

CERTIFICATE

of Product Conformity (QAL1)

Certificate No: 0000036948_05

Certified AMS: SM-4 for Hg

Manufacturer: ENVEA GmbH
Liebigstr. 5
85757 Karlsfeld
Germany

Test Institute: TÜV Rheinland Energy GmbH

**This is to certify that the AMS has been tested
and found to comply with 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).
The present certificate replaces certificate 0000036948_04 dated 18 July 2017.



Suitability Tested
EN 15267
QAL1 Certified
Regular
Surveillance

www.tuv.com
ID 0000036948

Publication in the German Federal Gazette
(BAnz) of 23 July 2013

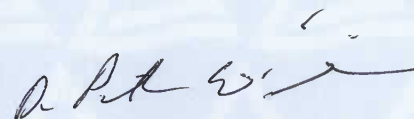
German Environment Agency
Dessau, 20 July 2022

This certificate will expire on:
19 July 2027

TÜV Rheinland Energy GmbH
Cologne, 19 July 2022



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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:	936/21221608/A dated 20 March 2013
Initial certification:	20 August 2012
Expiry date:	19 July 2027
Certificate:	Renewal (of previous certificate 0000036948_04 of 18. Juli 2017 valid until 19 July 2022)
Publication:	BAnz AT 23.07.2013 B4, Chap. I No. 1.1

Approved application

The tested AMS is suitable for use at plants according to Directive 2010/75/EU, chapter III (13th BImSchV:2012), chapter IV (17th BImSchV:2009), 30th BImSchV:2009, Directive 2015/2193/EC (44th BImSchV:2021), TA Luft:2002 and at plants according to the 27th BImSchV:2013. The measured ranges have been selected so as to ensure as broad a field of application as possible.

The suitability of the AMS for this application was assessed on the basis of a laboratory test and a six-month field test at industrial plant for hazardous waste incineration, a one-month field test at a lignite-fired power plant (fluidized-bed firing) using secondary fuel and a one-month field test at a rotary kiln for lime production (fuels: lignite dust/natural gas and secondary fuel).

The AMS is approved for an ambient temperature range of +5° 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 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 emission limit values 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.

Note:

The legal regulations mentioned do not correspond to the current state of legislation in every case. Each user should, if necessary, in consultation with the competent authority, ensure that this AMS meets the legal requirements for the intended use. In addition, it cannot be ruled out that legal regulations governing the use of a measuring device for emission monitoring may change during the lifetime of the certificate.

Basis of the certification

This certification is based on:

- Test report 936/21221608/A dated 20 March 2013 of TÜV Rheinland Energie und Umwelt GmbH
- Suitability announced by the German 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 23.07.2013 B4, Chap. I No. 1.1,
Announcement by UBA dated 03 July 2013:

AMS designation:

SM-4 for Hg

Manufacturer:

Mercury Instruments GmbH, Karlsfeld,
IMT Innovative Messtechnik GmbH, Moosbach

Field of application:

For plants requiring official approval and for plants according to the 27th BImSchV

Measuring ranges during the performance test:

Component	Certification range	Supplementary ranges		Unit
Hg	0 - 30	0 - 45	0 - 100	µg/m ³

Software version:

6.39

Restriction:

The requirement of the DIN EN 15267-3 for the response time was not met during the performance test.

Notes:

1. Wet gases shall be used for span point tests (QAL3). To this effect, the AMS is equipped with a test gas generator. An external test gas generator (type HOVACAL) may be used alternatively.
2. The maintenance interval is four weeks.
3. Every third day, the AMS performs an automatic span point correction.
4. The length of the test gas line was between 15 and 19.5 m.
5. A complementary test (approval of a smaller certification range) to notice of Federal Environmental Agency of 12 February 2013 (Federal Gazette: BAnz AT 05.03.2013 B10, chapter I no. 2.1).

Test report:

TÜV Rheinland Energie und Umwelt GmbH, Cologne
Report No.: 936/21221608/A dated 20 March 2013

Publication in the German Federal Gazette: BAnz AT 02.04.2015 B5, chapter IV notification 34, Announcement by UBA from 25 February 2015:

34 Notification as regards Federal Environment Agency (UBA) notice of 03 July 2013 (BAnz AT 23.07.2013 B4, chapter I number 1.1)

The SM-4 measuring system for Hg, manufactured by Mercury Instruments GmbH and IMT Innovative Messtechnik GmbH, can be equipped with a new probe housing, which permits the connection of an external vaporizer of a test gas generator.

The current software version of the SM-4 measuring system for Hg is now V 6.41.

Statement of TÜV Rheinland Energie und Umwelt GmbH of 29 September 2014

Publication in the German Federal Gazette: BAnz AT 26.03.2019 B7, chapter IV notification 41, Announcement by UBA dated 27 February 2019:

41 Notification as regards Federal Environment Agency (UBA) notices of 3 July 2013 (BAnz AT 23.07.2013 B4, chapter I number 1.1) and of 25 February 2015 (BAnz AT 02.04.2015 B5, chapter IV notification 34)

A number of hardware changes have been made to the SM-4 measuring system for mercury manufactured by Mercury Instruments GmbH. Instead of the EBM Papst 8412N fan used so far, a type EBM Papst 8312H may also be used. Moreover, the transformer power supply board of the analyser was replaced by a switching power supply board. The MFC installed in the photometer may also be operated digitally via an RS-485 bus.

The annular gap at the probe tube feedthrough in the measuring gas probe was closed by means of an additional cover plate. With the VP-2 check valve, the opening pressure is increased from 1 psi to 5 psi.

IMT Innovative Messtechnik GmbH has merged with Mercury Instruments GmbH and now operates under the common company name Mercury Instruments GmbH.

Statement issued by TÜV Rheinland Energy GmbH dated 9 October 2018

Publication in the German Federal Gazette: BAnz AT 24.03.2020 B7, chapter IV notification 58, Announcement by UBA dated 24 February 2020:

58 Notification as regards Federal Environment Agency (UBA) notices of 3 July 2013 (BAnz AT 23.07.2013 B4, chapter I number 1.1) and of 27 February 2019 (BAnz AT 26.03.2019 B7, chapter IV notification 41)

Mercury Instruments GmbH have introduced the following design change to their SM-4 measuring system for mercury: The KNF NMP830KNDC-B by-pass pump with brushless motor replaces its predecessor model KNF PM18328-NMP830 bell-rotor motor.

The latest software version is 6.59.

Software version 6.58 may also be used.

Statement issued by TÜV Rheinland Energy GmbH dated 16 December 2019

Publication in the German Federal Gazette: BAnz AT 03.05.2021 B9, chapter III notification 13, Announcement by UBA dated 31 March 2021:

13 Notification as regards Federal Environment Agency (UBA) notices of 3 July 2013 (BAnz AT 23.07.2013 B4, chapter I number 1.1) and of 24 February 2020 (BAnz AT 24.03.2020 B7, chapter IV notification 58)

The company name of Mercury Instruments GmbH and IMT Innovative Messtechnik GmbH has changed to ENVEA GmbH.

The latest software version of the SM-4 measuring system for mercury manufactured by the company ENVEA GmbH is:
6.62.

Statement issued by TÜV Rheinland Energy GmbH dated 03 September 2020

Certified product

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

The SM-4 measuring system is an extractive instrument that measures total mercury, i. e. mercury, ionic mercury and mercury in its compounds.

An ejector pump, which is operated with compressed air, continually draws sample gas from the flue gas duct via a heated sampling probe (180°). Stack gas passes by a heated filter. Instrument air serves to dilute flue gas at a constant ratio. Subsequently, a partial stream of diluted gas is passed through a thermo catalytic converter. All mercury compounds are converted to elemental mercury. After its conversion, mercury in the diluted gas stream passes through a heated sample gas line and is led to the detector inside the analyser cabinet. Mercury concentration is determined by means of atomic absorption of UV radiation at a wavelength of 253.7 nm with amalgamation and a gold trap for capturing and separating the sample matrix.

The SM-4 measuring system consists of the following components:

- sampling conditioning system including a probe, filter, dilution system, a thermo catalytic reactor, a vaporizer for the test gas generator and a control unit
- a heated sample gas line with a bundle containing supply lines for sample gas and other transmission media for the probe and the sample gas generator (length of 15 m during the performance test)
- an analyser cabinet with a bypass pump, a detector, a control unit for a calibration gas generator

The sampling system and the sample conditioning system of the SM-4 measuring system are directly mounted to the sampling probe. Sample gas is extracted from the stack at a low flow rate of 12 l/h and passed through the probe filter in order to remove dust particles from the sample gas. Subsequently, a critical nozzle is used to dilute the sample gas by a factor of 50. This serves to reduce the effects of cross-sensitivities and the concentration of interferences to tolerable levels. After purification and dilution, the sample gas is led through a thermo catalytic reactor. Inside the reactor, the entire mercury contained in the sample gas is converted to elemental mercury. Subsequently, the sample gas is transported to the analyser cabinet via the sampling probe line. The gas is transported via an ejector operated with compressed air, which is also located at the probe. The converter, ejector, critical nozzle and particle filter are installed in a heater with a temperature of 200°. The entire sample gas path of the measuring system is cleaned with purge air at each cycle (every 4 minutes).

Also integrated in the probe is a sample gas generator, which serves to feed test gas directly to the probe of the measuring system. The test gas generator continuously vaporises a solution containing Hg in a special vaporiser and mixes it with a specific carrier gas (purge air). This is then brought to the test item. Variation of the carrier gas flow rate, the liquid flow rate and the concentration of the solution allows for adjusting the concentration of the test gas. The carrier gas flow rate and the liquid flow rate are fixed and continuously monitored during the application of the test gas. Additionally, the probe control unit is installed at the measurement site near the probe. This control unit primarily contains temperature controllers.

The analyser cabinet contains the photometer in order to determine the Hg-concentration, together with the amalgamation unit, transmission media supply for the measuring system and the control unit for the test gas generator and electronics and the instrument reading.

During cyclical operation, the SM-4 measuring system works with amalgamation steps. One cycle is made up of 6 steps. Each step is displayed clearly. Sampling (90 s), Zeroing (12 s), heating of the gold trap (23 s), first of the gold trap (45 s including zero point), cleaning of the gold trap after the measurement (25 s), second cooling phase (45 s).

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

This document and 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: gal1.de.

History of documents

Certification of SM-4 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. 0000036948_00: 20 August 2012
Expiry date of the certificate: 19 July 2017
Test report 936/21213740/A dated 26 March 2012
TÜV Rheinland Energie und Umwelt GmbH
Publication BAnz AT 20.07.2012 B11, chapter I number 2.1
UBA announcement dated 6 July 2012

Supplementary testing according to EN 15267

Certificate No. 0000036948_01: 22 March 2013
Expiry date of the certificate: 19 July 2017
Test report 936/21213740/B dated 22 March 2013
TÜV Rheinland Energie und Umwelt GmbH
Publication BAnz AT 05.03.2013 B10, chapter I number 2.1
UBA announcement dated 12 February 2013

Supplementary testing according to EN 15267

Certificate No. 0000036948_02: 20 August 2013
Expiry date of the certificate: 19 July 2017
Test report 936/21221608/A dated 20 March 2013
TÜV Rheinland Energie und Umwelt GmbH
Publication BAnz AT 23.07.2013 B4, chapter I number 1.1
UBA announcement dated 3 July 2013

Notifications

Statement issued by TÜV Rheinland Energie und Umwelt GmbH dated 29 September 2014
Publication BAnz AT 02.04.2015 B5, chapter IV notification 34
UBA announcement dated 25 February 2015
(Soft- and hardware changes)

Correction of certificate

Certificate No. 0000036948_03: 25 April 2016
Expiry date of the certificate: 19 July 2017

Renewal of certificate

Certificate No. 0000036948_04: 18 July 2017
Expiry date of the certificate: 19 July 2022

Notifications

Statement issued TÜV Rheinland Energy GmbH dated 9 October 2018
Publication BAnz AT 26.03.2019 B7, chapter IV notification 41
UBA announcement dated 27 February 2019
(Hardware changes)

Statement issued by TÜV Rheinland Energy GmbH dated 16 December 2019
Publication BAnz AT 24.03.2020 B7, chapter IV notification 58
UBA announcement dated 24 February 2020
(Hard and software changes)

Statement issued by TÜV Rheinland Energy GmbH dated 3 September 2020
Publication BAnz AT 03.05.2021 B9, chapter III notification 13
UBA announcement dated 31 March 2021
(Software changes and changing name of manufacturer)

Renewal of certificate

Certificate No. 0000036948_05: 20 July 2022
Expiry date of the certificate: 19 July 2027

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

Measuring system

Manufacturer	Mercury Instruments GmbH IMT Innovative Messtechnik GmbH
AMS designation	SM-4
Serial number of units under test	706 / 707 / 823
Measuring principle	UV-Measurement with dilution, catalytic sample treatment and amalgamation

Test report

Test laboratory	936/21221608/A TÜV Rheinland
Date of report	2013-03-20

Measured component

Certification range	Hg 0 - 30 µg/m³
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Evaluation of the cross-sensitivity (CS)

(system with largest CS)

Sum of positive CS at zero point	1.16 µg/m³
Sum of negative CS at zero point	0.00 µg/m³
Sum of positive CS at span point	1.18 µg/m³
Sum of negative CS at span point	-0.99 µg/m³
Maximum sum of cross-sensitivities	1.18 µg/m³
Uncertainty of cross-sensitivity	0.682 µg/m³

Calculation of the combined standard uncertainty

Tested parameter

			u^2
Standard deviation from paired measurements under field conditions *	u_D	0.394 µg/m³	0.155 (µg/m³)²
Lack of fit	u_{lof}	0.173 µg/m³	0.030 (µg/m³)²
Zero drift from field test	$u_{d,z}$	0.208 µg/m³	0.043 (µg/m³)²
Span drift from field test	$u_{d,s}$	0.753 µg/m³	0.567 (µg/m³)²
Influence of ambient temperature at span	u_t	0.557 µg/m³	0.310 (µg/m³)²
Influence of supply voltage	u_v	0.225 µg/m³	0.051 (µg/m³)²
Cross-sensitivity (interference)	u_i	0.682 µg/m³	0.466 (µg/m³)²
Influence of sample gas flow	u_p	0.000 µg/m³	0.000 (µg/m³)²
Uncertainty of reference material at 70% of certification range	u_{rm}	0.242 µg/m³	0.059 (µg/m³)²
Combined standard uncertainty (u_c)	$u_c = \sqrt{\sum (u_{max,j})^2}$		1.30 µg/m³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$		2.54 µg/m³

Relative total expanded uncertainty

Requirement of 2000/76/EC and 2001/80/EC	U in % of the ELV 20 µg/m³	12.7
Requirement of EN 15267-3	U in % of the ELV 20 µg/m³	40.0
	U in % of the ELV 20 µg/m³	30.0