3. Hot-rolled steel flats

3.2. HOT-ROLLED STEEL FOR EXPORT ACCORDING TO DOMESTIC AND INTERNATIONAL STANDARDS

Figure 3.8. Thickness-to-width relation

Strip thickness, mm	Strip width, mm							
	900	1280	1360	1440	1550	1640	1710	1850
1.45	■	■						
1.8	■	■	■					
2.0	■	■	■	■	■			
2.6	■	■	■	■	■	■		
3.0	■	■	■	■	■	■	■	
3.5	■	■	■	■	■	■	■	■
up to 14.0	■	■	■	■	■	■	■	■

Hot-rolled material with other product mix requirements, including those in terms of thickness to width ratio may be produced on special order subject to an additional agreement.

3.2.5. Hot-rolled steel (strength class — 350 MPa)

Table 3.13. Mechanical properties of steel

Steel grade	Standard	Strip thickness, mm	Mechanical properties				
			Tensile strength MPa (N/mm^2)	Yield point, MPa (N/mm^2)	Elongation%, min	Mandrel diameter at 180° bending	Impact energy J, min (T, °C)
S235JRG2	EN 10025: 1993	1.45 – 2.90	360–510	235	19	d=1.5a	…
S235JRG2	EN 10025: 1993	3.00 – 9.90	340–470	235	24	d=2.0a	*(+20)
S235JRG2	EN 10025: 1993	10.0 –14.00	340–470	235	24	d=2.0a	27 (+20)
S235JO	EN 10025: 1993	1.50 – 2.90	360–510	235	19	d=1.0a	…
S235JO	EN 10025: 1993	3.00 – 9.90	340–470	235	24	d=1.5a	*(0)
S235JO	EN 10025: 1993	10.0 –14.00	340–470	235	24	d=1.5a	27 (0)
S235J2G3	EN 10025: 1993	1.50 – 2.90	360–510	235	19	d=1.0a	…
S235J2G3	EN 10025: 1993	3.00 – 9.90	340–470	235	24	d=1.5a	*(–20)
S235J2G3	EN 10025: 1993	10.0 –14.00	340–470	235	24	d=1.5a	27 (–20)
S235JR	EN 10025: 2004	1.50 –14.00	360–510	235	16–24**	d=1.6–25 mm*	27 (+20)
S235JO	EN 10025: 2004	1.50 –14.00	360–510	235	16–24**	d=1.6–25 mm	27 (0)
S235J2	EN 10025: 2004	1.50 –14.00	360–510	235	16–24**	d=1.6–25 mm	*(–20)
30	ASTM A 1011 (ASTM A 570)	1.50 – 1.59	340 min	205	21	d=1.0a	…
30	ASTM A 1011 (ASTM A 570)	1.60 – 2.49	340 min	205	24	d=1.0a	…
30	ASTM A 1011 (ASTM A 570)	2.50 – 4.45	340 min	205	25	d=1.0a	…
30	ASTM A 1018 (ASTM A 907)	4.50 –14.00	340 min	205	22	…	…
33	ASTM A 1011 (ASTM A 570)	1.50 – 1.59	360 min	230	18	d=1.0a	…
33	ASTM A 1011 (ASTM A 570)	1.60 – 2.45	360 min	230	22	d=1.0a	…

3. Hot-rolled steel flats

3.2. HOT-ROLLED STEEL FOR EXPORT ACCORDING TO DOMESTIC AND INTERNATIONAL STANDARDS

Mechanical properties of steel

Steel grade	Standard	Strip thickness, mm	Mechanical properties				
			Tensile strength MPa (N/mm^2)	Yield point, MPa (N/mm^2)	Elongation%, min	Mandrel diameter at 180° bending	Impact energy J, min (T, °C)
33	ASTM A 1011 (ASTM A 570)	2.50 – 4.49	360 min	230	23	d=1.0a	…
33	ASTM A 1018 (ASTM A 907)	4.50 –14.00	360 min	230	22	…	…
1012	ASTM A 635	4.50 –14.00	…	…	…	…	…
1012	SAE J403	1.50 – 4.45	…	…	…	…	…

… — parameter not limited by standard.
a — strip thickness
* — impact energy with sample width of 5.0-9.9 mm for steels:
S235JRG2 under EN 10025 corresponds to St 37-2 under DIN 17100 S235J0 under EN 10025 corresponds to St 37-3 under DIN 17100
S235J2G3 under EN 10025 corresponds to St 37-3N under DIN 17100
** — depending on strip thickness.
When ordering rolled steel under EN 10025 the letter "N" is added to the steel grade name for normalized rolled steel. Previous standard designation is given in parenthesis.

Table 3.14. Chemical composition of steel

Fraction of total mass, %									
C	Si	Mn	Al	S	P	Cr	Ni	Cu	N
0.10–0.15	0.15–0.30	0.30–0.60	0.02–0.07	0.035 max	0.030 max	0.15 max	0.20 max	0.20 max	0.008 max

For all steel grades under A1011(ASTM A570) fraction of total mass of molybdenum, vanadium and niobium is determined, which must not exceed:
Mo — 0.06 %; V — 0.008 %; Nb — 0.008 %

Total content of Cu, Cr, Ni and Mo must not exceed 0.50 %, and Cr + Mo shall be 0.16 % maximum.

For all steel grades under ASTM A1018 (ASTM A907) fraction of total mass of molybdenum, vanadium, niobium and titanium is determined, which must not exceed:
Mo — 0.06 %; V — 0.008 %; Nb — 0.008 %, Ti — 0.008 %

Total content of Cu, Cr, Ni and Mo must not exceed 0.50 %, and Cr + Mo shall be 0.16 % maximum.

For steel grade 1012 under ASTM A 635 and SAE J403 fraction of total mass of molybdenum, vanadium and niobium is determined, which must not exceed:

Mo — 0.06 %; V — 0.008 %; Nb — 0.008 %

Total content of Cu, Cr, Ni and Mo must not exceed 0.50 %.

3. Hot-rolled steel flats

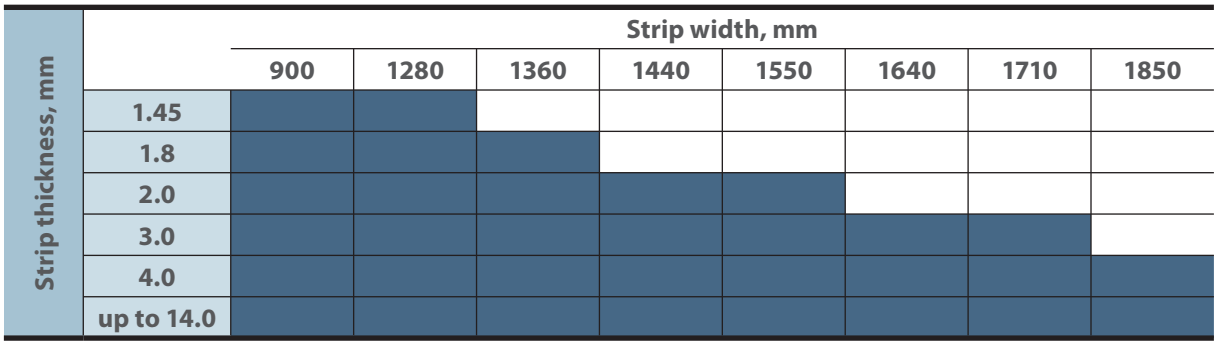
3.2. HOT-ROLLED STEEL FOR EXPORT ACCORDING TO DOMESTIC AND INTERNATIONAL STANDARDS

Table 3.15. Shape and dimensional tolerances

Standard for technical specification	EN 10025	ASTM A 1011 (ASTM A 570) SAE J403	ASTM A 635 ASTM A 1018 (ASTM A 907)
Standard for product mix, geometry and tolerances	EN 10051 EN 10029	ASTM A 568	ASTM A 635

Previous standard designation is given in parenthesis.

Figure 3.9. Thickness-to-width relation



Hot-rolled material with other product mix requirements, including those in terms of thickness to width ratio may be produced on special order subject to an additional agreement.

3.2.6. Hot-rolled steel (strength class — 400 MPa)

Table 3.16. Mechanical properties of steel

Steel grade	Standard	Strip thickness, mm	Mechanical properties				
			Tensile strength MPa (N/mm^2)	Yield point MPa (N/mm^2)	Elongation%, min	Mandrel diameter at 180° bending	Impact energy J, min (T, °C)
36 type 1	ASTM A 1011 (ASTM A 570)	1.80 – 2.49	365 min	250	21	d=1.5a	…
36 type 1	ASTM A 1011 (ASTM A 570)	2.50 – 4.45	365 min	250	22	d=1.5a	…
36 type 2	ASTM A 1011 (ASTM A 570)	1.80 – 2.49	400–550	250	20	d=2.0a	…
36 type 2	ASTM A 1011 (ASTM A 570)	2.50 – 4.45	400–550	250	21	d=2.0a	…
36	ASTM A 1018 (ASTM A 907)	4.50 – 14.00	365 min	250	21	…	…
1017	ASTM A 659	1.80 – 4.45	…	…	…	d=2.0a	…
1017	ASTM A 635	4.50 – 14.00	…	…	…	…	…
SS 400	JIS G 3101	1.80 – 5.00	400–510	245	21	d=1.5a	…
SS 400	JIS G 3101	5.10 – 14.00	400–510	245	17	d=1.5a	…
SPHT3	JIS G 3132	1.80 – 2.90	410 min	…	22	d=1.5a	…
SPHT3	JIS G 3132	3.00 – 5.90	410 min	…	25	d=2.0a	…
SPHT3	JIS G 3132	6.00 – 14.00	410 min	…	27	d=2.0a	…