

Steel

Hardenable boron steels TBL®

Product information for hot-rolled strip and cut-to-length plate



thyssenkrupp

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Brief profile

Hardenable boron steels TBL® from thyssenkrupp are fine-grain boron-alloyed special structural steels with high surface quality and high purity. These properties add up to a better-than-ever combination of excellent wear protection and superior forming and hardening characteristics.

TBL® steels are primarily used for agricultural wear parts in soil cultivation and harvesting technology, such as harrow and hollow discs, plowshares, but also for the manufacture of knives and hoes.

Content

01	Brief profile
02	Available steel grades
02	Dimensions
02	Comments
03	Technical characteristics
04	Notes on applications and processing
05	Application examples

Available steel grades

TBL® is available as uncoated wide hot strip and as cut-to-length plate.

Steel grade designations and delivery forms		
Steel grade designation	Delivery form	
	Hot-rolled strip	Cut-to-length plate
TBL® 30	●	●
TBL® 35	●	●
TBL® 40	●	●
TBL® 45	●	●
TBL® 50	●	●

● Available

Steel grades according to DIN EN ISO 683-2.

Dimensions

Subject to finishing, steel grades are available in the dimensions shown below. We will be pleased to inform you on request of the dimensional combinations in which our TBL® steels as cut-to-length plate are available.

Steel grade	Delivery form	Thickness [mm]	Width [mm]
		from_to	from_to
TBL® 30	Hot-rolled strip / Cut-to-length plate	2.50 – 18.00	1,000 – 2,030
TBL® 35	Hot-rolled strip / Cut-to-length plate	2.50 – 15.00	1,000 – 1,630
TBL® 40	Hot-rolled strip / Cut-to-length plate	2.50 – 12.00	1,000 – 1,630
TBL® 45	Hot-rolled strip / Cut-to-length plate	2.50 – 12.00	1,000 – 1,630
TBL® 50	Hot-rolled strip / Cut-to-length plate	3.00 – 12.00	1,000 – 1,630

Other dimensions and delivery forms as well as different thickness and width combinations available on request.

Comments

Wide hot strip and cut-to-length plate can be ordered in normalized annealed or normalized-rolled condition as well as in pickled or non-pickled condition and with mill or trimmed edges. Cut-to-length plate is only supplied pickled in the annealed condition.

Unless otherwise agreed upon in the order, the delivery will be governed by the conditions outlined in DIN EN 10021.

The admissible tolerances are based on DIN EN 10051 for wide hot strip and cut-to-length plate.

Technical characteristics

All TBL® steel grades from thyssenkrupp can be supplied in normalized annealed or normalized-rolled condition. Among other things, the TBL® grades differ in their carbon content and are produced with low levels of phosphorus and sulfur.

For better processability, we recommend ordering TBL® 40, TBL® 45 and TBL® 50 in the annealed condition.

Chemical composition

Mass fractions
in ladle analysis

	C [%]	Si [%]	Mn [%]	P [%]	S [%]	Al [%]	Cr [%]	Ni [%]	Ti [%]	B [ppm]
Steel grade										
TBL® 30	0.25–0.35	≤0.40	1.00–1.50	≤0.025	≤0.010	0.02–0.06	≤0.50	–	0.02–0.05	10–50
TBL® 35	0.30–0.40	≤0.40	1.00–1.50	≤0.025	≤0.010	0.02–0.06	≤0.50	–	0.02–0.05	10–50
TBL® 40	0.35–0.45	≤0.40	1.00–1.50	≤0.025	≤0.010	0.02–0.06	≤0.50	–	0.02–0.05	10–50
TBL® 45	0.40–0.50	≤0.40	1.00–1.50	≤0.025	≤0.010	0.05–0.15	≤0.50	–	0.005–0.020	10–50
TBL® 50	0.45–0.55	≤0.40	1.00–1.50	≤0.025	≤0.010	0.02–0.06	≤0.70	0.10–0.30	0.02–0.05	10–50

The steel has a fine grained microstructure. Nitrogen is absorbed to form nitrides.

Mechanical properties, non-guaranteed values in delivery condition at room temperature

Steel grade	Delivery form	Test direction	Yield strength	Tensile strength	Elongation	Hardness in delivery condition
			R _e typ. [MPa]	R _m typ. [MPa]	A ₅ typ. [%]	Typ. [HBW]
TBL® 30	Hot-rolled strip	Transverse to rolling direction	400	620	22	180
TBL® 35	Hot-rolled strip	Transverse to rolling direction	430	680	22	200
TBL® 40	Hot-rolled strip	Transverse to rolling direction	470	750	20	220
TBL® 45	Hot-rolled strip	Transverse to rolling direction	510	825	17	240
TBL® 50	Hot-rolled strip	Transverse to rolling direction	620	880	17	260

Typical values may differ depending on testing position (beginning, middle or end of coil).

A₅ Percentage elongation after fracture using a proportional specimen with $L_0 = 5.65 \sqrt{S_0}$

Number of tests

Wide hot strip and cut-to-length plate

The scope of testing has to be agreed when ordering.

Notes on application and processing

Heat treatment

Depending on the area of application, TBL® steels are hardened. They can be hardened in water, oil or polymer dispersion with no problems. The hardnesses achieved depend mainly on the chemical composition and the cooling rate during the hardening process. The maximum hardness depending on TBL® variant can be approximately 660 HBW (62 HRC).

Typical values for heat treatment

	Normalizing	Hardening	
		Austenitizing Duration ≥ 15 min.	Subsequent tempering Duration ≥ 30 min.
Steel grade			
TBL® 30	860–880 °C	860–880 °C	150–350 °C ¹⁾
TBL® 35	840–860 °C	840–860 °C	150–350 °C ¹⁾
TBL® 40	835–855 °C	835–855 °C	150–350 °C
TBL® 45	820–840 °C	820–840 °C	150–350 °C
TBL® 50	810–830 °C	810–830 °C	150–350 °C

¹⁾ Optional.

The desired hardness can be achieved with subsequent tempering. For the variants TBL® 40, TBL® 45 and TBL® 50, additional tempering is necessary and has to be taken into account.

Forming

TBL® steels are cold-formable in their delivery condition. Cold forming is only possible to a limited extent in the hardened state.

Welding and thermal cutting

Taking account of the carbon content, welding and thermal cutting are possible using the well-known methods.

All standard thermal cutting processes may be used to cut TBL® steels.

All hardenable TBL® boron steels can be welded either automatically or manually using any standard method. Preheating is effective in preventing cold cracking.

The instructions outlined in STAHL-EISEN-Werkstoffblatt 088 (weldable fine grain structural steels, processing directives, especially for welding) should be noted for TBL® steels.

Recommendations for welding are also given in DIN EN 1011 part 1 and part 2 – Welding, recommendation for welding of metallic materials.

Our technical experts can be consulted for any information beyond the scope of these instructions, in particular on first use.

Application examples



Agricultural machinery.



Disk harrows.



Blade disks.

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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