

CERTIFICATE

on Product Conformity (QAL1)

Number of Certificate: 0000035006

Certified AMS: V-CEM5100 for velocity

Manufacturer: CODEL International Ltd.
Station Road, Bakewell
DE45 1GE GB Derbyshire
England

Test Institute: TÜV Rheinland Energie und Umwelt GmbH

**This is to certify that the AMS has been tested
and found to comply with:**

**EN 15267-1: 2009, EN 15267-2: 2009, EN 15267-3: 2008
and EN 14181: 2004**

Certification is awarded in respect of the conditions stated in this certificate
(see also the following pages).



- EN 15267-3 tested
- QAL1 certified
- TUV approved
- Annual inspection

Publication in the German Federal Gazette
(BAnz.) of 02 March 2012

The certificate is valid until:
01 March 2017

Umweltbundesamt
Dessau, 16 March 2012

TÜV Rheinland Energie und Umwelt GmbH
Köln, 15 March 2012

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Am Grauen Stein
51105 Köln

Accreditation according to EN ISO/IEC 17025 and certified according to ISO 9001:2008.

Test report:	936/21216334/A of 14 October 2011
First certification:	02 March 2012
Validity ends:	01 March 2017
Publication:	BAnz. 02 March 2012, No. 36, p. 920, chapter II, No. 2.2

Approved application

The tested AMS is suitable for use at combustion plants according to EC directive 2001-80-EC, at waste incineration plants according to EC directive 2000-76-EC and other plants requiring official approval. The tested ranges have been chosen with respect to 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 three months field test at a coal fired power plant.

The AMS is approved for an ambient temperature range of -20 °C to +50 °C.

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 936/21216334/A dated 14 October 2011 of TÜV Rheinland Energie und Umwelt GmbH
- suitability announced by the German Environmental Agency (UBA) as the relevant body
- the ongoing surveillance of the product and the manufacturing process
- publication in the German Federal Gazette (BAnz. 02 March 2012, No. 36, p. 920, chapter II, No. 2.2, announcement by UBA from 23 February 2012)

AMS name:

V-CEM5100 for velocity

Manufacturer:

CODEL International Ltd., Bakewell, Derbyshire, England

Field of application:

For measurements at plants requiring official approval (i. e. plants in 2000-76-EC, waste incineration directive and 2001-80-EC large combustion plants directive)

Measuring range during the suitability test:

Component	Certification range	Unit
Velocity	3 - 50	m/s

Software version:

507.105B

Restriction:

The lower level of the velocity measuring range is 3 m/s.

Notes:

1. A four weeks period has been determined as maintenance interval.
2. Operation of the measuring device is only possible taking into account the following boundary conditions: Gas humidity > 2 Vol.-%, Gas temperature > 40 °C, Diameter of the duct: > 0.5 m.

Test report:

TÜV Rheinland Energie und Umwelt GmbH, Köln
Report No.: 936/21216334/A dated 14 October 2011

Certified product

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

Flow monitoring system CODEL Model V-CEM5100 is using a cross correlation principle to determine the velocity in gas flows.

Series of vortexes caused by turbulences in the gas flow are transported by the gas flow. The infrared radiation of hot waste gas is characterized by special flickering caused by the gas vortexes. These characteristic infrared signals are detected by two infrared detectors mounted at the duct wall in flow direction with a defined distance to determine the time delay between the two sensors to calculate the gas velocity.

The flow monitor V-CEM5100 consists of the following parts:

- Two transducer units consisting of a broadband infrared detector, a lens to focus the radiation on to the sensor and a preamplifier. These parts are mounted inside a sealed epoxy-coated aluminium housing.
- A Power supply unit (PSU).
- A Signal processor unit (SPU) for signal processing, for submission of diagnostic data and for adjustment.
- A Data display unit (DDU) for the presentation of measuring results and diagnostic values in the display and for editing of input values. Also the analogue output values and the digital status signals of the flow monitor are transmitted by the DDU. DDU is connected with the SPU via wire of max. 1 km length.
- The instrument software version 507.105B.

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 Energie und Umwelt 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 Energie und Umwelt GmbH. With revocation of the publication the certificate loses its validity. After the expiration of the validity of the certificate and on requests of the TÜV Rheinland Energie und Umwelt GmbH this document shall be returned and the certificate mark must not be employed anymore.

The relevant version of this certificate and the validity is also accessible on the internet Address: **qal1.de**.

Certification of V-CEM5100 for velocity 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. 0000035006: 16 March 2012

Validity of the certificate: 01 March 2017

Test report: 936/21216334/A of 14 October 2011
TÜV Rheinland Energie und Umwelt GmbH, Köln

Publication: BAnz. 02 March 2012, No. 36, p. 920, chapter II, No. 2.2:
Announcement by UBA from 23 February 2012

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

Measuring system

Manufacturer	Codel International Ltd.
Name of measuring system	V-CEM5100
Serial number of the candidates	M 5100-0134 / M 5100-0135
Measuring principle	cross correlation

Test report

Test laboratory	TÜV Rheinland
Date of report	2011-10-14

Measured component

Certification range	velocity	3 - 50 m/s
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Calculation of the combined standard uncertainty

Tested parameter

	u	u ²
Standard deviation from paired measurements under field conditions *	u_D 0.448 m/s	0.201 (m/s) ²
Lack of fit	u_{lof} 0.115 m/s	0.013 (m/s) ²
Zero drift from field test	$u_{d,z}$ 0.086 m/s	0.007 (m/s) ²
Span drift from field test	$u_{d,s}$ 0.115 m/s	0.013 (m/s) ²
Influence of ambient temperature at span	u_t 0.306 m/s	0.094 (m/s) ²
Influence of supply voltage	u_v 0.240 m/s	0.058 (m/s) ²
Uncertainty of reference material at 70% of certification range	u_{rm} 0.404 m/s	0.163 (m/s) 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)	$u_c = \sqrt{\sum (u_{max,i})^2}$	0.74 m/s
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	1.45 m/s

Relative total expanded uncertainty

Requirement of 2000/76/EC and 2001/80/EC

Requirement of EN 15267-3

U in % of the range 50 m/s	2.9
U in % of the range 50 m/s	10.0
U in % of the range 50 m/s	7.5

** For this component no requirements in the EC-directives 2001/80/EG und 2000/76/EG are given.
The chosen value is recommended by the certification body.