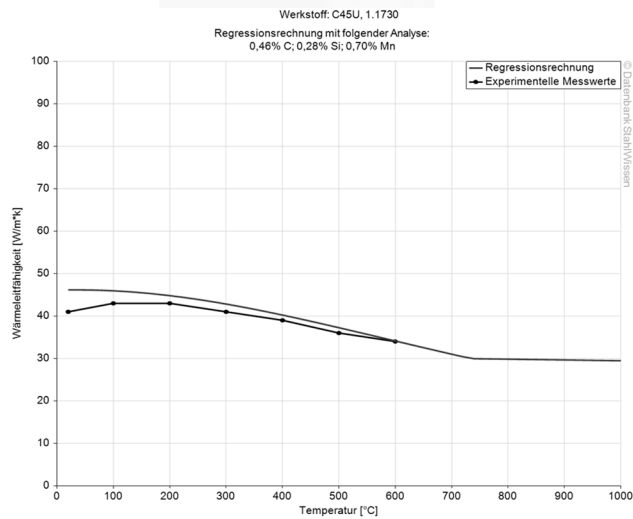
	Temperature	Cooling	Hardness	
Soft annealing	1256 - 1310°F	Furnace	max. 190 HB	
Stress relief annealing	Temperature	Cooling		
	approx. 1112 - 1202°F	Furnace		
Hardening	Temperature	Quenching in	Hardness after quenching	
	1472 - 1562°F	Water	57 HRC	
Tempering	212°F	392°F	572°F	662°F
	57 HRC	54 HRC	49 HRC	42 HRC



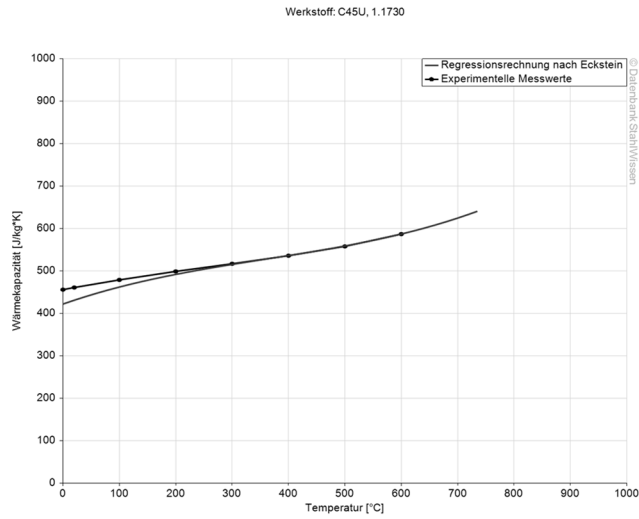
## Thermal expansion coefficient diagram



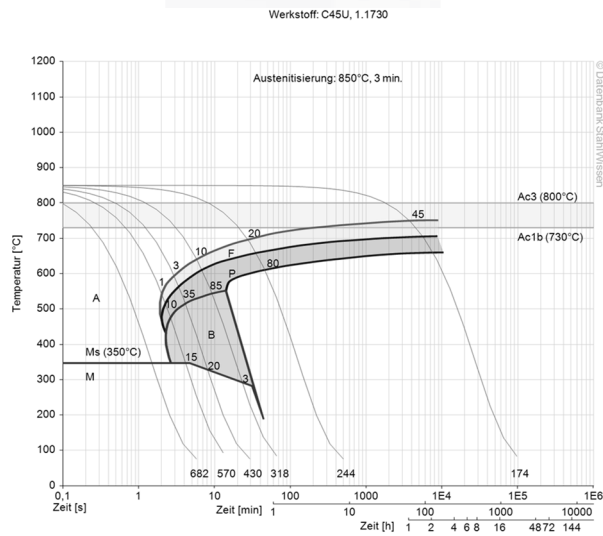
## Thermal conductivity diagram



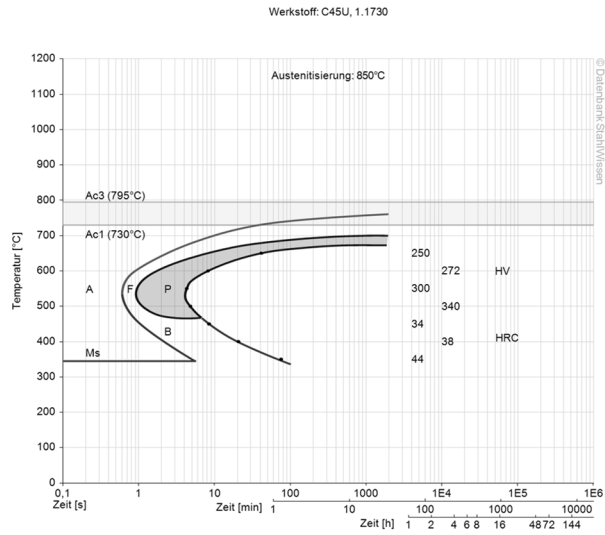
## Thermal capacity diagram



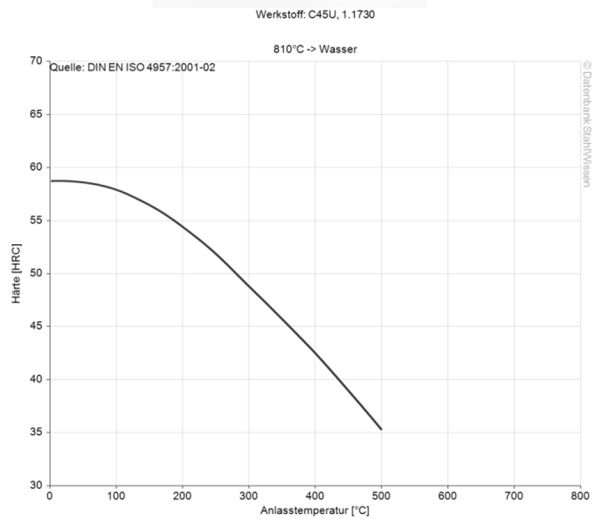
## Continuous ZTU-diagram



## Isothermal ZTU-diagram



## Tempering diagram



The data shown here is to be used only as an indication of the statistics, thus we accept no liability.  
 Diagrams are taken from Datenbank StahlWissen Dr. Sommer Werkstofftechnik  
 Issued: 2012

