UL 61010-2-051

STANDARD FOR

Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 2-051: Particular Requirements for Laboratory Equipment for Mixing and Stirring

UL Standard for Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 2-051: Particular Requirements for Laboratory Equipment for Mixing and Stirring, UL 61010-2-051

Fourth Edition, Dated June 27, 2019

Summary of Topics

Adoption of IEC 61010-2-051, Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use – Part 2-051: Particular Requirements for Laboratory Equipment for Mixing and Stirring (fourth edition, issued by IEC October 2018) as a new IEC-based UL standard, UL 61010-2-051 with No US Differences.

The new requirements are substantially in accordance with Proposal(s) on this subject dated April 5, 2019.

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Standard for Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 2-051: Particular Requirements for Laboratory Equipment for Mixing and Stirring

Third Edition – July 2015

Fourth Edition

June 27, 2019

This ANSI/UL Standard for Safety consists of the Fourth Edition.

The most recent designation of ANSI/UL 61010-2-051 as an American National Standard (ANSI) occurred on June 18, 2019. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page, or Preface. The IEC Foreword is also excluded from the ANSI approval of IEC-based standards.

Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Proposals should be submitted via a Proposal Request in UL's On-Line Collaborative Standards Development System (CSDS) at https://csds.ul.com.

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Preface

This UL Standard is based on IEC Publication 61010-2-051: fourth edition Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 2-051: Particular Requirements for Laboratory Equipment for Mixing and Stirring. IEC publication 61010-2-051 is copyrighted by the IEC.

Efforts have been made to synchronize the UL edition number with that of the corresponding IEC standard with which this standard is harmonized. As a result, one or more UL edition numbers have been skipped to match that of the IEC edition number.

This UL Standard 61010-2-051 Standard for Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 2-051: Particular Requirements for Laboratory Equipment for Mixing and Stirring, is to be used in conjunction with the third edition of UL 61010-1. The requirements for laboratory equipment for the heating of materials are contained in this Part 2 Standard and UL 61010-1.

Requirements of this Part 2 Standard, where stated, amend the requirements of UL 61010-1.

Where a particular subclause of UL 61010-1 is not mentioned in UL 61010-2-051, the UL 61010-1 subclause applies.

Note – Although the intended primary application of this Standard is stated in its Scope, it is important to note that it remains the responsibility of the users of the Standard to judge its suitability for their particular purpose.

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FOREWORD

INTERNATIONAL ELECTROTECHNICAL COMMISSION

SAFETY REQUIREMENTS FOR ELECTRICAL EQUIPMENT FOR MEASUREMENT, CONTROL, AND LABORATORY USE – Part 2-051: Particular requirements for laboratory equipment for mixing and stirring

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.

2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.

3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.

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5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.

6) All users should ensure that they have the latest edition of this publication.

7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.

8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.

9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61010-2-051 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:

adaptation of changes introduced by Amendment 1 of IEC 61010-1;

added tolerance for stability of AC voltage test equipment to Clause 6;

added required RISK assessment for equipment intended to be used with flammable, hazardous, or toxic fluids to Clause 17.

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

CDV	Report on voting
66/642/CDV	66/667/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 2-051 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 2-051 supplements or modifies the corresponding clauses in IEC 61010-1 so as to convert that publication into the IEC standard: *Particular requirements for laboratory equipment for mixing and stirring*.

Where a particular subclause of Part 1 is not mentioned in this Part 2, that subclause applies as far as is reasonable. Where the part states “addition”, “modification”, “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. 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 2-051: Particular requirements for laboratory equipment for mixing and stirring

1 Scope and object

This clause of Part 1 is applicable except as follows:

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 is applicable to electrically operated laboratory equipment and its accessories for mechanical mixing and stirring, where mechanical energy influences the shape or size or homogeneity of materials and their accessories. Such devices can contain heating elements.

NOTE If all or part of the equipment falls within the scope of one or more other Part 2 standards of the IEC 61010 series as well as within the scope of this document, consideration is given to those other Part 2 standards. The standard for equipment which contains heating devices is IEC 61010-2-010.

2 Normative references

This clause of Part 1 is applicable.

3 Terms and definitions

This clause of Part 1 is applicable.

4 Tests

This clause of Part 1 is applicable.

5 Marking and documentation

This clause of Part 1 is applicable except as follows:

5.4.1 General

Addition:

Add, after item h), the following new item:

aa) if a HAZARD could be caused by operating a mixer or stirrer intended for use as HAND-HELD EQUIPMENT, there shall be a warning statement to that effect.

5.4.4 Equipment operation

Addition:

Add after item j), the following new item:

aa) instructions for fixing the stirring vessel if specified and sold as part of a mixing system, or if otherwise applicable.

Add a new paragraph after the list of items as follows:

The instructions shall warn against use of the equipment in hazardous atmospheres or with hazardous materials for which the equipment is not designed.

Replacement:

Replace the paragraph before the compliance statement with the following new text:

The user shall be made aware that the protection provided by the equipment can be impaired if the equipment is used with accessories not provided or recommended by the manufacturer, or used in a manner not specified by the manufacturer.

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 ± 5 % of the specified value.

7 Protection against mechanical HAZARDS

This clause of Part 1 is applicable except as follows:

7.3.2 Exceptions

Replacement:

Replace, in item a), the words "for example drilling and mixing equipment" with the following:

for example stirrer shafts and impellers extending downwards into material being stirred

Addition:

Add the following new subclauses:

7.3.101 Speed controls

If a SINGLE FAULT of an electronic speed control could cause a HAZARD, the equipment shall incorporate means to interrupt power or otherwise prevent the HAZARD.

Conformity is checked by inspection and test.

7.3.102 Movement during operation

Equipment other than HAND-HELD EQUIPMENT shall not change position during NORMAL USE.

Conformity is checked by inspection and test. Equipment which has not moved by more than 5 mm after operation for 10 min is considered to meet the requirement.

7.3.103 Restarting after interruption

Depending on the operation, a HAZARD can be caused either by re-starting or by not re-starting after interruption of the mixing action. Instructions shall specify whether equipment will re-start or not re-start, both in the case of MAINS interruption and in the case of a fault or mechanical interruption. If after interruption a HAZARD can occur the equipment shall be equipped with an audible or visible signal to warn that an interruption has occurred.

Conformity is checked by inspection of documentation.

7.3.104 HAZARDS related to application

Additional HAZARDS can occur with equipment used to mix flammable materials, or where the transfer of mechanical energy to a glass apparatus could lead to breakage.

Instructions for use shall warn against the use of equipment in such applications unless the equipment incorporates appropriate safety devices to prevent a HAZARD in SINGLE FAULT CONDITION. Such safety devices shall be independent from control systems.

Examples of HAZARDS and appropriate safety devices include the following:

a) Where failure of the mixing action could cause a HAZARD, for example in metal-organic reactions, the safety device shall initiate an alarm signal:

1) if the drive shaft or mixer fails to turn when the mixer is switched on; or

2) when an overload causes the shaft speed to fall below a preset level.

NOTE Speed reduction can be caused by a lack of power or by the operation of an automatic device which reduces the shaft speed in the case of an overload.

b) Where a HAZARD could be caused by excessive torque applied to high-viscosity material, for example through glass breakage, the safety device shall initiate an alarm signal if the torque rises above a preset level. It is recommended that safety devices work according to the principle of rest-current.

Conformity is checked by inspection and test.

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.

11 Protection against HAZARDS from fluids and solid foreign objects

This clause of Part 1 is applicable except as follows:

Addition:

Add the following new subclause:

11.101 Connections for hoses and pipes

Connectors shall be so designed that hoses can be prevented from detaching, for example by means of hose clamps, and that pipes are adequately restrained.

Conformity is checked by inspection.

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

This clause of Part 1 is applicable.

13 Protection against liberated gases and substances, explosion and implosion

This clause of Part 1 is applicable except as follows:

Addition:

Add the following new subclause:

13.2.101 Protection against explosion and explosives

Equipment designed for protection against explosion or to be used with explosives shall, according to the type, the mode of operation and the location, comply with the appropriate requirements of relevant IEC and ISO standards such as the IEC 60079 series on explosive atmospheres.