

Materials Services

Materials Poland

Wear-resistant steel

perdur[®]

Extreme demands call
for a resilient partner.



thyssenkrupp







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Wear-resistant steels **perdur®**

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Profile



perdur® steels from thyssenkrupp are wear-resistant steels with excellent workability and exceptionally high toughness. **perdur®** stands for "performance" and "durability", i.e. for particularly pronounced wear resistance. Hardnesses of 400 and 450 HBW and sheet thicknesses from 4.0 to 8.0 mm make these steels ideal for a wide range of applications, from moderate wear to heavy abrasion. Modern, low carbon equivalent alloying concepts that are optimally matched to the thickness range ensure good cut-ting and welding properties.

These steels are ideal for applications subject to wear such as:

1. Tipper bodies
2. Agricultural machinery
3. Laser-cut parts
4. Scrap containers

Available steel grades and dimensions

perdur® 400 and **perdur® 450** offer you versatile cut-to-length sheets that combine high wear resistance with excellent forming properties, offering guaranteed durability and all the advantages of thyssenkrupp steel in a single product.

Our **perdur®** cut-to-length sheets will initially be available in a thickness range from 4.00 mm to 8.00 mm. Due to their very tight thickness tolerance, they offer both the advantage weight reduction, as well as better cold forming properties.

Available dimensions

Cut-t-length sheet		
	Thicness [mm]	Max. Width [mm]
Name of steel grade		
perdur® 400	4.0 ≤ t < 8.0	1,500
	4.0 ≤ t < 6.0	1,500
perdur® 450	6.0 ≤ t < 8.0	1,600

Lenght: min/ 2,000, max. 16,000 mm.
Further sizes on request.

The wear-resistant partnership

Benefit from our Experience

As an experienced materials technology partner, thyssenkrupp Steel has always been synonymous with innovative, custom solutions – especially where cut-to-length sheet products are concerned.

Trust is our success

Our sales and technical customer service teams maintain close contact with our customers and can look back on years of experience and partnerships across many industries.



Shaping the future together

We support our customers with our know-how and team of experts, and provide a partner to develop and manufacture high-quality and tailor-made wear-resistant steels, which will also include “green” wear-resistant cut-to-length sheets on demand in the future.

Technical features

Chemical composition

	Mass fraction in ladle analysis									Typical carbon equivalent	
	C [%] max.	Si [%] max.	Mn [%] max.	P [%] max.	S [%] max.	Cr [%] max.	Mo [%] max.	B [%] max.	Ni [%] max.	CE [%]	CET [%]
Name of steel grade											
perdur® 400	0.20	0.80	1.50	0.020	0.010	1.00	0.50	0.005	1.50	0.36	0.26
perdur® 450	0.22	0.80	1.50	0.020	0.010	1.30	0.50	0.005	1.50	0.41	0.30

$CE\ [%] = C + Mn/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15$
 $CET\ [%] = C + (Mn + Mo)/10 + (Cr + Cu)/20 + Ni/40$
The steel has a fine-grain microstructure. The nitrogen is bound as nitrides with Al as well as Nb or Ti where applicable.

The Brinell hardness is determined in accordance with DIN EN ISO 6506, measured approx 1 mm below the sheet surface.

Notch impact testing to DIN EN ISO 148-1 is carried out on longitudinal samples from the area of the product surface.
The minimum values represent an average of three samples, for which no single value may be less than 70% of the prescribed value.

For thicknesses below 10 mm the impact energy value stated in the table decreases in proportion to the sample width (product thickness).

Tensile testing is carried out on longitudinal samples at room temperature in accordance with DIN EN ISO 6892-1, method B.

Mechanical properties – testing in direction of rolling, as-delivered condition: thermomechanically rolled with accelerated cooling

	Brinell hardness	Impact energy		Yield strength	Tensile strength	Elongation
	[HBW]	KV min. [J] at -20 °C	KV typ. [J] at -40 °C	R _{p0,2} typ. [MPa]	R _m typ. [MPa]	A typ. [%]
Name of steel grade						
perdur® 400	370 - 430	27	45	1,100	1,300	11
perdur® 450	420 - 480	27	40	1,200	1,450	10

Scope of testing

Unless otherwise agreed when ordering, the following scope applies for acceptance testing:

Scope of testing		
	Hardness	Impact Energy (1 set = 3 samplet)
Name of steel grade		
perdur® 400	Min. 1 x per Coil	Thickness: ≥ 6 mm: mind. 1 x per Coil
perdur® 450	Min. 1 x per Coil	Thickness: ≥ 6 mm: mind. 1 x per Coil

The unbeatable advantages of perdur®

- ✓ -lower dead weight
- ✓ -significant payload increase
- ✓ -substantial fuel savings
- ✓ -better eco and CO2 footprint during operation
- ✓ -economic cost reduction thanks to more durable wear parts

For example, our wear-resistant steels used on the tail lifts of garbage trucks last up to three times longer than conventional structural steel. **perdur®** also offers new potential for lightweight construction with a lower dead weight for your customers' vehicles. A lower dead weight allows dumpers to transport more bulk materials per trip.



Notes on use and processing

Cold forming

perdur® steels are suitable for cold bending, taking into account their high hardness. Under favorable conditions (e.g. deburred and notch-free edges, slow forming,

die lubrication), crack-free forming is possible with the following minimum bending radius and die width:

Minimum bending radius and die width for cold forming					
	Nominal thickness [mm]	r/t ⊥	r/t II	W/t ⊥	W/t II
Name of steel grade					
perdur® 400	4.0 – 8.0	3.0	4.0	10.0	10.0
perdur® 450	4.0 – 8.0	4.0	4.5	10.0	12.0

⊥ = bending line perpendicular to rolling direction; II = bending line in rolling direction; W = die width; r/t = radius/nominal thickness



Machining

Despite their high wear resistance, **perdur®** steels are readily machinable using suitable machine tools and sharp carbide tools. Feed rate and cutting speed must be adapted to the hardness of the steel.

Heat treatment

To avoid loss of hardness, the steel must not be heated above 250 °C.

Welding

If generally accepted good engineering practice is observed, **perdur®** steels are suitable for both manual and automated welding.

Thermal cutting

The optimized analysis concepts with low carbon equivalent (see “Chemical composition”) ensure good cutting and welding properties. Depending on sheet thickness, the following thermal cutting methods can be used with **perdur®** steels: plasma cutting, laser cutting, oxy-fuel cutting.



No preheating is required for welding or cutting. Contractors themselves must decide on additional precautions to avoid cracking during thermal cutting and welding under the given design and manufacturing conditions.





Applications

The wide range of **perdur®** special wear steels offers designers the possibility of selecting the optimum steel grade, taking into account the conditions of use and production. **perdur®** steels have thus established a wide range of applications in important areas of engineering.

Examples of typical applications include:

Mining equipment

- moulds, abrasive discs, blades, chutes
- drilling equipment for foundation piles
- stone crushers
- conveyors
- mixer parts
- shovel blade
- bottom plates
- scrapers
- crusher jaws
- supporting and reinforcing plates for tippers
- mould plates pulverizer



Earth-moving machines

- excavators, grabs
- bulldozers
- tines
- shovels
- blades, grinding wheels

Steelworks

- crushing machines
- shredders
- presses
- chutes
- vibrating screens



Applications

The special properties of this group of steels have been thoroughly tried and tested for against wear and exhibit very high deformation resistant to deformation as a result of the in many cases overloads.

Cement plant

- crushers
- containers
- riddle
- mixers
- chutes
- moulds for cobblestones

Coal power plants

- coal crushers

Agricultural machinery

- plows
- harrows

Other

- trailers
- garbage trucks
- containers



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