California Type Evaluation Program
Certificate of Approval
Weighing and Measuring Devices

For:	**Submitted By:**
Other Measuring Device Nitrogen Gas Measuring System Orifice Gas Flow Meter Models: Eagle Research Micro MV 100	Air Products and Chemicals 1515 Norman Avenue Santa Clara, California 95054 Contact: Robert Bautch Tel: (408) 221-7217 Email: bautchrj@airproducts.com Web site: www.airproducts.com

Standard Features and Options

Standard Features:

- Orifice, flow-measuring computer using adjusted Bernoulli's equation
- Volume measurement in Standard Cubic Foot (SCF)
- Software (SW) Version: Eagle Research: 60798 or higher
  Micro MV 100: MVA v6.04.02 or higher
- 1000 SCF resolution digital display with 1 SCF resolution for calibration
- Integrated transmitter for differential pressure and pressure
- Resistance Temperature Detector (RTD) temperature sensor
- Remote data reading
- Bore Calculation data is specific to each system (provided by manufacturer for each site)
- Flow rating must be listed on identification (ID) label (unique per system)
- Pressure rating must be listed ID label (unique per system)

This device was evaluated under the California Type Evaluation Program (CTEP) and was found to comply with the applicable requirements of California Code of Regulations for "Weighing and Measuring Devices." Evaluation results and device characteristics necessary for inspection and use in commerce are on the following pages.

Kevin Schnepp, Director
Effective Date: February 13, 2024

Air Products and Chemicals

Other Measuring Device-Nitrogen Gas Measuring System / Eagle Research, Micro MV 100

Application: For use as a Nitrogen Gas Measuring System in commercial applications.

Identification: The identification markings (***Figure 1***) for the Eagle Research meter is located on the left side of the device. The ID label for the Micro MV is located at the base of the meter (***Figure 2***) and includes the SW version number. See ***Test Conditions*** for flow rate identification.

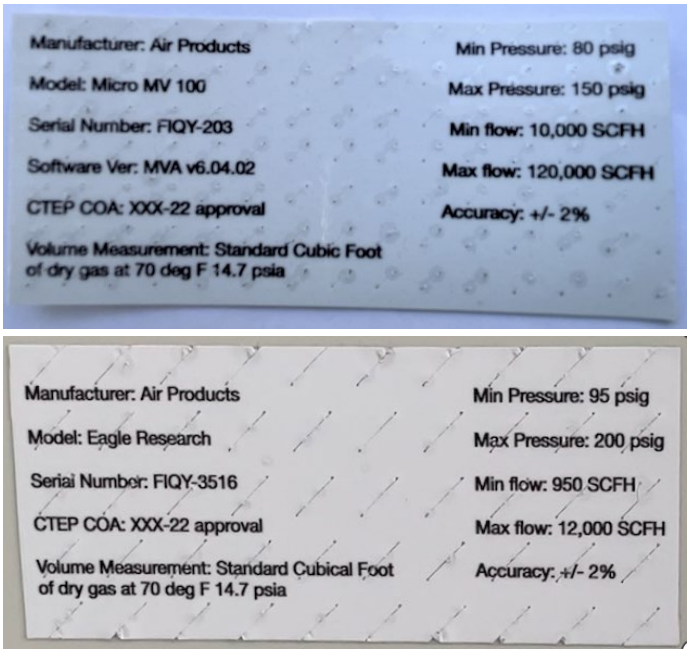

Figure 1. Example of ID labels

Figure 2. Base of Micro MV 100

Sealing: The Air Products systems are Category 1 Devices, with on-site calibration via direct connection to the meter. There is no physical sealing provision; the software required for servicing the meter is protected by username and password.

Operation: This nitrogen gas measuring system uses the differential pressures created by an orifice plate, pressure, and temperature of the system to determine the flow of nitrogen gas, according to an adjusted Bernoulli's equation. There are no moving mechanical components within this metering system. The flow range is determined by the Beta Ratio (β), pipeline pressure (PSIG) and temperature (°F) at the orifice plate. This process meets the requirements of the American Gas Association Report No.3, Part 1.

Beta Ratio (β) = d/D

d = orifice bore diameter

D = pipe inner diameter

The Beta Ratio (β) must be between 0.225 and .071

The Beta Ratio (β) is listed on the orifice bore calculation

Bore calculation parameters must be provided by Air Products for each site/system. The inspector must compare the flow and pressure ratings on the ID label to the flow and pressure ratings on the corresponding bore calculation information sheet. Calibration is assessed on an annual basis by the Air Products technician and requires valid calibration reports for the stopwatch, and temperature and pressure reference standards.

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Test Conditions: The validation process for this evaluation consisted of three parts: 1) flow verification test, 2) 1-hour integrator test, and 3) low flow repeatability test. The flow accuracy test uses fixed parameters for pressure, temperature, and a differential pressure at 100 in. water column (WC) to calculate the flow rate. That meter value is compared to the theoretical value for accuracy. The 1-hour integrator test validates the accuracy of the "integrator" or counter. After one hour, the quantity of flow calculated is compared to the theoretical quantity expected at that flow rate. Lastly, the repeatability test is based on the repeatability of three 10-minute tests at 5 in. WC. Accuracy and repeatability were assessed at 1% acceptance tolerance and this device shall maintain 1% maintenance tolerance.

Based on these results and the lack of moving components in this metering system, field verification tests should include: a flow verification at maximum flow (100 in. WC), a flow verification at low flow (5 in. WC), and a 1-hour integrator test.

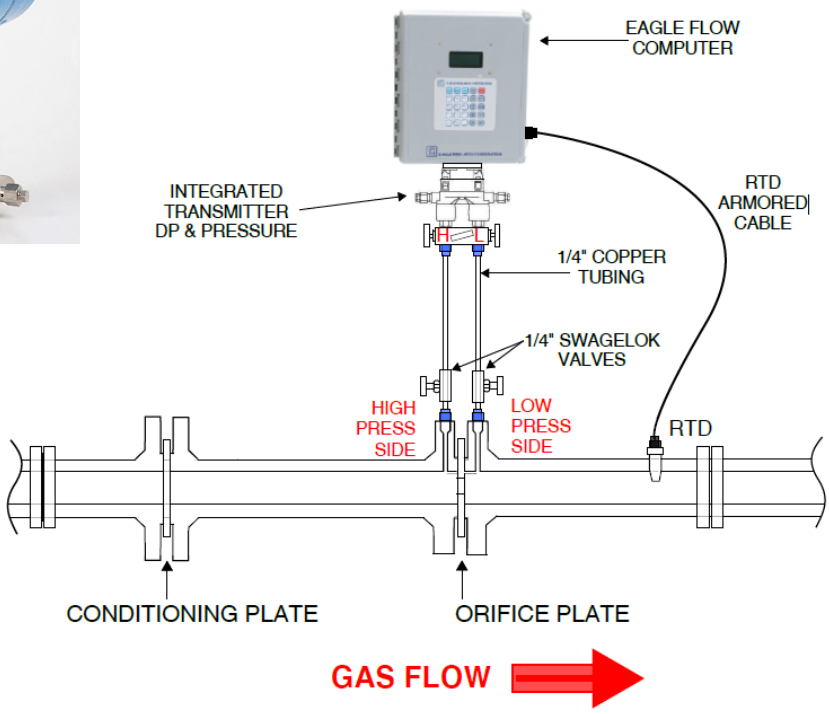
Evaluated By: J. Burbridge (CA) and J. Witt (CA)

Type Evaluation Criteria Used: *California Code of Regulations, Title 4, Division 9, Chapter 1, Article 1. General Code 1.10. and Section 3.33. Hydrocarbon Gas Vapor-Measuring Devices. 2023 Edition.*

Conclusion: The results of the evaluation and information provided by the manufacturer indicate the device complies with applicable requirements.

Example(s) of the Device:

Micro MV



Eagle Research