

Calibration certificate

Certificate number: LH71128

Revision 3.3

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

Instrument : Description : Airborne particle counter
Manufacturer : Lighthouse
Model : Solair 3100E
Serial no. : 190504038
Customer ID : C96

Date of calibration : 08 June 2021

Due date calibration : June 2022

Calibration location : Lighthouse Benelux Calibration laboratory
in Boven-Leeuwen

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.
No readjustments are made.

Compliance, As left : All measured values comply with the specification limit(s).

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. Compliance statements are given in accordance with ISO21501-4:2018.

Date of issue : 09 June 2021

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



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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.

Reproduction of the complete certificate is allowed, parts of the certificate may only be reproduced with written approval of the calibration laboratory. This certificate is issued provided that neither Lighthouse Worldwide Solutions Benelux BV nor the Raad voor Accreditatie assumes any liability.

Appendix

Certificate number: LH71128

Date of calibration : 08 June 2021
Calibrated by : A.C.G. Gerritse
Function : Calibration & Service Engineer
Environmental conditions : The ambient temperature was 21,9°C
at a relative humidity of 42,1%

Measurement results. As found

Performance information				
Test	Test result	Expanded uncertainty	Criteria	
ISO21501-4 Flow	28,08l/min	0,82l/min	28,30l/min $\pm 5\%$	Pass
JIS B 9921 Zero count	0	N/A	≤ 1 in 5 mins	Pass
ISO21501-4 False count rate	Upper confidence level 21 particles/m ³	N/A	N/A	N/A
ISO21501-4 Timer check	60,1 seconds	0,40s	$\pm 1\%$	Pass
ISO21501-4 Size resolution	5,21% used size 0,41 μ m	2,33%SR	$< 15\%$	Pass
ISO21501-4 Counting efficiency 50%	51,3% used size 0,30 μ m	2,89%CE	(50 ± 20)%	Pass
ISO21501-4 Counting efficiency 100%	98,5% used size 0,50 μ m	5,65%CE	(100 ± 10)%	Pass

Size calibration					
Channel	Channel Size	Threshold voltage	Calculated size	Expanded uncertainty	Calculated Sizing error ($\pm 10\%$)
1	0,30 μ m	51mV	0,310 μ m	0,007 μ m	3,19% Pass
2	0,50 μ m	447mV	0,512 μ m	0,010 μ m	2,36% Pass
3	1,00 μ m	1180mV	1,028 μ m	0,018 μ m	2,77% Pass
4	3,00 μ m	3217mV	3,161 μ m	0,068 μ m	5,38% Pass
5	5,00 μ m	3714mV	4,900 μ m	0,155 μ m	-2,00% Pass
6	10,00 μ m	4504mV	10,312 μ m	0,296 μ m	3,12% Pass

Notes

Counting efficiency: used size 1,0 μ m: 96,5 %CE \pm 5,75%CE

Reference equipment

Model	S/N	Due to	Certificate number
TSI Mass Flowmeter 4043	40431138006	23-Apr-2022	68593
MCA8000D	425	15-Feb-2022	21-13808-1-3
Fluke-175	25760010	7-Dec-2021	20-13808-13-1
Fisher Scientific 0666256	200359247	16-Jun-2022	1042-11351217
Palas	6752 / 6751	23-Nov-2021	235-11058

Particle size standards

Size	Description	Due to	Lot#
0,30 μ m	3300A & 3300B, Nanosphere Size Standards	1-Apr-2023	D20015
0,40 μ m	3400A, Nanosphere Size Standards	1-Nov-2022	D20016
0,50 μ m	3500 & 3500A, Nanosphere Size Standards	1-Apr-2022	D20017
1,00 μ m	4009A, 4009A & 4009B Microsphere Size Standards	1-Oct-2022	D20020
3,00 μ m	4D-03 Dry Duke Microsphere Size standards	1-Aug-2023	D20025
5,00 μ m	4D-05 Dry Duke Microsphere Size standards	1-Dec-2022	D20022
10,00 μ m	4D-10 Dry Duke Microsphere Size standards	1-Jan-2022	DM20001

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Size calibration						
Channel	Channel Size	Threshold voltage	Calculated size	Expanded uncertainty	Calculated Sizing error (±10%)	
1	0,30µm	51mV	0,310µm	0,007µm	3,19%	Pass
2	0,50µm	447mV	0,512µm	0,010µm	2,36%	Pass
3	1,00µm	1180mV	1,028µm	0,018µm	2,77%	Pass
4	3,00µm	3217mV	3,161µm	0,068µm	5,38%	Pass
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10,00µm	4D-10 Dry Duke Microshere Size standards	1-Jan-2022	DM20001