

STANDARD REFERENCE:

EN ISO 683-1: 2018 (Hot-rolled products) | EN 10277: 2018 (Bright products)

RODACCIAI REFERENCES AND COMPARABLE STANDARDS

EUROPE		ITALY	GERMANY		FRANCE	UK	USA
EN 10083-2: 2006 EN 10277-5: 2008		(UNI 7845-78)	(DIN 17200-86)		(NF A 35-552-86)	(BS 970 pt.3-96)	ASTM A 29
Grade	N°		Werkstoff	N°			
C45E	1.1191	C45	Ck 45	1.1191	XC 45	080M47	1045
C45R	1.1201		Cm 45	1.1201			

CHEMICAL COMPOSITION (CAST ANALYSIS) (%)

EUROPE	C	Si	Mn	P / max	S	Cr / max	Mo / max	Ni / max	Cu / max	Al	Pb
C45E					≤ 0,035					-	-
C45R	0,42÷0,50	0,10÷0,40	0,50÷0,80	0,025	0,020÷0,040	0,40	0,10	0,40	0,30	-	-
C45Rpb					0,020÷0,040					0,020÷0,050	0,15÷0,30

MECHANICAL PROPERTIES - AS ROLLED CONDITION

Size mm	HB max to condition		Quenched and tempered (+QT)					Normalized (+N)		
	Treated to improve shearability (+S)	Soft annealing (+A)	R _{p0,2} (MPa) min	R _m (MPa) min	A ₅ (%) min	Z (%) min	KV (J) min	R _{p0,2} (MPa) min	R _m (MPa) min	A ₅ (%) min
≤ 16	255	207	490	700÷850	14	35	15	340	620	14
> 16 ≤ 40	255	207	430	650÷800	16	40	15	305	580	16
> 40 ≤ 100	255	207	370	630÷780	17	45	15	305	580	16
> 100 ≤ 160	255	207	-	-	-	-	-	275	560	16
> 160 ≤ 250	255	207	-	-	-	-	-	275	560	16

MECHANICAL PROPERTIES - BRIGHT PRODUCTS CONDITION

Size mm	Rolled+Turned (+SH)		Quenched+Tempered+Turned (+QT +SH)*				Quenched+Tempered+Cold Drawn (+QT +C)			Cold Drawn (+C)		
	Hardness HB	R _m (MPa)	R _{p0,2} (MPa) min	R _m (MPa)	A ₅ (%) min	KV (J) min	R _{p0,2} (MPa) min	R _m (MPa)	A ₅ (%) min	R _{p0,2} (MPa) min	R _m (MPa)	A ₅ (%) min
≥ 5 ≤ 10	-	-	-	-	-	-	595	850÷1050	8	565	750÷1050	5
> 10 ≤ 16	-	-	-	-	-	-	565	800÷1010	8	500	710÷1030	6
> 16 ≤ 40	172÷241	580÷820	430	650÷800	16	25	525	700÷900	9	410	650÷1000	7
> 40 ≤ 63	172÷241	580÷820	370	630÷780	17	25	455	650÷850	10	360	630÷900	8
> 63 ≤ 100	172÷241	580÷820	370	630÷780	17	25	455	650÷850	11	310	580÷850	8

*This values are valid also for Cold Drawn - Quenched + Tempered Condition (+C +QT)
 For size <5 mm the mechanical properties may be agreed at the time of enquiry and order



HARDNESS LIMITS (JOMINY TEST)

Limits of range	Hardness HRC at a distance from quenched end of test pieces (mm)																
	1	2	3	4	5	6	7	8	9	10	11	13	15	20	25	30	
+H	Max	62	61	61	60	57	51	44	37	34	33	32	31	30	29	28	27
	Min	55	51	37	30	28	27	26	25	24	23	22	21	20	-	-	-

WORKING TEMPERATURES RECOMMENDED

Operation	Hot forgings deformation	Normalizing	Soft annealing	Quenching in oil or water	Tempering
°C	850÷1150	850÷890	650÷700	830÷870	550÷660

