

Steel

# perform<sup>®</sup> HD

Product information for highly ductile micro-alloyed fine-grained steels with increased forming potential



thyssenkrupp

Issue: June 13, 2023, version 0

## Brief portrait

perform<sup>®</sup> HD from thyssenkrupp is a highly ductile micro-alloyed thermomechanically rolled cold-forming steel. perform<sup>®</sup> HD steels have the following characteristics: a particularly low sulfur content, a low carbon content, and the microalloying of niobium, vanadium, molybdenum, titanium and their combination.

Thanks to a special combination of alloying concept and hot strip production, the highly ductile steel grades offer a convincing and significantly narrower range of mechanical properties and increased elongation after fracture compared to the standard – the best prerequisites for high production reliability. The HD steels have excellent cold formability and weldability. The extremely fine-grained structure also results in very good toughness with low risk of cold cracking.

The highly ductile grades can be delivered as hot-rolled wide strip in the yield point range from 315 to 550 MPa in accordance with VDA 239-100, DIN EN 10149-2 or according to product information.

perform<sup>®</sup> HD steels are used primarily for complex component geometries in automotive construction, including in the chassis in the area of axles or wheel suspension, for axle beams, control or trailing arms, for special profiles and shaped parts, as well as for vehicle seat applications. In commercial vehicle construction, the micro-alloyed HD steels are used in axle structures and steering components of semi-trailers or in steel wheels.

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## Available steel grades

### Steel grade designation

#### Highly ductile micro-alloyed fine-grain structural steel for cold forming

Steel grade	Reference grade DIN EN 10149-2	Reference grade VDA 239-100	Material-No.
perform® 315 HD	S315MC	–	1.0972
perform® 340 HD	–	HR340LA	–
perform® 355 HD	S355MC	–	1.0976
perform® 420 HD	S420MC	HR420LA	1.0980
perform® 460 HD	S460MC	HR460LA	1.0982
perform® 500 HD	S500MC	HR500LA	1.0984
perform® 550 HD	S550MC	HR550LA	1.0986

## Remarks

The perform® HD steel grades can also be ordered with category A galvanizing properties based on DIN EN 10149-2. In the delivery form of hot-rolled wide strip, the HD grades can be ordered in pickled and unpickled surface conditions as well as with mill or trimmed edges.<sup>1)</sup>

Unless otherwise agreed in the order, the delivery will be governed by the conditions outlined in DIN EN 10021. Purchase orders can also be placed for microalloyed HD steels according to DIN EN 10149-2 and VDA 239-100. For hot-rolled wide strip, the permitted dimensional and shape deviations are based on DIN EN 10051.

<sup>1)</sup> Not all thickness and width combinations are possible for trimmed edge and/or pickled conditions.

## Technical features

Chemical composition											
Mass fractions in ladle analysis	C [%] max.	Si [%] <sup>1)</sup> max.	Mn [%] max.	P [%] max.	S [%] max.	Al [%] min.	Nb [%] <sup>3)</sup> max.	V [%] <sup>3)</sup> max.	Ti [%] <sup>3)</sup> max.	Mo [%] max.	B [%] max.
Steel grade											
perform® 315 HD	0.10	0.10	1.30	0.025	0.010 <sup>2)</sup>	0.015	0.050	0.08	0.100	–	–
perform® 340 HD	0.10	0.10	1.50	0.025	0.010 <sup>2)</sup>	0.015	0.060	0.08	0.100	–	–
perform® 355 HD	0.10	0.10	1.50	0.025	0.010 <sup>2)</sup>	0.015	0.060	0.08	0.100	–	–
perform® 420 HD	0.10	0.10	1.60	0.025	0.010 <sup>2)</sup>	0.015	0.070	0.10	0.100	–	–
perform® 460 HD	0.10	0.30	1.60	0.025	0.010 <sup>2)</sup>	0.015	0.080	0.15	0.100	–	–
perform® 500 HD	0.10	0.10	1.70	0.025	0.005	0.015	0.080	0.15	0.100	–	–
perform® 550 HD	0.10	0.10	1.80	0.025	0.005	0.015	0.080	0.15	0.100	–	–

<sup>1)</sup> By arrangement the grades perform® 315 HD to 550 HD can be supplied with category A galvanizing properties based on DIN EN 10149-2 (Si content ≤ 0.03%).

<sup>2)</sup> A sulfur content of max. 0.006% can be agreed when ordering.

<sup>3)</sup> For perform® 315 HD to 550 HD: The sum of the alloying components Nb, V and Ti must not exceed 0.22%.

### Mechanical properties, test direction in longitudinal direction, delivery condition thermomechanically rolled, for thicknesses ≤ 6 mm

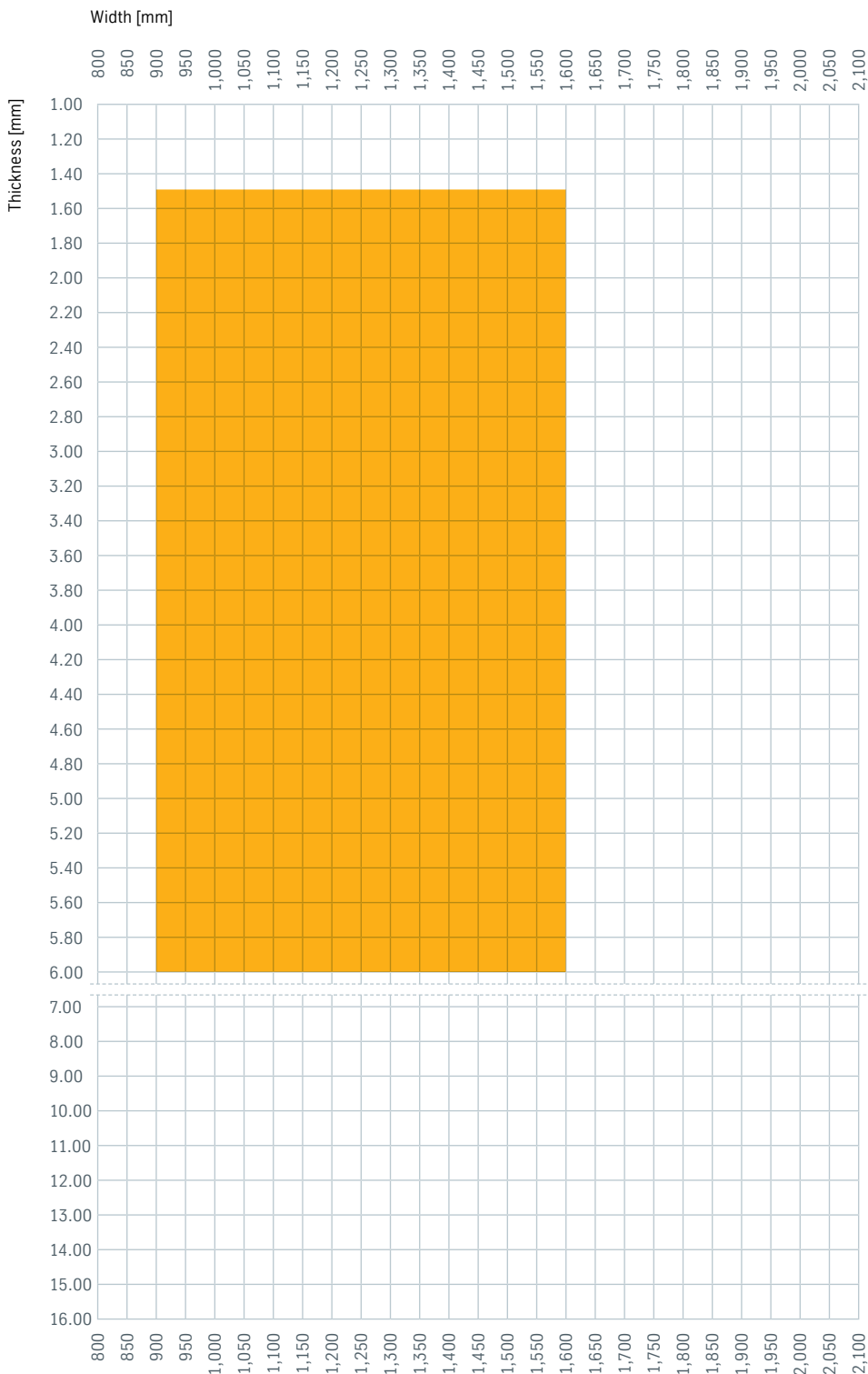
	Yield strength	Tensile strength	Elongation			
	R <sub>eH</sub> [MPa]	R <sub>m</sub> [MPa]	A <sub>80</sub> [%] min. L <sub>0</sub> = 80 mm < 3.0 mm	A <sub>80</sub> [%] min. acc. to DIN EN	A <sub>5</sub> [%] min. L <sub>0</sub> = 5,65 √S <sub>0</sub> ≥ 3.0 mm	A <sub>5</sub> [%] min. acc. to DIN EN
Steel grade						
perform® 315 HD	315–415	390–480	22	20	30	24
perform® 340 HD	340–450	420–510	22	–	26	–
perform® 355 HD	355–465	430–520	21	19	27	23
perform® 420 HD	420–530	480–590	18	16	25	19
perform® 460 HD	460–570	520–630	17	14	22	17
perform® 500 HD	500–580	560–640	19	12	22	14
perform® 550 HD	550–690	600–710	14	12	18	14

## Extent of inspection

Unless otherwise agreed in the purchase order, the scope of testing applies in accordance with DIN EN 10149-1 and -2 for the inspection certificate 3.1 to DIN EN 10204.

## Available dimensions

### Wide hot strip perform® 315 HD



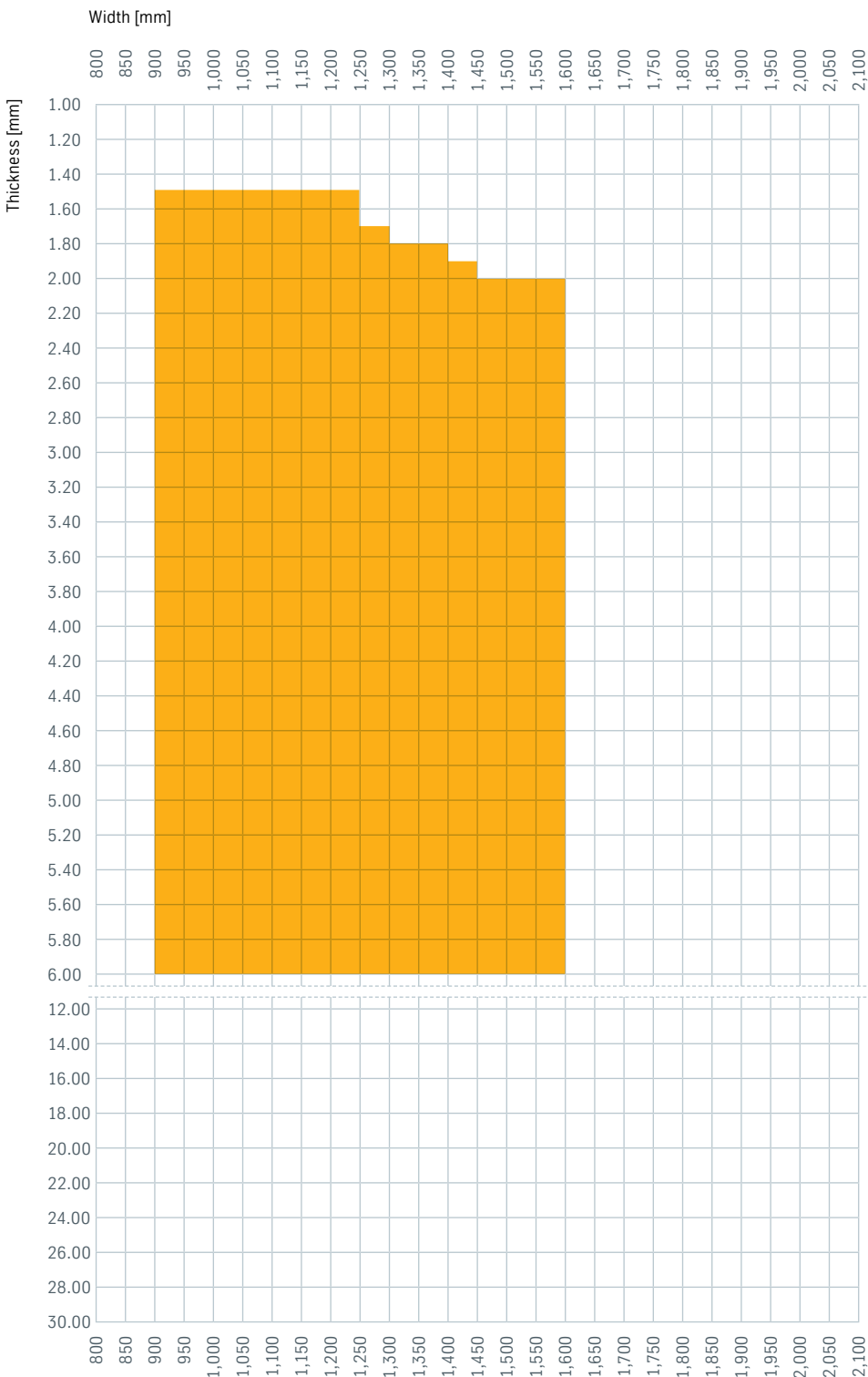
Wide hot strip

Widths < 900 mm and other sizes on request.

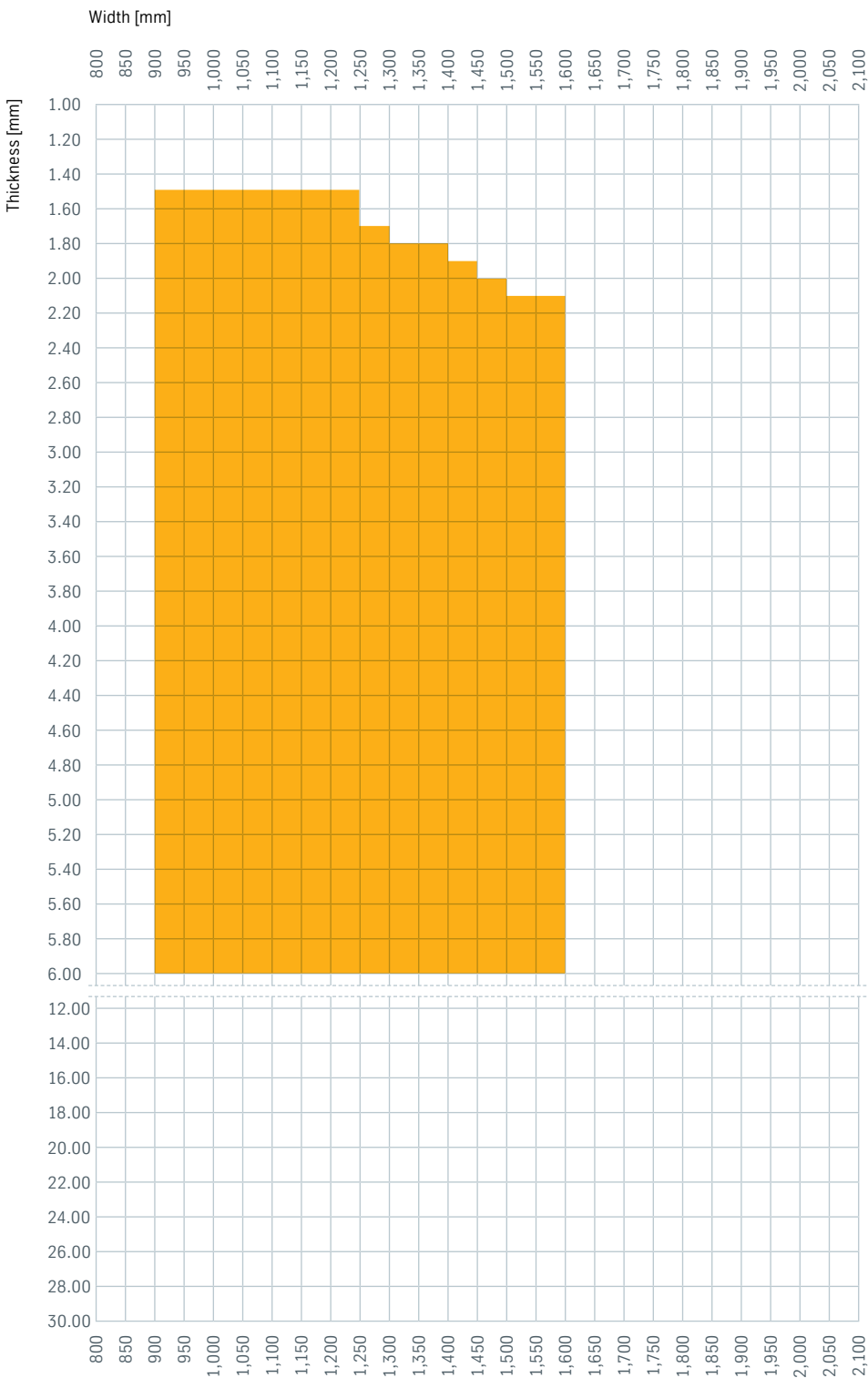
Tolerances to DIN EN 10051 or narrower by arrangement.

Available in the product version scalur®.

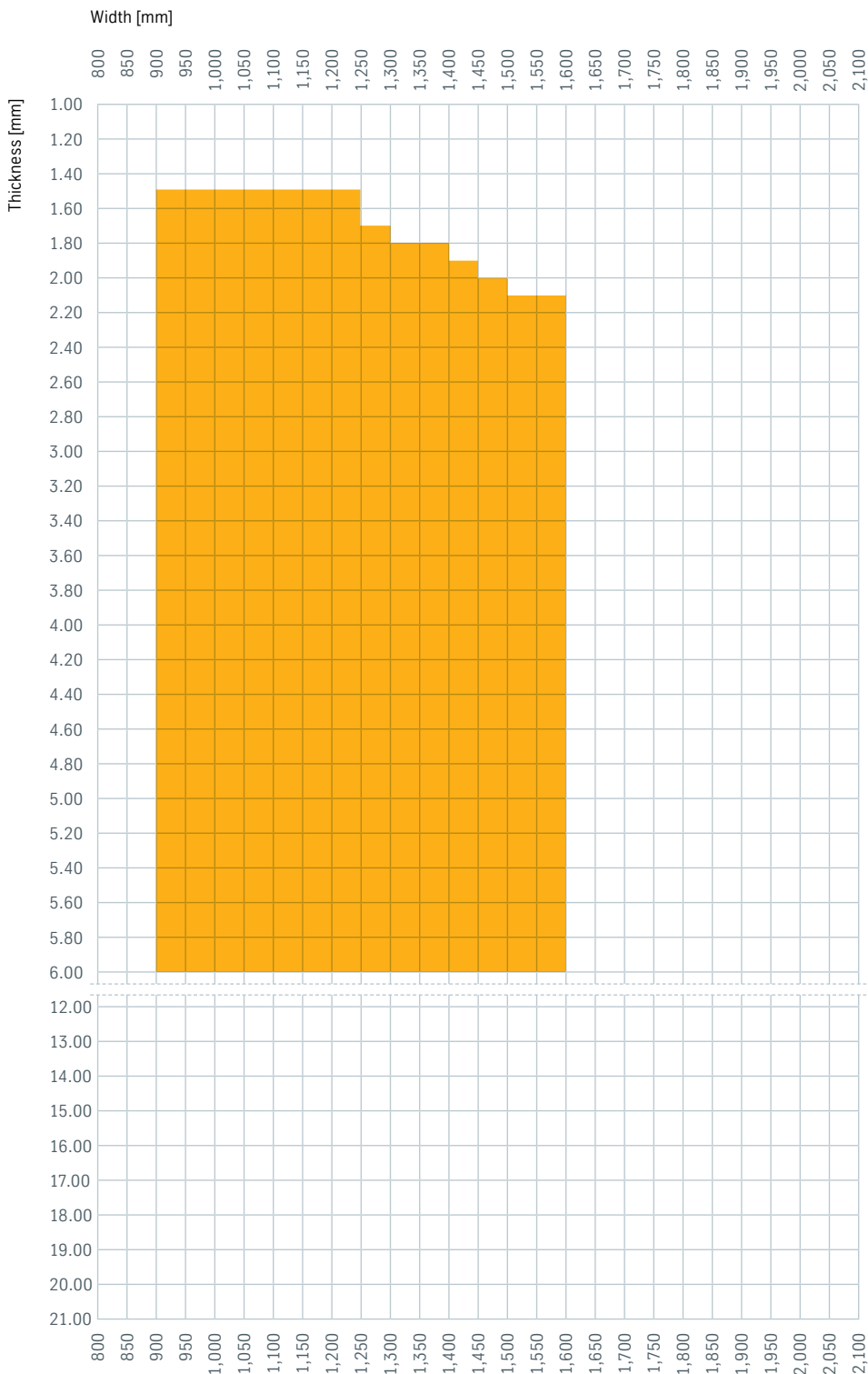
Warmbreitband  
perform® 340 HD



Warmbreitband  
perform® 355 HD



Warmbreitband  
perform® 420 HD



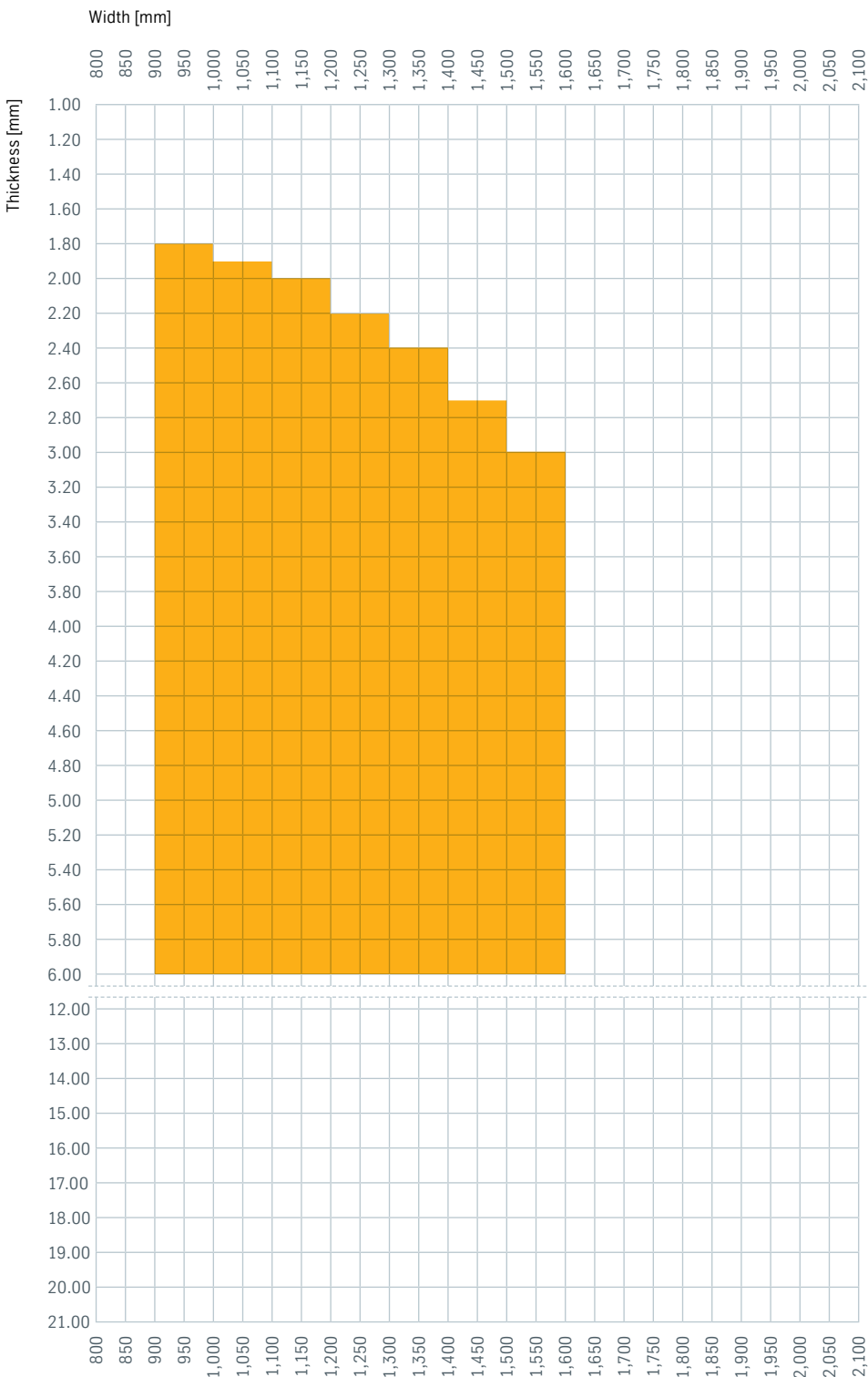
■ Wide hot strip

Widths < 900 mm and other sizes on request.

Tolerances to DIN EN 10051 or narrower by arrangement.

Available in the product version scalur®.

Warmbreitband  
perform® 460 HD



Wide hot strip

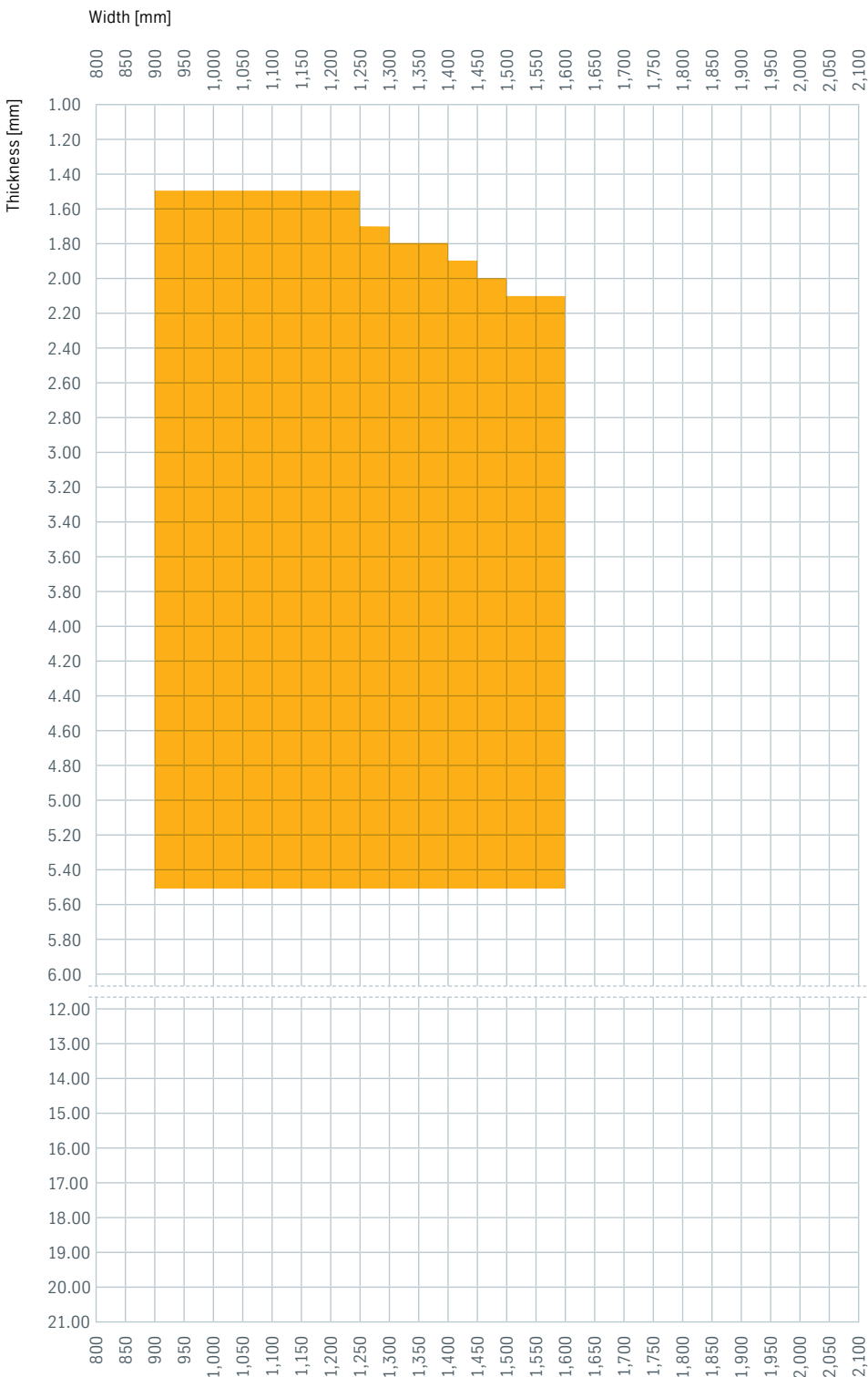
Widths < 900 mm and other sizes on request.

Tolerances to DIN EN 10051 or narrower by arrangement.

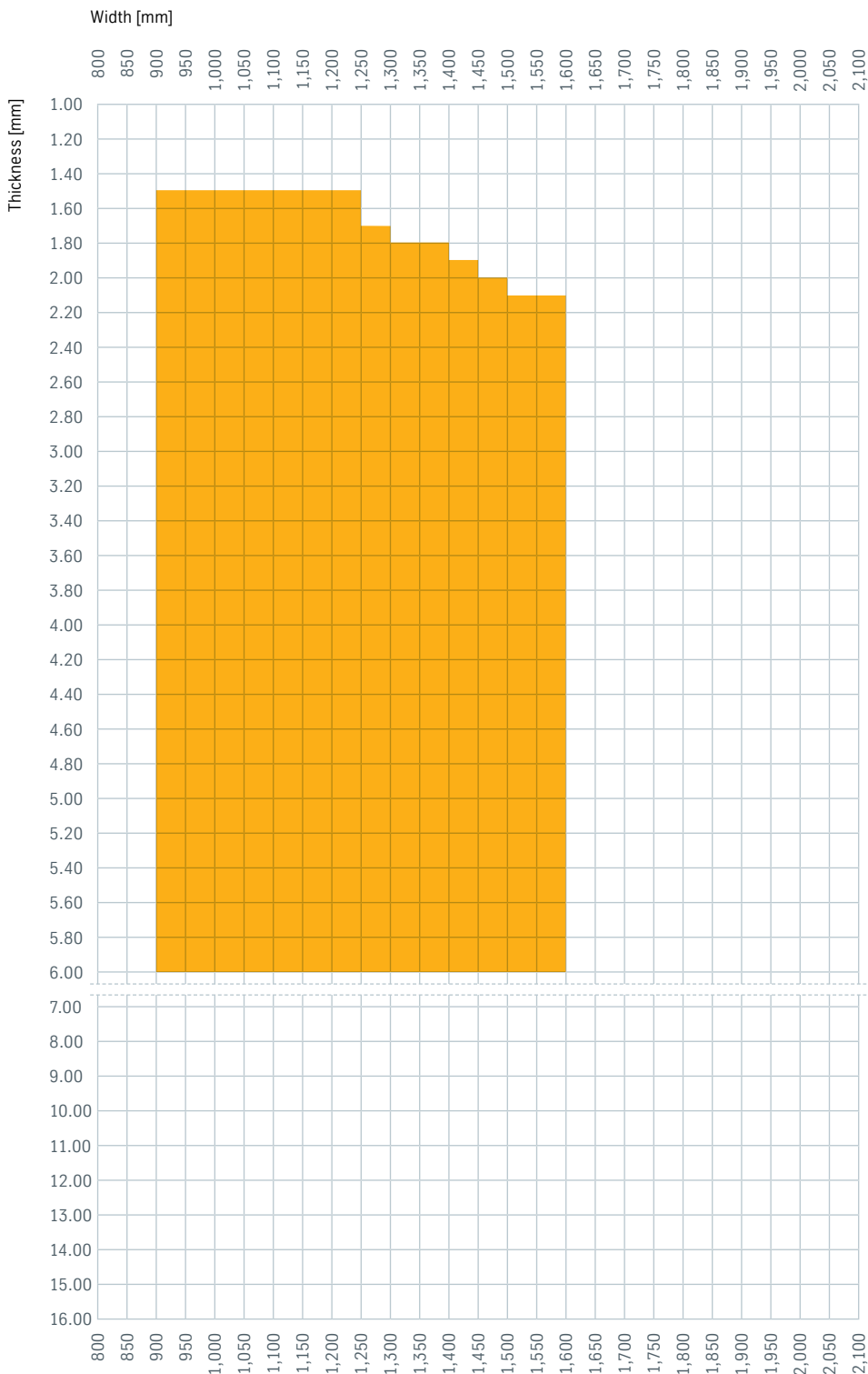
Available in the product version scalur®.



Warmbreitband  
perform® 500 HD



Warmbreitband  
perform® 550 HD



Wide hot strip

Widths < 900 mm and other sizes on request.

Tolerances to DIN EN 10051 or narrower by arrangement.

Available in the product version scalur®.

## Application examples



Highly ductile micro-alloyed steels for suspension components.



Highly ductile micro-alloyed steels in the chassis: In the area of axles or wheel suspension, for for subframes, cross members and side members.

Special mill grades are supplied subject to the special conditions of thyssenkrupp. Other delivery conditions not specified here will be based on the applicable specifications. The specifications used will be those valid on the date of issue of this product information brochure.

### General information

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