PRODUCT CONFORMITY CERTIFICATE

This is to certify that the

AR 602Z NNHg

Manufactured by:

Opsis AB

P.O. Box 244
S-244 02 Furulund
Sweden

has been assessed by CSA Group
and for the conditions stated on this certificate complies with:

Environment Agency Guidance
"MCERTS for stack emissions monitoring equipment at industrial installations"
- **Continuous emissions monitoring systems (CEMS)**
Updated 28 August 2024
EN 15267-1:2023, EN15267-2:2023, EN 15267-3:2007
& QAL 1 as defined in EN 14181: 2014

	Certification range:	Supplementary ranges:
Hg	0 to 10 µg/m^3	0 to 45 µg/m^3 0 to 100 µg/m^3

Project No.:	80240708
Certificate No:	CSA MC250447/00
Initial Certification:	28 March 2025
This Certificate issued:	28 March 2025
Renewal Date:	28 March 2030

Andrew Young
Environmental Team Manager

MCERTS is operated on behalf of the Environment Agency by

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Form 1335
Issue 12

Certificate Contents

Approved Site Application

Any potential user should make sure, in consultation with the manufacturer, that the monitoring system is suitable for the intended application. For further information on stack emissions monitoring refer to the Environment Agency's guidance available at www.mcerts.net

This instrument is considered suitable for use on waste incineration and large combustion plants. This CEMS has been proven suitable for its measuring task (parameter and composition of the flue gas) by use of the QAL 1 procedure specified in EN14181. The lowest certified range for the determinand shall not be more than 1.5 times the daily average emission limit value (ELV) for incineration plants, and not more than 2.5 times the ELV for other types of applications.

The field trial was undertaken on an exhaust gas of a municipal waste incinerator The field test duration was from 10th November 2022 to 17th May 2023.

Basis of Certification

This certification is based on the following test report(s) and on CSA Group's assessment and ongoing surveillance of the product and the manufacturing process:

TÜV Rheinland Energy GmbH, Report No.: EuL/21255229/E, Cologne, 01 June 2023

Product Certified

The AR602Z/NNHg measuring system consists of the following parts:

- Measuring cell - 2m long measuring cell with stainless steel pipe of 89 cm diameter with fitted light emitters and receivers at either end of the cell, a converter, an ejector pump, a flow controller, a temperature controller and a UV-DOAS catalyser. The emitter high pressure xenon lamp is powered by a PS150 supply unit.
- M&C SP2000 heated sampling gas probe.
- Heated sample gas line of 6mm diameter, typically of 10m length.
- Optical fibre connection reception device to the analyser
- A grating spectrometer AR602 UV analyser

Allowable variations could include:

- A different brand or model of sampling system of the same type, provided that there is evidence the alternative system works with similar types of CEMS.

- Additional manifolds and heated valves used to allow more than one analyser to share a sampling system.

This certificate applies to all instruments fitted with software version 7.2.1 and serial number 2718 onwards.

Certified Performance

The instrument was evaluated for use under the following conditions:
Ambient Temperature Range: +5°C to +40°C
Instrument IP rating: IP52
Note: This protection class is sufficient since the device is designed for mounting indoors.
Results are expressed as error % of certification range, unless otherwise stated.

Test	*Result expressed as % of the certification range*				*Other results*	*MCERTS specification*
	<0.5	*<1*	*<2*	*<5*		
LABORATORY TESTS						
Response time						
Hg (0 - 10 µg/m^3)					160 s	≤200 s
Hg (0 - 45 µg/m^3)					160 s	≤200 s
Hg (0 - 100 µg/m^3)					160 s	≤200 s
Repeatability standard deviation at zero point						
Hg (0 - 10 µg/m^3)			1.4			≤2.0 %
Repeatability standard deviation at span point						
Hg (0 - 10 µg/m^3)			1.4			≤2.0 %
Lack of fit						
Hg (0 - 10 µg/m^3)			1.40			≤2.0 %
Hg (0 - 45 µg/m^3)			1.11			≤2.0 %
Hg (0 - 100 µg/m^3)			-1.00			≤2.0 %
Influence of ambient temperature zero point (-20°C to +50°C)						
Hg (0 - 10 µg/m^3)		-0.8				≤5.0 %
Influence of ambient temperature span point (-20°C to +50°C)						
Hg (0 - 10 µg/m^3)			-1.6			≤5.0 %
Influence of sample gas flow for extractive CEMS (zero)						
Hg (0 - 10 µg/m^3)		-0.5				≤2.0 %
Influence of sample gas flow for extractive CEMS (reference)						
Hg (0 - 10 µg/m^3)	-0.2					≤2.0 %
Influence of voltage variations (320V to 420V) - zero						
Hg (0 - 10 µg/m^3)		0.8				≤2.0 %
Influence of voltage variations (320V to 420V) - reference						
Hg (0 - 10 µg/m^3) - span		0.9				≤2.0 %
Influence of vibration (10 to 60Hz (±0.35mm), 60 to 150 Hz at 0.5g)						
Hg (0 - 10 µg/m^3)					Not applicable	≤2.0 %
Cross-sensitivity at zero with interferents: O_2, H_2O, CH_4, CO_2, CO, N_2O, NO, NO_2, NH_3, SO_2, HCl						
Hg (0 - 10 µg/m^3)				3.50		≤4.0 %
Cross-sensitivity at span with interferents: O_2, H_2O, CH_4, CO_2, CO, N_2O, NO, NO_2, NH_3, SO_2, HCl						
Hg (0 - 10 µg/m^3)				3.50		≤4.0 %

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Test	Result expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
FIELD TESTS						
Coefficient of determination of calibration function, R^2						
Hg (0 - 10 µg/m³)					0.9890	≥0.85
Response time						
Hg (0 - 10 µg/m³)					160 s	≤200 s
Lack of fit						
Hg (0 - 10 µg/m³)			1.6			≤2.0 %
Minimum maintenance interval						
Hg (0 - 10 µg/m³)					3 months	8 days
Zero and span drift requirement						
Hg (0 - 10 µg/m³)	It is possible to record zero and span drift. This complies with the requirements for QAL3 according to EN 14181. In order to determine zero and span drift, an external test gas generator is required.					cl. 6.13 & 10.13 Manufacturer shall provide a description of the technique to determine and compensate for aero and span drift.
Drift at zero point within maintenance interval						
Hg (0 - 10 µg/m³)			1.2			≤3.0 %
Drift at span point within maintenance interval						
Hg (0 - 10 µg/m³)				2.5		≤3.0 %
Availability						
Hg (0 - 10 µg/m³)					98.8%	≥95%
Reproducibility, Rf						
Hg (0 - 10 µg/m³)				2.5		≤3.3 %

Measurement uncertainty	*Guidance - at least 25% below max permissible uncertainty*	
Hg (0 - 10 µg/m³) - for an ELV of 66.6 µg/m³	**9.8%**	**30.0%**

Note 1: The AR602Z/NNHg has a maintenance interval of 3 months.
Work in the maintenance interval - i) regular visual inspections of the entire CEMS, ii) checking of the temperature of the test gas line, sampling probe, measuring cell and converter, iii) checking of the measured light level, iv) checking of the zero point by means of admitting synthetic moist air to the test gas connector of the probe, v) checking of the reference point by admitting Hg sample gas obtained from an evaporated $HgCl_2$ solution to the test gas connection of the probe. vi) checking of the reference point requires a test gas generator (e.g. Type HovaCal) as well as a suitable $HgCl_2$ solution.

Note 2: The following procedure is recommended to perform a surveillance test or measures to be taken before calibration: i) visual inspection of the CEMS and the sampling system, ii) leakage test by way of admitting zero gas and test gas to the probe, iii) linearity check using zero and sample gases of various concentrations, iv) zero and span drift test, v) determination of response times, vi) checking of data transfer to the evaluation system (analogue and status signals).

Note 3: Regular controls of the reference point during the maintenance interval require a test gas generator HovaCal.

Note 4: In order to compensate for cross-sensitivity, the SO_2 content has to be determined in the measuring cell.

Description

The AR602Z/NNHg measuring system is based on Differential Optical Absorption Spectroscopy (DOAS) technology. The DOAS measurement principle is used to determine the concentration of certain gaseous components based on their unique absorption spectrum characteristics. The quantity of absorption is stated in the Beer-Lambert law.

The AR602Z/NNHg is an extractive CEMS and consists of a rack with a measuring cell, a AR602 UV analyser, a heated sampling probe and a heated test gas line. The rack with measuring cell also houses all external devices.

General Notes

1. This certificate is based upon the equipment tested. The Manufacturer is responsible for ensuring that on-going production complies with the standard(s) and performance criteria defined in this certificate. 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 system shall be subject to regular surveillance according to 'Regulations Applicable to the Holders of CSA Group Testing UK Ltd Certificates'.

2. The design of the product certified is held and maintained by TÜV Rheinland for certificate No. CSA MC250447.

3. If a certified product is found not to comply, CSA Group should be notified immediately at the address shown on this certificate.

4. The certification marks that can be applied to the product or used in publicity material are defined in 'Regulations Applicable to the Holders of CSA Group Testing UK Ltd Certificates'.

5. This document remains the property of CSA Group and shall be returned when requested by CSA Group.