

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 the 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:

- » Workability in the direct and indirect hot forming process
- » Best crash behavior
- » Very good joining behavior
- » Tailored-property parts possible

Chemical composition:

Heat analysis in mass %

| Steel grade | C | Si max. | Mn max. | P max. | S max. | Al | Cr max. | Ti + Nb max. | B |
|--------------------------------|-------------|---------|---------|--------|--------|-------------|---------|--------------|---------------|
| phs1500 uncoated | 0.20 – 0.25 | 0.5 | 2.0 | 0.02 | 0.005 | 0.02 – 0.10 | 0.5 | 0.05 | 0.002 – 0.005 |
| phs2000 uncoated ¹⁾ | 0.30 – 0.38 | 0.5 | 2.0 | 0.02 | 0.005 | 0.02 – 0.10 | 0.5 | 0.10 | 0.002 – 0.005 |

¹⁾ Steel grade being developed, indication of preliminary values

Mechanical properties:

Test direction: transverse to rolling direction

TENSILE TEST IN NON-HARDENED DELIVERY CONDITION

| Steel grade | 0.2 % yield strength R _{p0.2} [MPa] | Tensile strength R _m [MPa] | Total elongation A ₈₀ [%] min. |
|--------------------------------|----------------------------------------------------|---------------------------------------------|-------------------------------------------------|
| phs1500 uncoated | 320 – 480 | 480 – 600 | ≥ 18 |
| phs2000 uncoated ¹⁾ | 320 – 500 | 500 – 650 | ≥ 17 |

¹⁾ Steel grade being developed, indication of preliminary values

TENSILE AND BENDING TESTS IN HARDENED CONDITION

| Steel grade | 0.2 % yield strength ¹⁾ R _{p0.2} [MPa] | Tensile strength ¹⁾ R _m [MPa] | Total elongation ¹⁾ A ₈₀ [%] min. | Bending angle ¹⁾²⁾ α _{1mm} [°] min. |
|--------------------------------|------------------------------------------------------------------|-----------------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------|
| phs1500 uncoated | 950 – 1250 | 1350 – 1600 | ≥ 5 | ≥ 55 |
| phs2000 uncoated ¹⁾ | ≥ 1100 | ≥ 1800 | ≥ 5 | ≥ 40 |

¹⁾ 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: between 3 and 7 seconds (transfer time = time between furnace and complete pressure buildup in the press)

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

» Temperature at which blanks are removed: < 200 °C

²⁾ Instrument measurement of bending angle during bend test according to VDA 238-100, α_{1mm} = α x thickness^{0.35}

¹⁾ Steel grade being developed, indication of preliminary values

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 | 3.0 |
| phs1500 uncoated | 1600 | 1600 | 1600 | 1600 | 1600 |
| phs2000 uncoated ¹⁾ | - | 1550 | 1550 | 1550 | 1550 |

¹⁾ Steel grade being developed, indication of preliminary values

Additional dimensions upon request.

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