

CERTIFICATE

of product conformity (QAL 1)

Certificate number: 1701628.10-ts

AMS	LDS 6 7MB6121 with CD6 7MB6122 sensor monitoring NH ₃ and H ₂ O
Manufacturer	Siemens AG Östliche Rheinbrückenstraße 50 76187 Karlsruhe Germany

Test institute TÜV SÜD Industrie Service GmbH

**This is to certify that the AMS fulfils the requirements of the
DIN EN 15267-1: 2009, DIN EN 15267-2: 2009, DIN EN 15267-3: 2008 and DIN EN 14181: 2004
standards.**



Certificate No.: 1701628.10-ts

Publication in the German Federal Gazette
dated 5th March 2013

Certificate validity
until 4th March 2018

Umweltbundesamt
Dessau, 27th March 2013

TÜV SÜD Industrie Service GmbH
Testing laboratory Emission measurement/ calibration
Munich, 26th March 2013



p.p. Dr. Marcel Langner



Dr. Michael Waeber

Certification applies to the conditions listed in this certificate

Test report	1701628.10 from 9 th October 2012
Initial certification	5 th March 2013
Certificate validity until	4 th March 2018 (5 years)
Publication	BAnz. AT 5 th March 2013 B10, chapter I, No. 5.6

Approved application

The AMS tested is suitable for plants requiring authorisation (plants in compliance with the 13th / 17th BImSchV, TA-Luft) and plants in compliance with the 27th BImSchV. The suitability of the AMS for this application was assessed on the basis of a laboratory test and a field test of the measuring system LDS 6 7MB6121 lasting over three months at a plant in compliance with the 17th BImSchV. The measuring system is authorised with regard to the central unit for the ambient temperature range from +5 °C to +40 °C and with regard to the sensor unit for the ambient temperature range from -20 °C to +50 °C.

The operator should consult the manufacturer to ensure that the AMS is suitable for the plant where it is being installed.

Certification basis

This certificate is based on the TÜV SÜD Industrie Service GmbH test report 1701628.10 from 9th October 2012 and on the suitability publication by the Umweltbundesamt as relevant body as well as on monitoring of the product and the manufacturing process and the publication in the German Federal Gazette (BAnz. AT 5th March 2013 B10, chapter I, No. 5.6, UBA publication from 12th February 2013).

AMS:	Central unit LDS 6 7MB6121 for NH ₃ /H ₂ O, sensor 7MB6122
Manufacturer:	Siemens AG, Karlsruhe
Suitability:	For plants requiring authorization and plants in compliance with the 27 th BImSchV

Measurement ranges in the suitability test:

Component	Certification range	Additional measurement range		Unit
NH ₃	0 - 20	0 - 76	0 - 380	mg/m ³
H ₂ O	0 - 30	0 - 40	-	Vol.-%

These measurement ranges correspond at a path length of 1.25 m and for H₂O to the following products from the concentration of the measurement components and the optical path length:

Component	Certification range	Additional measurement range		Unit
NH ₃	0 - 25	0 - 95	0 - 475	mg/m ³ x m
H ₂ O	0 - 37,5	0 - 50,0	-	Vol.-% x m

Software version: R 25

Restriction:

The protection provided by enclosure class is only IP 20 for the central unit. If the operating conditions require a higher class the central unit shall be incorporated into an analysis cabinet with the relevant protection class.

Notes:

1. Minimum requirements are also fulfilled for the single component versions LDS 6 NH₃ and LDS 6 H₂O. The suitability tested system configuration is available under the following designations:

designation	Measurement ranges
7 MB 6121 – 0DT	0 – 20 mg/m ³ NH ₃ 0 – 76 / 0 – 380 mg/m ³ NH ₃ 0 – 30 / 0 – 40 Vol.-% H ₂ O
7 MB 6121 – 0CT	0 – 20 mg/m ³ NH ₃ 0 – 76 / 0 – 380 mg/m ³ NH ₃
7 MB 6121 – 0MT	0 – 30 / 0 – 40 Vol.-% H ₂ O
Sensor unit 7 MB 6122 – 0W	

2. The compensation parameters should be set on the system to compensate for O₂ and CO₂ cross-sensitivity with the measurement component NH₃.
3. The dynamic moisture correction facility should be deactivated when the calibration kit RC 3009 is used.
4. The analyser should be operated with instrument air purging.
5. The AMS shall be provided with the value of the temperature and pressure of the measured gas. Either as an analogue signal 4-20 mA or set as a fixed value if there are very stable conditions.
6. The maintenance interval is two weeks.
7. Zero and span point drift for NH₃ and H₂O should be checked every 9 months using alignment apparatus.
8. The alarm threshold for relative transmission, when interference is reported due to contamination or re-alignment of the sensor heads, should be set at least at 85% (transmission disturbance can suggest re-adjustment).
9. Supplementary test (system conversion to DIN EN 15267, additional measurement ranges) to the publication by the Umweltbundesamt from 3rd August 2009 (BAnz. page 2929, chapter I number 3.6) and from 6th July 2012 (BAnz AT 20th July 2012 B11, chapter IV statement 29).

Test report:

TÜV SÜD Industrie Service GmbH, Munich
Report-No.: 1701628.10 from 9th October 2012

Certified product

The certificate applies to AMS that comply with the following description:

The entire tested modular AMS consists of the central unit 7MB 6121, the sensor pair CD 6 7MB 6122, the hybrid cable, sensor connecting cable, optical alignment system and reference kit (RC 3009). The AMS operates based on the principle of the high-resolution molecular absorption spectroscopy as in-situ measurement for the measurement of NH₃ and H₂O.

A diode laser produces laser light in the near infrared range, which passes through the measurement gas and is received by the detector. The wavelength of the laser light is aligned to a specific absorption line of the gas to be measured. The laser continually scans this single absorption line with a very high spectral resolution. The result is a completely resolved single molecule line, which is analysed for absorption intensity and line form. The stability of the spectrometer is continuously monitored by an internal reference and zero gas path and an alignment of zero and span point is generally unnecessary.

The sensor unit is fitted with an external air purging system to protect the optical surfaces.

The central unit can process a maximum of up to three measurement gas channels.

The reference Kit (RC 3009) for NH₃ and H₂O can be used for external monitoring of zero and span points.

The entire system is made up of the following components:

Central unit	LDS 6 7 MB6121	
	Software version	R 25
Sensor unit	CD 6 7 MB6122	
Hybrid cable	Length up to 1000 m; length in test: 5 m, 25 m, 100 m (Connection central unit to CD 6 sensor transmitter)	
Sensor connecting cable	Connects CD 6 sensor transmitter to the CD 6 sensor receiver	
Attachments	Optical alignment system Reference kit	

General comments

This certificate is based on the analyser tested. The manufacturer is responsible for the continuous compliance of the production to the DIN EN 15267 requirements. The manufacturer is obliged to maintain a tested quality management system to control the manufacture of the certified product. Regular monitoring must be conducted on both the product and the quality management systems.

Should the product from the current production series no longer comply with the certified product, the Environmental Service Department of TÜV SÜD Industrie Service GmbH should be informed (Address see footnote).

The certification mark, which appears on the certified product or is used in advertising materials, is presented on page 1 of this certificate.

This document and the certification mark shall remain the property of TÜV SÜD Industrie Service GmbH.

Should the publication be revoked, this certificate will become invalid. This document must be returned when the period of validity has elapsed and at the request of TÜV SÜD Industrie Service GmbH and the certification mark may no longer be used.

The current version of the certificate and its validity can also be viewed on the internet page:
qal1.de.

The certification of the measuring system LDS 6 7MB6121 / 7MB6122 for NH₃ and H₂O is based on the following documents and the regular continuous monitoring of the manufacturer's quality management system:

Basic test:

Test report: 751376 from 5th January 2006
TÜV SÜD Industrie Service GmbH

Publication: BAnz. 8th April 2006, No. 70, Page 2653, chapter I, No. 3.1
UBA Publication from 21st February 2006

Supplementary test No. 1:

Test report: 819683 from 29th February 2008
TÜV SÜD Industrie Service GmbH

Publication: BAnz. 3rd September 2008, No. 133, page 3243, chapter I, No. 2.6
UBA Publication from 12th August 2008

Supplementary test Nr. 2:

Test report: 819683-E2 from 31st March 2009
TÜV SÜD Industrie Service GmbH

Publication: BAnz. 25th August 2009, No. 125, page 2929, chapter I, No. 3.6
UBA Publication from 3rd August 2009

Statements:

Publication: BAnz. 25th August 2009, Nr. 125, page 2929, chapter III, statements 25 and 26
UBA Publication from 3rd August 2009

Publication: BAnz. 12th February 2010, Nr. 24, page 552, chapter IV, statement 22
UBA Publication from 25th January 2010

Publication: BAnz. 2nd March 2012, Nr. 36, page 920, chapter IV, statement 20
UBA Publication from 23rd February 2012

Publication: BAnz. AT 20th July 2012 B11, chapter IV, statement 29
UBA Publication from 6th July 2012

Initial certification to DIN EN 15267:

Certificate No. 1701628.10-ts 5th March 2013
Certificate validity until 4th March 2018 (5 years)

Test report: 1701628.10 from 9th October 2012,
TÜV SÜD Industrie Service GmbH
Publication: BAnz. AT 5th March 2013 B10, chapter I, No. 5.6
UBA Publication from 12th February 2013

**Calculation of total uncertainty for QAL1 testing to DIN EN 14181 and
DIN EN 15267-3**

**Total uncertainty for the measurement component NH₃ in the measurement range
0-20 mg/m³**

<i>Performance characteristic</i>	<i>Uncertainty</i>	<i>Value of stan- dard uncertainty in mg/m³</i>	<i>Square sum of standard uncer- tainty in (mg/m³)²</i>
Lack-of-fit	u_{lof}	0,566	0,320
Zero point drift	$u_{d,z}$	-0,289	0,084
Span point drift	$u_{d,s}$	0,254	0,065
Influence of ambient temperature at span point	u_t	0,388	0,151
Influence of sample gas pressure	u_p	0,119	0,014
Influence of sample gas flow	u_f		
Influence of voltage	u_v	0,152	0,023
Cross-sensitivity	u_i	-0,416	0,173
Standard deviation from paired measurements or repeat standard deviation at span point ^{*)}	u_r	0,323	0,104
Uncertainty of the test gas	u_{tg}	0,162	0,026
Uncertainty on excursion of measurement beam	u_{mb}	-0,231	0,053
Sum		-	1,013
Combined standard uncertainty	$u_c = \sqrt{\sum (u_i)^2}$	1,01	mg/m ³
Expanded uncertainty	$U_{0,95} = 1,96 \times u_c$	1,97	mg/m ³
Relative expanded uncertainty	U	19,7	% ELV
Demanded uncertainty to DIN EN 15267 - 3 (ELV 10 mg/ m ³)		30	% ELV
Requirement concerning uncertainty fulfilled		Yes	

^{*)} here: Standard deviation from paired measurements

**Calculation of total uncertainty for QAL1 testing to DIN EN 14181 and
DIN EN 15267-3**

**Total uncertainty for the measurement component H₂O in the measurement range
0-30 Vol.-%**

<i>Performance characteristic</i>	<i>Uncertainty</i>	<i>Value of stan- dard uncertainty in Vol.-%</i>	<i>Square sum of standard uncer- tainty in (Vol.-%)²</i>
Lack-of-fit	u_{lof}	-0,410	0,17
Zero point drift	$u_{d,z}$	0,208	0,04
Span point drift	$u_{d,s}$	0,502	0,25
Influence of ambient temperature at span point	u_t	0,230	0,05
Influence of sample gas pressure	u_p	0,152	0,02
Influence of sample gas flow	u_f		
Influence of voltage	u_v	0,157	0,02
Cross-sensitivity	u_i	0,208	0,04
Standard deviation from paired measurements or repeat standard deviation at span point *)	u_r	0,193	0,04
Uncertainty of the test gas (2% at 70% CR)	u_{ig}	0,242	0,06
Uncertainty on excursion of measurement beam	u_{mb}	-0,294	0,09
Sum		-	0,790
Combined standard uncertainty	$u_c = \sqrt{\sum(u_i)^2}$	0,90	Vol.-%
Expanded uncertainty	$U_{0,95} = 1,96 \times u_c$	1,74	Vol.-%
Relative Expanded uncertainty	U	8,7	% from the limit value
Demanded uncertainty (ELV 20 Vol.-%)		22,5	% from the limit value
Requirement concerning uncertainty fulfilled		Yes	

*) here: Standard deviation from paired measurements