

Calibration certificate

Certificate number: LH69039

Revision 3.3

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

Instrument : Description : Airborne particle counter
 Manufacturer : Lighthouse
 Model : Solair 1100
 Serial no. : 200605027
 Customer ID : C108

Date of calibration : 05 May 2021

Due date calibration : May 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.

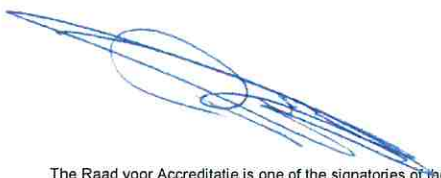
Compliance, As left : All measured values comply with the specification limit(s).

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 : 06 May 2021

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



Appendix

Certificate number: LH69039

Date of calibration : 05 May 2021
Calibrated by : A.C.G. Gerritse
Function : Calibration & Service Engineer
Environmental conditions : The ambient temperature was 22,8°C at a relative humidity of 40,4%

Measurement results, As found

Performance information				
Test	Test result	Expanded uncertainty	Criteria	
ISO21501-4 Flow	28,70l/min	0,83l/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	5,20% used size 0,24 μ m	3,61%SR	$< 15\%$	Pass
ISO21501-4 Counting efficiency 50%	50,6% used size 0,10 μ m	3,48%CE	(50 ± 20)%	Pass
ISO21501-4 Counting efficiency 100%	99,3% used size 0,20 μ m	5,24%CE	(100 ± 10)%	Pass

Size calibration						
Channel	Channel Size	Threshold voltage	Calculated size	Expanded uncertainty	Calculated Sizing error ($\pm 10\%$)	
1	0,10 μ m	28mV	0,101 μ m	0,005 μ m	1,00%	Pass
2	0,15 μ m	1184mV	0,153 μ m	0,006 μ m	2,02%	Pass
3	0,20 μ m	2764mV	0,206 μ m	0,007 μ m	3,00%	Pass
4	0,25 μ m	3768mV	0,250 μ m	0,007 μ m	-0,04%	Pass
5	0,30 μ m	4461mV	0,306 μ m	0,008 μ m	1,89%	Pass
6	0,50 μ m	5468mV	0,512 μ m	0,022 μ m	2,45%	Pass
7	1,00 μ m	6127mV	1,051 μ m	0,096 μ m	5,10%	Pass
8	5,00 μ m	7322mV	5,095 μ m	0,167 μ m	1,90%	Pass

Notes

Counting efficiency: used size 0,3 μ m: 99,0%CE $\pm$ 5,58%CE
Counting efficiency: used size 0,5 μ m: 98,9%CE $\pm$ 5,67%CE
Counting efficiency: used size 1,0 μ m: 93,6%CE $\pm$ 5,58%CE

Reference equipment

Model	S/N	Due to	Certificate number
TSI Mass Flowmeter 4043	40431802001	22-Jul-2021	62758
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#
0,10 μ m	3100 & 3100A Nanosphere size standards	1-Nov-2022	D20012
0,15 μ m	3150A & 3150B Nanosphere size standards	1-Nov-2022	D20013
0,20 μ m	3200 & 3200A Nanosphere size standards	1-Mar-2022	D20014
0,25 μ m	3240A, Nanosphere size standards	1-Jul-2023	D20024
0,30 μ m	3300A & 3300B, Nanosphere Size Standards	1-Apr-2023	D20015
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
5,00 μ m	4D-05 Dry Duke Microsphere Size standards	1-Dec-2022	D20022

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0,20µm	3200 & 3200A Nanosphere size standards	1-Mar-2022	D20014
0,25µm	3240A, Nanosphere size standards	1-Jul-2023	D20024
0,30µm	3300A & 3300B, Nanosphere Size Standards	1-Apr-2023	D20015
0,50µm	3500 & 3500A, Nanosphere Size Standards	1-Apr-2022	D20017
1,00µm	4009A, 4009A & 4009B Microsphere Size Standards	1-Oct-2022	D20020
5,00µm	4D-05 Dry Duke Microsphere Size standards	1-Dec-2022	D20022