

# CERTIFICATE

## of Product Conformity (QAL1)

Certificate No.: 0000051693\_04

**AMS designation:** HM 1400 TRX for mercury

**Manufacturer:** DURAG GmbH  
Kollastraße 105  
22453 Hamburg  
Germany

**Test Laboratory:** TÜV Rheinland Energy GmbH

**This is to certify that the AMS has been tested  
and found to comply with 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 10 pages).  
The present certificate replaces certificate 0000051693\_03 of 22 July 2016.



Suitability Tested  
EN 15267  
QAL1 Certified  
Regular  
Surveillance


www.tuv.com  
ID 0000051693


Publication in the German Federal Gazette  
(BAnz) of 05 August 2014

This certificate will expire on:  
28 July 2022

German Federal Environment Agency  
Dessau, 28 July 2021

TÜV Rheinland Energy GmbH  
Cologne, 27 July 2021

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

**Certificate:**  
0000051693\_04 / 28 July 2021

**Test Report:** 212UMP003/8000641152 of 07 April 2014  
**Initial certification:** 29 July 2011  
**Expiry date:** 28 July 2022  
**Certificate:** Renewal (of previous certificate 0000051693\_03 of 22 July 2016 valid until 28 July 2021)  
**Publication:** BAnz AT 05.08.2014 B11, chapter I number 3.1

### Approved application

The tested AMS is suitable for use at combustion plants according to Directive 2010/75/EU, (13<sup>th</sup> BImSchV), at waste incineration plants according to Directive 2010/75/EU, (17<sup>th</sup> BImSchV, TA Luft) and other plants requiring official approval according to the 27<sup>th</sup> BImSchV. The measured ranges have been selected so as to ensure as broad a field of application as possible.

The suitability of the AMS for this application was assessed on the basis of

- a laboratory test,
- an eleven-month field test at a waste incineration plant (17<sup>th</sup> BImSchV),
- a simplified field test at a power plant (13<sup>th</sup> BImSchV) with co-combustion and
- a simplified test at a rotating cement kiln with co-combustion (TA Luft)

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 applicable at the time of testing. As changes in legal provisions 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 intended purpose.

### Basis of the certification

This certification is based on:

- Test report 212UMP003/8000641152 of 07 April 2014 by 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, UBA announcement dated 17 July 2014:

**AMS designation:**

HM 1400 TRX

**Manufacturer:**

DURAG GmbH, Hamburg

**Field of application:**

For plants requiring official approval and for plants according to the 27<sup>th</sup> BImSchV

**Measuring ranges during performance testing:**

Component	Certification range	Supplementary range	Unit
Hg	0 – 45	0 – 75	µg/m <sup>3</sup>

**Software version:** 2.01

(The display software [version: DIS TRX 008] only contains the language packages and has no influence on the function)

**Restrictions:**

None

**Notes:**

1. The maintenance interval is three months, provided that continuous condensate drainage is guaranteed.
2. For the periodical span checks (at 3 month intervals) a suitable test gas generator must be available.
3. The zero point is automatically adjusted with purified ambient air every two hours.
4. With O<sub>2</sub> concentrations above 18 vol.%, it may be necessary to replace the filling of the Hg<sup>2+</sup>/Hg<sup>0</sup> reactor more frequently than every six months.
5. The length of the heated measuring gas duct in the laboratory test was 5m and in the field test 10m.
6. The length of the heated sample gas line was 4m during the additional test at the power plant (13<sup>th</sup> BImSchV).
7. The length of the heated sample gas line was 24m during the additional test at the cement kiln installation (4<sup>th</sup> BImSchV).
8. The notification of suitability applies to systems of the 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 (UBA) of 12 February 2013 (BAnz AT 05.03.2013 B10, chapter I number 2.4 and chapter V 1<sup>st</sup> notification) and of 27 February 2014 (BAnz AT 01.04.2014 B12, chapter VI 6<sup>th</sup> notification).

**Test Report:**

TÜV NORD Umweltschutz GmbH & Co. KG

Report no.: 212UMP003/8000641152 of 07 April 2014

Publication in the German Federal Gazette: BAnz AT 05.08.2014 B11, chapter V 4<sup>th</sup> notification, UBA announcement dated 17 July 2014:

**4 Notification as regards Federal Environmental Agency (UBA) notices of 12 February 2013 (BAnz AT 05.03.2013 B10, chapter I number 2.4 and chapter V 1<sup>st</sup> notification) and of 27 February 2014 (BAnz AT 01.04.2014 B12, chapter VI 6<sup>th</sup> notification) and this notice (chapter I number 3.1)**

The current software version of the HM 1400 TRX measuring system for Hg from DURAG GmbH is: 2.02

The display software for language packages is: DIS\_TRX\_010.

Statement issued by TÜV NORD Umweltschutz GmbH & Co. KG of 08 April 2014

Publication in the German Federal Gazette: BAnz AT 26.08.2015 B4, chapter V 29<sup>th</sup> notification, UBA announcement dated 22 July 2015:

**29 Notification as regards Federal Environment Agency (UBA) notice of 17 July 2014 (BAnz AT 05.08.2014 B11, chapter I number 3.1 and chapter V 4<sup>th</sup> notification)**

The HM-1400 TRX measuring system for mercury from 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 issued by TÜV Rheinland Energie und Umwelt GmbH dated 26 March 2015

Publication in the German Federal Gazette: BAnz AT 15.03.2017 B6, Chapter V 21<sup>st</sup> notification, UBA announcement dated 22 February 2017:

**21 Notification as regards Federal Environment (UBA) notices of 17 July 2014 (BAnz AT 05.08.2014 B11, chapter I number 3.1) and of 22 July 2015 (BAnz AT 26.08.2015 B11, chapter V 29<sup>th</sup> notification)**

The current software version of the HM 1400 TRX measuring system for Hg from DURAG GmbH is: V02.02R0004

The AMS is equipped with a modified heating of the ball valve Y1.

Statement issued by TÜV Rheinland Energy GmbH dated 13 October 2016

Publication in the German Federal Gazette: BAnz AT 26.03.2018 B8, chapter V 26<sup>th</sup> notification, UBA announcement dated 21 February 2018:

**26 Notification as regards Federal Environmental Agency (UBA) notices of 17 July 2014 (BAnz AT 05.08.2014 B11, chapter I number 3.1) and of 22 February 2017 (BAnz AT 15.03.2017 B6, chapter V 21<sup>st</sup> notification)**

The HM-1400 TRX measuring system has been modified by DURAG. The following changes have been made:

- Adaptation of the reactor receptacle for better operability of maintenance activities
- Integration of the AKM test gas generator into the equipment cabinet
- Integration of the specification option (separate presentation of elemental and chemically bound gaseous mercury)
- Performance of an automatic leak test
- Omission of the COH dryer/adaptation of the condensate trap
- Positioning of the temperature measurement for standardisation of the gas volume flow
- Replacement of the air filter in front of the photometer.

The current software version of the HM-1400 TRX measuring system for Hg from DURAG GmbH is:

PLC: S03.00R0032  
Display: D03.00R0048

The results of the testing of the amendments are presented in the test report 936/21238805/C of 29 September 2017 by TÜV Rheinland Energy GmbH.

Statement issued by TÜV Rheinland Energy GmbH dated 7 December 2017

Publication in the German Federal Gazette: BAnz AT 26.03.2019 B7, chapter IV 14<sup>th</sup> notification, UBA announcement dated 27 February 2019:

**14 Notification as regards Federal Environmental Agency (UBA) notices of 17 July 2014 (BAnz AT 05.08.2014 B11, chapter I number 3.1) and of 21 February 2018 (BAnz AT 26.03.2018 B8, chapter V 26<sup>th</sup> notification)**

The current software version of the HM-1400 TRX measuring system for Hg from DURAG GmbH is:

PLC: 03.04R0000  
Display: TRX\_03.04R0000

Furthermore, versions SPS: 03.02R0001, Display: TRX\_03.02R0000 and SPS: 03.01R0000, Display: TRX\_D03.01R0000 have also been approved.

The photometer of the HM-1400 TRX measuring system now has a proprietary inverter instead of the TDK CXA-P20L-L used so far.

Statement issued by TÜV Rheinland Energy GmbH dated 10 October 2018

### Certified product

This certification 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 (Cold Vapour Atomic Absorption Spectroscopy).

In the 2-beam photometer, measurement and reference cells are connected in series. Between the cells, mercury is absorbed in a selective filter. This design compensates for cross-sensitivities. The determined concentration is related 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. The measurement gas is taken out through a 2  $\mu\text{m}$  particle filter at 180°C and sucked at a gas flow of about 100 l/h into the HM 1400 TRX measuring system.

The UV photometer is a concentration measuring device, so that a volume flow does not have to be set exactly. The volume flow of 100 l/h corresponds approximately to a gas velocity of 2 m/s in the sample gas line. The volume flow can be adjusted with a pin valve.

The length of the heated sample gas line of both measuring devices was 10 m for the installation tested first. During the field test at a power plant, the length of the heated measuring gas line was 4 m. During the field test at a cement kiln, the length of the heated measuring gas line 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 off 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 remarks

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 manufacturing process for 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 document as well as the certification mark remains property of TÜV Rheinland Energy GmbH. Upon revocation of the publication the certificate loses its validity. After the expiration of the certificate and on request of TÜV Rheinland Energy GmbH this document shall be returned and the certificate mark must no longer be used.

The relevant version of this certificate and its expiration date are also accessible on the internet at [gal1.de](http://gal1.de).

### Document history

Certification of the HM 1400 TRX measuring system is based on the documents listed below and the regular, continuous surveillance of the manufacturer's quality management system:

#### 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  
UBA announcement dated 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 of 14 January 2013  
TÜV NORD Umweltschutz GmbH & Co. KG  
Publication: BAnz AT 05.03.2013 B10, chapter I number 2.4  
UBA announcement dated 12 February 2013

#### Notifications in accordance with EN 15267

Statement issued by TÜV NORD Umweltschutz GmbH & Co. KG dated 19 October 2012  
Publication: BAnz AT 05.03.2013 B10, chapter V notification 1  
UBA announcement dated 12 February 2013  
(Modification of the photometer assembly)

**Certificate:**  
0000051693\_04 / 28 July 2021

Statement issued by TÜV NORD Umweltschutz GmbH & Co. KG dated 30 May 2013  
Publication: BAnz AT 23.07.2013 B4, chapter IV notification 29  
UBA announcement dated 03 July 2013  
(Renaming of the manufacturer)

Statement issued by TÜV NORD Umweltschutz GmbH & Co. KG dated 7 October 2013  
Publication: BAnz AT 01.04.2014 B12, chapter VI notification 6  
UBA announcement dated 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 number 3.1  
UBA announcement dated 17 July 2014

#### **Notifications in accordance with EN 15267**

Statement issued by TÜV NORD Umweltschutz GmbH & Co. KG dated 08 April 2014  
Publication: BAnz AT 05.08.2014 B11, chapter V notification 4  
UBA announcement dated 17 July 2014  
(New software version)

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

#### **Renewal of the certificate**

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

#### **Notifications in accordance with EN 15267**

Statement issued by TÜV Rheinland Energy GmbH dated 13 October 2016  
Publication: BAnz AT 15.03.2017 B6, chapter V notification 21  
UBA announcement dated 22 February 2017  
(Hardware change, software changes)

Statement issued by TÜV Rheinland Energy GmbH dated 7 December 2017  
Publication: BAnz AT 26.03.2018 B8, chapter V notification 26  
UBA announcement dated 21 February 2018  
(Hardware change, software changes)

Statement issued by TÜV Rheinland Energy GmbH dated 10 October 2018  
Publication: BAnz AT 26.03.2019 B7, chapter IV notification 14  
UBA announcement dated 27 February 2019  
(Hardware change, software changes)

#### **Renewal of the certificate**

Certificate no. 0000051693\_04: 28 July 2021  
Expiry date of the certificate: 28 July 2022



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

**AMS designation:**

Manufacturer	DURAG GmbH
Name of the measuring system	<b>HM 1400 TRX</b>
Serial number of test units in the laboratory	1512081, 1512080
Serial number of test units in the field test	1512079, 1512078
Serial number of the test unit in the field test at the cement kiln. ..	1512078
Measuring principle	catalytic reduction to Hg <sup>0</sup> , 2-beam UV photometer

**Test Report**

109GMT007 / 8000632287 of 30 June 2011  
112UML0348/8000638271 of 14 January 2013  
212UMP003/8000641152 of 07 April 2014

Test Laboratory:

TÜV NORD Umweltschutz GmbH & Co. KG

**Measured components:**

Mercury Hg

Certification range (CR)

0 - 45 µg/m<sup>3</sup>

**Cross-sensitivities (CS)**

(system with largest CS)

Sum of positive CS at zero point	0.36 µg/m <sup>3</sup>	[µg/m <sup>3</sup> ]
Sum of negative CS at zero point	0.00	[µg/m <sup>3</sup> ]
Sum of positive CS at span point	1.64	[µg/m <sup>3</sup> ]
Sum of negative CS at span point	- 1.65	[µg/m <sup>3</sup> ]
Maximum sum of cross-sensitivities	- 1.65	[µg/m <sup>3</sup> ]
Measurement uncertainty of cross-sensitivity	0.961	[µg/m <sup>3</sup> ]

**Combined standard uncertainty**

Tested parameter	Standard- uncertainty	Standard uncertainty [ $\mu\text{g}/\text{m}^3$ ]	Standard uncertainty <sup>2</sup> [ $\mu\text{g}/\text{m}^3$ ] <sup>2</sup>
Lack-of-fit	$U_{\text{lof}}$	0.234	0.055
Zero drift from the field test	$U_{\text{d,z}}$	0.130	0.017
Span point drift from the field test	$U_{\text{d,s}}$	0.520	0.270
Influence of the ambient temperature at span	$U_t$	0.375	0.140
Influence of sample gas pressure	$U_p$	-	-
Influence of sample gas flow	$U_f$	0.140	0.020
Influence of voltage variations	$U_v$	0.012	0.000
Cross-sensitivity	$U_l$	0.961	0.924
Std.dev. from paired measurements in the field test *)	$U_r$	0.223	0.050
Uncertainty of the test gas	$U_{\text{tg}}$	0.439	0.193
Total	-	-	1.668

\*) The greater of "Repeated standard deviation at span point" and "Standard deviations from double determinations in the field test"

Combined standard uncertainty $U_c$	[ $\mu\text{g}/\text{m}^3$ ]	1.29
Total expanded uncertainty for a confidence level of 95%	[ $\mu\text{g}/\text{m}^3$ ]	2.53
<b>Relative expanded uncertainty in % of limit value <math>30 \mu\text{g}/\text{m}^3</math></b>	<b>[%]</b>	<b>8.4</b>
<b>Requirement of 2010/75/EU</b>	<b>[%]</b>	<b>40.0</b>
<b>Requirement of EN 15267-3</b>	<b>[%]</b>	<b>30.0</b>

The calculation of the total uncertainty was taken from the certificate TNU212UMP003 of TÜV NORD Umweltschutz GmbH & Co. KG.