C79

LIGHTHOUSE
WORLDWIDE SOLUTIONS BENELUX BV

ilac-MRA

RvA KALIBRATIE RvA K 166

Calibration certificate

Certificate number: LH11045

Revision 2.9

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

Instrument : Description : Airborne particle counter
Manufacturer : Lighthouse
Model : Remote 2014
Serial no. : 110421002

Customer ID : C79

Date of calibration : 13 February 2017

Due date calibration : February 2018

Calibration location : Lighthouse Benelux Calibration laboratory in Boven-Leeuwen

Calibration method : Calibration has been accomplished as described in ISO21501-4:2007. 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. 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 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.

M.A.W. van Boxtel
Head of calibration

Lighthouse Worldwide Solutions Benelux BV
Van Heemstraweg 19A 6657 KD
Boven-Leeuwen The Netherlands
Tel: +31 (0)487 560811 Fax: +31 (0)487 560013
E-mail: csbenelux@golighthouse.com

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.

C7f

LIGHTHOUSE
WORLDWIDE SOLUTIONS BENELUX BV

ilac-MRA

KALIBRATIE
RvA K 166

Appendix

Certificate number: LH11045

Date of calibration : 13 February 2017

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

Environmental conditions : The ambient temperature was 23,1°C at a relative humidity of 29,8%

Measurement results, As found

Performance information

Test	*Test result*		*Expanded uncertainty*	*Criteria*
ISO21501-4 Flow	2,85l/min		0,10l/min	2,83l/min ±5%
JIS B 9921 Zero count	0		N/A	<1 in 5 mins
ISO21501-4 False count rate	Upper confidence level 212 particles/m3		N/A	N/A
ISO21501-4 Timer check	60,1 seconds		0,40s	±1%
ISO21501-4 Size resolution	5,62%		3,07%SR	< 15%
ISO21501-4 Counting efficiency 50%	36,6%	used size 0,20µm	2,75%CE	(50±20)%
ISO21501-4 Counting efficiency 100%	97,0%	used size 0,30µm	6,10%CE	(100±10)%

Size calibration

Channel	*Channel Size*	*Threshold voltage*	*Calculated size*	*Expanded uncertainty*	*Calculated Sizing error (±10%)*
1	0,20µm	66mV	0,205µm	0,005µm	2,47%
2	0,30µm	482mV	0,297µm	0,006µm	-1,10%
3	0,50µm	2139mV	0,518µm	0,008µm	3,64%
4	1,00µm	4913mV	1,065µm	0,018µm	6,48%

Notes

Reference equipment

Model	*S/N*	*Due to*	*Certificate number*
TSI Mass Flowmeter 4043	40431138006	15-Sep-2017	36750
MCA8000D	567	21-Apr-2017	1603-18232
Fluke-175	32820179	1-Jul-2017	1691396
Fisher Scientific 0666256	150783685	20-Oct-2017	1042-7138479
Solair 1100+	060805006	1-May-2017	LH08302

Particle size standards

Size	*Description*	*Due to*	*Lot#*
0,20µm	3200 & 3200A Nanosphere size standards	1-Apr-2017	43115
0,30µm	3300A & 3300B, Nanosphere Size Standards	1-Feb-2019	164983
0,50µm	3500 & 3500A, Nanosphere Size Standards	1-Apr-2019	168223
1,00µm	4009A, 4009A & 4009B Microsphere Size Standards	1-Jan-2019	164509

LIGHTHOUSE
WORLDWIDE SOLUTIONS BENELUX BV

ilac-MRA

RvA KALIBRATIE RvA K 166

C7P

Appendix

Certificate number: LH11045

Date of calibration : 13 February 2017

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

Environmental conditions : The ambient temperature was 23,1°C at a relative humidity of 29,8%

Measurement results, As left

Performance information

Test	*Test result*		*Expanded uncertainty*	*Criteria*
ISO21501-4 Flow	2,85l/min		±0,10l/min	2,83l/min ±5%
JIS B 9921 Zero count	0		N/A	<1 in 5 mins
ISO21501-4 False count rate	Upper confidence level 212 particles/m3		N/A	N/A
ISO21501-4 Timer check	60,0 seconds		0,40s	±1%
ISO21501-4 Size resolution	2,14%		3,37%SR	< 15%
ISO21501-4 Counting efficiency 50%	39,1%	used size 0,20µm	3,23%CE	(50±20)%
ISO21501-4 Counting efficiency 100%	101,4%	used size 0,30µm	6,28%CE	(100±10)%

Size calibration

Channel	*Channel Size*	*Threshold voltage*	*Calculated size*	*Expanded uncertainty*	*Calculated Sizing error (±10%)*
1	0,20µm	58mV	0,201µm	0,005µm	0,50%
2	0,30µm	519mV	0,303µm	0,006µm	1,00%
3	0,50µm	2075mV	0,508µm	0,008µm	1,60%
4	1,00µm	4552mV	0,994µm	0,018µm	-0,60%

Notes

Reference equipment

Model	*S/N*	*Due to*	*Certificate number*
TSI Mass Flowmeter 4043	40431138006	15-Sep-2017	36750
MCA8000D	567	21-Apr-2017	1603-18232
Fluke-175	32820179	1-Jul-2017	1691396
Fisher Scientific 0666256	150783685	20-Oct-2017	1042-7138479
Solair 1100+	060805006	1-May-2017	LH08302

Particle size standards

Size	*Description*	*Due to*	*Lot#*
0,20µm	3200 & 3200A Nanosphere size standards	1-Apr-2017	43115
0,30µm	3300A & 3300B, Nanosphere Size Standards	1-Feb-2019	164983
0,50µm	3500 & 3500A, Nanosphere Size Standards	1-Apr-2019	168223
1,00µm	4009A, 4009A & 4009B Microsphere Size Standards	1-Jan-2019	164509