

# CERTIFICATE

## of Product Conformity (QAL1)

Certificate No.: 0000035015\_03

**Certified AMS:** MERCEM300Z for Hg

**Manufacturer:** SICK AG  
Rengoldshauser Str. 17 a  
88662 Überlingen  
Germany

**Test Institute:** TÜV Rheinland Energy GmbH

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

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  
(this certificate contains 9 pages).



Suitability Tested  
EN 15267  
QAL1 Certified  
Regular  
Surveillance

www.tuv.com  
ID 0000035015

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

This certificate will expire on:  
01 March 2022

German Federal Environment Agency  
Dessau, 28 February 2017

TÜV Rheinland Energy GmbH  
Cologne, 27 February 2017



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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:**  
0000035015\_03 / 28 February 2017

**Test report:** 936/21216054/C of 30 September 2012  
**Initial certification:** 02 March 2012  
**Expiry date:** 01 March 2022  
**Certificate** renewal (previous certificate 0000035015\_02 dated from 22 March 2013 with validity up to the 01 March 2017)  
**Publication:** BAnz AT 05.03.2013 B10, chapter I, No. 2.3

### **Approved application**

The tested AMS is suitable for use at combustion plants according to Directive 2010/75/EU, chapter III (13. BImSchV), at waste incineration plants according to Directive 2010/75/EU, chapter IV (17. BImSchV) and other plants requiring official approval. The measured ranges have been selected considering 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 MERCEM300Z is approved for an ambient temperature range of -20 °C to +50 °C. The MERCEM300Z Indoor is approved for an ambient temperature range of +5 °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 valid at the time of performance testing. As changes in legal regulations are possible, any potential user should ensure 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 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 05.03.2013 B10, chapter I number 2.3, Announcement by UBA from 12 February 2013:

**AMS name:**

MERCEM300Z for Hg

**Manufacturer:**

SICK MAIHAK GmbH, Meersburg

**Field of application:**

For measurements at plants requiring official approval and plants according to 27<sup>th</sup> BImSchV

**Measuring ranges during the performance test:**

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

**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, Cologne  
Report No.: 936/21216054/C of 30 September 2012

Publication in the German Federal Gazette: BAnz AT 23.07.2013 B4, chapter V notification 12 [number 4],

Announcement by UBA from 03 July 2013:

**12 Notification on announcements of the Federal Environment Agency (UBA) regarding performance tested AMS manufactured by SICK MAIHAK GmbH**

Lfd. Nr.	Measuring device / manufacturer;	Announcement	Notification	Statement test institute
...				
4	MERCEM300Z/ SICK MAIHAK GmbH	of 12 February 2013 Federal Gazette (BAnz AT 5 March 2013 B10, chapter I No. 2.3)	SICK MAIHAK GmbH merged with its parent company SICK AG as of 1 January 2013. The manufacturer is now re- gistered as SICK AG.	TÜV Rheinland Energie und Umwelt GmbH vom 25 March 2013
...				

Publication in the German Federal Gazette: BAnz AT 05.08.2014 B11, chapter V notification 14,

Announcement by UBA from 17 July 2014:

**14 Notification as regards Federal Environmental Agency notices of 12 February 2013 (Federal Gazette (BAnz) AT 5 March 2013 B10, chapter I No. 2.3) and of 3 July 2013 (Federal Gazette (BAnz) AT 23 July 2013 B4, chapter V, notification 12 [no. 4])**

For the MERCEM300Z measuring system for monitoring Hg manufactured by SICK AG an additional type designated as MERCEM300Z Indoor has been approved. This type may be used in the temperature range +5 °C to 40 °C.

The current software version for both types is: 9162140 XS73

Statement of TÜV Rheinland Energie und Umwelt GmbH of 28 March 2014

Publication in the German Federal Gazette: BAnz AT 26.08.2015 B4, chapter V notification 5,

Announcement by UBA from 22 July 2015:

**5 Notification as regards Federal Environment Agency notices of 12 February 2013 (Federal Gazette (BAnz.) AT 5 March 2013 B10, chapter I No. 2.3) and of 17 July 2014 (Federal Gazette (BAnz.) AT 5 August 2014 B11, chapter V notification 14)**

The current software version for the MERCEM300Z measuring system for Hg, manufactured by SICK AG, is: 9162140 YDU4

Statement of TÜV Rheinland Energie und Umwelt GmbH of 27 March 2015

Publication in the German Federal Gazette: BAnz AT 14.03.2016 B7, chapter V notification 33,  
Announcement by UBA from 18 February 2016:

**33 Notification as regards Federal Environment Agency notices of 12 February 2013 (BAnz. AT 05.03.2013 B10, chapter I number 2.3) and of 22 July 2015 (BAnz AT 26.08.2016 B4, chapter V notification 5)**

The current software version of the measuring equipment MERCEM300Z for Hg of SICK AG is: 2061514 - YBR3.

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

Publication in the German Federal Gazette: BAnz AT 01.08.2016 B11, chapter IV correction 2,  
Announcement by UBA from 14 July 2016:

**2 Correction of Federal Environmental Agency notice of 17 July 2014 (BAnz AT 05.08.2014 B11, chapter V notification 14)**

The aforementioned notice related to the MERCEM300Z and the MERCEM300Z Indoor measuring system for the determination of Hg manufactured by SICK AG states an incorrect date for the statement issued by TÜV Rheinland Energie und Umwelt GmbH; the correct date is 26 May 2014 (instead of 28 March 2014).

Publication in the German Federal Gazette: BAnz AT 01.08.2016 B11, chapter IV notification 17,  
Announcement by UBA from 14 July 2016:

**17 Notification as regards Federal Environmental Agency notices of 12 February 2013 (BAnz AT 05.03.2013 B10, chapter I number 2.3) and of 18 February 2016 (BAnz AT 14.03.2016 B7 chapter V notification 33)**

The current software version of the MERCEM300Z and MERCEM300Z Indoor measuring systems for Hg manufactured by SICK AG is:

9162140 YOT8.

Statement of TÜV Rheinland Energy GmbH dated 17 May 2016.

### 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 Version MERCEM300Z is equipped with an climate control unit and is suitable 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 and features an Ethernet network connectivity for data transfer.

The measuring system MERCEM300Z 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 YOT8.

The measuring system is as well available without the climate control unit and is than labelled as MERCEM300Z Indoor and is suitable for a temperature range of 5 °C to 40 °C. The setup of the system inside the cabinet and the handling via display remain unchanged. The protection class of the MERCEM300Z Indoor is IP 43 (MERCEM300Z: IP 55).

### 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](http://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\_01: 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

**Notifications and Corrections according to EN 15267**

Statement of TÜV Rheinland Energie und Umwelt GmbH of 25 March 2013  
Publication: BAnz AT 23.07.2013 B4, chapter V notification 12  
Announcement by UBA from 03 July 2013  
(change of manufacturer name)

Statement of TÜV Rheinland Energie und Umwelt GmbH of 26 May 2014  
Publication: BAnz AT 05.08.2014 B11, chapter V notification 14  
Announcement by UBA from 17 July 2014  
(additional system version)

Statement of TÜV Rheinland Energie und Umwelt GmbH of 27 March 2015  
Publication: BAnz AT 26.08.2015 B4, chapter V notification 5  
Announcement by UBA from 22 July 2015  
(new software version)

Statement of TÜV Rheinland Energie und Umwelt GmbH of 21 October 2015  
Publication: BAnz AT 14.03.2016 B7, chapter V notification 33  
Announcement by UBA from 18 February 2016  
(new software version)

Publication: BAnz AT 01.08.2016 B11, chapter IV Correction 2  
Announcement by UBA from 14 July 2016  
(correction of date)

Statement of TÜV Rheinland Energy GmbH of 17 May 2016  
Publication: BAnz AT 01. 08. 2016 B11, chapter V notification 17  
Announcement by UBA from 14 July 2016  
(new software version)

**Renewal of the certificate**

Certificate No. 0000035015\_03: 28 February 2017  
Expiry date of the certificate: 01 March 2022



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

**Measuring system**

Manufacturer	SICK Maihak GmbH
Name of measuring system	MERC300Z
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	$u_{d,z}$ 0.169 µg/m³	0.029 (µg/m³)²
Span drift from field test	$u_{d,s}$ 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	$u_b$ -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

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