

Liquid Flowmeter Sizing

Variable area flowmeters suitable for liquid service have a capacity rating based on water at 70°F 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.

LIQUID CORRECTION FORMULA

Water Equivalent Flow Rate = Customer Liquid Flow Rate X Liquid Correction Factor

Step 1: Convert *Customer Liquid Flow Rate* unit of measure to a standard unit of measure for water flow (GPM or CC/MIN).

Step 2: Calculate *Liquid Specific Gravity Correction Factor* from given values.

Step 3: Determine the *Water Equivalent Flow Rate* from the product of the *Customer Liquid Flow Rate* and the *Liquid Correction Factor*.

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

Step 1: Convert Customer Liquid Flow Rate unit of measure to a standard unit of measure for water flow.

Customer Liquid Flow Rate _____
 Converted Gas Flow Rate _____ GPM / CC/MIN

Liquid Flow Rate Conversions			
From	To GPM	From	To CC/MIN
GPH	Divide by 60	GPM	Multiply by 3,785
CC/MIN	Divide by 3,785	GPH	Multiply by 63.08
CC/HR	Divide by 227,100	CC/HR	Divide by 60
LPM	Multiply by 3.785	LPM	Multiply by 1,000
LPH	Multiply by 227.1	LPH	Multiply by 16.67
M ³ /MIN	Multiply by 264.2	M ³ /MIN	Multiply by 1,000,000
M ³ /HR	Multiply by 4.402	M ³ /HR	Multiply by 16,667
PINTS/MIN	Divide by 8	PINTS/MIN	Multiply by 473.1
FT ³ /MIN	Multiply by 7.48	FT ³ /MIN	Multiply by 28,320
FT ³ /HR	Divide by 8.021	FT ³ /HR	Multiply by 472
KG/MIN	Multiply by (0.264 ÷ SpGr)	KG/MIN	Multiply by (1,000 ÷ SpGr)
KG/HR	Divide by (227 X SpGr)	KG/HR	Multiply by (16.67 ÷ SpGr)
LBS/MIN	Divide by (8.347 X SpGr)	LBS/MIN	Multiply by (453.6 ÷ SpGr)
LBS/HR	Divide by (500.8 X SpGr)	LBS/HR	Multiply by (7.56 ÷ SpGr)
GMS/MIN	Divide by (3,785 X SpGr)	GMS/MIN	Divide by SpGr
GMS/HR	Divide by (227,000 X SpGr)	GMS/HR	Divide by (60 X SpGr)

Step 2: Calculate Liquid Correction Factor from given values

This information is required to size for liquids other than water:

- Specific Gravity of Liquid: _____ @ Operating Conditions
- Liquid Temperature: _____ °F @ Operating Conditions
- Liquid Viscosity: _____ cps @ Operating Conditions
- Specific Gravity of the Float to be used: _____

Float Specific Gravity				Liquid Density Conversions	
Teflon	2.20	316 SS	8.04	From	To Specific Gravity
Glass	2.53	Hastelloy C	8.94	LBS/FT ³	Divide by 62.4
Sapphire	3.99	Carboloy	15.00	KG/M ³	Divide by 1,000
Titanium	4.50	Tantalum	16.60	API	[141.5 ÷ (131.5+API)]
316L SS	8.03			g/cm ³	= SpGr

Liquid Specific Gravity Correction Factor (LSGCF) formula:

$$LSGCF = \sqrt{\frac{\text{Float Specific Gravity} - \text{Specific Gravity of the Metered Liquid}}{[(\text{Float Specific Gravity} - 1.0) \times (\text{Specific Gravity of the Metered Fluid})]}}$$

3. Determine the Water Equivalent Flow Rate

Water Equivalent Flow Rate = Customer's Liquid Flow Rate ÷ LSGCF Water Equivalent Flow Rate = _____

4. Calculate the maximum or minimum flow rate for the customer's conditions. (Customer Liquid Flow Rate Scale)

Customer Liquid Flow Rate Scale = Catalog Flow Rate ÷ LSGCF @ 70° F
 Customer Liquid Flow Rate Scale = _____