

1045 / C45 Equivalents - 6 medium-carbon steels across AISI, EN 10083-2, old DIN / AFNOR / UNE, BS 970, JIS G4051, GB/T 1045

1045 = C45 / 1.0503 (C45E / 1.1191 = Ck45) = S45C = GB 45 = 080M46 = XC48 = F-114: C 0.43-0.50 (SAE) / 0.42-0.50 (EN), Mn 0.60-0.90 / 0.50-0.80 %. All rows direct equivalents; the differences are in the delivery condition (+N Rm 560-650 MPa; +QT Rm 700-850, Re 490 MPa at <=16 mm, 430 at 16-40, 370 at 40-100), the P/S cap (C45E 0.035 %) and the section size. Induction hardening 55-58 HRC. Not 42CrMo4 (adds Cr + Mo), not 1018 / S235 / Q235.

EKINSUN LTD - shafts, pins, studs and gear blanks machined in the drawing's grade and condition from one piece - <https://www.ekinsun.com/materials/medium-carbon-steel-equivalents/>

Crosswalk

AISI / SAE	EN 10083-2 (number)	Old DIN / AFNOR / UNE	BS 970	JIS	GB/T 699	Rating
0.45 % carbon - the shaft and pin steel						
1045	C45 (C45E) (1.0503 (1.1191))	Ck45 / C45 (AFNOR XC48, UNE F-114)	080M46 (080M40 nearest)	S45C	45	direct
1045 (fine-grain, std)	C45E (1.1191)	Ck45	080M46	S45C	45 (high-quality: 45A, std)	direct
0.40 % carbon - the general-purpose grade						
1040	C40 (C40E) (1.0511 (1.1186))	Ck40 (AFNOR XC42)	080M40 (EN8)	S40C	40	direct
0.35 % carbon - bolts, forgings, lightly loaded shafts						
1035	C35 (C35E) (1.0501 (1.1181))	Ck35 (AFNOR XC38)	080M36 (EN8 lower band)	S35C	35	direct
0.50-0.55 % carbon - springs, blades, wear parts						
1050	C50 (C50E) (1.0540 (1.1206))	Ck50 (AFNOR XC50)	080M50	S50C	50	direct
1055	C55 (C55E) (1.0535 (1.1203))	Ck55 (AFNOR XC55)	070M55	S55C	55	direct

Composition bands, mass % - US (SAE J403) | EN (EN 10083-2)

Grade	C US	C EN	Mn US	Mn EN	Si US	Si EN	S US	S EN
1045 / C45	0.43-0.50	0.42-0.50	0.60-0.90	0.50-0.80	- (not specified)	<=0.40	<=0.050	<=0.045 (C45E: <=0...
1040 / C40	0.37-0.44	0.37-0.44	0.60-0.90	0.50-0.80	-	<=0.40	<=0.050	<=0.045
1035 / C35	0.32-0.38 (std)	0.32-0.39	0.60-0.90 (std)	0.50-0.80	-	<=0.40	<=0.050	<=0.045 (C35E: <=0...
1050 / C50	0.48-0.55 (std)	0.47-0.55	0.60-0.90 (std)	0.60-0.90	-	<=0.40	<=0.050	<=0.045
1055 / C55	0.50-0.60 (std)	0.52-0.60	0.60-0.90 (std)	0.60-0.90	-	<=0.40	<=0.050	<=0.045
1045 / C45E	0.43-0.50	0.42-0.50	0.60-0.90	0.50-0.80	-	<=0.40	<=0.050	<=0.035 (P <=0.035)

JIS G4051: S45C C 0.42-0.48, Si 0.15-0.35, Mn 0.60-0.90. GB/T 699: 45 C 0.42-0.50, Si 0.17-0.37, Mn 0.50-0.80. C45 vs 42CrMo4: same carbon, 42CrMo4 adds Cr 0.90-1.20 and Mo 0.15-0.30 for hardenability (+QT Re 900 vs 490 MPa at <=16 mm). Old names: XC38/XC42/XC48 (AFNOR), F-114 (UNE), Ck45 (DIN), EN8 = 080M40, EN9 = 070M55 (BS 970:1955). 'std' = band from the standard's table.