Steel

TBL

Hardenable boron steels with excellent processing potential for high wear protection in special vehicles.

thyssenkrupp

Agricultural machinery and cement mixers can only operate cost-efficiently if their steel structures display high wear resistance. At the same time, manufacturers must be able to depend on steels for best possible processing characteristics. With our hardenable TBL boron steel grades, you have the best of both worlds. In addition to their high purity and good surface quality, these steels feature close-analysis tolerances to ensure uniform hardening behavior, smooth-running production processes and consistently high product quality – to keep your customers highly satisfied.

TBL steels from thyssenkrupp: wear resistance and process-ability in perfect combination.

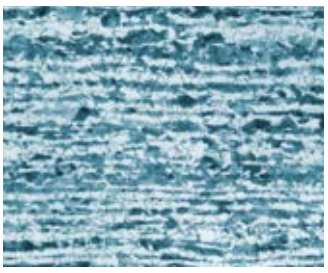
TBL and TBL Plus are fine-grain boron-alloyed special structural steels with high surface quality and high purity. These properties add up to a better-than-ever combination of excellent wear protection and superior forming and hardening characteristics – not to mention reduced costs.

Advantages at a glance

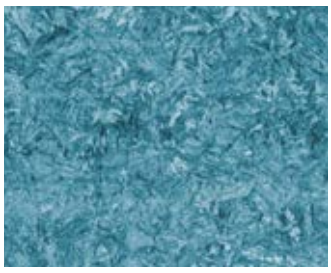
- High wear resistance for longer service life
- Flexible forming with adjustable characteristics
- Consistently high quality of end products
- Substantial cost savings

High wear resistance. For consistently high product quality.

In delivery condition, thyssenkrupp TBL steels already have excellent forming characteristics and good welding properties. Normally, they are hardened after being processed for use in agricultural machinery. And this is where the advantages of alloying with boron stand out: TBL grades can be hardened in water, oil or polymer dispersion with no problems. This makes TBL and TBL Plus ideal for structures demanding high wear resistance, for instance in harrows, packers and plows. A wide range of different mechanical properties can be realized depending on the steel grade and heat-treatment conditions.



The microstructure of TBL Plus shows both hard pearlite structures (dark areas) and soft ferrite components (light areas).



After hardening, the microstructure of TBL Plus is 100 % martensite.

Impressive final hardnesses.

The maximum attainable hardness is 560 HBW (55 HRC) for TBL Plus and 500 HBW (51 HRC) for TBL. Ultimately, the hardnesses achieved depend mainly on the chemical composition and the cooling rate in the hardening process. The recommended austenitization temperature is 900 °C for TBL and 860 °C for TBL Plus. Tempering after hardening is generally not necessary.

Effective even without hardening.

TBL grades can also be successfully used in delivery condition in more moderate wear applications, such as cement mixers. They owe these good wear properties to the microstructure developed during rolling, which is characterized by the presence of both hard and soft components – ferrite with pearlite.

Available dimensions of TBL steels

		Width [mm]	Thickness [mm]
Steel grade			
TBL	Cut-to-length plate	800–1,770	3–12
TBL	Quarto	1,300–3,600	4–100
TBL Plus	Cut-to-length plate	800–1,770	3–12

TBL and TBL Plus are each supplied in normalized or normalized-rolled condition, the grades differing mainly in their carbon content.

Chemical composition

	C [%]	Si [%]	Mn [%]	P [%]	S [%]	Cr [%]	B [%]	Typ. CEV	Typ. CET
Steel grade									
TBL	0.24–0.30	≤ 0.40	1.10–1.30	≤ 0.04	≤ 0.04	≤ 0.50	0.0008–0.0040	0.55	0.41
TBL Plus	0.33–0.37	≤ 0.40	1.20–1.40	≤ 0.04	≤ 0.03	≤ 0.50	0.0008–0.0040	0.65	0.49

Typical mechanical properties (transverse sample) in delivery condition

	Plate thickness [mm]	Yield strength R_e [MPa]	Tensile strength R_m [MPa]	Elongation A [%]	Hardness in delivery condition [HBW]
Steel grade					
TBL	15	410	610	22	185
TBL Plus	4	430	680	22	190

Excellent processing characteristics.

Hot forming.

For complex geometries, hot forming between 900 and 1,050 °C is recommended, followed by quenching in water, oil or polymer dispersion, each of which is associated with a different cooling rate. Where the geometry permits, air cooling can also be sufficient for achieving the desired final hardness.

Cold forming is also possible.

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

Thermal cutting? No problem.

All commonly used thermal cutting processes may be used to cut TBL and TBL Plus plates. Plates of up to 20 mm thickness can be cut without preheating.

Excellent weldability.

Both hardenable boron steels, TBL and TBL Plus, are characterized by their suitability for welding, and can be welded either automatically or manually using all commonly-used methods. Preheating is effective in preventing cold-cracking.

thyssenkrupp – a partner that understands its business. And yours.

Our mission is to advance your business – through sound advice, individual and innovative solutions and fulfillment of your specific needs. Our extensive technological know-how, gained over many years, makes this possible. As does our ability to see things the way you do. This enables us to develop an in-depth understanding of your business model. Our brand promise says it all: “engineering. tomorrow. together.” Because when it comes to finding successful solutions for tomorrow, the closer we cooperate the better.

Comprehensive advice.

To ensure that you get the best advice on the selection and processing of TBL steels, our Technical Customer Service is at your disposal. They are 100% committed to offering you comprehensive assistance with regard to design and processing, answers to structure- and forming-related issues, product training, and of course technical support in optimizing fabrication processes.

Tailored service.

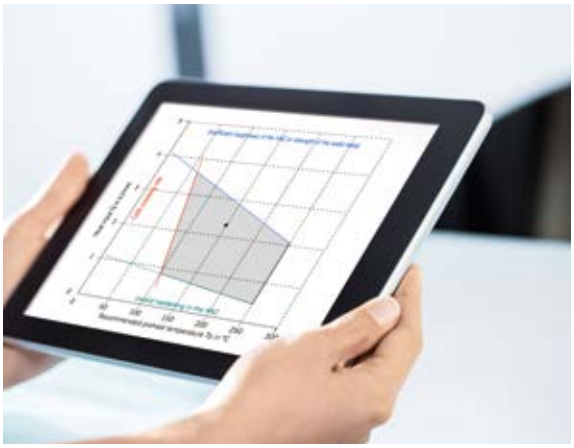
For high-quality logistics and processing, our global distribution network ensures rapid supply and just-in-time delivery of TBL steels – in top quality and with excellent value for money. Close cooperation with our steel service centers additionally enables us to offer pre-fabricated, cold-formed or welded parts.

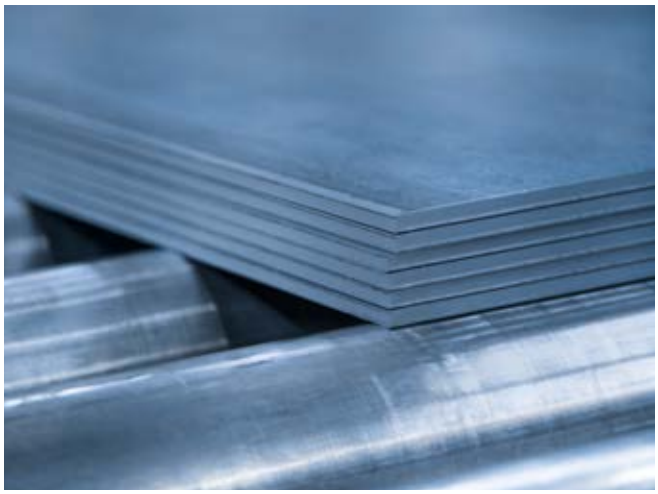
Practical virtual tool.

Naturally, you can find specific information about our special structural steels on our website:

www.thyssenkrupp-steel.com/plate

This includes useful product information, processing recommendations and a direct line to your personal service representatives for sales and technical consulting. You can also access ProWeld, thyssenkrupp’s web-based application for welding calculations. After registering as a user, you can log in and use this tool for your projects at any time, free of charge.





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