C P1
(1/3)

LIGHTHOUSE
WORLDWIDE SOLUTIONS BENELUX BV

ilac-MRA

KALIBRATIE
RvA K 166

Calibration certificate

Certificate number: LH80905

Revision 3.0.e

Applicant:
CCSTEC GesmbH
Triesterstrasse 36
A-2512, Oeynhausen
Austria

Instrument:

Description	Airborne particle counter
Manufacturer	Lighthouse
Model	Remote 2014
Serial number	180221001
Customer ID	C91

Date of calibration: 03 January 2022

Due date calibration: January 2023

Calibration method: Calibration has been accomplished as described in ISO21501-4:2018. All work performed is in accordance with Lighthouse Worldwide Solutions Benelux, Master Calibration Document: I201 and is recorded and maintained as such.

Results: The results of the measurements are shown in the appendix.
Readjustments: No readjustments are made.
Compliance, As left: Pass - The measured values were observed in tolerance at the points tested.

Traceability: The measurements have been executed using standards for which the traceability to (inter)national standards has been demonstrated towards the Raad voor Accreditatie.

Uncertainty: The reported expanded uncertainty is based on the standard uncertainty of the measurement multiplied by a coverage factor k, such that the coverage probability corresponds to approximately 95%. The standard uncertainty is determined in accordance with EA-4/02. The ILAC-G8:09/2019 Binary statement is used as method for the compliance statement.

Date of issue: 04 January 2022

Authorized by: M.A.W. van Boxtel
Head of Calibration

Lighthouse Worldwide Solutions Benelux BV
Van Heemstraweg 19A 6657 KD
Boven-Leeuwen The Netherlands
Tel: +31 (0)487 560811
E-mail: csbenelux@golighthouse.com

The Raad voor Accreditatie is one of the signatories of the Multilateral Agreement of the European Cooperation for Accreditation (EA) for the mutual recognition of calibration certificates.

CP1
(2/3)

LIGHTHOUSE
WORLDWIDE SOLUTIONS BENELUX BV

ilac-MRA

KALIBRATIE
RvA K 166

Appendix

Certificate number: LH80905

Date of calibration: 03 January 2022
Calibration location: Lighthouse Benelux Calibration laboratory in Boven-Leeuwen
Calibrated by: A.C.G. Gerritse
Function: Calibration & Service Engineer

Environmental conditions: The ambient temperature was 22,1 °C at a relative humidity of 33,0 %rh.

Measurement results, As found

Performance information

Test	*Test result*	*Expanded uncertainty*	*Criteria*	*Pass / Fail*
ISO21501-4 Flow	2,85 l/min	0,11 l/min	2,83 l/min ±5 %	Pass
JIS B 9921 Zero count	0	N/A	≤1 in 5 min	Pass
ISO21501-4 False count rate	Upper confidence level 212 counts per cubic meter	N/A	N/A	N/A
ISO21501-4 Timer check	60,1 seconds	0,4 s	±1 %	Pass
ISO21501-4 Size resolution	3,0 % used size 0,243 µm	5,4 %SR	< 15 %	Pass
ISO21501-4 Counting efficiency 50%	58,4 % used size 0,204 µm	3,0 %CE	(50±20) %	Pass
ISO21501-4 Counting efficiency 100%	102,4 % used size 0,309 µm	4,9 %CE	(100±10) %	Pass

Size calibration (criteria ±10%)

Channel	*Channel size* [µm]	*Threshold value* [mV]	*Calculated size* [µm]	*Expanded uncertainty* [µm]	*Calculated sizing error* [%]	*Compliance*
1	0,20	60	0,201	0,007	0,3	Pass
2	0,30	544	0,300	0,007	0,0	Pass
3	0,50	2233	0,508	0,010	1,7	Pass
4	1,00	4203	1,032	0,018	3,2	Pass

Notes

Counting efficiency: used size 0,500 µm: 97,2 %CE ± 5,0%CE
Counting efficiency: used size 1,000 µm: 101,9 %CE ± 5,8%CE

Reference equipment

Model	*S/N*	*Due to*	*Certificate number*
TSI Mass Flowmeter 4043	*40432119021*	*28 June 2022*	*70030*
Fisher Scientific 0666256	*200359247*	*16 June 2022*	*1042-11351217*
Palas	*6752 / 6751*	*16 November 2022*	*235-11195*
MCA8000D	*425*	*15 February 2022*	*21-13808-1-3*

Particle size standards

Size	*Description*	*Due to*	*Certificate*
0,20 µm	*3200 & 3200A Nanosphere size standards*	*March 2022*	*D20014*
0,25 µm	*3240A, Nanosphere size standards*	*July 2023*	*D20024*
0,30 µm	*3300A & 3300B, Nanosphere Size Standards*	*April 2023*	*D20015*
0,50 µm	*3500 & 3500A, Nanosphere Size Standards*	*April 2022*	*D20017*
1,00 µm	*4009A, 4009A & 4009B Microsphere Size Standards*	*October 2022*	*D20020*

LIGHTHOUSE
WORLDWIDE SOLUTIONS BENELUX BV

ilac-MRA
KALIBRATIE
RvA K 166

Appendix

Certificate number: LH80905

Date of calibration: 03 January 2022
Calibration location: Lighthouse Benelux Calibration laboratory in Boven-Leeuwen
Calibrated by: A.C.G. Gerritse
Function: Calibration & Service Engineer

Environmental conditions: The ambient temperature was 22,1 °C at a relative humidity of 33,0 %rh.

Measurement results, As left

Performance information

Test	*Test result*	*Expanded uncertainty*	*Criteria*	*Pass / Fail*
ISO21501-4 Flow	2,85 l/min	0,11 l/min	2,83 l/min ±5 %	Pass
JIS B 9921 Zero count	0	N/A	≤1 in 5 min	Pass
ISO21501-4 False count rate	Upper confidence level 212 counts per cubic meter	N/A	N/A	N/A
ISO21501-4 Timer check	60,1 seconds	0,4 s	±1 %	Pass
ISO21501-4 Size resolution	3,0 % used size 0,243 µm	5,4 %SR	< 15 %	Pass
ISO21501-4 Counting efficiency 50%	58,4 % used size 0,204 µm	3,0 %CE	(50±20) %	Pass
ISO21501-4 Counting efficiency 100%	102,4 % used size 0,309 µm	4,9 %CE	(100±10) %	Pass

Size calibration (criteria ±10%)

Channel	*Channel size* [µm]	*Threshold value* [mV]	*Calculated size* [µm]	*Expanded uncertainty* [µm]	*Calculated sizing error* [%]	*Compliance*
1	0,20	60	0,201	0,007	0,3	Pass
2	0,30	544	0,300	0,007	0,0	Pass
3	0,50	2233	0,508	0,010	1,7	Pass
4	1,00	4203	1,032	0,018	3,2	Pass

Notes

Counting efficiency: used size 0,500 µm: 97,2 %CE ± 5,0%CE
Counting efficiency: used size 1,000 µm: 101,9 %CE ± 5,8%CE

Reference equipment

Model	*S/N*	*Due to*	*Certificate number*
TSI Mass Flowmeter 4043	*40432119021*	*28 June 2022*	*70030*
Fisher Scientific 0666256	*200359247*	*16 June 2022*	*1042-11351217*
Palas	*6752 / 6751*	*16 November 2022*	*235-11195*
MCA8000D	*425*	*15 February 2022*	*21-13808-1-3*

Particle size standards

Size	*Description*	*Due to*	*Certificate*
0,20 µm	*3200 & 3200A Nanosphere size standards*	*March 2022*	*D20014*
0,25 µm	*3240A, Nanosphere size standards*	*July 2023*	*D20024*
0,30 µm	*3300A & 3300B, Nanosphere Size Standards*	*April 2023*	*D20015*
0,50 µm	*3500 & 3500A, Nanosphere Size Standards*	*April 2022*	*D20017*
1,00 µm	*4009A, 4009A & 4009B Microsphere Size Standards*	*October 2022*	*D20020*