

Characterization of air quality —

Part 4: Stationary source emissions —

Section 4.4 Determination of the mass concentration of sulfur dioxide — Performance characteristics of automated measuring methods

UDC 614.72:543.272.51

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Environment and Pollution Standards Policy Committee (EPC/-) to Technical Committee EPC/35, upon which the following bodies were represented:

- Association of Consulting Engineers
- British Coal Corporation
- British Gas plc
- British Steel plc
- Department of Health
- Department of the Environment (Her Majesty's Inspectorate of Pollution)
- Department of Trade and Industry (Laboratory of the Government Chemist)
- Department of Trade and Industry (Warren Spring Laboratory)
- Electricity Supply Industry in England and Wales
- GAMBICA (BEAMA Ltd.)
- Health and Safety Executive
- Institute of Occupational Hygiene
- Institute of Petroleum
- Institution of Environmental Health Officers
- Institution of Gas Engineers
- Lead Development Association
- National Society for Clean Air
- Society of Chemical Industry

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

- Asbestos Information Centre Ltd.
- Asbestosis Research Council
- Chemical Industries Association
- Council for Environmental Conservation
- Engineering Equipment and Materials Users' Association
- Fibre Cement Manufacturers' Association Ltd.
- Institute of Occupational Medicine
- London Regional Transport
- Royal Society of Chemistry

This British Standard, having been prepared under the direction of the Environment and Pollution Standards Policy Committee, was published under the authority of the Standards Board and comes into effect on 15 May 1993

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The following BSI references relate to the work on this standard:
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Amendments issued since publication

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National foreword

This Section of BS 6069 has been prepared under the direction of the Environment and Pollution Standards Policy Committee and is identical with ISO 7935:1992 *Stationary source emissions — Determination of the mass concentration of sulfur dioxide — Performance characteristics of automated measuring methods*. The international standard was prepared by Technical Committee 146, Air quality, of the International Organization for Standardization (ISO) with the active participation and approval of the UK.

BS 6069 is being published in a series of Parts and Sections that will generally correspond to particular International Standards arising from the UK participation in the work of ISO/TC 146. This Section of BS 6069 is one of several relating to stationary source emissions that are being published as Sections of Part 4: Methods concerning workplace atmospheres are being published as Sections of Part 3 of BS 6069. Topics relating to other aspects of air quality characterization will be published as further Parts or Sections of BS 6069.

The following Parts of BS 6069 have already been published:

- Part 1: *Units of measurement*;
- Part 2: *Glossary*.

Methods for the determination of particular constituents of ambient air are being published as Parts of BS 1747 *Methods for the measurement of air pollution*.

Cross-reference

International Standard	Corresponding British Standard
	BS 6069 <i>Characterization of air quality</i>
ISO 7934:1989	Section 4.1:1990 <i>Method for the determination of sulphur dioxide: Hydrogen peroxide/barium perchlorate/Thorin method</i> (Identical)

The Technical Committee has reviewed the provisions of ISO 6879, to which normative reference is made in the text, and has decided that they are acceptable for use in conjunction with this standard.

Textual error. When adopting the text of the International Standard, the following textual error was discovered. It has been marked in the text and has been reported to ISO in a proposal to amend the text of the International Standard.

In Table 1, note 2, line 5, “HN” should read “HF”.

Additional information. Further information on the sampling of flue gases (stationary source emissions) may be found in BS 1756-1:1971. A British Standard based on an ISO Standard is under development on this subject.

Under UK conditions, a typical measuring range for sulfur dioxide in furnaces for hard coal fitted with stack gas desulfuration plant would be 0 g/m² to 0.5 g/m² (Table 2).

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 8, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This International Standard specifies a complete set of values of performance characteristics for automated measuring systems for the continuous measurement of the mass concentrations of sulfur dioxide in stationary source emissions.

NOTE 1 If the performance characteristics of an automated measuring system are listed according to Table 1, this ensures that the automated measuring system is reliable and gives satisfactory continuous results.

The set of data listed in Table 1 refers to the performance characteristics of measurement methods, including all steps from sampling to recording and, if necessary, storage of data.

This International Standard is applicable to extractive and non-extractive automated sulfur dioxide measuring methods. For both methods it implies the applicability of zero and calibration gas and the availability of comparable samples. The automated measuring system can be calibrated with calibration gases, by applying the manual method described in ISO 7934, or by applying an automated measuring system previously verified according to this International Standard using a different principle of detection. The value of the integral performance (3.7) is determined by using ISO 7934 or an automated measuring system verified according to this International Standard with a different principle of detection. At present, the range over which this specification applies is between 0 g/m³ to 0,1 g/m³ and 0 g/m³ to 8 g/m³ (see Table 2 for details).

NOTE 2 Although it is impossible to give precise testing details, the requirements and testing principles are also applicable to non-extractive systems.

Table 1 — Main performance characteristics

Performance characteristics	Numerical value	Test methods (see Annex A)
Detection limit	2 %	A.4.2.1.1
Effect of interfering substances	± 2 % ^a	A.4.2.1.2
Response time	≤ 200 s ^c	A.4.2.1.3
Integral performance (s _A)	± 2,5 % ^{ad}	A.4.2.2
^a Related to the upper limit of measurement. ^b The main interfering substances in the flue gas from combustion plants are CO ₂ , CO, NO, H ₂ O and, in smaller concentrations, NO ₂ and NH ₃ . If the water vapour is not removed from the flue gas of coal and waste fired incinerators, HCl and HN* may also interfere. In special cases there may be other interfering substances (e.g. cyanide). ^c Assuming an integration time of 30 min. ^d See 3.7. * See national foreword for details of textual error.		

The facilities at which the values of the performance characteristics given in Table 1 have been verified according to this International Standard in the appropriate ranges are listed in Table 2.

Table 2 — Facilities and measuring ranges^b

Facility	Measuring range g/m ³ of SO ₂ ^a
Furnaces for hard coal	0 – 1 to 0 – 8
Furnaces for hard coal with stack gas desulfuration plant	0 to 0,1 ^b
Furnaces for brown coal	0 – 0,1 to 0 – 3,0
Furnaces for heavy fuel oil	0 – 0,1 to 0 – 5,0
Refuse incinerator	0 – 0,4 to 0 – 1,0
Coke oven	0 to 1
Calcar with heavy fuel oil	0 to 5
Sulfuric acid recovery plant	0 to 1
^a Related to 101,3 kPa, 273 K and dry gas. ^b See national foreword for additional information.	

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 6879:1983, *Air quality — Performance characteristics and related concepts for air quality measuring methods*.

ISO 7934:1989, *Stationary source emissions — Determination of the mass concentration of sulfur dioxide — Hydrogen peroxide/barium perchlorate/Thorin method*.

3 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1 automated measuring system (AMS)

a complete system that may be attached to a chimney to continuously measure and record the mass concentration of sulfur dioxide passing through the chimney

3.2 analyser

analytical part in an extractive AMS