

# CERTIFICATE

## on Product Conformity (QAL1)

Number of Certificate: 0000034863

**Certified AMS:** Gaschromatograph GC 5000 BTX Type PID for Benzene

**Manufacturer:** AMA Instruments GmbH  
Söflinger Straße 100  
89077 Ulm  
Germany

**Test Institute:** TÜV Rheinland Energie und Umwelt GmbH

**This is to certify that the AMS has been tested  
and found to comply with:**

**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  
(also see the following pages).



- Certified equivalent EN method
- Complying with 2008/50/EC
- TUV approved
- Annual inspection

Publication in the German Federal Gazette  
(BAnz.) of 26 January 2011

The certificate is valid until:  
01 March 2017

Umweltbundesamt  
Dessau, 16 March 2012

TÜV Rheinland Energie und Umwelt GmbH  
Köln, 15 March 2012

  
i. A. Dr. Hans-Joachim Hummel

  
ppa. Dr. Peter Wilbring

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51105 Köln

Accreditation according to EN ISO/IEC 17025 and certified according to ISO 9001:2008.

<b>Test report:</b>	LUBW-Report No: 143-04R / 10 of 23 November 2010
<b>First certification:</b>	02 March 2012
<b>Validity ends:</b>	01 March 2017
<b>Publication:</b>	BAnz. 2011, No. 14, p. 294, chapter III, No. 1.1

**Approved application**

The certified AMS is suitable for continuous ambient air monitoring (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 temperature range of +5 °C to +35 °C.

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 143-04R / 10 dated 23 November 2010 of Landesanstalt für Umwelt, Messungen und Naturschutz Baden-Württemberg (LUBW), Karlsruhe
- suitability announced by the German Environmental Agency (UBA) as the relevant body
- the ongoing surveillance of the product and the manufacturing process
- publication in the German Federal Gazette (BAnz. 2011, No. 14, p. 294, chapter III, No. 1.1, announcement by UBA from 10 January 2011)
- publication in the German Federal Gazette (BAnz. 02 March 2012, No. 36, page 920, chapter V, notification 14 as well as notification 22, announcement by UBA from 23 February 2012)

**AMS name:**

Gaschromatograph GC 5000 BTX Type PID 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/m<sup>3</sup>

**Software version:**

GC 5000 BTX Version 1.1

**Restrictions:**

Based on the operating principle the AMS does not have a living zero.

**Remarks:**

None

**Test report:**

Landesanstalt für Umwelt, Messungen und Naturschutz Baden-Württemberg (LUBW), Karlsruhe  
Report No.: 143-04R / 10 dated 23 November 2010

14 Notification on the announcement of the Federal Environment Agency of 10 January 2011  
(BAnz. p. 294, chapter III, number 1.1)

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

The measuring system can also be operated with a Mean Well PS-35-24 24V/1.5 A power supply instead of the Mean Well PS-25-24 24V/1,0 A power supply.

Statement by TÜV Rheinland Energie und Umwelt GmbH dated 29 September 2011

22 Notification on the announcement of the Federal Environment Agency of 10 January 2011  
(BAnz. p. 294, chapter III, number 1.1)

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

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

The test report on the suitability test is accessible on the Internet at [www.qal1.de](http://www.qal1.de).

Statement by TÜV Rheinland Energie und Umwelt GmbH dated 30 January 2012

**Certified product**

This certificate applies to automated measurement systems confirming 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: N<sub>2</sub> 5.0 (12 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, 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 I (Bayern und Hessen), Gesytec II, Modbus RTU, 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 Energie und Umwelt GmbH must be notified at the given address 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 is presented on page 1 of this certificate.

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

The relevant version of this certificate and the validity is also accessible on the internet Address: **qal1.de**.

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

**First suitability test:**

Test report: 143-04R / 10 of 23 November 2010  
Landesamt für Umwelt, Messungen und Naturschutz Baden-Württemberg  
Publication: BAnz. 26 January 2011, No. 14, p. 294, chapter III, No. 1.1  
Announcement by UBA from 10 January 2011

**Initial certification according to EN 15267:**

Certificate No. 0000034863: 16 March 2012  
Validity of the certificate until: 01 March 2017  
Test report: 143-04R / 10 of 23 November 2010  
Landesamt für Umwelt, Messungen und Naturschutz Baden-Württemberg  
Publication: BAnz. 02 March 2012, No. 36, p. 920, chapter V,  
notification 14 as well as notification 22  
Announcement by UBA from 23 February 2012

<b>Gesamtmessunsicherheit für den Labortest</b>		<b>GC 5006</b>	<b>GC 5007</b>		<b>GC 5006</b>	<b>GC 5007</b>
Unsicherheit des Prüfgases*	$u_{\text{span}} [\mu\text{g}/\text{m}^3]$	0,06	0,06	$c_{\text{Benz}} [\mu\text{g}/\text{m}^3]$	5,0	5,0
Anpassung der Kalibriergeraden	$u_{\text{fit}} [\mu\text{g}/\text{m}^3]$	0,08	0,11	$c_{\text{Benz}} [\mu\text{g}/\text{m}^3]$	5,0	5,0
Wiederholpräzision	$u_r [\mu\text{g}/\text{m}^3]$	0,02	0,06	$c_{\text{Benz}} [\mu\text{g}/\text{m}^3]$	5,9	5,9
Störung durch Ozon	$u_{\text{O}_3} [\mu\text{g}/\text{m}^3]$	0,01	0,06	$c_{\text{Benz}} [\mu\text{g}/\text{m}^3]$	39,1	39,1
Störung durch organische Verbindungen	$u_{\text{org}} [\mu\text{g}/\text{m}^3]$	0,41	0,32	$c_{\text{Benz}} [\mu\text{g}/\text{m}^3]$	39,1	39,1
Störung durch relative Feuchte	$u_{\text{rh}} [\mu\text{g}/\text{m}^3]$	0,33	0,08	$c_{\text{Benz}} [\mu\text{g}/\text{m}^3]$	39,1	39,1
Abhängigkeit vom Luftdruck	$u_p [\mu\text{g}/\text{m}^3]$	0,12	0,11	$c_{\text{Benz}} [\mu\text{g}/\text{m}^3]$	39,1	39,1
Abhängigkeit von der Umgebungstemperatur	$u_{T_s} [\mu\text{g}/\text{m}^3]$	0,22	0,37	$c_{\text{Benz}} [\mu\text{g}/\text{m}^3]$	40,5	40,5
Abhängigkeit von der Spannung	$u_v [\mu\text{g}/\text{m}^3]$	0,12	0,06	$c_{\text{Benz}} [\mu\text{g}/\text{m}^3]$	39,1	39,1
<b>Gesamtmessunsicherheit <math>u_c/c</math> [%]</b>		<b>2,6</b>	<b>3,0</b>			
<b>Erweiterte Messunsicherheit <math>U_{c, \text{rel}}</math> [%]</b>		<b>5,2</b>	<b>6,0</b>			

\*: Die Unsicherheit der Prüfgaserzeugung liegt bei  $\pm 2,5\%$  (bez. auf  $5 \mu\text{g}/\text{m}^3$ ). Standardverfahren über Jahre verifiziert

<b>Gesamtmessunsicherheit für den Feldtest</b>		<b>GC 5006</b>	<b>GC 5007</b>		<b>GC 5006</b>	<b>GC 5007</b>
Unsicherheit des Prüfgases*	$u_{\text{span}} [\mu\text{g}/\text{m}^3]$	0,06	0,06	$c_{\text{Benz}} [\mu\text{g}/\text{m}^3]$	5,0	5,0
Anpassung der Kalibriergeraden	$u_{\text{fit}} [\mu\text{g}/\text{m}^3]$	0,08	0,11	$c_{\text{Benz}} [\mu\text{g}/\text{m}^3]$	5,0	5,0
Vergleichsstandardabweichung	$u_{\text{ref}} [\mu\text{g}/\text{m}^3]$	0,19	0,19	$c_{\text{Benz}} [\mu\text{g}/\text{m}^3]$	40,5	40,5
Störung durch Ozon	$u_{\text{O}_3} [\mu\text{g}/\text{m}^3]$	0,01	0,06	$c_{\text{Benz}} [\mu\text{g}/\text{m}^3]$	39,1	39,1
Störung durch organische Verbindungen	$u_{\text{org}} [\mu\text{g}/\text{m}^3]$	0,41	0,32	$c_{\text{Benz}} [\mu\text{g}/\text{m}^3]$	39,1	39,1
Störung durch relative Feuchte	$u_{\text{rh}} [\mu\text{g}/\text{m}^3]$	0,33	0,08	$c_{\text{Benz}} [\mu\text{g}/\text{m}^3]$	39,1	39,1
Abhängigkeit vom Luftdruck	$u_p [\mu\text{g}/\text{m}^3]$	0,12	0,11	$c_{\text{Benz}} [\mu\text{g}/\text{m}^3]$	39,1	39,1
Abhängigkeit von der Umgebungstemperatur	$u_{T_s} [\mu\text{g}/\text{m}^3]$	0,22	0,37	$c_{\text{Benz}} [\mu\text{g}/\text{m}^3]$	40,5	40,5
Abhängigkeit von der Spannung	$u_v [\mu\text{g}/\text{m}^3]$	0,12	0,06	$c_{\text{Benz}} [\mu\text{g}/\text{m}^3]$	39,1	39,1
Langzeitdrift	$u_d [\mu\text{g}/\text{m}^3]$	0,45	0,69	$c_{\text{Benz}} [\mu\text{g}/\text{m}^3]$	40,5	40,5
<b>Gesamtmessunsicherheit <math>u_c/c</math> [%]</b>		<b>2,8</b>	<b>3,3</b>			
<b>Erweiterte Messunsicherheit <math>U_{c, \text{rel}}</math> [%]</b>		<b>5,7</b>	<b>6,7</b>			

\*: Die Unsicherheit der Prüfgaserzeugung liegt bei  $\pm 2,5\%$  (bez. auf  $5 \mu\text{g}/\text{m}^3$ ). Standardverfahren über Jahre verifiziert