

Applicant

CCSTEC GesmbH
Triesterstrasse 36
2512 Oeynhausen
Österreich

Instrument

Type:	Airborne Particle Counter
Manufacturer:	Lighthouse Worldwide Solutions
Model:	ApexZ3
Serial no.:	1711141013
Customer device ID.:	C107

Date of calibration 19. June 2020

Due date of calibration June 2021

Calibration Location A-2512 Oeynhausen

Calibration methode Calibration has been accomplished as described according to ISO 21501-4:2018.

Results

The result of the measurements are shown on the following pages.
The unit is readjusted.
All measured values comply with the specification limit(s).

Traceability Reference equipment used for calibration are regulary calibrated and traceable to national standards.

Uncertainty The reported expanded 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.

Inspected by:

Christian Ribarits
19. June 2020
(Name, Date, Signature)

Approved by:

Marcus Willig
19. June 2020
(Name, Date, Signature)

Calibration Service

CCSTEC GesmbH
2512 Oeynhausen

Triesterstraße 36
Austria

Tel: +43 2252/25 27 59-0
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PARTIKELMESSTECHNIK

Revision: E

Certificate number: 20_2152

Date of calibration 19. June 2020

Calibrated by Christian Ribarits

Environmental conditions 22,5 °C 49,5 %rF 989,1 hPa

Results, As found

Performance details

Test	Test result	Expanded uncertainty	Criteria	Pass / Fail
ISO21501-4 Flow	28,3 l/min	0,05 l/min	28,3 l/min. +- 5%	Pass
JIS B 9921 Zero count	0 particles in 5 min. Upper confidence level	N/A	≤1 in 5 min.	Pass
ISO21501-4 False count rate	21,19 particles/m ³	N/A	N/A	Pass
ISO21501-4 Timer Check	60,0 sec.	0,03 sec.	±1%	Pass
ISO21501-4 Size resolution	1,72 % used size 0,4 µm	0,69 %	< 15%	Pass
ISO21501-4 Counting efficiency 50%	63,4 % used size 0,3 µm	4,413 %	(50±20)%	Pass
ISO21501-4 Counting efficiency 100%	92,3 % used size 0,5 µm	3,842 %	(100±10)%	Pass

Size calibration

Channel	Channel Size	Threshold voltage	Calculated Size	Expanded uncertainty	Calculated Sizing error (±10%)	Pass / Fail
1.	0,30 µm	63 mV	0,300 µm	0,0061 µm	-0,14 %	Pass
2.	0,50 µm	547 mV	0,482 µm	0,0050 µm	-3,68 %	Pass
3.	1,00 µm	1451 mV	0,907 µm	0,0052 µm	-9,30 %	Pass
4.	3,00 µm	3343 mV	3,054 µm	0,0032 µm	1,81 %	Pass
5.	5,00 µm	5446 mV	5,245 µm	0,0046 µm	4,89 %	Pass
6.	10,00 µm	6424 mV	9,727 µm	0,0037 µm	-2,73 %	Pass

Notes

Reference Equipment

Internal ID	Model	Serial Number	Certificate Number	Due date
C87	Mass Flowmeter 4043	40431653004	58393	10.12.2020
C45	Fluke 87 V	87380269	65112019	21.11.2020
Z29	Hanhart Labor 3	4202	20_1439	30.01.2021
C93	MCA 8000D	01665	1912-12735	13.01.2021
C94	Testo 622	3951 8351/809	207677	03.03.2021
C89	Solair 3100 GenE	171004018	LH46484	14.11.2020
C91	Remote 2014	180221001	LH48796	27.01.2021

Particle size standards

Size	Description	Due date	Lot#
0,30 µm	DUKE STANDARDS™ Nanosphere Size Standards Particles	Oct-20	189903
0,50 µm	DUKE STANDARDS™ Nanosphere Size Standards Particles	Sep-20	188886
1,00 µm	DUKE STANDARDS™ Microsphere Size Standards Particles	Aug-20	187477
3,00 µm	DUKE STANDARDS™ Microsphere Size Standards Particles	Feb-21	194205
5,00 µm	DUKE STANDARDS™ Dry Microsphere Size Standards Particles	Jan-22	206792
10,00 µm	DUKE STANDARDS™ Dry Microsphere Size Standards Particles	Apr-21	196944

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ISO21501-4 Timer Check	60,0 sec.	0,03 sec.	±1%	Pass
ISO21501-4 Size resolution	1,72 % used size 0,4 µm	0,69 %	< 15%	Pass
ISO21501-4 Counting efficiency 50%	51,9 % used size 0,3 µm	3,807 %	(50±20)%	Pass
ISO21501-4 Counting efficiency 100%	100,3 % used size 0,5 µm	3,982 %	(100±10)%	Pass

Size calibration

Channel	Channel Size	Threshold voltage	Calculated Size	Expanded uncertainty	Calculated Sizing error (±10%)	Pass / Fail
1.	0,30 µm	69 mV	0,303 µm	0,0061 µm	0,89 %	Pass
2.	0,50 µm	601 mV	0,498 µm	0,0049 µm	-0,31 %	Pass
3.	1,00 µm	1579 mV	0,994 µm	0,0048 µm	-0,63 %	Pass
4.	3,00 µm	3298 mV	3,007 µm	0,0032 µm	0,22 %	Pass
5.	5,00 µm	5334 mV	5,020 µm	0,0048 µm	0,39 %	Pass
6.	10,00 µm	6446 mV	9,852 µm	0,0037 µm	-1,48 %	Pass

Notes

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