

CERTIFICATE

of Product Conformity (QAL1)

Certificate number: 0000051693_03

Certified AMS: HM 1400 TRX for mercury

Manufacturer: DURAG GmbH
Kollaustraße 105
22453 Hamburg
Germany

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 9 pages).



Suitability Tested
EN 15267
QAL1 Certified
Regular
Surveillance

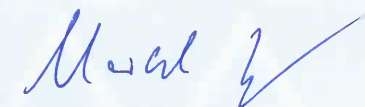
www.tuv.com
ID 0000051693

Publication in the German Federal Gazette
(BAnz.) of 5 August 2014

German Federal Environment Agency
Dessau, 22 July 2016

This certificate will expire on:
28 July 2021

TÜV Rheinland Energy GmbH
Cologne, 21 July 2016



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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:
0000051693_03 / 22 July 2016

Test report: 212UMP003/8000641152 of 7 April 2014
Initial certification: 29 July 2011
Expiry date: 28 July 2021
Certificate: renewal (previous certificate TNU212UMP003 dated from 23 December 2014 with validity up to the 28 July 2016)
Publication: BAnz AT 05.08.2014 B11, chap. I, No. 3.1

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 these applications was assessed based on:

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

The AMS is approved for an ambient temperature range of +5 °C to +40 °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 212UMP003/8000641152 of 7 April 2014 of TÜV NORD Umweltschutz GmbH und Co. KG
- 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 05.08.2014 B11, chapter I number 3.1,
Announcement by UBA from 17 July 2014:

AMS designation:

HM 1400 TRX

Manufacturer:

DURAG GmbH, Hamburg

Field of application:

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

Measuring ranges during the performance 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 008] 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 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 O₂-concentrations over 18 Vol-% it may be necessary to change the filling of the Hg²⁺/Hg⁰-converter more frequently than 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 length of the heated measuring gas duct during the field test at a cement kiln was 24 m.
8. The notification of suitability applies to devices type HM 1400 TRX with serial numbers higher than 1512175.
9. Supplementary testing (suitability for another type of plant) to the notification of the German Federal Environment Agency of 12 February 2013 (BAnz AT 05.03.2013 810, chapter I No. 2.4 and chapter V announcement 1) and of 27 February 2014 (BAnz AT 01.04.2014 812, chapter VI announcement 6).

Test report:

TÜV NORD Umweltschutz GmbH & Co. KG

Report No.: 212UMP003/8000641152 of 7 April 2014

Publication in the German Federal Gazette: BAnz AT 05.08.2014 B11, chapter V notification 4,
Announcement by UBA from 17 July 2014:

4 Notification as regards Federal Environment Agency (UBA) notices of 12 February 2013 (BAnz AT 05.03.2013 B10, chapter I number 2.4 and chapter V notification 1) and of 27 February 2014 (BAnz AT 01.04.2014 B12, chapter VI notification 6) and this notification (chapter I number 3.1)

The current software version for the measuring system HM 1400 TRX
for Hg of DURAG GmbH is: 2.02
The display software for language packages is DIS_TRX_010.

Statement of TÜV NORD Umweltschutz GmbH & Co. KG of 8 April 2014

Publication in the German Federal Gazette: BAnz AT 26.08.2015 B4, chapter V notification 29,
Announcement by UBA from 22 July 2015:

29 Notification as regards Federal Environment Agency (UBA) notices of 17 July 2014 (BAnz AT 05.08.2014 B11, chapter I number 3.1 und chapter V notification 4)

The HM-1400 TRX measuring system for mercury of the company DURAG GmbH can
also be equipped with the new CJ2M control unit (SPS) manufactured by OMRON.

In addition, the PT570024 relay in the control cabinet has been replaced by one of the
type RIF-0-RPT-24DC/21, and the screw and plug-in terminals have been exchanged.

Statement of TÜV Rheinland Energie und Umwelt GmbH of 26 March 2015

Certified product

This certificate applies to automated measurement systems conforming 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 sample probe and heated sampling line. 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 [$\mu\text{g}/\text{m}^3$] (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 10m. During the field test at a power plant, the length of the heated measuring gas duct was 4 m. During the field test at a cement kiln, the length of the heated measuring gas duct was 24m.

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, 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 certification 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 HM 1400 TRX for mercury 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. TNU109GMT007: 31 August 2011
Expiry date of the certificate: 28 July 2016

Test report: 109GMT007 / 8000632287 of 30 June 2011
TÜV NORD Umweltschutz GmbH & Co. KG
Publication: BAnz. 29 July 2011, No. 113, page 2725
Announcement by UBA from 15 July 2011

Supplementary testing according to EN 15267

Certificate No. TNU112UML0348: 25 September 2013
Expiry date of the certificate: 28 July 2016
Test report: 112UML0348 / 8000638271 vom 14 January 2013
TÜV NORD Umweltschutz GmbH & Co. KG
Publication: BAnz AT 05.03.2013 B10, chapter I No. 2.4
Announcement by UBA from 12 February 2013

Notifications according to EN 15267

Statement of TÜV NORD Umweltschutz GmbH & Co. KG of 19 October 2012
Publication BAnz AT 05.03.2013 B10, chapter V, notification 1
Announcement by UBA from 12 February 2013
(changes of Photometer assembly)

Statement of TÜV NORD Umweltschutz GmbH & Co. KG of 30 May 2013
Publication BAnz AT 23.07.2013 B4, chapter IV, notification 29
Announcement by UBA from 03 July 2013
(renaming of manufacturer)

Statement of TÜV NORD Umweltschutz GmbH & Co. KG of 7 October 2013
Publication BAnz AT 01.04.2014 B12, chapter VI, notification 6
Announcement by UBA from 27 February 2014
(changing of material for the line after gas cooler)

Supplementary testing according to EN 15267

Certificate No. TNU212UMP003: 19 December 2014
Expiry date of the certificate: 28 July 2016
Test report: 212UMP003/8000641152 of 7 April 2014
TÜV NORD Umweltschutz GmbH & Co. KG
Publication: BAnz AT 05.08.2014 B11, chapter I No. 3.1
Announcement by UBA from 17 July 2014

Notifications according to EN 15267

Statement of TÜV NORD Umweltschutz GmbH & Co. KG of 8 April 2014
Publication BAnz AT 05.08.2014 B11, chapter V notification 4
Announcement by UBA from 17 July 2014
(new software version)

Statement of TÜV Rheinland Energie und Umwelt GmbH of 26 March 2015
Publication BAnz AT 26.08.2015 B4, chapter V notification 29
Announcement by UBA from 22 July 2015
(Hardware changes)

Renewal of the certificate

Certificate No. 0000051693_03: 22 July 2016
Expiry date of the certificate: 28 July 2021

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 laboratory | 1512081, 1512080 |
| Serial number of the candidates in field test | 1512079, 1512078 |
| Serial number of candidate used in field test at cement kiln | 1512078 |
| Measuring principle | catalytic reduction to Hg ⁰ , 2-beam UV photometer |

Test reports

| | |
|----------------|--|
| | 109GMT007 / 8000632287 vom 30.06.2011 |
| | 112UML0348/8000638271 vom 14.01.2013 |
| | 212UMP003/8000641152 vom 7. April 2014 |
| Test Institute | TÜV NORD Umweltschutz GmbH & Co. KG |

Measured component

| | |
|---------------------|-----------------------------|
| | mercury Hg |
| Certification range | 0 - 45 [µg/m ³] |

Evaluation of the cross sensitivity (CS)

(system with largest CS)

| | |
|---------------------------------------|-----------------------------|
| Sum of positive CS at zero point | 0.36 [µg/m ³] |
| Sum of negative CS at zero point | 0.00 [µg/m ³] |
| Sum of positive CS at reference point | 1.64 [µg/m ³] |
| Sum of negative CS at reference point | - 1.65 [µg/m ³] |
| Maximum Sum of cross sensitivities | - 1.65 [µg/m ³] |
| Uncertainty of cross sensitivities | 0.961 [µg/m ³] |

Calculation of the combined std. uncertainty

| Tested parameter | Standard- unsicherheit | Std.unsich. [µg/m ³] | Std.unsich. ² [µg/m ³] ² |
|---|---------------------------|-------------------------------------|---|
| 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/m ³] | 1.29 |
| Total expanded uncertainty U (confidence interval 95%) | [µg/m ³] | 2.53 |
| Relative total expanded uncertainty U | [% ELV 30 µ/m³] | 8.4 |
| Requirement of 2010/75/EU | [% ELV 30 µ/m³] | 40.0 |
| Requirement of EN 15267-3 | [% ELV 30 µ/m³] | 30.0 |