



COLD-ROLLED CARBON STEELS

Carbon steels as cold-rolled strip for direct processing or repeated cold rolling

Carbon steels as cold-rolled strip for direct processing or repeated cold rolling are typically intended for heat treatment in order to achieve the desired processing and component properties. They are used in applications in which it is important to strike an optimum balance between hardness and toughness.

Case-hardening steels

- » For components with high toughness and hard wearing surfaces.
- » Delivery pursuant to EN 10132 and the voestalpine standard

Heat-treatable steels

- » Unalloyed or alloyed for hardness and toughness as required.
- » Delivery pursuant to EN 10132 and the voestalpine standard



PREMIUM QUALITY
WITH REDUCED
CARBON FOOTPRINT

EN 10132 differentiates between case-hardening steels, heat-treatable steels and spring steels as well as steels for special applications.

Case-hardening steels

The C content for optimized machining and forming lies between 0.07% and 0.20%. In order to achieve the desired properties, a high degree of hardness in the case and usually a tough core, the surface area must be enriched with carbon, hardened and perhaps tempered or stress-relieved.

Carbon enrichment is accomplished in the course of component manufacturing by means of carburization. Carbonitriding is carried out when nitrogen enrichment is required.

Heat-treatable steels

The carbon content of heat-treatable steels lies between 0.17% and 0.65%. Additional alloying elements such as chromium, molybdenum and nickel make it possible to finely tune component properties. Heat treatment is required in order to adjust the desired component properties, mostly an optimized combination of strength and toughness:

- » Normalizing
- » Quenching and tempering

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.

Chemical composition unalloyed steels

Heat analysis in mass %

Steel grade	C	Si max.	Mn	P max.	S max.	Cr max.	Mo max.	Ni max.	Cu max.
Case-hardening steels according to EN 10132									
C10E	0.07 - 0.13	0.40	0.30 - 0.60	0.025	0.035	0.40	0.1	0.4	0.3
C15E	0.12 - 0.18	0.40	0.30 - 0.60	0.025	0.035	0.40	0.1	0.4	0.3

Steel grade	C	Si max.	Mn	P max.	S max.	Cr max.	Mo max.	Ni max.	Cu max.	Cr+Mo+Ni max.
Heat-treatable steels according to EN 10132										
C22E	0.17 - 0.24	0.40	0.40 - 0.70	0.025	0.035	0.40	0.10	0.40	0.3	0.63
C25E	0.22 - 0.29	0.40	0.40 - 0.70	0.025	0.035	0.40	0.10	0.40	0.3	0.63
C35E	0.32 - 0.39	0.40	0.50 - 0.80	0.025	0.035	0.40	0.10	0.40	0.3	0.63

Chemical composition alloyed steels

Heat analysis in mass %

Steel grade	C	Si max.	Mn	P max.	S max.	Cr	Mo max.	Ni max.	Cu max.
Case-hardening steels according to EN 10132									
16MnCr5	0.14 - 0.19	0.40	1.00 - 1.30	0.025	0.035	0.80 - 1.10	-	-	0.4

Steel grade	C	Si max.	Mn	P max.	S max.	Cr max.	Mo max.	Ni max.	Ti max.	B
Heat-treatable steels according to voestalpine standard										
22MnB5	0.19 - 0.25	0.40	1.10 - 1.40	0.025	0.015	0.40	-	-	0.06	0.0008-0.005
27MnB5	0.25 - 0.30	0.40	1.10 - 1.40	0.025	0.025	0.50	-	-	0.05	0.0008-0.005
34MnB5	0.31 - 0.39	0.40	1.10 - 1.50	0.025	0.035	0.40	-	-	0.05	0.0008-0.005

Comparative table of standards unalloyed steels

Steel grade	Material number	SAE
Case-hardening steels according to EN 10132		
C10E	1.1121	1010
C15E	1.1141	1013, 1015
Heat-treatable steels according to EN 10132		
C22E	1.1151	1021
C25E	1.1158	1025
C35E	1.1181	1035

Comparative table of standards alloyed steels

Steel grade	Material number	SAE
Case-hardening steels according to EN 10132		
16MnCr5	1.7131	-
Heat-treatable steels according to voestalpine standard		
22MnB5	1.5528	-
27MnB5	1.5529	-
34MnB5	-	-

Mechanical properties unalloyed steels

Values depending on as-delivered condition

Steel grade	Annealed (+A), annealed and slightly rerolled (+LC)			
	Yield strength $R_{p0.2}$ max. [MPa]	Tensile strength R_m max. [MPa]	A_{80} min. [%]	HV max.
Case-hardening steels according to EN 10132				
C10E	345	430	26	135
C15E	360	450	25	140
Heat-treatable steels according to EN 10132				
C22E	400	500	22	155
C25E	410	510	21	160
C35E	430	540	19	170

Mechanical properties alloyed steels

Values depending on as-delivered condition

Steel grade	Annealed (+A), annealed and slightly rerolled (+LC)			
	Yield strength $R_{p0.2}$ max. [MPa]	Tensile strength R_m max. [MPa]	A_{80} min. [%]	HV max.
Case-hardening steels according to EN 10132				
16MnCr5	420	550	21	170
Heat-treatable steels according to voestalpine standard				
22MnB5	450	650	18	-
27MnB5	450	650	18	-
34MnB5	450	650	16	-

Dimensions and forms of delivery

Cold-rolled carbon steels can be supplied as coils or as preprocessed material (slit or cut to length). The following dimensions are available:

- » Coil width: 900 - 1615 mm
- » Strip widths beginning at 10 mm
- » Thickness: 0.5 - 3 mm
- » Weight/width: 18 - 20 kg/mm

Available combinations of widths and thicknesses vary depending on the steel grade. Indicated values are standard; limitations possible depending on thickness. Further dimensions upon request.

Dimensional tolerances

Dimensional tolerances of the cold-rolled strip comply with EN 10131. Narrower thickness tolerances are possible upon request. A very flat strip shape (crown) is decisive for a number of further processing steps. Dimensions and material properties are subject to agreement.

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 molybdenum influence the through-hardening. 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

Further values pursuant to EN 10132 and this data sheet upon request.

As-delivered condition

Following terms of delivery upon request:

- » Annealed (+A)
- » Annealed and skin-passed (slightly rerolled/+LC)
- » Batch annealing with guaranteed level of spheroidization (+AC)
according to grade upon request

Degree of purity

The carbon steels produced at voestalpine Stahl GmbH come with reduced sulfur and phosphorus content. This is in view of the microscopic degree of purity and formation of segregations. Customer-specific requirements with regard to degree of purity can be met upon request.



Premium quality with reduced carbon footprint

Cold-rolled steel strip – greentec steel Edition

Max. carbon footprint 1.97 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.

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