

TECH NOTES



Air Sampling Flowmeters – The Correct Classification

Occupational and Environmental Health and Safety (OEHS) professionals must verify the assigned flow rate of air sampling pumps, depending on the airborne contaminant, for proper collection and reduction of any variability in the sampling. Personal sampling pumps must meet [ISO 13137:2022](#), which “specifies performance requirements for battery-powered pumps used for personal sampling of chemical and biological agents in workplace air. It also specifies test methods to determine the performance characteristics of such pumps under prescribed laboratory conditions.”¹

Air sampling pump flow rates are verified using different types of flowmeters (e.g., manual wet-cell, dry-cell, thermal mass, orifice flowmeters, or rotameters). In the past, documents referred to flowmeters that had traceable calibration as “primary standards” and those without traceability as “secondary standards.” However, according to the latest [ASTM D5337](#), “Standard Practice for Setting and Verifying the Flow Rate of Personal Sampling Pumps,” the terms “primary standard” and “secondary standard” have different definitions in metrology and should not be applied when referring to flowmeters used to set and verify the flow rate of air sampling pumps.² Instead, both types of flowmeters used should be referred to as “working standards” with or without traceability of calibration. In addition, the above-mentioned standard requires the use of flowmeters demonstrated to be traceable to the national and international standards, and the traceability should be established on a routine (generally annual) basis. Organizations that perform traceable calibration of equipment should be accredited under [ISO/IEC 17025](#) by an organization certified to do so under [ISO/IEC 17011](#).

The Occupational Safety and Health Administration (OSHA) does not mention definitions for primary or secondary calibration standards but its technical manual describes

how to perform sampling pump flow rate verification as well as the pros and cons of different types of flowmeters.³

SKC chek-mate® Flowmeter

The [SKC chek-mate®](#) is a flowmeter based on differential pressure that incorporates a sensor to measure pressure drop across a fixed orifice. The flowmeter automatically corrects for changes in air temperature and atmospheric pressure to provide accurate volumetric flow rate readings without the inconveniences of piston-style flowmeters.

The chek-mate is calibrated against the National Institute of Standards and Technology (NIST), United Kingdom (UK), or ISO standards in the SKC Calibration Laboratory, which is ISO/IEC 17025:2017 accredited. The certified accuracy is 1% of reading for ranges of 5 to 30 L/min (high flow), 0.50 to 5 L/min (medium flow), and 20 to 500 ml/min (low flow).

According to the [ISO 13137](#) standard, the uncertainty of the test instruments shall be as follows:

Test Instrument	Uncertainty
Volume flowmeter	Within ± 2%
Volume meter	Within ± 2%
Pressure gauge	Within ± 2%
Timer	Within ± 2%
Thermometer	Within ± 2%

The chek-mate meets the uncertainty requirements for calibration under [ISO 13137](#) and is calibrated against traceable standards under an ISO 17025:2017-accredited laboratory.

Based on the requirements from ASTM, ISO, and other entities, chek-mate meets the “working standards” of flow rate verification like soap bubble, dry-cell, and piston-style flowmeters. It is easy to use and lightweight, provides accurate flow rate calibration according to the applicable standards, and features an averaging function that enables faster flow rate verification.

References:

- ¹ ISO 13137:2022, *Workplace atmospheres – Pumps for personal sampling of chemical and biological agents – Requirements and test methods*, <https://www.iso.org/standard/79682.html>
- ² ASTM D5337-23, *Standard Practice for Setting and Verifying the Flow Rate of Personal Sampling Pumps*, American Society for Testing and Materials, <https://www.astm.org/d5337-23.html>
- ³ OSHA Technical Manual, Section II, Chapter 1, *Occupational Safety and Health Administration*, <https://www.osha.gov/otm/section-2-health-hazards/chapter-1>