

# EN10025-2: 2004

Chemical Composition of the Ladle Analysis for Flat and Long Products<sup>a</sup>

Designation		Method of deoxidation b	C in % max. for nominal product thickness in mm			Si % max.	Mn % max.	P % max. d	S % max. d,e	N % max. f	Cu % max. g	Other % max. h
			≤16	>16 ≤40	> 40 <sup>c</sup>							
According EN10027-1 and CR 10260	According EN10027-2											
S235JR	I.0038	FN	0,17	0,17	0,20	-	1,40	0,035	0,035	0,012	0,55	-
S235J0	I.0114	FN	0,17	0,17	0,17	-	1,40	0,030	0,030	0,012	0,55	-
S235J2	I.0117	FF	0,17	0,17	0,17	-	1,40	0,025	0,025	-	0,55	-
S275JR	I.0044	FN	0,21	0,21	0,22	-	1,50	0,035	0,035	0,012	0,55	-
S275J0	I.0143	FN	0,18	0,18	0,18 <sup>i</sup>	-	1,50	0,030	0,030	0,012	0,55	-
S275J2	I.0145	FF	0,18	0,18	0,18 <sup>i</sup>	-	1,50	0,025	0,025	-	0,55	-
S355JR	I.0045	FN	0,24	0,24	0,24	0,55	1,60	0,035	0,035	0,012	0,55	-
S355J0	I.0553	FN	0,20 <sup>j</sup>	0,20 <sup>k</sup>	0,22	0,55	1,60	0,030	0,030	0,012	0,55	-
S355J2	I.0577	FF	0,20 <sup>j</sup>	0,20 <sup>k</sup>	0,22	0,55	1,60	0,025	0,025	-	0,55	-
S355K2	I.0596	FF	0,20 <sup>j</sup>	0,20 <sup>k</sup>	0,22	0,55	1,60	0,025	0,025	-	0,55	-
S450J0 <sup>l</sup>	I.0590	FF	0,20	0,20 <sup>k</sup>	0,22	0,55	1,70	0,030	0,030	0,025	0,55	<sup>m</sup>

- a See 7.2.
- b FN = rimming steels not permitted; FF = fully killed steel (see 6.2.2).
- c For sections with nominal thickness > 100 mm the C content by agreement. See option 26.
- d For long products the P and S content can be 0,005 % higher.
- e For long products the max. S content can be increased for improved machinability by 0,015 % by agreement if the steel is treated to modify the sulphide morphology and the chemical composition shows min. 0,0020 % Ca. See option 27.
- f The max. value for nitrogen does not apply if the chemical composition shows a minimum total Al content of 0,020 % or alternatively min. 0,015 % acid soluble Al or if sufficient other N binding elements are present. In this case the N binding elements shall be mentioned in the inspection document.
- g Cu content above 0,40 % may cause hot shortness during hot forming.
- h If other elements are added, they shall be mentioned on the inspection document.
- i For nominal thickness > 150 mm: C = 0,20 % max..
- j For grades suitable for cold roll forming (see 7.4.2.2.3): C = 0,22 % max..
- k For nominal thickness > 30 mm: C = 0,22 % max..
- l Applicable for long products only.
- m The steel may show a Nb content of max. 0,05 %, a V content of max. 0,13 % and a Ti content of max. 0,05 %.

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## Mechanical Properties

Designation		Minimum yield strength $R_{eH}^a$ MPa <sup>b</sup> Nominal thickness mm										Tensile strength $R_m^a$ MPa <sup>b</sup> Nominal thickness mm				
According EN 10027-1 and CR 10260	According EN 10027-2	≤16	>16 ≤40	>40 ≤63	>63 ≤80	>80 ≤100	>100 ≤150	>150 ≤200	>200 ≤250	>250 ≤400 <sup>c</sup>	<3	≥3 ≤100	>100 ≤150	>150 ≤250	>250 ≤400 <sup>c</sup>	
S235JR	1.0038	235	225	215	215	215	195	185	175	-	360 to 510	360 to 510	350 to 500	340 to 490	-	
S235J0	1.0114	235	225	215	215	215	195	185	175	-	360 to 510	360 to 510	350 to 500	340 to 490	-	
S235J2	1.0117	235	225	215	215	215	195	185	175	165	360 to 510	360 to 510	350 to 500	340 to 490	330 to 480	
S275JR	1.0044	275	265	255	245	235	225	215	205	-	430 to 580	410 to 560	400 to 540	380 to 540	-	
S275J0	1.0143	275	265	255	245	235	225	215	205	-	430 to 580	410 to 560	400 to 540	380 to 540	-	
S275J2	1.0145	275	265	255	245	235	225	215	205	195	430 to 580	410 to 560	400 to 540	380 to 540	380 to 540	
S355JR	1.0045	355	345	335	325	315	295	285	275	-	510 to 680	470 to 630	450 to 600	450 to 600	-	
S355J0	1.0553	355	345	335	325	315	295	285	275	-	510 to 680	470 to 630	450 to 600	450 to 600	-	
S355J2	1.0577	355	345	335	325	315	295	285	275	265	510 to 680	470 to 630	450 to 600	450 to 600	450 to 600	
S355K2	1.0596	355	345	335	325	315	295	285	275	265	510 to 680	470 to 630	450 to 600	450 to 600	450 to 600	
S450J0 <sup>d</sup>	1.0590	450	430	410	390	380	380	-	-	-	-	550 to 720	530 to 700	-	-	

- a For plate, strip and wide flats with widths  $\geq 600$  mm the direction transverse (t) to the rolling direction applies. For all other products the values apply for the direction parallel (l) to the rolling direction.
- b 1 MPa = 1 N/mm<sup>2</sup>.
- c The values apply to flat products.
- d Applicable for long products only.

## Mechanical Properties (Concluded)

Designation		Position of test pieces <sup>a</sup>	Minimum percentage elongation after fracture <sup>a</sup> %										
According EN 10027-1 and CR 10260	According EN 10027-2		$L_0 = 80$ mm Nominal thickness mm					$L_0 = 5,65 \sqrt{s_0}$ Nominal thickness mm					
			≤1	>1 ≤1,5	>1,5 ≤2	>2 ≤2,5	>2,5 ≤3	≥3 ≤40	>40 ≤63	>63 ≤100	>100 ≤150	>150 ≤250	>250 <sup>c</sup> ≤400 only for J2 and K2
S235JR	1.0038	l	17	18	19	20	21	26	25	24	22	21	-
S235J0	1.0114												-
S235J2	1.0117	t	15	16	17	18	19	24	23	22	22	21	21 (l and t)
S275JR	1.0044	l	15	16	17	18	19	23	22	21	19	18	-
S275J0	1.0143												-
S275J2	1.0145	t	13	14	15	16	17	21	20	19	19	18	18 (l and t)
S355JR	1.0045	l	14	15	16	17	18	22	21	20	18	17	-
S355J0	1.0553												-
S355J2	1.0577												17 (l and t)
S355K2	1.0596	t	12	13	14	15	16	20	19	18	18	17	17 (l and t)
S450J0 <sup>d</sup>	1.0590	l	-	-	-	-	-	17	17	17	17	-	-

- a For plate, strip and wide flats with widths  $\geq 600$  mm the direction transverse (t) to the rolling direction applies. For all other products the values apply for the direction parallel (l) to the rolling direction.
- c The values apply to flat products.
- d Applicable for long products only.