



phs-ultraform®

Galvanized hot forming steels for the production of press-hardened components using the indirect process

An innovation of voestalpine, phs-ultraform® combines the advantages of press-hardened components with the high-quality corrosion resistance of hot-dip galvanized steel strip.

phs-ultraform® allows lightweight design in a higher dimension with regard to freedom of design, dimensional accuracy and process security and is the future-oriented solution for safety-relevant components that are subject to heavy corrosion.

phs-ultraform® sets standards in the achievement of light-weight design and is therefore highly relevant to electromobility applications.

Typical applications

- » Roof frame
- » Bumpers
- » A and B pillars
- » Hinge reinforcements
- » Rocker panels
- » Cross members
- » Side members

Convincing advantages

- » Complex and large components possible, even as tailored-property parts
- » Excellent cathodic corrosion protection
- » Minimum tool wear, even with high unit numbers
- » Best crash behavior
- » High dimensional accuracy and uniform strength distribution
- » Very good joinability (spot welding, adhesive bonding)



Premium quality
with reduced carbon footprint

phs-ultraform®
greentec steel

In indirect processing, blanks made of phs-ultraform® (including laser-welded blanks made of various steel grades and thickness combinations) are formed using conventional cold-forming technologies and are cut to final geometry. The material is subsequently form-hardened in hot condition. This adjusts the mechanical properties and finalizes the component geometries. 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 max.	P max.	S max.	Al	Cr max.	Ti + Nb	B
phs-ultraform 490	≤ 0.11	0.5	1.4	0.03	0.025	≥ 0.015	-	≤ 0.1	-
phs-ultraform 1500	0.20 – 0.25	0.5	1.5	0.02	0.005	0.02 – 0.08	0.5	≤ 0.05	0.002 – 0.005

Mechanical properties in as-delivered condition

Testing transverse to rolling direction

Steel grade ¹⁾	0.2 %-Yield strength $R_{p0.2}$ [MPa]	Tensile strength R_m [MPa]	Total elongation A_{80} [%] min.
phs-ultraform 490	280 – 450	380 – 540	21
phs-ultraform 1500	350 – 480	500 – 700	18

Mechanical properties after hot forming and hardening (typical values)

Testing transverse to rolling direction

Steel grade	0.2 %-Yield strength ²⁾ $R_{p0.2}$ [MPa]	Tensile strength ²⁾ R_m [MPa]	Total elongation ³⁾ A_{50} Steel grade [%]	Bending angle ^{2) 3)} α_{1mm} [°]
phs-ultraform 490	400	490	16	130
phs-ultraform 1500	1050	1500	6	75

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

Testing transverse to rolling direction

Steel grade	0.2 %-Yield strength ²⁾ $R_{p0.2}$ [MPa]	Tensile strength ²⁾ R_m [MPa]	Total elongation ²⁾ A_{50} Steel grade [%]	Bending angle ^{2) 3)} α_{1mm} [°]
phs-ultraform 490	400	490	16	130
phs-ultraform 1500	1150	1500	6	75

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

²⁾ Mechanical parameters in hardened condition are standard values achieved in 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
 » Transfer time approximately 10 s (transfer time = time between furnace and complete pressure buildup in the press)
 » Cooling conditions: Cooling rate > 40 K/s and up to approximately 200 °C 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

³⁾ Instrument measurement of bending angle during bend test pursuant to VDA 238-100, calculated as $\alpha_{1mm} = \alpha \times \text{thickness}^{0.35}$

Coating in as-delivered condition

Coating class pursuant ¹⁾ to VDA 239-500	Coating per side [g/m ²]	Coating thickness informative [μm]	Fe content in coating [Mass-%]	Al content in coating [Mass-%] max.
GI60/60	60 – 90	8.5 – 13	1.0	1.0

¹⁾ Additional coating layers upon request

Coating after hot forming (typical values)

Coating class pursuant	Coating thickness [μm]	Al content in coating [Mass-%]
GI60/60	20	60

Available dimensions

Steel grade	Thickness range [mm]	Width range [mm]
phs-ultraform 490	0.5 – 2.5	900 – 1720
phs-ultraform 1500	0.7 – 2.45	900 – 1635

Available combinations of widths and thicknesses vary depending on the steel grade.
Additional coating layers upon request



Premium quality with reduced carbon footprint

phs-ultraform®
greentec steel

Hot-dip galvanized steel strip – greentec steel Edition

Maximum carbon footprint: 2.30 kg CO₂e/kg steel ¹⁾

¹⁾ pursuant to EN 15804+A2 (EPD methodology), “cradle to gate”

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

The information and product properties contained in this printed material are non-binding and serve the sole purpose of technical orientation. They do not replace individual advisory services provided by our sales and customer service teams. The product information and characteristics set forth herein shall not be considered as guaranteed properties unless explicitly stipulated in a separate contractual agreement. For this reason, voestalpine shall not grant any warranty nor be held liable for properties and/or specifications other than those subject to explicit agreement. This also applies to the suitability and applicability of products for certain applications as well as to the further processing of materials into final products. (All application risks and suitability risks shall be borne by the customer.) The General Terms of Sale for Goods and Services of the voestalpine Steel Division shall apply to all materials supplied by the voestalpine Steel Division and can be accessed using the following link:
www.voestalpine.com/stahl/en/The-Steel-Division/General-Terms-of-Sale

Technical changes reserved. Errors and misprints excepted. No part of this publication may be reprinted without explicit written permission by voestalpine Stahl GmbH.

Please find further information and
downloads under the following link:
www.voestalpine.com/phs-ultraform/en



voestalpine Stahl GmbH
voestalpine-Straße 3
4020 Linz, Austria
productmanagement@voestalpine.com
www.voestalpine.com/stahl/en

voestalpine
ONE STEP AHEAD.