



OFFICE OF TRANSPORTATION AND AIR QUALITY

WASHINGTON, D.C. 20460

September 10, 2024

Ms. Madison Corbut
Emerson Rosemount
5601 N 71st St.
Longmont, CO 80503

Dear Ms. Corbut:

This letter is in response to your alternative measurement protocol (AMP) submission of May 3, 2024, under 40 CFR 80.155(a)(3). In your letter, you requested that EPA approve the use of Emerson Rosemount Conditioning Orifice Plate flow meters as an alternative to the flow meters specified at 40 CFR 80.155(a)(2) for the measurement of renewable natural gas.¹

The regulations at 40 CFR 80.155(a) specify that the volume of biogas, renewable natural gas, and renewable compressed natural gas or liquefied natural gas must be continuously measured using specified flow meters. The regulations allow for EPA to approve an alternative measurement protocol under 40 CFR 80.155(a)(3) if a party demonstrates that they are unable to continuously measure using the specified methods and the party demonstrates that the alternative measurement protocol is at least as accurate and precise as the specified methods. The regulations at 40 CFR 80.135(c)(3)(iii) and (d)(3)(iii) outline the requirements for biogas production and RNG production facilities, respectively, to request an alternative measurement protocol under 40 CFR 80.155(a)(3).

Your submission included information that described how Emerson Rosemount conditioning orifice plate flow meters conduct measurement, listed applicable voluntary consensus standards bodies, described routine maintenance and calibration for Emerson Rosemount conditioning orifice plate flow meters, described the measurement frequency of Emerson Rosemount conditioning orifice plate flow meters, and included a comparison with supporting data between the accuracy, precision, and reliability of the alternative measurement protocol and the requirements specified in 40 CFR 80.155(a)(2).

¹ In your May 3, 2024, submission, you described the following Emerson Rosemount Conditioning Orifice Plate flow meters: Emerson Rosemount meter models beginning with 1595. For purposes of this letter, unless otherwise specified, the term Emerson Rosemount Conditioning Orifice Plate flow meters include all of the flow meter models included in your May 3, 2024, submission.

Based on our review of your May 3, 2024, submission and the voluntary consensus standards listed in your AMP submission, the EPA approves your May 3, 2024 AMP submission for the measurement of RNG, and an RNG producer may register its facility to use Emerson Rosemount conditioning orifice plate flow meters under 40 CFR 80.155(a)(3) so long as the producer meets the conditions specified in the attachment and all other applicable regulatory requirements at 40 CFR part 80, subpart E.

We note that your submission and this AMP approval do not address whether a specific facility satisfies the criteria for the approval of an AMP under 40 CFR 80.155(a)(3)(i). A facility that intends to use Emerson Rosemount conditioning orifice plate flow meters covered under this AMP approval must address this criterion in its registration submission as described in the regulations at 40 CFR 80.135(c)(3)(iii)(A) or (d)(3)(iii)(A), as applicable.

If you have any questions related to this AMP approval, please contact Robert Anderson at anderson.robert@epa.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Byron Bunker", is positioned above the typed name.

Byron Bunker, Director
Implementation, Analysis and Compliance Division
Office of Transportation and Air Quality

EPA Determination that Emerson Rosemount conditioning orifice plate flow meters (Emerson Rosemount meter models beginning with 1595) meet the requirements of 40 CFR 80.155(a)(3)(ii)

Summary

On May 3, 2024, Emerson Rosemount submitted an alternative measurement protocol request under 40 CFR 80.155(a)(3)(ii) for Emerson Rosemount conditioning orifice plate flow meters (Emerson Rosemount meter models beginning with 1595). The regulations at 40 CFR 80.155(a) specify that the volume of biogas, renewable natural gas (RNG), and renewable compressed natural gas (CNG) or liquified natural gas (CNG) must be continuously measured using specified flow meters. The regulations allow for EPA to approve an alternative measurement protocol under 40 CFR 80.155(a)(3) if a party demonstrates that they are unable to continuously measure using the specified methods and the party demonstrates that the alternative measurement protocol is at least as accurate and precise as the specified methods. The regulations at 40 CFR 80.135(c)(3)(iii) and (d)(3)(iii) outline the requirements for biogas production and RNG production facilities, respectively, to request an alternative measurement protocol under 40 CFR 80.155(a)(3).

Based on EPA staff review of the May 3, 2024, and EPA has determined that Emerson Rosemount conditioning orifice plate flow meters (Emerson Rosemount meter models beginning with 1595) are as precise, accurate, and reliable as meters specified at 40 CFR 80.155(a)(1) so long as a facility installs, operates, calibrates, and maintains the meter consistent with the May 3, 2024, submission.

The following sections describe how the May 3, 2024, submission satisfies the applicable regulatory requirements at 40 CFR 80.135 and 80.155, and how RNG production facilities using Emerson Rosemount conditioning orifice plate flow meters must submit as part of their registration submissions under 40 CFR 80.135.

Description and VCSB standards

The regulations at 40 CFR 80.135(c)(3)(iii)(B)-(C) and 80.135(d)(3)(iii)(B)-(C) require a description of how measurement would be conducted under the alternative measurement product and a description of any standards or specifications that apply for the measurement of biogas and RNG, respectively. Your May 3, 2024, submission, included a description of the Emerson Rosemount conditioning orifice plate flow meters (Emerson Rosemount meter models beginning with 1595) and described the following VCSB standards that cover the Emerson Rosemount conditioning orifice plate flow meters:

- ISO 5167-1:2022 Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full, Part 1: General principles and requirements ^{2,3}
- API MPMS 14.3 – Orifice Metering of Natural Gas^{3,4}

² Your May 3, 2024, submission notes “[while the 1595 Conditioning Orifice is built to the intent of ISO 5167-1:2022, it diverges due to the 4-hole orifice used to enhance performance in limited piping arrangements.”

³ See exceptions in appendix from Emerson AMP submission; meter accuracy, precision, repeatability and reliability requirements still apply.

⁴ Your May 3, 2024, submission notes Emerson Rosemount conditioning orifice plate flow meter diverge from API MPMS 14.3 by “being four orifice bores are used and the 6” size orifice plate being thicker to prevent bowing of the plate and a reduction in accuracy.”

- ASME MFC 3M Measurement of Fluid Flow in Pipes Using Orifice, Nozzle, and Venturi³

Additional standards that may apply :

- OIML R 137-1 & 2 Gas meters, Part 1: Metrological and technical requirements and Part 2: Metrological controls and performance tests
- ISO 17025 General requirements for the competence of testing and calibration laboratories

Any facility wishing to utilize this AMP approval must note in their registration submission under 40 CFR 80.135 that they are using an Emerson Rosemount conditioning orifice plate flow meters as described in this AMP approval letter and must note in their registration submission under 40 CFR 80.135 which VCSB standards they intend to use for their Emerson Rosemount conditioning orifice plate flow meters installed at their facility.⁵

Calibration and maintenance

The regulations at 40 CFR 80.135(c)(3)(iii)(D) and 80.135(d)(3)(iii)(D) require a description of all routine maintenance and the frequency that such maintenance will be conducted for an alternative measurement protocol.

Data shown in your May 3, 2024, submission demonstrate that the Emerson Rosemount conditioning orifice plate flow meters are compliant with accuracy and repeatability specifications in Appendix C and the Rosemount reference manual 00821-0100-4810, Rev EC, January 2023 (<https://www.emerson.com/documents/automation/manual-rosemount-405-compact-orifice-series-rosemount-1595-conditioning-orifice-plate-en-74374.pdf>). Your May 3, 2024, submission also described reliability and maintenance requirements for the Emerson Rosemount conditioning orifice plate flow meters.

Based on our review of the VCSB standards cited in your May 3, 2024, submission, calibration must be performed according to API MPS 14.3, ASME MFC 3M, ISO 5167-1, and ISO/IEC 17025 or ANSI Z540. If the Emerson Rosemount conditioning orifice plate flow meters is calibrated with a fluid other than RNG, the equivalency to RNG flow must be demonstrated. Any facility wishing to utilize this AMP approval must note in their registration submission under 40 CFR 80.135 that the facility intends to meet the calibration specifications in API MPS 14.3, ASME MFC 3M, ISO 5167-1, and ISO/IEC 17025 or ANSI Z540 or describe an alternative maintenance and calibration procedure. If utilizing an alternative calibration procedure, the facility must describe how the alternative will ensure proper operation of the meter in their registration submission.

Based on our review of your submission, the maintenance procedures you specify should help ensure reliable operation of Emerson Rosemount conditioning orifice plate flow meters if followed. Any facility wishing to utilize this AMP approval must note that they intend to follow the manufacturer recommended maintenance requirements for the Emerson Rosemount conditioning orifice plate flow meters or suggest an alternative maintenance procedure. If utilizing an alternative maintenance procedure, the facility must describe how the alternative will ensure proper operation of the meter in

⁵ Note, the facility should not submit copies of referenced VCSB standards as part of their registration submission.

their registration submission. If utilizing an alternative maintenance and/or calibration procedure, the facility must describe how the alternative will ensure proper operation of the meter.

Measurement frequency

The regulations at 40 CFR 80.135(c)(iii)(E) and 80.135(d)(iii)(E) require facilities to submit a description of the frequency of all measurements and how often such measurements will be recorded under the alternative measurement protocol. According to your April 23, 2024, submission the meter calculates and can record flow readings at a frequency of 22 Hz. The data output meets the minimum measurement frequency stated⁶ consistent with the definition of continuous measurement at 40 CFR 80.2. Based on your submission, facilities that use Emerson Rosemount conditioning orifice plate flow meters should be able to measure and record data within the 40 CFR 80.2 specification.

Any facility wishing to utilize this AMP approval must include a description of the frequency of measurement and how often such measurements will be recorded as part of their registration submission under 40 CFR 80.135. If the facility intends to meet the frequency specified in the definition of continuous measurement at 40 CFR 80.2, the facility should note that. If the facility wishes to use a less frequent measurement or recording frequency, the facility must specify what that frequency is and include a demonstration over how that frequency will result in measurement equivalent or better than the specified measurement and recording rates for continuous measurement at 40 CFR 80.2.

Accuracy, precision, and reliability comparison

The regulations at 40 CFR 80.135(c)(3)(iii)(F) and 80.135(d)(3)(iii)(F) require a comparison between the accuracy, precision, and reliability of the alternative measurement protocol and the requirements specified in 40 CFR 80.155(a)(1) and (2), as applicable, including any supporting data. In your May 3, 2024, submission, you included information including supporting data that compared the accuracy, precision, and reliability of Emerson Rosemount conditioning orifice plate flow meters and meters specified at 40 CFR 80.155(a)(1).

Based on our review of your May 3, 2024, submission, and the listed VCSB standards, we have determined that Emerson Rosemount conditioning orifice plate flow meters are as accurate, precise, and reliable as flow meters specified at § 80.155(a)(2). Any facility using Emerson Rosemount conditioning orifice plate flow meters covered under this AMP approval should note in their registration submission under 40 CFR 80.135 that they are relying on EPA's determination in this letter to demonstrate the comparison of accuracy, precision, and reliability of Emerson Rosemount conditioning orifice plate flow meters and the meters specified at 40 CFR 80.155(a)(2).

Appendix

⁶ The regulations at 40 CFR 80.2 define "continuous measurement" as "the automated measurement of specified parameters of biogas, treated biogas, or natural gas as follows: (1) For in-line GC meters, automated measurement must occur and be recorded no less frequent than once every 15 minutes. (2) For flow meters, automated measurement must occur no less frequent than once every 6 seconds, and weighted totals of such measurement must be recorded at no more than 1 minute intervals. (3) For all other meters, automated measurement and recording must occur at a frequency specified at registration."

Conditioning Orifice Plate

Table 1 depicts a comparison between conditioning orifice plate technology and standard orifice plate technology, highlighting the deviations from the standards. These deviations allow for a more flexible installation as straight pipe requirements are reduced in some cases by as much as 96%.

Table 1: The Conditioning Orifice Plate as compared to the orifice plate standards.

Category	1595 and 405C Conditioning Orifice Plate Technology			
Total Straight Pipe Run Requirements	1595 and 405C	ASME MFC 3M	AGA Report Number 3	ISO 5167
Upstream (In Pipe Diameters)	2	Up to 54	Up to 95	Up to 60
Downstream (In Pipe Diameters)	2	5	4.2	7
Flow Conditioners	Not Required. All three standards sometimes require flow conditioners to shorten required straight pipe run.			
Pressure Taps	Complies with all three standards. Complies with ASME and ISO. Corner taps not included in AGA Report Number 3. In development.			
Flange Taps				
Corner Taps				
D and D/2				
O-Plate Thickness	Complies with all three Standards. Compliant to ASME MFC 3M and ISO 5167. Thicker than AGA Report Number 3. Complies with all three Standards.			
2" to 4"				
6"				
8" to 24"				
Beta	Area of 4 holes = Area of same β for standard orifice of all three standards. ⁽¹⁾			
All other plate dimensions (Including angle of bevel, bore thickness (e), etc.)	Complies with all three Standards.			
Surface Finish	Complies with all three Standards.			
Discharge Coefficient Uncertainty	Follows ISO 5167. ⁽²⁾			
Expansion Factor	Follows ISO 5167.			

⁽¹⁾ At Schedule Standard

⁽²⁾ Follows ISO 5167 with a bias shift – The bias is determined in a calibration flow lab and factored into the DP bore calculation.