

Calibration certificate

Certificate number: LH79697

Revision 3.0.d

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

Instrument:	Description	Airborne particle counter
	Manufacturer	Lighthouse
	Model	Remote 2014
	Serial number	191121036
	Customer ID	C97

Date of calibration: 22 November 2021

Due date calibration: November 2022

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.

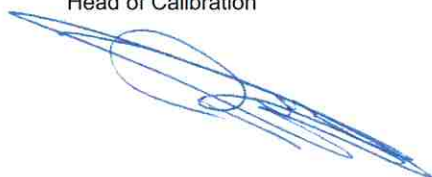
Compliance, As left: Pass - The measured values were observed in tolerance at the points tested.

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: 23 November 2021

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



Appendix

Certificate number: LH79697

Date of calibration: 22 November 2021
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 22,2 °C at a relative humidity of 42,0 %rh.

Measurement results, As found

Performance information				
Test	Test result	Expanded uncertainty	Criteria	Pass / Fail
ISO21501-4 Flow	2,93 l/min	0,12 l/min	2,83 l/min $\pm$ 5 %	Pass
JIS B 9921 Zero count	0	N/A	$\leq$ 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	$\pm$ 1 %	Pass
ISO21501-4 Size resolution	3,1 % used size 0,243 μ m	5,2 %SR	$<$ 15 %	Pass
ISO21501-4 Counting efficiency 50%	53,7 % used size 0,204 μ m	2,8 %CE	(50 $\pm$ 20) %	Pass
ISO21501-4 Counting efficiency 100%	101,1 % used size 0,309 μ m	4,8 %CE	(100 $\pm$ 10) %	Pass

Size calibration (criteria $\pm$ 10%)						
Channel	Channel size	Threshold value	Calculated size	Expanded uncertainty	Calculated sizing error	Compliance
	[μ m]	[mV]	[μ m]	[μ m]	[%]	
1	0,20	52	0,203	0,007	1,5	Pass
2	0,30	454	0,302	0,007	0,7	Pass
3	0,50	2162	0,510	0,010	2,0	Pass
4	1,00	4033	1,039	0,018	3,9	Pass

Notes

Counting efficiency: used size 0,500 μ m: 98,3 %CE $\pm$ 5,1%CE
Counting efficiency: used size 1,000 μ m: 102,5 %CE $\pm$ 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 μ m	3200 & 3200A Nanosphere size standards	March 2022	D20014
0,25 μ m	3240A, Nanosphere size standards	July 2023	D20024
0,30 μ m	3300A & 3300B, Nanosphere Size Standards	April 2023	D20015
0,50 μ m	3500 & 3500A, Nanosphere Size Standards	April 2022	D20017
1,00 μ m	4009A, 4009A & 4009B Microsphere Size Standards	October 2022	D20020

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