

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000028756_04

AMS designation: APOA 370 for O₃

Manufacturer: HORIBA, Ltd.
2 Miyanohigashi
Kisshoin Minami-ku
Kyoto 610-8510
Japan

Test Laboratory: TÜV Rheinland Energy GmbH

**This is to certify that the AMS has been tested
and found to comply with:
VDI 4202-1 (2002), VDI 4203-3 (2004), EN 14625 (2012),
EN 15267-1 (2009) and EN 15267-2 (2009).**

Certification is awarded in respect of the conditions stated in this certificate
(this certificate contains 12 pages).

The present certificate replaces certificate 0000028756_03 of 21 January 2016.



Suitability Tested
Equivalent to
2008/50/EC
EN 15267
Regular Surveillance
www.tuv.com
ID 0000028756

Publication in the German Federal Gazette
(BAnz) of 08 April 2006

This certificate will expire on:
25 January 2026

German Federal Environment Agency
Dessau, 25 January 2021

TÜV Rheinland Energy GmbH
Cologne, 24 January 2021


Dr. Marcel Langner
Head of Section II 4.1


ppa. Dr. Peter Wilbring

www.umwelt-tuv.eu
tre@umwelt-tuv.eu
Phone: + 49 221 806-5200

TÜV Rheinland Energy GmbH
Am Grauen Stein
51105 Köln

Test institute accredited to EN ISO/IEC 17025 by DAkkS (German Accreditation Body).
This accreditation is limited to the accreditation scope defined in the enclosure to certificate D-PL-11120-02-00.

Test Report:	936/21204643/A dated 5 January 2006
Initial certification:	26 January 2011
Expiry date:	25 January 2026
Certificate:	Renewal (of previous certificate 0000028756_03 dated 21 January 2016 valid until 25 January 2021)
Publication:	BAnz. 8 April 2006, no. 70, p. 2653, chapter IV number 3.1

Approved application

The certified AMS is suitable for continuous ambient air monitoring of ozone (stationary operation).

The suitability of the AMS for this application was assessed on the basis of a laboratory test and a three-months field test.

The AMS is approved for an ambient temperature range of 0 °C to +40 °C.

The notification of suitability of the AMS, performance testing and the uncertainty calculation have been effected on the basis of the regulations applicable at the time of testing. As changes in legal provisions are possible, any potential user should ensure that this AMS is suitable for monitoring the limit values relevant to the application.

Any potential user should ensure, in consultation with the manufacturer, that this AMS is suitable for the intended purpose.

Basis of the certification

This certification is based on:

- Test report No. 936/21204643/A dated 5 January 2006 issued by TÜV Rheinland Immissionsschutz und Energiesysteme GmbH
- Addenda 936/21204643/A1 dated 27 July 2011 and 936/21222689/A dated 5 October 2013
- Suitability announced by the German Federal Environment Agency (UBA) as the relevant body
- The ongoing surveillance of the product and the manufacturing process

Publication in the German Federal Gazette: BAnz. 8 April 2006, no. 70, p. 2653, chapter IV number 3.1, UBA announcement dated 21 February 2006:

AMS designation:

APOA 370

Manufacturer:

HORIBA, Ltd., Kyoto 610-8510, Japan

Distribution:

HORIBA Europe GmbH, 42799 Leichlingen

Field of application:

For continuous monitoring of O₃ in ambient air (stationary operation)

Measuring ranges during performance testing

O₃ 0 – 360 µg/m³
0–500 µg/m³

Software:

Version P1000878001C

Test Laboratory:

TÜV Immissionsschutz und Energiesysteme GmbH, Cologne
TÜV Rheinland Group

Test Report:

Report no. 936/21204643/A dated 5 January 2006

Publication in the German Federal Gazette: BAnz. 25 August 2009, no. 125, p. 2929, chapter III notification 3, UBA announcement dated 3 August 2009:

3 Notification as regards Federal Environment Agency notice of 21 February 2006 (BAnz. p. 2655)

The latest software version of the APOA 370 ambient air measuring system manufactured by Horiba Europe GmbH is:

P1000878001J

The type GD-6 EH sample gas pump manufactured by Horiba may be used instead of the N 86 KNE sample gas pump manufactured by KNF.

Statement issued by TÜV Rheinland Immissionsschutz und Energiesysteme GmbH dated 31 March 2009

Publication in the German Federal Gazette: BAnz. 26 January 2011, No. 14, p. 294, chapter IV notification 8, UBA announcement dated 10 January 2011:

8 Notification as regards Federal Environment Agency (UBA) notices of 21 February 2006 (BAnz. p. 2653, chapter IV number 3.1) and of 3 August 2009 (BAnz. p. 2929, chapter III 3rd notification)

The APOA 370 measuring system for O₃ manufactured by Horiba Ltd, Japan, and Horiba Europe GmbH meets the requirements defined in standard EN 14625. Furthermore, the manufacturing process and the quality management for the Model APOA 370 for O₃ measuring system meet the requirements of EN 15267.

The test report on performance testing is available on the internet at www.qal1.de.

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 6 October 2010

Publication in the German Federal Gazette: BAnz. 2 March 2012, no. 36, p. 920, chapter V notification 15, UBA announcement dated 23 February 2012:

15 Notification as regards Federal Environment Agency (UBA) notices of 21 February 2006 (p. 2653, chapter IV number 3.1) and of 10 January 2011 (BAnz. p. 294, chapter IV 8th notification)

There is an addendum to test report no. 936/21204643/A for the APOA 370 measuring system for O₃ manufactured by Horiba, Ltd., Japan and Horiba Europe GmbH. The addendum is assigned report no. 936/21204643/A1 and after its publication is an integral part of the test report no. 936/21204643/A and is also available online at www.qal1.de.

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 3 November 2011

Publication in the German Federal Gazette: BAnz AT 05.03.2013 B10, chapter V notification 9, UBA announcement dated 12 February 2013:

9 Notification as regards Federal Environment Agency (UBA) notices of 21 February 2006 (p. 2653, chapter IV number 3.1) and of 23 February 2012 (BAnz. p. 920, chapter V 15th notification)

The APOA 370 measuring system for O₃ manufactured by Horiba Ltd, Japan, and Horiba Europe GmbH may optionally be equipped with an additional calibration port. Calibration gas may be fed upstream or downstream of the sample gas filter using a three-way valve.

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 11 October 2012

Publication in the German Federal Gazette: BAnz AT 01.04.2014 B12, chapter VI notification 28, UBA announcement dated 27 February 2014:

28 Notification as regards Federal Environment Agency (UBA) notices of 21 February 2006 (p. 2653, chapter IV number 3.1) and of 12 February 2013 (BAnz AT 05.03.2013 B10, chapter V 9th notification)

The APOA 370 measuring system for O₃ manufactured by Horiba Ltd, Japan, and Horiba Europe GmbH meets the requirements defined in standard EN 14625 (December 2012 version). An addendum as integral part of test report no. 936/21222689/A is available online at www.qal1.de.

In addition to the Nidec case fan type D06T-24 PH previously used, the measuring system may also be equipped with a controlled fan type 3412 NGV manufactured by Papst.

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 8 October 2013

Publication in the German Federal Gazette: BAnz AT 01.08.2016 B11, chapter V notification 32, UBA announcement dated 14 July 2016:

32 Notification as regards Federal Environment Agency (UBA) notices of 21 February 2006 (p. 2653, chapter IV number 3.1) and of 27 February 2014 (BAnz AT 01.04.2014 B12, chapter VI 27th notification)

The APOA-370 measuring system for O₃ manufactured by HORIBA Ltd. is equipped with a new display which, in design and functionality, largely corresponds to its predecessor. In addition, the power supply ZWS-BAF may also be used.

The current software version of the APOA-370 measuring system for O₃ is:
P1000878001K

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 29 February 2016.

Publication in the German Federal Gazette: BAnz AT 22.07.2019 B8, chapter V notification 11, UBA announcement dated 28 June 2019:

11 Notification as regards Federal Environment Agency (UBA) notices of 21 February 2006 (BAnz. p. 2653, chapter IV number 3.1) and of 14 July 2016 (BAnz AT 01.08.2016 B11, chapter V 32nd notification)

The latest software version of the APOA-370 for O₃ manufactured by HORIBA Ltd. is:

P1000878001L

The rear of the housing was modified to cater for additional cable connections. In future, it will be possible to use a type QT-4A measuring cell.

Statement issued by TÜV Rheinland Energy GmbH dated 5 March 2019

Publication in the German Federal Gazette: BAnz AT 24.03.2020 B7, chapter IV notification 55, UBA announcement dated 24 February 2020:

55 Notification as regards Federal Environment Agency (UBA) notices of 21 February 2006 (p. 2653, chapter IV number 3.1) and of 28 June 2019 (BAnz AT 22.07.2019 B8, chapter V 11th notification)

The latest software version of the APOA-370 for O₃ manufactured by HORIBA Ltd. is:

P1000878001M

Statement issued by TÜV Rheinland Energy GmbH dated 20 September 2019

Certified product

This certification applies to automated measurement systems conforming to the following description:

The APOA 370 ambient air measuring system is based on the measuring principle of UV absorption.

The measuring principle complies with the reference measuring method described in section 5.2 of Standard EN 14625 (2012).

The sample air first passes a filter in the APOA 370, where coarse dirt particles are filtered out. It is then divided in two gas flows (measuring and reference gas) The analyser is equipped with a single measurement cuvette. A 3-way magnetic valve directs measuring and reference gas to the cuvette. A catalytic converter removes ozone from the reference gas. The cuvette irradiated by monochromatic radiation, centred on 253.7 nm, from a stabilized low-pressure mercury (Hg) discharge lamp. The UV radiation, which passes through the absorption cell, is measured by a sensitive photodiode and converted to a measurable electrical signal. The difference of the UV absorption of measuring and reference gas is a measure of the ozone concentration in the ambient air.

General remarks

This certificate is based upon the equipment tested. The manufacturer is responsible for ensuring that on-going production complies with the requirements of the EN 15267. The manufacturer is required to maintain an approved quality management system controlling the manufacturing process for the certified product. Both the product and the quality management systems shall be subject to regular surveillance.

If a product of the current production does not conform to the certified product, TÜV Rheinland Energy GmbH must be notified at the address given on page 1.

A certification mark with an ID-Number that is specific to the certified product is presented on page 1 of this certificate.

This document as well as the certification mark remains property of TÜV Rheinland Energy GmbH. Upon revocation of the publication the certificate loses its validity. After the expiration of the certificate and on request of TÜV Rheinland Energy GmbH this document shall be returned and the certificate mark must no longer be used.

The relevant version of this certificate and its expiration date are also accessible on the internet at gal1.de.

Document history

Certification of the APOA 370 measuring system is based on the documents listed below and the regular, continuous surveillance of the manufacturer's quality management system:

Basic testing

Test Report: 936/21204643/A dated 5 January 2006
TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Cologne
Publication: BAnz. 8 April 2006, no. 70, p. 2653, chapter IV number 3.1
UBA announcement dated 21 February 2006

Notifications

Statement issued by TÜV Rheinland Immissionsschutz und Energiesysteme GmbH dated 31 March 2009
Publication: 25 August 2009, no. 125, p. 2929, chapter III notification 3
UBA announcement dated 03 August 2009
(Changes to software and hardware extension)

Initial certification according to EN 15267

Certificate no. 0000028756: 09 February 2011
Expiry date of the certificate: 25 January 2016
Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 6 October 2010
Test Report: 936/21204643/A dated 05 January 2006
TÜV Rheinland Immissionsschutz und Energiesysteme GmbH, Cologne
Publication: BAnz. 26 January 2011, no. 14, p. 294, chapter IV notification 8
UBA announcement dated 10 January 2011

Notifications in accordance with EN 15267

Certificate no. 0000028756_01: 16 March 2012
Expiry date of the certificate: 25 January 2016
Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 3 November 2011
and Addendum no. 936/21204643/A1 dated 27 July 2011
Publication: BAnz. 2 March 2012, no. 36, p. 920, chapter V notification 15
UBA announcement dated 23 February 2012
(Supplemented by an addendum)

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 11 October 2012
Publication: BAnz AT 05.03.2013 B10, chapter V notification 9
UBA announcement dated 12 February 2013
(Additional hardware)

Certificate no. 0000028756_02: 29 April 2014
Expiry date of the certificate: 25 January 2016
Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 8 October 2013
and Addendum to Test Report no. 936/21222689/A dated 5 October 2013
Publication: BAnz AT 01.04.2014 B12, chapter VI notification 28
UBA announcement dated 27 February 2014
(EN 14625 (2012) and design changes)

Renewal of the certificate:

Certificate no. 0000028756_03: 21 January 2016
Expiry date of the certificate: 25 January 2021

Notifications in accordance with EN 15267

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 29 February 2016
Publication: BAnz AT 01.08.2016 B11, chapter V notification 32
UBA announcement dated 14 July 2016
(new display)

Statement issued by TÜV Rheinland Energy GmbH dated 5 March 2019
Publication: BAnz AT 22.07.2019 B8, chapter V notification 11
UBA announcement dated 28 June 2019
(New software version)

Statement issued by TÜV Rheinland Energy GmbH dated 20 September 2019
Publication: BAnz AT 24.03.2020 B7, chapter IV notification 55
UBA announcement dated 24 February 2020
(New software version)

Renewal of the certificate

Certificate no. 0000028756_04: 25 January 2021
Expiry date of the certificate: 25 January 2026

Expanded uncertainty from the results obtained in the laboratory tests for analyser 1

Measuring device:		Serial-No.:		SN 10041		nmol/mol	
Measured component:		1h-alert threshold:		120			
No.	Performance characteristic	Performance criterion	Result	Partial uncertainty	Square of partial uncertainty		
1	Repeatability standard deviation at zero	≤ 1.0 nmol/mol	0.250	U _{r,z}	0.0042		
2	Repeatability standard deviation at 1h-alert threshold	≤ 3.0 nmol/mol	0.140	U _{r,h}	0.0107		
3	"lack of fit" at 1h-alert threshold	≤ 4.0% of measured value	-1.100	U _{f,h}	0.5808		
4	Sensitivity coefficient of sample gas pressure at 1h-alert threshold	≤ 2.0 nmol/mol/kPa	0.023	U _{gp}	0.0755		
5	Sensitivity coefficient of sample gas temperature at 1h-alert threshold	≤ 1.0 nmol/mol/K	0.090	U _{gt}	1.3333		
6	Sensitivity coefficient of surrounding temperature at 1h-alert threshold	≤ 1.0 nmol/mol/K	0.360	U _{st}	2.4300		
7	Sensitivity coefficient of electrical voltage at 1h-alert threshold	≤ 0.30 nmol/mol/V	0.000	U _v	0.0000		
8a	Interferent H ₂ O with 21 nmol/mol	≤ 10 nmol/mol (Zero)	-0.100	U _{H2O}	0.0120		
8b	Interferent Toluene with 0,5 µmol/mol	≤ 10 nmol/mol (Span)	0.270	U _{int,pos} or U _{int,neg}	0.64		
		≤ 5.0 nmol/mol (Zero)	0.070			0.4146	
8c	Interferent Xylene with 0,5 µmol/mol	≤ 5.0 nmol/mol (Span)	0.740	U _{av}	0.97		
		≤ 5.0 nmol/mol (Zero)	0.100			0.9408	
9	Averaging effect	≤ 7.0% of measured value	1.400	U _{asc}	0.0000		
18	Difference sample/calibration port	≤ 1.0%	0.000	U _{cg}	1.4400		
21	Uncertainty of test gas	≤ 3.0%	2.000	U _c	2.6911		
Combined standard uncertainty						U _c	2.6911
Expanded uncertainty						U	5.3821
Relative expanded uncertainty						W	4.49
Maximum allowed expanded uncertainty						W _{req}	15

Expanded uncertainty from the results obtained in the laboratory tests for analyser 2

Measuring device:		Serial-No.:		SN 10042	
Measured component:		1h-alert threshold:		120 nmol/mol	
No.	Performance characteristic	Performance criterion	Result	Partial uncertainty	Square of partial uncertainty
1	Repeatability standard deviation at zero	≤ 1.0 nmol/mol	0.170	$u_{r,z}$	0.0020
2	Repeatability standard deviation at 1h-alert threshold	≤ 3.0 nmol/mol	0.135	$u_{r,lv}$	0.0103
3	"lack of fit" at 1h-alert threshold	≤ 4.0% of measured value	-0.700	$u_{l,lv}$	0.2352
4	Sensitivity coefficient of sample gas pressure at 1h-alert threshold	≤ 2.0 nmol/mol/kPa	0.013	u_{gp}	0.0253
5	Sensitivity coefficient of sample gas temperature at 1h-alert threshold	≤ 1.0 nmol/mol/K	0.100	u_{gt}	1.6875
6	Sensitivity coefficient of surrounding temperature at 1h-alert threshold	≤ 1.0 nmol/mol/K	0.390	u_{st}	2.8519
7	Sensitivity coefficient of electrical voltage at 1h-alert threshold	≤ 0.30 nmol/mol/V	0.000	u_v	0.0000
8a	Interferent H ₂ O with 21 mmol/mol	≤ 10 nmol/mol (Zero) ≤ 10 nmol/mol (Span)	-0.770 0.140	u_{H_2O}	0.0149
8b	Interferent Toluene with 0.5 µmol/mol	≤ 5.0 nmol/mol (Zero)	0.100	$u_{int,pos}$	0.3388
8c	Interferent Xylene with 0.5 µmol/mol	≤ 5.0 nmol/mol (Span)	0.300	or	
		≤ 5.0 nmol/mol (Zero)	0.100		
9	Averaging effect	≤ 7.0% of measured value	1.100	$u_{int,neg}$	
18	Difference sample/calibration port	≤ 1.0%	-0.300	u_{av}	0.0432
21	Uncertainty of test gas	≤ 3.0%	2.000	u_{dsc}	0.0000
				ucg	1.4400
Combined standard uncertainty				u_c	2.5786
Expanded uncertainty				U	5.1571
Relative expanded uncertainty				W	4.30
Maximum allowed expanded uncertainty				W_{req}	15

Expanded uncertainty from the results obtained in the laboratory and field tests for analyser 1

Measuring device: Horiba APOA 370		Serial-No.: SN 10041		11-alert threshold: 120		nmol/mol	
Measured component: O3		11-alert threshold: 120		11-alert threshold: 120		nmol/mol	
No.	Performance characteristic	Performance criterion	Result	Partial uncertainty	Square of partial uncertainty		
1	Repeatability standard deviation at zero	≤ 1.0 nmol/mol	0.250	$u_{r,z}$	0.06	0.0042	
2	Repeatability standard deviation at 1h-alert threshold	≤ 3.0 nmol/mol	0.140	$u_{r,h}$	not considered, as $u_{r,h} = 0.1 < u_{r,f}$	-	
3	"lack of fit" at 1h-alert threshold	≤ 4.0% of measured value	-1.100	$u_{l,h}$	-0.76	0.5808	
4	Sensitivity coefficient of sample gas pressure at 1h-alert threshold	≤ 2.0 nmol/mol/kPa	0.023	u_{gp}	0.27	0.0755	
5	Sensitivity coefficient of sample gas temperature at 1h-alert threshold	≤ 1.0 nmol/mol/K	0.090	u_{gt}	1.15	1.3333	
6	Sensitivity coefficient of surrounding temperature at 1h-alert threshold	≤ 1.0 nmol/mol/K	0.360	u_{st}	1.56	2.4300	
7	Sensitivity coefficient of electrical voltage at 1h-alert threshold	≤ 0.30 nmol/mol/V	0.000	u_y	0.00	0.0000	
8a	Interferent H ₂ O with 21 nmol/mol	≤ 10 nmol/mol (Zero)	-0.100	u_{H_2O}	0.11	0.0120	
		≤ 10 nmol/mol (Span)	0.270				
8b	Interferent Toluene with 0.5 µmol/mol	≤ 5.0 nmol/mol (Zero)	0.070	$u_{Tol, pos}$			
		≤ 5.0 nmol/mol (Span)	0.740	or	0.64	0.4146	
8c	Interferent Xylene with 0.5 µmol/mol	≤ 5.0 nmol/mol (Zero)	0.100	$u_{Xyl, neg}$			
		≤ 5.0 nmol/mol (Span)	0.840				
9	Averaging effect	≤ 7.0% of measured value	1.400	u_{av}	0.97	0.9408	
10	Reproducibility standard deviation under field conditions	≤ 5.0% of average over 3 months	2.180	$u_{r,f}$	2.62	6.8435	
11	Long term drift at zero level	≤ 5.0 nmol/mol	-0.900	$u_{d,l,z}$	-0.52	0.2700	
12	Long term drift at span level	≤ 5.0% of max. of certification range	-3.890	$u_{d,l,h}$	-2.70	7.2634	
18	Difference sample/calibration port	≤ 1.0%	0.000	u_{asc}	0.00	0.0000	
21	Uncertainty of test gas	≤ 3.0%	2.000	u_{cg}	1.20	1.4400	
Combined standard uncertainty						u_c	4.6484
Expanded uncertainty						U	9.2969
Relative expanded uncertainty						W	7.75
Maximum allowed expanded uncertainty						W_{req}	15

Expanded uncertainty from the results obtained in the laboratory and field tests for analyser 2

Measuring device:		Serial-No.:		nmol/mol	
Horiba APOA 370		SN 10042			
Measured component:		1h-alert threshold:		120	
O3					
No.	Performance characteristic	Performance criterion	Result	Partial uncertainty	Square of partial uncertainty
1	Repeatability standard deviation at zero	≤ 1.0 nmol/mol	0.170	U _{r,z}	0.0020
2	Repeatability standard deviation at 1h-alert threshold	≤ 3.0 nmol/mol	0.135	U _{r,h}	-
3	"lack of fit" at 1h-alert threshold	≤ 4.0% of measured value	-0.700	U _{i,h}	0.2352
4	Sensitivity coefficient of sample gas pressure at 1h-alert threshold	≤ 2.0 nmol/mol/kPa	0.013	U _{gp}	0.0253
5	Sensitivity coefficient of sample gas temperature at 1h-alert threshold	≤ 1.0 nmol/mol/K	0.100	U _{gt}	1.6875
6	Sensitivity coefficient of surrounding temperature at 1h-alert threshold	≤ 1.0 nmol/mol/K	0.390	U _{st}	2.8519
7	Sensitivity coefficient of electrical voltage at 1h-alert threshold	≤ 0.30 nmol/mol/V	0.000	U _v	0.0000
8a	Interferent H ₂ O with 21 nmol/mol	≤ 10 nmol/mol (Zero) ≤ 10 nmol/mol (Span)	-0.770 0.140	U _{H2O}	0.0149
8b	Interferent Toluene with 0.5 µmol/mol	≤ 5.0 nmol/mol (Zero) ≤ 5.0 nmol/mol (Span)	0.100 0.300	U _{int,pos} or	0.3388
8c	Interferent Xylene with 0.5 µmol/mol	≤ 5.0 nmol/mol (Zero) ≤ 5.0 nmol/mol (Span)	0.100 1.100	U _{int,neg}	
9	Averaging effect	≤ 7.0% of measured value	-0.300	U _{av}	0.0432
10	Reproducibility standard deviation under field conditions	≤ 5.0% of average over 3 months	2.180	U _{r,i}	6.8435
11	Long term drift at zero level	≤ 5.0 nmol/mol	-1.100	U _{l,z}	0.4033
12	Long term drift at span level	≤ 5.0% of max. of certification range	-3.670	U _{d,i,h}	6.4651
18	Difference sample/calibration port	≤ 1.0%	0.000	U _{sc}	0.0000
21	Uncertainty of test gas	≤ 3.0%	2.000	U _{cg}	1.4400
Combined standard uncertainty			U _c		4.5112
Expanded uncertainty			U		9.0223
Relative expanded uncertainty			W		7.52
Maximum allowed expanded uncertainty			W _{req}		15