Gas Properties Calculator — Report

Calculation summary | PlantCalcKit v1.0

DOCUMENT

Plant / project	**Example Plant**
Equipment tag / system	**Gas data sheet**
Calculation / document no.	**CALC-GP-001**
Revision	**0**
Prepared by	**Your name**
Checked by	**—**
Date	**28-Oct-2026**
Calculation basis	Gas: Methane (CH4) · Methods: Peng–Robinson EOS (kij = 0), ideal-gas cp polynomials, Wilke / Mason–Saxena with Chung dense-gas factors, heating values from enthalpies of formation
Status	✓ **Inputs OK** · ℹ️ **2 default value(s) in use: table: start temperature, table: end temperature**

KEY INPUTS

Input	Unit	Value used
Temperature	°C	25.00
Pressure (absolute or gauge – pick the unit)	bar a	1.0133
Table: start temperature	°C	0.0
Table: end temperature	°C	400.0

COMPOSITION

Component	Mole %	Mass %
Methane (pure)	100.000	100.000

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RESULTS

Property	Unit	Value
State at these conditions	—	the critical temperature)
Boiling (saturation) temperature at the pressure	°C	-161.48
Molar mass	g/mol	16.042
Compressibility factor Z	—	0.99775
Density	kg/m³	0.6572
Specific volume	m³/kg	1.52161
Density at normal conditions (0 °C, 1.01325 bar)	kg/m³	0.7179
Density at standard conditions (15 °C, 1.01325 bar)	kg/m³	0.6802
Relative density to air (ideal gas)	—	0.5539
Specific heat cp (real gas)	kJ/kg·K	2.23269
Specific heat cv (real gas)	kJ/kg·K	1.70903
Ideal-gas specific heat cp°	kJ/kg·K	2.22658
Ratio of specific heats γ = cp/cv (real gas)	—	1.30641
Isentropic exponent (real gas)	—	1.30348
Speed of sound	m/s	448.29
Joule–Thomson coefficient	K/bar	0.50685
Dynamic viscosity	µPa·s	11.1941
Kinematic viscosity	cSt	17.03314
Thermal conductivity	W/m·K	0.034348
Prandtl number	—	0.7276
Specific enthalpy (relative to ideal gas at 25 °C)	kJ/kg	-1.146
Residual (real-gas) enthalpy H − H°	kJ/kg	-1.146
Specific entropy (relative to ideal gas at 25 °C, 1.01325 bar)	kJ/kg·K	-0.00268
Higher heating value (gross) — per mass	MJ/kg	55.517
Lower heating value (net) — per mass	MJ/kg	50.031
HHV per normal m³ (0 °C, 1.01325 bar, real gas)	MJ/Nm³	39.854
LHV per normal m³ (0 °C, 1.01325 bar, real gas)	MJ/Nm³	35.916
HHV per standard cubic foot (60 °F, 14.73 psia)	BTU/scf	1013.89
HHV per mole	kJ/mol	890.64
Wobbe index (HHV / √relative density)	MJ/Nm³	53.552
Stoichiometric air (by mass)	kg air/kg	17.240
Stoichiometric air (by volume, ideal gas)	m³ air/m³	9.548
Lower flammable limit in air (LFL / LEL)	vol %	4.40
Upper flammable limit in air (UFL / UEL)	vol %	17.00
Autoignition temperature	°C	538

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GHS flammability category (derived from the data above)	—	lammable gas, Category 1
NFPA 704 rating	—	· Instability 0 · Special SA
GHS hazard statements	—	ed — see the supplier SDS
Occupational exposure limit, 8-h TWA	—	1000 ppm
Critical temperature (mixture: pseudo-critical, Kay)	°C	-82.59
Critical pressure (mixture: pseudo-critical, Kay)	bar a	45.992
Critical volume	cm³/mol	98.6
Acentric factor ω (mixture: mole average)	—	0.0114
Normal boiling point (1.01325 bar)	°C	-161.48
Melting / freezing point	°C	-182.49
Dipole moment	debye	0.000
Enthalpy of formation, ideal gas, 25 °C	kJ/mol	-74.53
Reduced temperature T/Tc	—	1.5646
Reduced pressure P/Pc	—	0.0220

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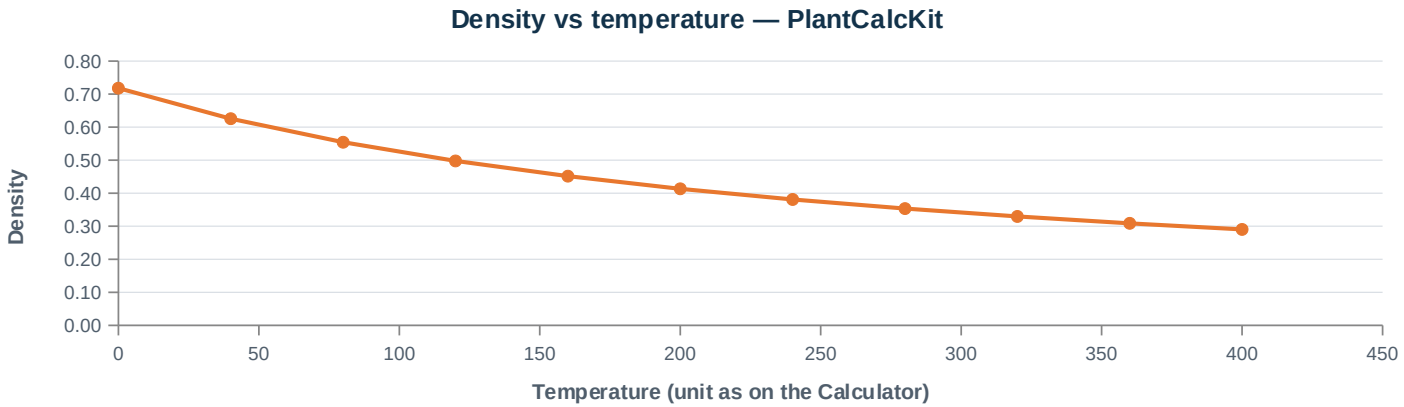
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PROPERTY TABLE

Temperature	Z	Density	cp	γ	Viscosity	Conductivity	Enthalpy
°C	—	kg/m³	kJ/kg·K	—	µPa·s	W/m·K	kJ/kg
0.0	0.99702	0.7179	2.1807	1.3170	10.389	0.03092	-56.29
40.0	0.99810	0.6255	2.2690	1.2996	11.665	0.03648	32.61
80.0	0.99877	0.5543	2.3812	1.2807	12.881	0.04241	125.55
120.0	0.99921	0.4977	2.5107	1.2619	14.046	0.04877	223.34
160.0	0.99951	0.4516	2.6518	1.2442	15.168	0.05557	326.56
200.0	0.99971	0.4133	2.7997	1.2282	16.253	0.06286	435.57
240.0	0.99986	0.3810	2.9504	1.2138	17.306	0.07066	550.57
280.0	0.99996	0.3534	3.1008	1.2013	18.332	0.07901	671.60
320.0	1.00004	0.3296	3.2485	1.1903	19.334	0.08795	798.60
360.0	1.00010	0.3087	3.3921	1.1807	20.314	0.09749	931.42
400.0	1.00014	0.2904	3.5307	1.1723	21.276	0.10769	1069.89

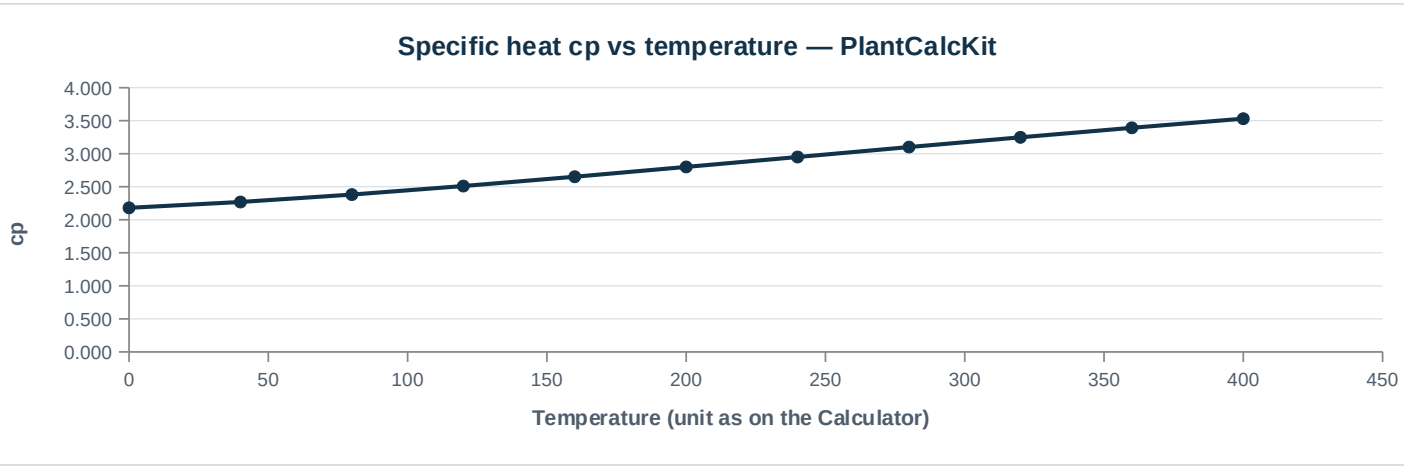
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CHARTS



Observations — density

[Write your observations here]



Observations — specific heat

[Write your observations here]

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