Umwelt Bundes Amt
Für Mensch und Umwelt

TÜV NORD

CERTIFICATE

on Product Conformity (QAL 1)

Number of Certificate: TNU112UML0348

Certified AMS: **HM 1400 TRX for mercury (Hg)**

Manufacturer: **DURAG GmbH**
Kollaustraße 105
22453 Hamburg, Germany

Test Institute: TÜV NORD Umweltschutz GmbH & Co. KG
Große Bahnstraße 31, 22525 Hamburg

This is to certify that the AMS has been tested and found to comply with:
EN 15267-1: 2009, EN 15267-2: 2009, DIN EN 15267-3: 2008 and EN 14181: 2004

Certification is awarded in respect of the conditions stated in this certificate.
This certificate replaces TNU109GMT007 of 31 August 2011.

TÜV NORD
TÜV NORD Umweltschutz GmbH & Co. KG
Eignungsgeprüft
nach DIN EN 15267-1 bis 3; DIN EN 14181

Number of Certificate: TNU112UML0348

Publication in the German Federal Gazette (BAnz) of 05 March 2013

The certificate is valid until: 28 July 2016

Umweltbundesamt
Dessau-Roßlau, 27 September 2013

i. A. Dr. M. Langner

TÜV NORD Umweltschutz GmbH & Co. KG
Hamburg, 25 September 2013

i. A. Dipl.-Ing. S. Wolynski

Test report:	112UML0348 / 8000638271 of 14 January 2013
First certification:	29 July 2011 (first certification)
Validity ends:	28 July 2016
Publication in the Federal Gazette:	BAnz AT 05 March 2013 B10 Chapter I No. 2.4

Approved application:

The tested AMS is suitable for measurements at power plants and waste incineration plants (within co-combustion plants) according to directive 2010/75/EU (chapter III article 28 an chapter IV article 42 of the directive).

The suitability of the AMS for these applications was assessed based on:

- a laboratory test and an eleven month field test at a waste incineration plant
- a simplified field test at a power plant with co-combustion

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

Basis of the certification:

This certification is based on test report 112UML0348 / 8000638271 of 14 January 2013 by TÜV NORD Umweltschutz GmbH und Co. KG, the suitability announcement and further notifications by the German Environmental Agency (UBA) as the relevant body as well as the ongoing surveillance of the product and the manufacturing process plus the publications in the German Federal Gazette:

- BAnz AT 05 March 2013 B10 Chapter I No. 2.4
- BAnz AT 23 July 2013 B4 Chapter IV, Announcement No. 29

HM 1400 TRX

Manufacturer:

Verewa Umwelt- und Prozessmesstechnik GmbH, Hamburg.

Approval:

For power plants and waste incineration plants (within co-combustion plants) according to directive 2010/75/EU (chapter III article 28 and chapter IV article 42 of the directive)

Measuring ranges during the suitability test:

Component	Certification range	Supplementary range	Unit
Hg	0 – 45	0 – 75	µg/m^3

Software version:

2.01 (The Display-Software [Version: DIS TRX 006] contains only language packages and has no influence to the function)

Restrictions:

None

Notes:

1. The maintenance interval has been determined as three months as a continuous condensate drain is maintained.
2. For the periodical span checks (interval: 3 months) a suitable Hg^{2+} test gas generator shall be used.
3. In the two hour period an automatic adjustment of zero point is carried out with cleaned ambient air.
4. On O_2-concentrations over 18 Vol-% it may be necessary to change the filling of the Hg^{2+}/Hg^0-converter more frequently then every 6 months.
5. The length of the heated measuring gas duct in the laboratory test was 5 m and in the field test 10 m.
6. The length of the heated measuring gas duct during the field test at a power plant was 4 m.
7. The announcement of suitability applies to devices type HM 1400 TRX with serial numbers higher than 1512175.
8. Supplementary testing (suitability for another type of plant, enhanced maintenance interval) to the announcement of the German Federal Environment Agency of 15 July 2011(BAnz 2011 p.2725 chapter I No. 3.1).

Test report by TÜV NORD Umweltschutz GmbH & Co. KG

Report No.: 112UML0348 / 8000638271 of 14 January 2013

Announcement in the Federal Gazette:

- Federal Gazette (BAnz) AT 05 March 2013 B10, chapter I No. 2.4
- Federal Gazette (BAnz) AT 23 July 2013 B4, chapter IV, notification No. 29:
  Notification as regards Federal Environmental Agency notice of 12 February 2013 (Federal Gazette (BAnz) AT 05 March 2013 B10, chapter I No. 2.4 und chapter V, 1st notification)

  The Verewa Umwelt- und Prozessmesstechnik GmbH merged with DURAG GmbH on 01 January 2013. The manufacturer is DURAG GmbH, Hamburg. Opinion stated by TÜV NORD Umweltschutz GmbH & Co. KG dated 30 May 2013)

Certified product:

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

The HM 1400 TRX measuring system continuously measures the total mercury in the flue gas of a combustion plant. For this, sample gas is continuously extracted from the exhaust gas duct, and fed to the measuring system via a heated sampling line to a heated sample probe. A selective catalytic converter reduces ionised mercury to elemental mercury. Detection is then performed in a 2-beam UV photometer on the basis of CVAAS (**C**old **V**apour **A**tomic **A**bsorption **S**pectroscopy)

In the 2-beam photometer, measurement and reference cells are connected in series. Between the cells, mercury is absorbed in a selective filter. This layout compensates for cross-sensitivities. The concentration determined is in relation to 1013 hPa and 273.15 K. The data output is performed in [µg/m³] (dry).

The measuring system of the HM 1400 TRX system for total mercury measurement is accommodated in a Rittal cabinet. The catalytic converter acting as a heat source is located in the upper part, the UV detector, the gas cooler and the volumetric flow system are located in the lower part of the cabinet. The PLC for controlling and monitoring the measuring system is located in the centre part, together with the electrical components. The display and the control cabinet fan are incorporated in the front door.

Sample taking is performed with the probe SP 2000 H from the company M&C. For this the measurement gas is taken out through a 2 µm particle filter at 180°C and sucked at a gas flow of about 100 l/h into the HM 1400 TRX measuring system. The volumetric flow of 100 l/h corresponds to a gas speed of about 2 m/s in the measuring gas line (PTFE, internal diameter 4 mm). The UV photometer is a concentration measuring system, so that the volumetric flow need not be metered exactly. The volumetric flow can be adjusted using a needle valve.

In the initial installation the length of the heated measuring gas duct in each of the measuring systems is 10 m. During the field test at a power plant, the length of the heated measuring gas duct was 4 m.

During the cyclical zero check, which is performed as standard for a period of 8 minutes every 2 hours, the 3/2-way valve upstream from the catalytic converter switches of from measurement gas to ambient air. A cartridge with iodised activated carbon is connected upstream of this valve in the ambient air flow, which filters out any mercury that may be present in the ambient air.

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, the TÜV NORD Umweltschutz GmbH & Co. KG must be notified at the address given on page 1.

The certification mark that is specific to the certified product is presented on page 1 of this certificate. This can be applied to the product or in publicity material.

This document as well as the certification mark remains property of TÜV NORD Umweltschutz GmbH & Co. KG. With revocation of the publication the certificate looses its validity. After expiration of the validity of the certificate and on requests of the TÜV NORD Umweltschutz GmbH & Co. KG 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: **www.qal1.de**

Certification of the measuring system HM 1400 TRX is based on the documents listed below and the regular, continuous monitoring of the Quality Management System of the manufacturer:

First certification according to DIN EN 15267:

Certificate No.:	TNU109GMT007 of 31 August 2011
Validity of the certificate:	28 July 2016
Test report:	109GMT007 / 8000632287 of 30 June 2011
Test Institute:	TÜV NORD Umweltschutz GmbH & Co. KG
Publication:	BAnz 2011 p. 2725 chapter I No. 3.1)
Announcement by UBA:	15 July 2011

Supplementary testing according to DIN EN 15267:

Certificate No.:	TNU112UML0348 of 25 September 2013
Validity of the certificate:	28 July 2016
Test reports:	112UML0348 / 8000638271 of 14 January 2013
Test Institute:	TÜV NORD Umweltschutz GmbH & Co. KG
Publication:	BAnz AT 05 March 2013 B10 Chapter I No. 2.4
Announcement by UBA:	12 February 2013

Notifications:

1. Modified photometer unit
   Publication: BAnz AT 05 March 2013 B10, chapter V, notification No. 1
   Announced by UBA on: 13 February 2013
2. Manufacturer's name changed
   Publication: BAnz AT 23 July 2013 B4, chapter IV, notification No. 29
   Announced by UBA on: 03 July 2013

Certificate:
TNU112UML0348/2013-09-25

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

Measuring system	
Manufacturer	DURAG GmbH
Name of measuring system	**HM 1400 TRX**
Serial number of the candidates in laboratoy	1512081, 1512080
Serial number of the candidates in field test	1512079, 1512078
Serial number of candidate used in field test at power plant	10751 (device upgraded to HM 1400 TRX, not renumbered)
Measuring principle	catalytic reduction to Hg^0, 2-beam UV photometer
Test reports	109GMT007 / 8000632287 of 30 June 2011 112UML0348 / 8000638271 of 14 January 2013
Test Institute	TÜV NORD Umweltschutz GmbH & Co. KG
Measured component	mercury Hg
Certification range	0 - 45 [µg/m³]

Evaluation of the cross sensitivity (CS)

(system with largest CS)

Sum of positive CS at zero point	0,36 [µg/m³]
Sum of negative CS at zero point	0,00 [µg/m³]
Sum of positive CS at reference point	1,64 [µg/m³]
Sum of negative CS at reference point	- 1,65 [µg/m³]
Maximum Sum of cross sensitivities	- 1,65 [µg/m³]
Uncertainty of cross sensitivities	0,961 [µg/m³]

Calculation of the combined std. uncertainty

		u [µg/m³]	u² [µg/m³]²
Tested parameter			
Lack-of-fit	u_{lof}	0,234	0,055
Zero point drift from the field test	$u_{d,z}$	0,130	0,017
Span point drift from the field test	$u_{d,s}$	0,520	0,270
Effect of ambient temperature at span point	u_t	0,375	0,140
Influence of sample gas pressure	u_p	-	-
Influence of sample gas flow	u_f	0,140	0,020
Influence of supply voltage	u_v	0,012	0,000
Cross-sensitivity	u_l	0,961	0,924
Std.dev. from paired measurements in field test *)	u_r	0,223	0,050
Uncertainty of the test gas	u_{tg}	0,439	0,193
Total	-	-	1,668

*) The larger value of "Repeatability std.dev. at span"
or "Std.dev. from paired measurements in field test"

Combined standard uncertainty u_c	[µg/m³]	1,29
Total expanded uncertainty U (confidence intervall 95%)	[µg/m³]	2,53
Relative total expanded uncertainty U	**[% ELV 30 µg/m³]**	**8,4**
Requirement of 2000/76/EC, 2001/80/EC and 2010/75/EU	**[% ELV 30 µg/m³]**	**40,0**
Requirement of EN 15267-3	**[% ELV 30 µg/m³]**	**30,0**