

# Mild, unalloyed steels for cold forming

Technical Terms of Delivery

# Contents

<u>Mild unalloyed steels for cold forming</u>	<u>3</u>
Overview	3
Chemical composition	4
Mechanical properties	4
Processing instructions	4
Available dimensions	5
<u>Unalloyed special steels for cold forming</u>	<u>7</u>
Scope of validity	7
Chemical composition	7
Mechanical properties	7
Available dimensions	8

# Mild unalloyed steels for cold forming

We supply mild steels for cold forming in accordance with EN 1011.

## Overview

### DD11 (drawing grade)

From simple, non-formed parts to medium drawing quality. For edging and for difficult shapes with narrow radii.

### DD12 (deep-drawing grade)

For higher forming requirements, as for drawn parts and difficult shapes with very narrow edging radii.

### DD13 (special deep-drawing grade)

For high forming requirements such as for greater drawing depth, for multi-stage deep drawing and most difficult section shapes.

### DD14 (special boron-containing deep-drawing grade)

For highest forming requirements. In comparison with DD13, the field of application is even broadened by adding a low amount of boron.

## Steel grades

Comparison table

Steel grade	EURONORM 111-77	DIN 1614 Part 2	NFA 36-501	BS 1449	UNI 5867	Material No.
DD11	Fe P 11	StW 22	1C	HR3	FeP11	1.0332
DD12	Fe P 12	RRStW 23	-	-	-	1.0348
DD13	Fe P 13	StW 24	3C	HR1	FeP13	1.0335
DD14	-	-	3CT	-	-	1.0389

## Chemical composition

Guaranteed values of heat analysis in %

Steel grade	C max.	Si max.	Mn max.	P max.	S max.
DD11	0.12	-	0.60	0.045	0.045
DD12	0.10	-	0.45	0.035	0.035
DD13	0.08	-	0.40	0.030	0.030
DD14	0.08	-	0.35	0.025	0.025

The following additional restrictions apply if the indicated steel grades ordered are to be galvanized:

Si 0.03% max. and P 0.045% max.  $Si\% + 2.5 \times P\% \leq 0.09\%$ .

## Mechanical properties

Steel grade	Thickness [mm]	Yield strength $R_{p0.2}$ [N/mm <sup>2</sup> ] Transverse	Tensile strength $R_m$ [N/mm <sup>2</sup> ] Transverse max.	Fracture elongation [%] Transverse min.		Bend test Transverse Bending mandrel Angle = 180° s = sheet thickness	Period of validity
				A <sub>80</sub>	A <sub>5</sub>		
DD11	1.5 < 2	170 – 360	440	23	28	1 s	1 month
	2 < 3	170 – 340		24			
	≥ 3	170 – 340					
DD12	1.5 < 2	170 – 340	420	25	30	0 s	6 months
	2 < 3	170 – 320		26			
	≥ 3	170 – 320					
DD13	1.5 < 2	170 – 330	400	28	33	0 s	6 months
	2 < 3	170 – 310		29			
	≥ 3	170 – 310					
DD14	1.5 < 2	170 – 310	380	31	36	0 s	6 months
	2 < 3	170 – 290		32			
	≥ 3	170 – 290					

## Processing information

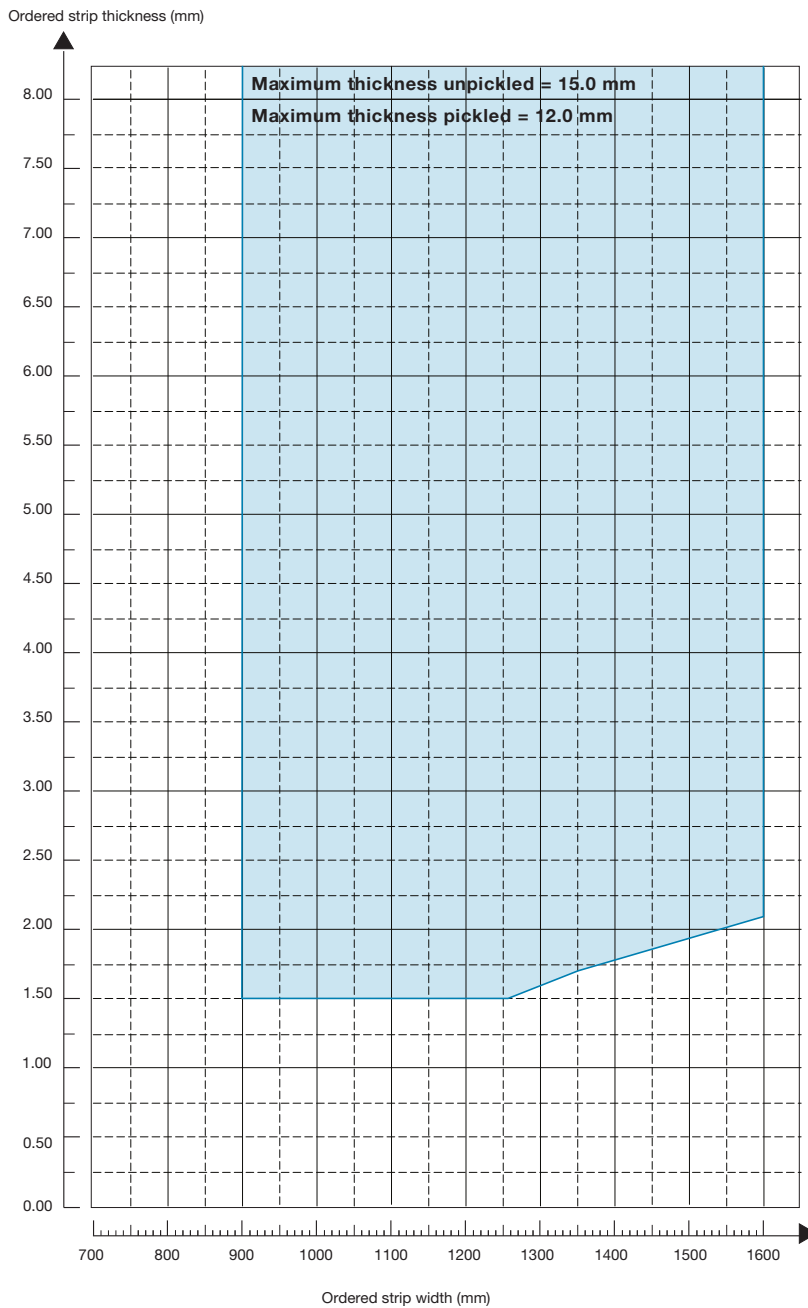
If requested in the order, the steel grades can be used for galvanization or the application of other types of surface coatings.

For special applications we offer specialty steel for cold forming in our production program. These steels comply with the regulations contained in the standards and at the same time feature higher strength.

# Available dimensions

## DD11, DD12

Available dimensions mild steels

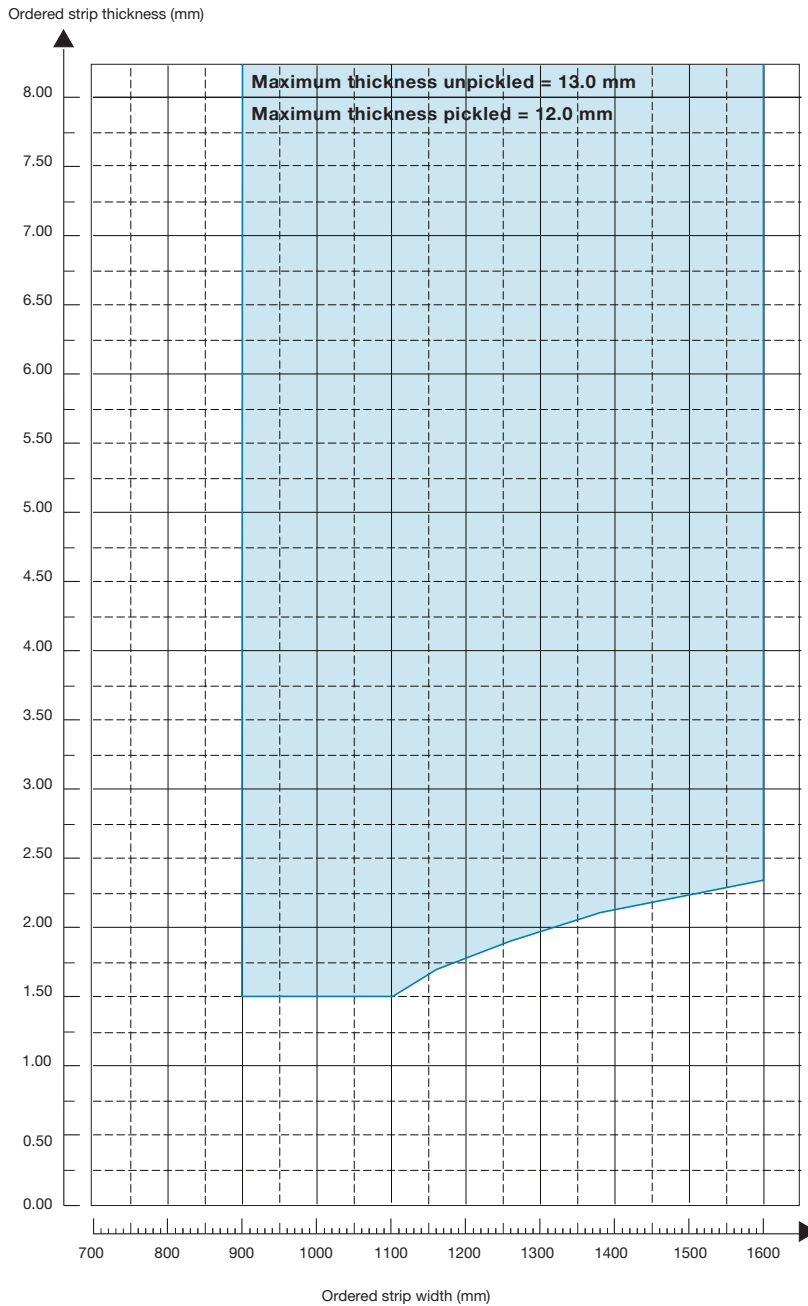


The graphics refer to thickness values with symmetrical thickness tolerances.

Please contact our sales departments for dimensions in widths below 900 mm (production scheduling for center slitting and longitudinal slitting lines).

## DD13, DD14

Available dimensions mild steels



The graphics refer to thickness values with symmetrical thickness tolerances.

Please contact our sales departments for dimensions in widths below 900 mm (production scheduling for center slitting and longitudinal slitting lines).

**voestalpine**

ONE STEP AHEAD.

# Unalloyed special steels for cold forming

## Scope of validity

These technical terms of delivery apply to hot-rolled wide strip, slit and non-slit, and hot-rolled cut steel sheets in thicknesses of up to 6.0 mm max.

## Chemical composition

Guaranteed values of heat analysis in %

Standard orders	Steel grade	C max.	Si max.	Mn max.	P max.	S max.	Al
EN 10111/2008	DD11mod.H	0.12	0.05	0.60	0.020	0.015	0.020 – 0.060
EN 10111/2008	DD12mod.H	0.10	0.05	0.45	0.020	0.015	0.020 – 0.060
EN 10111/2008	DD13mod.H	0.08	0.05	0.40	0.020	0.015	0.020 – 0.060
EN 10025/2004	S235JRmod.H	0.14	0.05	0.70	0.020	0.015	0.020 – 0.060

The following additional restrictions apply if the indicated steel grades ordered are to be galvanized:

Si 0.03% max. and P 0.018% max.

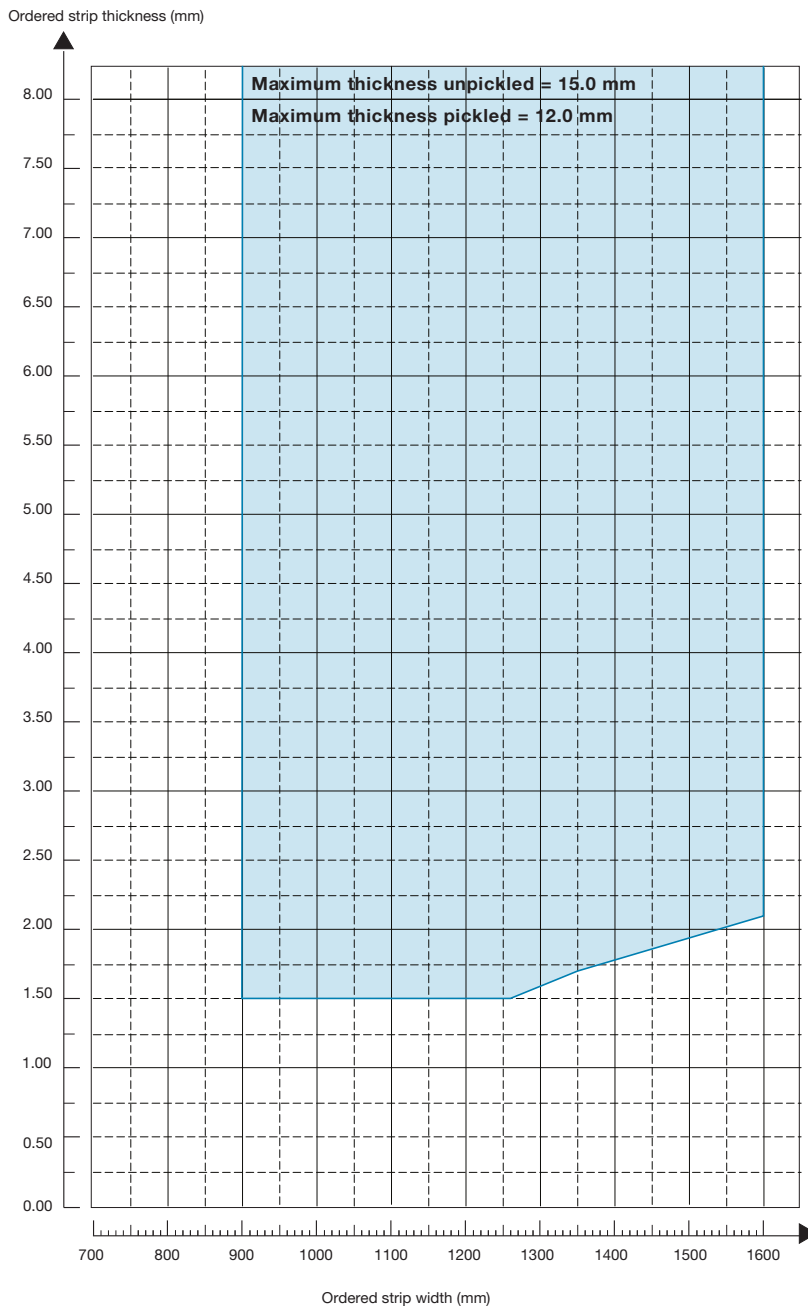
## Mechanical properties

Steel grade	Thickness [mm]	Yield strength $R_{p0,2}$ [N/mm <sup>2</sup> ] Transverse	Tensile strength $R_m$ [N/mm <sup>2</sup> ] Transverse	Fracture elongation [%] Transverse min.		Bend test Transverse Bending mandrel Angle = 180° s = sheet thickness
				$A_{80}$	$A_5$	
DD11mod.H	< 3.0	250 – 340	360 – 420	28		0 s
	≥ 3.0	235 – 325	350 – 410		32	
DD12mod.H	< 3.0	250 – 340	360 – 420	30		0 s
	≥ 3.0	235 – 325	350 – 410		34	
DD13mod.H	< 3.0	240 – 320	350 – 420	32		0 s
	≥ 3.0	230 – 310	350 – 410		36	
S235JRmod.H	< 3.0	275 – 365	400 – 460	25		0 s
	≥ 3.0	260 – 350	390 – 450		28	

# Available dimensions

## DD11mod.H, DD12mod.H, DD13mod.H

Available dimensions mild steels

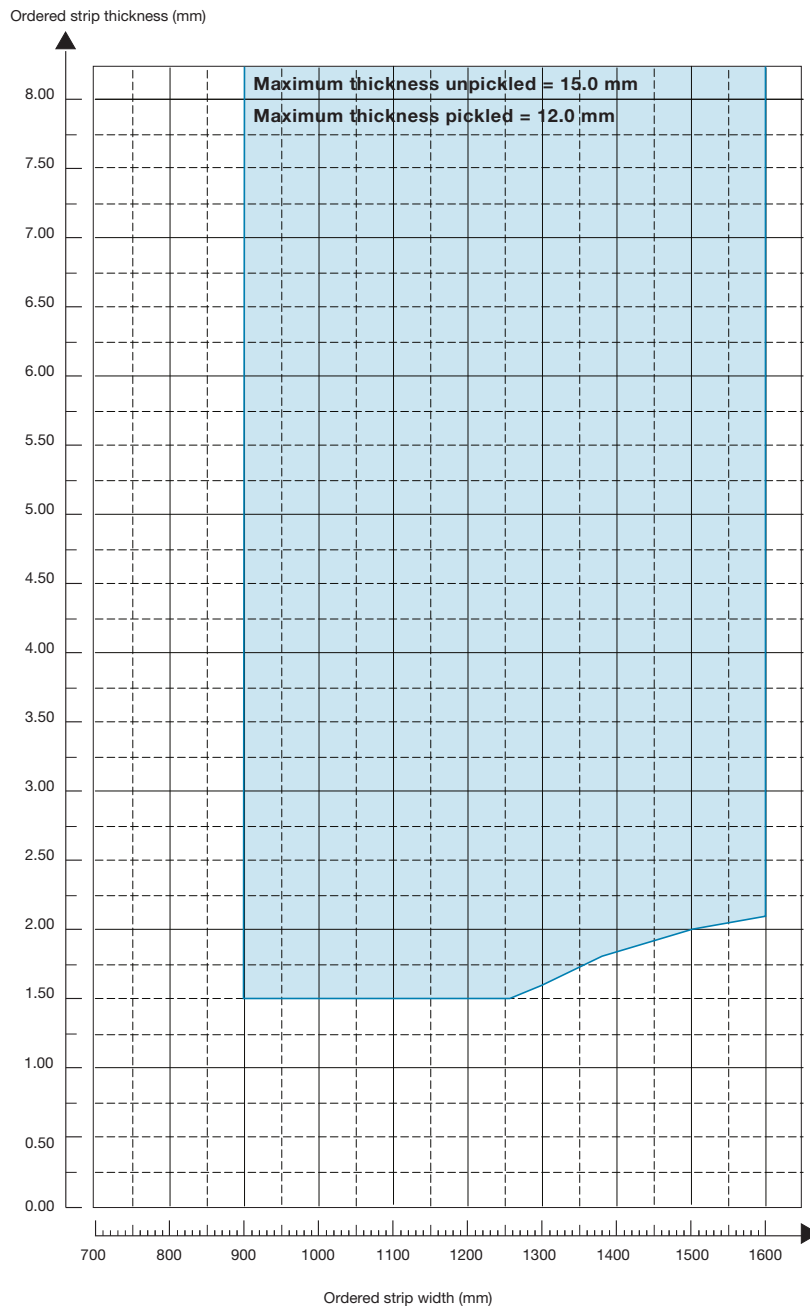


The graphics refer to thickness values with symmetrical thickness tolerances.

Please contact our sales departments for dimensions in widths below 900 mm (production scheduling for center slitting and longitudinal slitting lines).

## S235JRmod.H

Available dimensions mild steels



The graphics refer to thickness values with symmetrical thickness tolerances.

Please contact our sales departments for dimensions in widths below 900 mm (production scheduling for center slitting and longitudinal slitting lines).

**voestalpine**

ONE STEP AHEAD.

# Technically more advanced. Successful together.

**voestalpine Steel Division – the partner you can trust.**

High-quality materials are the basis for our products. We strive to be the best partner for our customers and want to provide them with the best-possible solution. We focus our expertise on two aspects:

The personal aspect, with dedicated and highly competent employees

The technical aspect, with high-quality methods, products and services.

The companies in the voestalpine Steel Division and their employees understand partnership to be the following:

- Understanding for their customers' business
- Expertise and reliability
- Responsibility for satisfactory project completion
- Partnerships based on trust

Many years of successful partnerships with our customers prove our point.

## **voestalpine Stahl GmbH**

voestalpine-Straße 3

4020 Linz, Austria

T. +43/50304/15-8007

F. +43/50304/55-8007

marketing\_stahl@voestalpine.com

www.voestalpine.com/stahl

**voestalpine**

ONE STEP AHEAD.