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LIGHTHOUSE
WORLDWIDE SOLUTIONS BENELUX BV

ilac-MRA

KALIBRATIE
RvA K 166

Calibration certificate

Certificate number: LH39413

Revision 3.0

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	: 03 June 2019	
Due date calibration	: June 2020	
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. The unit is readjusted.	
Compliance, As left	: For some of the measured values it is not possible to make a statement of compliance with specification.	
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 uncertainty is based on a standard uncertainty multiplied by a coverage factor of k = 2, which provides a confidence level of approximately 95%. The standard uncertainty is determined in accordance with EA-4/02. The measurement uncertainty is taken into account for compliance statements according to ILAC-G8:03/2009.	

M.A.W. van Boxtel
Head of calibration

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Appendix

Certificate number: LH39413

Date of calibration : 03 June 2019

Calibrated by : M.A.W. van Boxtel
Function : Head of calibration

Environmental conditions : The ambient temperature was 23,7°C at a relative humidity of 40,6%

Measurement results, As found

Performance information

Test	*Test result*		*Expanded uncertainty*	*Criteria*
ISO21501-4 Flow	28,73l/min		0,83l/min	28,30l/min ±5%
JIS B 9921 Zero count	0		N/A	≤1 in 5 mins
ISO21501-4 False count rate	Upper confidence level 21 particles/m3		N/A	N/A
ISO21501-4 Timer check	60,0 seconds		0,40s	±1%
ISO21501-4 Size resolution	1,43%	used size 0,40µm	3,09%SR	< 15%
ISO21501-4 Counting efficiency 50%	57,9%	used size 0,30µm	2,67%CE	(50±20)%
ISO21501-4 Counting efficiency 100%	97,2%	used size 0,50µm	10,83%CE	(100±10)%

Size calibration

Channel	*Channel Size*	*Threshold voltage*	*Calculated size*	*Expanded uncertainty*	*Calculated Sizing error (±10%)*
1	0,30µm	49mV	0,302µm	0,006µm	0,72%
2	0,50µm	453mV	0,492µm	0,008µm	-1,50%
3	1,00µm	1058mV	0,979µm	0,018µm	-2,09%
4	3,00µm	3223mV	2,767µm	0,053µm	-7,78%
5	5,00µm	3758mV	5,082µm	0,167µm	1,64%
6	10,00µm	4606mV	10,339µm	0,222µm	3,39%

Notes

Counting efficiency: used size 1,0 µm: 87,9 %CE ± 7,06%CE

Reference equipment

Model	*S/N*	*Due to*	*Certificate number*
TSI Mass Flowmeter 4043	40431350007	22-Mar-2020	52822
MCA8000D	566	26-Apr-2020	1904-13246
Fluke-175	29250596	22-Nov-2019	1811-09376
Fisher Scientific 0666256	170471257	26-Jun-2019	1042-8643931
Palas	6752 / 6751	20-Nov-2019	235-10808

Particle size standards

Size	*Description*	*Due to*	*Lot#*
0,30µm	3300A & 3300B, Nanosphere Size Standards	1-Apr-2021	196947
0,40µm	3400A, Nanosphere Size Standards	1-Apr-2021	197091
0,50µm	3500 & 3500A, Nanosphere Size Standards	1-Jan-2021	193188
1,00µm	4009A, 4009A & 4009B Microsphere Size Standards	1-Aug-2021	200992
3,00µm	4D-03 Dry Duke Microshere Size standards	1-Jul-2021	199811
5,00µm	4D-05 Dry Duke Microshere Size standards	1-Aug-2020	188015
10,00µm	4D-10 Dry Duke Microshere Size standards	1-Apr-2021	196944

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Calibrated by : M.A.W. van Boxtel
Function : Head of calibration

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Measurement results, As left

Performance information

Test	*Test result*		*Expanded uncertainty*	*Criteria*
ISO21501-4 Flow	28,73l/min		±0,83l/min	28,30l/min ±5%
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ISO21501-4 False count rate	Upper confidence level 21 particles/m3		N/A	N/A
ISO21501-4 Timer check	60,0 seconds		0,40s	±1%
ISO21501-4 Size resolution	1,43%	used size 0,40µm	3,09%SR	< 15%
ISO21501-4 Counting efficiency 50%	58,0%	used size 0,30µm	2,67%CE	(50±20)%
ISO21501-4 Counting efficiency 100%	96,4%	used size 0,50µm	10,73%CE	(100±10)%

Size calibration

Channel	*Channel Size*	*Threshold voltage*	*Calculated size*	*Expanded uncertainty*	*Calculated Sizing error (±10%)*
1	0,30µm	48mV	0,301µm	0,006µm	0,43%
2	0,50µm	473mV	0,501µm	0,008µm	0,15%
3	1,00µm	1082mV	1,000µm	0,018µm	-0,04%
4	3,00µm	3330mV	3,004µm	0,078µm	0,12%
5	5,00µm	3743mV	4,999µm	0,164µm	-0,03%
6	10,00µm	4551mV	9,999µm	0,220µm	-0,01%

Notes

Counting efficiency: used size 1,0 µm: 90,3 %CE ± 7,25%CE

Reference equipment

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1,00µm	4009A, 4009A & 4009B Microsphere Size Standards	1-Aug-2021	200992
3,00µm	4203 and 4203A, Particle Size Standards	1-Sep-2021	202646
5,00µm	4D-05 Dry Duke Microshere Size standards	1-Aug-2020	188015
10,00µm	4D-10 Dry Duke Microshere Size standards	1-Apr-2021	196944