Table 9 — Mechanical properties[a] at room temperature in the quenched and tempered condition (+QT)

Steel designation		Mechanical properties for the ruling section (see EN 10083-1:2006, Annex A) with a diameter (*d*) or for flat products thickness (*t*) of														
		d ≤ 16 mm *t* ≤ 8 mm					16 mm < *d* ≤ 40 mm 8 mm < *t* ≤ 20 mm					40 mm < *d* ≤ 100 mm 20 mm < *t* ≤ 60 mm				
Name	Number	R_e min.	R_m	*A* min.	*Z* min.	*KV* [b] min.	R_e min.	R_m	*A* min.	*Z* min.	*KV* [b] min.	R_e min.	R_m	*A* min.	*Z* min.	*KV* [b] min.
		MPa[c]		%	%	J	MPa[c]		%	%	J	MPa[c]		%	%	J
Quality steels																
C35	1.0501	430	630 to 780	17	40	-	380	600 to 750	19	45	-	320	550 to 700	20	50	-
C40	1.0511	460	650 to 800	16	35	-	400	630 to 780	18	40	-	350	600 to 750	19	45	-
C45	1.0503	490	700 to 850	14	35	-	430	650 to 800	16	40	-	370	630 to 780	17	45	-
C55	1.0535	550	800 to 950	12	30	-	490	750 to 900	14	35	-	420	700 to 850	15	40	-
C60	1.0601	580	850 to 1 000	11	25	-	520	800 to 950	13	30	-	450	750 to 900	14	35	-
Special steels																
C22E C22R	1.1151 1.1149	340	500 to 650	20	50	-	290	470 to 620	22	50	50	-	-	-	-	-
C35E C35R	1.1181 1.1180	430	630 to 780	17	40	-	380	600 to 750	19	45	35	320	550 to 700	20	50	35
C40E C40R	1.1186 1.1189	460	650 to 800	16	35	-	400	630 to 780	18	40	30	350	600 to 750	19	45	30
C45E C45R	1.1191 1.1201	490	700 to 850	14	35	-	430	650 to 800	16	40	25	370	630 to 780	17	45	25
C50E C50R	1.1206 1.1241	520	750 to 900	13	30	-	460	700 to 850	15	35	-	400	650 to 800	16	40	-
C55E C55R	1.1203 1.1209	550	800 to 950	12	30	-	490	750 to 900	14	35	-	420	700 to 850	15	40	-
C60E C60R	1.1221 1.1223	580	850 to 1 000	11	25	-	520	800 to 950	13	30	-	450	750 to 900	14	35	-
28Mn6	1.1170	590	800 to 950	13	40	-	490	700 to 850	15	45	40	440	650 to 800	16	50	40

[a] R_e: Upper yield strength or, if no yield phenomenon occurs, the 0,2 % proof strength $R_{p0,2}$.
R_m: Tensile strength.

A: Percentage elongation after fracture (gauge length $L_0 = 5{,}65\sqrt{S_0}$; see Table 12, column 7a, line T4).

Z: Reduction in cross-section on fracture.
KV: Impact strength of longitudinal Charpy V-notch test pieces (average of 3 individual values shall meet the minimum specified in the table; no individual value shall be lower than 70% of the minimum shown in the table).

[b] For sampling see EN 10083-1:2006 figure 1 and figure 3

[c] 1 MPa = 1 N/mm^2

Table 10 — Mechanical properties[a] at room temperature in the normalized condition (+N)

Steel designation		Mechanical properties for products with a diameter (d) or, for flat products, a thickness (t) of								
		$d \leq 16$ mm $t \leq 16$ mm			16 mm < $d \leq 100$ mm 16 mm < $t \leq 100$ mm			100 mm < $d \leq 250$ mm 100 mm < $t \leq 250$ mm		
Name	Number	R_e min. MPa[c]	R_m min. MPa[c]	A min. %	R_e min. MPa[c]	R_m min. MPa[c]	A min. %	R_e min. MPa[c]	R_m min. MPa[c]	A min. %
Quality steels										
C35	1.0501	300	550	18	270	520	19	245	500	19
C40	1.0511	320	580	16	290	550	17	260	530	17
C45	1.0503	340	620	14	305	580	16	275	560	16
C55	1.0535	370	680	11	330	640	12	300	620	12
C60	1.0601	380	710	10	340	670	11	310	650	11
Special steels[b]										
C22E C22R	1.1151 1.1149	240	430	24	210	410	25	-	-	-
C35E C35R	1.1181 1.1180	300	550	18	270	520	19	245	500	19
C40E C40R	1.1186 1.1189	320	580	16	290	550	17	260	530	17
C45E C45R	1.1191 1.1201	340	620	14	305	580	16	275	560	16
C50E C50R	1.1206 1.1241	355	650	13	320	610	14	290	590	14
C55E C55R	1.1203 1.1209	370	680	11	330	640	12	300	620	12
C60E C60R	1.1221 1.1223	380	710	10	340	670	11	310	650	11
28Mn6	1.1170	345	630	17	310	600	18	290	590	18

[a] R_e: Upper yield strength or, if no yield phenomenon occurs, the 0,2 % proof strength $R_{p0,2}$.
R_m: Tensile strength.
A: Percentage elongation after fracture (gauge length $L_0 = 5{,}65\sqrt{S_0}$; see Table 12, column 7a, line T4).

[b] The values also apply for the special steel grades with hardenability requirements (+H, +HH and +HL grades) as specified in Tables 5 to 7.

[c] 1 MPa = 1 N/mm^2.