

INTERNATIONAL STANDARD



**Safety requirements for electrical equipment for measurement, control, and laboratory use –
Part 2-061: Particular requirements for laboratory atomic spectrometers with thermal atomization and ionization**

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INTERNATIONAL STANDARD



**Safety requirements for electrical equipment for measurement, control, and laboratory use –
Part 2-061: Particular requirements for laboratory atomic spectrometers with thermal atomization and ionization**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

SAFETY REQUIREMENTS FOR ELECTRICAL EQUIPMENT FOR MEASUREMENT, CONTROL, AND LABORATORY USE –

Part 2-061: Particular requirements for laboratory atomic spectrometers with thermal atomization and ionization

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International Standard IEC 61010-2-061 has been prepared by IEC technical committee 66: Safety of measuring, control and laboratory equipment.

It has the status of a group safety publication in accordance with IEC Guide 104.

This fourth edition cancels and replaces the third edition published in 2015. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) adaptation of changes introduced by Amendment 1 of IEC 61010-1;
- b) added tolerance for stability of AC voltage test equipment to Clause 6;
- c) added requirement for interlock systems containing electric/electronic or programmable components to Clause 15.

The text of this International Standard is based on the following documents:

CDV	Report on voting
66/643/CDV	66/668/RVC

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

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

A list of all parts of the IEC 61010 series, under the general title, *Safety requirements for electrical equipment for measurement, control, and laboratory use*, may be found on the IEC website.

This Part 2-061 is intended to be used in conjunction with IEC 61010-1. It was established on the basis of the third edition (2010) and its Amendment 1 (2016).

This Part 2-061 supplements or modifies the corresponding clauses in IEC 61010-1 so as to convert that publication into the IEC standard: *Particular requirements for laboratory atomic spectrometers with thermal atomization and ionization*.

Where a particular subclause of Part 1 is not mentioned in this Part 2, that subclause applies as far as is reasonable. Where this part states “addition”, “modification” or “replacement”, or “deletion”, the relevant requirement, test specification or note in Part 1 should be adapted accordingly.

In this standard:

- 1) the following print types are used:
 - requirements: in roman type;
 - NOTES: in small roman type;
 - *conformity and test: in italic type;*
 - terms used throughout this standard which have been defined in Clause 3: SMALL ROMAN CAPITALS;
- 2) subclauses, figures, tables and notes which are additional to those in Part 1 are numbered starting from 101. The additional annexes are lettered starting from AA and additional list items are lettered from aa).

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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
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SAFETY REQUIREMENTS FOR ELECTRICAL EQUIPMENT FOR MEASUREMENT, CONTROL, AND LABORATORY USE –

Part 2-061: Particular requirements for laboratory atomic spectrometers with thermal atomization and ionization

1 Scope and object

This clause of Part 1 is applicable except as follows:

1.1 Scope

1.1.1 Equipment included in scope

Replacement:

Replace the text ~~by~~, except the first paragraph, with the following new text:

This part of IEC 61010 applies to electrically powered laboratory atomic spectrometers with thermal atomization.

NOTE 1 Examples include atomic absorption spectrometers, emission flame photometers, atomic fluorescence spectrophotometers, inductively coupled plasma spectrometers, microwave coupled plasma spectrometers and mass spectrometers, all with thermal atomization and ionization (including tubing and connectors which are provided by the manufacturer for connection to external supplies).

NOTE 2 If all or part of the equipment falls within the scope of one or more other Part 2 documents of IEC 61010 as well as within the scope of this document, consideration is ~~to be~~ given to those other Part 2 documents.

1.1.2 Equipment excluded from scope

Addition:

Add ~~as~~, before the first paragraph, the following new text:

This document does not apply to thermal atomization detectors (flame ionization detectors) used in gas chromatography.

2 Normative references

This clause of Part 1 is applicable.

3 Terms and definitions

This clause of Part 1 is applicable except as follows:

Additions:

Add the following ~~definitions~~ new terms:

3.2.101

SPRAY CHAMBER

chamber in which droplets of sample in aerosol are allowed to separate so that the droplets of necessary size can be passed onward to the burner, with the remainder draining to waste

3.2.102

GAS LOCK

device to allow drainage of waste sample liquid, and to prevent unintentional escape of gas from the SPRAY CHAMBER through its drain outlet

Note 1 to entry: See for example Figure 101.

3.5.101

FLASH-BACK

event during which the flame travels back through the burner with the result that the gas in the mixing chamber is caused to ignite

4 Tests

This clause of Part 1 is applicable except as follows:

Addition:

Add the following new subclauses:

4.4.2.101 Sampling probe tip

Any system designed to withdraw a sampling probe tip after sampling has been completed shall be overridden, so as to leave the tip in its most exposed position when a sample vessel is removed.

Exceptions:

The withdrawal system need not be overridden if the sampling probe:

- a) cannot cause a HAZARD to the OPERATOR when it is exposed;
- b) is designed in such a manner that no SINGLE FAULT CONDITION can cause the tip to remain exposed after sampling has been completed.

4.4.2.102 Failure, or partial failure, of the MAINS supply

The voltage of the power supply to the equipment from the MAINS supply shall first be reduced to just less than 90 % of the RATED voltage, and shall then be switched off.

5 Marking and documentation

This clause of Part 1 is applicable except as follows:

Addition:

Add the following new subclause:

5.1.5.101 Gas and liquid connections

The following shall be unambiguously marked adjacent to the connector on the equipment (see 5.2):

- a) the identity of the gas or liquid;
- b) the maximum permitted pressure;
- c) flow direction of the gas and liquid, if applicable.

NOTE Such markings ~~may~~ can be specific (for example acetylene, propane, water) or generic (for example fuel gas, oxidant gas, coolant, waste liquid).

Where no internationally recognized symbol (such as a chemical formula) exists, the equipment shall be marked with symbol 14 of Table 1 together with an unambiguous text in English. The documentation accompanying the equipment shall provide an adequate translation of this text (where it is required) in the language of the country in which it is to be installed, to assure that the installer or OPERATOR is able to connect the equipment correctly.

Conformity is checked by inspection.

5.2 Warning markings

Addition:

Add the following new paragraph before the conformity statement:

Where hot gases or plasma emerge from equipment, the protective structure provided (for example a chimney, see 10.1), shall be clearly marked by symbol 13 of Table 1, to indicate where excessively hot temperatures ~~may~~ can exist.

5.4.3 Equipment installation

Addition:

Add, before the first paragraph, the following new paragraph:

The documentation shall state that the RESPONSIBLE BODY shall ensure that the type of connector used at the outlet side of the gas-pressure regulator conforms to applicable national requirements.

Deletion:

Delete item f).

Addition:

Add, after item g) and before the note, the following new items:

- aa) requirements for liquid connection;
- bb) requirements for a fume extraction system to remove exhaust gases which may be hazardous. In the case of equipment using only a propane flame in a ventilated room, and when it is known that samples will not leave any hazardous residues, it is not necessary to provide an extraction system, since the exhaust gases from a propane flame will themselves not present any HAZARD;
- cc) requirements for appropriate filtering or other systems which may be necessary to trap hazardous sample residues present in the exhaust gas stream;
- dd) documentation ~~shall state~~ stating that the RESPONSIBLE BODY shall carry out appropriate leakage tests necessary for safety on those gas and liquid connections which the OPERATOR is directed to assemble during installation, NORMAL USE, or maintenance;
- ee) instructions for examining, during installation and maintenance, parts of the external gas supply system including tubing connected to the equipment, in order to confirm that their condition is satisfactory, for example to detect stress cracks. In addition any special national regulations for the safe use of gases and gas cylinders shall be observed;

- ff) instructions for necessary provisions for collection of waste from the SPRAY CHAMBER, including the requirements for any waste container which may be specified by the manufacturer;
- gg) requirements for connection of the equipment to supplies of air, fuel gas (for example hydrogen, acetylene, or propane) and oxidant (for example oxygen or nitrous oxide). See also 11.103.

Add, after the existing note, the following new notes:

NOTE 101 Connections on the outlet side of gas regulators (from which tubing connects to the equipment) vary from country to country and are often covered by national regulations. Variations can include thread type, whether left-hand or right-hand, types of tubing and means of attachment.

NOTE 102 Warning markings are specified in 5.1.5.101, 5.1.5.2 c), 6.1.2 b), 7.3.2 b) 3), 7.4, 10.1, and 13.2.2.

5.4.4 Equipment operation

Additions:

Add, after item j), the following new items:

- aa) a reminder to the RESPONSIBLE BODY of the responsibility for the correct collection and disposal of waste materials, including the necessity for:
 - 1) a suitably sized waste container of appropriately resistant material for the collection of organic solvent waste;

NOTE The proper disposal of waste materials is well documented by national authorities and it is these procedures that supersede the requirements of this document in regard of waste disposal. This Part 2 ~~should~~ only brings to the attention of the OPERATOR that potentially hazardous waste materials are present and national (local) regulations for the proper disposal can apply.

- 2) provision for the removal into an appropriate exhaust system of any gases or vapours which may be produced in hazardous concentrations;
- bb) a list of fluids known by the manufacturer to be potentially unsafe if used with the equipment.

Add, after the list of items, the following new paragraph:

Documentation shall also indicate that this list cannot be taken to be exhaustive and that, in case of uncertainty about a specific fluid, that fluid shall not be used until confirmation by the manufacturer that it will not present a HAZARD.

Add the following new subclause:

5.4.4.101 Cleaning and decontamination

Documentation shall indicate:

- a) that the RESPONSIBLE BODY has the responsibility for carrying out appropriate decontamination if hazardous material is spilt on or inside the equipment;
- b) the manufacturer's recommendations for cleaning and, where necessary, decontamination, together with the recognized generic names of recommended materials for cleaning and decontamination.

The following wording shall appear in the documentation:

"Before using any cleaning or decontamination methods except those specified by the manufacturer, the RESPONSIBLE BODY should check with the manufacturer that the proposed method will not damage the equipment."

If a manufacturer claims that an item can be decontaminated by steam sterilization, it shall be capable of withstanding steam sterilization under at least one of the time-temperature conditions given in Table 101. Cleaning and decontamination shall be necessary as a safeguard when spectrometers and their accessories are maintained, repaired, or transferred. Manufacturers shall provide a format for the RESPONSIBLE BODY to certify that such a treatment has been carried out.

NOTE Information on decontaminants, their use, dilution and potential application is contained in the *Laboratory Biosafety Manual*, published by the World Health Organization and the *Biosafety in Microbiological and Biomedical Laboratories*, published by Centers for Disease Control and Prevention and National Institutes of Health, Washington. There are also national guidelines that cover these areas.

Table 101 – Time-temperature conditions

Absolute pressure kPa	Corresponding steam temperature		Minimum hold time min
	Nominal °C	Range °C	
325	136,0	134 to 138	3
250	127,5	126 to 129	10
215	122,5	121 to 124	15
175	116,5	115 to 118	30

NOTE "Minimum hold time" means the time the contaminant is at the steam temperature.

5.4.5 Equipment maintenance and service

Addition:

Add, after the first paragraph, the following new paragraph:

Instructions shall include any instructions for examination and tests which are to be carried out on parts and connections containing gases or liquids inside the equipment, in order to check that no leakage is occurring.

6 Protection against electric shock

This clause of Part 1 is applicable except as follows:

6.8.3.1 The AC voltage test

Replacement:

Replace the first sentence with the following new sentence:

The voltage tester shall be capable of maintaining the test voltage throughout the test within $\pm 5\%$ of the specified value.

7 Protection against mechanical HAZARDS

This clause of Part 1 is applicable.

8 Resistance to mechanical stresses

This clause of Part 1 is applicable except as follows:

8.1 General

Replacement:

Replace the text of item 3) ~~by~~ with the following new text:

- 3) *except for FIXED EQUIPMENT, for equipment with a mass over 100 kg, or for equipment whose size and weight make unintentional movement unlikely and which is not moved in NORMAL USE, the appropriate test of 8.3. The equipment is not operated during the tests.*

9 Protection against the spread of fire

This clause of Part 1 is applicable.

10 Equipment temperature limits and resistance to heat

This clause of Part 1 is applicable, except as follows:

10.1 Surface temperature limits for protection against burns

Addition:

Add, before Table 19, the following new paragraph:

Protection shall be provided to minimize the possibility of unintentional direct access by the OPERATOR or other persons in the vicinity ~~to~~ of hot gases or plasma emerging from the equipment. ~~This~~ The protection shall comprise a protective structure, for example a chimney of sufficient height to indicate its function (see also 5.2).

11 Protection against HAZARDS from fluids and solid foreign objects

This clause of Part 1 is applicable except as follows:

11.1 General

Replacement:

Replace the first paragraph ~~by~~ with the following new paragraph:

Equipment shall be designed to give protection to the OPERATOR, other persons in the vicinity, and the surrounding area against HAZARDS from direct contact with fluids encountered in NORMAL USE, and from HAZARDS resulting from degradation of parts in contact with these.

Addition:

Add the following new subclauses:

11.101 Sampling probes

Sample fluid remaining on the outside of a sampling probe shall not cause a HAZARD to the OPERATOR or other persons in the vicinity.

Conformity is checked by inspection and, if necessary, by a test using a suitable fluid, for example a solution of fluorescein in water.

11.102 Gases

Components within the fuel-gas and oxidant paths shall be resistant to the gases specified by the manufacturer, and to any associated solvent vapours. In the case of acetylene, a solvent, for example acetone, will be present in the cylinder which contains the acetylene. Any special national regulations for the safe use of gases and pressurized gas cylinders shall be observed.

Conformity is checked by inspection and by examination of the specification of the materials used.

11.103 Solvents

Parts in contact with solvents, including any which will be contacted by diffusion of vapour in the stand-by condition, shall be resistant to the solvents specified by the manufacturer.

Conformity is checked by inspection and examination of the specification of the materials used.

11.104 Parts in contact with acetylene

The following materials shall not be used for parts intended to be in contact with acetylene:

- a) copper and copper alloys with a copper content of more than 70 %;
- b) copper alloys (even with a copper content of less than 70 %) in the case of filters and sieves;
- c) silver and silver alloys, except for brazing. Silver filler used for brazing shall have a silver content of less than 43 %, and a copper content of less than 21 %. The width of a solder gap, where the silver filler might come into contact with acetylene, shall be less than 0,3 mm;
- d) any other material which may form an explosive acetylides.

Conformity is checked by inspection of the materials used and their specification according to the manufacturer.

12 Protection against radiation, including laser sources, and against sonic and ultrasonic pressure

This clause of Part 1 is applicable except as follows:

12.5.1 Sound level

Addition.

Add, before Note 1, the following new paragraph:

Equipment which may generate occasional and unavoidable short-duration high sound pressure levels, for example as a result of FLASH-BACK in a burner gas mixing chamber, shall not produce a sound power level in excess of 140 dB(A).

Add, after Note 2, the following new note:

NOTE 101 Exposure to noise has been categorized in many countries by three action levels of “daily personal noise exposure” at 85 dBA, 90 dBA, and 140 dBA. “Daily personal noise exposure” is defined as the total exposure over the whole working day, taking into account the varying noise levels in the working environment and how long a person is exposed to them, without taking account of whether ear protectors are worn.

The peak action level of 140 dBA relates to cartridge operated tools, shooting guns, and similar loud explosive noises. This action level is most important where workers are subject to a small number of loud impulses during an otherwise quiet day.

Employers in many countries are required to reduce the risk of damage to the hearing of employees from exposure to noise to the lowest level reasonably practicable. For example some countries require manufacturers to provide suitable and efficient ear protectors on request, to employees whose daily personal exposure is between 80 dBA and 90 dBA. For exposures above 90 dBA, exposure is required to be reduced to the lowest level reasonably practicable without taking account of the use of ear protectors. At the same time, suitable ear protectors are to be provided by the employer.

13 Protection against liberated gases and substances, explosion and implosion

This clause of Part 1 is applicable except as follows:

13.1 Poisonous and injurious gases and substances

Addition:

Add, after the ~~first~~ second paragraph, the following new notes:

NOTE 101 Discharge of gases into a fume extraction system is not considered to be liberation (see 5.4.3 bb)).

NOTE 102 Absence of fluid from the type of GAS LOCK shown in Figure 101 is a typical SINGLE FAULT CONDITION.

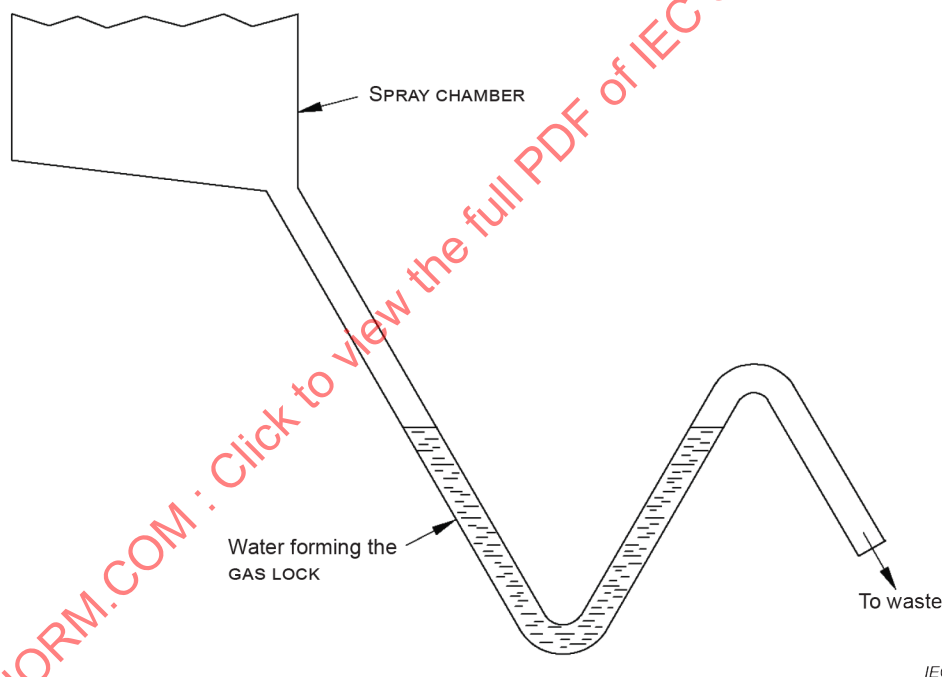


Figure 101 – Example of a GAS LOCK

13.2.1 Components

Replacement:

Replace the first paragraph ~~by~~ with the following new text:

If an explosion ~~could~~ can occur either by FLASH-BACK of gases in a burner and mixing chamber, or if components, if overheated or overcharged, are not provided with a pressure relief device, protection for the OPERATOR and other persons shall be incorporated in the equipment (see also 7.7).

Replace the conformity statement ~~by~~ with the following new text:

Conformity is checked by inspection and, for burners, by test a) or b) as appropriate:

- a) *for burners designed to prevent FLASH-BACK, the flame is ignited and the flow of gas mixture, maintained at a constant fuel-oxidant ratio, is gradually reduced to zero. The flame shall extinguish without FLASH-BACK;*
- b) *for other burners, the flame is ignited and the gas mixture adjusted so as to generate the maximum energy flame. Ignition is then initiated inside the burner to simulate FLASH-BACK. No parts shall be expelled outside the equipment.*

Addition:

Add the following new subclauses:

13.101 Flame ignition system

For equipment which has an automatically controlled ignition system, the ignition procedure when started shall either cause the flame to ignite in a time less than that required for 0,8 l of fuel-gas to be delivered, or the ignition procedure shall be ended automatically and the equipment returned to stand-by condition. For equipment which does not have an automatically controlled ignition system, it shall not be possible to open the valves which control the flows of fuel-gas and oxidant-gas (except compressed air) for purposes of igniting the flame, unless a manually operated device as described below is provided.

An acceptable manually operated device is one which satisfies the following criteria:

- a) it shall override the flame-failure gas shut-off device for not longer than the time for 0,8 l of fuel-gas to be delivered;

NOTE For fuel-gas, the litre (l) will be understood as that which is measured at 0 °C and 0,1 MPa (1 bar).

- b) it shall allow the gases to flow to permit the necessary adjustment of the flow rates before the ignition system is operated;
- c) if ignition is not achieved, the gas flow valves shall close ~~immediately~~ as soon as the device is released.

Conformity is checked by fitting a gas flow-rate meter in the fuel-gas pipe and measuring both the rate of gas escaping during the ignition procedure in NORMAL USE, and the time from opening the fuel-gas inlet valve to closing it after ignition failures. The gas volume is calculated from these measurements.

13.102 Non-interchangeability of gas connectors

Connectors available to the OPERATOR for fuel-gas shall not be interchangeable with connectors for oxidant-gas.

Conformity is checked by inspection.

13.103 Interchangeable burners

In equipment with interchangeable burners (for example to permit the use of either air or nitrous oxide as the oxidant gas) and where a HAZARD could arise if the incorrect gas is fed to a burner, it shall only be possible to operate with a gas appropriate to the burner fitted.

Conformity is checked by fitting, in turn, each available burner specified by the manufacturer, and confirming that only the gases specified for a burner can flow to the burner.

14 Components and subassemblies

This clause of Part 1 is applicable.

15 Protection by interlocks

This clause of Part 1 is applicable except as follows:

15.1 General

Addition:

Add, after the first paragraph, the following new text:

As an alternative method, for interlock systems containing electric/electronic or programmable components (E/E/P components) the reliability and design requirements can be determined by applying for example IEC 62061 (SIL) or ISO 13849 (all parts) (PL) or other solutions providing equivalent functional safety.

16 HAZARDS resulting from application

This clause of Part 1 is applicable.

17 Risk assessment

This clause of Part 1 is applicable.

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Annexes

The annexes of Part 1 are applicable except as follows:

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Annex ~~F~~ A
(normative)

Routine tests

Addition:

Add the following new ~~sub~~clause:

F.101 Gas leakage test

A test is carried out to measure leakage of gas from the internal system leading to the burner. The worst-case gas intended to be used in that internal system is applied at 1,2 times the maximum inlet pressure for NORMAL USE. An alternative gas (for example helium) can be used provided that the results, when converted, are equivalent to the results had the worst-case gas been used. Leakage shall not exceed 5 ml/min.

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Annex ~~H~~ L
(informative)

Index of defined terms

Addition:

*Add the following **new** defined terms to the list:*

FLASH-BACK	3.5.101
GAS LOCK	3.2.102
SPRAY CHAMBER	3.2.101

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Bibliography

The Bibliography of Part 1 is applicable, except as follows:

Addition:

Add the following new references:

~~Laboratory biosafety manual, World Health Organization~~

~~Biosafety in microbiological and biomedical laboratories, Centers for Disease Control and Prevention and National Institutes of Health, Washington~~

IEC 62061, *Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems*

ISO 13849 (all parts), *Safety of machinery – Safety-related parts of control systems*

World Health Organization, *Laboratory Biosafety Manual*

Centers for Disease Control and Prevention and National Institutes of Health, *Biosafety in Microbiological and Biomedical Laboratories*, Washington

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**Safety requirements for electrical equipment for measurement, control, and laboratory use –
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Exigences de sécurité pour appareils électriques de mesurage, de régulation et de laboratoire –

Partie 2-061: Exigences particulières pour spectromètres atomiques de laboratoire avec vaporisation et ionisation thermiques

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**SAFETY REQUIREMENTS FOR ELECTRICAL EQUIPMENT FOR
MEASUREMENT, CONTROL, AND LABORATORY USE –****Part 2-061: Particular requirements for laboratory atomic
spectrometers with thermal atomization and ionization**

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 61010-2-061 has been prepared by IEC technical committee 66: Safety of measuring, control and laboratory equipment.

It has the status of a group safety publication in accordance with IEC Guide 104.

This fourth edition cancels and replaces the third edition published in 2015. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) adaptation of changes introduced by Amendment 1 of IEC 61010-1;
- b) added tolerance for stability of AC voltage test equipment to Clause 6;

- c) added requirement for interlock systems containing electric/electronic or programmable components to Clause 15.

The text of this International Standard is based on the following documents:

CDV	Report on voting
66/643/CDV	66/668/RVC

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

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

A list of all parts of the IEC 61010 series, under the general title, *Safety requirements for electrical equipment for measurement, control, and laboratory use*, may be found on the IEC website.

This Part 2-061 is intended to be used in conjunction with IEC 61010-1. It was established on the basis of the third edition (2010) and its Amendment 1 (2016).

This Part 2-061 supplements or modifies the corresponding clauses in IEC 61010-1 so as to convert that publication into the IEC standard: *Particular requirements for laboratory atomic spectrometers with thermal atomization and ionization*.

Where a particular subclause of Part 1 is not mentioned in this Part 2, that subclause applies as far as is reasonable. Where this part states "addition", "modification" or "replacement", or "deletion", the relevant requirement, test specification or note in Part 1 should be adapted accordingly.

In this standard:

- 1) the following print types are used:
 - requirements: in roman type;
 - NOTES: in small roman type;
 - *conformity and test: in italic type;*
 - terms used throughout this standard which have been defined in Clause 3: SMALL ROMAN CAPITALS;
- 2) subclauses, figures, tables and notes which are additional to those in Part 1 are numbered starting from 101. The additional annexes are lettered starting from AA and additional list items are lettered from aa).

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

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

SAFETY REQUIREMENTS FOR ELECTRICAL EQUIPMENT FOR MEASUREMENT, CONTROL, AND LABORATORY USE –

Part 2-061: Particular requirements for laboratory atomic spectrometers with thermal atomization and ionization

1 Scope and object

This clause of Part 1 is applicable except as follows:

1.1 Scope

1.1.1 Equipment included in scope

Replacement:

Replace the text, except the first paragraph, with the following new text:

This part of IEC 61010 applies to electrically powered laboratory atomic spectrometers with thermal atomization.

NOTE 1 Examples include atomic absorption spectrometers, emission flame photometers, atomic fluorescence spectrophotometers, inductively coupled plasma spectrometers, microwave coupled plasma spectrometers and mass spectrometers, all with thermal atomization and ionization (including tubing and connectors which are provided by the manufacturer for connection to external supplies).

NOTE 2 If all or part of the equipment falls within the scope of one or more other Part 2 documents of IEC 61010 as well as within the scope of this document, consideration is given to those other Part 2 documents.

1.1.2 Equipment excluded from scope

Addition:

Add, before the first paragraph, the following new text:

This document does not apply to thermal atomization detectors (flame ionization detectors) used in gas chromatography.

2 Normative references

This clause of Part 1 is applicable.

3 Terms and definitions

This clause of Part 1 is applicable except as follows:

Addition:

Add the following new terms:

3.2.101

SPRAY CHAMBER

chamber in which droplets of sample in aerosol are allowed to separate so that the droplets of necessary size can be passed onward to the burner, with the remainder draining to waste

3.2.102

GAS LOCK

device to allow drainage of waste sample liquid, and to prevent unintentional escape of gas from the SPRAY CHAMBER through its drain outlet

Note 1 to entry: See for example Figure 101.

3.5.101

FLASH-BACK

event during which the flame travels back through the burner with the result that the gas in the mixing chamber is caused to ignite

4 Tests

This clause of Part 1 is applicable except as follows:

Addition:

Add the following new subclauses:

4.4.2.101 Sampling probe tip

Any system designed to withdraw a sampling probe tip after sampling has been completed shall be overridden, so as to leave the tip in its most exposed position when a sample vessel is removed.

Exceptions:

The withdrawal system need not be overridden if the sampling probe:

- a) cannot cause a HAZARD to the OPERATOR when it is exposed;
- b) is designed in such a manner that no SINGLE FAULT CONDITION can cause the tip to remain exposed after sampling has been completed.

4.4.2.102 Failure, or partial failure, of the MAINS supply

The voltage of the power supply to the equipment from the MAINS supply shall first be reduced to just less than 90 % of the RATED voltage, and shall then be switched off.

5 Marking and documentation

This clause of Part 1 is applicable except as follows:

Addition:

Add the following new subclause:

5.1.5.101 Gas and liquid connections

The following shall be unambiguously marked adjacent to the connector on the equipment (see 5.2):

- a) the identity of the gas or liquid;
- b) the maximum permitted pressure;
- c) flow direction of the gas and liquid, if applicable.

NOTE Such markings can be specific (for example acetylene, propane, water) or generic (for example fuel gas, oxidant gas, coolant, waste liquid).

Where no internationally recognized symbol (such as a chemical formula) exists, the equipment shall be marked with symbol 14 of Table 1 together with an unambiguous text in English. The documentation accompanying the equipment shall provide an adequate translation of this text (where it is required) in the language of the country in which it is to be installed, to assure that the installer or OPERATOR is able to connect the equipment correctly.

Conformity is checked by inspection.

5.2 Warning markings

Addition:

Add the following new paragraph before the conformity statement:

Where hot gases or plasma emerge from equipment, the protective structure provided (for example a chimney, see 10.1), shall be clearly marked by symbol 13 of Table 1, to indicate where excessively hot temperatures can exist.

5.4.3 Equipment installation

Addition:

Add, before the first paragraph, the following new paragraph:

The documentation shall state that the RESPONSIBLE BODY shall ensure that the type of connector used at the outlet side of the gas-pressure regulator conforms to applicable national requirements.

Deletion:

Delete item f).

Addition:

Add, after item g) and before the note, the following new items:

- aa) requirements for liquid connection;
- bb) requirements for a fume extraction system to remove exhaust gases which may be hazardous. In the case of equipment using only a propane flame in a ventilated room, and when it is known that samples will not leave any hazardous residues, it is not necessary to provide an extraction system, since the exhaust gases from a propane flame will themselves not present any HAZARD;
- cc) requirements for appropriate filtering or other systems which may be necessary to trap hazardous sample residues present in the exhaust gas stream;
- dd) documentation stating that the RESPONSIBLE BODY shall carry out appropriate leakage tests necessary for safety on those gas and liquid connections which the OPERATOR is directed to assemble during installation, NORMAL USE, or maintenance;
- ee) instructions for examining, during installation and maintenance, parts of the external gas supply system including tubing connected to the equipment, in order to confirm that their condition is satisfactory, for example to detect stress cracks. In addition any special national regulations for the safe use of gases and gas cylinders shall be observed;

- ff) instructions for necessary provisions for collection of waste from the SPRAY CHAMBER, including the requirements for any waste container which may be specified by the manufacturer;
- gg) requirements for connection of the equipment to supplies of air, fuel gas (for example hydrogen, acetylene, or propane) and oxidant (for example oxygen or nitrous oxide). See also 11.103.

Add, after the existing note, the following new notes:

NOTE 101 Connections on the outlet side of gas regulators (from which tubing connects to the equipment) vary from country to country and are often covered by national regulations. Variations can include thread type, whether left-hand or right-hand, types of tubing and means of attachment.

NOTE 102 Warning markings are specified in 5.1.5.101, 5.1.5.2 c), 6.1.2 b), 7.3.2 b) 3), 7.4, 10.1, and 13.2.2.

5.4.4 Equipment operation

Addition:

Add, after item j), the following new items:

- aa) a reminder to the RESPONSIBLE BODY of the responsibility for the correct collection and disposal of waste materials, including the necessity for:
 - 1) a suitably sized waste container of appropriately resistant material for the collection of organic solvent waste;

NOTE The proper disposal of waste materials is well documented by national authorities and it is these procedures that supersede the requirements of this document in regard of waste disposal. This Part 2 only brings to the attention of the OPERATOR that potentially hazardous waste materials are present and national (local) regulations for the proper disposal can apply.

- 2) provision for the removal into an appropriate exhaust system of any gases or vapours which may be produced in hazardous concentrations;
- bb) a list of fluids known by the manufacturer to be potentially unsafe if used with the equipment.

Add, after the list of items, the following new paragraph:

Documentation shall also indicate that this list cannot be taken to be exhaustive and that, in case of uncertainty about a specific fluid, that fluid shall not be used until confirmation by the manufacturer that it will not present a HAZARD.

Add the following new subclause:

5.4.4.101 Cleaning and decontamination

Documentation shall indicate:

- a) that the RESPONSIBLE BODY has the responsibility for carrying out appropriate decontamination if hazardous material is spilt on or inside the equipment;
- b) the manufacturer's recommendations for cleaning and, where necessary, decontamination, together with the recognized generic names of recommended materials for cleaning and decontamination.

The following wording shall appear in the documentation:

"Before using any cleaning or decontamination methods except those specified by the manufacturer, the RESPONSIBLE BODY should check with the manufacturer that the proposed method will not damage the equipment."

If a manufacturer claims that an item can be decontaminated by steam sterilization, it shall be capable of withstanding steam sterilization under at least one of the time-temperature conditions given in Table 101. Cleaning and decontamination shall be necessary as a safeguard when spectrometers and their accessories are maintained, repaired, or transferred. Manufacturers shall provide a format for the RESPONSIBLE BODY to certify that such a treatment has been carried out.

NOTE Information on decontaminants, their use, dilution and potential application is contained in the *Laboratory Biosafety Manual*, published by the World Health Organization and the *Biosafety in Microbiological and Biomedical Laboratories*, published by Centers for Disease Control and Prevention and National Institutes of Health, Washington. There are also national guidelines that cover these areas.

Table 101 – Time-temperature conditions

Absolute pressure kPa	Corresponding steam temperature		Minimum hold time min
	Nominal °C	Range °C	
325	136,0	134 to 138	3
250	127,5	126 to 129	10
215	122,5	121 to 124	15
175	116,5	115 to 118	30

NOTE "Minimum hold time" means the time the contaminant is at the steam temperature.

5.4.5 Equipment maintenance and service

Addition:

Add, after the first paragraph, the following new paragraph:

Instructions shall include any instructions for examination and tests which are to be carried out on parts and connections containing gases or liquids inside the equipment, in order to check that no leakage is occurring.

6 Protection against electric shock

This clause of Part 1 is applicable except as follows:

6.8.3.1 The AC voltage test

Replacement:

Replace the first sentence with the following new sentence:

The voltage tester shall be capable of maintaining the test voltage throughout the test within $\pm 5\%$ of the specified value.

7 Protection against mechanical HAZARDS

This clause of Part 1 is applicable.

8 Resistance to mechanical stresses

This clause of Part 1 is applicable except as follows:

8.1 General

Replacement:

Replace the text of item 3) with the following new text:

- 3) *except for FIXED EQUIPMENT, for equipment with a mass over 100 kg, or for equipment whose size and weight make unintentional movement unlikely and which is not moved in NORMAL USE, the appropriate test of 8.3. The equipment is not operated during the tests.*

9 Protection against the spread of fire

This clause of Part 1 is applicable.

10 Equipment temperature limits and resistance to heat

This clause of Part 1 is applicable, except as follows:

10.1 Surface temperature limits for protection against burns

Addition:

Add, before Table 19, the following new paragraph:

Protection shall be provided to minimize the possibility of unintentional direct access by the OPERATOR or other persons in the vicinity of hot gases or plasma emerging from the equipment. The protection shall comprise a protective structure, for example a chimney of sufficient height to indicate its function (see also 5.2).

11 Protection against HAZARDS from fluids and solid foreign objects

This clause of Part 1 is applicable except as follows:

11.1 General

Replacement:

Replace the first paragraph with the following new paragraph:

Equipment shall be designed to give protection to the OPERATOR, other persons in the vicinity, and the surrounding area against HAZARDS from direct contact with fluids encountered in NORMAL USE, and from HAZARDS resulting from degradation of parts in contact with these.

Addition:

Add the following new subclauses:

11.101 Sampling probes

Sample fluid remaining on the outside of a sampling probe shall not cause a HAZARD to the OPERATOR or other persons in the vicinity.

Conformity is checked by inspection and, if necessary, by a test using a suitable fluid, for example a solution of fluorescein in water.

11.102 Gases

Components within the fuel-gas and oxidant paths shall be resistant to the gases specified by the manufacturer, and to any associated solvent vapours. In the case of acetylene, a solvent, for example acetone, will be present in the cylinder which contains the acetylene. Any special national regulations for the safe use of gases and pressurized gas cylinders shall be observed.

Conformity is checked by inspection and by examination of the specification of the materials used.

11.103 Solvents

Parts in contact with solvents, including any which will be contacted by diffusion of vapour in the stand-by condition, shall be resistant to the solvents specified by the manufacturer.

Conformity is checked by inspection and examination of the specification of the materials used.

11.104 Parts in contact with acetylene

The following materials shall not be used for parts intended to be in contact with acetylene:

- a) copper and copper alloys with a copper content of more than 70 %;
- b) copper alloys (even with a copper content of less than 70 %) in the case of filters and sieves;
- c) silver and silver alloys, except for brazing. Silver filler used for brazing shall have a silver content of less than 43 %, and a copper content of less than 21 %. The width of a solder gap, where the silver filler might come into contact with acetylene, shall be less than 0,3 mm;
- d) any other material which may form an explosive acetylides.

Conformity is checked by inspection of the materials used and their specification according to the manufacturer.

12 Protection against radiation, including laser sources, and against sonic and ultrasonic pressure

This clause of Part 1 is applicable except as follows:

12.5.1 Sound level

Addition.

Add, before Note 1, the following new paragraph:

Equipment which may generate occasional and unavoidable short-duration high sound pressure levels, for example as a result of FLASH-BACK in a burner gas mixing chamber, shall not produce a sound power level in excess of 140 dB(A).

Add, after Note 2, the following new note:

NOTE 101 Exposure to noise has been categorized in many countries by three action levels of “daily personal noise exposure” at 85 dBA, 90 dBA, and 140 dBA. “Daily personal noise exposure” is defined as the total exposure over the whole working day, taking into account the varying noise levels in the working environment and how long a person is exposed to them, without taking account of whether ear protectors are worn.

The peak action level of 140 dBA relates to cartridge operated tools, shooting guns, and similar loud explosive noises. This action level is most important where workers are subject to a small number of loud impulses during an otherwise quiet day.

Employers in many countries are required to reduce the risk of damage to the hearing of employees from exposure to noise to the lowest level reasonably practicable. For example some countries require manufacturers to provide suitable and efficient ear protectors on request, to employees whose daily personal exposure is between 80 dBA and 90 dBA. For exposures above 90 dBA, exposure is required to be reduced to the lowest level reasonably practicable without taking account of the use of ear protectors. At the same time, suitable ear protectors are to be provided by the employer.

13 Protection against liberated gases and substances, explosion and implosion

This clause of Part 1 is applicable except as follows:

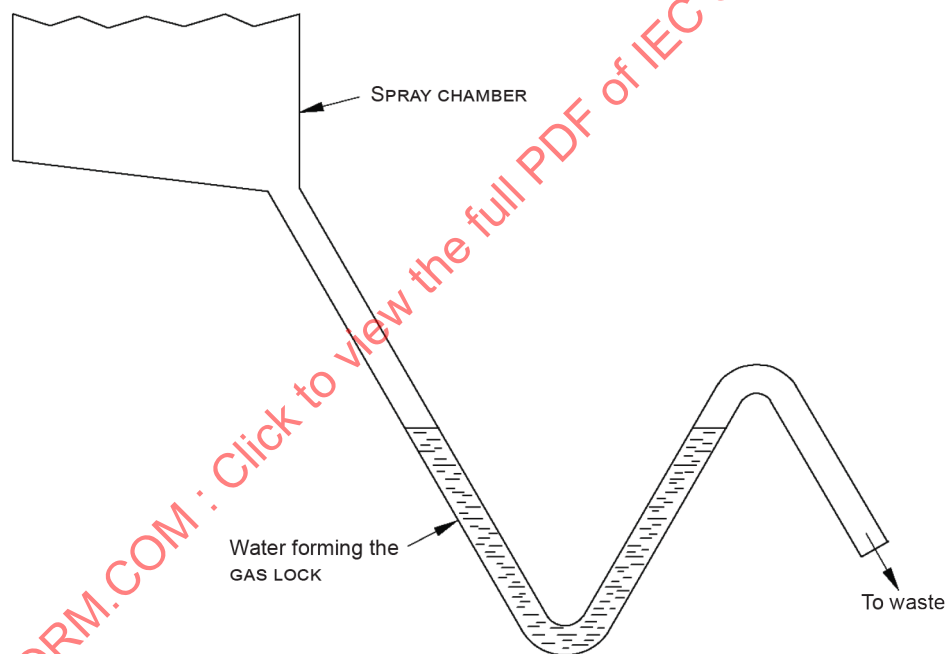
13.1 Poisonous and injurious gases and substances

Addition:

Add, after the second paragraph, the following new notes:

NOTE 101 Discharge of gases into a fume extraction system is not considered to be liberation (see 5.4.3 bb)).

NOTE 102 Absence of fluid from the type of GAS LOCK shown in Figure 101 is a typical SINGLE FAULT CONDITION.



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Figure 101 – Example of a GAS LOCK

13.2.1 Components

Replacement:

Replace the first paragraph with the following new text:

If an explosion can occur either by FLASH-BACK of gases in a burner and mixing chamber, or if components, if overheated or overcharged, are not provided with a pressure relief device, protection for the OPERATOR and other persons shall be incorporated in the equipment (see also 7.7).

Replace the conformity statement with the following new text:

Conformity is checked by inspection and, for burners, by test a) or b) as appropriate:

- a) *for burners designed to prevent FLASH-BACK, the flame is ignited and the flow of gas mixture, maintained at a constant fuel-oxidant ratio, is gradually reduced to zero. The flame shall extinguish without FLASH-BACK;*
- b) *for other burners, the flame is ignited and the gas mixture adjusted so as to generate the maximum energy flame. Ignition is then initiated inside the burner to simulate FLASH-BACK. No parts shall be expelled outside the equipment.*

Addition:

Add the following new subclauses:

13.101 Flame ignition system

For equipment which has an automatically controlled ignition system, the ignition procedure when started shall either cause the flame to ignite in a time less than that required for 0,8 l of fuel-gas to be delivered, or the ignition procedure shall be ended automatically and the equipment returned to stand-by condition. For equipment which does not have an automatically controlled ignition system, it shall not be possible to open the valves which control the flows of fuel-gas and oxidant-gas (except compressed air) for purposes of igniting the flame, unless a manually operated device as described below is provided.

An acceptable manually operated device is one which satisfies the following criteria:

- a) it shall override the flame-failure gas shut-off device for not longer than the time for 0,8 l of fuel-gas to be delivered;

NOTE For fuel-gas, the litre (l) will be understood as that which is measured at 0 °C and 0,1 MPa (1 bar).

- b) it shall allow the gases to flow to permit the necessary adjustment of the flow rates before the ignition system is operated;
- c) if ignition is not achieved, the gas flow valves shall close as soon as the device is released.

Conformity is checked by fitting a gas flow-rate meter in the fuel-gas pipe and measuring both the rate of gas escaping during the ignition procedure in NORMAL USE, and the time from opening the fuel-gas inlet valve to closing it after ignition failures. The gas volume is calculated from these measurements.

13.102 Non-interchangeability of gas connectors

Connectors available to the OPERATOR for fuel-gas shall not be interchangeable with connectors for oxidant-gas.

Conformity is checked by inspection.

13.103 Interchangeable burners

In equipment with interchangeable burners (for example to permit the use of either air or nitrous oxide as the oxidant gas) and where a HAZARD could arise if the incorrect gas is fed to a burner, it shall only be possible to operate with a gas appropriate to the burner fitted.

Conformity is checked by fitting, in turn, each available burner specified by the manufacturer, and confirming that only the gases specified for a burner can flow to the burner.

14 Components and subassemblies

This clause of Part 1 is applicable.

15 Protection by interlocks

This clause of Part 1 is applicable except as follows:

15.1 General

Addition:

Add, after the first paragraph, the following new text:

As an alternative method, for interlock systems containing electric/electronic or programmable components (E/E/P components) the reliability and design requirements can be determined by applying for example IEC 62061 (SIL) or ISO 13849 (all parts) (PL) or other solutions providing equivalent functional safety.

16 HAZARDS resulting from application

This clause of Part 1 is applicable.

17 Risk assessment

This clause of Part 1 is applicable.

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Annexes

The annexes of Part 1 are applicable except as follows:

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Annex A (normative)

Routine tests

Addition:

Add the following new clause:

F.101 Gas leakage test

A test is carried out to measure leakage of gas from the internal system leading to the burner. The worst-case gas intended to be used in that internal system is applied at 1,2 times the maximum inlet pressure for NORMAL USE. An alternative gas (for example helium) can be used provided that the results, when converted, are equivalent to the results had the worst-case gas been used. Leakage shall not exceed 5 ml/min.

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Annex L

(informative)

Index of defined terms

Addition:

Add the following new defined terms to the list:

FLASH-BACK	3.5.101
GAS LOCK	3.2.102
SPRAY CHAMBER	3.2.101

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Bibliography

The Bibliography of Part 1 is applicable, except as follows:

Addition:

Add the following new references:

IEC 62061, *Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems*

ISO 13849 (all parts), *Safety of machinery – Safety-related parts of control systems*

World Health Organization, *Laboratory Biosafety Manual*

Centers for Disease Control and Prevention and National Institutes of Health, *Biosafety in Microbiological and Biomedical Laboratories*, Washington

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COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

**EXIGENCES DE SÉCURITÉ POUR APPAREILS ÉLECTRIQUES
DE MESURAGE, DE RÉGULATION ET DE LABORATOIRE –****Partie 2-061: Exigences particulières pour spectromètres atomiques
de laboratoire avec vaporisation et ionisation thermiques****AVANT-PROPOS**

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- 9) L'attention est attirée sur le fait que certains des éléments de la présente Publication de l'IEC peuvent faire l'objet de droits de brevet. L'IEC ne saurait être tenue pour responsable de ne pas avoir identifié de tels droits de brevets et de ne pas avoir signalé leur existence.

La Norme internationale IEC 61010-2-061 a été établie par le comité d'études 66 de l'IEC: Sécurité des appareils de mesure, de commande et de laboratoire.

Elle a le statut d'une publication groupée de sécurité conformément au Guide IEC 104.

Cette quatrième édition annule et remplace la troisième édition parue en 2015. Cette édition constitue une révision technique.

Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

- a) adaptation des modifications introduites par l'Amendement 1 de l'IEC 61010-1;

- b) ajout à l'Article 6 de la tolérance pour la stabilité du matériel d'essai en tension alternative;
- c) ajout à l'Article 15 d'une exigence relative aux systèmes de verrouillage contenant des composants électriques/électroniques ou programmables.

Le texte de cette Norme internationale est issu des documents suivants:

CDV	Rapport de vote
66/643/CDV	66/668/RVC

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à l'approbation de cette Norme internationale.

Ce document a été rédigé selon les Directives ISO/IEC, Partie 2.

Une liste de toutes les parties de la série IEC 61010, sous le titre général *Exigences de sécurité pour appareils électriques de mesurage, de régulation et de laboratoire*, peut être consultée sur le site web de l'IEC.

Cette partie 2-061 est destinée à être utilisée conjointement avec l'IEC 61010-1. Elle a été établie sur la base de la troisième édition (2010) et de son Amendement 1 (2016).

La présente Partie 2-061 complète ou modifie les articles correspondants de l'IEC 61010-1 de façon à transformer cette publication en norme IEC: *Exigences particulières pour spectromètres atomiques de laboratoire avec vaporisation et ionisation thermiques*.

Lorsqu'un paragraphe particulier de la Partie 1 n'est pas mentionné dans la présente Partie 2, ce paragraphe s'applique pour autant que cela soit raisonnable. Lorsque cette partie indique «addition», «modification», «remplacement» ou «suppression», il convient d'adapter en conséquence l'exigence, la modalité d'essai ou la note correspondante de la Partie 1.

Dans la présente norme:

- 1) les caractères d'imprimerie suivants sont utilisés:
 - exigences: caractères romains;
 - NOTES: petits caractères romains;
 - *conformité et essais: caractères italiques;*
 - termes définis à l'Article 3 et utilisés dans toute cette norme: PETITES CAPITALES EN CARACTÈRES ROMAINS;
- 2) les paragraphes, figures, tableaux et notes qui viennent en supplément de ceux de la Partie 1 sont numérotés à partir de 101. Les annexes complémentaires sont désignées à partir de AA et les listes de termes additionnels à partir de aa).

Le comité a décidé que le contenu de ce document ne sera pas modifié avant la date de stabilité indiquée sur le site web de l'IEC sous "<http://webstore.iec.ch>" dans les données relatives au document recherché. A cette date, le document sera

- reconduit,
- supprimé,
- remplacé par une édition révisée, ou
- amendé.

EXIGENCES DE SÉCURITÉ POUR APPAREILS ÉLECTRIQUES DE MESURAGE, DE RÉGULATION ET DE LABORATOIRE –

Partie 2-061: Exigences particulières pour spectromètres atomiques de laboratoire avec vaporisation et ionisation thermiques

1 Domaine d'application et objet

L'article de la Partie 1 est applicable à l'exception de ce qui suit:

1.1 Domaine d'application

1.1.1 Appareils inclus dans le domaine d'application

Remplacement:

Remplacer le texte, excepté le premier alinéa, par le nouveau texte suivant:

La présente partie de l'IEC 61010 s'applique aux spectromètres atomiques de laboratoire équipés d'une alimentation électrique et d'une vaporisation thermique.

NOTE 1 Il s'agit par exemple des spectromètres à absorption atomique, des photomètres de flamme, des spectrophotomètres à fluorescence atomique, des spectromètres à plasma couplé par induction, des spectromètres à plasma couplé par micro-onde et des spectromètres de masse, tous avec vaporisation et ionisation thermiques (y compris les tuyaux et les raccords des appareils qui sont fournis par le fabricant pour connexion aux alimentations externes).

NOTE 2 Si une ou toutes les parties de l'appareil relèvent du domaine d'application d'une ou plusieurs autres Parties 2 de la série IEC 61010, ainsi que du domaine d'application du présent document, ces autres Parties 2 sont prises en compte.

1.1.2 Appareils exclus du domaine d'application

Addition:

Ajouter, avant le premier alinéa, le nouveau texte suivant:

Le présent document ne s'applique pas aux détecteurs de vaporisation thermique (détecteurs à ionisation de flamme) utilisés en chromatographie en phase gazeuse.

2 Références normatives

L'article de la Partie 1 est applicable.

3 Termes et définitions

L'article de la Partie 1 est applicable à l'exception de ce qui suit:

Addition:

Ajouter les nouveaux termes suivants:

3.2.101

CHAMBRE DE VAPORISATION

chambre dans laquelle des gouttelettes de prélèvement en aérosol peuvent se séparer et atteindre la dimension nécessaire pour pénétrer dans le brûleur, le surplus étant évacué en déchets

3.2.102

DISPOSITIF DE RETENUE DE GAZ

dispositif destiné à permettre l'évacuation des déchets des prélèvements de liquide et éviter les fuites involontaires de gaz de la CHAMBRE DE VAPORISATION à travers la sortie d'évacuation

Note 1 à l'article: Voir par exemple la Figure 101.

3.5.101

RETOUR DE FLAMME

allumage du gaz dans la chambre de mélange provoqué par un retour de la flamme à travers le brûleur

4 Essais

L'article de la Partie 1 est applicable à l'exception de ce qui suit:

Addition:

Ajouter les nouveaux paragraphes suivants:

4.4.2.101 Embout de sonde de prélèvement

Tout système conçu pour retirer un embout de sonde de prélèvement après la réalisation du prélèvement doit être neutralisé pour laisser l'embout dans sa position la plus exposée quand le récipient de prélèvement est enlevé.

Exceptions:

Le système de retrait peut ne pas être neutralisé si la sonde de prélèvement:

- a) ne peut engendrer un DANGER pour l'OPÉRATEUR quand elle est exposée;
- b) est conçue de telle manière qu'aucune CONDITION DE PREMIER DÉFAUT ne conduit à laisser l'embout exposé après la réalisation du prélèvement.

4.4.2.102 Défaillance, ou défaillance partielle, de l'alimentation RÉSEAU

La tension d'alimentation de l'appareil, à partir de l'alimentation RÉSEAU, doit d'abord être réduite à une valeur juste inférieure à 90 % de la tension ASSIGNÉE, et doit ensuite être coupée.

5 Marquage et documentation

L'article de la Partie 1 est applicable à l'exception de ce qui suit:

Addition:

Ajouter le nouveau paragraphe suivant:

5.1.5.101 Raccordements des gaz et liquides

Les marquages suivants doivent être indiqués sans ambiguïté sur l'appareil, près des raccords (voir 5.2):

- a) nature du gaz ou du liquide;
- b) pression maximale autorisée;
- c) sens d'écoulement du gaz et du liquide, le cas échéant.

NOTE Un tel marquage peut être spécifique (par exemple acétylène, propane, eau) ou générique (par exemple gaz combustible, gaz oxydant, liquide de refroidissement, liquides résiduels).

En l'absence de symbole reconnu au niveau international (comme une formule chimique), l'appareil doit être marqué avec le symbole 14 du Tableau 1, accompagné d'un texte non ambigu en anglais. La documentation accompagnant l'appareil doit fournir une traduction appropriée de ce texte (si exigé) dans la langue du pays dans lequel l'appareil doit être installé, afin de garantir que l'installateur ou l'OPÉRATEUR peut connecter l'appareil correctement.

La conformité est vérifiée par examen.

5.2 Marquage des avertissements

Addition:

Ajouter le nouvel alinéa suivant avant la déclaration de conformité:

Quand des gaz chauds ou plasmas sortent de l'appareil, la structure de protection fournie (par exemple une cheminée, voir 10.1), doit être clairement marquée avec le symbole 13 du Tableau 1, pour indiquer les surfaces auxquelles une température excessive peut être observée.

5.4.3 Installation de l'appareil

Addition:

Ajouter, avant le premier alinéa, le nouvel alinéa suivant:

La documentation doit indiquer que l'AUTORITÉ RESPONSABLE doit garantir que le type de raccord utilisé sur la sortie du régulateur de pression du gaz est conforme aux exigences nationales en vigueur.

Suppression:

Supprimer le point f).

Addition:

Ajouter, après le point g) et avant la note, les nouveaux points suivants:

- aa) les exigences pour connexions de liquides;
- bb) les exigences pour un système d'extraction des fumées pour éliminer les gaz d'évacuation qui peuvent être dangereux. Si l'appareil utilise uniquement une flamme propane dans une pièce ventilée, et quand il est avéré que les prélèvements ne vont laisser aucun résidu dangereux, il n'est pas nécessaire de fournir un système d'extraction, puisque les gaz d'évacuation d'une flamme propane ne présentent eux-mêmes aucun DANGER;

- cc) les exigences pour un filtrage approprié ou d'autres systèmes qui peuvent être nécessaires pour capturer les résidus de prélèvement dangereux présents dans le flux des gaz d'évacuation;
- dd) la documentation indiquant que l'AUTORITÉ RESPONSABLE doit effectuer les essais de fuite appropriés nécessaires pour la sécurité sur les connexions des gaz et liquides que l'OPÉRATEUR est tenu d'assembler lors de l'installation, en UTILISATION NORMALE, ou pour l'entretien;
- ee) les instructions relatives à l'examen, lors de l'installation ou l'entretien, des pièces du système d'alimentation externe en gaz, y compris des tuyaux reliés à l'appareil, pour vérifier que leur état est satisfaisant, par exemple pour détecter des fissures de contrainte. De plus, toutes les réglementations nationales spéciales relatives à la sécurité d'utilisation des gaz et des bouteilles de gaz doivent être respectées;
- ff) les instructions relatives aux dispositions nécessaires concernant la collecte des déchets de la CHAMBRE DE VAPORISATION, y compris les exigences pour tous les récipients à déchets qui peuvent être spécifiés par le fabricant;
- gg) les exigences pour la connexion de l'appareil aux alimentations en air, gaz combustible (par exemple hydrogène, acétylène ou propane) et oxydant (par exemple oxygène ou oxyde d'azote). Voir également 11.103.

Ajouter, après la note existante, les nouvelles notes suivantes:

NOTE 101 Les connexions sur les sorties des régulateurs de gaz (à partir desquelles la tuyauterie les relie à l'appareil) varient selon les pays et sont souvent couvertes par les réglementations nationales. Les différences peuvent inclure le type de filetage, aussi bien pas à gauche que pas à droite, les types de tuyauteries et les moyens de branchement.

NOTE 102 Le marquage des avertissements est spécifié en 5.1.5.101, 5.1.5.2 c), 6.1.2 b), 7.3.2 b) 3), 7.4, 10.1, et 13.2.2.

5.4.4 Fonctionnement de l'appareil

Addition:

Ajouter, après le point j), les nouveaux points suivants:

- aa) un rappel à l'AUTORITÉ RESPONSABLE concernant la responsabilité de la collecte et de l'élimination correctes des déchets, comprenant la nécessité:
 - 1) d'un récipient de taille adaptée et constitué de matériaux résistants appropriés, destiné à la collecte des déchets de solvant organique;

NOTE L'élimination correcte des déchets est parfaitement documentée par les autorités nationales et ces procédures remplacent les exigences du présent document concernant l'élimination des déchets. La présente Partie 2 a pour seul objectif d'attirer l'attention de l'OPÉRATEUR sur la présence de déchets potentiellement dangereux. Les réglementations nationales (locales) pour leur élimination correcte peuvent s'appliquer.

- 2) de dispositions pour l'élimination par un système d'évacuation approprié des gaz et vapeurs qui peuvent être produits dans des concentrations dangereuses;
- bb) une liste des fluides dont le fabricant sait qu'ils peuvent être potentiellement dangereux en cas d'utilisation avec l'appareil.

Ajouter, après la liste de points, le nouvel alinéa suivant:

La documentation doit également indiquer que cette liste ne peut être considérée comme exhaustive et qu'en cas de doute sur un fluide spécifique, celui-ci ne doit pas être utilisé avant confirmation par le fabricant qu'il ne présente aucun DANGER.

Ajouter le nouveau paragraphe suivant:

5.4.4.101 Nettoyage et décontamination

La documentation doit indiquer:

- a) que l'AUTORITÉ RESPONSABLE est chargée de procéder à la décontamination appropriée si des matériaux dangereux ont été répandus sur l'appareil ou à l'intérieur de celui-ci;
- b) les recommandations du fabricant concernant le nettoyage et, si nécessaire, la décontamination, ainsi que les noms génériques reconnus des matériaux recommandés pour le nettoyage et la décontamination.

La mention suivante doit figurer dans la documentation:

«Avant utilisation de méthodes de nettoyage ou de décontamination différentes de celles qui sont spécifiées par le fabricant, il convient que l'AUTORITÉ RESPONSABLE vérifie auprès de ce dernier que l'application de la méthode envisagée ne risque pas d'endommager l'appareil.»

Si un fabricant prétend qu'un article peut être décontaminé par stérilisation à la vapeur, cet article doit être capable de supporter la stérilisation à la vapeur dans au moins une des conditions de température-temps mentionnées dans le Tableau 101. Le nettoyage et la décontamination doivent s'avérer nécessaires à titre préventif lors de la maintenance, de la réparation ou du transfert de ces spectromètres et de leurs accessoires. Les fabricants doivent délivrer un document sur lequel l'AUTORITÉ RESPONSABLE certifie que ce type de traitement a été effectué.

NOTE Les informations sur les décontaminants, leurs utilisations, leurs dilutions et leurs applications potentielles sont contenues dans le *Manuel de sécurité biologique en laboratoire* publié par l'Organisation mondiale de la santé et le document *Biosafety in Microbiological and Biomedical Laboratories*, publié par les Centres for Disease Control and Prevention and National Institutes of Health, Washington. Il existe également des lignes directrices nationales couvrant ces domaines.

Tableau 101 – Conditions de température-temps

Pression absolue kPa	Température de la vapeur correspondante		Temps de maintien minimal min
	Valeur nominale °C	Plage de température °C	
325	136,0	134 à 138	3
250	127,5	126 à 129	10
215	122,5	121 à 124	15
175	116,5	115 à 118	30

NOTE Le «temps de maintien minimal» est la durée pendant laquelle le contaminant reste à la température de la vapeur.

5.4.5 Entretien de l'appareil et service

Addition:

Ajouter, après le premier alinéa, le nouvel alinéa suivant:

Ces instructions doivent comprendre les instructions relatives aux examens et essais qui doivent être effectués sur les parties et les connexions contenant des gaz ou des liquides à l'intérieur de l'appareil, pour vérifier l'absence de fuite.

6 Protection contre les chocs électriques

L'article de la Partie 1 est applicable à l'exception de ce qui suit: