

# P265GH

Material no. 1.0425 · Unalloyed pressure-vessel steel

**Material group:** Unalloyed pressure-vessel steel

**Material no. (EN):** 1.0425

**EN designation:** P265GH

**Former DIN designation:** St 45.8 · H II

**ASTM / ASME equivalent:** Pipes: A/SA 106 Gr. B · Fittings: A/SA 234 WPB · Flanges: A/SA 105

**Service temperature:** -10 °C to +400 °C (continuous service)

**Standards (pipes):** EN 10216-2 (seamless) · EN 10217-2 (welded)

**Standards (fittings):** EN 10253-2 · ASME B16.9

**Forms (Nirotec):** Elbows · tees · reducers · caps · flanges · custom parts

## 1 Material Equivalents & Comparable Grades

### National equivalents

Standard / region	Designation	Material no. / Grade	Remark
EN	P265GH	1.0425	Current European designation
DIN (old)	St 45.8 / H II	1.0425	Predecessor designation
ASTM/ASME	A/SA 106 Grade B	–	Seamless pipes
ASTM/ASME	A/SA 234 WPB	–	Buttweld fittings
ASTM/ASME	A/SA 105	–	Flanges, forgings
BS (UK)	430	1.0425	Approximation

### Alternative materials

Material	Material no.	Reference / use	Note
P235GH	1.0345	Lower strength, lower cost	General pressure piping
P355GH	1.0473	Significantly higher strength	Heavy-wall components
16Mo3	1.5415	Creep resistant up to 530 °C	Elevated-temperature service
P265NL2	1.1116	Low-temperature toughness to -50 °C	Cryogenic / cold-service applications

## 2 Chemical Composition

Composition in mass percent (%). Standard: EN 10216-2 / EN 10028-2. Simple unalloyed steel – residual elements are restricted to low contents. P265GH offers higher strength than P235GH at almost identical processability.

Element	Symbol	Min. (heat)	Max. (heat)	Max. (product)	Function / remark
Carbon	C	–	0.20	0.22	Strength, weldability
Silicon	Si	–	0.40	0.45	Deoxidation
Manganese	Mn	0.80	1.40	1.50	Strength, toughness
Phosphorus	P	–	0.025	0.030	Impurity – limit
Sulfur	S	–	0.010	0.012	Impurity – limit
Aluminium (tot.)	Al	0.020	–	–	Grain refining, min. 0.020 %
Chromium	Cr	–	0.30	0.35	Residual
Copper	Cu	–	0.30	0.35	Residual
Molybdenum	Mo	–	0.08	0.10	Residual
Nickel	Ni	–	0.30	0.35	Residual
Nitrogen	N	–	0.012	0.014	Residual
Titanium	Ti	–	0.03	0.04	Residual
Vanadium	V	–	0.02	0.025	Residual

## 3 Mechanical Properties

### Room temperature – minimum requirements (normalised)

Values apply to wall thicknesses  $t \leq 16$  mm (normalising).

Property	Symbol	Unit	Minimum value	Remark
Yield strength 0.2 %	Rp0.2	MPa	$\geq 265$	$t \leq 16$ mm
Yield strength 0.2 %	Rp0.2	MPa	$\geq 255$	$16 < t \leq 40$ mm
Tensile strength	Rm	MPa	410 – 530	–
Elongation at fracture	A	%	$\geq 23$	Longitudinal specimens
Impact energy (0 °C)	KV	J	$\geq 27$	Mean value
Hardness	HB	–	$\leq 197$	Reference value

### Hot yield strength Rp0.2 in MPa (typical values per standard)

Temperature	100 °C	150 °C	200 °C	250 °C	300 °C	400 °C
Rp0.2 (MPa)	220	205	193	180	168	153

## 4 Physical Properties

Property	Symbol	20 °C	200 °C	400 °C	Unit
Density	$\rho$	7.85	7.76	7.65	g/cm <sup>3</sup>
Modulus of elasticity	E	210	196	180	GPa
Thermal conductivity	$\lambda$	52	49	44	W/(m·K)
Coeff. thermal expansion	$\alpha$	11.5	12.3	13.0	10 <sup>-6</sup> /K
Specific heat capacity	cp	470	504	530	J/(kg·K)

## 5 Corrosion Resistance

Medium / environment	Remark	Resistance
High-pressure steam (treated)	Standard application up to 400 °C	++
Hot water (treated, pH-neutral)	Boiler water, feed water	++
Technical gases (dry)	Dry compressed air, N <sub>2</sub> , CO <sub>2</sub>	+
Hydrocarbons (dry)	Non-corrosive process streams	+
Atmosphere / humid air	Surface rust possible	o
Condensate / moisture	Corrosion protection recommended	o
Acids of any kind	No resistance	-
Chloride-bearing media	Corrosion risk	-
Seawater	Strongly corrosive	-

++ excellent resistance
+ good resistance
o limited resistance
- not resistant

*P265GH is an unalloyed carbon steel without corrosion-resistant alloying. For corrosive media, stainless or higher-alloy grades are required.*

## 6 Typical Applications

Industry / plant	Typical application	Operating condition
Power plants / energy	Steam piping, feedwater piping (medium-pressure range)	Up to 400 °C, medium pressure
General industrial plants	Pressure piping for non-corrosive media	Standard application

Industry / plant	Typical application	Operating condition
Pressure vessel construction	Shells, nozzles, connection piping	Pressure vessels per AD 2000 / ASME
Water supply / district heat	Hot-water and high-temperature water piping	Treated pH-neutral water
Process plants	Heat exchanger components, piping	Higher loads than P235GH

## 7 Forms Available at Nirotec

Component	Standard (EN)	Standard (ASME/ASTM)	Remark
Elbows	EN 10253-2	ASME B16.9 · A/SA 234 WPB	LR/SR, 90°/45°, custom angles on request
Tees	EN 10253-2	ASME B16.9 · A/SA 234 WPB	Equal and reducing branch
Reducers	EN 10253-2	ASME B16.9 · A/SA 234 WPB	Concentric and eccentric
Caps	EN 10253-2	ASME B16.9 · A/SA 234 WPB	Hemispherical caps
Weld neck flanges	EN 1092-1 Type 11	ASME B16.5 · A/SA 105	PN 10 – PN 250 / Class 150 – 900
Custom parts	Per drawing	Per drawing	Special-form components on request

## 8 Standards, Approvals & Codes

Standard / code	Title / application
EN 10216-2	Seamless steel tubes for pressure purposes – unalloyed steels, high-temperature properties
EN 10217-2	Welded steel tubes for pressure purposes
EN 10028-2	Flat products of pressure-vessel steels
EN 10253-2	Butt-welding pipe fittings – unalloyed and ferritic alloy steels
EN 1092-1	Flanges and their joints
AD 2000-Merkblatt W2	Steel tubes
PED 2014/68/EU	Pressure Equipment Directive
ASME B31.1 / B31.3	Power / process piping

## 9 Processing Notes

### Weldability

Parameter	Specification / recommendation	Remark
Preheat	Not required (< 25 mm wall thickness)	For larger wall thicknesses preheat to 100–150 °C
Post-weld heat treatment	Stress-relief anneal 550–620 °C (recommended)	For pressure-bearing components per AD 2000
Filler metal	S2 / S3 (EN ISO 14341)	Unalloyed filler, strength match
Welding processes	GTAW (TIG), GMAW/MAG, SMAW	All standard processes suitable

- Delivery condition: normalised (N) or normalising + tempering
- Surface protection: corrosion-protection oil or coating recommended for storage and transport
- Identification per EN 10216-2: heat no., 1.0425, standard, dimensions

## 10 Inquiry & Contact

For a project-specific inquiry we ideally require:

- Standard and type (e.g. elbow LR 90° per EN 10253 or ASME B16.9)
- Dimensions: DN / NPS, wall thickness or schedule
- Quantity and required delivery date
- Required documentation (EN 10204 type 3.1 / 3.2, NDT, external inspection)
- Project-specific specification or special requirements

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