

## Frequently Asked Questions and Answers on EPA GHG Mandate.

### **Q) Are FCI products certified by USA EPA for use in GHG mandate applications?**

A) The USA EPA does not certify or endorse any products. There is no such thing as an EPA certified product or certification program. Users considering purchasing products from companies making or implying this claim should read the “fine print” to understand what the company is really offering and its intent. As you can read below and at the EPA website’s FAQ’s the use of thermal flow meters, such as those manufactured by FCI and acceptable. A key compliance factor of which prospective buyers should be aware and should be asking a potential supplier is their whether their gas flow meter calibration process complies with that stipulated by the EPA mandate in Part 98.34. FCI’s calibration equipment and processes are in compliance with Part 98.34.

### **Q) Does EPA accept thermal flow meters for measuring volumetric flow rate of Landfill Gas?**

A) Thermal mass flow meters may be used to comply with the monitoring requirements of the rule provided they meet the accuracy requirements under section 98.3(i). Calibration should be done as specified by the manufacturers if none of the methods listed in section 98.344(b) or (c) are applicable.

### **Q) Does EPA accept thermal flow meters for measuring volumetric flow rate under 98.34?**

A) The MRR does not specify equipment type but rather lists standard methods used to quality assure fuel flow meters. Any fuel flow meter that can be calibrated based on one of the methods specified in 98.34 (b)(4) is acceptable. The calibration may be conducted by the reporter or an independent third party so long as the standard method is adhered to and the calibration does not deviate from the method.

### **Q) What is FCI’s recommended re-calibration interval for its thermal flow meters?**

*(Note; The EPA GHG mandate states a recalibration interval per manufacturer’s recommendation or every 2 years, which ever is less.)*

A) FCI’s genreal recommendation is 18 month intervals. However, the actual application, installation conditions and/or user experience may warrant a 1 year interval or 2 year interval. In applications where gas composition mix has changed by more than 10%, then a recalibration to the new composition is recommended. In dirty gases, corrosive or erosive gases, and/or wet gases an interval of 1 year is recommend. In clean or dry gas applications, or where user experience has shown as found calibration checks to be within specification, then a 2 year interval, per the EPA maximum, is recommended.

(Note: In addition to FCI calibration lab, FCI can deploy field service technicians to your site for calibration verification and adjustments. For installations where removing the instrument from service for calibration checks is an issue, where more frequent checking is desired or to save un-needed recalibration costs, FCI

recommends you consider a flow meter outfitted with a VeriCal<sup>®</sup> in-situ calibration verification option.

**Q) Does FCI automatically calibrate its flow meters to standard conditions of 60°F @ 14.7 PSIA as specified in sections?**

A) FCI will calibrate to standard conditions of 60°F @ 14.7 PSIA when specified. This can apply to new orders as well as recalibration services. FCI's AVAL flow meter sizing/specifying program allows inputting of required standard conditions.

EPA regulations 40 CFR, Chapter I, Subchapter C, Part 98 - Mandatory Greenhouse Gas Reporting refers to using standard conditions of 60°F at 14.7 PSIA (1 atm) in the following subparts: HH (Landfill Gas), JJ (Manure Gas), MM (Suppliers of Petro products - CO2 emission monitoring of combusted or oxidized Nat Gas or bio gasses), NN (Suppliers of Nat Gas - CO2 emissions monitoring of combusted or oxidized ethane, propane, butanes, etc.), and RR (Carbon Dioxide Injection and Geologic Sequestration).

First, let's make sure we all understand what is meant by the term "standard conditions." Standard conditions are used because the amount of mass in a specific volume can only be determined if pressure and temperature are known. For example, 1 cubic foot of air at 70°F. and 14.7 PSIA contains 0.074915 lbm of air. If pressure and temperature are not specified, the amount of mass is unknown.

Standard conditions are used in the following example formula to convert ACFM to SCFM.

$$\text{SCFM} = \text{ACFM} \times \frac{\text{Standard Temp } ^\circ\text{R}}{\text{Process Temp } ^\circ\text{R}} \times \frac{\text{Process Pressure PSIA}}{\text{Standard Pressure in PSIA}}$$

So if we use 70°F and 14.7 PSIA as standard conditions and process conditions are also at 70°F and 14.7 PSIA then ACFM and SCFM will be the same:

Note to convert °F to Rankine: [°R] = [°F] + 459.67

$$100 \text{ SCFM} = 100 \text{ ACFM} \times \frac{529.67 \text{ } ^\circ\text{R}}{529.67 \text{ } ^\circ\text{R}} \times \frac{14.7 \text{ PSIA}}{14.7 \text{ PSIA}}$$

But if we increase the process temperature to 140°F and double the process pressure to 29.4 PSIA:

$$176.65 \text{ SCFM} = 100 \text{ ACFM} \times \frac{529.67 \text{ } ^\circ\text{R}}{599.67 \text{ } ^\circ\text{R}} \times \frac{29.4 \text{ PSIA}}{14.7 \text{ PSIA}}$$

So we can see how temperature and pressure affect the conversion of ACFM to SCFM.

But, now lets see how changing the standard conditions will affect the outcome. Let's change standard conditions from 70°F to 60°F:

$$173.32 \text{ SCFM} = 100 \text{ ACFM} \times \frac{519.67 \text{ }^\circ\text{R}}{599.67 \text{ }^\circ\text{R}} \times \frac{29.4 \text{ PSIA}}{14.7 \text{ PSIA}}$$

So you can see when standard conditions change, the conversion from ACFM to SCFM also changes.

FCI's default standard conditions are 70°F at 14.7 PSIA, so most installed base of FCI flow meters in the U.S. were calibrated to this standard. For EPA GHG affected users can adjust the meter's K-factor to conform to 60°F at 14.7 PSIA.

The formula below calculates the K factor for a standard conditions conversion from 70°F at 14.7 PSIA to 60°F at 14.7 PSIA:

$$K = \frac{\text{New Std. Temp in } ^\circ\text{R}}{\text{FCI Std. Temp in } ^\circ\text{R}}$$

$$K = \frac{60^\circ\text{F} + 459.67 \text{ }^\circ\text{R}}{70^\circ\text{F} + 459.67 \text{ }^\circ\text{R}}$$

$$K = \frac{519.67 \text{ }^\circ\text{R}}{529.67 \text{ }^\circ\text{R}}$$

$$K = 0.9811$$

However, users already using a K-factor to adjust for the variance methane content, such as in landfill gas applications, may not want to compound their calculations with an additional K-factor adjustment for standard conditions.

For these users FCI offers a choice of ordering new or replacement equipment calibrated at 60°F at 14.7 PSIA or recalibration service of existing equipment. Do they wish to use FCI's standard of 70°F and 14.7 PSIA, or?

Confirming standard conditions is nothing new, but with the introduction of these regulations it has become more important to ask and not simply make assumptions. Some FCI customers with a large installed base of FCI meters may wish to continue using 70°F to maintain uniformity, while others may prefer to use 60°F. FCI offers choice to match the users situation and requirements.

How to select standard conditions using AVAL:

The program defaults to 70°F and 14.7 PSIA when running English units of measurement (such as SCFM), but you can select 60°F on the drop down menu on AVAL. Look for the drop down menu for standard conditions on the Applications Parameter Page, which is the first page that appears when you open your AVAL to enter pipe size, flow rates, etc. , then make selection of standard conditions to accord with EPA Green House Gas Regulations