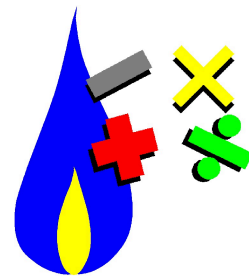# GASCalc™

Description

GASCalc™ is a Windows-based suite of calculation tools for the natural gas professional. Routines are provided for calculating numerous parameters associated with the design and operation of natural gas gathering, transmission, distribution, plant, or fuel piping systems. Its robust set of calculation routines and features include...

GASCalc Calculations & Features		
GAS PROPERTY VALUES		
Physical Properties	Calculates various physical properties, including heating value, specific gravity (ideal or real), specific heat ratio, and viscosity for a specified gas composition.	Supported Heating Value Methods: AGA 8 -1992 GPA 2172 - 1986 GPA 2172 - 2009 GPSA - 1998
Thermodynamic Properties	Calculates various thermodynamic property values, including enthalpy, entropy, constant pressure, and volume-specific heat values for a specified gas composition at specified pressure and temperature conditions.	Supported Heating Value Methods: AGA 10 - 2003
Compressibility Factor	Calculates compressibility, density, and supercompressibility of a gas composition at specified pressure and temperature conditions. Automatically or individually calculated.	Supported Methods: AGA 8 - 1992 AGA 8 - 2017 (GERG 2008) AGA NX19 GERG - 1988 GPA 2145 - 2009 GPSA ISO 6979 - 2016
Sonic Velocity	Calculates the speed of sound value for User-specified pressure and temperature conditions and gas composition.	Supported Methods: AGA 10 - 2003 GPSA
Hydrate Formation	Calculates the pressure or temperature associated with hydrate formation in a User-specified gas composition.	
Interchangeability	Calculates various interchangeability indices for different gas compositions.	Supported Methods: AGA Bulletin 36
Pressure, Volume, Temperature (P, V, T)	Calculates associated pressure, temperature, and volume values for specified conditions.	
Atmospheric Pressure	Calculates the atmospheric pressure for a given elevation or an elevation based on pressure value. Automatically or individually calculated.	Supported Methods: AGA Measurement ASHRAE - 2009 Handbook Of Chemistry & Physics ISHM NOAA - 1976
Average Pressure	Calculates the average pressure in a pipe segment or pair of values.	Supported Methods: Hydraulic Linear

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GASCalc Calculations & Features		
Average Temperature	Calculates the average temperature in a pipe segment or pair of values.	
METER VALUES		
Fixed Pressure Measurement Factor	Calculates the required adjustment factor for gas measured using a fixed pressure factor.	
Standard Volume	Calculates the equivalent standard (base) volume for a volume measured at non-standard conditions.	
Base Conditions Conversion	Converts a volume at one set of standard (base) conditions to the equivalent volume at another set of standard (base) conditions.	
Volume Comparison	Calculates the difference in volumes at different standard (base) conditions. Useful for calculating "lost and unaccounted for" values.	
Orifice Meter	Calculates values associated with measurement by an orifice meter. Includes calculation of orifice diameter, pressure differential, and flow values.	Supported Methods: AGA 3 - 1985 AGA 3 - 1992 AGA 3 - 2013 ISO 5167
Diaphragm Meter	Calculates values associated with the sizing of the diaphragm displacement meters.	Supported Methods: GRI/SWRI Rockwell Sprague
Rotary Meter	Calculates values associated with the sizing of the rotary meters.	
Ultrasonic Meter	Calculates values associated with the sizing of the ultrasonic meters.	
Turbine Meter	Calculates values associated with the sizing of the turbine meters.	
Cone Meter	Calculates values associated with measurement by a v-cone meter.	Supported Methods: McCrometer
Pulse Output Meter	Calculates values associated with measurement by a pulse output meter.	Supported Methods: AGA 7
Meter MatchMaker	Finds appropriate meters based on specified sizing criteria.	
Flow Limiting Device	Calculates values associated with sizing flow limiting orifices and nozzles.	Supported Methods: AGA 7

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GASCalc Calculations & Features		
PIPE VALUES		

Pipe Flow	Calculates various values associated with flow through a single or series of pipe segments. Allows calculation of diameter, length, flow rate, roughness, pressure drop, and downstream temperature. Allows fittings to be attached.	Supported Equations:
		  AGA partially and fully turbulent
		  Colebrook - White
		  Cox
		  Darcy-Weisbach
		  IAPMO high and low pressure
		  IFGC high and low pressure
		  IGE3 low, medium, general
		  IGT-Improved
		  IMC high and low pressure
		  Mueller high and low pressure
		  Oliphant
		  OmegaFlex Tracpipe - CSST
		  Panhandle A and B
		  Pole low pressure
		  Renouard
		  Spitzglass high and low pressure
		  Weymouth

Service Line Sizing	Calculates various values associated with flow through a service line - from the main tap to the termination riser. Allows fittings to be attached and inclusion of EFV. Calculates various EFV values, including maximum protected length and reset time.	Supported EFVs:
		  Dresser
		  Elster Perfection
		  Lyall
		  UMAC

Blowdown Time	Calculates the estimated time required to vent a line to the atmosphere.	
Pipe Volume	Calculates the volume of gas contained in a single or series of pipe segments at specified beginning and ending conditions.	
Pipe Fill Time	Calculates various values associated with filling a single or series of pipe segments at specified beginning and ending conditions.	
Pipe Vent Time	Calculates various values associated with venting a single or series of pipe segments at specified beginning and ending conditions.	
Pipe Purging & Clearing	Calculates various values associated with purging and/or clearing a pipe segment.	

Steel Pipe Design Formula	Calculates design values for steel pipe segments.	Supported Methods:
		  ASME B31.8
		  CSA Z662-11
		  US DOT 192

Plastic Pipe Design Formula	Calculates design values for plastic pipe segments.	Supported Methods:
		  API 15LE
		  ASME B31.8
		  CSA Z662-11
		  PPI
		  US DOT 192

Maximum (Allowable) Operating Pressure (MAOP/MOP)	Calculates the MAOP value for a pipe segment based on User-specified values and conditions.	Supported Methods:
		  ASME B31.8
		  CSA Z662-11
		  US DOT 192

Bending Stress - Span	Calculates values associated with a pipe span. Supports pinned and fixed end conditions.	

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GASCalc Calculations & Features

Hoop Stress	Calculates hoop stress and SMYS comparison for User-specified conditions.	Supported Methods: API 1102 Traditional (Barlow)
External Loading	Calculates stress values associated with roadway, railway, and unclassified crossings.	Supported Methods: API 1102 ANSI GPTC Z380.1 PPI
Thermal Expansion	Calculates stress and change in length values associated with the temperature change of a pipe segment.	
Total Pipe Stress	Calculates the total combined stress for a pipe segment.	Supported Methods: ASME B31.8
Pipe Lowering	Calculates stress due to lowering of the in-service pipe segment.	Supported Methods: API 1117
Buoyancy	Calculates buoyancy and weight requirements for wet environment crossings.	
Pipe Permeation	Calculates the volume of gas lost through permeation through a pipe wall.	
Pipe Hydraulic Diameter	Calculates the hydraulic diameter of plastic pipe based on dimensional values and tolerances.	Supported Methods: Generic PPI
Pipe Flow Area	Calculates the flow area of a pipe or opening based on User-specified conditions.	

VALVES & FITTINGS

Regulator Values	Calculates sizing values associated with flow through a regulator.	Supported Equations: American Meter American Meter AFV Donkin Equimeter/Rockwell Fisher Grove 80, 83, 900 ISA - S75.01 Itron Mokveld Mooney Pietro Fiorentini Table Based Values Universal (Original 1964 ver)
Regulator & Monitor System	Calculates sizing, flow, and pressure values associated with flow through a regulator and monitor pressure control station.	
Regulator & Relief Valve System / 2-Stage	Calculates sizing, flow, and pressure values associated with flow through a regulator and relief valve pressure control station. Supports single or two-stage stations.	
Fitting Values	Calculates sizing values associated with flow through a line fitting (elbow, tee, or valve) using equivalent length values.	Supported Equations: Crane 410 Rockwell
Valve Values	Calculates sizing values associated with flow through a line valve.	

GASCalc Calculations & Features		
Relief Valve Values	Calculates sizing values associated with flow through a relief valve.	Supported Equations: American Meter AFV Anderson Greenwood API 520 ASME BPV Equimeter/Rockwell Fisher Grove 80, 83, 900 ISA S75.01 Mooney
Relief Valve & Piping System	Calculates sizing, flow, and pressure values associated with flow through a relief valve system.	
Station MatchMaker	Finds appropriate stations based on specified design and operating conditions.	
Device MatchMaker	Finds appropriate devices based on specified sizing criteria.	
MISCELLANEOUS CALCULATIONS		
Gas Loss From Damage	Estimates the volume of gas lost from a punctured or severed line.	
Compressor Values	Calculates various values associated with flow through a compressor unit.	
Well Flow	Calculates various values associated with flow through a well casing.	
Line Heater	Calculates various values associated with sizing an in-line heater.	
Pipe Tap	Calculates various values associated with flow through a pipe-side wall tap.	
Velocity	Calculates the flow velocity through an opening.	
Reynolds Number	Calculates the Reynolds Number associated with User-specified flow conditions.	
Sacrificial Anodes	Calculates various values associated with specifying and estimating sacrificial anode performance.	
Remaining Strength	Calculates various values associated with the evaluation of a corroded pipe segment.	Supported Methods: ASME B31G - 1991 ASME B31G - 2012
Container Volume	Calculates the volume of various shaped containers.	
UTILITY CALCULATIONS		
Unit Conversions	Calculates dimensional equivalent of User specified value. Supports over 100 different dimensional units.	
Energy Conversions	Calculates energy equivalent of User-specified energy unit. Supports 30 different energy types.	
Value Interpolation	Calculates an intermediate value from a set of specified table values. Automatically or individually calculated.	
Value Extrapolation	Calculates an extended value from a set of specified table values.	

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GASCalc Calculations & Features

SELECTED PROGRAM FEATURES

Dimensional Units - Supports standard US, metric, and diverse unit systems. Includes a wide range of industry-related units.

Applications - Allows external applications to be executed directly from the main menu.

User Interface - Provides intuitive and easy-to-understand, fill-in-the-blank data screens for interacting with the many calculation routines.

Pipe & Device Property Tables - A comprehensive set of tables provides values required by the various pipes, fittings, devices, and equipment calculations.

Property Table Editor - An extensive editor is provided for modifying the Anode, EFV, Fitting, Meter, Pipe, Regulator, Relief Valve, and Valve Property Tables, which support the various calculation routines. The User can add, delete, and modify the models contained in the various Property Tables to meet their individual specific requirements.

Value Selection Tables - An extensive set of tables is provided to assist in the selection of certain required calculation values, such as SMYS, HDB, HDS, MOE, Material Density, and Thermal Expansion Coefficients.

Device Selector - A handy device selection utility is provided to allow efficient selection of meters, regulators, and relief valves by selecting the Manufacturer, Model, Size, Orifice, etc.

Many of the calculation routines are also available through the GASCalc™ Application Program Interface (API). The API allows access to the supported calculation routines by way of programmatic function calls, allowing the User to create and access the calculation routines through their own custom user interface. The API is available at an additional charge.

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Authorised Distributor: COMPUTERS & ENGINEERING, Holzmühler Weg 87- 89, D-35457 Lollar-Germany
Tel: 0049 6406 73667 Fax 0049 6406 4745 Baser@comp-engineering.com   www.comp-engineering.com