



CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

TSI Instruments Limited
Stirling Road, Cressex Business Park
High Wycombe, Buckinghamshire, UK HP12 3ST

Fulfills the requirements of

ISO/IEC 17025:2017

In the field of

CALIBRATION

This certificate is valid only when accompanied by a current scope of accreditation document.
The current scope of accreditation can be verified at www.anab.org.

A handwritten signature in black ink, appearing to be 'J. Stine', is positioned above a horizontal line.

Jason Stine, Vice President

Expiry Date: 09 July 2024

Certificate Number: AC-3002



This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017.
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory
quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

TSI Instruments Limited
 Stirling Road, Cressex Business Park
 High Wycombe, Buckinghamshire, UK HP12 3ST
 Miles Wallis +44 (0)1494 459200

CALIBRATION

Valid to: **July 9, 2024**

Certificate Number: **AC-3002**

Chemical Quantities

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Air-born particle size detection and concentration counting efficiencies/ Condensation Particle Counters (CPC/PNC) ¹	Particle Size		Electrometer, 3068B CPC, 3750/3772 ISO 27891:2015
	10 nm	0.09	
	15 nm	0.074	
	23 nm	0.15	
	41 nm	0.1	
	55 nm	0.12	
	Particle Concentration Range @ 55 nm		
	300 counts/cm ³	0.12	
	600 counts/cm ³	0.12	
	1 000 counts/cm ³	0.12	
	2 000 counts/cm ³	0.12	
	4 000 counts/cm ³	0.068	
	6 000 counts/cm ³	0.12	
8 000 counts/cm ³	0.082		
10 000 counts/cm ³	0.12		
25 000 counts/cm ³	0.062		
50 000 counts/cm ³	0.076		
Linearity (Slope) for 55 nm particles			
(0.90 to 1.1)			
@ 10 000 cm ⁻³	0.032		
@ 50 000 cm ⁻³	0.035		
Gas Analyzers ²	0 parts in 10 ⁻⁶ (ppm) CO 35 parts in 10 ⁻⁶ (ppm) CO 100 parts in 10 ⁻⁶ (ppm) CO 200 parts in 10 ⁻⁶ (ppm) CO	1 part in 10 ⁻⁶ CO 1.3 parts in 10 ⁻⁶ CO 2 parts in 10 ⁻⁶ CO 2.3 parts in 10 ⁻⁶ CO	Reference Gasses Mass Flow Meter



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Chemical Quantities

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Gas Analyzers ²	0 parts in 10 ⁻⁶ (ppm) CO ₂ 500 parts in 10 ⁻⁶ (ppm) CO ₂ 1 000 parts in 10 ⁻⁶ (ppm) CO ₂ 3 000 parts in 10 ⁻⁶ (ppm) CO ₂ 5 000 parts in 10 ⁻⁶ (ppm) CO ₂	2.8 parts in 10 ⁻⁶ CO ₂ 13 parts in 10 ⁻⁶ CO ₂ 20 parts in 10 ⁻⁶ CO ₂ 50 parts in 10 ⁻⁶ CO ₂ 52 parts in 10 ⁻⁶ CO ₂	Reference Gasses Mass Flow Meter

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Air Velocity	Thermal Anemometers (0.2 to 1.25) m/s (1.26 to 7.5) m/s (7.6 to 50) m/s	0.47 % of reading + 0.016 m/s 1.2 % of reading + 0.036 m/s 1.2 % of reading + 0.088 m/s	Wind Tunnel, Barometer, Manometers
	Vane Anemometers 0.5 m/s 0.75 m/s 1.0 m/s 2.5 m/s 5.0 m/s 7.5 m/s 15 m/s 30 m/s	0.31 % of reading + 0.02 m/s 0.31 % of reading + 0.024 m/s 0.31 % of reading + 0.03 m/s 0.31 % of reading + 0.061 m/s 0.31 % of reading + 0.085 m/s 0.31 % of reading + 0.12 m/s 0.31 % of reading + 0.2 m/s 0.31 % of reading + 0.4 m/s	Gold Standard Vane Anemometer
Pressure – Gage	(-1 to 4) kPa (4 to 13.33) kPa	3.4 Pa 1.1 % of reading + 31 Pa	Pressure Transducer
Pressure – Absolute	(60 to 135) kPa	0.7 % of reading + 1.2 Pa	Barometer
Pneumatic Differential Pressure (Low Flow Meter)	(-153 to 153) cmH ₂ O	0.33 cmH ₂ O	PPC4-ui A1.4 Ms/A200Kp Pressure Controller
Pneumatic Differential Pressure (High Flow Meter)	(-11 to 50) psig (50 to 152) psig	0.077 psig 0.45 psig	PPC4-ui A1.4 Ms/A200Kp Pressure Controller
Volumetric Flowrate (Flow Meter; Gas Type: Air, O ₂ , N ₂)	(0.03 to 0.02) slpm	6.1 % of reading	Flow Calibrator w/Small Bronkhorst Pressure/Temperature Measurement System

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Volumetric Flowrate (Flow Meter; Gas Type: Air, CO ₂ , O ₂ , N ₂)	(0.01 to 0.02) slpm (0.03 to 0.05) slpm (0.06 -to 0.10) slpm (0.11 -to 0.20) slpm (0.21 -to 0.40) slpm (0.41 -to 0.80) slpm (0.81 to 1.60) slpm (1.61 to 3.00) slpm	6.1 % of reading 4.1 % of reading 2.4 % of reading 2 % of reading 1.5 % of reading 1.2 % of reading 1.1 % of reading 1 % of reading	Flow Calibrator w/Small Bronkhorst Pressure/Temperature Measurement System
	(3.01 to 300) slpm	0.81 % of reading	Flow Calibrator w/Sonic Nozzle

Thermodynamics

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Temperature – Source	0 °C 60 °C	0.19 °C 0.19 °C	Calibration Baths
Relative Humidity	(10 to 90) %RH @ 25 °C	2.5 %RH	Thermohygrometer and Probe, Chamber

Calibration and Measurement Capability (CMC) is expressed in terms of the measurement parameter, measurement range, expanded uncertainty of measurement and reference standard, method, and/or equipment. The expanded uncertainty of measurement is expressed as the standard uncertainty of the measurement multiplied by a coverage factor of 2 ($k=2$), corresponding to a confidence level of approximately 95%.

Notes:

1. Unitless linear measure.
2. Parts per million (ppm) refers to parts in 10⁶.
3. This scope is formatted as part of a single document including Certificate of Accreditation No. AC-3002.



Jason Stine, Vice President