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## Engineering And Software For The Natural Gas Industry

November 2019

## Volume Correction For Gas Measurement

Following up our previous discussion on Base Pressure and Temperature, we will address a topic that was raised during several of our training courses in 2019.

As previously discussed, Base Pressure and Temperature are used to establish the basis for a "standard cubic foot" of gas. For many systems, these values are determined by a tariff or contract. A common Base Pressure value in the United States is 14.73 Psia, for example.

However, gas is almost never supplied to the customer at the Base Pressure. In fact, with a delivery pressure of 0.25 Psig (7 inches of water column), only meters located in areas with an atmospheric pressure of 14.48 Psia, which occurs at elevations approximately 475 feet above sea level, will exactly match a Base Pressure of 14.73 Psia.

For most meters, where the delivery pressure differs from the Base Pressure, a correction factor must be applied. The measured volume is multiplied by this factor to arrive at the "corrected" volume. Failure to correct the volume when the delivery pressure is higher than the Base Pressure will result in under reporting the actual quantity of gas that passed through the meter.

Measurement for large volume customers may also need to be adjusted for temperature. Depending on the regional climate, summer time flowing temperatures may exceed the Base Temperature value, while flowing temperatures in the winter months are generally lower. Failure to adjust the measured volume when the flowing temperature is less than the Base Temperature will result in under reporting the actual quantity of gas that passed through the meter. Temperatures can vary throughout the day, while pressures tend to be steady from upstream regulation. As a result, temperature compensation is often applied at the meter.

Most calculations for gas volume are derived from the Ideal Gas Law. Natural gas and other pipeline gases are "real" gases that do not exactly follow "ideal" gas behavior. The deviation from ideal behavior is known as *compressibility*, and it varies with changes in pressure and temperature. A compressibility factor of 1 represents ideal gas behavior.

Compressibility is often ignored at low pressures, where gases tend to more closely follow ideal behavior, and for low volume measurement calculations. At high pressures, compressibility can have a larger effect on the results. For large volume applications, compressibility should be included at any pressure.

GASCalc™ provides two calculations for volume correction factors. The *Fixed Pressure Measurement Factor* calculation in GASCalc 4.0 and newer allows Users to adjust a measured volume for pressure and compressibility. This factor is appropriate for most distribution customers. The *Standard Volume* calculation in GASCalc 5.0 and newer includes temperature in addition to pressure and compressibility for computing the Total Volume Adjustment Factor. This factor should be used only for the largest volume metering locations.

More details on these factors can be found in the GASCalc Calculation Reference documents for each respective calculation.

## GASWorkS™ 10 - Geomapping

Last month, we announced an addition to the great features found in GASWorkS 10 - **Geomapping**

Geomapping offers the ability to include background images directly from Google Maps™ or Bing™ Maps. This will allow Users to view their models overlaid on street maps or satellite imagery streamed from those services.

Several Users responded to our call for testers, and we are willing to accept more. If you are a GASWorkS 10 license holder, and would be interested in trying out a beta version, send us an email with your name, the company you work for, and the email address where we should send the setup file.

Make sure your software is up-to-date by visiting our Updates page to download the latest revision, posted on **September 4**.

If you have not already tried GASWorkS 10, click here to request a 30-day evaluation copy. To upgrade today, fill out an order form and return it to sales@b3pe.com.

## B3PE Conference Update

Thank you to everyone who visited with us in Huntsville and Manhattan. Whether it was our first meeting, or catching up with longtime customers, it was our pleasure to

share what we have been doing. Thank you to the American Public Gas Association, and the Kansas Corporation Commission, for hosting these great events.

For those who could not attend, stay tuned to the newsletter for future announcements of events where B3PE will be exhibiting.

## Happy Thanksgiving

November 28 marks Thanksgiving at the B3PE headquarters. To all those who celebrate the holiday, Happy Thanksgiving from our family to yours. To all our customers worldwide, we give thanks for your continued support of B3PE as we strive to deliver exceptional products and service.

## Applications Portal

Check out our new Applications Portal, where you will find links to GASPurge and the free GASCalc Web App.

## Our Products

GASWorkS™ - Affordable and robust network modeling.

GASCalc™ - Suite of gas system design and analytical tools.

GASPurge™ - Natural gas pipeline purging calculator.

StationManager™ - Regulator and relief valve station management solution.

WaterCalc™ - Suite of water system design and analytical tools.