

Material Grade: **C45**  
 Material Condition(s): **Untreated / Normalised / Annealed / Quench and tempered**  
 Surface Finish: **As rolled / As forged / Bright turned**

Associated Standard: **BS EN 10083**  
**BS EN 10277**  
**BS EN 10250**

Description:

A medium carbon steel offering moderate tensile strengths. The material is capable of through hardening by quenching and tempering on limited sections but can be also flame or induction hardened to Hrc 55. This grade is most commonly supplied in an untreated or normalized condition and is available in several variations (denoted by additional letters) which offer slight modifications of chemical composition. Machinability similar to that of mild steel can be expected, however weldability is reduced.

Typical applications: **Axles, spindles, studs, shafts, knives and many automotive and general engineering components**

Typical variations: **C45 - basic grade with chemical composition from paragraph 1**  
**C45E - modified with limited P & S levels**  
**C45R - modified with limited P level and minimum S level for enhanced machinability**

Typical conditions: **no designation or +U - as rolled**  
**+A - soft annealed**  
**+N - normalised**  
**+QT - quench and tempered**  
**+SH - turned**  
**+H - with additional hardenability test (for C45E and C45R)**  
**+HH - with enhanced hardenability test (for C45E and C45R)**

**1. STEELMAKING**

	<u>C</u>	<u>Si</u>	<u>Mn</u>	<u>S*</u>	<u>P*</u>	<u>Cr</u>	<u>Ni</u>	<u>Mo</u>	<u>Cr+Mo+Ni</u>
Min	0.42		0.50						
Max	0.50	0.40	0.80	0.045	0.045	0.40	0.40	0.10	0.63

(\* differs with grade variation)

**2. TYPICAL MECHANICAL PROPERTIES**

Test type			Tensile and hardness test (at room temperature)					Impact test (KV)	
			Yield (Re)	0.2 % proof	UTS (Rm)	Elong (A)	R of A (Z)	Hardness	Room Temp
Variation	Sample dia	Unit	N/mm <sup>2</sup>	N/mm <sup>2</sup>	N/mm <sup>2</sup>	%	%	HB	J
C45 + A		Min							
		Max						207	
C45 + N	> 100 ≤ 250mm	Min	275		560	16			
		Max							
C45 + N	> 250 ≤ 500mm	Min	240		540	16			15
		Max						207	
C45 + QT	> 40 ≤ 100mm	Min	370		630	17	45		
		Max			780				
C45 + +SH	> 63 ≤ 100mm	Min			580			172	
		Max			820			242	