



Method Implementation Document for EN 15259

BS EN 15259:2007

Stationary source emissions – Requirements for the
measurement sections and sites and for the measurement
objective, plan and report

Environment Agency
Version 1.2
January 2012



Record of amendments

Version number	Date	Amendment
1.1	Feb 10	Changed Note 3, about TOC measurement, from 6 mg/m ³ to 3 mg/m ³ (section 8.3).
		Clarified text on CEMs (section 8.4)
1.2	Jan 12	Added text about flow proportional sampling of gases (section 8.2)
		Replaced word “surrogate” with “alternative”
		Added section (d) specifying default values in lieu of an ELV for O ₂ and H ₂ O (section 8.3)
		Added section (e) about using Sgrid values to prevent “false fails” of the homogeneity survey (section 8.3)

Status of this document

This method implementation document may be subject to review and amendment following publication. The most recent version of this note is available on the Source Testing Association web site at:

www.S_T_A.org

Implementation date

It is expected that organisations, which hold MCERTS accreditation for BS EN 15259, will have met the requirements of this MID by 30 April 2012.

Feedback

Any comments or suggested improvements to this MID should be e-mailed to Rupert Standing at rupert.standing@enviroment-agency.gov.uk.

Role of Method Implementation Documents

The Environment Agency recognises 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. Organisations 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 stack emissions monitoring organisations.

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

Contents

Introduction	1
1 Scope	1
2 Normative references	1
3 Definitions symbols and abbreviations	1
4 Symbols and abbreviations.....	2
5 Principles	2
6 Measurement section and measurement site.....	2
7 Measurement objective and measurement plan	2
8 Sampling strategy	2
9 Measurement report	6

Introduction

Comité Européen de Normalisation (CEN) standard BS EN 15259 is a European standard that is important to plant designers, plant operators and organisations that measure stack emissions.

In summary BS EN 15259:

- specifies requirements for locations for measuring stack emissions;
- specifies requirements for sampling facilities;
- applies to both periodic measurements and to continuous emission measurement systems (CEMs);
- outlines how to plan a monitoring campaign;
- outlines the sampling strategy required to obtain a representative sample; and
- provides information on reporting results

By meeting the MCERTS performance standard for organisations a stack emission monitoring organisation will meet the sample planning and reporting requirements of EN 15259.

In order to meet the sample strategy requirements it may be necessary to carry out a test for stack gas homogeneity. Section 8.3 of EN 15259 and this MID provide information on meeting the requirements of the homogeneity test.

This MID does not repeat text, tables or diagrams from BS EN 15259, instead it refers to the relevant sections of this standard. It is therefore essential that the reader has a copy of BS EN 15259.

1 Scope

No additional requirements

2 Normative references

MCERTS Performance standard for organisations. Environment Agency. Available from www.mcerts.net

Environment Agency Technical Guidance Note M1, Sampling requirement for stack emissions monitoring. Available from www.mcerts.net

Environment Agency Method Implementation Document for BS EN 13284-1. Available from www.S.T.A.org

Environment Agency Technical Guidance Note M21, A procedure to use an alternative method to measure emissions of sulphur dioxide, using an instrumentals method. Available from www.mcerts.net

Environment Agency Technical Guidance Note M22, Measuring stack gas emissions using FTIR instruments. Available from www.mcerts.net

3 Definitions symbols and abbreviations

No additional requirements

4 Symbols and abbreviations

No additional requirements

5 Principles

No additional requirements

6 Measurement section and measurement site

Information on measurement sections and measurement sites are provided in Environment Agency Technical Guidance note M1.

7 Measurement objective and measurement plan

The Environment Agency's minimum requirements for meeting this section of the standard is provided in the MCERTS performance standard for organisations.

Note: the measurement plan is a Site Specific Protocol (SSP).

8 Sampling strategy

8.1 General

Monitoring organisations may use the results from a homogeneity test carried out by another monitoring organisation, provided the organisation that carried out the test has MCERTS accreditation for it.

Note: information on when a homogeneity test is repeated is given in section 8.3a.

8.2 Measurements of particulates and other components by grid measurement

Information on carrying out grid measurements is provided in Environment Agency Method Implementation Document for BS EN 13284-1.

Flow proportional sampling is not required when carrying out a grid measurement for gases.

8.3 Determination of homogeneity

a) Recommended scope of homogeneity test

The homogeneity test is applicable to combustion processes. This includes but is not restricted to, those regulated under the Waste Incineration Directive (2000/76/EC) and the Large Combustion Plant Directive (2001/80/EC).

Note 1: under some circumstances the Environment Agency may require a homogeneity test to be carried out on non-combustion processes.

The test is not usually required for stacks with sampling plane areas of $<1 \text{ m}^2$ (i.e. below 1.13 m in diameter for circular ducts).

If the following determinands have Emission Limit Values (ELVs) in an operator's Permit, then a homogeneity test is applicable for each of them:

- NO_x
- CO
- TOC

If the NO₂ concentration is insignificant (less than 10% of the total NO_x), a homogeneity test for NO_x may be carried out by measuring NO only. If significant amounts of NO₂ are present (greater than 10% of the total NO_x), it is necessary to perform a total NO_x measurement.

Note 2: a converter may be used to convert NO₂ to NO. Total NO_x can then be measured directly.

It may not be necessary to carry out a homogeneity survey for TOC, if it is established that CO is a suitable proxy for TOC.

Note 3: if TOC is at low concentrations (i.e. less than 3 mg/m³) the variability in the readings may make it difficult to apply the homogeneity test.

The homogeneity test applies to O₂ because it is used to correct the final measurement result. However, the homogeneity tests are not corrected for oxygen.

Due to practical reasons the homogeneity test is carried out using instrumental measurement techniques. For determinands, where the CEN / ISO standard reference method is a manual (non-instrumental) method, an alternative instrument based method may be used (see Table 1).

However, for SO₂ stack gas monitoring, on coal fired power stations with flue gas desulphurisation abatement, the homogeneity test needs to be carried out using an analyser that measures SO₂. Environment Agency Technical Guidance Note M21 or M22 provides an instrumental method for measuring SO₂.

Note 4: TGN M21 is a generic performance based instrumental standard for measuring SO₂.

Note 5: TGN M22 is a standard for the use of Fourier transform infra-red instruments. These can be used to measure SO₂.

It is also strongly recommended that TGN M21 or M22 is used to carry out a homogeneity test for SO₂ on other processes.

Note 6: SO₂ is a relatively large gaseous molecule that has greater potential than other combustion gases to be heterogeneously distributed in stacks.

Table 1: Alternatives for manual (non- instrumental) methods

Manual (non-instrumental) method	Determinand	Alternative ¹	Alternative method
EN 14791	SO ₂	O ₂	TGN M21 or M22 ²
EN 1911	HCl	O ₂	TGN M22
ISO 15713	HF	O ₂	TGN M22
EN 14791	NH ₃	O ₂	TGN M22
EN 13649	Speciated VOCs	Total VOCs	-

¹Oxygen is not a suitable alternative for non-combustion processes, as they have fixed ambient air oxygen concentrations.

²It is strongly recommended that TGN M21 or M22 is used to carry out a homogeneity test for SO₂.

The homogeneity test is not usually required if the emissions of a pollutant are less than 30% of the ELV.

For operators that do not have an ELV, a virtual ELV shall be agreed with the competent authority.

The homogeneity test is usually carried out at a measurement location once only. This must be done at conditions that are representative of the normal operation of the process. However, it may have to be repeated if there is a significant operational change in the process, such as a long term change in load, fuel, abatement technology or ductwork.

An operational change is considered significant if:

- it requires a permit variation and is likely to affect the stack gas emissions
- if there is a change in fuel type and the new fuel type is used for more than 10% of the time during a year.

Note 7: an example of changes in fuel is between gaseous, liquid or solid fuel, or a change from a single type of fuel to a mixture of more than one type of fuel.

b) Responsibility on MCERTS accredited monitoring organisations

MCERTS accredited monitoring organisations (i.e. testing laboratories) shall have documented procedures to meet the requirements for the determination of homogeneity. This shall include having the required equipment and a method for calculation.

If the homogeneity test has not been carried out at a location, where it is applicable, the MCERTS accredited monitoring organisation (i.e. contractor) shall inform the operator that the homogeneity test can be carried out to confirm that the sample location is suitable for measuring gases from a single point. The SSP and monitoring report shall record if the homogeneity test has not been carried out.

Note 8: if the sampling facilities and access to the sample ports do not comply with TGN M1, it may not be possible to carry out the test fully due to practical and safety considerations.

c) Carrying out the test

The test is carried out using instrumental analysers. The analysers shall be verified for performance, such as by the annual systems check specified in reference methods (i.e. zero, span, linearity, response time compared to moving system etc).

When measuring water soluble gases the full length of the probe shall be maintained at a temperature of 20K above the stack gas dew point. This is an important consideration as it is important to ensure that condensation of stack gas in the probe does not occur. Alternatively, a probe which has multiple extraction tubes at each sample point may be used, as this does not require heating.

When measuring insoluble gases, such as NO, CO or O₂, an unheated probe may be used.

The standard defines the procedure for carrying out the homogeneity test using two instruments simultaneously. One instrument is at a fixed reference location to measure time dependent variations, the other instrument is used for the grid measurement.

It is acceptable to use a CEM system as the fixed instrument. The standard states that a permanently installed CEM may be used provided it is working in accordance with BS EN 14181. It is therefore necessary to confirm that the CEM has a valid up to date Quality Assurance Level 2 / Annual Surveillance Test assessment and report, as prescribed by EN 14181.

Note 9: It is generally better to use the same type of reference method for both the grid and time dependant reference measurements, since the statistical tests defined in EN 15259 require a comparison of the standard deviations of the two sets of data.

Alternatively, a single instrument may be used to carry out the grid measurement and time dependent reference measurements. The time dependant reference measurements are taken for the same length of time as the grid measurements. It is important that the process is stable for both sets of measurements. This approach is acceptable if the combined uncertainty of the grid and time dependant reference measurements is less than the value specified in the standard. If this is not the case, then the measurements must be repeated with two instruments.

d) Default values in lieu of an ELV for O₂ and H₂O

For O₂, a default value of 21% shall be used in lieu of an ELV. For H₂O a default value of 30% shall be used in lieu of an ELV (see Section 8.3, Note 10 of EN 15259). These default values are used in the absence of an ELV to calculate the *U_{perm}* value.

Note: these values are aligned with those specified in the MID for EN 14181.

e) Using S_{grid} values to prevent “false fails”

Note 1: if the variation in the fixed point is small (i.e. low S_{ref}), it is possible that the duct will appear to be heterogeneous even if the grid only shows a small variation (i.e. low S_{grid}). This could result in a “false fail” of the homogeneity test.

If S_{grid} = <5% of the ELV for all gases except O₂ and H₂O, any sample point in the duct may be used because the duct is considered to be homogeneous (i.e. the standard deviation of the gas concentrations at the sample points across the duct is insignificant when compared to the ELV).

In the absence of an ELV for H₂O, a default value of 30% shall be used to determine if S_{grid} = <5% of the ELV.

If S_{grid} is <0.3 for O₂, any sample point in the duct may be used because the duct is considered to be homogeneous.

Note 2: for O₂ a fixed S_{grid} value of <0.3 is used.

8.4 Permanently installed AMS

Note: EN 15259 refers to CEMs as AMS.

If the procedure in Section 8.3 of EN 15259 demonstrates that the gas concentration(s) are homogeneously distributed across the sample plane, it means the CEM probe or measurement path may be located at any point(s) in the sample plane. If they are not homogeneously distributed a representative point(s) or line must be found using the procedure given in Section 8.4.

Section 8.4 of EN 15259 refers to Annex E: Examples for determining homogeneity of waste gas profiles. Annex E gives example data from a homogeneity test. Example E.1 of the Annex is applicable to both periodic monitoring and CEMs. Example E.2 is for finding a single representative point for locating an extractive CEM.

It is recommended that example E.1 is followed because it allows the CEM probe or measurement path to be located anywhere in the sample plane, provided the gases are homogeneously distributed. If they are not homogeneously distributed example E.2 is applicable.

A homogeneity test is required when installing CEMs at a location that has not had a previous homogeneity test. If the CEMs are replaced, and the same location is used by the new CEMs, the test does not need repeating.

9 Measurement report

If carrying out MCERTS accredited work, the monitoring report shall be submitted in the report format specified in the Manual stack emission monitoring performance standard for organisations.