EN 10225: 2001 Chemical & Mechanical Properties

Chemical Properties

Group	Steel name	Steel number	C max. %	Si max. %	Mn %	P max. %	S max. %	Cr max. %	Mo max. %	Ni max. %	Al (Total)[b] %	Cu max. %	N max. %	Nb max. %	Ti max. %	V max. %	Cr+Mo+Ni+Cu max. %	Nb+V max. %	Nb+V+Ti max. %
			Ladle analysis[a]																
1	S355G1[d] S355G1+N	1.8814 1.8814+N	0,20	0,50	0,90 to 1,65	0,035	0,030	0,30	0,10	0,50	0,020min.	0,35	0,015	0,050	0,030	0,120	-	-	-
1	S355G4[d] S355G4+M	1.8803 1.8803+M	0,16	0,50	1,60max.	0,035	0,030	-	0,20	0,30	0,020min.	0,35	0,015	0,050	0,050	0,100	-	-	-
			Ladle and product analysis																
2	S355G11[c,d] S355G11+N[c] S355G11+M[c]	1.8806 1.8806+N 1.8806+M	0,14	0,55	1,65max.	0,025	0,015	0,25	0,08	0,50	0,015/ 0,055	0,30	0,012	0,040	0,025	0,060	0,80	0,06	0,08
3	S355G12[c,d] S355G12+N[c] S355G12+M[c]	1.8809 1.8809+N 1.8809+M	0,14	0,55	1,65max.	0,020	0,007	0,25	0,08	0,50	0,015/ 0,055	0,30	0,012	0,040	0,025	0,060	0,80	0,06	0,08
2	S420G3[c,d] S420G3+M[c]	1.8851 1.8851+M	0,14	0,55	1,65max.	0,025	0,015	0,25	0,08	0,70	0,015/ 0,055	0,30	0,012	0,050	0,025	0,080	0,80	0,09	0,11
3	S420G4[c,d] S420G4+M[c]	1.8859 1.8859+M	0,14	0,55	1,65max.	0,020	0,007	0,25	0,08	0,70	0,015/ 0,055	0,30	0,012	0,050	0,025	0,080	0,80	0,09	0,11
2	S460G3[c,d] S460G3+M[c]	1.8883 1.8883+M	0,14	0,55	1,70max.	0,025	0,015	0,25	0,08	0,70	0,015/ 0,055	0,30	0,012	0,050	0,025	0,080	0,80	0,12	0,13
3	S460G4[c,d] S460G4+M[c]	1.8889 1.8889+M	0,14	0,55	1,70max.	0,020	0,007	0,25	0,08	0,70	0,015/ 0,055	0,30	0,012	0,050	0,025	0,080	0,80	0,12	0,13

NOTE

a For product chemical composition variations see Table 12.

b The total aluminium to nitrogen ratio shall be a minimum of 2:1. When other nitrogen binding elements are used, the minimum Al value and Al:N ratio does not apply.

c The levels of the residual elements arsenic, antimony, tin, lead, bismuth and calcium shall not exceed 0,03 % As, 0,010 % Sb, 0,020 % Sn, 0,010 % Pb, 0,010 % Bi and 0,005 % Ca. Boron (B)shall not exceed 0,000 5 %. These elements shall be checked at least once every 5 000 tonnes at each manufacturing location and shall be reported as a ladle analysis.

d As-rolled condition limited to a maximum thickness of 25 mm.

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Mechanical Properties

Group	Steel name	Steel number	Tensile strength R_m	Minimum yield strength R_{eH} for thickness t (mm)				Minimum elongation A gauge length of $5{,}65\sqrt{S_0}$	Minimum average Charpy V-notch impact test value	
			MPa[f]	t ≤ 16 MPa[f]	16 < t ≤ 40 MPa[f]	40 < t ≤ 63 MPa[f]	R_e/R_m maximum ratio	%	Temp. °C	Energy J
1	S355G1[e] S355G1+N	1.8814 1.8814+N	470 to 630	355	345[d]	-	0,87	22	-20	50
1	S355G4[e] S355G4+M	1.8803 1.8803+M	450 to 610	355	345[d]	-	0,87	22	-20	50
2	S355G11[e] S355G11+N S355G11+M	1.8806 1.8806+N 1.8806+M	460 to 620	355	345	335	0,87	22	-40[b]	50
3	S355G12[e] S355G12+N S355G12+M	1.8809 1.8809+N 1.8809+M	460 to 620	355	345	335	0,87	22	-40[b]	50[b]
2	S420G3[e] S420G3+M	1.8851 1.8851+M	500 to 690	420	410	400	0,90	19	-40[b]	60
3	S420G4[e] S420G4+M	1.8859 1.8859+M	500 to 690	420	410	400	0,90	19	-40[b]	60[c]
2	S460G3[e] S460G3+M	1.8883 1.8883+M	530 to 720	460	440	430	0,90	17	-40[b]	60
3	S460G4[e] S460G4+M	1.8889 1.8889+M	530 to 720	460	440	430	0,90	17	-40[b]	60[c]

When agreed at the time of enquiry and order, sections with thicknesses greater than specified shall be supplied, see option 25.

a See option 26.
b For up to and including 25 mm thickness, test at -20 °C.
c See option 27.
d Available up to 25 mm thick only.
e As rolled condition limited to maximum thickness of 25 mm.
f 1 MPa = 1 N/mm².

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