

Steel for forming

Hot-rolled steel for cold forming is used for bending and deep drawing and is suitable for pickling and welding. It has good properties for moderately deep-drawn parts.

Typical applications

- car components
- tubes and sections
- components for domestic appliances
- industrial furniture
- garden furniture

Standards

Hot-rolled steel for forming complies with European standard EN 10111 : 1998 shown in table 8 below. Former national standards and nearest related grades are also shown in the table.

Table 8: Standards

European	National			
EN 10111 : 1998	UK	France	Germany	Italy
Grade	BS 1449 part 1	NFA 36-301	DIN 1614 part 2	UNI 5867
DD14	–	3C+	–	AP14
DD13	HR1	3C	StW24	AP13
DD12	HR2	(2C)	RRStW23	AP12
DD11	HR3/HR4	1C	StW22	AP11

Table 9: Mechanical properties: EN 10111 : 1998

Grade	R _{eL} (N/mm ²)		R _m (N/mm ²)	A (%)		Bend test mandrel diameter	
	Min-max		Max	Min			
	1.5 ≤ t < 2	2 ≤ t ≤ 8		L ₀ = 80mm			
				1.5 ≤ t < 2	2 ≤ t < 3	L ₀ = 5.65√S ₀ 3 ≤ t ≤ 8	
DD14	170-310	170-290	380	31	32	36	1t
DD13	170-330	170-310	400	28	29	33	0t
DD12	170-340	170-320	420	25	26	30	0t
DD11	170-360	170-340	440	23	24	28	0t

Note: Material thickness, t, is in millimetres.

Mechanical properties

The values shown for the mechanical properties in table 9 below are for test pieces taken transverse to the rolling direction.

Chemical composition

Hot-rolled steel for forming meets the requirements of the cast analysis in the standard, as shown in table 10 on page 9.

Dimensions

The width and thickness limits are shown in tables 11 and 12 on page 9.

Table 10: Chemical composition: EN 10111 : 1998

Grade	C	Mn	P	S
	Max	Max	Max	Max
DD14	0.08	0.35	0.025	0.025
DD13	0.08	0.40	0.030	0.030
DD12	0.10	0.45	0.035	0.035
DD11	0.12	0.60	0.045	0.045

Note: Values are in weight percentages.

Table 11: Dimensions: EN 10111 : 1998 Mill finish

Thickness		Width	
>	≤	Min	Max
1.47	1.50	700	1300
1.50	1.60	700	1330
1.60	1.70	700	1405
1.70	1.80	700	1480
1.80	1.90	700	1555
1.90	2.00	700	1630
2.00	2.10	700	1750
2.10	2.40	700	1830
2.40	2.60	700	1924
2.60	2.70	700	2029
2.70	8.00	700	2070

Note: Dimensions are in millimetres.

Table 12: Dimensions: EN 10111 : 1998 Pickled

Thickness		Width	
>	≤	Min	Max
1.50	1.60	735	1330
1.60	1.70	735	1405
1.70	1.80	735	1480
1.80	1.90	735	1555
1.90	2.00	735	1630
2.00	2.20	735	1705
2.20	2.40	735	1820
2.40	2.60	735	1924
2.60	2.70	735	2028
2.70	4.76	735	2070
4.76	4.90	735	2040
4.90	5.00	735	2000
5.00	5.10	750	1960
5.10	5.20	750	1923
5.20	5.30	750	1886
5.30	5.40	750	1852
5.40	5.50	750	1818
5.50	5.60	750	1785
5.60	5.70	750	1754
5.70	5.80	750	1724
5.80	5.90	750	1695
5.90	6.00	750	1666

Note: Dimensions are in millimetres.