



BORON-ALLOYED CASE-HARDENING AND HEAT-TREATABLE STEELS

Steels for direct processing or cold rolling

Boron-alloyed case-hardening and heat-treatable steels are often a cost-effective alternative to alloyed, quenched and tempered steels without boron. Adding boron ensures excellent hardenability, even when the carbon content is low or medium. Uniform processing characteristics and homogeneous properties are achieved on the end product by adhering to the narrowest analysis margins and controlled production conditions. These steel grades are particularly characterized by good cold formability in as-delivered condition as well as by high strength after hardening. Oil or gas quenching can be eliminated in many cases during heat treatment. Hardening in a water bath reduces costs and environmental impact. Boron-alloyed case-hardening and heat-treatable steels are produced by voestalpine pursuant to or in general compliance with EN ISO 683-2 and can be supplied in hot-rolled or soft-annealed condition as required.

Typical applications are as follows:

- » Axes
- » Drive shafts
- » Earth moving equipment
- » Chassis stabilizers
- » Construction parts in agricultural machinery
- » Safety-related parts in automotive engineering
- » Load-bearing car body parts
- » Parts subject to wear



PREMIUM QUALITY
WITH REDUCED
CARBON FOOTPRINT

Chemical composition

Heat analysis in mass %

Steel grade	C	Si	Mn	P max.	S max.	Cr	Ni max.	V	Cu max.	B
20MnB5	0.18 - 0.23	≤ 0.40	1.10 - 1.40	0.020	0.010	0.10 - 0.40	0.25	-	0.25	0.0008 - 0.0050
20MnB9	0.18 - 0.23	≤ 0.40	2.00 - 2.30	0.020	0.010	0.10 - 0.40	0.25	-	0.25	0.0008 - 0.0050
26MnB5	0.24 - 0.28	≤ 0.40	1.10 - 1.40	0.020	0.010	0.10 - 0.40	0.25	-	0.25	0.0008 - 0.0050
26MnB5+V	0.24 - 0.28	≤ 0.40	1.10 - 1.40	0.020	0.010	0.10 - 0.40	0.25	0.05 - 0.10	0.25	0.0008 - 0.0050
27MnCrB5-2	0.24 - 0.30	≤ 0.40	1.10 - 1.40	0.020	0.010	0.30 - 0.60	0.25	-	0.25	0.0008 - 0.0050
durostat B2	0.25 - 0.30	0.15 - 0.30	1.10 - 1.30	0.020	0.006	0.30 - 0.50	0.25	-	0.25	0.0015 - 0.0040
34MnB5	0.32 - 0.37	≤ 0.40	1.10 - 1.40	0.020	0.010	0.10 - 0.40	0.25	-	0.25	0.0008 - 0.0050
40MnB5	0.38 - 0.42	≤ 0.40	1.10 - 1.40	0.020	0.010	0.30 - 0.60	0.25	-	0.25	0.0008 - 0.0050
durostat B4	0.38 - 0.42	0.15 - 0.30	1.10 - 1.30	0.020	0.006	0.30 - 0.50	0.25	-	0.25	0.0015 - 0.0040

Please inquire about deviations from specified melt analyses and narrower tolerance limits.

The listed steel grades are an excerpt from our production range. Further steel grades defined by national and international standards and special analyses according to customer specifications are also available upon request.

Mechanical properties: Tensile test

Indicative values depending on as-delivered condition

Steel grade	As-rolled		Annealed
	Yield strength $R_{p0.2}$ [MPa]	Tensile strength R_m [MPa]	Tensile strength R_m [MPa]
20MnB5	500	650	550
20MnB9	600	750	580
26MnB5	500	700	540
26MnB5+V	600	750	590
27MnCrB5-2	500	700	540
durostat B2	500	700	540
34MnB5	500	700	580
40MnB5	500	700	620
durostat B4	500	700	620

Carbon steels are usually supplied in as-delivered condition without any guarantee of mechanical properties. Guaranteed values are subject to separate agreement.

Soft-annealed as-delivered condition upon request. We also supply spheroidized grade GKZ, soft-annealed on spherical cementite upon request.

Example dimensions

Examples of maximum width per thickness; additional dimensions and minimum order quantities upon request

Steel grade	Thickness [mm]						
	2.00	2.50	3.00	3.50	4.00	8.00	12.00
20MnB5	1110	1260	1410	1560	1620	1620	1620
20MnB9	1090	1260	1350	1480	1620	1620	1620
26MnB5	1110	1260	1410	1560	1620	1620	1620
26MnB5+V	1110	1260	1410	1560	1620	1620	1620
27MnCrB5-2	1110	1260	1410	1560	1620	1620	1620
durostat B2	1110	1260	1410	1560	1620	1620	1620
34MnB5	1110	1260	1410	1560	1620	1620	1620
40MnB5	1110	1260	1410	1560	1620	1620	1620
durostat B4	1110	1260	1410	1560	1620	1620	1620

Depending on dimension and strength, we supply these grades in pickled, oiled and trimmed condition

Steel strip		Slit steel strip		Cut-to-length sheets	
Width	900 – 1620 (1750) mm	Thickness	up to 12 mm	Thickness	up to 16 mm
Weight/width	18 – 20 kg/mm	Strip width	from 30 mm	Length	up to 12 m (18 m)

Dimension tolerances

Dimensional tolerances of hot-rolled steel strip are compliant with EN 10051. With respect to thickness, 50% of the tolerance according to EN 10051 (when measured 25 mm in from the cut edge) is guaranteed.

Narrower thickness tolerances are possible upon request.

A very flat strip shape (crown) is decisive for a number of further processing steps (such as cold rolling).

Dimensions and material properties are subject to agreement.

greentec steel Edition



Premium quality with reduced carbon footprint

Hot-rolled steel strip – greentec steel Edition

Max. carbon footprint 2.10 kg CO₂e per kg of steel ¹⁾

¹⁾ per EN 15804+A2 (EPD methodology) cradle to gate

All products, dimensions and steel grades listed in each voestalpine supply range are available as greentec steel Edition.

General information about material properties

Chemical composition

The basis for achievement of the desired hardness values after heat treatment is the chemical composition. The carbon content influences achievable hardness, and alloying elements such as manganese, chromium and boron influence the through hardenability. The indicated analysis boundaries apply to the ladle analysis. A number of modifications to the chemical composition are available for several grades. Further steels not included in the list can be supplied upon request according to standards and individual customer specifications.

Mechanical properties

Carbon steels are generally manufactured according the specified chemical composition without any guarantee of mechanical properties in the as-delivered condition of the hot-strip pre-material. The properties of the hot-rolled steel strip are determined in large part by the cooling strategy used. This especially applies to the formation of pearlite.

As-delivered condition

Depending on customer requirements and further processing steps, the following as-delivered conditions can be supplied for a wide range of steel grades:

- » As-rolled condition with largely fine-lamellar pearlite, such as for optimized microstructure during spheroidizing-annealing
- » As-rolled condition with largely coarse lamellar pearlite, for example in lower-strength steels in as-delivered condition
- » Soft-annealed Batch annealing without guaranteed level of spheroidization
- » Spheroidized-annealed Batch annealing with guaranteed level of spheroidization according to grade upon request

Prior descaling in a strip pickling line is required for deliveries in annealed condition.

Degree of purity

The carbon steels produced at voestalpine Stahl GmbH with reduced sulfur and phosphorus content. This is in view of the microscopic degree of purity and formation of segregations. Requirements with regard to the degree of purity can be met upon request according to EN 10247 (DIN 50602), ASTM E 45, ISO 4967.

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