

# CERTIFICATE

## of Product Conformity (QAL1)

Certificate No. : 0000043104

**Certified AMS:** D-CEM2100 for dust

**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: 2007  
and EN 14181: 2004**

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



Publication in the German Federal Gazette  
(BAnz.) of 2 April 2015

German Federal Environment Agency  
Dessau, 30 April 2015



i. A. Dr. Marcel Langner

This certificate will expire on:  
1 April 2020

TÜV Rheinland Energie und Umwelt GmbH  
Cologne, 29 April 2015



ppa. Dr. Peter Wilbring

[www.umwelt-tuv.de](http://www.umwelt-tuv.de) / [www.eco-tuv.com](http://www.eco-tuv.com)  
[teu@umwelt-tuv.de](mailto:teu@umwelt-tuv.de)  
Tel. +49 221 806-5200

TÜV Rheinland Energie und Umwelt GmbH  
Am Grauen Stein  
51105 Cologne

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

|                               |   |
|-------------------------------|---|
| <b>Test report:</b>           | 936/21216335/A of 2 October 2014              |
| <b>Initial certification:</b> | 2 April 2015                                  |
| <b>Expiry date:</b>           | 1 April 2020                                  |
| <b>Publication:</b>           | BAnz AT 2 April 2015 B5, chapter I number 1.1 |

### Approved application

The tested AMS is suitable for use at plants requiring official approval as per Directive 2010/75/EU, chapter III combustion plants and chapter IV waste incineration plants, the AMS is not suitable for the use at German waste incineration plants (17. BImSchV), due to the emission limit value of 5 mg/m<sup>3</sup>. 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 six-month field test at a municipal waste incinerator.

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

The notification of suitability of the AMS, performance testing, and the uncertainty calculation have been effected on the basis of the regulations valid at the time of performance testing. As changes in legal regulations are possible, any potential user should ensure that this AMS is suitable for monitoring the 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.

### Basis of the certification

This certification is based on:

- test report 936/21216335/A of 2 October 2014 of TÜV Rheinland Energie und Umwelt GmbH
- suitability announced by the German Federal 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 2 April 2015 B5, chapter I number 1.1 announcement by UBA from 25 February 2015)

**AMS designation:**

D-CEM2100 for dust

**Manufacturer:**

Codel International Ltd., Bakewell, Great Britain

**Field of application:**

For measurements at plants requiring official approval as per Directive 2010/75/EU, chapter III combustion plants and chapter IV waste incineration plants, the AMS is not suitable for the use at German waste incineration plants (17. BImSchV).

**Measuring ranges during the performance test:**

| Component | Certification range   | Supplementary ranges |       | Unit |
|-----------|-----------------------|----------------------|-------|------|
| dust      | 0 - 0,1 <sup>1)</sup> | 0 - 0,3              | 0 - 1 | Ext. |

<sup>1)</sup> during performance testing in the field, this value was equivalent to approx. 0 to 10 mg/m<sup>3</sup> of dust at a measurement path of 5 m

**Software versions:**

507.120A (DDU)  
507.069A (Transceiver Master)  
507.028A (Transceiver Slave)

**Restrictions:**

None

**Notes:**

1. The maintenance interval is three months.
2. The AMS may only be used in stack gas that is not saturated with water vapour.
3. Requirements with regard to the determination coefficient R<sup>2</sup> of the calibration function in accordance with EN 15267-3 were not satisfied during performance testing.
4. For every plant it shall be verified that the measuring range required for monitoring the limit value can be adjusted.

**Test report:**

TÜV Rheinland Energie und Umwelt GmbH, Cologne  
Report no.: 936/21216335/A of 2 October 2014

### **Certified product**

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

The AMS Codel D-CEM2100 is an in-situ dust monitor operating on the principle of transmission measurement. Emitted light is weakened on the measuring path. The detected weakening of light represents the measured value, which, apart from dust loading, also depends on other properties of dust, such as particle size distribution and colour.

The AMS consists of two identically constructed transceivers that both emit and receive light. During a measurement procedure two measuring light pulses alternately pass the measuring path in opposite direction with high frequency. Located between each of the two transceivers and the process gas is a pneumatically operated ball valve. A diffusing mirror is situated on the ball. In shut-off position the mirror is located in the ray path and reflects the emitted light. Hereby, contaminations of the optical interfaces can be detected and compensated.

For zero and span point checks the AMS must be installed on a dust-free reference junction. Span point checks are carried out by means of optical filters.

The AMS consists of the following components:

- 2 transceivers each with pneumatic valve and purge air unit
- 1 power supply unit (PSU)
- 1 signal processor unit (SPU)
- 1 data display unit with outputs (DDU)
- different reference filter
- telescope for adjustment of the light path
- dust-free path (comparative measuring path)

The distance between the two transceivers on the dust-free measurement section must be identical to the distance between the transceivers at the duct.

### **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 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 its expiration is also accessible on the internet: [qal1.de](http://qal1.de).

Certification of D-CEM2100 for dust 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. 0000043104: 30 April 2015  
 Expiry date of the certificate: 1 April 2020  
 Test report: 936/21216335/A of 2 October 2014  
 TÜV Rheinland Energie und Umwelt GmbH, Cologne  
 Publication: BAnz AT 2 April 2015 B5, chapter I number 1.1  
 Announcement by UBA from 25 February 2015

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

**Measuring system**

|                                   |                          |
|-----------------------------------|--------------------------|
| Manufacturer                      | Codel International Ltd. |
| AMS designation                   | D-CEM2100                |
| Serial number of units under test | 069; 070 / 071; 072      |
| Measuring principle               | Transmission             |

**Test report**

|                 |                             |
|-----------------|-----------------------------|
| Test laboratory | 936/21216335/A              |
| Date of report  | TÜV Rheinland<br>2014-10-02 |

**Measured component**

|                     |                                  |
|---------------------|----------------------------------|
| Certification range | Dust<br>0 - 10 mg/m <sup>3</sup> |
|---------------------|----------------------------------|

**Calculation of the combined standard uncertainty**

**Tested parameter**

|  |           |                          | $u^2$ |                                   |
|--|-----------|--------------------------|-------|-----------------------------------|
| Standard deviation from paired measurements under field conditions * | $u_D$     | 0.142 mg/m <sup>3</sup>  | 0.020 | (mg/m <sup>3</sup> ) <sup>2</sup> |
| Lack of fit  | $u_{lof}$ | -0.058 mg/m <sup>3</sup> | 0.003 | (mg/m <sup>3</sup> ) <sup>2</sup> |
| Zero drift from field test   | $u_{d,z}$ | 0.100 mg/m <sup>3</sup>  | 0.010 | (mg/m <sup>3</sup> ) <sup>2</sup> |
| Span drift from field test   | $u_{d,s}$ | 0.130 mg/m <sup>3</sup>  | 0.017 | (mg/m <sup>3</sup> ) <sup>2</sup> |
| Influence of ambient temperature at span                             | $u_t$     | 0.120 mg/m <sup>3</sup>  | 0.014 | (mg/m <sup>3</sup> ) <sup>2</sup> |
| Influence of supply voltage  | $u_v$     | 0.015 mg/m <sup>3</sup>  | 0.000 | (mg/m <sup>3</sup> ) <sup>2</sup> |
| Uncertainty of reference material at 70% of certification range      | $u_{rm}$  | 0.081 mg/m <sup>3</sup>  | 0.007 | (mg/m <sup>3</sup> ) <sup>2</sup> |
| Excursion of measurement beam  | $u_{mb}$  | 0.153 mg/m <sup>3</sup>  | 0.023 | (mg/m <sup>3</sup> ) <sup>2</sup> |

\* The larger value is used :

"Repeatability standard deviation at span" or

"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty ( $u_c$ )

$$u_c = \sqrt{\sum (u_{max,i})^2} \quad 0.31 \text{ mg/m}^3$$

Total expanded uncertainty

$$U = u_c * k = u_c * 1.96 \quad 0.60 \text{ mg/m}^3$$

**Relative total expanded uncertainty**

**U in % of the ELV 10 mg/m<sup>3</sup> 6.0**

**Requirement of 2010/75/EU**

**U in % of the ELV 10 mg/m<sup>3</sup> 30.0**

**Requirement of EN 15267-3**

**U in % of the ELV 10 mg/m<sup>3</sup> 22.5**