

Hot-rolled and cold-rolled steel strip

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phs-uncoated

Uncoated hot-forming steels for the production of press-hardened components

phs-uncoated is ideally suited as a hot-forming steel for the automotive industry and can be used in all safety-relevant components that do not require a higher level of corrosion protection.

The material allows forward-looking and innovative lightweight designs that must meet high demands on crash behavior. The alloy composition makes it possible to process the material in both direct and indirect hot-forming processes. With its carefully selected surface treatment, phs-uncoated is suitable for use in applications such as B pillars, bumper reinforcements and interior structural members.

phs-uncoated is also used to manufacture welded blanks.

Typical applications:

- » B pillars
- » Bumper reinforcements
- » Interior structural members

Convincing advantages

- » Wide range of thicknesses for a variety of applications
- » Best crash behavior
- » Very good joining behavior
- » Tailored-property parts possible
- » Workability in the direct and in the indirect hot forming process



Premium quality with reduced carbon footprint





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The entire process chain can be simulated down to the detailed component properties.

Depending on customer requirements, surface conditioning and/or transport corrosion protection is applied by the component manufacturer.

Chemical composition in mass %

Steel grade 1)	с	Si max.	Mn	P max.	S max.	AI	Cr max.	Ti + Nb max.	В	Cu max.	N max.	Ni max.
phs-uncoated 1500 CR phs-uncoated 1500 HR	0.20 - 0.25	0.5	1.1 - 1.5	0.02	0.005	0.02 - 0.08	0.35	*)	0.002 - 0.005	0.2	0.01	0.1
phs-uncoated 2000 CR $^{\rm 2)}$ phs-uncoated 2000 HR $^{\rm 2)}$	0.30 - 0.38	0.5	≤ 2.0	0.02	0.005	0.02 - 0.08	0.50	0.2	0.002 - 0.005	0.2	0.01	0.5

*) Ti 0.02 - 0.05 / Nb -

Mechanical properties in as-delivered condition

Testing transverse to rolling direction

Steel grade ^{1) 3)}	0.2 % yield strength R _{p0.2} [MPa]	Tensile strength Rm [MPa]	Total elongation A80 for t < 3 mm [%] min.	Total elongation A5 for t ≥ 3 mm [%] min.
phs-uncoated 1500 CR	300 - 480	480 - 600	18	_
phs-uncoated 1500 HR	≥ 280	450 – 750	12	14
phs-uncoated 2000 CR ²⁾	300 - 500	450 - 650	17	_
phs-uncoated 2000 HR ²⁾	280 - 680	440 - 850	10	12

Mechanical properties after hot forming and hardening (Typical values)

Testing transverse to rolling direction

Steel grade	0.2 % yield strength ⁴⁾ R _{p0.2} [MPa]	Tensile strength ⁴⁾ R _m [MPa]	Total elongation ⁴) A₅₀ for t < 3 mm [%]	Total elongation ⁴⁾ A₅ for t ≥ 3 mm [%]	Bending angle ^{4) 5)} $lpha_{1mm}$ [°]
phs-uncoated 1500 CR	1050	1500	6	-	65
phs-uncoated 1500 HR	1050	1500	6	9	65
phs-uncoated 2000 CR ²⁾	1200	1900	5	-	45
phs-uncoated 2000 HR ²⁾	1200	1900	5	8	45

Mechanical properties after hot forming, hardening and cathodic dip coating (Typical values)

Testing transverse to rolling direction

Stahlsorte	0.2 % yield strength ⁴⁾ R _{p0.2} [MPa]	Tensile strength ⁴⁾ R _m [MPa]	Total elongation ⁴) A₅₀ for t < 3 mm [%]	Total elongation ⁴⁾ A₅ for t ≥ 3 mm [%]	Bending angle 4) 5) α_{1mm} [°]
phs-uncoated 1500 CR	1150	1500	6	-	65
phs-uncoated 1500 HR	1150	1500	6	9	65
phs-uncoated 2000 CR ²⁾	1400	1850	5	-	50
phs-uncoated 2000 HR $^{\scriptscriptstyle 2)}$	1400	1850	5	8	50

¹⁾The voestalpine steel grades meet the specifications of VDA 239-500.

²⁾Indication of preliminary values

³⁾ Standard supply of hot-rolled steel strip (HR) is in as-rolled condition. Material can also be ordered in

soft-annealed condition, and mechanical properties are subject to separate agreement.

Standard supply of cold-rolled steel strip (CR) in annealed and skin-passed condition ⁴⁾ Mechanical parameters in hardened condition are standard values achieved in the professional processing of flat sheets.

The indicated values are not guaranteed by voestalpine Stahl GmbH.

» Austenitization conditions: Furnace chamber temperature of 910 °C, 45 s annealing time after achieving a blank temperature of 870 °C

» Cooling conditions: Cooling rate > 40 K/s during cooling between water-cooled plates

» Temperature at which blanks are removed < 200 °C

» Conditions of heat treatment during bake-hardening simulation: 170 °C/20 min, oil

» Hot-rolled steel strip (HR): Tensile and bending tests were carried out with test samples measuring 2 to 3 mm in

thickness (bending values converted to 1 mm thickness).

⁵⁾ Instrument measurement of bending angle during bend test pursuant to VDA 238-100.

The indicated bending values were converted to 1 mm thickness based on the formula ($\alpha_{1mm} = \alpha \times \text{thickness}^{0.35}$).

voestalpine one step ahead.

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Available dimensions

Steel grade	Thickness range [mm]	Width range [mm]
phs-uncoated 1500 CR	0.7 - 3.0	900 – 1600
phs-uncoated 1500 HR ¹⁾	2.0 - 6.0	900 - 1700
phs-uncoated 2000 CR ²⁾	1.0 - 3.0	900 - 1550
phs-uncoated 2000 HR ^{1) 2)}	2.0 - 6.0	900 - 1580

¹⁾ Inhomogeneous scale may develop on hot-rolled steel strip (HR) in thicknesses ranging between 2.0 and 2.5 mm (limited surface quality). ²⁾ Indication of preliminary values

The available combinations of widths and thicknesses vary depending on the steel grade. Additional dimensions upon request.



Premium quality with reduced carbon footprint

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greentec steel

 Hot-rolled steel strip - greentec steel Edition

 Max. carbon footprint 2.10 kg CO2e per kg of steel 10

 Cold-rolled steel strip - greentec steel Edition

 Max. carbon footprint 2.15 kg CO2e per kg of steel 10

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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