

CERTIFICATE

of Product Conformity (QAL1)

Certificate No: 0000074624_02

Certified AMS: DSM-XG for NO and O₂

Manufacturer: DXG Ltd.
102-8, Hoesan-Daero
Opo-Eup, Gwangju-Si
Republic Korea

Test Institute: TÜV Rheinland Energy & Environment 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 (2023), EN 15267-3 (2007)
as well as EN 14181 (2014).**

Certification is awarded in respect of the conditions stated in this certificate
(this certificate contains 8 pages).
The present certificate replaces certificate 0000074624_01 dated 5 September 2023.



Suitability Tested
EN 15267
QAL1 Certified
Regular
Surveillance

www.tuv.com
ID 0000074624


Publication in the German Federal Gazette
(BAnz) of 3 May 2021

German Environment Agency

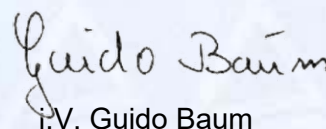
Dessau, 3 May 2026

This certificate will expire on:
2 May 2031

TÜV Rheinland
Energy & Environment GmbH
Cologne, 2 May 2026



Dr. Marcel Langner
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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 the certificate D-PL-11120-02-00.

Test report:	936/21239652/C dated 28 August 2020
Initial certification:	3 May 2021
Expiry date:	2 May 2031
Certificate:	Renewal (of previous certificate 0000074624_01 of 5 September 2023 valid until 2 May 2026)
Publication:	BAnz AT 03.05.2021 B9, chapter I No. 3.1

Approved application

The tested AMS is suitable for use at plants according to Directive 2010/75/EC, chapter III (combustion plants / 13th BImSchV:2020), chapter IV (waste incineration plants / 17th BImSchV:2013), Directive 2015/2193/EC (44th BImSchV:2019), TA Luft:2002, 30th BImSchV:2019 and 27th BImSchV:2013. 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 and a five month field test at a waste incineration.

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 emission limit values and oxygen concentration 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.

Note

The legal regulations mentioned correspond to the current state of legislation during certification. Each user should, if necessary, in consultation with the competent authority, ensure that this AMS meets the legal requirements for the intended use. In addition, it cannot be ruled out that legal regulations governing the use of a measuring device for emission monitoring may change during the lifetime of the certificate.

Basis of the certification

This certification is based on:

- Test report 936/21239652/C dated 28 August 2020 of TÜV Rheinland Energy 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 03.05.2021 B9, chapter I No. 3.1,
Announcement by UBA dated 31 March 2021:

AMS designation:

DST-X for NO and O₂

Manufacturer:

Dongwoo Optron Co., Ltd., Gwangju-Si, Republic of Korea

Field of application:

For measurements on plants subject to licensing as well as plants of the 27th BImSchV.

Measuring ranges during the performance test:

Component	Certification range	Additional range	Unit
NO	0 - 100	0 - 1,000	mg/m ³
O ₂	0 - 25	-	Vol.-%

Software version:

10000-29

Restrictions:

none

Notes:

The maintenance interval is four weeks.

Test Report: TÜV Rheinland Energy GmbH, Cologne

Report No.: 936/21239652/C dated 28 August 2020

Publication in the German Federal Gazette: BAnz AT 02.08.2023 B7, Chap. III notification 3,
Announcement by UBA dated 5 July 2023:

**3 Notification as regards Federal Environment Agency (UBA) notice
of 31 March 2021 (BAnz AT 03.05.2021 B9, chapter I number 3.1)**

The new designation of the DST-X measuring system for NO and O₂ from Dongwoo
Optron Co., Ltd. is now DSM-XG.

Statement issued by TÜV Rheinland Energy GmbH dated 20 January 2023

Publication in the German Federal Gazette: BAnz AT 31.10.2025 B5, Chap. IV notification 9,
Announcement by UBA dated 27 August 2025:

**9 Notification as regards Federal Environment Agency (UBA) notice
of 31 March 2021 (BAnz AT 03.05.2021 B9, chapter I number 3.1) and
of 5 July 2023 (BAnz AT 02.08.2023 B7, chapter III notification 3)**

The company name of Dongwoo Optron Co. Ltd., manufacturer of the DSM-XG
emission measuring device for NO and O₂, has changed to DXG Ltd.

The QAL1-certified measuring device will be marketed under this company name in
future.

Statement issued by TÜV Rheinland Energy & Environment GmbH
dated 18 February 2025

Certified product

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

The main unit consists of a UV cell (deuterium lamp), a paramagnetic O₂ sensor, a measuring gas chamber and a control board. The pretreatment system consists of the sample gas probe with filter (made of ceramic), a sampling line, a sample gas cooler and a sample gas pump. With the exception of the heated sampling probe as well as heated sample gas line, all components are located in a lockable measuring cabinet together with the electrical distribution and analog modules.

All gas concentrations to be measured of the individual measuring components as well as status signals are shown on the display of the main unit. The display is equipped with a touch screen. The system has a number of outputs, such as for analog signals and digital outputs, which reflect status and error messages. The length of the heated sample gas line was 12 m in the laboratory test and in the field test.

The measuring system tested here consists of:

- DST-X gas measuring unit main unit (MU)
- UV source (deuterium lamp)
- O₂ sensor (paramagnetic)
- Sampling probe with ceramic filter
- Heated sample gas line, max. 190 °C, material PFTE, max. length during performance testing 12 m
- Sample gas cooler DPC-100
- Sample gas pump

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 & Environment 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 certification mark may be applied to the product or used in advertising materials for the certified product.

This document as well as the certification mark remains property of TÜV Rheinland Energy & Environment 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 & Environment 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: qal1.de.

History of documents

Certification of DSM-XG 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. 0000074624_00: 2 June 2021

Expiry date of the certificate: 2 May 2026

Test report: 936/21239652/C dated 28 August 2020

TÜV Rheinland Energy GmbH

Publication: BAnz AT 03.05.2021 B9, chapter I number 3.1

UBA announcement dated 31 March 2021

Certificate based on a notification

Certificate No. 0000074624_01: 5 September 2023

Expiry date of the certificate: 2 May 2026

Statement issued by TÜV Rheinland Energy GmbH dated 20 January 2023

Publication: BAnz AT 02.08.2023 B7, chapter III number 3

UBA announcement dated 5 July 2023

Notification according to EN 15267

Statement issued by TÜV Rheinland Energy & Environment GmbH dated 18 February 2025

Publication: BAnz AT 31.10.2025 B5, chapter IV notification 9

UBA announcement dated 27 August 2025

(Company name change)

Renewal of certificates

Certificate No. 0000074624_02: 3 May 2026

Expiry date of the certificate: 2 May 2031

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

Measuring system

Manufacturer	Dongwoo Optron Co., Ltd.
AMS designation	DST-X
Serial number of units under test	DSM-17-003-NOX-SOX-O2 / DSM-17-004-NOX-SOX-O2
Measuring principle	paramagnetic

Test report

Test laboratory	936/21239652/C TÜV Rheinland
Date of report	2020-08-28

Measured component

Certification range	O ₂ 0 - 25 Vol.-%
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Evaluation of the cross-sensitivity (CS)

(system with largest CS)

Sum of positive CS at zero point	0.00	Vol.-%
Sum of negative CS at zero point	0.00	Vol.-%
Sum of positive CS at span point	0.22	Vol.-%
Sum of negative CS at span point	-0.37	Vol.-%
Maximum sum of cross-sensitivities	-0.37	Vol.-%
Uncertainty of cross-sensitivity	u_i	-0.214 Vol.-%

Calculation of the combined standard uncertainty

Tested parameter

				u^2	
Standard deviation from paired measurements under field conditions *	u_D	0.090	Vol.-%	0.008	(Vol.-%) ²
Lack of fit	u_{inf}	0.006	Vol.-%	0.000	(Vol.-%) ²
Zero drift from field test	$u_{d,z}$	0.046	Vol.-%	0.002	(Vol.-%) ²
Span drift from field test	$u_{d,s}$	-0.087	Vol.-%	0.008	(Vol.-%) ²
Influence of ambient temperature at span	u_t	0.123	Vol.-%	0.015	(Vol.-%) ²
Influence of supply voltage	u_v	0.000	Vol.-%	0.000	(Vol.-%) ²
Cross-sensitivity (interference)	u_i	-0.214	Vol.-%	0.046	(Vol.-%) ²
Influence of sample gas flow	u_n	0.023	Vol.-%	0.001	(Vol.-%) ²
Uncertainty of reference material at 70% of certification range	u_{rm}	0.202	Vol.-%	0.041	(Vol.-%) ²

* The larger value is used :

"Repeatability standard deviation at set point" or

"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u_c)

$$u_c = \sqrt{\sum (u_{max,j})^2} \quad 0.35 \text{ Vol.-%}$$

Total expanded uncertainty

$$U = u_c * k = u_c * 1.96 \quad 0.68 \text{ Vol.-%}$$

Relative total expanded uncertainty

U in % of the range 25 Vol.-% **2.7**

Requirement of 2010/75/EU

U in % of the range 25 Vol.-% **10.0 ****

Requirement of EN 15267-3

U in % of the range 25 Vol.-% 7.5

** The EU-directive 2010/75/EU on industrial emissions provides no requirements for this component.

A value of 10.0 % was used for this.

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

Measuring system

Manufacturer	Dongwoo Optron Co., Ltd.
AMS designation	DST-X
Serial number of units under test	DSM-17-003-NOX-SOX-O2 / DSM-17-004-NOX-SOX-O2
Measuring principle	UV Absorption

Test report

Test laboratory	936/21239652/C TÜV Rheinland
Date of report	2020-08-28

Measured component

Certification range	NO 0 - 100 mg/m ³
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Evaluation of the cross-sensitivity (CS)

(system with largest CS)

Sum of positive CS at zero point	0.00 mg/m ³
Sum of negative CS at zero point	0.00 mg/m ³
Sum of positive CS at span point	1.10 mg/m ³
Sum of negative CS at span point	0.00 mg/m ³
Maximum sum of cross-sensitivities	1.10 mg/m ³
Uncertainty of cross-sensitivity	u_i 0.635 mg/m ³

Calculation of the combined standard uncertainty

Tested parameter

		u^2
Standard deviation from paired measurements under field conditions *	u_D 1.120 mg/m ³	1.254 (mg/m ³) ²
Lack of fit	u_{lof} 0.196 mg/m ³	0.038 (mg/m ³) ²
Zero drift from field test	$u_{d,z}$ 0.520 mg/m ³	0.270 (mg/m ³) ²
Span drift from field test	$u_{d,s}$ 1.443 mg/m ³	2.082 (mg/m ³) ²
Influence of ambient temperature at span	u_t 1.442 mg/m ³	2.079 (mg/m ³) ²
Influence of supply voltage	u_v 0.340 mg/m ³	0.116 (mg/m ³) ²
Cross-sensitivity (interference)	u_i 0.635 mg/m ³	0.403 (mg/m ³) ²
Influence of sample gas flow	u_p -0.289 mg/m ³	0.084 (mg/m ³) ²
Uncertainty of reference material at 70% of certification range	u_{rm} 0.808 mg/m ³	0.653 (mg/m ³) ²

* The larger value is used :

"Repeatability standard deviation at set point" or

"Standard deviation from paired measurements under field conditions"

Combined standard uncertainty (u_c)	$u_c = \sqrt{\sum (u_{max,j})^2}$	2.64 mg/m ³
Total expanded uncertainty	$U = u_c * k = u_c * 1.96$	5.18 mg/m ³

Relative total expanded uncertainty

Requirement of 2010/75/EU	U in % of the ELV 67 mg/m³	7.7
Requirement of EN 15267-3	U in % of the ELV 67 mg/m³	20.0
	U in % of the ELV 67 mg/m³	15.0