

## Corus

**Corus manufactures, processes and distributes metal products and provides design, technology and consultancy services. The focus is upon customer satisfaction, achieved through quality products and services and innovative metal solutions.**

Corus seeks the earliest possible involvement with its customers to ensure that the best product is specified for the application and that the most advantageous design and processing technologies are used to produce the customer's end product.

The company is committed to environmental care and protection by minimising the impact of its operations and its products through the adoption of sustainable practices and through continuous improvement in environmental performance and control.

## This catalogue

This catalogue is divided into four main sections, each colour-coded for easy recognition.

- Hot-rolled products
- Cold-rolled products
- Hot-dip galvanised products
- General information

Each of the first three sections above begins with an introductory chapter that lists the strip steel products available in the range and describes their general characteristics. The introductory chapters are followed by individual chapters for each of the products in the range. These detailed chapters describe typical applications of the product, its compliance with standards, and its mechanical properties, chemistry and dimensions. Symbols used in the catalogue are defined in the glossary on page 74.

The fourth section contains complementary information about service and quality, inspection documents, packing, transport, and how to contact Corus.

If you have questions about the information in this catalogue, please call us at the appropriate office listed on page 73.

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## Hot-rolled products

**Hot rolling at Corus produces primary strip steel products in a range that offers extensive performance characteristics, versatility and economy, as well as steels for specific applications.**

### General

The hot-rolled strip steel products offered in this section are listed below.

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### Grades

This section of the catalogue shows the standard grades of hot-rolled steel offered by Corus.

### Typical applications

- automotive components
- tubes and sections
- ship plate
- bridge components
- pressure vessels and boilers
- domestic appliances
- industrial furniture
- slip-resistant floor plate
- yellow goods
- components for building and construction
- feed stock for cold-rolled, galvanised and packaging steels

### Coil condition

Corus can supply hot-rolled steel in the following conditions:

#### Hot-rolled coil:

Mill edges

Trimmed edges (on request)

Skin-passed (on request); available in thicknesses  $\leq 6.25\text{mm}$

#### Pickled and oiled coil:

Mill edges

Trimmed edges

#### Pickled dry (on request):

Mill edges

Trimmed edges

## Overall thickness and width limits

The overall thickness and width limits for hot-rolled products are shown in table 1 on page 6. The limits for specific products are shown under individual product headings throughout the hot-rolled section.

## Coil diameters

The coil diameters that apply to hot-rolled coil are shown in table 2 on page 6.

## Coil weight

The maximum weight of hot-rolled coils offered by Corus is determined by three factors:

- Manufacturing limit: Maximum 21kg/mm of width up to 33 tonnes
- Maximum safe outside diameter of coil (mm):  $10/7 \times$  coil width (limit of 2100mm)
- Maximum weight allowed by road/rail transport

Corus will discuss these factors with the customer to ensure compatibility with the quantity ordered.

Particular hot-rolled products may have maximum coil weights that differ from the range as a whole (see individual product sections).

If a minimum coil weight has not been specified by the customer and agreed with Corus, then it will be 50% of the agreed maximum weight.

## Tolerances on dimensions and shape

Tolerances for continuously hot-rolled uncoated plate, sheet and strip of non-alloy and alloy steels are given in EN 10051 : 1991+A1 : 1997.

### Tolerances for wide strip and slit wide strip

The values in EN 10051 : 1991+A1 : 1997 do not apply to the uncropped ends of the coil, i.e. the 'head' and 'tail'. The maximum length (in metres) of these ends can be equal to  $90/\text{nominal thickness (mm)}$ , but will not exceed 20 metres in total.

### Thickness

The thickness tolerances shown in table 3 on page 6 are from EN 10051 : 1991+A1 : 1997 and are for hot-

rolled steel with normal deformation resistance. The tolerances for grades with yield strengths greater than  $350\text{N/mm}^2$  can be calculated as shown in note 1 to table 3.

Corus generally supplies hot-rolled coil to tighter tolerances than those in EN 10051 : 1991+A1 : 1997, typically within 75% of the values in table 3. If improved tolerances are required, they must be agreed with Corus before ordering.

For cold-forming steels supplied to EN 10111 : 1998, the thickness tolerances are shown in table 4 on page 6.

### Crown values

Maximum crown value can be agreed between the customer and Corus when the material is ordered.

### Coil width

The coil width tolerances in table 5 on page 7 are from EN 10051 : 1991+A1 : 1997.

### Flatness

Flatness complies with EN 10051 : 1991+A1 : 1997 as shown in table 6 for steel grades with normal deformation resistance and table 7 for high deformation resistance, both on page 7.

### Edge camber

For strip that is 700mm wide or more, the deviation over a length of 5 metres will not exceed 20mm for mill edges and 15mm for trimmed edges.

## Surface

Hot-rolled steel is available in mill finish or pickled condition and can be supplied for surface-critical applications.

Pickled material can be supplied with rolling oil or preservative oil, normally from  $1.7\text{g/m}^2$  to  $2.3\text{g/m}^2$ , or with less oil on request.

If the level of oiling required is not specified in the order, a normal amount of oil will be applied.

**Table 1: Thickness and width limits**

Product	Product form	Thickness		Width	
		Min	Max	Min	Max
Hot-rolled dry	Mill finish	1.47	20.00	700	2070
Hot-rolled dry	Trimmed edges	1.50	10.00	700	2060
Hot-rolled pickled	Pickled & oiled, mill edge	1.50	6.00	735	2070
Hot-rolled pickled	Pickled & oiled, trimmed edges	1.50	6.00	735	2060

**Note:** Dimensions are in millimetres.

**Table 2: Diameter of hot-rolled coil**

Inside diameter, mill finish	762mm
Inside diameter, pickled and trimmed	610mm standard, 762mm on request
Tolerance on inside diameter	+0/-50mm
Outside diameter	Max 10/7 x width (limit 2100mm)

**Table 3: Thickness tolerances**

**Normal deformation resistance**

**EN 10051 : 1991+A1 : 1997**

Nominal thickness		Tolerances for a nominal width of			
		≤1200	>1200 ≤1500	>1500 ≤1800	>1800
>	≤	±	±	±	±
1.47	2.00	0.17	0.19	0.21	–
2.00	2.50	0.18	0.21	0.23	0.25
2.50	3.00	0.20	0.22	0.24	0.26
3.00	4.00	0.22	0.24	0.26	0.27
4.00	5.00	0.24	0.26	0.28	0.29
5.00	6.00	0.26	0.28	0.29	0.31
6.00	8.00	0.29	0.30	0.31	0.35
8.00	10.00	0.32	0.33	0.34	0.40
10.00	12.50	0.35	0.36	0.37	0.43
12.50	15.00	0.37	0.38	0.40	0.46
15.00	20.00	0.40	0.42	0.45	0.50

**Notes:**

1. Tolerances on steel grades with a specified yield strength >350 N/mm<sup>2</sup> are increased by 15%, >420 N/mm<sup>2</sup> by 30%, and >480 N/mm<sup>2</sup> by 40%.
2. Dimensions are in millimetres.

**Table 4: Thickness tolerances**

**Cold forming steels**

**EN 10051 : 1991+A1 : 1997**

Nominal thickness		Tolerances for a nominal width of			
		≤1200	>1200 ≤1500	>1500 ≤1800	>1800
>	≤	±	±	±	±
1.47	2.00	0.13	0.14	0.16	–
2.00	2.50	0.14	0.16	0.17	0.19
2.50	3.00	0.15	0.17	0.18	0.20
3.00	4.00	0.17	0.18	0.20	0.20
4.00	5.00	0.18	0.20	0.21	0.22
5.00	6.00	0.20	0.21	0.22	0.22
6.00	8.00	0.22	0.23	0.23	0.26

**Note:** Dimensions are in millimetres.

**Table 5: Tolerances on coil width****EN 10051 : 1991+A1 : 1997**

Nominal width		Mill edge		Trimmed edge	
		lower –	upper +	lower –	upper +
≥700	≤1200	0	20	0	3
>1200	≤1500	0	20	0	5
>1500	≤2070	0	20	0	6

**Note:** Dimensions are in millimetres.

**Table 6: Flatness tolerances****Normal deformation resistance****EN 10051 : 1991+A1 : 1997**

Nominal thickness	Nominal width		Tolerance class	
			Normal tolerances	Special tolerances
≤2	–	≤1200	18	9
	>1200	≤1500	20	10
	>1500	–	25	13
>2≤25	–	≤1200	15	8
	>1200	≤1500	18	9
	>1500	–	23	12

**Notes:**

1. The tolerances in this table represent maximum deviation from flatness.
2. Dimensions are in millimetres.

**Table 7: Flatness tolerances****High deformation resistance****EN 10051 : 1991+A1 : 1997**

Nominal thickness	Nominal width		Tolerance class		
			B	C	D
≤25	–	≤1200	18	23	Note 1
	>1200	≤1500	23	30	Note 1
	>1500	–	28	38	Note 1

**Notes:**

1. This tolerance shall be agreed at the time of enquiry and order.
2. Tolerance classes B, C and D represent grades with an increased resistance to high temperature deformation.
3. The tolerances in this table represent maximum deviation from flatness.
4. Dimensions are in millimetres.

## 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 <sup>2</sup> )		$R_m$ (N/mm <sup>2</sup> )	A (%)		Bend test mandrel diameter	
	Min-max		Max	Min			
	1.5 ≤ t < 2	2 ≤ t ≤ 8		L <sub>0</sub> = 80mm			
				1.5 ≤ t < 2	2 ≤ t < 3	L <sub>0</sub> = 5.65√S <sub>0</sub>	
						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	<b>C</b>	<b>Mn</b>	<b>P</b>	<b>S</b>
	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.

## Tenform high-strength low-alloy steel

Tenform is hot-rolled high-strength steel with enhanced properties for forming and welding. It has been specially developed to combine high strength with good formability. The products in this section are Tenform XK and Tenform XF (reduced level of sulphur).

### Typical applications

- longitudinal members for chassis parts
- wheels
- seats
- airbag parts
- headrests
- safety belts
- clutch plates
- carriages for conventional and high-speed trains
- bridge construction
- light towers
- building and construction
- warehouse shelving
- silos and containers
- earth moving and agricultural machines

### Standards

The nearest equivalent European specifications to Tenform products are given in table 13 below. Corus also offers steels to the exact specification shown in EN 10149-2 : 1996.

### Mechanical properties

The values shown for strength and elongation in tables 14 and 15 on page 11 are for test pieces taken in the rolling direction; those for the bend test are for test pieces taken transverse to the rolling direction.

### Chemical composition

Table 16 on page 11 shows the chemical composition of Tenform steels. Table 17 on page 12 shows the chemical composition of high-strength low-alloy steels to EN 10149-2 : 1996.

### Dimensions

The width and thickness limits for Tenform are shown in tables 18 and 19 on page 12, and those for steel to EN 10149-2 : 1996 in tables 20 and 21 on pages 13 and 14.

**Table 13: Standards: Tenform XK/XF**

Corus	European	National		
	EN 10149-2 : 1996	UK	France	Germany
Grade		BS 1449	NFA 36-231	SEW 092
XK300	S315MC	HR40/30	E 315 D	QStE340TM
XK350	S355MC	HR43/35	E 355 D	QStE380TM
XK400	S420MC	HR46/40	E 420 D	QStE420TM
XK450	S460MC	HR50/45	–	QStE460TM
XF300	S315MC	HR40F30	E 315 D	–
XF350	S355MC	HR43F35	E 355 D	–
XF400	–	HR46F40	–	–
XF420	S420MC	–	E 420 D	QStE420TM
XF450	–	HR50F45	–	–
XF460	S460MC	–	–	QStE460TM
XF500	S500MC	–	E490 D	QStE500TM
XF550	S550MC	–	–	QStE550TM

**Table 14: Mechanical properties: Tenform XK/XF**

Grade	$R_{eL}$ (N/mm <sup>2</sup> )	$R_m$ (N/mm <sup>2</sup> )	A (%)	Bend test mandrel diameter
	Min	Min	Min	Min
			$L_0 = 80\text{mm}$	
XK300	300	400	24	2t
XK350	350	430	21	2t
XK400	400	460	18	3t
XK450	450	500	18	3t
XF300	300	400	26	0t
XF350	350	430	23	0.5t
XF400	400	460	20	0.5t
XF420	420	480	20	0.5t
XF450	450	500	20	1t
XF460	460	520	18	1t
XF500	500	550	18	1t
XF550	550	600	12	1t

Note: Material thickness, t, is in millimetres.

**Table 15: Mechanical properties: EN 10149-2 : 1996**

Grade	$R_{eL}$ (N/mm <sup>2</sup> )	$R_m$ (N/mm <sup>2</sup> )	A (%)	Bend test mandrel diameter	
	Min	Min-max	Min		Min
			$L_0 = 80\text{mm}$	$L_0 = 5.65\sqrt{S_0}$	
			$t < 3$	$t \geq 3$	
S315MC	315	390-510	20	24	0t
S355MC	355	430-550	19	23	0.5t
S420MC	420	480-620	16	19	0.5t
S460MC	460	520-670	14	17	1t
S500MC	500	550-700	12	14	1t
S550MC	550	600-760	12	14	1.5t

Note: Material thickness, t, is in millimetres.

**Table 16: Chemical composition: Tenform XK/XF**

Grade	C	Mn	P	S	Si	Micro-alloying elements (e.g. Nb)
	Max	Max	Max	Max	Max	Max
XK300/350/400/450	0.10	1.20	0.030	0.020	0.04	0.300
XF300/350/400/420/450/460	0.10	1.20	0.025	0.010	0.04	0.300
XF500	0.10	1.50	0.025	0.010	0.35	0.300
XF550	0.12	1.50	0.020	0.020	0.30	0.300

Note: Values are in weight percentages.

**Table 17: Chemical composition: EN 10149-2 : 1996**

Grade	C	Mn	P	S	Si	Al-total	V
	Max	Max	Max	Max	Max	Min	Max
S315MC	0.12	1.30	0.025	0.020	0.50	0.015	0.20
S355MC	0.12	1.50	0.025	0.020	0.50	0.015	0.20
S420MC	0.12	1.60	0.025	0.015	0.50	0.015	0.20
S460MC	0.12	1.60	0.025	0.015	0.50	0.015	0.20
S500MC	0.12	1.70	0.025	0.015	0.50	0.015	0.20
S550MC	0.12	1.80	0.025	0.015	0.50	0.015	0.20

Note: Values are in weight percentages.

**Table 18: Dimensions: Tenform XK/XF Mill finish**

Thickness		Width				
		Min	Max	XK/XF300	XK/XF350 XK/XF400	XF420 XK/XF450 XF460, XF500 XF550
>	≤					
1.50	1.60	710	1250	1100	1100	–
1.60	1.90	710	1425	1250	1250	–
1.90	2.10	710	1525	1300	1300	–
2.10	2.20	710	1600	1300	1300	–
2.20	2.40	710	1600	1375	1375	–
2.40	2.70	710	1700	1550	1550	–
2.70	2.80	710	1830	1550	1550	1275
2.80	6.00	710	1830	1600	1550	1275
6.00	6.30	710	1830	1550	1550	1275
6.30	7.00	710	1830	1500	1500	1275
7.00	8.00	710	1550	1500	1500	1275
8.00	9.50	710	1550	–	–	–
9.50	11.00	710	1400	–	–	–
11.00	12.70	710	1375	–	–	–

Note: Dimensions are in millimetres.

**Table 19: Dimensions: Tenform XK/XF Pickled**

Thickness		Width				
		Min	Max	XK/XF300	XK/XF350 XK/XF400	XF420 XK/XF450 XF460, XF500 XF550
>	≤					
1.50	1.60	735	1250	1100	1100	–
1.60	1.90	735	1425	1250	1250	–
1.90	2.10	735	1525	1300	1300	–
2.10	2.20	735	1550	1300	1300	–
2.20	2.40	735	1550	1350	1350	–
2.40	2.70	735	1550	1550	1550	–
2.70	5.00	735	1550	1550	1550	1275

Note: Dimensions are in millimetres.

**Table 20: Dimensions: EN 10149-2 : 1996 Mill finish**

Thickness		Width						
		Min	Max					
>	≤		S315MC	S355MC	S420MC	S460MC	S500MC	S550MC
1.50	1.53	700	1180	1100	1100	–	–	–
1.53	1.57	700	1210	1100	1100	–	–	–
1.57	1.60	700	1250	1117	1100	–	–	–
1.60	1.70	700	1280	1250	1250	–	–	–
1.70	1.80	700	1367	1255	1250	910	–	–
1.80	1.90	700 <sup>1</sup>	1442	1330	1250	1150	1150	1150
1.90	2.00	700 <sup>1</sup>	1517	1405	1300	1250	1250	1250
2.00	2.20	700 <sup>1</sup>	1592	1480	1300	1250	1250	1250
2.20	2.40	700	1730	1607	1401	1300	1250	1250
2.40	2.60	700	1806	1734	1550	1420	1350	1350
2.60	2.80	700	1882	1789	1646	1550	1550	1550
2.80	3.00	700	1958	1844	1722	1660	1550	1550
3.00	3.20	700	2034	1900	1754	1716	1555	1550
3.20	3.50	700	2070	1955	1785	1744	1675	1550
3.50	3.65	700	2070	2038	1833	1786	1716	1630
3.65	4.00	700	2070	2070	1856	1807	1736	1678
4.00	4.40	700	2070	2070	1856	1807	1736	1726
4.40	5.00	700	2070	2070	2070	1840	1780	1780
5.00	5.60	700	2070	2070	2070	1923	1862	1862
5.60	6.00	700	2070	2070	2070	2005	1943	1943
6.00	6.16	700	2070	2070	2070	2061	1998	–
6.16	6.60	700	2070	2070	2070	2070	2019	–
6.60	10.00	700	2070	2070	2070	2070	2070	–
10.00	12.70	700	2070	2070	2070	2070	–	–

**Notes:**

1. For thicknesses from 1.80mm to 2.20mm, in S500MC and S550MC, the minimum width is 810mm.
2. Dimensions are in millimetres.

**Table 21: Dimensions: EN 10149-2 : 1996 Pickled**

Thickness		Width						
		Min	Max					
>	≤		S315MC	S355MC	S420MC	S460MC	S500MC	S550MC
1.50	1.53	735	1180	1100	1100	–	–	–
1.53	1.57	735	1210	1100	1100	–	–	–
1.57	1.60	735	1250	1117	1100	–	–	–
1.60	1.70	735	1280	1250	1250	–	–	–
1.70	1.80	735	1367	1255	1250	910	–	–
1.80	1.90	735 <sup>1</sup>	1442	1330	1250	1150	1150	1150
1.90	2.00	735 <sup>1</sup>	1517	1405	1300	1250	1250	1250
2.00	2.20	735 <sup>1</sup>	1592	1480	1300	1250	1250	1250
2.20	2.40	735	1730	1607	1401	1300	1250	1250
2.40	2.60	735	1806	1734	1550	1550	1350	1350
2.60	2.80	735	1882	1789	1646	1550	1550	1550
2.80	3.00	735	1958	1844	1722	1660	1550	1550
3.00	3.20	735	2034	1900	1754	1716	1555	1550
3.20	3.47	735	2070	1955	1785	1744	1675	1550
3.47	3.65	735	2070	1972	1833	1786	1786	1630
3.65	4.00	735	2070	1800	1800	1800	1800	1678
4.00	4.40	735	2070	1636	1636	1636	1636	1636
4.40	4.83	735	2070	1490	1490	1490	1490	1490
4.83	5.00	735	2000	1440	1440	1440	1440	1440
5.00	5.25	750	1904	1371	1371	1371	1371	1371
5.25	5.50	750	1818	1309	1309	1309	1309	1309
5.50	5.80	750	1724	–	–	–	–	–
5.80	6.00	750	1574	–	–	–	–	–

**Notes:**

1. For thicknesses from 1.80mm to 2.20mm, in S500MC and S550MC, the minimum width is 810mm.
2. Dimensions are in millimetres.

## Tenform carbon-manganese steel

Tenform carbon-manganese steel is high-strength formable steel with enhanced fatigue performance for the automotive industry. It allows the user to increase the strength of the finished component or to reduce the thickness of the steel, or both. The product in this section is Tenform CMN.

### Typical applications

- wheel rims
- wheel discs
- chassis parts for passenger cars and trucks
- suspension housings
- transverse links

### Grades

CMN 250, CMN 300, CMN 350

### Mechanical properties

The values shown for strength and elongation in table 22 below are for test pieces taken in the rolling direction; those for the bend test are for test pieces taken transverse to the rolling direction.

### Chemical composition

Tenform carbon-manganese steel meets the requirements of the cast analysis shown in table 23 below.

### Dimensions

The width and thickness limits are shown in tables 24 and 25 on page 16.

**Table 22: Mechanical properties: Tenform CMN**

Grade	R <sub>eL</sub> (N/mm <sup>2</sup> )	R <sub>m</sub> (N/mm <sup>2</sup> )	A (%)	Bend test mandrel diameter
	Min	Min	Min	Min
			L <sub>0</sub> = 80mm	
CMN 250	250	360	28	0t
CMN 300	300	440	26	0t
CMN 350	350	540	20	0t

**Note:** Material thickness, t, is in millimetres.

**Table 23: Chemical composition: Tenform CMN**

Grade	C	Mn	P	S	Si
	Max	Max	Max	Max	Max
CMN 250	0.12	0.90	0.035	0.008	0.10
CMN 300	0.15	0.90	0.035	0.006	0.10
CMN 350	0.15	1.50	0.035	0.006	1.00

**Note:** Values are in weight percentages.

**Table 24: Dimensions: Tenform CMN Mill finish**

Thickness		Width					
>	≤	CMN 250		CMN 300		CMN 350	
		Min	Max	Min	Max	Min	Max
1.50	1.60	710	1250	–	–	–	–
1.60	1.80	710	1420	710	1425	–	–
1.80	1.90	710	1420	710	1425	810	1135
1.90	2.00	710	1525	710	1500	810	1135
2.00	2.10	710	1525	710	1500	810	1200
2.10	2.15	710	1600	710	1550	810	1200
2.15	2.20	710	1600	710	1550	810	1200
2.20	2.375	710	1600	710	1550	810	1300
2.375	2.70	710	1700	710	1550	810	1390
2.70	4.00	710	1830	710	1550	810	1390
4.00	4.80	710	1830	710	1550	810	1500
4.80	5.00	710	1830	710	1550	810	1500
5.00	7.00	710	1830	710	1550	–	–
7.00	8.00	710	1550	710	1550	–	–

**Note:** Dimensions are in millimetres.

**Table 25: Dimensions: Tenform CMN Pickled**

Thickness		Width					
>	≤	CMN 250		CMN 300		CMN 350	
		Min	Max	Min	Max	Min	Max
1.50	1.60	735	1250	–	–	–	–
1.60	1.80	735	1420	735	1425	–	–
1.80	1.90	735	1420	735	1425	810	1135
1.90	2.00	735	1420	735	1500	810	1135
2.00	2.10	735	1420	735	1500	810	1200
2.10	2.15	735	1420	735	1550	810	1200
2.15	2.20	735	1550	735	1550	810	1200
2.20	2.30	735	1550	735	1550	810	1300
2.30	4.00	735	1550	735	1550	810	1390
4.00	5.00	735	1550	735	1550	810	1500

**Note:** Dimensions are in millimetres.

## Structural steel

The good welding properties and guaranteed strength of hot-rolled structural steel make it suitable for many applications.

### Typical applications

- transport
- chassis parts
- yellow goods
- building and construction
- tubes and pipes
- sections and warehouse shelving
- simple pressure vessels

### Standards

Hot-rolled structural steel complies with European standard EN 10025 : 1993 shown in table 26 below. Weldable fine-grained structural steels are also available as shown in European standards EN 10113-2 : 1993 and EN 10113-3 : 1993 in tables 27 and 28 on page 18. Former national standards and nearest related

grades are also shown in these tables. When ordering qualities EN 10025 : 1993 suitable for cold forming, add the letter “C” to the end of the grade, e.g. S355J0C. Corus does not supply steel with increased copper content.

### Mechanical properties

The values shown for strength and elongation in tables 29-31 on pages 18 and 19 are for test pieces taken transverse to the rolling direction; those for the impact test are for test pieces taken in the rolling direction.

### Chemical composition

Structural steel meets the requirements of the cast analysis in the standards, as shown in tables 32-34 on pages 19 and 20.

### Dimensions

The width and thickness limits are shown in tables 35 and 36 on pages 20 and 21.

**Table 26: Standards**

European	National			
	UK	Germany	France	Italy
<b>EN 10025 : 1993</b>				
Grade	BS 4360 1986-R.U.	DIN 17100 1987-1	NFA 35-501 1987-4	UNI 7070
S185	–	St 33	A 33	Fe 320
S235	40 A	–	–	–
S235JR	40 B	St 37-2	E 24-2	Fe360B
S235J0	40 C	St 37-3U	E 24-3	Fe360C
S235J2G3	40 D	St 37-3N	E 24-4	Fe360D
S235J2G4	–	–	–	–
S275	43 A	–	–	–
S275JR	43 B	St 44-2	E 28-2	Fe430B
S275J0	43 C	St 44-3U	E 28-3	Fe430C
S275J2G3	43 D	St 44-3N	E 28-4	Fe430D
S275J2G4	–	–	–	–
S355	50 A	–	–	–
S355JR	50 B	St 52-3	E 36-2	Fe510B
S355J0	50 C	St 52-3U	E 36-3	Fe510C
S355J2G3	50 D	St 52-3N	–	Fe510D
S355J2G4	–	–	–	–
S355K2G3	50 DD	–	E 36-4	–
S355K2G4	–	–	–	–

**Table 27: Standards: Weldable fine-grained structural steel**

European	National			
EN 10113-2 : 1993	UK	Germany	France	Italy
Grade		DIN 17102	NFA 36-201	UNI 7382
S275N	–	StE285	–	FeE285KGN
S355N	–	StE355	E 355 R	FeE355KGN

**Table 28: Standards: Weldable fine-grained structural steel**

European	National	
EN 10113-3 : 1993	Germany	Italy
Grade	SEW 083	UNI 7382
S355M	StE355TM	FeE355KGTM
S420M	StE420TM	–
S460M	StE460TM	FeE460KGTM

**Table 29: Mechanical properties: EN 10025 : 1993**

Grade	R <sub>eL</sub> (N/mm <sup>2</sup> )		R <sub>m</sub> (N/mm <sup>2</sup> )		A (%)			Impact test		
	Min		Min-Max		Min			Temp	Min energy	
	t <sub>s</sub> ≤16	16<t <sub>s</sub> ≤20	t <sub>s</sub> ≤3	3<t <sub>s</sub> ≤20	L <sub>0</sub> =80mm			°C	J	
					1.5<t <sub>s</sub> ≤2	2<t <sub>s</sub> ≤2.5	2.5<t <sub>s</sub> <3	L <sub>0</sub> =5.65√S <sub>0</sub> 3≤t <sub>s</sub> ≤20		
S185	185	175	310-540	290-510	10	11	12	16	–	–
S235	235	225	360-510	340-470	17	18	19	24	–	–
S235JR	235	225	360-510	340-470	17	18	19	24	20	27
S235J0	235	225	360-510	340-470	17	18	19	24	0	27
S235J2G3/G4	235	225	360-510	340-470	17	18	19	24	-20	27
S275	275	265	430-580	410-560	14	15	16	20	–	–
S275JR	275	265	430-580	410-560	14	15	16	20	20	27
S275J0	275	265	430-580	410-560	14	15	16	20	0	27
S275J2G3/G4	275	265	430-580	410-560	14	15	16	20	-20	27
S355	355	345	510-680	490-630	14	15	16	20	–	–
S355JR	355	345	510-680	490-630	14	15	16	20	20	27
S355J0	355	345	510-680	490-630	14	15	16	20	0	27
S355J2G3/G4	355	345	510-680	490-630	14	15	16	20	-20	27
S355K2G3/G4	355	345	510-680	490-630	14	15	16	20	-20	40

**Notes:**

1. Material thickness, t, is in millimetres.
2. The impact properties of quality JR products are verified only when specified at the time of enquiry or order.
3. Impact strengths apply to thicknesses ≥6mm and are for standard test pieces only.

**Table 30: Mechanical properties: EN 10113-2 : 1993**

Grade	R <sub>eL</sub> (N/mm <sup>2</sup> )		R <sub>m</sub> (N/mm <sup>2</sup> )	A (%)	Impact test	
	Min		Min-max	Min		
	t <sub>≤</sub> 16	16<t <sub>≤</sub> 20	t <sub>≤</sub> 20	L <sub>0</sub> = 5.65√S <sub>0</sub> 3≤t <sub>≤</sub> 20	Temp	Min energy
					°C	J
S275N	275	265	370-510	24	-20	40
S355N	355	345	470-630	22	-20	40

Note: Material thickness, t, is in millimetres.

**Table 31: Mechanical properties: EN 10113-3 : 1993**

Grade	R <sub>eL</sub> (N/mm <sup>2</sup> )		R <sub>m</sub> (N/mm <sup>2</sup> )	A (%)	Impact test	
	Min		Min-max	Min		
	t <sub>≤</sub> 16	16<t <sub>≤</sub> 20	t <sub>≤</sub> 20	L <sub>0</sub> = 5.65√S <sub>0</sub> 3≤t <sub>≤</sub> 20	Temp	Min energy
					°C	J
S355M	355	345	450-610	22	-20	40
S420M	420	400	500-660	19	-20	40
S460M	460	440	530-720	17	-20	40

Note: Material thickness, t, is in millimetres.

**Table 32: Chemical composition: EN 10025 : 1993**

Grade	C	Mn	P	S	Si	N <sup>1,2</sup>	Nb	V
	Max	Max	Max	Max	Max	Max	Min-max	Min-max
S185	–	–	–	–	–	–	–	–
S235	0.22	1.60	0.050	0.050	0.50	–	–	–
S235JR	0.17	1.40	0.045	0.045	–	0.009	–	–
S235J0	0.17	1.40	0.040	0.040	–	0.009	–	–
S235J2G3/G4	0.17	1.40	0.035	0.035	–	–	–	–
S275	0.25	1.60	0.050	0.050	0.50	–	–	–
S275JR	0.21	1.50	0.045	0.045	–	0.009	–	–
S275J0	0.18	1.50	0.040	0.040	–	0.009	–	–
S275J2G3/G4	0.18	1.50	0.035	0.035	–	–	–	–
S355	0.23	1.60	0.050	0.050	0.50	–	0.003-0.10	0.003-0.10
S355JR	0.24	1.60	0.045	0.045	0.55	0.009	–	–
S355J0	0.20	1.60	0.040	0.040	0.55	0.009	–	–
S355J2G3/G4	0.20	1.60	0.035	0.035	0.55	–	–	–
S355K2G3/G4	0.20	1.60	0.035	0.035	0.55	–	–	–

**Notes:**

1. It is permissible to exceed the specified values provided that for each increase of 0.001% nitrogen the phosphorus maximum content will be reduced by 0.005%; the nitrogen content of the ladle analysis, however, shall not be more than 0.012%.
2. The maximum value for nitrogen does not apply if the chemical composition shows a minimum total aluminium content of 0.020% or if sufficient other nitrogen-binding elements are present. The nitrogen-binding elements shall be mentioned in the inspection document.
3. Values are in weight percentages.

**Table 33: Chemical composition: EN 10113-2 : 1993**

Grade	C	Mn	P	S	Si	N
	Max	Min-max	Max	Max	Max	Max
S275N	0.18	0.50-1.40	0.035	0.030	0.400	0.015
S355N	0.20	0.90-1.65	0.035	0.030	0.500	0.015

Note: Values are in weight percentages.

**Table 34: Chemical composition: EN 10113-3 : 1993**

Grade	C	Mn	P	S	Si	N
	Max	Max	Max	Max	Max	Max
S355M	0.14	1.60	0.035	0.030	0.500	0.015
S420M	0.16	1.70	0.035	0.030	0.500	0.020
S460M	0.16	1.70	0.035	0.030	0.600	0.025

Note: Values are in weight percentages.

**Table 35: Dimensions: Mill finish**

Thickness		Width						
		Min	Max					
>	≤		S185	S235	S275	S355	S420M	S460M
1.47	1.49	700	1300	1300	–	–	–	–
1.49	1.50	700	1320	1320	1170	–	–	–
1.50	1.53	700	1330	1330	1250	1100	1100	–
1.53	1.57	700	1352	1352	1250	1100	1100	–
1.57	1.60	700	1382	1382	1250	1117	1100	–
1.60	1.70	700	1405	1425	1425	1250	1250	–
1.70	1.80	700	1480	1480	1425	1255	1250	910
1.80	2.00	700	1555	1555	1442	1330	1250	1030
2.00	2.20	700	1705	1705	1592	1480	1300	1180
2.20	2.40	700	1819	1819	1730	1607	1401	1300
2.40	2.60	700	1924	1924	1806	1734	1523	1420
2.60	2.70	700	2028	2028	1882	1789	1646	1540
2.70	2.80	700	2070	2070	1920	1816	1707	1600
2.80	3.00	700	2070	2070	1958	1844	1722	1660
3.00	3.20	700	2070	2070	2034	1900	1754	1716
3.20	3.50	700	2070	2070	2070	1955	1785	1744
3.50	3.65	700	2070	2070	2070	2038	1833	1786
3.65	4.00	700	2070	2070	2070	2070	1856	1807
4.00	4.40	700	2070	2070	2070	2070	1856	1785
4.40	5.00	700	2070	2070	2070	2070	2070	1840
5.00	5.60	700	2070	2070	2070	2070	2070	1923
5.60	6.00	700	2070	2070	2070	2070	2070	2005
6.00	12.70	700	2070	2070	2070	2070	2070	2070
12.70	20.00	700	2070	2070	2070	2070	–	–

Note: Dimensions are in millimetres.

**Table 36: Dimensions: Pickled**

Thickness		Width							
		Min	Max	S185	S235	S275	S355	S420M	S460M
>	≤								
1.50	1.53	735	1330	1330	1250	1100	1100	–	
1.53	1.57	735	1352	1352	1250	1100	1100	–	
1.57	1.60	735	1382	1382	1250	1117	1100	–	
1.60	1.70	735	1405	1405	1425	1250	1250	–	
1.70	1.80	735	1480	1480	1425	1255	1250	910	
1.80	2.00	735	1555	1555	1442	1330	1250	1030	
2.00	2.20	735	1705	1705	1592	1480	1300	1180	
2.20	2.40	735	1819	1819	1730	1607	1401	1300	
2.40	2.60	735	1924	1924	1806	1734	1523	1420	
2.60	2.70	735	2028	2028	1882	1789	1646	1540	
2.70	2.80	735	2070	2070	1920	1816	1707	1600	
2.80	3.00	735	2070	2070	1958	1844	1722	1660	
3.00	3.20	735	2070	2070	2034	1900	1754	1716	
3.20	3.47	735	2070	2070	2070	1955	1785	1744	
3.47	3.65	735	2070	2070	2070	1972	1833	1786	
3.65	4.00	735	2070	2070	2070	1800	1800	1800	
4.00	4.40	735	2070	2070	2070	1636	1636	1636	
4.40	4.83	735	2070	2070	2070	1550	1490	1490	
4.83	5.00	735	2000	2000	2000	1550	1440	1440	
5.00	5.25	750	1904	1904	1904	1371	1371	1371	
5.25	5.50	750	1818	1818	1818	1309	1309	1309	
5.50	5.80	750	1724	1724	1724	–	–	–	
5.80	6.00	750	1574	1574	1574	–	–	–	

**Note:** Dimensions are in millimetres.

## Steel for gas cylinders

Hot-rolled structural steel for gas cylinders has excellent properties for deep drawing and welding and meets all the performance requirements for this application.

### Standards

Steel for gas cylinders complies with European standard EN 10120 : 1997 shown in table 37 below. Former national standards and nearest related grades are also shown in the table.

### Mechanical properties

The values shown for the mechanical properties in table 38 below are for test pieces taken transverse to the rolling direction.

### Chemical composition

Hot-rolled steel for gas cylinders meets the requirements of the cast analysis in the standard, as shown in table 39 below.

### Dimensions

The width and thickness limits are shown in tables 40 and 41 on page 23.

**Table 37: Standards**

European	National		
EN 10120 : 1997	UK	France	Italy
Grade	BS 5045	NFA 36-211	UNI 7355
P245NB	–	BS1	AE235KR
P265NB	Type B	BS2	AE235KR

**Table 38: Mechanical properties: EN 10120 : 1997**

Grade	R <sub>eL</sub> (N/mm <sup>2</sup> )	R <sub>m</sub> (N/mm <sup>2</sup> )	A (%)	
	Min	Min-max	Min	
			L <sub>0</sub> = 80mm	L <sub>0</sub> = 5.65√S <sub>0</sub>
			t < 3	t ≥ 3 ≤ 5
P245NB	245	360-450	26	34
P265NB	265	410-500	24	32

**Note:** Material thickness, t, is in millimetres.

**Table 39: Chemical composition: EN 10120 : 1997**

Grade	C	Mn	P	S	Si	Al-total	N	Nb	Ti
	Max	Min	Max	Max	Max	Min	Max	Max	Max
P245NB	0.16	0.30	0.025	0.015	0.25	0.02	0.009	0.050	0.03
P265NB	0.19	0.40	0.025	0.015	0.25	0.02	0.009	0.050	0.03

**Note:** Values are in weight percentages.

**Table 40: Dimensions: EN 10120 : 1997 Mill finish**

Thickness		Width		
		Min	Max	
>	≤		P245NB	P265NB
1.47	1.50	710	1300	1150
1.50	1.60	710	1330	1250
1.60	1.70	710	1425	1425
1.70	1.80	710	1480	1425
1.80	1.90	710	1555	1425
1.90	2.00	710	1630	1525
2.00	2.20	710	1705	1525
2.20	2.40	710	1820	1550
2.40	2.60	710	1924	1550
2.60	2.70	710	2028	1550
2.70	5.00	710	2070	1550

**Note:** Dimensions are in millimetres.

**Table 41: Dimensions: EN 10120 : 1997 Pickled**

Thickness		Width		
		Min	Max	
>	≤		P245NB	P265NB
1.50	1.60	735	1330	1250
1.60	1.70	735	1425	1425
1.70	1.80	735	1480	1425
1.80	1.90	735	1555	1425
1.90	2.00	735	1630	1525
2.00	2.20	735	1705	1525
2.20	2.40	735	1820	1550
2.40	2.60	735	1924	1550
2.60	2.70	735	2028	1550
2.70	4.76	735	2070	1550
4.76	4.90	735	2040	1550
4.90	5.00	735	2000	1550

**Note:** Dimensions are in millimetres.

## Steel for pressure vessels

Hot-rolled structural steel for simple pressure vessels has excellent properties for welding and meets all the performance requirements for pressure vessels and boilers.

### Standards

Steel for pressure vessels complies with European standards EN 10028-2 : 1992 and EN 10207 : 1997 shown in tables 42 and 43 below. Former national standards and nearest related grades are also shown in these tables.

### Mechanical properties

Table 44 below shows the mechanical properties for grades of steel in EN 10028-2 : 1992. The values shown for strength and elongation in this table are for test pieces taken transverse to the rolling direction; those

for the impact test are for test pieces taken in the rolling direction.

Table 45 on page 25 shows the mechanical properties for grades of steel in EN 10207 : 1997. The values shown in this table are for test pieces taken in the rolling direction.

### Chemical composition

Steel for pressure vessels meets the requirements of the cast analysis in the standards, as shown in tables 46 and 47 on page 25.

### Dimensions

The width and thickness limits are shown in tables 48 and 49 on page 26.

**Table 42: Standards**

European	National			
EN 10028-2 : 1992	UK	Germany	France	Italy
Grade	BS 1501	DIN 17155	NFA 36-205	UNI 5869
P235GH	360-161	H I	A37CP	Fe360 1KW
P265GH	430-161	H II	A42CP	Fe410 1KW

**Table 43: Standards**

European	National	
EN 10207 : 1997	Germany	France
Grade		
P235S	H I	A37AP/E24.4P
P265S	H II	A42AP/E28.4P

**Table 44: Mechanical properties: EN 10028-2 : 1992**

Grade	$R_{eL}$ (N/mm <sup>2</sup> )	$R_m$ (N/mm <sup>2</sup> )	A (%)			Impact test	
	Min	Min-max	Min			Temp	Min energy
			$L_0 = 80\text{mm}$		$L_0 = 5.65\sqrt{S_0}$	°C	J
			$2 < t \leq 2.5$	$2.5 < t < 3$	$3 \leq t \leq 20$		
P235GH	235	360-480	19	20	25	0	27
P265GH	265	410-530	17	18	23	0	27

**Note:** Material thickness,  $t$ , is in millimetres.

**Table 45: Mechanical properties: EN 10207 : 1997**

Grade	$R_{eL}$ (N/mm <sup>2</sup> )	$R_m$ (N/mm <sup>2</sup> )	A (%)			Impact test	
	Min	Min-max	Min			Temp	Min energy
			$L_0 = 80\text{mm}$		$L_0 = 5.65\sqrt{S_0}$	°C	J
			$2 < t \leq 2.5$	$2.5 < t < 3$	$3 \leq t \leq 20$		
P235S	235	360-480	20	21	26	-20	28
P265S	265	410-530	17	18	22	-20	28

Note: Material thickness, t, is in millimetres.

**Table 46: Chemical composition: EN 10028-2 : 1992**

Grade	C	Mn	P	S	Si	Al-total	Nb	Ti	V
	Max	Min-max	Max	Max	Max	Min	Max	Max	Max
P235GH	0.16	0.40-1.20	0.030	0.025	0.350	0.020	0.010	0.030	0.020
P265GH	0.20	0.50-1.40	0.030	0.025	0.400	0.020	0.010	0.030	0.020

Note: Values are in weight percentages.

**Table 47: Chemical composition: EN 10207 : 1997**

Grade	C	Mn	P	S	Si	Al-total
	Max	Min-max	Max	Max	Max	Min
P235S	0.16	0.40-1.20	0.035	0.030	0.350	0.020
P265S	0.20	0.50-1.50	0.035	0.030	0.400	0.020

Note: Values are in weight percentages.

Table 48: Dimensions: Mill finish				
Thickness		Width		
		Min	Max	
>	≤		P235GH P235S	P265GH P265S
1.47	1.49	700	1300	-
1.49	1.50	700	1320	1170
1.50	1.53	700	1330	1250
1.53	1.57	700	1352	1250
1.57	1.60	700	1382	1250
1.60	1.70	700	1425	1425
1.70	1.80	700	1480	1425
1.80	2.00	700	1555	1442
2.00	2.20	700	1705	1592
2.20	2.40	700	1819	1730
2.40	2.60	700	1924	1806
2.60	2.70	700	2028	1882
2.70	2.80	700	2070	1920
2.80	3.00	700	2070	1958
3.00	3.20	700	2070	2034
3.20	3.50	700	2070	2070
3.50	3.65	700	2070	2070
3.65	4.00	700	2070	2070
4.00	4.40	700	2070	2070
4.40	5.00	700	2070	2070
5.00	5.60	700	2070	2070
5.60	12.70	700	2070	2070
12.70	20.00	700	2070	2070

Note: Dimensions are in millimetres.

Table 49: Dimensions: Pickled				
Thickness		Width		
		Min	Max	
>	≤		P235GH P235S	P265GH P265S
1.50	1.53	735	1330	1250
1.53	1.57	735	1352	1250
1.57	1.60	735	1382	1250
1.60	1.70	735	1425	1425
1.70	1.80	735	1480	1425
1.80	2.00	735	1555	1442
2.00	2.20	735	1705	1592
2.20	2.40	735	1819	1730
2.40	2.60	735	1924	1806
2.60	2.70	735	2028	1882
2.70	2.80	735	2070	1920
2.80	3.00	735	2070	1958
3.00	3.20	735	2070	2034
3.20	3.47	735	2070	2070
3.47	3.65	735	2070	2070
3.65	4.00	735	2070	2070
4.00	4.40	735	2070	2070
4.40	4.83	735	2070	2070
4.83	5.00	735	2000	2000
5.00	5.25	750	1904	1904
5.25	5.50	750	1818	1818
5.50	5.80	750	1724	1724
5.80	6.00	750	1574	1574

Note: Dimensions are in millimetres.

## Steel for pipes

Steel for pipes is hot-rolled structural steel suitable for manufacture into pipes used for transporting liquids and gases. The grades supplied are suitable for the steel pipe specifications as set out in the standards cited in table 50 below.

### Typical applications

Pipelines made from this steel carry gas, water and oil. The pipes can subsequently be cold-formed.

### Standards

The availability of the grades within European standard EN 10208-2 : 1997 shown in table 50 below depends upon your specific requirements. These specifications are supplied by Corus to a chemistry range only—the final mechanical properties attained in the pipes are determined by the dimensions of the pipes and the method used to manufacture them. Former national standards and nearest related grades are also shown in the table.

### More information

For information about the properties, chemical composition and dimensions of steel for pipes, contact Corus.

**Table 50: Standards**

European	National	
	Germany	USA
<b>EN 10208-2 : 1997</b>		
Grade	DIN 17172	API 5L
–	StE 210.7TM	A
L245MB/NB	StE 240.7TM	B
L290MB/NB	StE 290.7TM	X42
–	StE 320.7TM	X46
L360MB/NB	StE 360.7TM	X52
–	StE 385.7TM	X56
L415MB/NB	StE 415.7TM	X60
L450MB	StE 445.7TM	X65
–	StE 480.7TM	X70

## Ship plate

Hot-rolled structural steel for ship plate has excellent welding properties and is specially intended for shipbuilding.

### Standard

Ship plate meets the requirements of grades A and B, specified by Lloyd's Register of Shipping.

### Mechanical properties

The values shown for the mechanical properties in table 51 below are for test pieces taken transverse to the rolling direction, except as indicated.

### Chemical composition

Hot-rolled structural steel for ship plate meets the requirements of the cast analysis in the standard shown in table 52 below.

### Dimensions

The width and thickness limits are shown in table 53 below.

**Table 51: Mechanical properties: Lloyd's Register of Shipping**

Grade	$R_{eL}$ (N/mm <sup>2</sup> )	$R_m$ (N/mm <sup>2</sup> )	A (%)	Impact test	
	Min	Min-max	Min	Temp	Min energy
			$L_0 = 5.65\sqrt{S_0}$	°C	J
A	235	400-520	22	–	–
B	235	400-520	22	0	27 (see note)

**Note:** Tests for impacts on grade B are carried out in the rolling direction.

**Table 52: Chemical composition: Lloyd's Register of Shipping**

Grade	C	Mn	P	S	Si	
	Max	Min	Max	Max	Max	
A	0.21	–	0.525	0.035	0.035	0.5
B	0.21	0.80	–	0.035	0.035	0.5

**Notes:**

- Where grade B is impact tested, the minimum manganese content may be reduced to 0.60%.
- Values are in weight percentages.

**Table 53: Dimensions: Lloyd's Register of Shipping**

#### Mill finish

Thickness		Width	
		Min	Max
>	≤		
1.49	1.60	700	1170
1.60	1.70	700	1280
1.70	1.80	700	1367
1.80	1.90	700	1442
1.90	2.00	700	1517
2.00	2.20	700	1592
2.20	2.40	700	1730
2.40	2.60	700	1806
2.60	2.80	700	1882
2.80	3.12	700	1958
3.12	20.00	700	2070

**Note:** Dimensions are in millimetres.

## High-carbon steel

Hot-rolled high-carbon steel, supplied in the 'as rolled', untreated condition, is suitable for making quenched and tempered machine parts.

### Typical applications

- Automotive gearing
- Saw blades
- Safety-shoe toe caps
- Clips and buckles for seatbelts
- Fastenings
- Motorbike chains

### Chemical composition

Hot-rolled high-carbon steel meets the requirements of the cast analysis in the standard, as shown in table 54 below.

### Dimensions

The width and thickness limits are shown in table 55 below.

**Table 54: Chemical composition: BS 1449 : 1991**

Grade	C	Mn	P	S	Si
	Min-max	Min-max	Max	Max	Max
HR40	0.35-0.45	0.50-0.90	0.045	0.045	0.05-0.35
HR50	0.45-0.55	0.50-0.90	0.045	0.045	0.05-0.35
HR60	0.60-0.65	0.50-0.90	0.045	0.045	0.05-0.35
HR70	0.65-0.75	0.50-0.90	0.045	0.045	0.05-0.35

**Note:** Values are in weight percentages.

**Table 55: Dimensions: BS 1449 : 1991 Mill finish**

Thickness	Width		HR40	HR50	HR60	HR70
	Min	Max				
>	≤					
2.00	8.00	1000	1300	1300	1300	1150

**Note:** Dimensions are in millimetres.

## Durbar floor plate

Durbar is hot-rolled structural steel floor plate with excellent slip resistance and welding properties.

### Standards and grades

Durbar is available to EN 10025 : 1993 in grades S275, S275JR, S355 and S355JR.

### Mechanical properties

The mechanical properties of Durbar comply with EN 10025 : 1993 and are shown in table 56 below. The values shown for strength and elongation in table 56 are for test pieces taken transverse to the rolling direction; those for the impact test are for test pieces taken in the rolling direction.

### Chemical composition

The chemical composition of Durbar complies with EN 10025 : 1993 and is shown in table 57 on page 31.

### Dimensions

Corus manufactures Durbar in standard widths, thicknesses and lengths. Dimensions for coil are shown in table 58 and for cut lengths in table 59, both on page 31. For other thicknesses and widths, consult Corus.

### Surface aspects

Durbar has an evenly distributed, raised pattern that is integral to the product and which allows plates to be used in any direction. It provides a slip-resistant surface at all angles.

The spaces between the studs create a self-draining surface, which is easy to clean. This characteristic reduces corrosion and gives Durbar a long life.

**Table 56: Mechanical properties: Durbar**

Grade	R <sub>eL</sub> (N/mm <sup>2</sup> ) Min	R <sub>m</sub> (N/mm <sup>2</sup> ) Min-max	A (%)				Impact test	
			L <sub>0</sub> = 80mm				Temp	Min energy
			3≤t<5	5≤t<7	7≤t<11	11≤t<12.5	°C	J
S275	275	410-560	18	20	21	22	–	–
S275JR	275	410-560	18	20	21	22	20	27
S355	355	490-630	18	20	21	22	–	–
S355JR	355	490-630	18	20	21	22	20	27

#### Notes:

1. Material thickness, t, is in millimetres.
2. Impact properties of quality JR products are verified only when specified at the time of the enquiry and order.
3. Impact strengths apply to thicknesses ≥6mm and are for standard test pieces only.

**Table 57: Chemical composition: Durbar**

Grade	C	Mn	P	S	Si	N <sup>1,2</sup>	Nb
	Max	Max	Max	Max	Max	Max	Min-max
S275	0.25	1.60	0.050	0.050	0.50	–	–
S275JR	0.21	1.50	0.045	0.045	–	0.009	–
S355	0.23	1.60	0.050	0.050	0.50	–	0.003-0.100
S355JR	0.24	1.60	0.045	0.045	0.55	0.009	0.003-0.100

**Notes:**

1. It is permissible to exceed the specified values provided that for each increase of 0.001% nitrogen the phosphorus maximum content will be reduced by 0.005%; the nitrogen content of the ladle analysis, however, shall not be more than 0.012%.
2. The maximum value for nitrogen does not apply if the chemical composition shows a minimum total aluminium content of 0.020% or if sufficient other nitrogen-binding elements are present. The nitrogen-binding elements shall be mentioned in the inspection document.
3. Values are in weight percentages.

**Table 58: Dimensions: Durbar coil**

Standard thickness	Standard widths
	All grades
3.00	1000/1250
4.50	1000/1250/1500
6.00	1000/1250/1500
8.00	1000/1250/1500
10.00	1000/1250/1500
12.50	1000/1250/1500

**Note:** Dimensions are in millimetres.

**Table 59: Dimensions: Durbar cut lengths**

Standard thickness	Length			
	S275/S275JR		S355/S355JR	
	Min	Max	Min	Max
3.00	1830	6000	–	–
4.50	1500	9500	1500	9500
6.00	1500	9500	1500	9500
8.00	1500	13000	1500	13000
10.00	1500	13000	1500	13000
12.50	1500	13000	1500	13000

**Note:** Dimensions are in millimetres.

## Actis cut lengths for automated precision processing

Actis cut lengths are produced using close manufacturing and processing tolerances, which gives the product highly consistent mechanical and chemical properties and uniform shape.

The guaranteed flatness and low residual stress of Actis can improve high-speed automated production rates, decrease scrap, and thereby reduce costs.

Actis has a controlled level of silicon that improves laser and plasma cutting speeds and cut-edge condition.

### Grades

Actis 240, Actis 280, Actis 360.

### Mechanical properties

The values shown in table 60 below are for test pieces taken transverse to the rolling direction.

### Chemical composition

Actis meets the requirements of the cast analysis shown in table 61 below.

### Dimensions

The thickness, width and length limits are shown in table 62 below.

**Table 60: Mechanical properties: Actis**

Grade	$R_{eL}$ (N/mm <sup>2</sup> )	$R_m$ (N/mm <sup>2</sup> )	A (%)									
	Min	Min-max	Min									
$L_0 = 80\text{mm}$												
			3st<4	4st<5	5st<6	6st<7	7st<8	8st<10	10st<12	12st<14	14st<16	16st
240	240	340-470	20	21	22	23	23	24	25	26	27	27
280	280	410-560	17	18	19	19	20	20	21	22	22	23
360	360	490-630	17	18	19	19	20	20	21	22	22	23

**Note:** Material thickness, t, is in millimetres.

**Table 61: Chemical composition: Actis**

Grade	C	Mn	P	S	Si	N
	Max	Max	Max	Max	Max	Max
240	0.17	1.40	0.045	0.02	0.030	0.009
280	0.21	1.50	0.045	0.02	0.030	0.009
360	0.24	1.60	0.045	0.02	0.030	0.009

**Note:** Values are in weight percentages.

**Table 62: Dimensions: Mill finish Actis**

Thickness	Width			Length	
	Min	Max		Min	Max
>	≤	Actis 240/280		Actis 360	
3.00	3.19	700	1550	1460	1830 6000
3.19	3.59	700	1550	1525	1830 6000
3.59	3.99	700	1550	1605	1830 6000
3.99	5.99	700	1830	1650	1500 9500
5.99	16.00	700	1830	1830	1500 13000

#### Notes:

- For thicknesses greater than 16mm, consult Corus.
- For Actis 240 in thicknesses greater than 12.50mm, consult Corus.
- Dimensions are in millimetres.