

CERTIFICATE

about Product Conformity (QAL1)

Number of Certificate: 0000001014

Certified AMS: 4500 MkIII for dust

Manufacturer: Land Instruments International Ltd.
Stubley Lane, Dronfield
Derbyshire
S18 1DJ
United Kingdom

Test Institute: TÜV Rheinland Energie und Umwelt GmbH

**This is certifying 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).



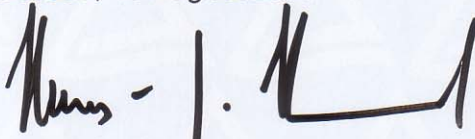
- EN 15267-3 tested
- QAL1 certified
- TUV approved
- Annual inspection

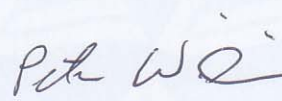
Publication in the German Federal Gazette
(BAnz.) of 29 July 2011

The certificate is valid until:
28 July 2016

Umweltbundesamt
Dessau, 19 August 2011

TÜV Rheinland Energie und Umwelt GmbH
Köln, 17 August 2011


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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: 936/21213182/A of 31 March 2011
First certification: 29 July 2011
Run of validity until: 28 July 2016
Publication BAnz. 29 July 2011, No 113, page 2725, chapter I, No 1.1

Authorised application

The tested AMS is suitable for the 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 permission. The tested measurement ranges were selected in order to secure an application range for the AMS as wide as possible.

The suitability of the AMS for this application was assessed on the basis of a laboratory test and a three month field test on a municipal waste incinerator. The AMS is authorised for the ambient temperature range from -20 °C to +50 °C.

Any potential user should ensure in consultation with the manufacturer that this AMS is suitable for the installation on which it will be installed.

Basis of the certification

This certification is based on:

- the test report 936/21213182/A of 31 March 2011 of TÜV Rheinland Energie und Umwelt GmbH
- suitability announced by the German Environmental Agency (UBA) as relevant body
- the ongoing surveillance of the product and the manufacturing process
- publication in the German Federal Gazette (BAnz. 29 July 2011, No 113, page 2725, chapter I No 1.1, UBA publication from 15 July 2011)

AMS name:

4500 MkIII for dust

Manufacturer:

Land Instruments International Ltd, Dronfield, United Kingdom

Suitability:

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

Measurement ranges during the suitability test:

Component	Certification range	Supplementary measurement ranges			Unit
Dust	0 – 0.2	0 – 0.1	0 – 0.4	0 – 1.2	Ext.

0 – 0.2 Ext. $\hat{=}$ 15 mg/m³ dust at 5 m measurement path length

Software versions:

Control Software Version: 01.03.01

HI Software Version: 01.02.01

Restriction:

The measurement device is only suitable when an undercut of the dew point can be excluded.

Remarks:

1. The dust concentration is measured in the wet flue gas under operating conditions.
2. Four weeks have been specified as maintenance interval.
3. By the measurement path length of 5 m and a measurement range of 15 mg/m³ evaluated during the calibration a product of 75 mg m/m³ results for the field test site.
4. The requirement of the type approval in accordance to EN 15267-3 for the correlation coefficient R² of the calibration function was not fulfilled.

Test report:

TÜV Rheinland Energie und Umwelt GmbH, Köln
Report-No.: 936/21213182/A of 31 March 2011

Certified product

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

The measurement device Land 4500 MkIII was developed for the determination of the dust concentration at emitting plants. The underlying principle is the measurement of the optical transmission.

The Land Model 4500 MkIII is a further development from the Land Model 4500 MkII+. The main light source uses three green LEDs in a special configuration (patent pending) to ensure homogeneity over the entire transmitted light beam. The light source is modulated at a frequency of 1 kHz, to reduce electrical noise and eliminate errors due to ambient light. A second light source, the (patented) "Flood LED" is used to reduce the effect of temperature drift in the detectors to an almost immeasurable low level.

Electronic modulation eliminates the need for a mechanical chopper and so the only moving parts are the motors used in the calibration system. These motors have a very low duty cycle and are very reliable.

The Land Instruments International Model 4500 MkIII Continuous Opacity Monitoring System (COMS) measures opacity by shining a light beam through flue gases. An internal microprocessor calculates dust density and other parameters. The instrument comprises the following parts: The Transceiver which contains all of the optical and electro-optic components; the Retro-Reflector containing a glass reflector and the air purge system.

The air purge system is available in several forms depending upon individual site requirements. Single and dual electric blowers are available, as are compressed-air driven devices. Continuous purge air supply is essential to prevent dust and corrosive gases from affecting the optical system. Automatic fail-safe shutters can also be fitted for temporary protection in the event of a purge air failure.

The analyser is basically composed of the following components:

- Transceiver:** Containing all of the major electronic and electro-optic components
- Retro-Reflector:** Containing a corner cube reflector
- Air Purge System:** A continuous supply of purge air is essential to prevent dust and corrosive gases from affecting the optical system. Single and dual electric blowers or compressed-air driven devices are available to suit individual site requirements. Automatic fail-safe shutters can also be fitted for temporary protection in the event of a purge air failure

Measurement path length and concentration:

0 – 0.2 Ext. $\hat{=}$ 15 mg/m³ dust at 5 m measurement path length

General notes

This certificate is based upon the equipment tested. The manufacturer is responsible for a long-lasting compliance of the ongoing production process with the requirements of EN 15267. The manufacturer is obliged to maintain a certified quality management system to control the production of the certified product. Both product and quality management system 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 given address on page 1.

The certification mark with the product specific ID-Number which may be applied to the product or used in promotion material of the certified product is presented on page 1 of this certificate.

This document as well as the certification mark remains property of TÜV Rheinland Energie und Umwelt GmbH. Upon revocation of the announcement the certificate loses validity. After expiration of the validity of the certificate or on request of the TÜV Rheinland Energie und Umwelt GmbH this document shall be returned and the certification mark shall longer be used.

The current version of this certificate and its validity is also listed at the Internet Address: qal1.de.

Certification of 4500 MKIII 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 0000001014 of: 19 August 2011

Validity of the certificate: 28 July 2016

Test report: 936/21213182/A of 31 March 2011
TÜV Rheinland Energie und Umwelt GmbH, Köln

Publication: BAnz. 29 July 2011, No 113, p. 2725, chapter I No 1.1:
Announcement by UBA from 15 July 2011.

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

Measuring system

Manufacturer	Land Instruments International Ltd.
Name of measuring system	4500 MKIII
Serial number of the candidates	150854 83 / 154891 91
Measuring principle	Transmission

Test report

Test laboratory	TÜV Rheinland Energie und Umwelt GmbH
Date of report	2011-03-31

Measured component

Certification range	dust	0 - 15 mg/m ³
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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 0.110 mg/m ³	0.012 (mg/m ³) ²
Lack of fit	u _{lof} -0.081 mg/m ³	0.007 (mg/m ³) ²
Zero drift from field test	u _{d,z} 0.095 mg/m ³	0.009 (mg/m ³) ²
Span drift from field test	u _{d,s} -0.170 mg/m ³	0.029 (mg/m ³) ²
Influence of ambient temperature at span	u _t 0.030 mg/m ³	0.001 (mg/m ³) ²
Influence of supply voltage	u _v 0.023 mg/m ³	0.001 (mg/m ³) ²
Uncertainty of reference material at 70% of certification range	u _{rm} 0.121 mg/m ³	0.015 (mg/m ³) ²
Excursion of measurement beam	u _{mb} 0.173 mg/m ³	0.030 (mg/m ³) 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)	$u_c = \sqrt{\sum (u_{max,j})^2}$	0.32 mg/m ³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	0.63 mg/m ³

Relative total expanded uncertainty

Requirement of 2000/76/EC and 2001/80/EC
Requirement of EN 15267-3

U in % of the ELV 10 mg/m³	6.3
U in % of the ELV 10 mg/m³	30.0
U in % of the ELV 10 mg/m³	22.5