

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000034862_04

Certified AMS: Gas chromatograph GC 5000 BTX Version FID for benzene

Manufacturer: AMA Instruments GmbH
Lise-Meitner-Strasse 8
89081 Ulm
Germany

Test Institute: TÜV Rheinland Energy & Environment GmbH

**This is to certify that the AMS has been tested
and found to comply with the standards
VDI 4202-1 (2018), EN 14662-3 (2016)
as well as EN 15267-1 (2009) and EN 15267-2 (2023).**

Certification is awarded in respect of the conditions stated in this certificate
(this certificate contains 10 pages).

The present certificate replaces certificate 0000034862_03 dated 5 November 2019.



Suitability Tested
Complying with
2008/50/EC
EN 15267
Regular
Surveillance
www.tuv.com
ID 0000034862

Publication in the German Federal Gazette
(BAnz) of 22 July 2019

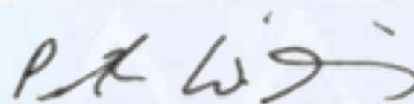
German Environment Agency
Dessau, 3 July 2024

This certificate will expire on:
21 July 2029

TÜV Rheinland Energy &
Environment GmbH
Cologne, 2 July 2024



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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 the certificate D-PL-11120-02-00.

Test report:	Addendum: AMA 143-01K FID/18D dated 26 April 2019 and test report 143-02R1/09 dated 8 June 2009
Initial certification:	16 March 2012
Expiry date:	21 July 2029
Certificate:	Renewal (of previous certificate 0000034862_03 of 5 November 2019 valid until 21 July 2024)
Publication:	BAnz AT 22.07.2019 B8, chapter III No. 3.1

Approved application

The tested AMS is suitable for continuous ambient air monitoring of Benzene (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 at a traffic related location.

The AMS is approved for an ambient temperature range of +5 °C to +35 °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 measured values relevant to the application.

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

Basis of the certification

This certification is based on:

- Addendum: AMA 143-01K FID/18D dated 26 April 2019 and test report 143-02R1/09 dated 8 June 2009 of Landesanstalt für Umwelt Baden-Württemberg (LUBW), Karlsruhe
- 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 AT 22.07.2019 B8, chapter III No. 3.1,
Announcement by UBA dated 28 June 2019:

AMS designation:

Gaschromatograph GC 5000 BTX Version FID for Benzene

Manufacturer:

AMA Instruments GmbH, Ulm

Field of application:

For continuous ambient air monitoring of benzene concentration (stationary operation)

Measuring ranges during the performance test:

Benzene: 0 – 50 µg/m³

Software versions:

AMA_System.Control v.1.25 (software for GC control)

AMA_Peak.log v.1.1 (software for chromatogram evaluation)

Restrictions:

1. The AMS does not have a living zero.
2. The measuring system can only be properly operated up to a vacuum of 86 kPa.

Notes:

None

Test institute:

Landesanstalt für Umwelt Baden-Württemberg (LUBW), Karlsruhe

Report No.: Addendum 936/AMA 143-01 FID/18D dated 21 February 2019
(Part of LUBW-Report: 143-02.R1/09 dated 8 June 2009)

Publication in the German Federal Gazette: BAnz AT 28.07.2022 B4, Chap. III
notification 37, Announcement by UBA dated 28 June 2022:

**37 Notification as regards Federal Environment Agency (UBA) notice
of 28 June 2019 (BAnz AT 22.07.2019 B8, chapter III number 3.1)**

The current software versions of the measuring device gas chromatograph GC 5000
BTX version FID for benzene of AMA Instruments GmbH are:

Common.Control	v. 1.1
SS.Control	v. 2.1
AMA_PEAK.log	v. 1.3

Various hardware changes have been made to the measuring equipment.

These concern the following points:

- new connector modules at the back of the device
- new electronic pressure controller
- optimization of valve drive 6-port valve
- new actuator for furnace damper
- minor housing adaptations

Statement issued by TÜV Rheinland Energy GmbH dated 26 April 2022

Certified product

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

The online gas chromatograph GC 5000 BTX has been developed for the continuous measurement of benzene, toluene, m-/p-xylene, o-xylene and ozone precursors (C6 to C12) in ambient air.

The tested AMS is installed in a 19 inch housing with the following technical specifications:

Housing 19 inch

Height: 6 rack units (U)
Depth: 600 mm
Weight: approximately 33 kg
Ambient temperature range: 0 to 40 °C

Voltage and gas supply

Voltage: 220 – 250 VAC, 50 Hz
Power: max. 800 W
Carrier gas: N₂ 5.0 (12 ml/min)
Burning air: Synthetic air or catalytic purified compressed air
Burning gas: H₂ 5.0 (37 ml/min)
Gas connection: Swagelok, 1/8 inch
Detector: FID – Photo-Ionisations-Detektor

Sampling system

Pump: Maintenance free diaphragm pump
Volume measurement: MFC – mass flow controller with thermal sensor
Sampling duration: 15 min
Sample flow rate: 20 ml/min (normal conditions, dry)
Sampling volume: 300 ml (normal conditions, dry)

Accumulation

Adsorber: Carbotrap
Accumulation temperature: 30 °C
Desorption temperature: 230 °C

Valve Oven

Temperature: 80 °C
Sample switch: 6-port-valve

Column Oven

Separating column: Quartz capillary column
AMAsep 1 - 0.32 mm ID/ 30 m / 1.5 µm film
Temperature program: 50 °C 3 min, 8 °C/min, 130 °C 5 min oven cooling
Cooling: Forced cooling by opening the column oven
and air recirculation

Communication interfaces

Interfaces: 2 Ethernet, RS 232, RS 485, 4 USB, PS2, VGA
max. 16 analogue outputs (4 - 20 mA, 0 - 20 mA, 0 - 5 V,
0 - 10 V), digital inputs/outputs, field bus connection
Protocols: Gesytec-II, Modbus, Profibus, others on request

General notes

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 manufacture of 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 & Environment 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 certification mark may be applied to the product or used in advertising materials for the certified product.

This document as well as the certification mark remains property of TÜV Rheinland Energy & Environment GmbH. With revocation of the publication the certificate loses its validity. After the expiration of the certificate and on requests of the TÜV Rheinland Energy & Environment GmbH this document shall be returned and the certificate mark must not be employed anymore.

The relevant version of this certificate and its expiration is also accessible on the internet: [**qal1.de**](http://qal1.de).

History of documents

Certification of Gaschromatograph GC 5000 BTX Version FID is based on the documents listed below and the regular, continuous monitoring of the Quality Management System of the manufacturer:

Basic approval

Test report: 143-02R1/09 dated 8 June 2009
Landesanstalt für Umwelt, Messungen und Naturschutz Baden-Württemberg (LUBW),
Publication: BAnz. 25 August 2009, No. 125, p. 2929, chapter II number 3.1
UBA announcement dated 3 August 2009

Notifications

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 29 September 2011
Publication: BAnz. 02 March 2012, No. 36, p. 920, chapter V notification 13
UBA announcement dated 23 February 2012
(Soft- and hardware changes)

Initial certification according to EN 15267

Certificate No. 0000034862_00: 16 March 2012
Expiry date of the certificate: 1 March 2017
Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 30 January 2012
Test report: 143-02.R1/09 of 08 June 2009
Landesanstalt für Umwelt, Messungen und Naturschutz Baden-Württemberg (LUBW),
Publication: BAnz. 02 March 2012, No. 36, p. 920, chapter V notification 21
UBA announcement dated 23 February 2012
(comply with the requirements of EN 14662-3 2005)

Notifications

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 23 March 2015
Publication: BAnz AT 26.08.2015 B4, chapter V notification 52
UBA announcement dated 22 July 2015
(Soft- and hardware changes)

Certificate based on a notification

Certificate No. 0000034862_01: 25 April 2016
Expiry date of the certificate: 1 March 2017
Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 21 October 2015
Publication: BAnz AT 14.03.2016 B7, chapter V notification 2
UBA announcement dated 18 February 2016
(new hardware parts)

Renewal of certificates

Certificate No. 0000034862_02: 28 February 2017
Expiry date of the certificate: 1 March 2022

Notifications

Statement issued by TÜV Rheinland Energy GmbH dated 6 January 2017
Publication: BAnz AT 31.07.2017 B12, chapter II notification 36
UBA announcement dated 13 July 2017
(Software changes)

Supplementary testing according to EN 15267

Certificate No. 0000034862_03: 5 November 2019

Expiry date of the certificate: 21 July 2024

Test report: AMA 143-01K FID/18D dated 26 April 2019

Landesanstalt für Umwelt, Messungen und Naturschutz Baden-Württemberg (LUBW),

Publication: BAnz AT 22.07.2019 B8, chapter III number 3.1

UBA announcement dated 28 June 2019

(approval according to EN 14662-3)

Notifications

Statement issued by TÜV Rheinland Energy GmbH dated 26 April 2022

Publication: BAnz AT 28.07.2022 B4, chapter III notification 37

UBA announcement dated 28 June 2022

(Soft- and hardware changes)

Renewal of certificates

Certificate No. 0000034862_04: 3 July 2024

Expiry date of the certificate: 21 July 2029

Expanded uncertainty laboratory, system 1

Parameter	Minimum requirement	value	Given benzene-conc. C _i	sensitivity coefficient	X _{min}	X _{max}	u	u ²
Repeatability standard deviation ¹	≤ 0,25 µg/m ³	0,08 µg/m ³	5,9 µg/m ³				0,02 µg/m ³	0,0005 (µg/m ³) ²
Largest deviation of linearity ²	≤ 5,0 %	-3,23 %	5,4 µg/m ³				-0,09 µg/m ³	0,009 (µg/m ³) ²
Change of the sample gas pressure ²	≤ 0,1 (µg/m ³)/kPa	0,02 (µg/m ³)/kPa	37,2 µg/m ³	0,02 (µg/m ³)/kPa	86 kPa	110 kPa	0,04 µg/m ³	0,002 (µg/m ³) ²
Change of the surrounding temperature ¹	≤ 0,08 (µg/m ³)/K	0,04 (µg/m ³)/kPa	38,1 µg/m ³	0,04 (µg/m ³)/kPa	278 K	308 K	0,08 µg/m ³	0,01 (µg/m ³) ²
Change of the electrical voltage ¹	≤ 0,08 (µg/m ³)/V	0,013 (µg/m ³)/V	41,7 µg/m ³	0,01 (µg/m ³)/V	210 V	245 V	0,031 µg/m ³	0,0009 (µg/m ³) ²
Interfering component H ₂ O (19 * 10 ⁻³ ppm) ²	≤ 0,015 (µg/m ³)/10 ³ ppm	-0,0002 (µg/m ³)/10 ³ ppm	4,9 µg/m ³	-0,0002 (µg/m ³)/10 ³ ppm	0,6 Vol-%	2,1 Vol-%	-0,002 µg/m ³	0,00001 (µg/m ³) ²
Carry over (memory-effect) ¹	≤ 1,0 µg/m ³	0,53 µg/m ³	41,7 µg/m ³				0,04 µg/m ³	0,001 (µg/m ³) ²
Reproducibility standard deviation under field conditions ¹	≤ 0,25 µg/m ³	0,14 µg/m ³					0,14 µg/m ³	0,02 (µg/m ³) ²
Long term drift at span-value ¹	≤ 10,0 %	-1,4 %	41,8 µg/m ³				-0,04 µg/m ³	0,002 (µg/m ³) ²
Short term drift at span-value ¹	≤ 2,0 µg/m ³	0,06 µg/m ³	42,0 µg/m ³					
Difference sample/calibration port [*]	≤ 1,0 %	N/A						
Maintenance interval ¹	≤ 14 days	4 weeks						
Availability ¹	≥ 90 %	100,00 %						
test gas ¹	N/A	2,5 %					0,06 µg/m ³	0,00 (µg/m ³) ²

*no separate calibration port

Benzene annual limit value	5,0 µg/m ³
Combined standard uncertainty laboratory	0,15 ppb
Relative expanded uncertainty laboratory	6,2 %
Comb. standard uncertainty laboratory + field	0,21 ppb
Rel. expanded uncertainty laboratory + field	8,4 %

¹: Tests conducted in 2008/2009 with the tested device AMA GC 5004

²: Tests conducted in 2018 with the tested device AMA GC 5549

The test data are taken from the test report: AMA 143-01K FID/18D of 26 April 2019 of the Landesanstalt für Umwelt, Messungen und Naturschutz Baden-Württemberg.

Expanded uncertainty, System 2

Parameter	Minimum requirement	value	Given benzene-conc. C _i	sensitivity coefficient	X _{min}	X _{max}	u	u ²
Repeatability standard deviation ¹	≤ 0.25 µg/m ³	0.06 µg/m ³	5.9 µg/m ³				0.02 µg/m ³	0.0003 (µg/m ³) ²
Largest deviation of linearity ²	≤ 5.0 %	-3.38 %	2.5 µg/m ³				-0.10 µg/m ³	0.010 (µg/m ³) ²
Change of the sample gas pressure ²	≤ 0.1 (µg/m ³)/kPa	0.02 (µg/m ³)/kPa	37.2 µg/m ³	0.02 (µg/m ³)/kPa	86 kPa	110 kPa	0.03 µg/m ³	0.001 (µg/m ³) ²
Change of the surrounding temperature ¹	≤ 0.08 (µg/m ³)/K	0.01 (µg/m ³)/kPa	38.1 µg/m ³	0.01 (µg/m ³)/kPa	278 K	308 K	0.03 µg/m ³	0.0007 (µg/m ³) ²
Change of the electrical voltage ¹	≤ 0.08 (µg/m ³)/V	0.0001 (µg/m ³)/V	41.7 µg/m ³	0.0001 (µg/m ³)/V	210 V	245 V	0.0004 µg/m ³	0.0000 (µg/m ³) ²
Interfering component H ₂ O (19 * 10 ³ ppm) ²	≤ 0.015 (µg/m ³)/10 ³ ppm	0.006 (µg/m ³)/10 ³ ppm	4.9 µg/m ³	0.01 (µg/m ³)/10 ³ ppm	0.6 Vol-%	2.1 Vol-%	0.09 µg/m ³	0.0075 (µg/m ³) ²
Carryover (memory-effect) ¹	≤ 1.0 µg/m ³	0.09 µg/m ³	41.7 µg/m ³				0.01 µg/m ³	0.000 (µg/m ³) ²
Reproducibility standard deviation under field conditions ¹	≤ 0.25 µg/m ³	0.14 µg/m ³					0.14 µg/m ³	0.02 (µg/m ³) ²
Long term drift at span-value ¹	≤ 10.0 %	-1.5 %	41.8 µg/m ³				-0.04 µg/m ³	0.002 (µg/m ³) ²
Short term drift at span-value ¹	≤ 2.0 µg/m ³	0.27 µg/m ³	42.0 µg/m ³					
Difference sample/calibration port ²	≤ 1.0 %	N/A						
Maintenance interval ¹	≤ 14 days	4 weeks						
Availability ¹	≥ 90 %	100.00 %						
test gas ¹	N/A	2.5 %					0.06 µg/m ³	0.00 (µg/m ³) ²

*no separate calibration port

Benzene annual limit value	5.0 µg/m ³
Combined standard uncertainty laboratory	0.15 ppb
Relative expanded uncertainty laboratory	6.1 %
Comb. standard uncertainty laboratory + field	0.21 ppb
Rel. expanded uncertainty laboratory + field	8.3 %

¹: Tests conducted in 2008/2009 with the tested device AMA GC 5005

²: Tests conducted in 2018 with the tested device AMA GC 5550

X_{min} Minimum value of the influence quantities
X_{max} Maximum value of the influence quantities

The test data are taken from the test report: AMA 143-01K FID/18D of 26 April 2019 of the Landesanstalt für Umwelt, Messungen und Naturschutz Baden-Württemberg.