

**UnionOcel**

Your partner in steel

# RANGE OF PRODUCTS +



# Corporate Profile

**UnionOcel, s.r.o., was founded in October 2001 as a metallurgical wholesaler who deals in:**

 **Plates**

 **Cut parts**

 **Components**

With respect to customer's wishes, we offer above-mentioned goods both from our warehouse and new production. We mostly dispatch from our storage and service center in Kopřivnice. In case the required goods are not available at our Kopřivnice center or in the warehouse of our sister company, UnionStahl, Duisburg, Germany we alternatively use our extensive network of business partners all over Europe in order to deliver to your destination on time. This, of course, depends on the nature of your order.

The Kopřivnice storage and service center was opened in September 2005. It is among the state-of-the-art establishment of its kind in Central and Eastern Europe, and extends the offered service of UnionOcel by additional activities, such as flame cutting, plasma-arc cutting, hydraulic shears cutting, and laser cutting.

We can also arrange deliveries directly from renowned European producers. This applies especially in case of extensive orders with required delivery time within a few weeks or months.

Complete variety of goods is displayed on following pages. There you will find detailed specifications concerning the quality, dimensions, chemical composition and mechanical properties. All specifications comply with the relevant European standards or mill standards.

Certificate documentation, provision of independent inspection, ultrasonic tests, import customs clearance, delivery to the destination, and arranging other services according to the customer's wishes is a matter of course.

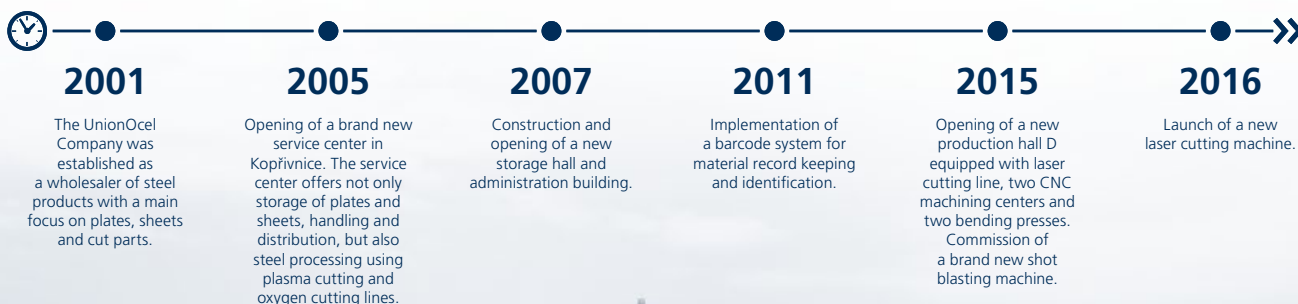
We can also provide our professional knowledge and mediate consultation with our suppliers' specialists.

We are looking forward to our future cooperation and we remain at your disposal.

You, as a satisfied customer, are the biggest motivation for our efforts.

Do not hesitate to call us.

UnionOcel – Your steel partner.







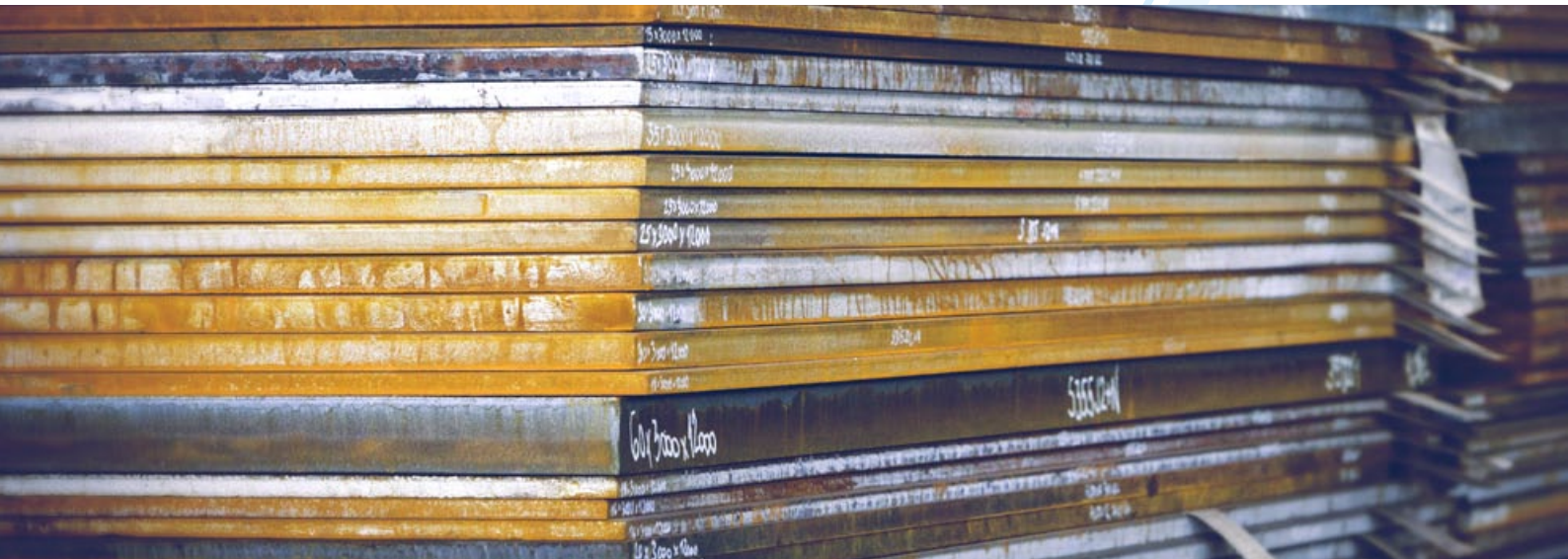
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*The values given in the tables are informative only.*

# Plates

<b>EN 10025-2</b>	Non-alloy structural steels
<b>EN 10025-3</b>	Normalized/normalized rolled fine grain structural steels
<b>EN 10025-4</b>	Thermomechanical rolled fine grain structural steels
<b>EN 10025-5</b>	Structural steels with improved atmospheric corrosion resistance
<b>EN 10025-6</b>	High yield strength structural steels in the quenched and tempered conditions
<b>EN 10028-2</b>	Steels for pressure purposes – non-alloy and alloy steels
<b>EN 10028-3</b>	Steels for pressure purposes – fine grain steels, normalized
<b>EN 10149-2</b>	High yield strength steels for cold forming – thermomechanically rolled
■ ■ ■ ■ ■ ■	Wear resistant steels
■ ■ ■ ■ ■ ■	ASME standard steels
■ ■ ■ ■ ■ ■	Ship building quality steels



## Further possibilities

- Cutting – autogen, plasma, laser and shearing according to ISO EN 9013
- Mechanical processing, milling, drilling
- Fixed dimensions from unreeling device – sheets from coils in standard stock sizes
- Blasting and conservation
- Ultrasonic testing in accordance with EN 10160 and ASME 435
- Acceptance by all accredited companies, e.g. DB/TÜV/LRS/DNV - GL/ABS/ČD

Every order is accompanied by an inspection certificate in accordance with EN 10204 / 3.1 or 2.2. It is our aim to ensure a reliable and timely processing and delivery of each order.



## Metal plate processing

### Flame cutting

#### Oxygen cutting machine ESAB SUPRAREX

Plate thickness [mm]	Table Dimensions [mm]
10–330	4 000 × 24 000

#### Plasma cutting machine ESAB SUPRAREX HD 4500 and PIERCE RUM 3500

Plate thickness [mm]	Table Dimensions [mm]
1,5–40	3 000 × 24 000

3D cutting: preparation of welded edges from +45° to -45°, edges X, Y and K, up to 40 mm square cut, up to 32 mm 45° cut

#### Laser LVD Impulse 12530/5kW power

Plate thickness [mm] max.	Table Dimensions [mm]
20	3 000 × 12 000

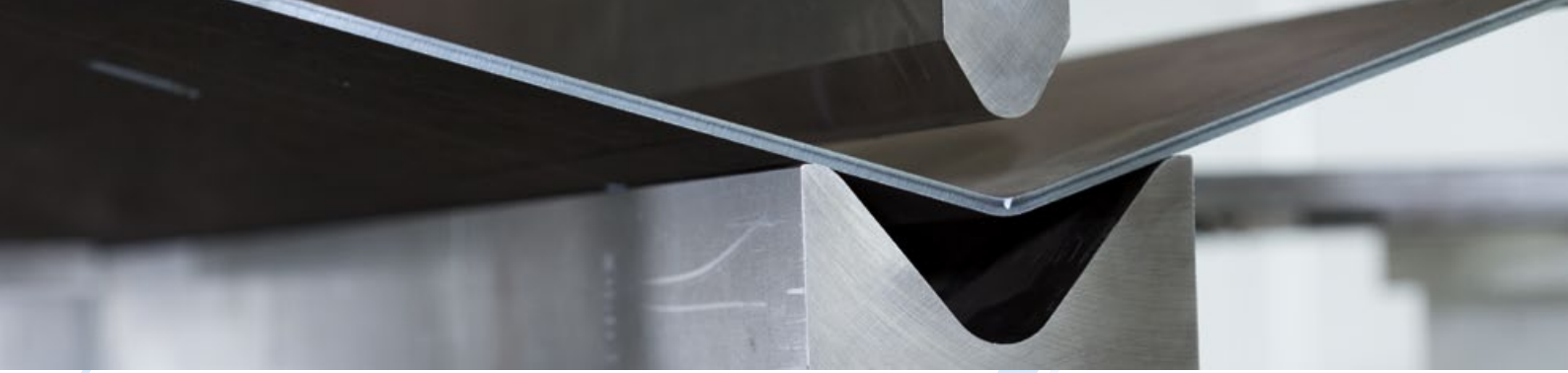
#### Laser Trumpf TruLaser 3060/4kW power

Plate thickness [mm] max.	Table Dimensions [mm]
20	2 500 × 6 000

### Scissors shearing

#### Hydraulic shears CNG HGM 3020

Plate width (mm) max.	Plate thickness max. Re max. 450 MPa (mm)	Plate thickness max. Re max. 700 MPa (mm)
3 080	20	13



## Metal plate processing

### Bending

#### Press brake LVD 400/4080

Working length [mm] max.	Pressing force [t] max.
4 000	400

#### Press brake LVD PPEB

Working length [mm] max.	Pressing force [t] max.
6 000	1 250

### Mechanical processing

#### CNC machining centre MCFV2080

Table load [t] max.	Table Dimensions [mm]
3	800 × 2 000

#### CNC machining centre FVC

Table load [t] max.	Table Dimensions [mm]
11	1600 × 4 000

#### Milling machine FA5B

Table load [t] max.	Table Dimensions [mm]
12	350 × 1 400

#### Drilling machine VO50

Table load [t]	Table Dimensions [mm]
Manual handling	1 000 × 3 500

### Shot blasting

#### Roller conveyor blast machine WHEELABRATOR

Entrance length [mm] max.	Entrance height [mm] max.	Entrance width [mm] max.
16 000	500	3 000



## Non-alloy structural steels EN 10025-2

Inspection certificate acc. to EN10204/3.1

DIMENSIONS				
Name	Number	Dimensions [mm]		
		Thickness	Width	Length up to
S235JR	1.0038	3-250	1 000-4 000	16 000
S355J2	1.0577	3-300	1 000-3 500	16 000
S355J2C	1.0579	3-30	1 000-3 500	16 000

CHEMICAL COMPOSITION										
Name	Number	Content of C [% max.] for nom. thickness [mm]			Content of elements – % by mass max.					
		≤ 16	> 16 ≤ 40	> 40	Si	Mn	P	S	N	Cu
S235JR	1.0038	0,19	0,19	0,23	–	1,50	0,045	0,045	0,014	0,60
S235J0	1.0114	0,19	0,19	0,19			0,040	0,040	0,014	
S235J2	1.0117	0,19	0,19	0,19			0,035	0,035	–	
S275JR	1.0044	0,24	0,24	0,25	–	1,60	0,045	0,045	0,014	0,60
S275J0	1.0143	0,21	0,21	0,21			0,040	0,040	0,014	
S275J2	1.0145	0,21	0,21	0,21			0,035	0,035	–	
S355JR	1.0045	0,27	0,27	0,27	0,60	1,70	0,045	0,045	0,014	0,60
S355J0	1.0553	0,23	0,23	0,24			0,040	0,040	0,014	
S355J2	1.0577	0,23	0,23	0,24			0,035	0,035	–	
S355K2	1.0596	0,23	0,23	0,24			0,035	0,035	–	

MECHANICAL PROPERTIES													
Name	Min. yield strength R <sub>EH</sub> [MPa] for product thickness [mm]								Tensile strength R <sub>m</sub> [MPa] for product thickness [mm]				
	≤ 16	> 16 ≤ 40	> 40 ≤ 63	> 63 ≤ 80	> 80 ≤ 100	> 100 ≤ 150	> 150 ≤ 200	> 200 ≤ 250	> 250 ≤ 400	≥ 3 ≤ 100	> 100 ≤ 150	> 150 ≤ 200	> 250 ≤ 400
S235JR									–				–
S235J0	235	225	215	215	215	195	185	175	–	360-510	350-500	340-490	–
S235J2									165				330-480
S275JR									–				–
S275J0	275	265	255	245	235	225	215	205	–	410-560	400-540	380-540	–
S275J2									195				380-540
S355JR									–				–
S355J0	355	345	335	325	315	295	285	275	–	470-630	450-600	450-600	–
S355J2									265				450-600
S355K2									265				450-600

Name	Orientation of test	Min. elongation [%] L <sub>0</sub> = 5,65 √ S <sub>0</sub> for product thickness [mm]						Testing temp. [°C]	Min. impact energy KV [J]		
		≥ 3,0 ≤ 40	> 40 ≤ 63	> 63 ≤ 100	> 100 ≤ 150	> 150 ≤ 250	> 250 ≤ 400		≤ 150	> 150 ≤ 250	> 250 ≤ 400
S235JR								20			
S235J0	l	26	25	24	22	21	–	0	27	27	–
S235J2	t	24	23	22	22	21	21 [l + t]	–20			27
S275JR								20			
S275J0	l	23	22	21	19	18	–	0	27	27	–
S275J2	t	21	20	19	19	18	18 [l + t]	–20			27
S355JR								20			
S355J0	l	22	21	20	18	17	–	0	27	27	–
S355J2	t	20	19	18	18	17	17 [l + t] 17 [l + t]	–20			27
S355K2								–20	40	33	33



## Wear resistant steels

Inspection certificate acc. to EN 10204/2.2 or 3.1

### DIMENSIONS

Name	Number	Dimension [mm]		
		Thickness	Width	Length up to
XAR 300	1.8704	3-50	1 000-2 500	12 000
XAR 400	1.8714	3-100	1 000-2 500	12 000
XAR 400 W	-	4-40	1 000-2 500	12 000
XAR 400 HR	-	4-25	1 000-2 500	12 000
XAR 400 HT	-	40-100	1 000-2 500	12 000
XAR 450	1.8722	3-100	1 000-3 000	12 000
XAR 500	1.8734	3-100	1 000-3 000	12 000
XAR 600	1.8735	4-50	1 000-2 500	12 000
Durostat 400	-	6-100	1 000-2 500	12 000
Durostat 450	-	6-50	2 500-3 000	12 000
Durostat 500	-	10-30	1 000-2 500	12 000
Dillidur 325 L	1.8705	5-50	1 000-3 000	12 000
Dillidur 400 V	1.8715	6-150	1 000-3 000	12 000
Dillidur 500 V	1.8721	8-100	1 000-3 000	12 000
Dillidur 550	-	10-51	1 000-3 300	12 000
Brinar 400 Cr	1.8703	6-25	1 000-3 500	14 000
X 120 Mn 12	1.3401	1,5-60	1 000-2 500	6 000

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Further details s. special catalog.

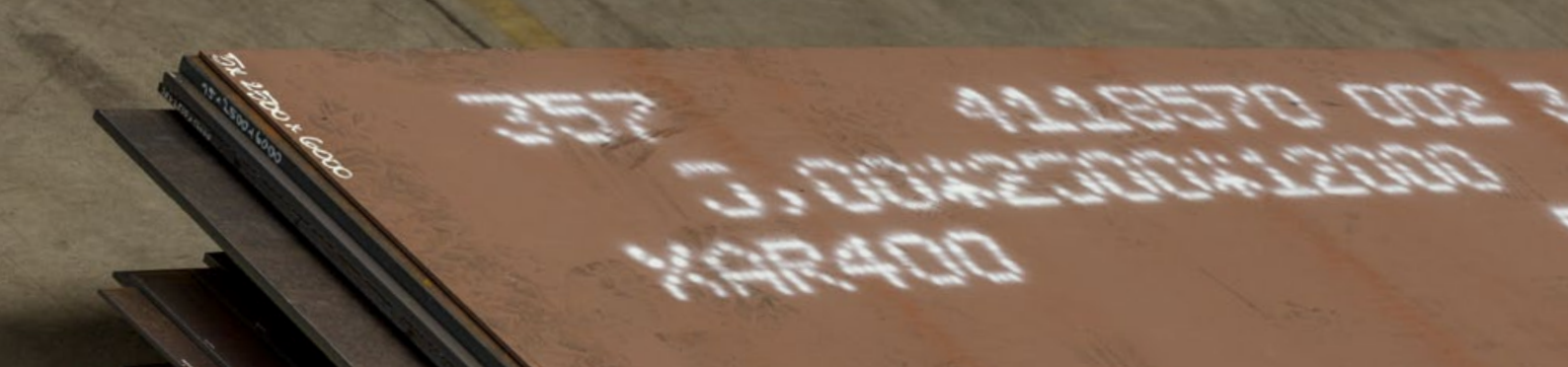
### CHEMICAL COMPOSITION

Name	Number	Content of elements – % by mass									
		C	Si	Mn	P max.	S max.	Cr	Mo max.	Cu max.	Ni max.	B max.
XAR 300	1.8704	max. 0,22	max. 0,65	max. 1,50	0,025	0,025	max. 1,20	0,30	-	-	0,005
XAR 400	1.8714	max. 0,20	max. 0,80	max. 1,50	0,025	0,010	max. 1,00	0,50	-	-	0,005
XAR 400 W	-	max. 0,26	max. 0,80	max. 1,30	0,025	0,025	max. 1,20	0,60	-	-	0,005
XAR 400 HR	-	max. 0,20	max. 0,50	max. 1,80	0,015	0,005	max. 1,90	0,50	-	1,00	0,005
XAR 400 HT	-	max. 0,20	max. 0,60	max. 1,60	0,020	0,010	max. 1,00	0,70	-	-	0,005
XAR 450	1.8722	max. 0,22	max. 0,80	max. 1,50	0,025	0,010	max. 1,30	0,50	-	-	0,005
XAR 500	1.8734	max. 0,28	max. 0,80	max. 1,50	0,025	0,010	max. 1,00	0,50	-	-	0,005
XAR 600	1.8735	max. 0,40	max. 0,80	max. 1,50	0,025	0,010	max. 1,50	0,50	-	1,50	0,005
Durostat 400	-	max. 0,18	max. 0,60	max. 2,10	0,025	0,010	max. 1,00	0,50	-	-	0,005
Durostat 450	-	max. 0,22	max. 0,60	max. 2,10	0,025	0,010	max. 1,00	0,50	-	-	0,005
Durostat 500	-	max. 0,30	max. 0,60	max. 2,10	0,025	0,010	max. 1,00	0,50	-	-	0,005
Dillidur 325 L	1.8705	max. 0,23	0,30-0,70	1,20-1,70	0,025	0,010	1,00-1,60	0,50	0,60	0,60	-
Dillidur 400 V	1.8715	max. 0,20	max. 0,50	max. 1,80	0,025	0,010	max. 1,50	0,50	-	0,80	0,005
Dillidur 500 V	1.8721	max. 0,30	max. 0,50	max. 1,60	0,025	0,010	max. 1,50	0,50	-	1,00	0,005
Dillidur 550	-	max. 0,37	max. 0,70	max. 1,60	0,025	0,010	max. 1,50	0,60	0,30	1,40	0,005
Brinar 400 Cr	1.8703	max. 0,20	max. 0,50	max. 1,70	0,015	0,005	max. 1,50	0,60	-	1,00	-
X 120 Mn 12	1.3401	1,10-1,30	0,30-0,50	12,0-13,0	0,100	0,040	max. 1,50	-	-	1,00	-

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Further details s. special catalog.





## MECHANICAL PROPERTIES

Name	Number	Yield strength R <sub>eh</sub> [MPa]	Tensile strength R <sub>m</sub> [MPa]	Elongation after fracture A [%]	Hardness according to Brinell
XAR 300 <sup>1)</sup>	1.8704	–	–	–	≤ 20 mm ≥ 270 ≥ 20 mm ≥ 240
XAR 400 <sup>2)</sup>	1.8714	~ 1 000	~ 1 250	~ 10	370–430
XAR 400 W <sup>2) 4)</sup>	–	–	–	–	360–430
XAR 400 HR <sup>1) 3) 4)</sup>	–	~ 900 <sup>5)</sup>	~ 1 200	12	340–440
XAR 400 HT <sup>2)</sup>	–	960 (900 – tl. >70 mm)	1 000 (960 – tl. >70 mm)	14	310–370
XAR 450 <sup>2)</sup>	1.8722	~ 1 200	~ 1 400	~ 10	420–480
XAR 500 <sup>2)</sup>	1.8734	~ 1 300	~ 1 600	~ 9	470–530
XAR 600 <sup>2)</sup>	1.8735	~ 1 700	~ 2 000	~ 8	min. 550
Durostat 400 <sup>2)</sup>	–	~ 1 000 <sup>5)</sup>	~ 1 250	~ 10	360–440
Durostat 450 <sup>2)</sup>	–	~ 1 100 <sup>5)</sup>	~ 1 400	~ 9	410–490
Durostat 500 <sup>2)</sup>	–	~ 1 200 <sup>5)</sup>	~ 1 550	~ 8	460–540
Dillidur 325 L <sup>1)</sup>	1.8705	~ 650	~ 1 000	~ 13	325
Dillidur 400 V <sup>2)</sup>	1.8715	~ 800	~ 1 200	~ 12	370–430
Dillidur 500 V <sup>2)</sup>	1.8721	~ 1 100	~ 1 600	~ 8	450–530
Dillidur 550 <sup>2)</sup>	–	–	–	–	520–580
Brinar 400 Cr <sup>3)</sup>	1.8703	~ 900 <sup>5)</sup>	~ 1 200	~ 12	340–440
X 120 Mn 12 <sup>1)</sup>	1.3401	~ min. 350	800–1 100	min. 40	200–500

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Further details s. special catalog.

<sup>1)</sup> Normalising. <sup>2)</sup> Hardened in water. <sup>3)</sup> Hardened in atmosphere. <sup>4)</sup> Abrasion resistance guaranteed up to 400 °C. <sup>5)</sup> Rp <sup>0,2</sup>

## Steels for pressure purposes – fine grain steels, normalized EN10028-3

Inspection certificate acc. to EN10204/3.1 or 3.2 TÜV

DIMENSIONS				
Name	Number	Dimension [mm]		
		Thickness	Width	Length up to
P275NH	1.0487	5-120	1 000-4 000	14 000
P275NL1	1.0488	5-120	1 000-4 000	14 000
P275NL2	1.1104	5-120	1 000-4 000	14 000
P355N	1.0562	3-220	1 000-3 500	13 000
P355NH	1.0565	3-220	1 000-3 500	13 000
P355NL1	1.0566	3-220	1 000-3 500	13 000
P355NL2	1.1106	3-220	1 000-3 500	13 000
P460NH	1.8935	4-180	1 000-3 000	13 000
P460NL1	1.8915	4-180	1 000-3 000	13 000
P460NL2	1.8918	4-180	1 000-3 000	13 000

CHEMICAL COMPOSITION							
Name	Number	Content of elements – % by mass					
		C max.	Si max.	Mn	P max.	S max.	Al total
P275NH	1.0487	0,16	0,40	0,80-1,50	0,025	0,010	min. 0,020
P275NL1	1.0488						
P275NL2	1.1104						
P355N	1.0562	0,18	0,50	1,10-1,70	0,025	0,010	min. 0,020
P355NH	1.0565						
P355NL1	1.0566						
P355NL2	1.1106						
P460NH	1.8935	0,20	0,60	1,10-1,70	0,025	0,010	min. 0,020
P460NL1	1.8915						
P460NL2	1.8918						

Name	Content of elements – % by mass max.								
	Cr	Cu	Mo	N	Nb	Ni	Ti	V	Nb + Ti + V
P275NH	0,30	0,30	0,08	0,012	0,05	0,50	0,03	0,05	0,05
P275NL1									
P275NL2									
P355N	0,30	0,30	0,08	0,012	0,05	0,50	0,03	0,10	0,12
P355NH									
P355NL1									
P355NL2									
P460NH	0,30	0,70	0,10	0,025	0,05	0,80	0,03	0,20	0,22
P460NL1									
P460NL2									



## MECHANICAL PROPERTIES

Name	Number	Thermal treatment	Min. yield strength $R_{eH}$ [MPa] for product thickness [mm]					
			≤ 16	> 16 ≤ 40	> 40 ≤ 60	> 60 ≤ 100	> 100 ≤ 150	> 150 ≤ 250
P275NH	1.0487	Normalized	275	265	255	235	225	215
P275NL1	1.0488							
P275NL2	1.1104							
P355N	1.0562		355	345	335	315	305	295
P355NH	1.0565							
P355NL1	1.0566							
P355NL2	1.1106		460	445	430	400	1)	1)
P460NH	1.8935							
P460NL1	1.8915							
P460NL2	1.8918							

Name	Tensile strength $R_m$ [MPa] for product thickness [mm]				Min. elongation after fracture A [%] for product thickness [mm]		
	≤ 60	> 60 ≤ 100	> 100 ≤ 150	> 150 ≤ 250	≤ 60	> 60 ≤ 150	> 150 ≤ 250
P275NH	390–510	370–490	360–480	350–470	24	23	23
P275NL1							
P275NL2							
P355N	490–630	470–610	460–600	450–590	22	21	21
P355NH							
P355NL1							
P355NL2							
P460NH	570–720 <sup>2)</sup>	540–710	1)	1)	17	1)	1)
P460NL1							
P460NL2							

1) According to negotiation. 2) For thickness up to 16 mm is acceptable the highest value 730 MPa.

Name	Nominal thicknesses	Thermal treatment	Impact energy KV min. [J] at temperatures [°C]										
			Test in crosswise direction					Test in lengthwise direction					
			-50	-40	-20	0	+20	-50	-40	-20	0	+20	
P...N	5–250 <sup>1)</sup>	Normalized	–	–	30	40	50	–	–	45	65	75	
P...NH			–	–	30	40	50	–	–	45	65	75	
P...NL1			–	27	35	50	60	30	40	50	70	80	
P...NL2			27	30	40	60	70	42	45	55	75	85	

1) For the steel P460NH, P460NL1 and P460NL2 with the thickness up to 100 mm.





## Steels for pressure purposes – non-alloy and alloy steels EN 10028-2

Inspection certificate acc. to EN 10204/3.1 or 3.2 TÜV

DIMENSIONS				
Name	Number	Dimension [mm]		
		Thickness	Width	Length up to
P265GH	1.0425	3–250	1 000–4 000	14 000
P295GH	1.0481	5–120	1 000–3 500	12 000
P355GH	1.0473	3–220	1 000–3 500	12 000
16Mo3	1.5415	1,5–200	1 000–3 000	12 000
13CrMo4–5	1.7335	3–160	1 000–3 000	12 000
10CrMo9–10	1.7380	3–120	1 000–2 500	12 000

CHEMICAL COMPOSITION							
Name	Number	Content of elements – % by mass					
		C	Si max.	Mn	P max.	S max.	Al total
P265GH	1.0425	max. 0,20	0,400	0,80–1,40	0,025	0,010	min. 0,020
P295GH	1.0481	0,08–0,20	0,400	0,90–1,50	0,025	0,010	min. 0,020
P355GH	1.0473	0,10–0,22	0,600	1,10–1,70	0,025	0,010	min. 0,020
16Mo3	1.5415	0,12–0,20	0,350	0,40–0,90	0,025	0,010	–
13CrMo4–5	1.7335	0,08–0,18	0,350	0,40–1,00	0,025	0,010	–
10CrMo9–10	1.7380	0,08–0,14	0,500	0,40–0,80	0,020	0,010	–

Name	Content of elements – % by mass							
	Cr	Cu max.	Mo	Nb max.	Ni max.	Ti max.	V max.	Cr + Cu + Mo + Ni max.
P265GH	max. 0,30	0,300	max. 0,08	0,020	0,300	0,030	0,020	0,700
P295GH	max. 0,30	0,300	max. 0,08	0,020	0,300	0,030	0,020	0,700
P355GH	max. 0,30	0,300	max. 0,08	0,040	0,300	0,030	0,020	0,700
16Mo3	max. 0,30	0,300	0,25–0,35	–	0,300	–	–	–
13CrMo4–5	0,70–1,15	0,300	0,40–0,60	–	–	–	–	–
10CrMo9–10	2,00–2,50	0,300	0,90–1,10	–	–	–	–	–



MECHANICAL PROPERTIES														
Name	Number	Usual delivery condition	Product thickness [mm]		Yield strength R <sub>EH</sub> [MPa] min.	Tensile strength R <sub>m</sub> [MPa]	Elongation after fracture A [%] min.	Impact energy [KV] + [J] min. at a temperature [°C]						
			>	≤				-20	0	+20				
P265GH	1.0425	+N	-	16	265	410-530	22	27	34	40				
			16	40	255									
			40	60	245									
			60	100	215	400-530								
			100	150	200									
			150	250	185									
P295GH	1.0481	+N	-	16	295	460-580	21	27	34	40				
			16	40	290									
			40	60	285									
			60	100	260	440-570								
			100	150	235									
			150	250	220									
P355GH	1.0473	+N	-	16	355	510-650	20	27	34	40				
			16	40	345									
			40	60	335									
			60	100	315	490-630								
			100	150	295									
			150	250	280									
16Mo3	1.5415	+N	-	16	275	440-590	22	a)	a)	31				
			16	40	270									
			40	60	260									
			60	100	240	430-580								
			100	150	220									
			150	250	210									
13CrMo4-5	1.7335	+NT	-	16	300	450-600	19	a)	a)	31				
			16	60	290									
		+NT+QT	60	100	270	440-590				27				
			100	150	255									
10CrMo9-10	1.7380	+QT	150	250	245	420-570	18	a)	a)	31				
			-	16	310									
		+NT	16	40	300	480-630								
			40	60	290									
		+NT+QT	60	100	280	470-620					17	a)	a)	27
			100	150	260									
+QT	150	250	250	450-600										

+N – normalized +NT – normalized and tempered. +QT – quenched and tempered, a) – value may be agreed at the time of inquiry and order.

## Normalized/normalized rolled fine grain structural steels EN 10025-3

Inspection certificate acc. to EN 10204/3.1

DIMENSIONS				
Name	Number	Dimension [mm]		
		Thickness	Width	Length up to
S355NL	1.0546	2-220	1 000-4 000	16 000
S420NL	1.8912	8-120	1 000-3 500	16 000
S460NL	1.8903	4-180	1 000-3 500	16 000

CHEMICAL COMPOSITION								
Name	Number	Content of elements – % by mass						
		C max.	Si max.	Mn	P max.	S max.	Nb max.	V max.
S355NL	1.0546	0,18	0,50	0,90-1,65	0,025	0,02	0,05	0,12
S420NL	1.8912	0,20	0,60	1,00-1,70				0,20
S460NL	1.8903	0,20	0,60	1,00-1,70				0,20

Name	Number	Content of elements – % by mass						
		Al min.	Ti max.	Cr max.	Ni max.	Mo max.	Cu max.	N max.
S355NL	1.0546	0,02	0,05	0,30	0,50	0,10	0,55	0,015
S420NL	1.8912				0,80			0,025
S460NL	1.8903				0,80			0,025

MECHANICAL PROPERTIES											
Name	Min. yield strength $R_{eH}$ [MPa] for thickness [mm]								Tensile strength $R_m$ [MPa] for thickness [mm]		
	$\leq 16$	$> 16 \leq 40$	$> 40 \leq 63$	$> 63 \leq 80$	$> 80 \leq 100$	$> 100 \leq 150$	$> 150 \leq 200$	$> 200 \leq 250$	$\leq 100$	$> 100 \leq 200$	$> 200 \leq 250$
S355NL	355	345	335	325	315	295	285	275	470-630	450-600	450-600
S420NL	420	400	390	370	360	340	330	320	520-680	500-650	500-650
S460NL	460	440	430	410	400	380	370	-	550-720	530-710	-

Name	Min. elongation A [%] $L_0 = 5,65 \sqrt{S_0}$ for thickness [mm]						Orientation of test	Min. impact energy KV [J] Testing temperature [°C]						
	$\leq 16$	$> 16 \leq 40$	$> 40 \leq 63$	$> 63 \leq 80$	$> 80 \leq 200$	$> 200 \leq 250$		+20	0	-10	-20	-30	-40	-50
S355NL	22	22	22	21	21	21	lengthwise	63	55	51	47	40	31	27
S420NL	19	19	19	18	18	18	crosswise	40	34	30	27	23	20	16
S460NL	17	17	17	17	17	-								



## Thermomechanical rolled fine grain structural steels EN 10025-4

Inspection certificate acc. to EN 10204/3.1

DIMENSIONS				
Name	Number	Dimension [mm]		
		Thickness	Width	Length up to
S355ML	1.8834	2–220	1 000–4 000	16 000
S420ML	1.8836	8–120	1 000–3 500	16 000
S460ML	1.8838	4–120	1 000–3 500	16 000

CHEMICAL COMPOSITION								
Name	Number	Content of elements – % by mass						
		C max.	Si max.	Mn max.	P max.	S max.	Nb max.	V max.
S355ML	1.8834	0,14	0,50	1,60	0,025	0,02	0,05	0,10
S420ML	1.8836	0,16	0,50	1,70				0,12
S460ML	1.8838	0,16	0,60	1,70				0,12

Name	Number	Content of elements – % by mass						
		Al min.	Ti max.	Cr max.	Ni max.	Mo max.	Cu max.	N max.
S355ML	1.8834	0,02	0,05	0,30	0,50	0,10	0,55	0,015
S420ML	1.8836				0,80	0,20		0,025
S460ML	1.8838				0,80	0,20		0,025

MECHANICAL PROPERTIES											
Name	Min. yield strength $R_{eH}$ [MPa] for thickness [mm]						Tensile strength $R_m$ [MPa] for thickness [mm]				
	≤ 16	> 16 ≤ 40	> 40 ≤ 63	> 63 ≤ 80	> 80 ≤ 100	> 100 ≤ 150	≤ 40	> 40 ≤ 63	> 63 ≤ 80	> 80 ≤ 100	> 100 ≤ 150
S355ML	355	345	335	325	325	320	470–630	450–610	440–600	440–600	430–590
S420ML	420	400	390	380	370	365	520–680	500–660	480–640	470–630	460–620
S460ML	460	440	430	410	400	385	540–720	530–710	510–690	500–680	490–660

Name	Min. elongation A [%] $L_0 = 5,65 \sqrt{S_0}$	Orientation of test	Min. impact energy KV [J] Testing temperature [°C]						
			+20	0	-10	-20	-30	-40	-50
S355ML	22	lengthwise	63	55	51	47	40	31	27
S420ML	19	crosswise	40	34	30	27	23	20	16
S460ML	17								

## High yield strength steels for cold forming – thermomechanically rolled EN 10149-2

Inspection certificate acc. to EN 10204/3.1

DIMENSIONS				
Name	Number	Dimension [mm]		
		Thickness	Width	Length up to
S315MC	1.0972	1,5–20	1 000–2 500	12 000
S355MC	1.0976	1,5–20	1 000–2 500	12 000
S420MC	1.0980	1,5–20	1 000–2 500	12 000
S460MC	1.0982	1,5–20	1 000–2 500	12 000
S500MC	1.0984	1,5–16	1 000–2 500	12 000
S550MC	1.0986	1,5–16	1 000–2 500	12 000
S600MC	1.8969	1,5–16	1 000–2 500	12 000
S650MC	1.8976	1,5–16	1 000–2 500	12 000
S700MC	1.8974	1,5–16	1 000–2 500	12 000

CHEMICAL COMPOSITION								
Name	Content of elements – % by mass							
	C max.	Si max.	Mn max.	P max.	S max.	Al – total min.	Nb max.	Ti max.
S315MC	0,12	0,50	1,30	0,025	0,020	0,015	0,09	0,15
S355MC	0,12	0,50	1,50	0,025	0,020	0,015	0,09	0,15
S420MC	0,12	0,50	1,60	0,025	0,015	0,015	0,09	0,15
S460MC	0,12	0,50	1,60	0,025	0,015	0,015	0,09	0,15
S500MC	0,12	0,50	1,70	0,025	0,015	0,015	0,09	0,15
S550MC	0,12	0,50	1,80	0,025	0,015	0,015	0,09	0,15
S600MC	0,12	0,50	1,90	0,025	0,015	0,015	0,09	0,22
S650MC	0,12	0,60	2,00	0,025	0,015	0,015	0,09	0,22
S700MC	0,12	0,60	2,10	0,025	0,015	0,015	0,09	0,22

MECHANICAL PROPERTIES				
Name	Min. yield strength $R_{eH}^{11}$ [MPa]	Tensile strength $R_m^{11}$ [MPa]	Min. elongation A [%]	
			Thickness < 3 mm	Thickness ≥ 3 mm
S315MC	315	390–510	20	24
S355MC	355	430–550	19	23
S420MC	420	480–620	16	19
S460MC	460	520–670	14	17
S500MC	500	550–700	12	14
S550MC	550	600–760	12	14
S600MC	600	650–820	11	13
S650MC	650	700–880	10	12
S700MC	700	750–950	10	12

Delivery program: **ALFORM, PERFORM**



## High yield strength structural steels in the quenched and tempered condition EN10025-6

Inspection certificate acc. to EN 10204/3.1

### DIMENSIONS

Name	Number	Dimensions [mm]		
		Thickness	Width	Length up to
S690Q	1.8931	2–200	1 000–3 000	13 000
S690QL	1.8928			
S690QL1	1.8988			
S890Q	1.8940	4–120	1 000–3 000	12 000
S890QL	1.8983			
S890QL1	1.8925			
S960Q	1.8941	4–100	1 000–3 000	12 000
S960QL	1.8933			

### CHEMICAL COMPOSITION

Name	Content of elements – % by mass max.							
	C	Si	Mn	P	S	N	B	Cr
S690Q	0,20	0,80	1,70	0,025	0,015	0,015	0,0050	1,50
S690QL				0,020	0,010			
S690QL1				0,020	0,010			
S890Q				0,025	0,015			
S890QL				0,020	0,010			
S890QL1				0,020	0,010			
S960Q				0,025	0,015			
S960QL				0,020	0,010			

Name	Content of elements – % by mass max.						
	Cu	Mo	Nb	Ni	Ti	V	Zr
S690Q	0,50	0,70	0,06	2,0	0,05	0,12	0,15
S690QL							
S690QL1							
S890Q							
S890QL							
S890QL1							
S960Q							
S960QL							

### MECHANICAL PROPERTIES

Name	Min. yield strength $R_{EH}$ [MPa] for th. [mm]			Tensile strength $R_m$ [MPa] for th. [mm]			Elong. A [%] min.	Impact energy KV min. [J] at temperatures			
	≥ 3 ≤ 50	> 50 ≤ 100	> 100 ≤ 150	≥ 3 ≤ 50	> 50 ≤ 100	> 100 ≤ 150		0 °C	–20 °C	–40 °C	–60 °C
S690Q	690	650	630	770–940	760–930	710–900	14	40	30	–	–
S690QL								50	40	30	–
S690QL1								60	50	40	30
S890Q	890	830	–	940–1 100	880–1 100	–	11	40	30	–	–
S890QL								50	40	30	–
S890QL1								60	50	40	30
S960Q	960	–	–	980–1 150	–	–	10	40	30	–	–
S960QL								50	40	30	–

Delivery program: NA-XTRA, DILLIMAX, ALDUR, SUPRALSIM, XABO.





## Ship building quality steels

Inspection certificate acc. to EN 10204/3.1

DIMENSIONS				
Name	Dimensions [mm]			Acceptance according to EN 10204
	Thickness	Width	Length up to	
Grade A	3-100	1 000-3 500	16 000	3.2 DNV GL, 3.2 LR
Grade D	4-120	1 000-4 000	16 000	3.2 DNV GL, 3.2 LR
Grade E	4-120	1 000-4 000	16 000	3.2 DNV GL, 3.2 LR
D 36	4-60	1 000-4 000	16 000	3.2 DNV GL
E 36/EH 36	5-250	1 000-3 500	16 000	3.2 DNV GL, 3.2 LR
F 36/FH 36	6-100	1 000-3 500	16 000	3.2 DNV GL, 3.2 LR
EH 40	8-40	1 050-3 500	16 000	3.2 LR

## ASME standard steels

Inspection certificate acc. to EN 10204/3.1 or 3.2

DIMENSIONS				
Name	Dimensions [mm]			Acceptance according to EN 10204
	Thickness	Width	Length up to	
SA 36	3-110	1 000-3 500	16 000	3.1
SA 283 Grade C	4-25	1 000-3 500	16 000	3.1
SA 285 Grade C	4-25	1 000-3 500	16 000	3.1
SA 516 Grade 60/415	3-270	1 000-4 000	16 000	3.1
SA 516 Grade 65/450	3-250	1 000-4 000	16 000	3.1
SA 516 Grade 70/485	3-250	1 000-4 000	16 000	3.2 LR, 3.1
SA 537 Cl.1	4-200	1 000-4 000	16 000	3.1
SA 387 Grade 12 Cl. 2	3-200	1 000-3 000	12 000	3.1
SA 387 Grade 11 Cl. 2	5-80	1 000-3 000	12 000	3.1
SA 387 Grade 22 Cl. 2	4-100	1 000-3 000	12 000	3.1
SA 387 Grade 5 Cl. 2	6-80	1 000-3 000	12 000	3.2 TÜV



## Structural steels with improved atmospheric corrosion resistance EN 10025-5

Inspection certificate acc. to EN 10204/3.1

### DIMENSIONS

Name	Number	Dimensions [mm]		
		Thickness	Width	Length
S355J0WP	1.8945	1-12	1 000-2 500	max. 12 000
S355J2WP	1.8946	1-12	1 000-2 500	max. 12 000
S355J0W	1.8959	3-50	1 000-2 500	max. 12 000
S355J2W	1.8965	3-50	1 000-2 500	max. 12 000

### CHEMICAL COMPOSITION

Name	Number	Content of elements – % by mass								
		C max.	Si max.	Mn	P	S max.	Cr	Cu	N max.	Addition of nitrogen binding elem.
S355J0WP	1.8945	0,15	0,80	max. 1,10	0,05 0,16	0,035	0,25 1,35	0,20 0,60	0,010	–
S355J2WP	1.8946	0,15	0,80	max. 1,10	0,05 0,16	0,030	0,25 1,35	0,20 0,60	–	0,40
S355J0W	1.8959	0,19	0,55	0,45 1,60	max. 0,040	0,035	0,35 0,85	0,20 0,60	0,010	–
S355J2W	1.8965	0,19	0,55	0,45 1,60	max. 0,035	0,030	0,35 0,85	0,20 0,60	–	0,40

### MECHANICAL PROPERTIES

Name	Number	Minimum yield strength $R_{eH}$ [MPa] for thickness [mm]					Tensile strength $R_m$ [MPa] for thickness [mm]		Position of test pieces	Elongation after fracture A [%] min.					
										$L_0 = 80$ mm			$L_0 = 5,65 \sqrt{S_0}$		
		$\leq 16$	$> 16 \leq 40$	$> 40 \leq 63$	$> 63 \leq 80$	$> 80 \leq 100$	$< 3$	$> 3 \leq 100$		$> 1,5 \leq 2$	$> 2 \leq 2,5$	$> 2,5 \leq 3$	$> 3 \leq 40$	$> 40 \leq 63$	$> 63 \leq 100$
S355J0WP	1.8945	355	345	–	–	–	510-680	470-630	l	16	17	18	22	–	–
										t	14	15	16	20	–
S355J2WP	1.8946	355	345	–	–	–	510-680	470-630	l	16	17	18	22	–	–
										t	14	15	16	20	–
S355J0W	1.8959	355	345	335	325	315	510-680	470-630	l	16	17	18	22	21	20
										t	14	15	16	20	19
S355J2W	1.8965	355	345	335	325	315	510-680	470-630	l	16	17	18	22	21	20
										t	14	15	16	20	19

Delivery program: CORTEN A, CORTEN B, PATINAX 355, PATINAX 355P, REDSTEEL, REDSTEEL P.

## Dimensional standard EN 10051 – continuously hot-rolled plates

(tab. 2) hot-rolled low carbon STEEL SHEET/PLATE AND STRIP for cold forming

(tab. 3) STRIP AND SHEET/PLATE OF STEELS with a specified minimum yield strength  $R_{0.2} \leq 300$  MPa [Category A]

(tab. 4) STRIP AND SHEET/PLATE OF STEELS with a specified minimum yield strength  $300 \text{ MPa} < R_{0.2} \leq 360$  MPa [Category B]

(tab. 5) STRIP AND SHEET/PLATE OF STEELS with a specified minimum yield strength  $360 \text{ MPa} < R_{0.2} \leq 420$  MPa [Category C]

(tab. 6) STRIP AND SHEET/PLATE OF STEELS with a specified minimum yield strength  $420 \text{ MPa} < R_{0.2} \leq 900$  MPa [Category D]

TOLERANCE OF THICKNESS – Class D					Dimensions [mm]
Nominal thickness $t$	Tolerance for a nominal width $w$				
	$w \leq 1\,200$	$1\,200 < w \leq 1\,500$	$1\,500 < w \leq 1\,800$	$w > 1\,800$	
$t \leq 2,00$	$\pm 0,24$	$\pm 0,27$	$\pm 0,29$	–	
$2,00 < t \leq 2,50$	$\pm 0,25$	$\pm 0,29$	$\pm 0,32$	$\pm 0,35$	
$2,50 < t \leq 3,00$	$\pm 0,28$	$\pm 0,31$	$\pm 0,34$	$\pm 0,36$	
$3,00 < t \leq 4,00$	$\pm 0,31$	$\pm 0,34$	$\pm 0,36$	$\pm 0,38$	
$4,00 < t \leq 5,00$	$\pm 0,34$	$\pm 0,36$	$\pm 0,39$	$\pm 0,21$	
$5,00 < t \leq 6,00$	$\pm 0,36$	$\pm 0,39$	$\pm 0,41$	$\pm 0,43$	
$6,00 < t \leq 8,00$	$\pm 0,41$	$\pm 0,42$	$\pm 0,43$	$\pm 0,49$	
$8,00 < t \leq 10,00$	$\pm 0,45$	$\pm 0,46$	$\pm 0,48$	$\pm 0,56$	
$10,00 < t \leq 12,50$	$\pm 0,49$	$\pm 0,50$	$\pm 0,52$	$\pm 0,60$	
$12,50 < t \leq 15,00$	$\pm 0,52$	$\pm 0,53$	$\pm 0,56$	$\pm 0,64$	
$15,00 < t \leq 25,00$	$\pm 0,56$	$\pm 0,59$	$\pm 0,63$	$\pm 0,70$	

TOLERANCE OF LENGHT			Dimensions [mm]
Nominal length $l$	Tolerances		
	Lower	Upper	
$l < 2\,000$	0	+ 10	
$2\,000 \leq l < 8\,000$	0	+ 0,005 $\times l$	
$l \geq 8\,000$	0	+ 40	

TOLERANCE OF WIDTH					Dimensions [mm]
Nominal width $w$	Mill edges		Trimmed edges		
	Lower	Upper	Lower	Upper	
$w \leq 1200$	0	+ 20	0	+ 3	
$1\,200 < w \leq 1850$	0	+ 20	0	+ 5	
$w > 1\,850$	0	+ 25	0	+ 6	

Tolerance for trimmed edges apply to products with nominal thickness  $\leq 10$  mm; for nominal thickness  $> 10$  mm the upper tolerances shall be agreed at the time of enquiry and order.

TOLERANCE OF FLATNESS – Class A				Dimensions [mm]
Nominal thickness $t$	Nominal width $w$	Tolerances of flatness		
		Normal	Special	
$t \leq 2,0$	$w \leq 1\,200$	18	9	
	$1\,200 < w \leq 1\,500$	20	10	
	$w > 1\,500$	25	13	
$2,00 < t \leq 25$	$w \leq 1\,200$	15	8	
	$1\,200 < w \leq 1\,500$	18	9	
	$w > 1\,500$	23	12	

TOLERANCE OF FLATNESS – Class B, C, D					Dimensions [mm]
Nominal thickness $t$	Nominal width $w$	Tolerances of flatness			
		Class B	Class C	Class D	
$t \leq 25$	$w \leq 1\,200$	18	23	Shall be agreed at the time of enquiry and order.	
	$1\,200 < w \leq 1\,500$	23	30		
	$w > 1\,500$	28	38		





## Dimensional standard EN 10029 – hot rolled plates

TOLERANCE ON THE NOMINAL THICKNESS								Dimensions [mm]	
Nominal thickness $t$	Class A		Class B		Class C		Class D		
	Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper	
$3 \leq t < 5$	-0,3	+0,7	-0,3	+0,7	0	+1,0	-0,5	+0,5	
$5 \leq t < 8$	-0,4	+0,8	-0,3	+0,9	0	+1,2	-0,6	+0,6	
$8 \leq t < 15$	-0,5	+0,9	-0,3	+1,1	0	+1,4	-0,7	+0,7	
$15 \leq t < 25$	-0,6	+1,0	-0,3	+1,3	0	+1,6	-0,8	+0,8	
$25 \leq t < 40$	-0,7	+1,3	-0,3	+1,7	0	+2,0	-1,0	+1,0	
$40 \leq t < 80$	-0,9	+1,7	-0,3	+2,3	0	+2,6	-1,3	+1,3	
$80 \leq t < 150$	-1,1	+2,1	-0,3	+2,9	0	+3,2	-1,6	+1,6	
$150 \leq t < 250$	-1,2	+2,4	-0,3	+3,3	0	+3,6	-1,8	+1,8	
$250 \leq t \leq 400$	-1,3	+3,5	-0,3	+4,5	0	+4,8	-2,4	+2,4	

TOLERANCE ON LENGTH		Dimensions [mm]	
Nominal length $l$	Lower	Upper	
$l < 4\ 000$	0	+ 20	
$4\ 000 \leq l < 6\ 000$	0	+ 30	
$6\ 000 \leq l < 8\ 000$	0	+ 40	
$8\ 000 \leq l < 10\ 000$	0	+ 50	
$10\ 000 \leq l < 12\ 000$	0	+ 75	
$15\ 000 \leq l < 20\ 000$	0	+ 100	

TOLERANCE ON WIDTH		Dimensions [mm]	
Nominal thickness $t$	Lower	Upper	
$t < 40$	0	+ 20	
$40 \leq t < 150$	0	+ 25	
$150 \leq t \leq 400$	0	+ 30	

TOLERANCE ON FLATNESS Class N		Dimensions [mm]			
Nominal thickness $t$	Measuring length				
	Steel group L		Steel group H		
	1000	2000	1000	2000	
$3 \leq t < 5$	9	14	12	17	
$5 \leq t < 8$	8	12	11	15	
$8 \leq t < 15$	7	11	10	14	
$15 \leq t < 25$	7	10	10	13	
$25 \leq t < 40$	6	9	9	12	
$40 \leq t < 250$	5	8	8	12	
$250 \leq t \leq 400$	6	9	9	13	

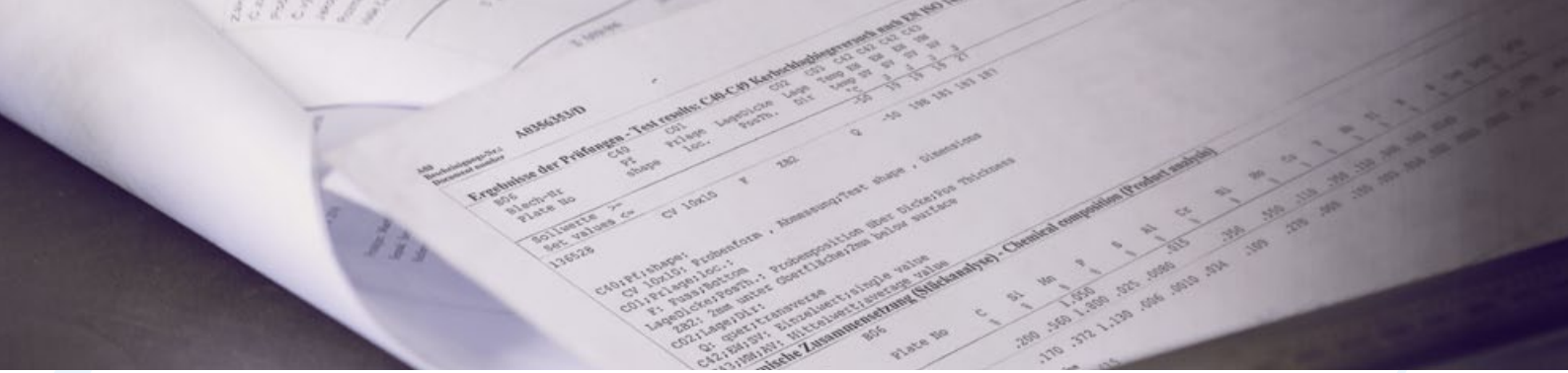
TOLERANCE ON FLATNESS Class S		Dimensions [mm]			
Nominal thickness $t$	Measuring length				
	Steel group L		Steel group H		
	1000	2000	1000	2000	
$3 \leq t < 5$	5	10	7	14	
$5 \leq t < 8$	5	10	7	13	
$8 \leq t < 15$	3	6	7	12	
$15 \leq t < 25$	3	6	7	11	
$25 \leq t < 40$	3	6	7	11	
$40 \leq t < 250$	3	6	6	10	
$250 \leq t \leq 400$	4	7	7	11	

Weight kg/m <sup>2</sup>									
Thickness [mm]	Weight/m <sup>2</sup> [kg]	Thickness [mm]	Weight/m <sup>2</sup> [kg]	Thickness [mm]	Weight/m <sup>2</sup> [kg]	Thickness [mm]	Weight/m <sup>2</sup> [kg]	Thickness [mm]	Weight/m <sup>2</sup> [kg]
3	24	16	128	38	304	95	760	160	1 280
4	32	17	136	40	320	100	800	165	1 320
5	40	18	144	45	360	105	840	170	1 360
6	48	19	152	46	368	110	880	175	1 400
7	56	20	160	50	400	115	920	180	1 440
8	64	22	176	55	440	120	960	185	1 480
9	72	25	200	60	480	125	1 000	190	1 520
10	80	26	208	65	520	130	1 040	195	1 560
11	88	28	224	70	560	135	1 080	200	1 600
12	96	30	240	75	600	140	1 120	210	1 680
13	104	32	256	80	640	145	1 160	220	1 760
14	112	35	280	85	680	150	1 200	230	1 840
15	120	36	288	90	720	155	1 240	240	1 920



## Comparison of standards – EN/GOST/Other

W. Nr.	EN	GOST	Other
1.0037	S235JR	СТ3СП	St 32-2
1.0553	S355J0	17Г1С	St 52-3
1.0577	S355J2	17Г1С	
1.0579	S355J2C	17Г1С	
1.0425	P265GH	20K	H II
1.0481	P295GH	18K	17Mn4
1.0473	P355GH		19Mn6
1.5415	16Mo3	15M	15Mo3
1.7335	13CrMo4-5	15XM	13CrMo44
1.7360	10CrMo9-10	10X2M	10CrMo9.10
1.0488	P275N/NH/NL1/NL2	СТ3ГПС	StE/WS/E/TS/E/EST/E 285
1.0566	P355N/NH/NL1/NL2	15ГФ	StE/WS/E/TS/E/EST/E 355
1.8915	P460N/NH/NL1/NL2	18Г2АФ	StE/WS/E/TS/E/EST/E 460
1.0546	S355NL	15ГФ	TS/E 355
1.8912	S420NL		TS/E 420
1.8903	S460NL	18Г2АФ	TS/E 460
1.8834	S355ML	15ГФ	TS/E 355 TM
1.8836	S420ML		TS/E 420 TM
1.8838	S460ML		TS/E 460 TM
1.8928	S690QL	16ХГМФТР	StE 690
1.8983	S890QL		StE 890
1.8933	S960QL		StE 960
1.8942	S1100QL		StE 1100
1.0978	S355MC		QStE 380 TM
1.0980	S420MC		QStE 420 TM
1.8974	S700MC		QStE 690 TM
1.0503	C45	45	C 45
1.0601	C60	60	C 60
1.7131	16MnCr5	18ХГ	16MnCr5
1.7147	20MnCr5	18ХГ	20MnCr5
1.7218	25CrMo4	20XM, 30XM	25CrMo4
1.7225	42CrMo4	38XM	42CrMo4
1.3401		110Г13Л	X120 Mn 12
1.8704 / 1.8705			XAR 300 / Dillidur 325 L
1.8714 / 1.8722			XAR 400 / XAR 450
- / 1.8715			Durostat, Dillidur 400
1.8703			Brinar 400 Cr
1.8734			XAR 500
- / 1.8721			Durostat, Dillidur 500
1.8735			XAR 600
1.8945	S355J0WP	10ХНДП	
1.8946	S355J2WP		CORTEN A, PATINAX 355P, REDSTEEL P
1.8959	S355J0W		
1.8965	S355J2W		CORTEN B, PATINAX 355, REDSTEEL



## Summary of inspection documents EN 10204

Type	Designation of the document type				Document content	Document validated by
	Czech	English	German	French		
2.1	Prohlášení o shodě s objednávkou	Declaration of compliance with the order	Werksbescheinigung	Attestation de conformité à la commande	Statement of compliance with the order	The manufacturer
2.2	Zkušební zpráva	Test report	Werkszeugnis	Relevé de contrôle	Statement of compliance with the order, with indication of results of non-specific inspection	The manufacturer
3.1	Inspekční certifikát 3.1	Inspection certificate 3.1	Abnahmeprüfzeugnis 3.1	Certificat de réception 3.1	Statement of compliance with the order, with indication of results of specific inspection	The manufacturer's authorized inspection representative independent of the manufacturing department
3.2	Inspekční certifikát 3.2	Inspection certificate 3.2	Abnahmeprüfzeugnis 3.2	Certificat de réception 3.2	Statement of compliance with the order, with indication of results of non-specific inspection	The manufacturer's authorized inspection representative independent of the manufacturing department and either the purchaser's authorized inspection representative or the inspector designated by the official regulations

## ISO certification

Our company is certified according to ČSN EN ISO 9001 and ČSN EN ISO 14001.







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