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# 34MnB5

## Boron alloyed quenched and tempered steel

Material no.	-
according to	<b>DIN EN 10083-3</b>
IMDS no.	-
Tensile strength class	<b>C</b>

### General information

Steel grade 22MnB5 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 <sup>1)2)</sup> (in percent by weight)

	min. in %	max. in %
C	0.33	0.37
Si	0.15	0.35
Mn	1.15	1.45
P		0.020
S		0.010
Al	0.015	0.060
N		0.010
Cr	0.05	0.20
Ti	0.015	0.060
B	0.0015	0.0045

1) Heat analysis

2) Abweichende Zusagen sind nach Vereinbarung möglich. Salzgitter Flachstahl liefert unter anderem Ni-legierte oder Ni-freie Varianten.

### Typical mechanical properties

(Approximate values)

Yield strength $R_{p0.2}$ in MPa (logitudinal/transversal)
320 – 600 / 340 – 610

Tensile strength $R_m$ in MPa (logitudinal/transversal)
580 – 820 / 580 – 820

Total elongation $A_{80}^{3)}$ in % (logitudinal/transversal)
$\geq 12\%$ / $\geq 10\%$

Total elongation $A_5^{3)}$ in % (logitudinal/transversal)
$\geq 14\%$ / $\geq 12\%$

3) It applies to nominal thickness e:  
e < 3 mm:  $A_{80}$   
e  $\geq$  3 mm:  $A_5$

### Delivery form

The steel is produced as hot-rolled strip (pickled, unpickled) in nominal thicknesses from 2.0 to 12.7 mm in widths in accordance with the SZFG delivery program (strength class C). 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 1,880 mm on request.

Thicknesses up to 25.40 < 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 – 3.99	900 – 1,680
4.00 – 6.00	900 – 1,512
6.01 – 12.70	900 – 1,510

Widths up to 1,880 mm on request.

Hot-rolled coils pickled, trimmed edge

Thickness in mm	Width in mm
2.00 – 2.24	900 – 1,380
2.25 – 2.49	900 – 1,430
2.50 – 2.99	900 – 1,485
3.00 – 3.99	900 – 1,512
4.00 – 6.00	900 – 1,512

Widths up to 1,880 mm on request.

Hot-rolled slit strip

Thickness in mm	Width in mm
2.00 – 2.24	100 – 690
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.

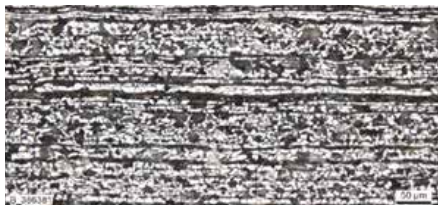


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### Microstructure

In the hot-rolled state, the 34MnB5 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:



Tempered state, water cooled

200:1



Tempered state, oil cooled

500:1

### Example applications

Thanks to the combination of ductility and hardness, the 34MnB5 is particularly used for supporting body parts and safety-relevant parts in the automotive industry, such as chassis components, gear shafts or bumpers.



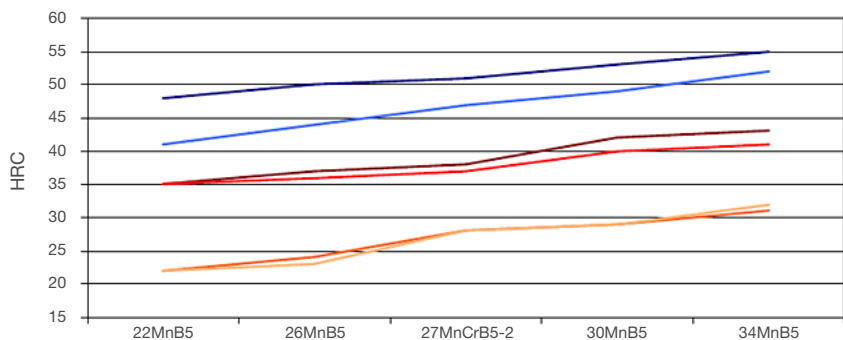
Example:  
drive shafts

### 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




- Water hardening, hardened state
- Oil-hardening, hardened state
- Water hardening, tempered at 300°
- Oil-hardening, tempered at 300°
- Water hardening, tempered at 500°
- Oil-hardening, tempered at 500°



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