ELECTRICAL STEEL

Grain oriented electrical steel bluemint® powercore® Traction GO

Product range

engineering. tomorrow. together.

thyssenkrupp

bluemint® powercore® Traction GO

bluemint® powercore® Traction GO is the base material for innovative applications in e-mobility drive concepts. Its superior magnetic properties in rolling direction enhances power torque and efficiency for motor concepts with one dimensional fields like e.g. axial flux motors.

Grain oriented electrical steel is a highly sophisticated high-tech material. Its special grain and domain structure enables easy magnetization in the rolling direction and thereby high polarization at relatively low fields.

Cover photo courtesy of SWD AG Stator- und Rotortechnik

Content


thyssenkrupp
Strom vom Band

The future of mobility: efficiency, sustainability and power through motor concepts with bluemint® powercore® Traction GO

Performance, Efficiency, Range: Innovative e-mobility drive concepts set new standards thanks to bluemint® powercore® Traction GO

Imagine a world where every vehicle is not only environmentally friendly but also powerful, efficient and capable of impressive ranges. This vision is becoming reality thanks to the remarkable innovations in electric motor technology and the customized development of our high-tech grain oriented electrical steel for application in electric motors.

Better Performance

The enhanced power density of innovative electric motors with grain oriented electrical steel translates into superior performance, delivering a significant boost in overall efficiency. These motors provide increased torque, resulting in impressive acceleration and responsiveness. Immediate torque delivery ensures a powerful and smooth driving experience, outperforming traditional engines. This improved performance not only enhances driving pleasure but also contributes to the vehicle‘s overall capability and reliability.
Motors can be operated at up to 1.8 T, therefore providing much more torque while simultaneously increasing efficiency.
Innovative motor design significantly enhances efficiency using grain oriented electrical steel. This approach offers the benefit of lower iron losses and lower mass what results in lower energy consumption and operating costs.

Extended Range

The innovative motor design and use of grain oriented electrical steel significantly enhances efficiency and power density. These improvements translate to greater range trips and more reliability and suitability for everyday use. The superior power density ensures that the vehicles maintain top performance while maximizing the use of every bit of energy, making extended trips more convenient and enjoyable.

Sustainability

The innovative design of electric motors compared to conventional designs contributes significantly to sustainability. In addition to the weight savings of the innovative designs and enhanced performance, the increased efficiency resulting from the use of grain oriented electrical steel supports conservation of resources. Particularly noteworthy here is the already CO_2-reduced production of our high-tech material bluemint® powercore® Traction GO. By integrating this advanced material, electric motors are a leading force in the move toward sustainable transportation, reducing environmental impact and promoting a cleaner, greener future.

The future of mobility is electric! Take advantage of the benefits of electric motors and experience a new era of driving with bluemint® powercore® Traction GO – efficient, powerful, and sustainable.

bluemint® Steel

High quality. Less CO_2.

With bluemint® Steel we are launching our first certified steels with reduced CO_2 intensity. The CO_2-reduced products are produced at our Duisburg site and give our customers the certainty to use high-quality steel with an improved ecobalance. bluemint® Steel is the beginning of the transformation to green steel.

A portfolio that lasts

bluemint® Steel is another important step towards a climate-neutral steel industry. The special feature: The material properties do not differ from the existing steel grades – except in their reduced specific CO_2 emissions.

This is our first transformation success within the scope of our climate strategy and reflects our ambitious goal of a sustainable and customer-oriented steel production. In the coming years, we will intensively invest in innovations and technologies which will gradually move our customers further towards our common goal of climate-neutrality and a green steel product.

bluemint® is our promise

In view of the challenges associated with climate change and the opportunities in future markets, the concept of low CO_2 steels is attracting the attention of many processing and end user industries.

Certified quality

bluemint® Steel stands for the diversity of our portfolio of grades. This means that you can rely on the continued availability of the familiar materials. In terms of material and processing properties, our bluemint® Steel products by no means fall short of our existing grades.
On the contrary: The high premium quality is complemented by a significant CO_2 reduction.

Green to the power of blue

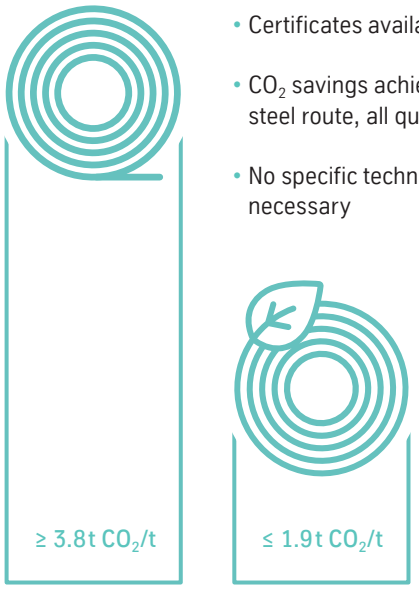
Our bluemint® powercore® has a more than 50 % reduced CO_2 footprint. That means it can now contribute even more towards changing the course of climate change by reducing global energy demand and the associated CO_2 emissions: transformers made with bluemint® powercore® meet the demanding efficiency requirements under the EU Ecodesign directive.

Read more at bluemint-steel.com

Advantages at a glance

Produced using bluemint® Steel

- 1 t of bluemint® powercore®: CO_2 emissions reduced by more than 1.9 metric tonnes (> 50 %)
- Directly applicable to your Scope-3 emission reduction
- Certificates available
- CO_2 savings achieved in the primary steel route, all qualities available
- No specific technical qualification necessary



By allocating CO_2 savings to specific products

GOES for innovative motor applications

bluemint® powercore® Traction GO

bluemint® powercore® Traction GO is the base material for innovative applications in e-mobility drive concepts. Its superior magnetic properties in rolling direction enhances power torque and efficiency for motor concepts with one dimensional fields like e.g. axial flux motors.

Due to its high magnetic polarization, bluemint® powercore® Traction GO grade is optimum for applications that work at high induction values. Magnetic properties are determined according to the single sheet tester (see IEC 60404-3).

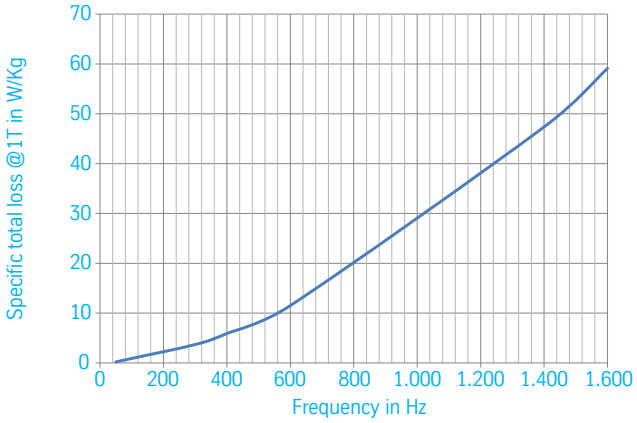
bluemint® powercore® Traction GO – magnetic properties

Grade	Nominal thickness	P1.0 @ 400 Hz	P1.0 @ 1000 Hz	P1.0 @ 2000 Hz	J2500 @ 50 Hz
		maximum	typical	typical	typical
	in mm	in W/kg	in W/kg	in W/kg	in W/kg
TRH-20	0.20	7	30	90	1.93

Other limits can be agreed individually

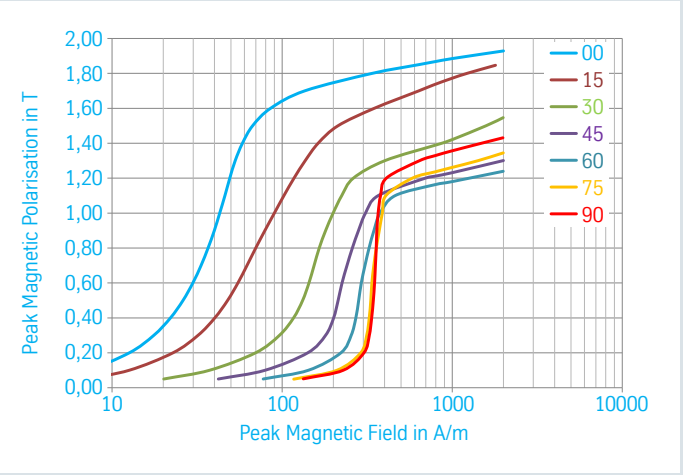
longitudinal in rolling direction

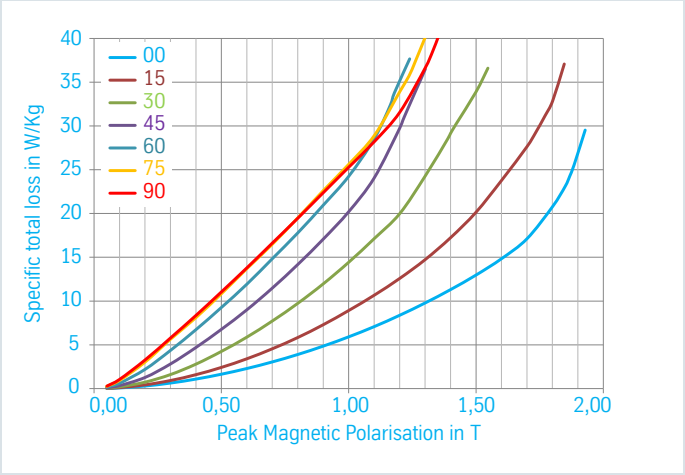
P1.0 at different working frequencies



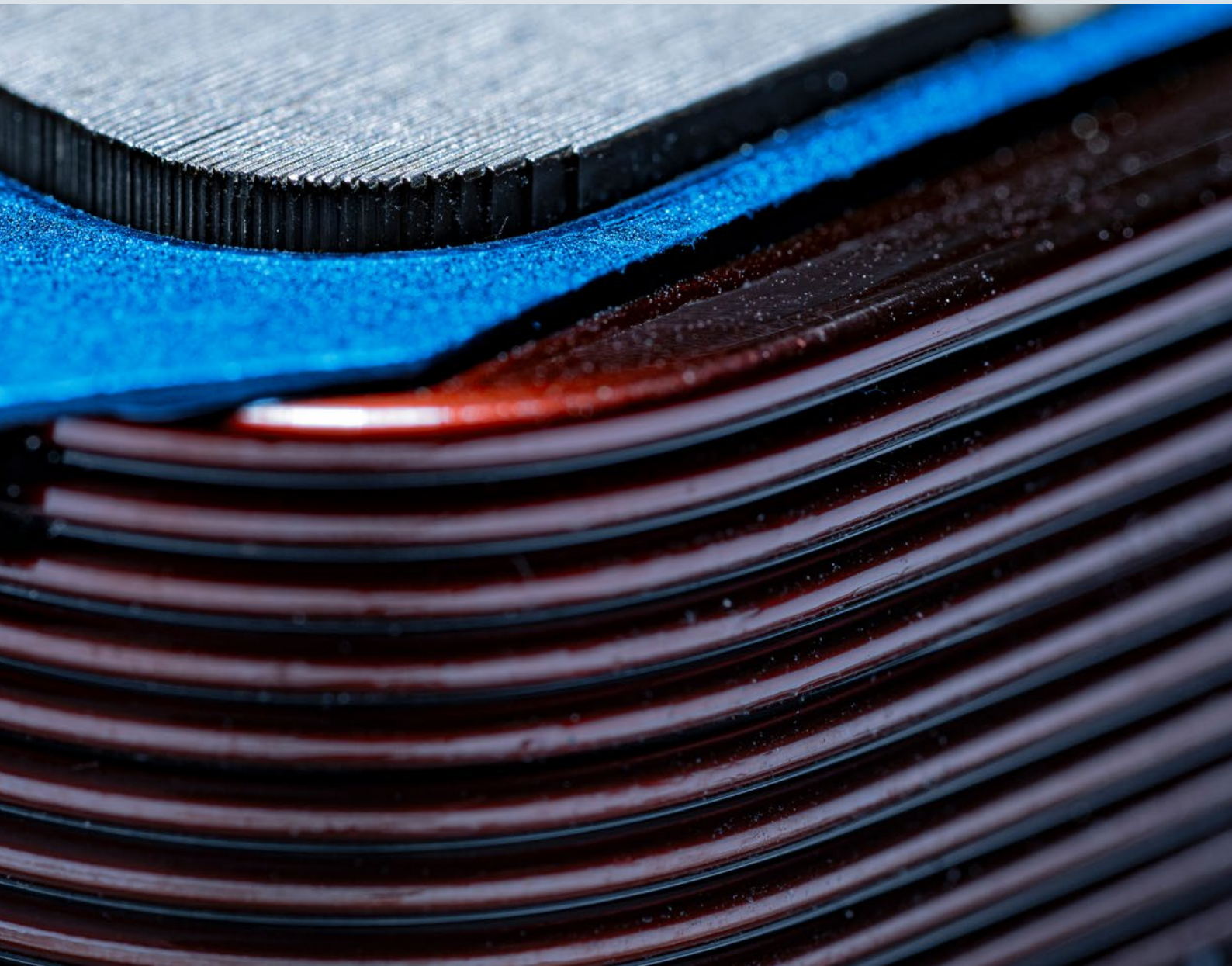
Typical magnetic properties at significant inductions and frequencies

Angle between rolling direction and applied magnetic field





Other typical or maximum values can be arranged individually.



Insulation types

The grain oriented electrical steel is supplied with a thin anorganic coating on the glass film layer which forms during annealing. For unique applications material can be supplied with an optional bonding varnish (figure 2).

A coating thickness of 2 to 5 µm (4 to 7 µm with bonding varnish) provides good electrical resistance and a high stacking factor.

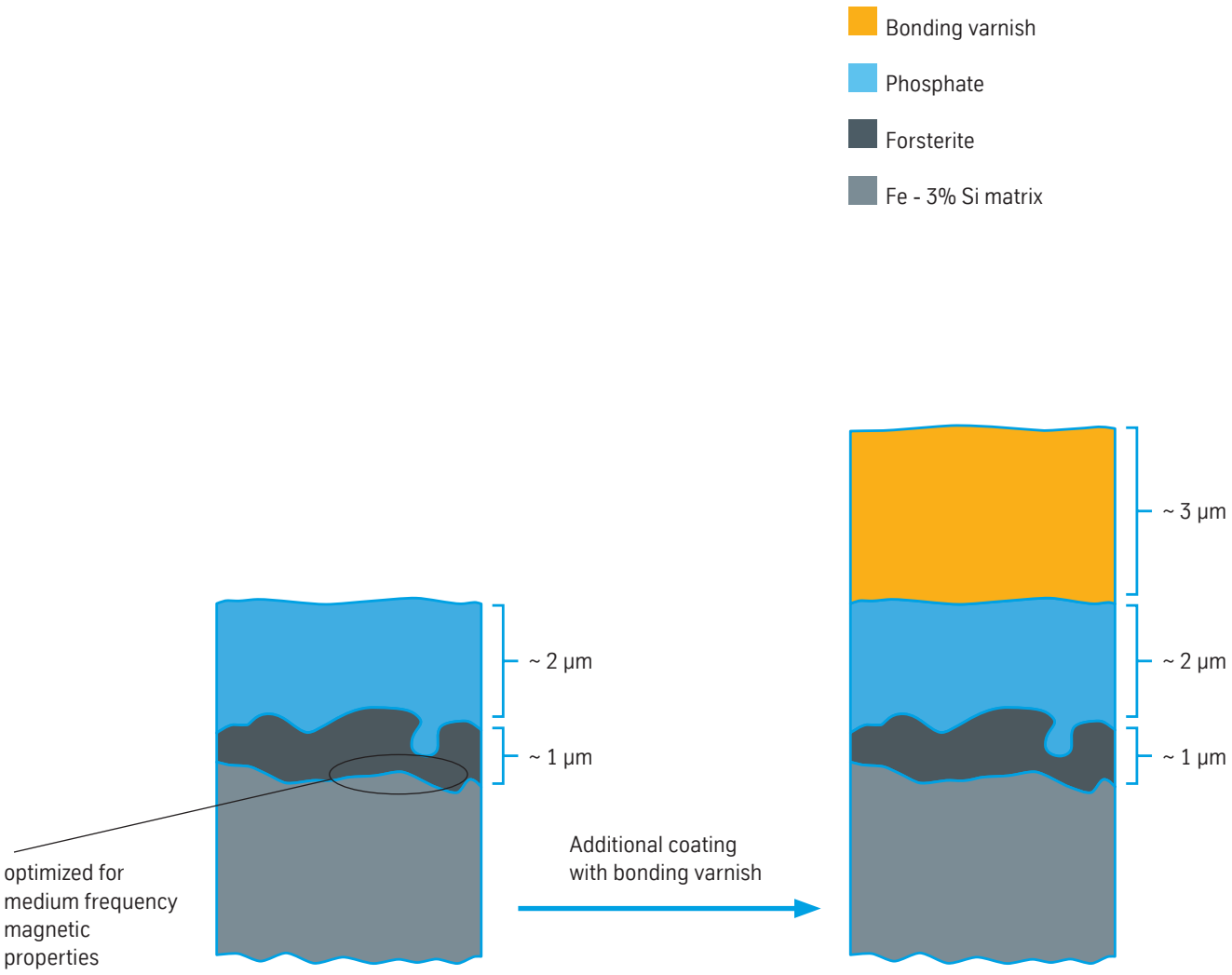
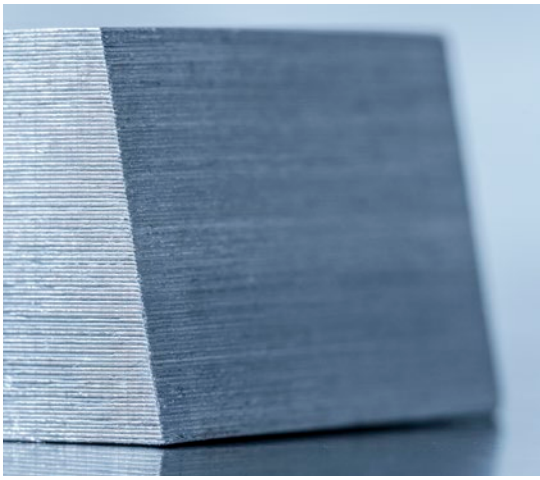


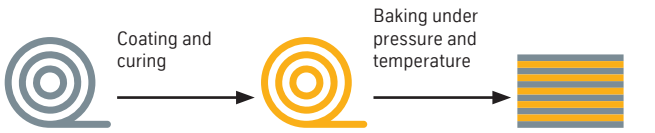
Figure 1:
Product without bonding varnish

Figure 2:
With bonding varnish coated product

Bonding varnish



Bonding varnish is used to dry-bond electrical sheets and create composite parts. This process eliminates the need for rivets or welded joints, which can negatively affect magnetic properties. Grain-oriented electrical steel is coated with bonding varnish and cured to a dry but still reactive state (B-state). In this condition, the product is suitable for further processing, such as slitting and punching, and remains usable for at least six months after delivery. The final cured and bonded part (C-state) is achieved through additional treatment under heat and pressure (baking). The B-state can be adjusted upon request to optimize the subsequent baking process.



Grain oriented electrical steel

B-State: GOES coated with bonding varnish (delivery state)

C-State: Bonded parts

Characteristics

Dimensions

Standard strips	
Inside diameter	508 mm
Width	900 - 1,000 mm
Nominal thickness	0.20 mm

Slit with	
Inside diameter	508 mm
Width	≥6 mm
Nominal thickness	0.20 mm

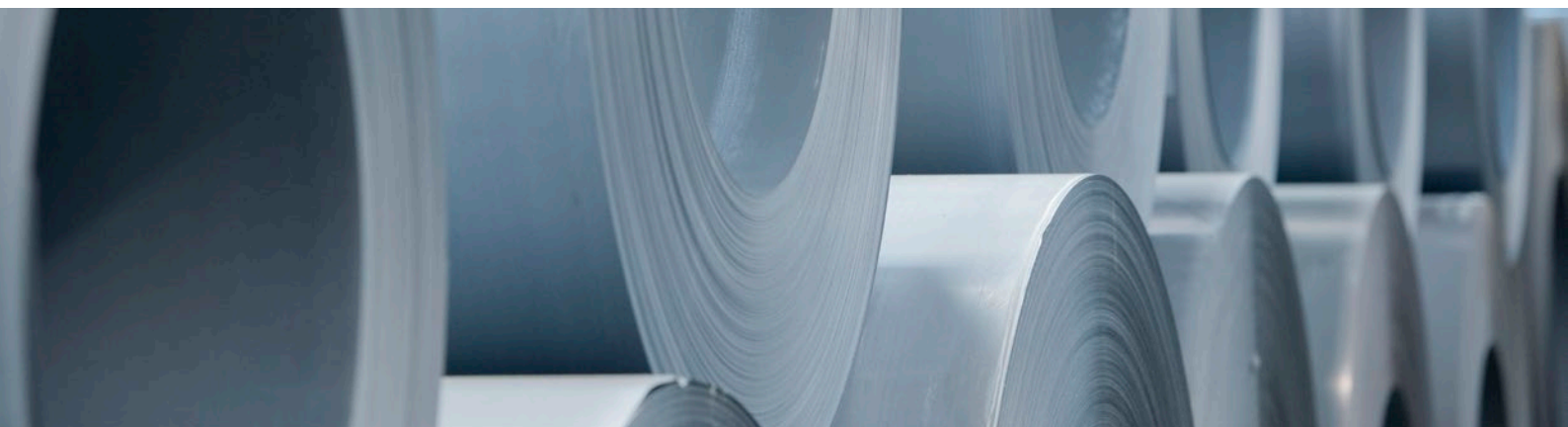
Other thicknesses can be arranged on special demands

Geometric tolerances

Thickness tolerances	
Max. tolerance on the nominal thickness	±0.020 mm
Max. difference in thickness parallel to the direction of rolling within a sheet or in a length of strip of 1,000 mm	0.025 mm
Max. difference in thickness perpendicular to the direction of rolling at a minimum distance of 40 mm from the edges	0.020 mm

Tolerances for widths	
Standard widths	±1 mm
Slit width* ≤150 mm	0/-0.2 mm
>150-400 mm	0/-0.3 mm
>400-750	0/-0.5 mm
>750-1,000	0/-0.6 mm

* Plus tolerances must be stipulated with order



Other characteristics and tolerances

Residual curvature	
Max. distance for a sample 500 mm in length applicable for width >150 mm	35 mm

Edge camber	
Max. edge camber for a measuring length of 1,000 mm applicable for width >150 mm	0.5 mm

Deviation from the shearing line due to internal stresses	
Max. measured gap within a strip length of 1,000 mm applicable for width >500 mm	1 mm

Flatness (wave factor)	
Max. wave factor applicable for width >150 mm	1.5 %

Burr height (only for slit width)	
Max. burr height	0.025 mm

The measuring methods for thickness and width are given in the product standards EN 10107 and IEC 60404-8-7. All other measuring methods and definitions are given in EN 10251 and IEC 60404-9.

Typical physical properties

Ultimate tensile strength R_m	
Longitudinal in rolling direction	330-370 MPa
Transverse to rolling direction	410-430 MPa

Elongation $A_{l=80}$	
Longitudinal in rolling direction	6-8 %
Transverse to rolling direction	10-14 %

Ultimate yield strength $Rp_{0.2}$	
Longitudinal in rolling direction	300-340 MPa
Transverse to rolling direction	350-370 MPa

Hardness	
HRB 15T	75-85
HV 0.1	185-200

Saturation polarization J_S	2.03 T

Stacking factor of sheet without bonding varnish	
0.20 mm	≥ 95.0 %

Coercive field strength H_S	<15 A/m

Density p_m	7.65 kg/dm³

Curie temperature T_C	745 °C/1,345 °F

Specific resistance p_e	0.48 µΩm

Other characteristics and tolerances on demand

For more information, visit us at:
www.thyssenkrupp-steel.com/en/electricalsteel

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