

Material specification sheet

Saarstahl - C45E (Ck45) - C45R (Cm45)

Material No.:	Former brand name:	International steel grades:
1.1191	R4	BS: 080M46, 060A47
1.1201		AFNOR: 2C45, 3C45, XC42H1, XC45, XC48H1
		SAE: 1045, 1049

Material group: Steel for quenching and tempering according to DIN EN 10083

Chemical composition: (Typical analysis in %)	Steel	C	Si	Mn	S	other
	C45E	0,45	0,25	0,65	<0,030	(Pb)
	C45R	0,45	0,25	0,65	0,020 0,035	(Pb)

Application: Plain carbon steel for mechanical engineering and automotive components.

Hot forming and heat treatment:	Forging or hot rolling:	1100 - 850°C
	Normalising:	840 - 880°C/air
	Soft annealing:	680 - 710°C/furnace
	Hardening:	820 - 860°C/water, oil
	Tempering:	550 - 660°C

Mechanical Properties: Treated for cold shearability +S: max. 255 HB
Soft annealed +A: max. 207 HB

Quenched and tempered, +QT:

Diameter d [mm]	< 16	>16 – 40	>40 – 100	>100 – 160	>160 – 250
Thickness t [mm]	< 8	8<t<20	20<t<60	60<t<100	100<t<160
0,2% proof stress R _{p0,2} [N/mm ²]	min. 490	min. 430	min. 370	-	-
Tensile strength R _m [N/mm ²]	700 - 850	650 - 800	630 - 780	-	-
Fracture elongation A ₅ [%]	min. 14	min. 16	min. 17	-	-
Reduction of area Z [%]	min. 35	min. 40	min. 45	-	-
Notch impact energy ISO-V [J]	min. 25	min. 25	min. 25	-	-

Normalised, +N:

Diameter d [mm]	< 16	>16 – 100	>100 – 250		
Thickness t [mm]	< 16	16<t<100	100<t<250		
0,2% proof stress R_{p0,2} [N/mm²]	min. 340	min. 305	min. 275		
Tensile strength R_m [N/mm²]	min. 620	min. 580	min. 560		
Fracture elongation A₅ [%]	min. 14	min. 16	min. 16		