

CERTIFICATE

on Product Conformity (QAL1)

Certificate No.: 0000035015_02

Certified AMS: MERCEM300Z for Hg

Manufacturer: SICK MAIHAK GmbH
Dr.-Zimmermann-Straße 18
88709 Meersburg
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 15267-1: 2009, EN 15267-2: 2009, EN 15267-3: 2007
and EN 14181: 2004**

Certification is awarded in respect of the conditions stated in this certificate
(see also the following pages).

The present certificate replaces Certificate No. 0000035015_01 of 20 August 2012



- EN 15267-3 tested
- QAL1 certified
- TUV approved
- Annual inspection

Publication in the German Federal Gazette
(BAnz.) of 05 March 2013

German Federal Environment Agency
Dessau, 22 March 2013

i. A. Dr. Marcel Langner

This certificate will expire on:
01 March 2017

TÜV Rheinland Energie und Umwelt GmbH
Cologne, 21 March 2013

ppa. Dr. Peter Wilbring

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TÜV Rheinland Energie und Umwelt GmbH
Am Grauen Stein
51105 Cologne

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

Test report:	936/21216054/C of 30 September 2012
Initial certification:	02 March 2012
Expiry date:	01 March 2017
Publication:	BAnz AT 05 March 2013 B10, chapter I, No. 2.3

Approved application

The tested AMS is suitable for use at combustion plants according to EC Directive 2001/80/EC and at waste incineration plants according to EC Directive 2000/76/EC and other plants requiring official approval. The tested ranges have been chosen with respect to the wide application range of the AMS.

The suitability of the AMS for this application was assessed on the basis of a laboratory test and a twelvemonth field test at a municipal waste incinerator, a threemonth field test at a mineral coal power plant with use of derived fuels and a one month field test at a cement kiln with use of secondary fuel.

The AMS is approved for an ambient temperature range of -20 °C to +50 °C.

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

Basis of the certification

This certification is based on:

- test report 936/21216054/C of 30 September 2012 of TÜV Rheinland Energie und Umwelt GmbH
- 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 05 March 2013 B10, chapter I, No. 2.3

AMS name:
MERC300Z for Hg

Manufacturer:
SICK MAIHAK GmbH, Meersburg

Field of application:
Measurement at plants requiring official approval such as plants within the scope of 2000/76/EC (waste incineration directive) and 2001/80/EC (large combustion plants directive)

Measuring ranges during the performance test:

Component	Certification range	Supplementary ranges			Unit
		0 - 45	0 - 100	0 - 1000	
Hg	0 - 10	0 - 45	0 - 100	0 - 1000	µg/m ³

Software version:
9162140 VL27

Restrictions:
None

Remarks:

1. Wet test gas shall be used for testing the AMS.
2. The maintenance interval is three months.
3. Controls of span point for Hg require a suitable Hg-test-gas generator, i. e. a type HovaCal. The AMS may also be operated with an internal test gas generator instead. In that case, an external test gas generator is not required. An internal Hg-cell is available for short-term tests of the system; data retrieved this way cannot be used for QAL3 purposes.
4. The length of the test gas line during the testing procedure was between 5 and 35 m.
5. A complementary test (approval of an additional plant of application) to Federal Environmental Agency notice of 6 July 2012 (Federal Gazette (BAnz.) AT 20 July 2012 B11, Chapter I Number 2.3).

Test report:
TÜV Rheinland Energie und Umwelt GmbH, Köln
Report No.: 936/21216054/C of 30 September 2012

Certified product

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

The sample gas of the measuring system MERCEM300Z is taken from the duct with the help of a particular sampling probe heated to 200 °C. The heated test gas line is equipped with two inner liners. The first inner liner is responsible for transporting flue gas to the analyzer. The second inner liner serves to feed in zero and sample gas – application to the system takes place inside the sampling probe.

Hg analysis is performed in a UV photometer. Conversion of the entire mercury contained in the exhaust gas takes place as a directly thermal reaction at a temperature of approximately 1000 °C. In order to compensate for cross-sensitivities, the Zeeman-effect is employed. Gas is transported based on the principle of an ejector pump.

The measuring system is suited for use in the open air at temperatures ranging from -20 °C to 50 °C. The measuring system's control panel is built in to its door. The system features an integrated climate control unit and Ethernet network connectivity for data transfer.

The tested measuring system consists of the following parts:

- the sampling probe heated to 200 °C equipped with a heated filter element and test gas feeding facilities,
- the sampling line heated to 200 °C with two inner liners (heated lines with 5 to 35 m length were used during the field test and with 5 m length during the lab test),
- the analyzer rack with a photometer unit including an adjustment cuvette, an optional test gas generator, controllers and data output and software 9162140 VL27.

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 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 Energie und Umwelt GmbH. With revocation of the publication the certificate loses its validity. After the expiration 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 its expiration is also accessible on the internet: qal1.de.

Certification of MERCEM300Z for Hg is based on the documents listed below and the regular, continuous monitoring of the Quality Management System of the manufacturer:

Initial certification according to EN 15267:

Certificate No. 0000035015: 16 March 2012
Expiry date of the certificate: 01 March 2017
Test report: 936/21216054/A of 19 October 2011
TÜV Rheinland Energie und Umwelt GmbH, Cologne
Publication: BAnz. 02 March 2012, No. 36, p. 920, chapter I, No. 3.2
Announcement by UBA from 23 February 2012

Supplementary testing according to EN 15267:

Certificate No. 0000035015_01: 20 August 2012
Expiry date of the certificate: 01 March 2017
Test report: 936/21216054/B of 19 March 2012
TÜV Rheinland Energie und Umwelt GmbH, Cologne
Publication: BAnz AT 20 July 2012 B11, chapter I, No. 2.3
Announcement by UBA from 06 July 2012

Supplementary testing according to EN 15267:

Certificate No. 0000035015_02: 22 March 2013
Expiry date of the certificate: 01 March 2017
Test report: 936/21216054/C of 30 September 2012
TÜV Rheinland Energie und Umwelt GmbH, Cologne
Publication: BAnz AT 05 March 2013 B10, chapter I, No. 2.3
Announcement by UBA from 12 February 2013

Calculation of overall uncertainty according to EN 14181 and EN 15267-3

Measuring system

Manufacturer	SICK Maihak GmbH
Name of measuring system	MERCEM300Z
Serial number of the candidates	TÜV 1 / TÜV 2
Measuring principle	UV-Absorption / Zeemann Effect

Test report

Test laboratory	TÜV Rheinland
Date of report	2011-10-19

Measured component

Certification range	Hg	0 - 10 µg/m³
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Evaluation of the cross sensitivity (CS)

(system with largest CS)

Sum of positive CS at zero point	0,00 µg/m³
Sum of negative CS at zero point	-0,12 µg/m³
Sum of positive CS at reference point	0,06 µg/m³
Sum of negative CS at reference point	-0,22 µg/m³
Maximum sum of cross sensitivities	-0,22 µg/m³
Uncertainty of cross sensitivity	-0,127 µg/m³

Calculation of the combined standard uncertainty

Tested parameter

	u	u²
Standard deviation from paired measurements under field conditions *	u_D 0,138 µg/m³	0,019 (µg/m³)²
Lack of fit	u_{lof} -0,046 µg/m³	0,002 (µg/m³)²
Zero drift from field test	u_{dz} 0,169 µg/m³	0,029 (µg/m³)²
Span drift from field test	u_{ds} 0,173 µg/m³	0,030 (µg/m³)²
Influence of ambient temperature at span	u_t 0,101 µg/m³	0,010 (µg/m³)²
Influence of supply voltage	u_v 0,055 µg/m³	0,003 (µg/m³)²
Cross sensitivity (interference)	u_i -0,127 µg/m³	0,016 (µg/m³)²
Influence of sample gas flow	u_n -0,109 µg/m³	0,012 (µg/m³)²
Uncertainty of reference material at 70% of certification range	u_{rm} 0,081 µg/m³	0,007 (µg/m³)²

* The larger value is used :

"Repeatability standard deviation at span" or

"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u_c)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0,36 µg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	0,70 µg/m³

Relative total expanded uncertainty

Requirement of 2000/76/EC and 2001/80/EC

Requirement of EN 15267-3

U in % of the ELV 30 µg/m³	2.3
U in % of the ELV 30 µg/m³	40.0
U in % of the ELV 30 µg/m³	30.0