

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Expression of performance of gas analyzers –
Part 6: Photometric analyzers**

**Expression des performances des analyseurs de gaz –
Partie 6: Analyseurs photométriques**



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IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
www.iec.ch

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

EXPRESSION OF PERFORMANCE OF GAS ANALYZERS –**Part 6: Photometric analyzers**

FOREWORD

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International Standard IEC 61207-6 has been prepared by sub-committee 65B: Measurement and control devices, of IEC technical committee 65: Industrial-process measurement, control and automation.

This second edition cancels and replaces the first edition published in 1994. This edition constitutes a technical revision.

The major changes with respect to the previous edition are as follows.

- All references (normative and informative) have been updated, deleted or added to as appropriate.
- All the terms and definitions relating to the document have been updated where appropriate.
- New definitions have been added for generic photometric equipment and measurements.

- All references to “errors” have been replaced by “uncertainties” and appropriate updated definitions applied.
- Figures A.1, A.2 and A.4 have been updated.

The text of this standard is based on the following documents:

FDIS	Report on voting
65B/947/FDIS	65B/956/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 61207 series, published under the general title *Expression of performance of gas analyzers*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

INTRODUCTION

Photometric analyzers utilize detectors which respond to wavelengths in the ultraviolet, visible and infrared part of the electromagnetic spectrum within the wavelength range 0,1 μm to 50 μm (see Figure A.1). Within this range of wavelengths, many gases have absorption and/or emission bands. Analyzers designed to utilize these bands employ several techniques, including sensing of specific absorbed radiation by the sample gas or emitted radiation from the gas sample after artificial excitation. The volume of gas measured may be contained within a sample cell and this sample may or may not be conditioned, or (for in-situ analyzers) the concentration may be directly measured within the sample gas itself (see Figure A.2).

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EXPRESSION OF PERFORMANCE OF GAS ANALYZERS –

Part 6: Photometric analyzers

1 Scope and object

This part of IEC 61207 applies to all aspects of analyzers using photometric techniques for the measurement of concentration of one or more components in a mixture of gases or vapors. It should be used in conjunction with IEC 61207-1.

For photometric analyzers utilizing tuneable semiconductor laser absorption spectroscopy (TSLAS) for gas measurements, IEC 61207-7 should also be referred to.

This part of IEC 61207 applies to analyzers using non-dispersive and dispersive wavelength selection and using absorption, emission, wavelength derivative or scattering techniques.

It applies to analyzers which receive either a conditioned or unconditioned sample of gas either under vacuum, at ambient pressure or pressurized.

It applies to analyzers which measure gas concentrations directly within the sample gas.

The object of this part is:

- to specify the terminology and definitions related to the functional performance of gas analyzers, utilizing a photometric analyzer, for the continuous measurement of gas or vapor concentration in a source gas;
- to unify methods used in making and verifying statements on the functional performance of such analyzers;
- to specify what tests should be performed to determine the functional performance and how such tests should be carried out;
- to provide basic documents to support the application of standards of quality assurance ISO 9001.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60079-29-1, *Explosive atmospheres – Part 29-1: Gas detectors – Performance requirements of detectors for flammable gases*

IEC 60079-29-4, *Explosive atmospheres – Part 29-4: Gas detectors – Performance requirements of open path detectors for flammable gases*

IEC 60654 (all parts), *Operating conditions for industrial-process measurement and control equipment*

IEC 61207-1, *Expression of performance of gas analyzers – Part 1: General*

IEC 61207-7, *Expression of performance of gas analyzers – Part 7: Tuneable semiconductor laser gas analyzers*

ISO 9001, *Quality management systems – Requirements*

3 Terms and definitions

For the purposes of the present document, the following terms and definitions apply.

NOTE The following definitions and examples of equipment and measuring techniques are for illustration and do not constitute a complete list of all possible measurement types. See Figure A.1 for the relationship between the different optical wavelength ranges.

3.1

light source

device that emits light within the wavelength range 0,1 μm to 50 μm

Note 1 to entry: A source may be, but is not limited to: a gas or solid state laser, semiconductor laser diode, light emitting diode, electric discharge source or incandescent filament.

3.2

light detector

device that is sensitive to light and that may be used to detect light within the wavelength range 0,1 μm to 50 μm

Note 1 to entry: A light detector may be, but is not limited to: a photomultiplier tube, semiconductor device (photovoltaic or photoconductive) such as a photodiode, avalanche photodiode or charge coupled device (CCD) and, additionally, in the infrared region: pyroelectric detector, bolometer or thermopile.

3.3

wavelength selection

wavelength or range of wavelengths selected for use in particular measurement

Note 1 to entry: A suitable wavelength transmission range may be selected by using an appropriate means including a band-pass optical filter or dispersive element such as a diffraction grating.

Note 2 to entry: The wavelength from the light source may be tuned or modulated such as by using the current or temperature for a semiconductor laser diode, varying the temperature of an incandescent source or varying the input angle to a band-pass filter.

3.4

optical sample cell

enclosed volume where the optical measurement of the sample gas takes place

Note 1 to entry: The optical measurement may take place by measuring the absorption or emission of the analyte after light of a suitable wavelength has been passed through an optical sample cell.

Note 2 to entry: The sample cell shall have some means of gas inlet and outlet, which may be via piping for flow or pressure driven systems or via diffusion through a mechanical filter.

Note 3 to entry: The cell may require a high integrity seal from the outside environment for extractive systems other than the gas inlet and outlet means.

Note 4 to entry: Cell windows of the appropriate optical transmission band are required for the light ingress and egress.

Note 5 to entry: Internal mechanical or optical features of the sample cell may be used to decrease stray light interference or to direct or concentrate the light where appropriate.

Note 6 to entry: The cell is designed to give an optical path length which is appropriate to the analyte and range required.