Gas Flowmeter Sizing

Variable area flowmeters suitable for liquid service have a capacity rating based on water at 70° Fahrenheit. Flowmeters suitable for gas service have a capacity rating based on air at STP (70°F, 14.7 PSIA) conditions. The correction factors listed below are used to calculate the flow capacity when using a liquid other than water or a gas other than air at STP conditions.

GAS CORRECTION FORMULA

Air Equivalent Flow Rate = Customer Gas Flow Rate X Gas Correction Factor

Step 1: Convert *Customer Gas Flow Rate* unit of measure to a standard unit of measure for air flow (SCFM or SCCM).

Step 2: Calculate *Gas Correction Factor* from given values.

Step 3: Calculate the product of the *Air Equivalent Flow Rate* from the *Customer Gas Flow Rate* and the *Gas Correction Factor.*

Step 4: Calculate the maximum or minimum flow rate for the customer's conditions.

Step 1: Convert *Customer Gas Flow Rate* unit of measure to a standardunit of measure for air flow

Customer Gas Flow Rate _____
Converted Gas Flow Rate _____ SCFM / SCCM

Gas Flow Rate Conversions			
From	**To SCFM**	**From**	**To SCCM**
SCFH	Divide by 60	SCFM	Multiply by 28,317
SCIM	Divide by 1,728	SCFH	Multiply by 472
SLPM	Divide by 28.317	SCIM	Multiply by 16.39
SM^3/MIN	Multiply by 35.31	SLPM	Multiply by 1,000
SM^3/HR	Multiply by 0.5885	SLPH	Multiply by 16.67
NM^3/MIN	Multiply by 37.99	SM^3/MIN	Multiply by 1,000,000
NM^3/HR	Multiply by 0.6331	SM^3/HR	Multiply by 16,667
SCCM	Divide by 28,317	NM^3/MIN	Multiply by 1,075,785
KG/MIN	Multiply by (29.39 ÷ SpGr)	NM^3/HR	Multiply by 17,929
KG/HR	Multiply by (0.49 ÷ SpGr)	KG/MIN	Multiply by (832,000 ÷ SpGr)
LBS/MIN	Multiply by (13.33 ÷ SpGr)	KG/HR	Multiply by (13,876 ÷ SpGr)
LBS/HR	Multiply by(0.2222 ÷ SpGr)	LBS/MIN	Multiply by (377,500 ÷ SpGr)
LBS/DAY	Multiply by (0.00926 ÷ SpGr)	LBS/HR	Multiply by (6,292 ÷ SpGr)
ACFM	Multiply by [[(Operating PSIG+14.7)(530)] ÷ [(14.7)(Operating °F+460)]]		

Step 2: Calculate *Gas Correction Factor* from given values

This information is required to size for conditions other than air at STP:
- Operating Temperature: _____°F
- Operating Back Pressure:_____ PSIG
- Specific Gravity of Gas: _____ @STP

Temperature Conversions		Gas Density Conversions	
From	**To °Fahrenheit**	**From**	**To Specific Gravity**
°Centigrade	(°C X 1.8) + 32	LBS/FT^3	Divide by 0.075
°Kelvin	(°K – 273.15) 1.8 + 32	KG/M^3	Divide by 1.2
°Rankine	°R – 459.67	MolWt	Divide by 29.0
		g/cm^3	Divide by 0.0012

Pressure Conversions			
From	**To PSIG**	**From**	**To PSIG**
foot Water	Divide by 2.308	Pa	(Pa÷101,300) X 14.7
Inch Water	Divide by 27.73	PSIA	Minus 14.7
mm Water	Divide by 704	ATM	(ATM X 14.7) – 14.7
inch Hg	Divide by 2.036	Torr	((Torr÷760) X14.7) – 14.7
mm Hg	Divide by 51.7	Bars	((Bars÷1.013) X14.7) – 14.7
kg/cm^2	Multiply by 14.228	Millibar	((Millibars÷1013) X 14.7) –14.7
kPa	(kPa÷101.3) X 14.7		

Gas Correction Factor (GCF) formula:

$$GCF = \sqrt{\frac{[(\text{Gas Specific Gravity}) \text{ X } (\text{Operating Temperature} + 460)]}{[(36) \text{ X } (\text{Operating Backpressure} + 14.7)]}}$$

GCF = _____

Step 3: Determine the Air Equivalent Flow Rate.

Air Equivalent Flow Rate = Customer Gas Flow Rate x Gas Correction Factor
Air Equivalent Flow Rate = _____

Step 4: Calculate the maximum or minimum flow rate for the customer's conditions (Customer Gas Flow Rate Scale)

Customer Gas Flow Rate Scale = Catalog Flow Rate ÷ Gas Correction Factor
Customer Gas Flow Rate Scale = _____