Method Implementation Document (MID)

BS EN 14792:2005

Stationary source emissions
– Determination of mass concentration of nitrogen oxides (NOx)
– Reference method: Chemiluminescence

Environment Agency

Version 1.1

May 2011

THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

Record of amendments

Version number	Date	Amendment
1.1	May 11	Section 8.3 - deleted requirement to have a MCERTS certified range for NO_2 of less than 20% of the certified range for NOx, when measuring NO_2 directly.

Status of this document

This MID may be subject to review and amendment following publication. The most recent version of this MID is available on our website at:

www.mcerts.net

or from the Source Testing Association website at:

www.s-t-a.org

Implementation date

It is expected that organisations, which hold MCERTS accreditation for BS EN 14792, will have met the requirements of this version of the MID by 1 December 2011.

Feedback

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Role of Method Implementation Documents

The Environment Agency recognizes that European and International standards may need supplementing by Method Implementation Documents (MIDs) to ensure they are being implemented consistently.

We have established our Monitoring Certification Scheme: MCERTS to deliver quality environmental measurements. Organizations wishing to include a standard in their schedule of MCERTS accreditation shall follow the requirements of the standard and, where available, the associated MID.

It may not be necessary to produce a MID for every standard but where required they will be used to supplement standards called up by Technical Guidance Note M2. MIDs provide details on how the preferred standards shall be used for regulatory monitoring.

MIDs are produced in collaboration with the Source Testing Association and its members.

Copies of MIDs and further information on MCERTS including copies of performance standards and guidance can be obtained from our web-site at:

www.mcerts.net

Or from the STA web-site at:

www.s-t-a.org

Introduction

This document supplements BS EN 14792:2005[(1)]. However, it does not re-state all the provisions of EN 14792 and organisations are reminded of the need to comply with the requirements detailed in EN 14792. The clause numbers in this document follow those of EN 14792, although the text from the standard is not repeated in this document. EN 14792 remains the authoritative document and in cases of dispute, the accreditation body will adjudicate on unresolved matters.

1 Scope

Note: EN 14792 uses a chemiluminescence monitoring technique. Under MCERTS accreditation alternative techniques may be used, provided they are proven Alternative Methods (AMs), which are listed in Environment Agency Technical Guidance Note M2[(2)]. More information on the use of AMs is available in the MCERTS performance standard for organisations[(3)].

2 Normative references

No additional requirements to EN 14792.

3 Terms and Definitions

No additional requirements to EN 14792.

4 Principle

No additional requirements to EN 14792.

5. Description of measuring equipment – Sampling and sample gas conditioning systems

5.1 General

BS EN 14792 specifies that in order to minimise loses of NO_2, the removal of water vapour by condensation using a cooling system shall be avoided when the measured ratio of NO_2 / NOx is greater than 10%. However, if a sampling system is used that is MCERTS certified at the appropriate range for CEMs certified to measure NO_2, either separately or as total NOx, this clause does not have to be followed.

Note: Improvements in chiller dryer conditioning systems have enabled systems to be developed that have been proven to meet the performance requirements of this reference method.

6. Analyser equipment

BS EN 14792 specifies that the NO_2 / NO converter shall have a conversion efficiency of at least 95% (i.e. at least 95% of the NO_2 present in the stack gas must be converted to NO). This requirement only applies to the stack gas in the converter, it does not apply to the entire analyser or to the associated sampling system.

Note 1: For example, if the analyser has an integrated drying unit, before the converter, this would not be included in the determination of the converter efficiency.

The determination of the NO_2 / NO converter efficiency shall, wherever possible, be carried out by an organisation that has MCERTS accreditation for EN 14792. The determination of the converter efficiency is carried out at a permanent laboratory.

Note 2: An on site determination of the converter efficiency may be difficult to do because the check is of the converter only, not the sampling system.

Note 3: On processes, such as gas turbines, the efficiency of the converter is an important consideration due to the expected NO to NO_2 ratio.

7. Determination of the characteristics of the SRM: analyser, sampling and conditioning line

Note 1: Information on the use of portable instruments is provided in the MCERTS performance standard for organisations. It states that when carrying out monitoring under the requirements of EN14181[(4)] the use of an MCERTS certified system at the appropriate range is mandatory. For routine compliance monitoring it states that it is acceptable to use an instrument that is not MCERTS certified, provided, the system has been proven to meet all the requirements of EN 14792.

Routine compliance monitoring

The most straightforward way to meet the requirements of EN 14792 is to use an MCERTS certified CEM / transportable system at the appropriate range.

If a monitoring organisation does not use an MCERTS certified system, they shall follow the requirement in the standard to use a permeation drier, when the NO_2 / NO ratio is greater than 10%. However, if the sampling system has a NO_2 / NO converter before the drying system, this requirement does not need to be followed.

Use of MCERTS certified analysers (mandatory for EN 14181)

Instruments that have been MCERTS certified at the appropriate range, as a part of a continuous monitoring (or transportable) system, when used within the framework of EN 14792, can be considered to comply with the performance characteristics of EN 14792 .

A different make / model of conditioning system to the one used during the certification of the analyser may be used, provided the conditioning system has been used during the certification of a system that is MCERTS certified for NO and NO_2, at an equivalent certified range and process. However, the type of system is not interchangeable. For example:

- a chiller dryer conditioning system may only be replaced by another chiller system; or
- a system that presents *hot and wet* stack gas to the analyser cannot be replaced with a chiller dryer conditioning system.

Note 2: The term *hot and wet* stack gas refers to gas that has been heated in the sampling system (usually to 180°C) and has not had water vapour removed from it.

Note 3: Under MCERTS, a change in the type of system used to condition the sampled stack gas is considered a design change. This would require either complete retesting, or partial retesting. If the alternative sampling system has been tested within another certified system, it may be possible to forego some of the tests.

8. Field operation

8.1 Sample location

The sampling locations shall meet the requirements of EN 15259[5] and provide representative samples. In addition, the sampling location shall be chosen with regard to safety of the personnel, accessibility and availability of electrical power. Further guidance is provided in TGN M1[6].

8.2 Sampling point(s)

The approach for selecting a sample point(s) described in EN 15259 shall be followed.

8.3 Choice of the measuring system

Note 1: On processes that have significant amounts of NO_2, such as for example in production of dye-stuffs in the chemical industry or the brightening of aluminium components in acid baths, both of which lead directly to NO_2 production, it may be advisable to use a different analytical technique to chemiluminescence due to the greater relative importance of the NO_2 and the potential difficulty in maintaining the 95% NO_2 to NO converter efficiency.

8.4 Setting of the SRM on site

No additional requirements to EN 14792.

9. Ongoing quality control

9.1 General

No additional requirements to EN 14792.

9.2 Frequency of checks

If an analyser is only used for monitoring processes that have less than 10% NO_2 / NOx ratio, the NO_2 / NO converter efficiency shall be demonstrated annually.

If the analyser is used on processes with over 10% NO_2 / NOx ratio, the determination of the NO_2 / NO converter efficiency shall carried out at a frequency established by the monitoring organisation. The frequency shall be based on the:

- length of time the analyser is used on processes with over 10% NO_2 / NOx ratio;
- concentration of NO_2 encountered; and
- expected life span of the converter material.

If the NO_2 converter fails to meet the conversion efficiency, then all the monitoring work carried out on processes with over 10% NO_2, since the last successful determination of the converter efficiency, shall be considered out of compliance with EN 14792 and MCERTS accreditation.

If an analyser is used on processes with over 10% NO_2 / NOx ratio, the NO_2 / NO converter efficiency shall also be determined before the material in the converter is replaced. If it fails to

meet the 95% converter efficiency, then all the monitoring work carried out on processes with over 10% NO_2, since the last successful determination of the NO_2 / NO converter efficiency, shall be considered out of compliance with EN 14792 and MCERTS accreditation.

10. Expression of results

No additional requirements to EN 14792.

11. Evaluation of the method in the field

No additional requirements to EN 14792.

12. Equivalence with an alternative method

TGN M22[7] is an alternative method to EN 14792.

13. Test report

The report shall include the reporting details stated in the MCERTS performance standard for organisations.

When using a NO_2 converter the results and date of the last converter efficiency test shall be included in the report.

Annex A – Four different sampling and conditioning configurations

No additional requirements to EN 14792.

Annex B – Determination of converter efficiency

The Annex describes two approaches for determining converter efficiency – cylinder gases and gas phase titration.

Note 1: Feedback from organisations with experience of carrying out the converter efficiency test indicates that gas phase titration is the preferred approach.

Note 2: 5% traceable NO_2 gas cylinders are difficult and expensive to produce. NO_2 gas cylinders that are not traceable may introduce uncertainties that prevent their use for the determination of converter efficiency.

Note 3: The converter efficiency may be checked using a cylinder of NO_2, as soon as practicable after the converter efficiency has been checked using gas-phase titration. This will give an indication of what value the instrument should read using the cylinder of NO_2, when the converter efficiency has been proven as acceptable. The cylinder may then be used to provide checks of the converter between carrying out gas phase titration checks.

Annex C – Examples of different types of converters

No additional requirements to EN 14792.

Annex D – Example of assessment of compliance of chemiluminescence method for NOx with requirements on emissions measurements

No additional requirements to EN 14792.

Annex E – Procedure of correction of data of drift effect

No additional requirements to EN 14792.

Annex F – Evaluation of the method in the field

No additional requirements to EN 14792.

Bibliography

(1) EN 14792:2005 Stationary source emissions – Determination of mass concentration of nitrogen oxides (NOx) Reference method: Chemiluminescence. Available from BSi, at www.bsi-global.com .

(2) TGN M2, Monitoring of stack emissions to air Environment Agency. Available from www.mcerts.net

(3) MCERTS performance standard for organisations, Environment Agency, www.mcerts.net

(4) EN 14181 - EN 14181: Stationary source emissions: Quality assurance of automated measuring systems. Available from BSi, at www.bsi-global.com .

(5) EN 15259:2007, Air Quality – Measurement of stationary source emissions – Requirements for measurement sections and sites and for the measurement objective, plan and report.

(6) TGN M1, Sampling requirements for stack emissions monitoring, Environment Agency. Available from www.mcerts.net

(7) TGN M22, Measuring stack gas emissions using FTIR instruments, Environment Agency. Available from www.mcerts.net