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PRODUCT CONFORMITY CERTIFICATE

This is to certify that the

G-CEM 4000 In-situ Multigas Analyser

manufactured by:

CODEL International Ltd

*Station Building
Station Road
Bakewell
Derbyshire
DE45 1GE
UK*

has been assessed by Sira Certification Service
and for the conditions stated on this certificate complies with:

MCERTS Performance Standards for Continuous Emission Monitoring Systems, Version 2, Revision 1 (April 2003)

Certification Ranges :

NO	0 to 134 mg/m ³ (0 to 100 ppm)
	0 to 1340 mg/m ³ (0 to 1000 ppm)
NO ₂	0 to 205 mg/m ³ (0 to 100 ppm)
CO	0 to 125 mg/m ³ (0 to 100 ppm)
	0 to 1250 mg/m ³ (0 to 1000 ppm)
SO ₂	0 to 286 mg/m ³ (0 to 100 ppm)
	0 to 2860 mg/m ³ (0 to 1000 ppm)
H ₂ O	0 to 30 % vol

Project No: 674/0061 & 674/0317
Certificate No: Sira MC 070098/05
Initial Certification: 01 February 2007
This Certificate Issued: 21 October 2010
Renewal Date: 31 January 2012

Technical Director

MCERTS is operated on behalf of the Environment Agency by

Sira Certification Service

12 Acorn Industrial Park, Crayford Road, Crayford
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Approved Site Application

Any potential user should ensure, in consultation with the manufacturer, that the emission monitoring system is suitable for the process on which it will be installed. In this instance mounting arrangements should be discussed as the output may be susceptible to vibration at specific frequencies.

The product was assessed on a coal-fired power station application (500MW Electrostatic Precipitator ESP).

For general guidance on stack emission monitoring techniques refer to Environment Agency Technical Guidance Note M2: Monitoring of stack emissions to air. This is available on the Agency's website at www.mcerts.net

Basis of Certification

This certification is based on the following Test Report(s) and on Sira's assessment and ongoing surveillance of the product and the manufacturing process:

NPL Report	Ref: E04050085/1 Codel 01 dated 21 st December 2005
AEA Report	Ref: AEAT/ENV/R/2049/Issue 1 dated October 2005
Sira Report	Ref: N 0533 dated August 2005
KTL Report	Ref: 6C9715CEN1 dated 16 October 2006
TUV Rheinland	Report Ref: 936/21208236/A dated 18/09/07

Product Certified

The G-CEM 4000 measuring system consists of the following parts:

- G-CEM4000 in-situ diffusion probe and transceiver unit
- Power supply and support cabinet

MCERTS certified products are identified by an MCERTS label stating the determinants covered by the scope of the certification and this certificate applies to all instruments fitted with software versions Master 507 041 C, Slave 507 020 A onwards.

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Certified Performance

The instrument was evaluated for use under the following conditions:

Ambient Temperature Range: -20°C to $+50^{\circ}\text{C}$

Unless otherwise stated the evaluation was carried out on the certification ranges for NO 0 to 134 mg/m^3 , NO₂ 0 to 205 mg/m^3 , CO 0 to 125 mg/m^3 , SO₂ 0 to 286 mg/m^3 and H₂O 0 to 30%vol on G-CEM 4100 analyser.

Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<4		
Linearity						
NO		0.6				<2%
CO		1.0				<2%
SO ₂		1.0				<2%
NO ₂		0.6				<2%
H ₂ O	0.2					<2%
Cross-sensitivity (H ₂ O, CO ₂ , CH ₄ , N ₂ O)						
NO		1.0				<4%
CO	0.0				See note 1	<4%
SO ₂			-2.0			<4%
NO ₂	0.0					<4%
H ₂ O	0.0					<4%
Temperature dependent zero shift						
NO, CO	0.02					<0.3%/°C
SO ₂ , H ₂ O	0.03				See note 2	<0.3%/°C
NO ₂	0.04					<0.3%/°C
Temperature dependent upper reference point shift						
NO	-0.04					<0.3%/°C
CO	-0.02				See note 2	<0.3%/°C
SO ₂ , NO ₂	0.04					<0.3%/°C
H ₂ O	0.22					<0.3%/°C

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<4		
Response time						
NO					159s	<200s
CO					157s	<200s
SO ₂					162s	<200s
NO ₂					160s	<200s
H ₂ O					171s	<200s
Detection Limit						
NO			1.1			<2.0%
CO	0.1					<2.0%
SO ₂			1.9			<2.0%
NO ₂		0.8				<2.0%
H ₂ O	0.0					<2.0%
Interference of test gas flow on the measurement signal					See note 3	<1.0%
Vibration test (10 to 60Hz (±0.3mm), 60 to 150Hz at 19.6m/s ²)					See note 4 Pass	To be reported
Mains voltage (190V to 250V)						
CO	0.0					<2%
Sample gas pressure (3kPa change)						
CO	0.1					To be reported
Sample gas temperature (130°C & 160°C)						
NO	0.2					To be reported
CO	0.2					
SO ₂	0.1					
NO ₂	0.1					
H ₂ O	0.1					

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Test	Results expressed as % of the certification range				Other results	MCERTS specification
	<0.5	<1	<2	<4		
Analysis function (field) ^{Note 5}						
NO					95.1%	>95%
CO					98.7%	>95%
SO ₂					96.1%	>95%
H ₂ O					96.1%	>95%
Availability ^{Note 5}					98.6%	>95%
Zero drift per week during field trial ^{Note 5}						
NO			2.0			<2%/week
CO	0.4					<2%/week
SO ₂			2.0			<2%/week
H ₂ O	-0.5					<2%/week
Upper reference point drift per week during field trial ^{Note 5}						
NO	0.1					<4%/week
CO	0.2					<4%/week
SO ₂	0.1					<4%/week
H ₂ O	-				Not performed	<4%/week
Maintenance Interval ^{Note 5}					>12 weeks	To be reported

- Note 1: Cross sensitivity to interference substances was only performed on zero measurements.
 Note 2: Test performed on G-CEM 4000 analyser.
 Note 3: Test not applicable as in-situ analyser and considering the mechanical construction of the probe.
 Note 4: Test performed on G-CEM 4000 analyser.
 Note 5: Field test: Model 4000 was assessed on the basis of a three month field trial mounted on a coal fired power station. The certification ranges were; NO 0-1340mg/m³, CO 0-1250mg/m³, SO₂ 0-2860mg/m³ and H₂O 0-30%vol.
 Field test: Model 4100 was assessed on the basis of a three month field trial mounted on a gas turbine power station. The certification ranges were; NO 0 to 134 mg/m³, NO₂ 0 to 205 mg/m³, CO 0 to 125 mg/m³, SO₂ 0 to 286 mg/m³ and H₂O 0 to 30%vol. For results see 4100 certificate Sira MC 070116.

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Description:

The G-CEM 4000 analyser comprises an in-situ diffusion probe and transceiver unit. The probe configuration does not require the extraction of a sample from the gas stream as the flue gas diffuses into the probe measurement chamber via an array of stainless steel sintered filters. The flue gas concentration for up to seven different gas species are determined from the measurement of the absorption of infra-red radiation, at up to 10 different wavelengths, that is transmitted through the probe measurement chamber. The microprocessor base transceiver unit consists of an infrared source and detection system to simultaneously measure the different gas species. Integral measurement of flue gas temperature and pressure allows full data normalisation to standard values. The output data can be presented in ppm (by volume), mg/m³ (measured) and mg/Nm³ (normalised). Zero and span protocol gas can be injected either automatically or manually on demand for calibration and /or auditing the analyser.

The G-CEM 4100 analyser is a hot extractive system which utilises the same sensor and optical configuration as the G-CEM 4000 in-situ model, but with the measurement chamber contained within a temperature controlled enclosure instead of in-situ within the stack.

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 Sira Certificates'. The design of the product certified is defined in the Sira Design Schedule for certificate No. Sira MC 070098/04.
2. If certified product is found not to comply, Sira Certification Service should be notified immediately at the address shown on this certificate.
3. The Certification Marks that can be applied to the product or used in publicity material are defined in 'Regulations Applicable to the Holders of Sira Certificates'.
4. This document remains the property of Sira and shall be returned when requested by the company.

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