13CrMo4-5

Mat. No. 1.7335 · 1¼Cr–½Mo creep-resistant steel (P11)

Mat. No.: 1.7335

EN designation: 13CrMo4-5

ASTM/ASME equiv.: Pipes: A/SA 335 P11 · Fittings: A/SA 234 WP11 · Flanges: A/SA 182 F11

Temperature range: Up to +570 °C (creep-resistant)

Standard: EN 10216-2 · EN 10253-2

Delivery forms: Elbows · Tees · Reducers · Caps · Flanges · Pipes

1 Material Equivalents & Comparable Grades

International Equivalents

Standard / Region	Designation	Mat. No. / Grade	Note
EN	13CrMo4-5	1.7335	1¼Cr–½Mo steel
ASTM	A/SA 335 P11	–	Pipes – global standard
ASTM	A/SA 234 WP11	–	Fittings
ASTM	A/SA 182 F11	–	Flanges

Alternative Materials

Material	Mat. No.	Relation to 13CrMo4-5	When to use
16Mo3	1.5415	Lower alloy	For service up to 530 °C only
10CrMo9-10 (P22)	1.7380	Higher CrMo	For temperatures above 570 °C
P91	1.4903	9Cr-Mo-V	For temperatures up to 650 °C

2 Chemical Composition

Values in mass percent (%). Standard: EN 10216-2.

1.25Cr–0.5Mo. Excellent creep resistance up to 570 °C. Step 2 in the CrMo hierarchy.

Element	Sym.	Min. (Heat)	Max. (Heat)	Max. (Prod.)	Function
Carbon	C	0.08	0.150	0.180	Moderate for weldability
Silicon	Si	–	0.350	0.400	Deoxidation

Manganese	Mn	0.40	0.700	0.800	Strength
Chromium	Cr	0.70	1.150	1.250	Creep and oxidation resistance
Molybdenum	Mo	0.40	0.600	0.650	Key element: creep resistance

3 Mechanical Properties

Room Temperature – Minimum Requirements

Normalised + Tempered. Delivery condition mandatory for P11.

Property	Sym.	Unit	Min. Value	Note
Yield strength	Rp0.2	MPa	≥ 290	t ≤ 16 mm
Tensile strength	Rm	MPa	440–640	–
Elongation	A	%	≥ 22	–
Impact energy (0 °C)	KV	J	≥ 40	–

Elevated Temperature Yield Strength Rp0.2 in MPa (indicative values)

Temp.	200 °C	300 °C	400 °C	500 °C	570 °C
Rp0.2 (MPa)	256	228	202	176	150

4 Physical Properties

Property	Sym.	20 °C	200 °C	400 °C	Unit
Density	ρ	7.84	7.74	7.63	g/cm³
Modulus of elasticity	E	212	198	182	GPa
Thermal conductivity	λ	37	36	34	W/(m·K)
Thermal expansion	α	11.5	12.3	13.0	10^{-6}/K

5 Corrosion Behaviour

Medium / Environment	Notes	Rating
Steam / hot water (up to 570 °C)	Standard high-temp. service	+
Hydrocarbons (dry)	H_2 service per Nelson curve	+
H_2 service	Nelson curve check required	o
Acids / chlorides	Not suitable	–

++ excellent	+ good	o limited	– not suitable

13CrMo4-5/P11: primarily used for creep resistance. Nelson curve compliance check required for H_2 service.

6 Typical Applications

Industry / Plant	Typical Application	Operating Conditions
Power plants	Main steam, reheat, superheater piping	Up to 570 °C
Refineries	High-temperature process lines	Nelson curve verification
Petrochemical	Hot process piping	Non-corrosive media

7 Delivery Forms at Nirotec

Component	Standard (EN)	Standard (ASME/ASTM)	Note
Elbows	EN 10253-2	ASME B16.9 · A/SA 234 WP11	LR/SR, 90°/45°
Tees	EN 10253-2	ASME B16.9 · A/SA 234 WP11	Equal and reducing
Reducers	EN 10253-2	ASME B16.9 · A/SA 234 WP11	Concentric and eccentric
Caps	EN 10253-2	ASME B16.9 · A/SA 234 WP11	Ellipsoidal
Flanges	EN 1092-1 Type 11	ASME B16.5 · A/SA 182 F11	PN 16–400
Pipes	EN 10216-2	A/SA 335 P11	Seamless

8 Standards, Approvals & Codes

Standard / Code	Title / Application
EN 10216-2	Seamless steel tubes – elevated temperature
EN 10253-2	Butt-welding fittings
AD 2000-W2	Creep-range steel
PED 2014/68/EU	Pressure Equipment Directive
ASME B31.1	Power Piping

9 Fabrication Notes

Weldability

Parameter	Requirement / Recommendation	Note
Preheat	200–250 °C mandatory	Prevents hydrogen cracking

Interpass temp.	Max. 300 °C	Strict control
PWHT	Mandatory: 720–760 °C, min. 1 h	Tempers martensite
Filler	ER90S-B3 / E9018-B3	1¼Cr-½Mo type
Process	GTAW, SMAW	Low-hydrogen mandatory

- Delivery condition: N+T
- PWHT mandatory
- Bake-out at 300–350 °C if PWHT is delayed

10 Enquiry & Contact

For a project-specific quotation, please provide:

- Standard and execution (e.g. LR 90° elbow per EN 10253-4)
- Dimensions: DN / NPS and wall thickness or schedule
- Quantity and requested delivery date
- Documentation: EN 10204 Type 3.1 / 3.2, NDT, third-party inspection
- Any project-specific specifications or special requirements

Nirotec GmbH & Co. KG
Otto-Hahn-Str. 4 · 59423 Unna · Germany
Tel.: +49 (0) 02303 / 985-0 · info@nirotec.de · www.nirotec.de