

CERTIFICATE

of Product Conformity (QAL1)

Certificate No.: 0000034862_02

Certified AMS: Gaschromatograph GC 5000 BTX Version FID for Benzene

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

Test Institute: TÜV Rheinland Energy GmbH

This is to certify that the AMS has been tested and certified
according to the standards

EN 14662-3 (2005)
EN 15267-1 (2009) and EN 15267-2 (2009).

Certification is awarded in respect of the conditions stated in this certificate
(this certificate contains 9 pages).



Suitability Tested
Complying with
2008/50/EC
EN 15267
Regular
Surveillance

www.tuv.com
ID 0000034862

Publication in the German Federal Gazette
(BAnz.) of 25 August 2009

German Federal Environment Agency
Dessau, 28 February 2017



Dr. Marcel Langner
Head of Section II 4.1

This certificate will expire on:
01 March 2022

TÜV Rheinland Energy GmbH
Cologne, 27 February 2017



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51105 Köln

Test institute accredited to EN ISO/IEC 17025:2005 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

Certificate:
0000034862_02 / 28 February 2017

Test report: 143-02.R1/09 of 08 June 2009
Initial certification: 02 March 2012
Expiry date: 01 March 2022
Certificate renewal (previous certificate 0000034862_01 dated from 25 April 2016 with validity up to the 01 March 2017)
Publication: BAnz. 25 August 2009, No. 125, page 2929, chapter II, 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 more than 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 valid at the time of performance testing. As changes in legal regulations are possible, any potential user should ensure in consultation with the manufacturer that this AMS is suitable for monitoring the limit value relevant to the application.

Any potential user should ensure, in consultation with the manufacturer, that this AMS is suitable for ambient air applications at which it will be installed.

Basis of the certification

This certification is based on:

- Test report 143-02.R1/09 of 08 June 2009 of Landesanstalt für Umwelt, Messungen und Naturschutz 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 25 August 2009, No. 125, page 2929,
chapter II number 3.1,
Announcement by UBA from 03 August 2009:

AMS designation:

Gaschromatograph GC 5000 BTX Ausführung FID for Benzene

Manufacturer:

AMA Instruments GmbH, Ulm

Approval:

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

Measuring ranges during the suitability test:

Benzene 0 – 50 µg/m³

Software version:

GC 5000 BTX Version 1.1

Restrictions:

The AMS does not have a living zero.

Remarks:

None

Test report:

Landesanstalt für Umwelt, Messungen und Naturschutz Baden-Württemberg (LUBW),
Karlsruhe, Report No.: 143-02.R1/09 of 08 June 2009

Publication in the German Federal Gazette: BAnz. 2 March 2012, No. 36, page 920, chapter
V notification 13,
Announcement by UBA from 23 February 2012:

13 Notification as regards Federal Environment Agency (UBA) notices of 03 August 2009 (BAnz. p. 2929, chapter II, number 3.1)

The current software version number of the GC 5000 BTX gas chromatograph in its FID version for benzene manufactured by AMA Instruments GmbH is:
Version 2.1.

The measuring system can also operate with the Mean Well PS-35-24 24V/1.5A power supply instead of the Mean Well PS-25-24 24V/1.0A power supply.

Statement of TÜV Rheinland Energie und Umwelt GmbH of 29 September 2011

Publication in the German Federal Gazette: BAnz. 2 March 2012, No. 36, page 920, chapter V notification 21,
Announcement by UBA from 23 February 2012:

21 Notification as regards Federal Environment Agency (UBA) notices of 03. August 2009 (BAnz. page 2929, chapter II, number 3.1)

The GC 5000 BTX measuring system in its FID version for benzene manufactured by AMA instrument's GmbH for determining the concentration of benzene in the ambient air meets the requirements of the EN 14662-3 (August 2005).

Moreover, the manufacturing process and the quality management system of the GC 5000 BTX measuring system in its FID version for benzene meet the requirements of the EN 15267.

The test report on the suitability test is accessible on the Internet at www.qal1.de.

Statement of TÜV Rheinland Energie und Umwelt GmbH of 30 January 2012

Publication in the German Federal Gazette: BAnz AT 26.08.2015 B4, chapter V, notification 52,
Announcement by UBA from 22 July 2015:

52 Notification as regards Federal Environment Agency (UBA) notices of 10 January 2011 (BAnz. S. 294, chapter III number 3.1) and of 23 February 2012 (BAnz. S. 920, chapter V, notification 13 and 21)

The GC 5000 BTX gas chromatograph for benzene, manufactured by AMA Instruments GmbH, has new software for its FID version. The software modules relevant for the de-termination of measured values are:

- SS.Control v.1.0 for operation of the GC and
- AMA_Peak.log v.1.0 for chromatographic evaluation.

With the launch of the new software, the following hardware changes took place:

- Replacement of the NOVA-945GSE industry PC motherboard with Perfectron INS8335A
- Integration of a touch screen panel instead of previously used display and monitor
- Upgrade from Windows XP to Windows 7

Statement of TÜV Rheinland Energie und Umwelt GmbH of 23 March 2015

Publication in the German Federal Gazette: BAnz AT 14.03.2016 B7, chapter V notification 2,
Announcement by UBA from 18 February 2016:

2 Notification as regards Federal Environment Agency (UBA) notices of 3 August 2009 (BAnz. page 2929, chapter II number 3.1) and of 22 July 2015 (BAnz AT 26.08.2015 B4, chapter V notification 52)

The measuring device GC 5000 BTX version FID for benzene of the company AMA instrument's GmbH can operate also with the new amplifier module AMA Instruments product code 2895 and the new temperature controller AMA Instruments product code 2853.

Statement of TÜV Rheinland Energie und Umwelt GmbH of 21 October 2015

Certified product

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

Online Gaschromatograph GC 5000 BTX is developed for continuous measurement of benzene, toluene, m-/p-xylene, o-xylene, and Ozone precursors (C6 to C12) in ambient air.

The tested AMS is assembled in 19 inch housing with the following technical data:

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

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: 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 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 can be applied to the product or used in publicity material for the certified product.

This document as well as the certification mark remains property of TÜV Rheinland Energy 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 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.

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

Basic approval

Test report No.: 143-02.R1/09 of 08 June 2009

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

Publication: BAnz. 25 August 2009, No. 125, page 2929, chapter II, no. 3.1

Announcement by UBA from 03 August 2009

Notification

Statement of TÜV Rheinland Energie und Umwelt GmbH, Cologne of 29 September 2011

Publication: BAnz. 2 March 2012, No. 36, page 920, chapter V notification 13

Announcement by UBA from 23 February 2012

(new software version, new power supply)

Initial certification according to EN 15267

Certificate No. 0000034862: 16 March 2012
Expiry date of the certificate: 01 March 2017

Test report: 143-02.R1/09 of 08 June 2009

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

Statement of TÜV Rheinland Energie und Umwelt GmbH of 30 January 2012

Publication: BAnz. 02 March 2012, No. 36, page 920, chapter V notification 21

Announcement by UBA from 23 February 2012

Notifications according to EN 15267

Statement of TÜV Rheinland Energie und Umwelt GmbH, Cologne of 23 March 2015

Publication: BAnz AT 26.08.2015 B4, chapter V notification 52

Announcement by UBA from 22 July 2015

(new software and hardware)

Certificate No. 0000034862_01: 25 April 2016

Expiry date of the certificate: 01 March 2017

Statement of TÜV Rheinland Energie und Umwelt GmbH of 21 October 2015

Publication: BAnz AT 14.03.2016 B7, chapter V notification 2

Announcement by UBA from 18 February 2016

(new hardware parts)

Renewal of the certificate

Certificate No. 0000034862_02: 28 February 2017

Expiry date of the certificate: 01 March 2022

Total uncertainty of measurement for the laboratory test		GC 5004	GC 5005		GC 5004	GC 5005
Uncertainty of test gas*	u_{span} [$\mu\text{g}/\text{m}^3$]	0,06	0,06	C_{Benz} [$\mu\text{g}/\text{m}^3$]	5,0	5,0
Adjustment of calibration line	u_{fit} [$\mu\text{g}/\text{m}^3$]	0,07	0,05	C_{Benz} [$\mu\text{g}/\text{m}^3$]	14,0	14,0
Repeatability	u_r [$\mu\text{g}/\text{m}^3$]	0,08	0,06	C_{Benz} [$\mu\text{g}/\text{m}^3$]	5,9	5,9
Interfering by Ozon	u_{O_3} [$\mu\text{g}/\text{m}^3$]	0,01	0,02	C_{Benz} [$\mu\text{g}/\text{m}^3$]	41,7	41,7
Interfering by organic components	u_{org} [$\mu\text{g}/\text{m}^3$]	0,14	0,2	C_{Benz} [$\mu\text{g}/\text{m}^3$]	41,7	41,7
Interfering by relative humidity	u_{rh} [$\mu\text{g}/\text{m}^3$]	0,15	0,09	C_{Benz} [$\mu\text{g}/\text{m}^3$]	41,7	41,7
Dependency of air pressure	u_p [$\mu\text{g}/\text{m}^3$]	0,03	0,16	C_{Benz} [$\mu\text{g}/\text{m}^3$]	41,8	41,8
Dependency of ambient air temperature	u_{Ts} [$\mu\text{g}/\text{m}^3$]	0,31	0,1	C_{Benz} [$\mu\text{g}/\text{m}^3$]	38,1	38,1
Dependency of voltage	u_V [$\mu\text{g}/\text{m}^3$]	0,13	0,01	C_{Benz} [$\mu\text{g}/\text{m}^3$]	41,7	41,7
Total uncertainty of measurement u_c / c [%]		2,2	1,8			
Expanded uncertainty of measurement $U_{c,rel}$ [%]		4,3	3,6			

* The uncertainty of test gas generation is $\pm 2,5$ % (in reference to $5 \mu\text{g}/\text{m}^3$). Standard version verified over years.

Total uncertainty of measurement for the field test		GC 5004	GC 5005		GC 5004	GC 5005
Uncertainty of test gas*	u_{span} [$\mu\text{g}/\text{m}^3$]	0,06	0,06	C_{Benz} [$\mu\text{g}/\text{m}^3$]	5,0	5,0
Adjustment of calibration line	u_{fit} [$\mu\text{g}/\text{m}^3$]	0,07	0,05	C_{Benz} [$\mu\text{g}/\text{m}^3$]	14,0	14,0
Repeatability	u_r [$\mu\text{g}/\text{m}^3$]	0,14	0,14	C_{Benz} [$\mu\text{g}/\text{m}^3$]	41,8	41,8
Interfering by Ozon	u_{O_3} [$\mu\text{g}/\text{m}^3$]	0,01	0,02	C_{Benz} [$\mu\text{g}/\text{m}^3$]	41,7	41,7
Interfering by organic components	u_{org} [$\mu\text{g}/\text{m}^3$]	0,14	0,2	C_{Benz} [$\mu\text{g}/\text{m}^3$]	41,7	41,7
Interfering by relative humidity	u_{rh} [$\mu\text{g}/\text{m}^3$]	0,15	0,09	C_{Benz} [$\mu\text{g}/\text{m}^3$]	41,7	41,7
Dependency of air pressure	u_p [$\mu\text{g}/\text{m}^3$]	0,03	0,16	C_{Benz} [$\mu\text{g}/\text{m}^3$]	41,8	41,8
Dependency of ambient air temperature	u_{Ts} [$\mu\text{g}/\text{m}^3$]	0,31	0,1	C_{Benz} [$\mu\text{g}/\text{m}^3$]	38,1	38,1
Dependency of voltage	u_V [$\mu\text{g}/\text{m}^3$]	0,13	0,01	C_{Benz} [$\mu\text{g}/\text{m}^3$]	41,7	41,7
Long term drift	u_d [$\mu\text{g}/\text{m}^3$]	0,17	0,27	C_{Benz} [$\mu\text{g}/\text{m}^3$]	41,8	41,8
Total uncertainty of measurement u_c / c [%]		1,7	1,6			
Expanded uncertainty of measurement $U_{c,rel}$ [%]		3,4	3,2			

* The uncertainty of test gas generation is $\pm 2,5$ % (in reference to $5 \mu\text{g}/\text{m}^3$). Standard version verified over years.