



CERTIFICATE OF ACCREDITATION

The ANSI National Accreditation Board

Hereby attests that

TSI Incorporated
500 Cardigan Road
Shoreview, MN 55126

Fulfills the requirements of

ISO/IEC 17025:2017

and national standard

ANSI/NCSL Z540-1-1994 (R2002)

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.

Jason Stine, Vice President

Expiry Date: 20 February 2024

Certificate Number: AC-2850



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
AND
ANSI/NCSL Z540-1-1994 (R2002)**

TSI Incorporated
500 Cardigan Road
Shoreview, MN 55126
Larry Lemanski

CALIBRATION

Valid to: **February 20, 2024**

Certificate Number: **AC-2850**

Chemical Quantities

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Airborne particle counting efficiency ¹	(0.50 to 0.80) efficiency Particle size 10 nm	0.068	Electrometer, 3068B CPC, 3750/3772 ISO 27891:2015
	> 0.90 efficiency Particle size 15 nm	0.05	
	(0.38 to 0.62) efficiency Particle size 23 nm	0.054	
	> 0.90 efficiency Particle size 41 nm	0.19	
	(0.90 to 1.1) efficiency Particle size 55 nm	0.046	
Airborne particle concentration counting efficiency ^{1,2} Calibration factor for condensation particle counters (CPC/PNC)	(0.9 to 1.1) efficiency Particle Concentration Range		Electrometer, 3068B CPC, 3750/3772 ISO 27891:2015
	300 counts/cm ³	0.11	
	600 counts/cm ³	0.11	
	1 000 counts/cm ³	0.13	
	2 000 counts/cm ³	0.03	
	4 000 counts/cm ³	0.04	
	6 000 counts/cm ³	0.03	
	8 000 counts/cm ³	0.03	
	10 000 counts/cm ³	0.03	
25 000 counts/cm ³	0.04		
50 000 counts/cm ³	0.04		

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Differential Pneumatic Pressure (Anemometer)	(0 to 15) inH ₂ O	0.21 % of reading + 0.003 1 inH ₂ O	MKS Pressure Transducer
Pneumatic Barometric Pressure (Anemometer)	(8 to 40) inHg	0.042 inHg	Setra 370 Pressure Gage
Air Velocity	(35 to 8 000) fpm	2.6 % of reading	Pressure transducer
Pneumatic Differential Pressure (Low Flow Meter)	(-153 to 153) cmH ₂ O	0.58 cmH ₂ O	PPC4-ui A1.4 Ms/A200Kp Pressure Controller
Pneumatic Differential Pressure (High Flow Meter)	(-11 to 152) psig	0.023 psig	PPC4-ui A1.4 Ms/A200Kp Pressure Controller
Mass Flow (Gas Type: Air, O ₂ , N ₂)	(0.01 to 0.02) slpm (0.021 to 0.03) slpm (0.031 to 0.1) slpm	6.1 % of reading 4.1 % of reading 2.4 % of reading	Flow Calibrator with FPP T-916-TD Bronkhorst Mercury Sealed Piston Prover
	(0.11 to 0.2) slpm (0.21 to 0.4) slpm (0.41 to 0.8) slpm (0.81 to 1.6) slpm (1.61 to 3) slpm	2 % of reading 1.5 % of reading 1.2 % of reading 1.1 % of reading 1 % of reading	Flow Calibrator with FPP T-950-TD Bronkhorst Mercury Sealed Piston Prover
	(3 to 300) slpm	0.81 % of reading	Flow Calibrator with Fluke (0.019, 0.039, 0.078) inch Sonic Nozzles
Mass Flow (Gas Type: CO ₂)	(0.01 to 0.02) slpm (0.021 to 0.03) slpm (0.031 to 0.1) slpm	5.9 % of reading 4 % of reading 2.4 % of reading	Flow Calibrator with FPP T-916-TD Bronkhorst Mercury Sealed Piston Prover
	(0.11 to 0.2) slpm (0.21 to 0.4) slpm (0.41 to 0.8) slpm (0.81 to 1.6) slpm (1.61 to 3) slpm	2.3 % of reading 1.7 % of reading 1.3 % of reading 1.1 % of reading 1 % of reading	Flow Calibrator with FPP T-950-TD Bronkhorst Mercury Sealed Piston Prover
	(3 to 50) slpm	0.76 % of reading	Flow Calibrator with Fluke (0.019, 0.039) inch Sonic Nozzles

Mass and Mass Related

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Mass Flow (Gas Type: N ₂ O)	(0.01 to 0.02) slpm (0.021 to 0.03) slpm (0.031 to 0.1) slpm	5.9 % of reading 4 % of reading 2.4 % of reading	Flow Calibrator with FPP T-916-TD Bronkhorst Mercury Sealed Piston Prover
	(0.11 to 0.2) slpm (0.21 to 0.4) slpm (0.41 to 0.8) slpm (0.81 to 1.6) slpm (1.61 to 3) slpm	2.3 % of reading 1.7 % of reading 1.2 % of reading 1.1 % of reading 1 % of reading	Flow Calibrator with FPP T-950-TD Bronkhorst Mercury Sealed Piston Prover
	(3 to 25) slpm	0.75 % of reading	Flow Calibrator with Fluke (0.019, 0.039) inch Sonic Nozzles

Thermodynamics

Parameter/Equipment	Range	Expanded Uncertainty of Measurement (+/-)	Reference Standard, Method, and/or Equipment
Temperature	0 °C 60 °C	0.12 °C	ThermoFisher Scientific Temperature Baths, PRT
Humidity	(9.8 to 95) %RH	0.61 %RH	Thunder Scientific 2500 Humidity 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. The nominal values listed are approximate.
3. This scope is formatted as part of a single document including Certificate of Accreditation No. AC-2850.



Jason Stine, Vice President