30MnB5

Boronalloyed quenched and tempered steel

Material no.	1.5531
according to	DIN EN 10083-3
IMDS no.	13696
Tensile strength class	B

General information

Steel grade 30MnB5 in accordance with DIN EN 10083-3 is one of the boron-alloyed quenched and tempered steels. These grades are characterized in particular by their formability in the hot rolled state and their high strength after the heat treatment. The strength characteristics after quenching and tempering are achieved in particular by the low boron content, in addition to the carbon and manganese. SZFG is current delivering manganese-boron steels from 10MnB5 to 40MnB5.

Chemical composition [1)2)]

(in percent by weight)

	min. in %	max. in %
C	0.27	0.33
Si	0.15	0.35
Mn	1.15	1.45
P		0.02
S		0.007
Cr	0.05	0.25
Ti	0.015	0.045
B	0.0008	0.0050

1) Heat analysis

2) Deviating promises may be possible by arrangement.

Typical mechanical properties[3)]

(Approximate values)

Yield strength $R_{p0,2}$ in MPa (thickness e ≤ 6 / e > 6)
360 – 600 / 340 – 590

Tensile strength R_m in MPa (thickness e ≤ 6 / e > 6
610 – 7680 / 580 – 760

Total elongation A_{80}[4)] in %
≥ 10

Total elongation A_5[4)] in % (thickness e ≤ 6 / e > 6)
≥ 12 / ≥ 11

3) Tested transverse to direction of rolling

4) It applies to nominal thickness e:

e < 3 mm: A_{80}

e ≥ 3 mm: A_5

Delivery form

The steel is supplied as hot-rolled strip (pickled, unpickled) as well as longitudinally or transversely cut hot-rolled strip in nominal thicknesses from 2.0 to 12.7 mm in widths in accordance with the SZFG delivery programme (strength class B). Additional thicknesses are also available upon agreement. SZFG uses a Ti-Cr concept. Where necessary, a statement of the required chemical analysis or inclusion of a customer specification is required.

The conditions of DIN EN 10083-3, Sections 6.3.1 and 8 apply to the delivery and inspection.

All quenched and tempered steels are delivered in a hot-rolled, untreated state.

Inspection certificates in accordance with DIN EN 10204 can also be delivered in the following forms: computer medium, remote data transmission, fax, E-Mail, paper.

Available dimensions

Hot-rolled coils unpickled, mill edge

Thickness in mm	Width in mm
2.00 – 2.24	900 – 1,400
2.25 – 2.49	900 – 1,450
2.50 – 2.99	900 –1,500
3.00 – 3.99	900 – 1,680
4.00 – 12.70	900 – 1,750

Widths up to 2,000 mm on request.

Hot-rolled coils pickled, mill edge

Thickness in mm	Width in mm
2.00 – 2.24	900 –1,400
2.25 – 2.49	900 –1,450
2.50 – 2.99	900 –1,500
3.00 – 12.70	900 –1,530

Widths up to 1,880 mm on request.

Hot-rolled slit strip

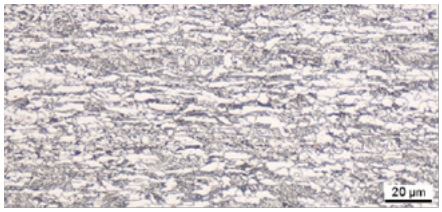
Thickness in mm	Width in mm
2,00 – 2,24	100 – 680
2,25 – 2,49	100 – 715
2,50 – 2,99	100 – 740
3,00 – 4,60	100 – 800
4,61 – 6,00	116 – 800
6,01 – 7,00	175 – 800
7,01 – 8,00	233 – 800

Widths ≤ 100 mm on request.

Microstructure

In the hot-rolled state, the 30MnB5 typically exhibits a ferritic-pearlitic microstructure with a typical grain size of > 9 according to ASTM.

200:1

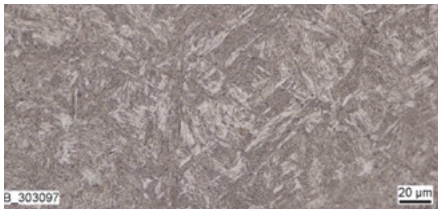


500:1

In the hardened and tempered state, after suitable heat treatment the manganese-boron steels form a microstructure consisting of 100% martensite:

Hardened state, water cooled 200:1

Tempered state, water cooled 200:1



Tempered state, oil cooled 200:1

Example applications

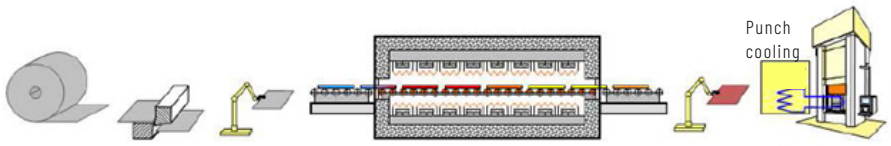
Thanks to the combination of ductility and hardness, the 30MnB5 is particularly used for supporting body parts and safety-relevant parts in the automotive industry, such as chassis components, stabilizers or bumpers, and also for agricultural products.

Example:
Disk harrow

Example:
Stabilizer

Press-hardening

Press-hardening helps combine the hot forming and hardening procedures in one process step. In press-hardening, the steel's microstructure is first transferred into the austenitic range and formed by heating at more than 950° C in a protective atmosphere. While still in the mold, the pressed part is cooled to temperatures between 100° C and 200° C. This leads to the formation of a martensitic microstructure, which results in a high strength component.



Uncoil Cut to size Transfer Heat Transfer Form and harden

Welding

The manganese-boron steels are suitable for welding with all known welding procedures, either by hand or with automatic systems. Resistance spot welding, gas-shielded welding and laser beam welding are particularly applicable. The steels are also suitable for welding in mixed joints with other common steel grades and in different thicknesses. The quality of the welded joint, however, depends on the welding procedure, the welding conditions and the selection of the correct filler materials.

In addition, it must be noted that when welding these steels in the quenched and tempered state, tempering effects can occur in the joining zone. This can reduce the strength of the joint compared to the base material that was strongly solidified by the preceding hot-forming process.

Characteristics in the hardened state