

Calibration certificate

Certificate number: LH62859

Revision 3.3

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

Instrument : Description : Airborne particle counter
Manufacturer : Lighthouse
Model : Solair 3100
Serial no. : 200704044

Customer ID : C109

Date of calibration : 23 December 2020

Due date calibration : December 2021

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.

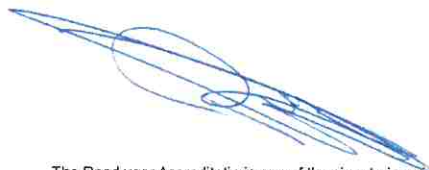
Compliance, As left : All measured values comply with the specification limit(s).

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 : 28 December 2020

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



Appendix

Certificate number: LH62859

Date of calibration : 23 December 2020
 Calibrated by : A.C.G. Gerritse
 Function : Calibration & Service Engineer
 Environmental conditions : The ambient temperature was 22,3°C
 at a relative humidity of 45,9%

Measurement results, As found

Performance information				
Test	Test result	Expanded uncertainty	Criteria	
ISO21501-4 Flow	29,61l/min	0,86l/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/m3	N/A	N/A	N/A
ISO21501-4 Timer check	59,9 seconds	0,40s	$\pm 1\%$	Pass
ISO21501-4 Size resolution	3,23% used size 0,41 μ m	2,72%SR	$< 15\%$	Pass
ISO21501-4 Counting efficiency 50%	47,2% used size 0,30 μ m	2,66%CE	(50 ± 20)%	Pass
ISO21501-4 Counting efficiency 100%	98,8% used size 0,50 μ m	5,67%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	3,22%	Pass
2	0,50 μ m	487mV	0,520 μ m	0,010 μ m	4,09%	Pass
3	1,00 μ m	1105mV	0,995 μ m	0,018 μ m	-0,47%	Pass
4	3,00 μ m	3246mV	3,162 μ m	0,069 μ m	5,38%	Pass
5	5,00 μ m	3750mV	4,986 μ m	0,151 μ m	-0,28%	Pass
6	10,00 μ m	4613mV	10,207 μ m	0,277 μ m	2,07%	Pass

Notes

 Counting efficiency: used size 1,0 μ m: 93,5 %CE $\pm$ 5,58%CE

Reference equipment

Model	S/N	Due to	Certificate number
TSI Mass Flowmeter 4040	40401919024	12-Aug-2021	63031
MCA8000D	564	3-Mar-2021	20-13808-3-1
Fluke-175	12170245	6-Apr-2021	20-13808-4-2
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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