



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.

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

phs-uncoated
greentec steel

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⁾	C	Si max.	Mn	P max.	S max.	Al	Cr max.	Ti + Nb max.	B	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 ²⁾ phs-uncoated 2000 HR 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: Tensile test

Testing transverse to rolling direction

Steel grade ^{1) 3)}	0.2 % yield strength R _{p0.2} [MPa]	Tensile strength R _m [MPa]	Total elongation A ₈₀ for t < 3 mm [%] min.	Total elongation A ₅ 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

Typical mechanical properties after hot forming and hardening

Testing transverse to rolling direction

Steel grade	Typ. 0.2 % yield strength ⁴⁾ R _{p0.2} [MPa]	Typ. tensile strength ⁴⁾ R _m [MPa]	Typ. total elongation ⁴⁾ A ₅₀ for t < 3 mm [%]	Typ. total elongation ⁴⁾ A ₅ for t ≥ 3 mm [%]	Typ. bending angle ^{4) 5)} α _{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

Typical mechanical properties after hot forming, hardening and cathodic dip coating

Testing transverse to rolling direction

Stahlsorte	Typ. 0.2 % yield strength ⁴⁾ R _{p0.2} [MPa]	Typ. tensile strength ⁴⁾ R _m [MPa]	Typ. total elongation ⁴⁾ A ₅₀ for t < 3 mm [%]	Typ. total elongation ⁴⁾ A ₅ for t ≥ 3 mm [%]	Typ. 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 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.

» Conditions during hot forming: Furnace temperature of 910 °C, holding time of at least of 45 seconds after the blank reaches a temperature of 870 °C, cooling rate > 40 K/s to roughly 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 (α_{1mm} = α × thickness^{0.35}).

Available dimensions

Maximum width [mm] per thickness, minimum width of 900 mm for wide strip

Steel grade	Thickness [mm]							
	0.7	1.0	1.4	2.0 ¹⁾	2.5 ¹⁾	3.0	3.5	3.7 – 8.0
phs-uncoated 1500 CR	1600	1600	1600	1600	1600	1600	-	-
phs-uncoated 1500 HR ¹⁾	-	-	-	1100	1250	1400	1550	1620
phs-uncoated 2000 CR ²⁾	-	1550	1550	1550	1550	1550	-	-
phs-uncoated 2000 HR ^{1) 2)}	-	-	-	1100	1250	1400	1550	1620

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

Values apply to untrimmed wide strip. Maximum widths are reduced by 20 mm in the event of trimmed edges. Additional dimensions upon request.



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⁾

Cold-rolled steel strip – greentec steel Edition

Max. carbon footprint 2.15 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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