PRODUCT CONFORMITY CERTIFICATE

This is to certify that the

AR 602Z (UV) & AR 650 (IR)
used either independently or in combination

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 ranges:

		AR 650 (IR)			**AR 602Z (UV)**
CO	-	0 to 75 mg/m^3	SO_2	-	0 to 75 mg/m^3
HCl	-	0 to 15 mg/m^3	NO_2	-	0 to 20 mg/m^3
H_2O	-	0 to 30 %vol.	NH_3	-	0 to 10 mg/m^3
HF	-	0 to 5 mg/m^3	NO	-	0 to 150 mg/m^{-3}
			Formaldehyde	-	0 to 20 mg/m^3
			Phenol	-	0 to 20 mg/m^3
			H_2O	-	0 to 30 mg/m^3

Project No.:	80287226
Certificate No:	CSA MC020011/09
Initial Certification:	01 March 2002
This Certificate issued:	23 March 2026
Renewal Date:	28 March 2031

Andrew Young
Environmental Team Manager

MCERTS is operated on behalf of the Environment Agency by

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Form 1335
Issue 13

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 each 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.

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 report 936/804002/NH3 dated 06/06/94
TÜV Rheinland report 936/800010 dated 27/06/92
TÜV Rheinland report 936/804001 from April 26, 1996 (CO, HCl and H2O)
TÜV Rheinland report 936/21201391/A from June 30, 2004 (HF)
TÜV Rheinland report 936/80009 from August 02, 1991 (SO2, NO and NO2)
TÜV Rheinland report 936/806013 from August 02, 1991 (SO2, NO and NO2)
TÜV Rheinland report 936/807024/A from September 30, 1999 (SO2, NO and NO2)
TÜV Rheinland report 936/800010 from March 30, 1992 (NH3)
TÜV Rheinland report 936/802011 from June 06, 1994 (Formaldehyde and Phenol)
TÜV Rheinland report 936/807017 from March 12, 1998 (Formaldehyde)
TÜV Rheinland report 936/800010/2 from March 01, 1993 (H2O)
Sira report N0393 dated Feb 2002

TÜV Rheinland report 936/21213004/A dated 30/11/2010
TÜV Rheinland report 936/21213004/C dated 30/11/2010
Sira Evaluation Report 16A24051 (AR 650) dated 21/01/2011
Sira Evaluation Report 16A24051 (AR 602Z) dated 21/01/2011

Product Certified

The AR 602Z (UV) / AR 650 (IR) measuring system consists of the following parts:

- Receiver unit (Model RE062)
- Transmitter unit (Model EM 062-A)
- Control unit (analyser)

This certificate applies to all instruments fitted with software version 7.21 onwards (serial number 160 onwards).

Certified Performance

The instrument was evaluated for use under the following conditions:

Ambient Temperature Range: Stack components -30^{0}C to +60^{0}C
Control unit +5^{0}C to +35^{0}C

IP rating: IP20: Analyser, must be placed in a protected area
IP54: Duct mounted parts (transmitter & receiver unit)

Unless otherwise stated the evaluation was carried out on the certification ranges, CO 0 to 75mg/m^3, HCl 0 to 15mg/m^3, H_2O 0 to 30 %vol. (IR), HF 0 to 5 mg/m^3, SO_2 0 to 75mg/m^3, NO_2 0 to 20mg/m^3, NH_3 0 to 10mg/m^3, NO 0 to 150mg/m^3, Formaldehyde 0 to 20 mg/m^3, Phenol 0 to 20 mg/m^3, H_2O 0 to 30 mg/m^3 (UV).

Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Response time						
CO					<120s	<200s
HCl					<120s	<400s
H_2O (30 %$^{vol.}$)					<120s	<200s
HF					<120s	<400s
SO_2					<180s	<200s
NO_2					<180s	<200s
NH_3					<180s	<400s
NO					<180s	<200s
Formaldehyde					<180s	<200s
Phenol					<180s	<200s
H_2O (30 mg/m^3)					<180s	<200s
Repeatability standard deviation at zero point						
CO		0.8				<2.0%
HCl			1.8			<2.0%
H_2O (30 %$^{vol.}$)	0.1					<2.0%
HF		0.8				<2.0%
SO_2	0.1					<2.0%
NO_2	0.3					<2.0%

Certificate No: CSA MC020011/09
This certificate issued: 23 March 2026

Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
NH_3		0.8				<2.0%
NO	0.1					<2.0%
Formaldehyde		0.5				<2.0%
Phenol	0.1					<2.0%
H_2O (30 mg/m^3)	0.2					<2.0%
Repeatability standard deviation at reference point						
CO	0.4					<2.0%
HCl			1.3			<2.0%
H_2O (30 %$^{vol.}$)	0.2					<2.0%
HF		0.9				<2.0%
SO_2	0.1					<2.0%
NO_2	0.2					<2.0%
NH_3			1.2			<2.0%
NO	0.2					<2.0%
Formaldehyde	0.4					<2.0%
Phenol		0.5				<2.0%
H_2O (30 mg/m^3)	0.3					<2.0%
Lack-of-fit						
CO		0.93				<2.0%
HCl				2.00		<2.0%
H_2O (30 %$^{vol.}$)		0.67				<2.0%
HF			-1.80			<2.0%
SO_2		0.63				<2.0%
NO_2		0.70				<2.0%
NH_3		0.70				<2.0%
NO		-0.73				<2.0%
Formaldehyde		1.00				<2.0%

Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Phenol		0.50				<2.0%
H_2O (30 mg/m^3)			1.00			<2.0%
Influence of ambient temperature zero point						
CO	-0.40					<5.0%
HCl	0.20					<5.0%
H_2O (30 %$^{vol.}$)	0.00					<5.0%
HF			-1.20			<5.0%
SO_2	-0.20					<5.0%
NO_2	0.20					<5.0%
NH_3	0.10					<5.0%
NO	-0.10					<5.0%
Formaldehyde	-0.40					<5.0%
Phenol	0.10					<5.0%
H_2O (30 mg/m^3)	0.20					<5.0%
Influence of ambient temperature reference point						
CO			-1.20			<5.0%
HCl	0.20					<5.0%
H_2O (30 %$^{vol.}$)	0.03					<5.0%
HF				4.00		<5.0%
SO_2		0.50				<5.0%
NO_2		-0.50				<5.0%
NH_3		-1.00				<5.0%
NO	0.10					<5.0%
Formaldehyde		-0.50				<5.0%
Phenol		0.50				<5.0%
H_2O (30 mg/m^3)	0.30					<5.0%

Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Influence of sample gas pressure						
CO		-0.53				<2.0%
HCl		-0.89				<2.0%
H_2O (30 %$^{vol.}$)	-0.33					<2.0%
HF	-0.47					<2.0%
SO_2	-0.49					<2.0%
NO_2		-0.67				<2.0%
NH_3			1.21			<2.0%
NO	0.33					<2.0%
Formaldehyde		-0.50				<2.0%
Phenol		-0.50				<2.0%
H_2O (30 mg/m^3)	0.11					<2.0%
Influence of voltage variations 190 to 250V						
CO		0.50				<2.0%
HCl		-0.90				<2.0%
H_2O (30 %$^{vol.}$)	-0.10					<2.0%
HF		-0.80				<2.0%
SO_2	0.20					<2.0%
NO_2		0.50				<2.0%
NH_3		-1.00				<2.0%
NO	0.10					<2.0%
Formaldehyde		0.90				<2.0%
Phenol	0.20					<2.0%
H_2O (30 mg/m^3)		0.70				<2.0%
Influence of vibration (10 to 60Hz (±0.3mm), 60 to 150Hz at 19.6m/s^2)					Note 1	*To be reported*

Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Cross-sensitivity at zero with interferents: O_2, H_2O, CO, CO_2, CH_4, N_2O, NO, NO_2, NH_3, SO_2, HCl						
CO	-0.44					<4.0%
HCl	0.00					<4.0%
H_2O (30 %$^{vol.}$)		-0.67				<4.0%
HF	0.00					<4.0%
SO_2			-1.21			<4.0%
NO_2				2.60		<4.0%
NH_3				2.00		<4.0%
NO					Note 2	<4.0%
Formaldehyde	0.40					<4.0%
Phenol				2.00		<4.0%
H_2O (30 mg/m^3)					Note 2	<4.0%
Cross-sensitivity at reference with interferents: O_2, H_2O, CO, CO_2, CH_4, N_2O, NO, NO_2, NH_3, SO_2, HCl						
CO		0.84				<4.0%
HCl		0.94				<4.0%
H_2O (30 %$^{vol.}$)		0.57				<4.0%
HF						<4.0%
SO_2			-1.96			<4.0%
NO_2				-2.85		<4.0%
NH_3				2.30		<4.0%
NO					Note 2	<4.0%
Formaldehyde		0.50				<4.0%
Phenol			1.35			<4.0%
H_2O (30 mg/m^3)					Note 2	<4.0%

Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Excursion of measurement beam of cross-stack in-situ CEMS						
CO		0.93				<2.0%
HCl				1.33		<2.0%
H_2O (30 $\%^{vol.}$)		-0.85				<2.0%
HF			-1.25			<2.0%
SO_2		-0.64				<2.0%
NO_2			1.25			<2.0%
NH_3				2.00		<2.0%
NO		-0.62				<2.0%
Formaldehyde			1.80			<2.0%
Phenol		0.70				<2.0%
H_2O (30 mg/m^3)		-0.77				<2.0%
Converter Efficiency					N/A	>95%

Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Measurement uncertainty						
CO					6.9%	7.5%
HCl					12.5%	30%
H_2O (30 %$^{vol.}$)					14.7%	22.5%
HF					2.6%	30%
SO_2					6.7%	15%
NO_2					6.3%	15%
NH_3					24.5%	30%
NO					5.0%	15%
Formaldehyde					12.7%	22.5%
Phenol					6.4%	22.5%
H_2O (30 mg/m^3)					5.1%	7.5%
Calibration function (field)						
CO					0.99-0.97	>0.90
HCl					0.97-0.93	>0.90
H_2O (30 %$^{vol.}$)					1.00	>0.90
HF					1.00-0.90	>0.90
SO_2					1.00	>0.90
NO_2					1.00-0.99	>0.90
NH_3					1.00-0.99	>0.90
NO					1.00-0.91	>0.90
Formaldehyde					0.97-0.95	>0.90
Phenol					0.99	>0.90
H_2O (30 mg/m^3)					0.97-0.90	>0.90

Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Response time (field)						
CO					<120s	<200s
HCl					<120s	<400s
H_2O (30 %$^{vol.}$)					<120s	<200s
HF					<120s	<400s
SO_2					<180s	<200s
NO_2					<180s	<200s
NH_3					<180s	<400s
NO					<180s	<200s
Formaldehyde					<180s	<200s
Phenol					<180s	<200s
H_2O (30 mg/m^3)					<180s	<200s
Lack of fit (field)						
CO		-0.93				<2.0%
HCl		0.67				<2.0%
H_2O (30 %$^{vol.}$)			<2.00		Note 3	<2.0%
HF			<2.00		Note 3	<2.0%
SO_2	-0.40					<2.0%
NO_2			<2.00		Note 3	<2.0%
NH_3			-1.30			<2.0%
NO		-0.60				<2.0%
Formaldehyde			1.00			<2.0%
Phenol			1.50			<2.0%
H_2O (30 mg/m^3)			<2.00		Note 3	<2.0%

Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Maintenance interval						>8 days
CO					6-months	>8 days
HCl					6-months	>8 days
H_2O (30 $\%^{vol.}$)					6-months	>8 days
HF					1-month	>8 days
SO_2					6-months	>8 days
NO_2					6-months	>8 days
NH_3					6-months	>8 days
NO					3-months	>8 days
Formaldehyde					1-month	>8 days
Phenol					1-month	>8 days
H_2O (30 mg/m^3)					1-month	>8 days
Zero and Span drift requirement	The CEM does not contain an automatic correction of zero and span drift.					Clause 6.13 & 10.13 Manufacturer shall provide a description of the technique to determine and compensate for zero and span drift.

Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<5		
Change in zero point over maintenance interval						
CO	0.40					<3.0%
HCl		0.60				<3.0%
H_2O (30 %$^{vol.}$)				2.00	Note 4	<3.0%
HF				2.00	Note 4	<3.0%
SO_2	0.30				Note 4	<3.0%
NO_2			1.50		Note 4	<3.0%
NH_3				2.00	Note 4	<3.0%
NO		0.50			Note 4	<3.0%
Formaldehyde			1.00		Note 4	<3.0%
Phenol			1.00		Note 4	<3.0%
H_2O (30 mg/m^3)			1.50		Note 4	<3.0%
Change in reference point over maintenance interval						
CO			1.00			<3.0%
HCl			1.00			<3.0%
H_2O (30 %$^{vol.}$)				3.00	Note 4	<3.0%
HF				3.00	Note 4	<3.0%
SO_2				2.00	Note 4	<3.0%
NO_2				3.00	Note 4	<3.0%
NH_3				3.00	Note 4	<3.0%
NO				2.00	Note 4	<3.0%
Formaldehyde				2.30	Note 4	<3.0%
Phenol				2.00	Note 4	<3.0%
H_2O (30 mg/m^3)				3.00	Note 4	<3.0%
Availability					>95.4%	>95% (>98% for O_2)

Reproducibility						
CO				2.10		<3.3%
HCl			1.20			<3.3%
H_2O (30 $\%^{vol.}$)		0.70				<3.3%
HF			1.00			<3.3%
SO_2				2.20		<3.3%
NO_2			1.50			<3.3%
NH_3			1.80			<3.3%
NO				2.90		<3.3%
Formaldehyde			1.70			<3.3%
Phenol				2.80		<3.3%
H_2O (30 mg/m^3)				2.30		<3.3%

Note 1: The instrument exhibited some moderate resonances. Some resonances caused the light source to go out. The effect was only temporary and the system functioned correctly once restored. The instrument did not appear to suffer any mechanical degradation (pre and post calibration).
Note 2: All deviations below 0.5% are considered to be negligible and not reported.
Note 3: Based on field calibration function test and laboratory lack of fit test. The lack of fit in the field must be verified during every check of installation of the CEM.
Note 4: Results taken from original report from initial certification, no additional testing required.

Description

The OPSIS CEM system is a cross stack flue gas measurement system that uses either an AR602Z (UV) analyser or a AR650 (IR) or a combination of both depending on the range of pollutants to be measured. A combination system was tested for MCERTS.

The AR 602Z is based upon UV absorption techniques for measuring SO_2, NO and NO_2, H_2O, HCl, NH_3, Hg and CO_2.

The AR 650 is based upon IR absorption techniques for measuring CO, HCl, HF and H_2O.
The transmitter and receiver units are mounted opposite each other on a duct or stack. The receiver is connected to the control units by fibre optic cable. A common transmitter/receiver assembly is used with both control units.

This certificate applies to the AR602Z (UV) and AR650 (IR) either individually or in combination for the gases listed on page 1 of this certificate only.

Other gases can be measured with this system but were not tested as part of MCERTS.

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 MC020011.

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.