

CERTIFICATE

of Product Conformity (QAL1)

Certificate number: 0000001014_03

Certified AMS: 4500 MKIII for dust

Manufacturer: Land Instruments International Ltd.
Stubley Lane, Dronfield
Derbyshire, S18 1DJ
Great Britain

Test Institute: TÜV Rheinland Energy GmbH

**This is to certify that the AMS has been tested and certified
according to the standards**

**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
(this certificate contains 6 pages).



Suitability Tested
EN 15267
QAL1 Certified
Regular
Surveillance

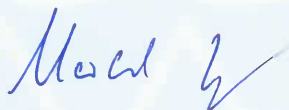
www.tuv.com
ID 0000001014

Publication in the German Federal Gazette
(BAnz.) of 20 July 2012

German Federal Environment Agency
Dessau, 22 July 2016

This certificate will expire on:
28 July 2021

TÜV Rheinland Energy GmbH
Cologne, 21 July 2016



Dr. Marcel Langner
Head of Section II 4.1



ppa. Dr. Peter Wilbring

www.umwelt-tuv.eu
tre@umwelt-tuv.eu
Tel. + 49 221 806-5200

TÜV Rheinland Energy GmbH
Am Grauen Stein
51105 Köln

Test institute accredited to EN ISO/IEC 17025:2005 by DAkkS (German Accreditation Body).
This accreditation is limited to the accreditation scope defined in the enclosure to the certificate D-PL-11120-02-00

Certificate:
0000001014_03 / 22 July 2016

Test report: 936/21217693/A of 21 March 2012
Initial certification: 29 July 2011
Expiry date: 28 July 2021
Certificate: renewal (previous certificate 0000001014_02 dated from 20 August 2012 with validity up to the 28 July 2016)
Publication: BAnz AT 20.07.2012 B11, chap. I, no. 1.3

Approved application

The tested AMS is suitable for use at combustion plants according to Directive 2010/75/EU, chapter III (13. BImSchV), at waste incineration plants according to Directive 2010/75/EU, chapter IV (17. BImSchV) and other plants requiring official approval. The measured ranges have been selected considering 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 fifteen-month field test at a waste incineration plant.

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 value 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 936/21217693/A of 21 March 2012 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 20.07.2012 B11, chapter I, no. 1.3
Announcement by UBA from 06 July 2012:

AMS name:

4500 MKIII for dust

Manufacturer:

Land Instruments International Ltd, Dronfield, United Kingdom

Approval:

For measurements at plants requiring official approval and plants according to 27th BImSchV

Measuring 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. \triangleq 15 mg/m³ dust at a measuring path of 5 m length.

Software versions:

Control Software Version: 01.03.01,

HI Software Version: 01.02.01

Restriction:

The AMS is only fit for purpose as long as it is assured that the temperature will not drop below the dew point.

Remarks:

1. Dust concentration is measured in wet flue gas under operating conditions.
2. The maintenance interval is six months.
3. Multiplying the length of the measuring path (5m) with a measuring range of 15 mg/m³ as determined through calibration, leads to a product of 75 mg m/m³ at the field test plant.
4. The requirement of the EN 15267-3 for the correlation coefficient R² of the calibration function was not met during the suitability test.
5. Complementary testing (extension of the maintenance interval) to Federal Environmental Agency notice of 23 February 2012 (Federal Journal (BAnz.) p. 920, Chapter I, No. 1.1).

Test report:

TÜV Rheinland Energie und Umwelt GmbH, Cologne

Report No.: 936/21217693/A of 21 March 2012

Certified product

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

The measurement device 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 AMS 4500 MKIII 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 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 Energy 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 Energy GmbH. With revocation of the publication the certificate loses its validity. After the expiration of the certificate and on requests of the TÜV Rheinland Energy 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: gal1.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: 19 August 2011
Expiry date of the certificate: 28 July 2016

Test report: 936/21213182/A of 31 March 2011
TÜV Rheinland Energie und Umwelt GmbH, Cologne
Publication: BAnz. 29 July 2011, No. 113, p. 2725, Chapter I No. 1.1
Announcement by UBA from 15 July 2011

Supplementary testing according to EN 15267

Certificate No. 0000001014_01: 16 March 2012
Expiry date of the certificate: 28 July 2016

Test report: 936/21216966/A of 15 September 2011
TÜV Rheinland Energie und Umwelt GmbH, Cologne
Publication: BAnz. 02 March 2012, No. 36, p. 920, chapter I, No. 1.1
Announcement by UBA from 23 February 2012

Certificate No. 0000001014_02: 20 August 2012
Expiry date of the certificate: 28 July 2016

Test report: 936/21217693/A of 21 March 2012
TÜV Rheinland Energie und Umwelt GmbH, Cologne
Publication: BAnz AT 20.07.2012 B11, chapter I, No. 1.3
Announcement by UBA from 06 July 2012

Renewal of the certificate

Certificate No. 0000001014_03: 22 July 2016
Expiry date of the certificate: 28 July 2021

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 936/21213182/A / 936/21213182/B / 936/21217693/A
Date of report TÜV Rheinland Energie und Umwelt GmbH
31.03.2011 / 15.09.2011 / 21.03.2012

Measured component

Dust
Certification range 0 - 15 mg/m³

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 _{inf} -0,081	mg/m ³	0,007 (mg/m ³) ²
Zero drift from field test	u ₀ 0,095	mg/m ³	0,009 (mg/m ³) ²
Span drift from field test	u _{d,s} -0,219	mg/m ³	0,048 (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) $u_c = \sqrt{\sum (u_{max, j})^2}$ 0,35 mg/m³
Total expanded uncertainty U = u_c * k = u_c * 1.96 0,68 mg/m³

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 6,8
U in % of the ELV 10 mg/m³ 30.0
U in % of the ELV 10 mg/m³ 22.5