Accredited Laboratory

A2LA has accredited

CAL LAB LIMITED

Tsuen Wan, NT, HONG KONG

for technical competence in the field of

Calibration

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 *General requirements for the competence of testing and calibration laboratories.* This laboratory also meets R205 – Specific Requirements: Calibration Laboratory Accreditation Program. 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*).

Presented this 26th day of November 2025.

Mr. Trace McInturff, Vice President, Accreditation Services
For the Accreditation Council
Certificate Number 3815.01
Valid to September 30, 2027

For the calibrations to which this accreditation applies, please refer to the laboratory's Calibration Scope of Accreditation.

Hong Kong Accreditation Service

FAQ / Information

Mutual Recognition Arrangements (MRA) / Multilateral Recognition Arrangements (MLA)

Mutual Recognition Arrangement (MRA) Partners for HOKLAS

Every effort is made to promote acceptance of test data from accredited laboratories, both internationally and locally. HKAS has concluded mutual recognition arrangements with accreditation bodies listed below by being one of the signatories of the International Laboratory Accreditation Cooperation Mutual Recognition Arrangement (ILAC MRA) and the Asia Pacific Accreditation Cooperation Mutual Recognition Arrangement (APAC MRA) for testing, calibration, medical testing, Proficiency Testing Providers (PTP) and Reference Material Producers (RMP). Click here to view the up-to-date signatories of ILAC and here to access the up-to-date signatories of APAC.

Visitors checking the names, logos and accreditation symbols shown on an endorsed certificate or report should note that some of our MRA partners may have their names, logos or accreditation symbols changed recently and test reports or certificates endorsed by displaying their old accreditation symbols may still be valid during the change-over period. For details, please visit their websites or contact them directly.

» Mutual Recognition Arrangement (MRA) Partners for HOKLAS

HKAS MRA partners will recognise HOKLAS endorsed test certificates as having the same technical validity as certificates endorsed by their respective schemes.

Hong Kong Accreditation Service

- HKAS Home
- HKAS
- Accreditation Services
- Accredited Conformity Assessment Bodies
- Publications
- **FAQ / Information**
  - Frequently Asked Questions
  - Closer Economic Partnership Arrangement (CEPA)
  - **Mutual Recognition Arrangements (MRA) / Multilateral Recognition Arrangements (MLA)**
  - Becoming an Assessor
  - Testing of Lead, Cadmium, Chromium, Nickel, Antimony and Copper in Water
  - Useful Links

Hong Kong Laboratory Accreditation Scheme (HOKLAS) - Mutual Recognition Arrangement (MRA) Partners

Economy	Logo	Name of Partner	URL	Test Area
Ukraine		National Accreditation Agency of Ukraine (NAAU)	http://www.naau.org.ua/	Calibration, Medical Testing, Non-medical Testing
United Arab Emirates		Emirates International Accreditation Center (EIAC)	http://www.eiac.gov.ae/	Calibration, Medical Testing, Non-medical Testing, Proficiency Testing Provider
United Arab Emirates		Ministry of Industry and Advanced Technology - Emirates National Accreditation System (MoIAT - ENAS)		Calibration, Non-medical Testing
United Kingdom of Great Britain and Northern Ireland		United Kingdom Accreditation Service (UKAS)	http://www.ukas.com	Calibration, Medical Testing, Non-medical Testing, Proficiency Testing Provider, Reference Material Producer
United States of America		AIHA Laboratory Accreditation Programs, LLC (AIHA-LAP, LLC)	http://www.aihaaccreditedlabs.org/	Non-medical Testing
United States of America		American Association for Laboratory Accreditation (A2LA)	http://www.a2la.org	Calibration, Medical Testing, Non-medical Testing, Proficiency Testing Provider, Reference Material Producer

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

CAL LAB LIMITED
Room 2103, Technology Plaza
29-35 Sha Tsui Road
Tsuen Wan, NT, Hong Kong
Warren Yeung Phone: 852 25680106

CALIBRATION

Valid To: September 30, 2027 Certificate Number: 3815.01

In recognition of the successful completion of the A2LA evaluation process (including an assessment of the organization's compliance with R205 – A2LA's Calibration Program Requirements), accreditation is granted to this laboratory to perform the following calibrations[1, 6]:

I. Chemical

Parameter/Equipment	Range	CMC[2] (±)	Comments
Gas Detection Equipment –			
Carbon Monoxide	Up to 500 µmol/mol	2.2 % of standard gas concentration	Reference gas comparison BS EN 60079-29-2/ JJG 635/ JJG915
Carbon Dioxide	Up to 5000 µmol/mol	2.0 % of standard gas concentration	Reference gas comparison BS EN 60079-29-2/ JJG 635
Isobutylene	Up to 10 µmol/mol	3.6 % of standard gas concentration	Reference gas comparison BS EN 60079-29-2/ JJF 1172
Hydrogen Sulfide	Up to 100 µmol/mol	6.6 % of standard gas concentration	Reference gas comparison BS EN 60079-29-2/ JJG 695
Methane	Up to 5 %	2.6 % of standard gas concentration	Reference gas comparison BS EN 60079-29-2/ JJG 693

5202 Presidents Court, Suite 220 | Frederick, MD 21703-8515 | Phone: 301 644 3248 | Fax: 240 454 9449 | www.A2LA.org

Parameter/Equipment	Range	CMC[2, 5] (±)	Comments
Gas Detection Equipment – (cont)			
Oxygen	6 % Volume 15 % Volume 24 % Volume	0.45 % 0.98 % 1.5 %	Reference gas comparison BS EN 60079-29-2/ JJG 365
Nitrogen Dioxide	Up to 1 µmol/mol	2.4 % of standard gas concentration	Reference gas comparison BS EN 60079-29-2
Ozone	(0.05 to 1) µmol/mol (1 to 100) µmol/mol	2.8 % 3.4 %	Reference gas comparison BS EN 60079-29-2/ JJG 1077
Sulfur Dioxide	Up to 20 µmol/mol	7.2 % of standard gas concentration	Reference gas comparison BS EN 60079-29-2/ JJG 551
Formaldehyde	Up to 1 µmol/mol	6.2 % of standard gas concentration	Reference gas comparison BS EN 60079-29-2/ JJG 1022
Radon	(500 to 4000) Bq/ m^3	17 %	Reference meter comparison JJG 825
Dust Concentration TSP PM10 PM2.5	 (0 to 10) mg/m^3 (0 to 10) mg/m^3 (0 to 10) mg/m^3	 17 % 17 % 17 %	Reference meter comparison ISO 21501-4/ JJF 1659/ JJG 846

II. Electrical – DC/Low Frequency

Parameter/Equipment	Range	CMC[2, 3, 5] (±)	Comments
DC Current – Measure	(0.0001 to 10) A (10 to 20) A	0.18 % 0.80 %	Keysight 34461A UNI-T UT89X
DC Voltage – Measure	(0.01 to 1000) V	0.010 %	Keysight 34461A

Parameter/Equipment	Range	CMC[2, 3, 5] (±)	Comments
DC Resistance – Measure	0.1 Ω to 100 MΩ	0.055 %	Keysight 34461A
DC Current – Generate	(0.0001 to 20) A	0.20 %	Multifunction calibrator
Clamp meters	Up to 1000 A	1.0 %	Multifunction calibrator with 50-turn coil
DC Voltage – Generate	(0.01 to 1000) V	0.11 %	Multifunction calibrator
DC Resistance – Generate Fixed Points	1 mΩ 10 mΩ 100 mΩ 1 Ω 10 Ω 100 Ω 1 kΩ 10 kΩ 100 kΩ 1 MΩ 10 MΩ	0.26 % 0.26 % 0.26 % 0.26 % 0.26 % 0.26 % 0.26 % 0.26 % 0.26 % 0.26 % 0.26 %	Reference resistors

Parameter/Equipment	Frequency	CMC[2, 4, 5] (±)	Comments
AC Current – Measure			
(0.0001 to 10) A	60 Hz	0.65 %	Keysight 34461A
(10 to 20) A	60 Hz	0.80 %	UNI-T UT89X
AC Voltage – Measure			
(0.25 to 750) V	60 Hz	0.21 %	Keysight 34461A
(750 to 1000) V		0.60 %	UNI-T UT89X
AC Current – Generate			
(0.002 to 20) A	60 Hz	0.65 %	Multifunction calibrator
Clamp Meters, All types - Up to 1000	60 Hz	1.0 %	Multifunction calibrator with 50-turn coil

Parameter/Range	Frequency	CMC[2, 3, 5] (±)	Comments
AC Voltage – Generate (0.25 to 1000) V	60 Hz	0.32 %	Multifunction calibrator

III. Fluid Quantities

Parameter/Equipment	Range	CMC[2, 4, 5] (±)	Comments
Air Flow Rate – Measure	Up to 30 L/min	3.0 %	Reference air flow comparison JJG 956 (Sec. 6.3.3.1)
Air Velocity – Measuring Equipment	Up to 10 m/s	3.6 %	Reference anemometer
Volume – Measure	(1 to ≤10) µL (>10 to ≤100) µL (>100 to ≤1000) µL (>1000 to ≤10 000) µL	0.09 µL 0.62 µL 1.8 µL 22 µL	Gravimetric method per ISO 8655-6 using electronic balances

IV. Thermodynamics

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Temperature – Measuring Equipment	(-20 to 5) °C (5 to 55) °C (55 to 80) °C	0.58 °C 0.14 °C 0.58 °C	Reference thermometer JJF 1183
Temperature – Liquid-In-Glass Thermometer	(-20 to 300) °C	0.14 °C	Reference thermometer JJG 130
Thermometer With Display Unit	(-20 to 300) °C	0.038 °C	

Parameter/Equipment	Range	CMC[2, 4, 5] (±)	Comments
Humidity Detecting Equipment	(10 to 90) % RH	1.9 % RH	Reference humidity probe JJF 1076

V. Mechanical

Parameter/Equipment	Range	CMC[2, 4] (±)	Comments
Pressure – Measuring Equipment	(-90 to -10) kPa (0.1 to 1) kPa (1 to 300) kPa (0.3 to 6) MPa	0.41 kPa 0.004 kPa 0.41 kPa 0.008 MPa	Reference pressure gages

[1] This laboratory offers commercial calibration service.

[2] Calibration and Measurement Capability Uncertainty (CMC) is the smallest uncertainty of measurement that a laboratory can achieve within its scope of accreditation when performing more or less routine calibrations of nearly ideal measurement standards or nearly ideal measuring equipment. CMCs represent expanded uncertainties expressed at approximately the 95 % level of confidence, usually using a coverage factor of k = 2. The actual measurement uncertainty of a specific calibration performed by the laboratory may be greater than the CMC due to the behavior of the customer's device and to influences from the circumstances of the specific calibration.

[3] The stated measured values are determined using the indicated instrument (see Comments). This capability is suitable for the calibration of the devices intended to measure or generate the measured value in the ranges indicated. CMCs are expressed as either a specific value that covers the full range or as a fraction/percentage of the reading plus a fixed floor specification.

[4] The type of instrument or material being calibrated is defined by the parameter. This indicates the laboratory is capable of calibrating instruments that measure or generate the values in the ranges indicated for the listed measurement parameter.

[5] In the statement of CMC, percentages are percentages of reading, unless otherwise indicated.

[6] This scope meets A2LA's *P112 Flexible Scope Policy*.

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Fax: +852 30116194 Website: www.callab.com.hk

CERTIFICATE OF CALIBRATION

Applicant: Apex Testing & Certification Ltd. Address: Unit D6A, 10/F, TML Tower, 3 Hoi Shing Road, Tsuen Wan, N.T., HK	Calibration Certificate No.	HV0082604
	Date of Receipt	30 March 2026
	Date of Calibration	1 April 2026
	Page	1 of 1

Item for Calibration

Description	:	便携式粉尘检测仪
Manufacturer	:	江苏灵熙电子有限公司
Model No.	:	LX-PM100
Serial No.	:	800S6312208

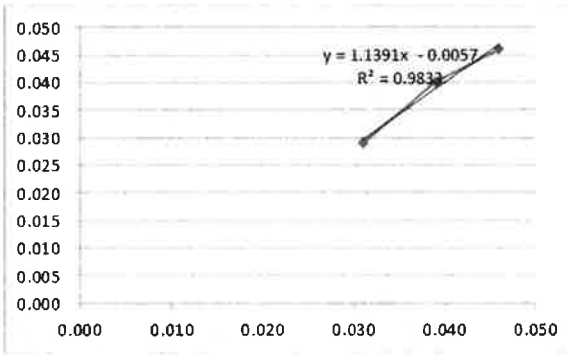
Standard Equipment

Description	:	High Volume Sampler / Calibration Orifice
Manufacturer	:	Tisch Environmental, Inc.
Model No.	:	TE-5170 / TE-5025A
Serial No.	:	3476 / 4088
Last Calibration	:	23 October 2025/ 9 September 2025

Date	Time	Mean Temp (°C)	Mean Pressure (hPa)	Concentration Standard Equipment (mg/m^3)	Concentration Calibrated Equipment (mg/m^3)
1 April 2026	10:13:00 AM	22.9	1004.4	0.046	0.046
1 April 2026	11:35:00 AM	22.9	1004.4	0.039	0.040
1 April 2026	12:49:00 PM	22.9	1004.4	0.031	0.029

By Linear Regression of Y on X

Slope	:	1.1391
Correlation Coefficient	:	0.9833
K-Factor	:	1.0147
Validity of Calibration	:	31 March 2027



Calibrated By: Checked and Approved By: Company Chop:

Wing Cheng Warren Yeung

Certificate Issue Date: 9 April 2026

CT-BEG-04

***** End of Certificate *****

Cal Lab Limited 校正實驗室有限公司
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CERTIFICATE OF CALIBRATION

Applicant: Apex Testing & Certification Ltd. Address: Unit D6A, 10/F, TML Tower, 3 Hoi Shing Road, Tsuen Wan, N.T., HK	Calibration Certificate No.	HV0212604
	Date of Receipt	30 March 2026
	Date of Calibration	1 April 2026
	Page	1 of 1

Item for Calibration

Description	:	便携式粉尘检测仪
Manufacturer	:	江苏灵熙电子有限公司
Model No.	:	LX-PM100
Serial No.	:	800S6312221

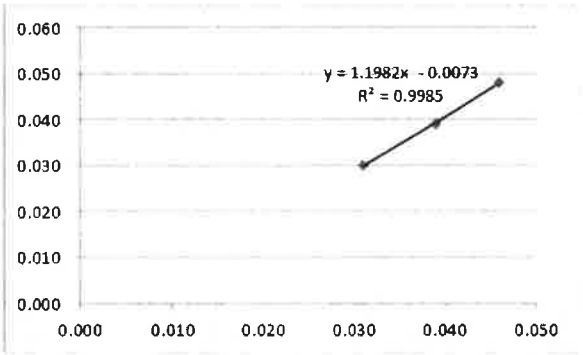
Standard Equipment

Description	:	High Volume Sampler / Calibration Orifice
Manufacturer	:	Tisch Environmental, Inc.
Model No.	:	TE-5170 / TE-5025A
Serial No.	:	3476 / 4088
Last Calibration	:	23 October 2025/ 9 September 2025

Date	Time	Mean Temp (°C)	Mean Pressure (hPa)	Concentration Standard Equipment (mg/m^3)	Concentration Calibrated Equipment (mg/m^3)
1 April 2026	10:13:00 AM	22.9	1004.4	0.046	0.048
1 April 2026	11:35:00 AM	22.9	1004.4	0.039	0.039
1 April 2026	12:49:00 PM	22.9	1004.4	0.031	0.030

By Linear Regression of Y on X

Slope	:	1.1982
Correlation Coefficient	:	0.9985
K-Factor	:	0.9972
Validity of Calibration	:	31 March 2027



Calibrated By: Checked and Approved By: Company Chop:

Wing Cheng Warren Yeung Certificate Issue Date: 9 April 2026

CT-BEG-04

***** End of Certificate *****

Cal Lab Limited 校正實驗室有限公司
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Fax: +852 30116194 Website: www.callab.com.hk

CERTIFICATE OF CALIBRATION

Applicant: Apex Testing & Certification Ltd. Address: Unit D6A, 10/F, TML Tower, 3 Hoi Shing Road, Tsuen Wan, N.T., HK	Calibration Certificate No.	HV0332604
	Date of Receipt	30 March 2026
	Date of Calibration	1 April 2026
	Page	1 of 1

Item for Calibration

Description	:	便携式粉尘检测仪
Manufacturer	:	江苏灵熙电子有限公司
Model No.	:	LX-PM100
Serial No.	:	800S6312233

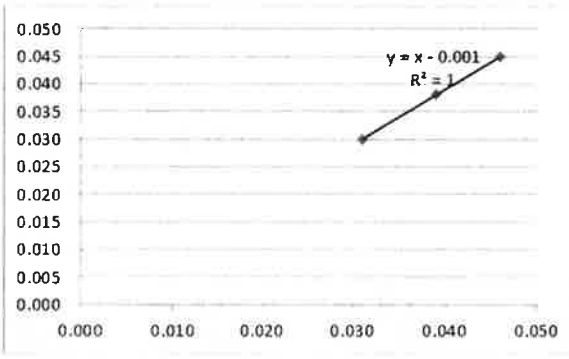
Standard Equipment

Description	:	High Volume Sampler / Calibration Orifice
Manufacturer	:	Tisch Environmental, Inc.
Model No.	:	TE-5170 / TE-5025A
Serial No.	:	3476 / 4088
Last Calibration	:	23 October 2025/ 9 September 2025

Date	Time	Mean Temp (°C)	Mean Pressure (hPa)	Concentration Standard Equipment (mg/m^3)	Concentration Calibrated Equipment (mg/m^3)
1 April 2026	10:13:00 AM	22.9	1004.4	0.046	0.045
1 April 2026	11:35:00 AM	22.9	1004.4	0.039	0.038
1 April 2026	12:49:00 PM	22.9	1004.4	0.031	0.030

By Linear Regression of Y on X

Slope	:	1.0000
Correlation Coefficient	:	1.0000
K-Factor	:	1.0273
Validity of Calibration	:	31 March 2027



Calibrated By: Wing Cheng

Checked and Approved By: Warren Yeung

Company Chop:

Certificate Issue Date: 9 April 2026

CT-BEG-04

***** End of Certificate *****

TE-5170 Calibration Worksheet

Site Information

Location:	AM3A	Site ID:	Zones 2A at West Kowloon Cultural	Date:	16-Apr-26
Sampler:	TE-5170	Serial No:	4340	Tech:	CS Tang

Site Conditions

Barometric Pressure (in Hg):	29.85	Corrected Pressure (mm Hg):	758
Temperature (deg F):	81	Temperature (deg K):	300
Average Press. (in Hg):	29.85	Corrected Average (mm Hg):	758
Average Temp. (deg F):	81	Average Temp. (deg K):	300

Calibration Orifice

Make:	Tisch	Qstd Slope:	2.11142
Model:	TE-5025A	Qstd Intercept:	-0.03845
Serial#:	4088	Date Certified:	9-Sep-25

Calibration Information

Plate or Test #	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)
1	12.60	1.692	53.0	52.76
2	10.70	1.560	48.0	47.78
3	7.50	1.309	41.0	40.81
4	4.60	1.029	33.0	32.85
5	2.60	0.778	23.0	22.90

Linear Regression

Slope:	31.6268
Intercept:	-0.8681
Corr. Coeff:	0.9976
# of Observations:	5

Calculations

Qstd = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b]
IC = I[Sqrt(Pa/Pstd)(Tstd/Ta)]

Qstd = standard flow rate
IC = corrected chart response
I = actual chart response
m = calibrator Qstd slope
b = calibrator Qstd intercept
Ta = actual temperature during calibration (deg K)
Pa = actual pressure during calibration (mm Hg)
Tstd = 298 deg K
Pstd = 760 mm Hg
For subsequent calculation of sampler flow:
1/m((I)[Sqrt(298/Tav)(Pav/760)]-b)

m = sampler slope
b = sampler intercept
I = chart response
Tav = daily average temperature
Pav = daily average pressure

Average I (chart):	40
Average Flow Calculation m3/min	1.273885088
Average Flow Calculation in CFM	44.98088246
Sample Time (Hrs):	1.0
Total Flow in m3/min	76.43310528
Total Flow in CFM	2698.852947

NOTE: Ensure calibration orifice has been certified within 12 months of use

TE-5170 Calibration Worksheet

Site Information

Location:	AM4A	Site ID:	Zones 2A at West Kowloon Cultural	Date:	16-Apr-26
Sampler:	TE-5170	Serial No:	3998	Tech:	CS Tang

Site Conditions

Barometric Pressure (in Hg):	29.85	Corrected Pressure (mm Hg):	758
Temperature (deg F):	81	Temperature (deg K):	300
Average Press. (in Hg):	29.85	Corrected Average (mm Hg):	758
Average Temp. (deg F):	81	Average Temp. (deg K):	300

Calibration Orifice

Make:	Tisch	Qstd Slope:	2.11142
Model:	TE-5025A	Qstd Intercept:	-0.03845
Serial#:	4088	Date Certified:	9-Sep-25

Calibration Information

Plate or Test #	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)
1	12.50	1.685	53.0	52.76
2	10.80	1.568	48.0	47.78
3	7.60	1.318	41.0	40.81
4	4.40	1.007	33.0	32.85
5	2.30	0.733	23.0	22.90

Linear Regression

Slope:	30.1402
Intercept:	1.3771
Corr. Coeff:	0.9976
# of Observations:	5

Calculations

Qstd = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b]
IC = I[Sqrt(Pa/Pstd)(Tstd/Ta)]

Qstd = standard flow rate
IC = corrected chart response
I = actual chart response
m = calibrator Qstd slope
b = calibrator Qstd intercept
Ta = actual temperature during calibration (deg K)
Pa = actual pressure during calibration (mm Hg)
Tstd = 298 deg K
Pstd = 760 mm Hg
For subsequent calculation of sampler flow:
1/m((I)[Sqrt(298/Tav)(Pav/760)]-b)

m = sampler slope
b = sampler intercept
I = chart response
Tav = daily average temperature
Pav = daily average pressure

Average I (chart): 40
Average Flow Calculation m3/min
1.262222125
Average Flow Calculation in CFM
44.56906323
Sample Time (Hrs): 1.0
Total Flow in m3/min
75.7333275
Total Flow in CFM
2674.143794

NOTE: Ensure calibration orifice has been certified within 12 months of use

TE-5170 Calibration Worksheet

Site Information

Location:	AM5A	Site ID:	Zones 2A at West Kowloon Cultural	Date:	16-Apr-26
Sampler:	TE-5170	Serial No:	4344	Tech:	CS Tang

Site Conditions

Barometric Pressure (in Hg):	29.85	Corrected Pressure (mm Hg):	758
Temperature (deg F):	81	Temperature (deg K):	300
Average Press. (in Hg):	29.85	Corrected Average (mm Hg):	758
Average Temp. (deg F):	81	Average Temp. (deg K):	300

Calibration Orifice

Make:	Tisch	Qstd Slope:	2.11142
Model:	TE-5025A	Qstd Intercept:	-0.03845
Serial#:	4088	Date Certified:	9-Sep-25

Calibration Information

Plate or Test #	H2O (in)	Qstd (m3/min)	I (chart)	IC (corrected)
1	12.60	1.692	53.0	52.76
2	10.50	1.546	48.0	47.78
3	7.70	1.326	41.0	40.81
4	4.50	1.018	33.0	32.85
5	2.50	0.764	23.0	22.90

Linear Regression

Slope:	31.2568
Intercept:	-0.2519
Corr. Coeff:	0.9979
# of Observations:	5

Calculations

Qstd = 1/m[Sqrt(H2O(Pa/Pstd)(Tstd/Ta))-b]
IC = I[Sqrt(Pa/Pstd)(Tstd/Ta)]

Qstd = standard flow rate
IC = corrected chart response
I = actual chart response
m = calibrator Qstd slope
b = calibrator Qstd intercept
Ta = actual temperature during calibration (deg K)
Pa = actual pressure during calibration (mm Hg)
Tstd = 298 deg K
Pstd = 760 mm Hg
For subsequent calculation of sampler flow:
1/m((I)[Sqrt(298/Tav)(Pav/760)]-b)

m = sampler slope
b = sampler intercept
I = chart response
Tav = daily average temperature
Pav = daily average pressure

Average I (chart): 40
Average Flow Calculation m3/min
1.269246384
Average Flow Calculation in CFM
44.81708982
Sample Time (Hrs): 1.0
Total Flow in m3/min
76.15478304
Total Flow in CFM
2689.025389

NOTE: Ensure calibration orifice has been certified within 12 months of use

TISCH Environmental

RECALIBRATION DUE DATE:
September 9, 2026

Certificate of Calibration

Calibration Certification Information				
Cal. Date:	September 9, 2025	**Rootsmeter S/N:** 438320	**Ta:** 294	°K
Operator:	Jim Tisch		**Pa:** 754.9	mm Hg
Calibration Model #:	TE-5025A	**Calibrator S/N:** **4088**		

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.4460	3.2	2.00
2	3	4	1	1.0320	6.4	4.00
3	5	6	1	0.9210	8.0	5.00
4	7	8	1	0.8840	8.8	5.50
5	9	10	1	0.7240	12.8	8.00

Data Tabulation

Vstd (m3)	Qstd (x-axis)	$\sqrt{\Delta H\left(\frac{Pa}{Pstd}\right)\left(\frac{Tstd}{Ta}\right)}$ (y-axis)	Va	Qa (x-axis)	$\sqrt{\Delta H(Ta/Pa)}$ (y-axis)
1.0025	0.6933	1.4190	0.9958	0.6886	0.8826
0.9983	0.9673	2.0068	0.9915	0.9608	1.2481
0.9961	1.0816	2.2436	0.9894	1.0743	1.3955
0.9951	1.1256	2.3532	0.9883	1.1180	1.4636
0.9897	1.3670	2.8380	0.9830	1.3578	1.7651
QSTD	**m=**	**2.11142**	**QA**	**m=**	**1.32213**
	b=	**-0.03845**		**b=**	**-0.02391**
	r=	**0.99983**		**r=**	**0.99983**

Calculations

Vstd=	ΔVol((Pa-ΔP)/Pstd)(Tstd/Ta)	**Va=**	ΔVol((Pa-ΔP)/Pa)
Qstd=	Vstd/ΔTime	**Qa=**	Va/ΔTime

For subsequent flow rate calculations:

Qstd= $1/m\left(\left(\sqrt{\Delta H\left(\frac{Pa}{Pstd}\right)\left(\frac{Tstd}{Ta}\right)}\right)-b\right)$

Qa= $1/m\left(\left(\sqrt{\Delta H(Ta/Pa)}\right)-b\right)$

Standard Conditions	
Tstd:	298.15 °K
Pstd:	760 mm Hg

Key
ΔH: calibrator manometer reading (in H2O)
ΔP: rootsmeter manometer reading (mm Hg)
Ta: actual absolute temperature (°K)
Pa: actual barometric pressure (mm Hg)
b: intercept
m: slope

RECALIBRATION

US EPA recommends annual recalibration per 1998 40 Code of Federal Regulations Part 50 to 51, Appendix B to Part 50, Reference Method for the Determination of Suspended Particulate Matter in the Atmosphere, 9.2.17, page 30

Tisch Environmental, Inc.
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华南国家计量测试中心
广东省计量科学研究院
SOUTH CHINA NATIONAL CENTER OF METROLOGY
GUANGDONG INSTITUTE OF METROLOGY

中国认可
国际互认
校准
CALIBRATION
CNAS L0730

校准证书

CALIBRATION CERTIFICATE

证书编号 SXE202510293 第 1 页，共 4 页
Certificate No. Page of

计量器具名称 Description	声校准器
型号/规格 Model/Type	AWA6221A
制造厂 Manufacturer	HANGZHOU AIHUA INSTRUMENTS CO., LTD.
出厂编号 Serial No.	AWA6221A0439E
设备管理编号 Equipment No.	FYH-QM4-NG-119
接收日期 Receipt on	2025 年 06 月 06 日 (Y M D)
结论 Conclusion	符合JJG 176-2022（1级）技术要求 Comply with the requirements for JJG 176-2022(for Class 1)
校准日期 Calibration on	2025 年 06 月 11 日 (Y M D)
发布日期 Issue on	2025 年 06 月 12 日 (Y M D)

批 准 Authorized by 李敏毅
核 验 Reviewed by 李广智
校 准 Calibrated by 何卓斌

证书专用章

扫一扫查真伪

本中心地址：中国广州市广园中路松柏东街30号 邮政编码：510405
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Add: No.30, Songbai East Street, Guangyuan Middle Road, Guangzhou, Guangdong, China
Post Code: 510405 Tel: (8620)86594172 Fax: (8620)86590743 Complaint Tel: (8620)36611242
证书真伪查询：www.scm.com.cn；cert.scm.com.cn Certificate AuthenticityIdentify: www.scm.com.cn；cert.scm.com.cn
计量标准考核证书号：[1992]国量标粤证字第085号
Certificate No. for Examination of measurement standard

校 准 结 果
RESULTS OF CALIBRATION

证书编号 SXE202510293 原始记录号 SXE202510293 第 3 页,共 4 页
Certificate No. Record No. Page of

1 外观： 符合要求

Apparent inspection: Pass

2 声压级：见表1

Sound Pressure Level: Shown in table 1

表1 Table 1

标称频率/Hz Nominal Frequency	规定声压级/dB Specified sound pressure level	测得的声压级/dB Measured sound pressure level	测得的声压级与规定声压级之差的绝对值/dB Absolute value of Error	接受限/dB Acceptance limit	结论 Conclusion
1000	94	93.96	0.04	0.25	符合要求(Pass)
1000	114	114.01	0.01	0.25	符合要求(Pass)

3 频率：见表2

Frequency: Shown in table 2

表2 Table 2

规定频率/Hz Specified frequency	标称声压级/dB Nominal sound pressure level	测得的频率/Hz Measured frequency	测得的频率与规定频率相对误差的绝对值/% Absolute value of Error	接受限/% Acceptance limit	结论 Conclusion
1000	94	998.95	0.1051	0.7	符合要求(Pass)
1000	114	998.99	0.1014	0.7	符合要求(Pass)

4 总失真+噪声： 见表3

Total distortion + noise: Shown in table 3

表3 Table 3

规定频率/Hz Specified frequency	标称声压级/dB Nominal sound pressure level	总失真+噪声/% Total Distortion+ noise	接受限/% Acceptance limit	结论 Conclusion
1000	94	0.1	2.5	符合要求(Pass)
1000	114	0.3	2.5	符合要求(Pass)

说　明

证书编号 SXE202510293　　第 2 页，共 4 页
Certificate No.　　**DIRECTIONS**　　Page of

1. 本中心是国家市场监督管理总局在华南地区设立的国家法定计量检定机构，本中心的质量管理体系符合ISO/IEC 17025:2017标准的要求。

This laboratory is the National Legal Metrological Verification Institution in southern China set up by the State Administration for Market Regulation. The quality system is in accordance with ISO/IEC 17025:2017.

2. 本中心所出具的数据均可溯源至国家计量基准和/或国际单位制(SI)。

All data issued by this laboratory are traceable to national primary standards and/or International System of Units (SI).

3. 校准地点、环境条件：

Location and environmental conditions of the calibration:

地点 Location　声学/振动实验室 Acoustics/Vibration Lab.　温度 Temperature　(25±1) ℃　相对湿度 R.H.　(40～50) %

4. 本次校准的技术依据：

Reference documents for the calibration:

JJG 176-2022 声校准器检定规程　V.R. of Sound Calibrators

5. 本次校准所使用的主要计量标准器具：

Major standards of measurement used in the calibration:

设备名称/型号规格/测量范围 Name of Equipment /Model/Type/Range	编号 Serial No.	证书号/有效期/溯源单位 Certificate No./Due Date /Traceability to	计量特性 Metrological Characteristic
动态信号分析仪 Dynamical Signal Analyzer /3560C (3110模块) /0.1 Hz～200 kHz	2392397	SXE202500778 /2026-04-16 /本中心	电压:U_{rel}=0.2%, 频率:U_{rel}=0.002% (k=2) Voltage:U_{rel}=0.2%, Frequency :U_{rel}=0.002% (k=2)
工作标准传声器 Working standard microphone /4190/20 Hz～20 kHz	2383233	SXE202500423 /2026-03-03 /本中心	20 Hz～4 kHz, U=0.20dB 5 kHz～20 kHz, U=0.50dB (k=2)
声校准器 Sound Level Calibrator /4231/94 dB, 114 dB	2730392	SXE202500307 /2026-02-09 /本中心	1 级 Class 1

注：1. 本证书校准结果只与受校准仪器有关。The results relate only to the items calibrated.

Note: 2. 未经本机构书面批准，不得部分复制此证书。This certificate shall not be reproduced except in full, without the written approval of our laboratory.

3. “客户名称”、“联络信息”由委托方提供，“制造厂”、“型号规格”、“出厂编号”以及“设备编号”为仪器上标注，委托方对上面内容如有异议，须在收到证书后二十个工作日内提出。

The information **Name of the Customer** and **Contact Information** are provided by client, and the **Manufacturer, Model/Type, Serial No.** and **Equipment No.** are marked on the items. Client shall submit any objection within 20 working days after receiving the certificate for the information above.

校 准 结 果
RESULTS OF CALIBRATION

证书编号 SXE202510293 原始记录号 SXE202510293 第 4 页,共 4 页
Certificate No. Record No. Page of

说明：

Note:

1 测量结果扩展不确定度：

Expanded uncertainty of measurement results:

声压级：U=0.15 dB，频率：U_{rel}=0.1%，总失真+噪声：U=0.4%，包含因子：k=2

Sound Pressure Level , Frequency , Total distortion + noise , Coverage factor

2 本证书中给出的扩展不确定度依据JJF1059.1-2012《测量不确定度评定与表示》评定，由合成标准不确定度乘以包含概率约为95%时对应的包含因子k得到。

The expanded uncertainty given in this certificate is evaluated according to JJF 1059.1-2012 "Evaluation and Expression of Uncertainty in Measurement", which is obtained by multiplying the combined standard uncertainty by the coverage factor k corresponding to the coverage probability of about 95%.

3 校准结果符合性判定依据JJF 1094-2002《测量仪器特性评定》之5.3.1和JJG 176-2022《声校准器检定规程》。

Decision rules of conformity are JJF 1094-2002 *Evaluation of the Characteristics of Measuring Instruments* (5.3.1) and JJG 176-2022 *V.R. of Sound Calibrators*.

4 结论：被校准仪器校准结果符合 JJG 176-2022 (1级)全部后续项目技术要求。

Conclusion: The data of instrument calibrated comply with the technical characteristics of all subsequent items in JJG 176-2022 (for Class 1).

5 该仪器的溯源日期为本证书的"校准日期"，由于复校时间间隔的长短是由仪器的使用情况、使用者、仪器本身质量等诸因素所决定的，因此，送校单位可根据实际使用情况自主决定复校时间间隔。更换重要部件、维修或对仪器性能有怀疑时，应及时校准。

The traceability date of this instrument is the "Calibration Date" on this certificate, Since the calibration interval is determined by the use of the instrument, operation of the user, the quality of the instrument itself and other factors, the re-calibration date can be decided by the user according to the actual situation. In case of replacement of important parts, maintenance or doubt on the performance of the instrument, it shall be calibrated in time.

6 校准活动中对测量结果有影响的条件：

Conditions under which the calibrations were made that have an influence on the measurement results

温度（Temperature）：（25±1）℃

湿度（Humidity）：（40~50）%RH

静压（Static pressure）：（100.0~101.0）kPa

CTI

中国认可
国际互认
校准
CALIBRATION
CNAS L5102

华测计量检测有限公司

CTI MEASUREMENT AND TESTING CO., LTD.

校准证书

Calibration Certificate

证书编号 Certificate No.	C2509253990002	第1页共7页 Page of	
委托单位 Customer	上峰检测认证有限公司		
委托单位地址 Address	香港荃湾海盛路3号TML广场10楼D6A室		
器具名称 Name of instrument	声级计		
型号规格 Model	AWA5661		
制造商 Manufacturer	杭州爱华仪器有限公司		
出厂编号 Serial No.	301135	管理编号 Management No.	--------
接收日期 Received date	2025/09/26	校准日期 Calibration date	2025/09/27
发布日期 Issue date	2025/09/28	建议下次校准日期 Next calibration date	2026/09/26

证书/报告章
Stamp

校准专用章
Calibration Seal

批准 Approved by	曾财萍 曾财萍
审核 Inspected by	刘然 刘然
校准 Calibrated by	李少雄 李少雄

总部地址：广东省深圳市宝安区西乡街道铁岗社区桃花源科技创新园B、C栋
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实验室地址：广东省深圳市宝安区西乡街道铁岗社区桃花源科技创新园B、C栋
Laboratory address: Building B and C, Taohuayuan Sci-Tech Innovation Park, Tiegang Community, Xixiang Sub-district, Bao'an District, Shenzhen, Guangdong, China
邮编 Post code：518101 电话 Tel.：86-755-33682045 电子邮箱 E-mail：calibration@cti-cert.com

说 明

Directions

证书编号 C2509253990002
Certificate No.

1. **本证书校准结果均可溯源至国际单位制（SI）单位。**
The results are traceable to International System of Units(SI).

2. **证书未盖本公司证书/报告章及骑缝章无效。未经本公司书面批准，不得部分复制此证书。**
Any certificate is deemed to be invalid without both the certificate/report seal and its across-page seal. This certificate shall not be copied partly without the written approval.

3. **本证书校准结果只与受校准仪器有关。如证书中的英文内容与中文内容有差异，以中文为准。**
The results relate only to the items calibrated. In case of any discrepancy between the English version and Chinese version of the certificate(if generated), the Chinese version shall prevail.

4. **本次校准的技术依据：**
Reference documents for the calibration
JJG 188-2017 声级计检定规程

5. **校准地点、环境条件：**
Place and environment condition during calibration
地点：本实验室力学室(6)
Place
温度：22.3℃
Temperature
相对湿度：52%
R.H.

计量溯源性声明

6. **本次校准所使用的主要计量标准器具：**
Main mearsurement standards used in the calibration

名称/型号规格 Name/Model	编号 Serial No.	测量范围 Measurement range	准确度等级/最大允许误差/不确定度 Accuracy class/Maximum permissible error/Uncertainty	证书号/溯源机构 Certificate No./Traceability to	有效期 Due date
声校准器 4231	3014336	94dB~114dB	1级	SXE202510332 广东省计量科学研究院	2026/07/07
消声箱 AWA188	080312	10Hz~20kHz （20~130）dB	U=0.8dB,k=2	JL2411712691 深圳市计量质量检测研究院	2029/09/09
声频功率放大器 AWA5871	080649	/	U=0.03dB,k=2	SXE202501365 广东省计量科学研究院	2026/07/08
有源耦合腔 AWA6153S+	2006409	10Hz~400Hz	声压级:U=0.2dB,k=2 失真度:U=0.2%,k=2	SXE202483069 广东省计量科学研究院	2026/07/22
传声器 4192	2996596	1Hz~20000Hz	20Hz ~ 4kHz:U=0.20dB,k=2; 5kHz ~ 20kHz:U=0.50dB,k=2	SXE202501375 广东省计量科学研究院	2026/07/14
信号发生器 AWA1650	089943	0.5Hz~20kHz	电压：U_{rel}=0.2%,k=2 频率：U_{rel}=0.1%,k=2	SXE202501364 广东省计量科学研究院	2026/07/08

说 明

Directions

名称/型号规格 Name/Model	编号 Serial No.	测量范围 Measurement range	准确度等级/最大允许误差/不确定度 Accuracy class/Maximum permissible error/Uncertainty	证书号/溯源机构 Certificate No./Traceability to	有效期 Due date
测试声源(扬声器) AWA5511A	090677	20Hz~20kHz	最大声压级:U=0.6dB,k=2 声源稳定性:U=0.6dB,k=2 总失真:U_{rel}=2.7%,k=2 频率响应:U=0.6dB,k=2	SXE202501372 广东省计量科学研究院	2026/07/14
测量放大器 AWA5810D	089909	4Hz~20kHz	灵敏度：U=0.04dB,k=2 频率计权：U=0.2dB,k=2 线性计权： 4Hz ~ 10Hz:U=0.11dB,k=2 10Hz ~ 20kHz:U=0.04dB,k=2	SXE202583084 广东省计量科学研究院	2026/07/10
信号发生器(猝发音发生器) AWA1650	089943	10Hz~20kHz	时间：(0.1~10) ms:U_{rel}=0.36%,k=2 (>10~200) ms:U_{rel}=0.28%,k=2 (>0.2~10) s:U_{rel}=0.24%,k=2 频率:U_{rel}=0.01%,k=2 电压:U_{rel}=0.1%,k=2	SXE202583085 广东省计量科学研究院	2026/07/14

校准结果

Results of calibration

证书编号 C2509253990002
Certificate No.

1. 外观及工作正常性检查
Appearance and function check
正常 Normal

2. 指示声级调整（1000HZ）

声级计频率计权	声校准器频率 (Hz)	声校准器标准值 (dB)	调校前声级计示值 (dB)	调校后声级计示值 (dB)	接受限 (dB)	结论 Pass/Fail
A	1000	94	93.5	94.0	93.7 ~ 94.3	Pass

3. 频率计权的声信号实验 （频率：1000Hz/A频率计权）

声压级标准值 (dB)	声压级指示值 (dB)	接受限 (dB)	结论 Pass/Fail
44	44.2	43.2 ~ 44.8	Pass
54	54.1	53.2 ~ 54.8	Pass
64	64.0	63.2 ~ 64.8	Pass
74	74.0	73.2 ~ 74.8	Pass
84	84.0	83.2 ~ 84.8	Pass
94	94.0	93.2 ~ 94.8	Pass
104	104.0	103.2 ~ 104.8	Pass
114	114.1	113.2 ~ 114.8	Pass

4. 本机自生噪音

测试类型	频率计权	实测值（dB）
声信号	A	41.2
电信号	A	41.5
	C	46.3
	Z	48.6

5. 级线性（1dB ~ 10dB内变化）： 起始点指示声级 90 dB

频率 (Hz)	测量项目 ----	实测值 (dB)	接受限 (dB)	结论 Pass/Fail
1000	起始点以上每间隔10dB最大偏差	+0.1	± 0.3	Pass
	起始点以下每间隔10dB最大偏差	0.0	± 0.3	Pass
	距上限5dB内每隔1dB最大偏差	0.0	± 0.3	Pass
	距下限5dB内每隔1dB最大偏差	–0.1	± 0.3	Pass
8000	起始点以上每间隔10dB最大偏差	0.0	± 0.3	Pass
	起始点以下每间隔10dB最大偏差	0.0	± 0.3	Pass
	距上限5dB内每隔1dB最大偏差	–0.1	± 0.3	Pass
	距下限5dB内每隔1dB最大偏差	0.0	± 0.3	Pass

校准结果

Results of calibration

证书编号 C2509253990002
Certificate No.

6. 频率计权

频率 (Hz)	A计权标准值 (dB)	声压级指示值 (dB)	接受限 (dB)	结论 Pass/Fail
20	-50.5	-50.6	-48.5 ~ -52.5	Pass
31.5	-39.4	-39.5	-37.9 ~ -40.9	Pass
63	-26.2	-26.2	-25.2 ~ -27.2	Pass
125	-16.1	-16.2	-15.1 ~ -17.1	Pass
250	-8.6	-8.6	-7.6 ~ -9.6	Pass
500	-3.2	-3.2	-2.2 ~ -4.2	Pass
1000	0.0	0.0	+0.7 ~ -0.7	Pass
2000	+1.2	+1.2	+2.2 ~ +0.2	Pass
4000	+1.0	+1.0	+2.0 ~ 0.0	Pass
8000	-1.1	-1.3	+0.4 ~ -3.6	Pass
16000	-6.6	-9.6	-4.1 ~ -22.6	Pass
20000	-9.3	-22.5	-6.3 ~ -∞	Pass

频率 (Hz)	C计权标准值 (dB)	声压级指示值 (dB)	接受限 (dB)	结论 Pass/Fail
20	-6.2	-6.2	-4.2 ~ -8.2	Pass
31.5	-3.0	-3.0	-1.5 ~ -4.5	Pass
63	-0.8	-0.8	+0.2 ~ -1.8	Pass
125	-0.2	-0.2	+0.8 ~ -1.2	Pass
250	0.0	0.0	+1.0 ~ -1.0	Pass
500	0.0	0.0	+1.0 ~ -1.0	Pass
1000	0.0	0.0	+0.7 ~ -0.7	Pass
2000	-0.2	-0.2	+0.8 ~ -1.2	Pass
4000	-0.8	-0.8	+0.2 ~ -1.8	Pass
8000	-3.0	-3.0	-1.5 ~ -4.5	Pass
16000	-8.5	-11.5	-6.0 ~ -24.5	Pass
20000	-11.2	-24.3	-8.2 ~ -∞	Pass

CTI

校准结果

Results of calibration

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频率 (Hz)	Z计权标准值 (dB)	声压级指示值 (dB)	接受限 (dB)	结论 Pass/Fail
20	0.0	−0.1	+2.0 ~ −2.0	Pass
31.5	0.0	−0.1	+1.5 ~ −1.5	Pass
63	0.0	0.0	+1.5 ~ −1.5	Pass
125	0.0	0.0	+1.0 ~ −1.0	Pass
250	0.0	0.0	+1.0 ~ −1.0	Pass
500	0.0	0.0	+1.0 ~ −1.0	Pass
1000	0.0	0.0	+0.7 ~ −0.7	Pass
2000	0.0	0.0	+1.0 ~ −1.0	Pass
4000	0.0	0.0	+1.0 ~ −1.0	Pass
8000	0.0	0.0	+1.5 ~ −2.5	Pass
16000	0.0	−0.1	+2.5 ~ −16.0	Pass
20000	0.0	−0.3	+3.0 ~ −∞	Pass

7. 1kHz处的频率计权

A计权参考声级 (dB)	C频率计权相对A频率计权的偏差 (dB)	Z频率计权相对A频率计权的偏差 (dB)	结论 Pass/Fail	接受限 (dB)
94	0.0	−0.1	Pass	± 0.2

8. F和S时间计权

衰减速率 (dB/s)	实测值 (dB/s)	接受限 (dB/s)	结论 Pass/Fail
快（F）计权	34.6	31.0 ~ 38.5	Pass
慢（S）计权	4.4	3.6 ~ 5.1	Pass

9. 猝发音响应（A计权）

猝发音持续时间 (ms)	(LAFmax−LA)标准值 (dB)	(LAFmax−LA)指示值 (dB)	接受限 (dB)	结论 Pass/Fail
200	−1.0	−1.0	−0.5 ~ −1.5	Pass
2	−18.0	−18.0	−17.0 ~ −18.5	Pass
0.25	−27.0	−27.1	−26.0 ~ −30.0	Pass
猝发音持续时间 (ms)	(LASmax−LA)标准值 (dB)	(LSFmax−LA)指示值 (dB)	接受限(dB) (dB)	结论 Pass/Fail
200	−7.4	−7.4	−6.9 ~ −7.9	Pass
2	−27.0	−27.2	−26.0 ~ −30.0	Pass

校准结果

Results of calibration

证书编号 C2509253990002
Certificate No.

注：仪器配传声器型号： AWA14425 ，传声器编号： 61356
本次校准结果的扩展不确定度为：
Expanded uncertainty of measurement:
声信号：20Hz～200Hz，U= 0.5 dB，k=2； 250Hz～400Hz，U= 0.4 dB，k=2； 500Hz～1250Hz，U= 0.4 dB，k=2； 1600Hz～10000Hz， U= 0.6 dB，k=2； 12.5kHz~20kHz， U= 1.0 dB；
正弦电信号： （0～140）dB，（20～20000）Hz，U= 0.3 dB，k=2；
猝发音电信号：（0～140）dB， （1000～8000）Hz，(0.25～1000)ms U= 0.3 dB，k=2；
时间计权 F 和 S： F:(25～40)dB/s，U= 3.2 dB/s，k=2； S:(1～10)dB/s，U= 0.3 dB/s，k=2。

备注：
Notes

1. 依据JJF1059.1-2012测量不确定度评定与表示。
   According to JJF1059.1-2012 Evaluation and Expression of Uncertainty in Measurement.
2. 校准项目符合1级技术要求。
   The calibrated measurand are accord with class 1 technical specifications.

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