UL 61010-2-034

STANDARD FOR SAFETY

Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use – Part 2-034: Particular Requirements for Measurement Equipment for Insulation Resistance and Test Equipment for Electric Strength

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UL Standard for Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use – Part 2-034: Particular Requirements for Measurement Equipment for Insulation Resistance and Test Equipment for Electric Strength, UL 61010-2-034

Second Edition, Dated October 17, 2024

Summary of Topics

This Second Edition of ANSI/UL 61010-2-034 dated October 17, 2024 is an Adoption of IEC 61010-2-034, Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use – Part 2-034: Particular Requirements for Measurement Equipment for Insulation Resistance and Test Equipment for Electric Strength (second edition issued July 2023) as a new IEC-based UL standard, UL 61010-2-034, with US National Differences.

The requirements are substantially in accordance with Proposal(s) on this subject dated August 6, 2024.

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OCTOBER 17, 2024

ANSI/UL 61010-2-034-2024

UL 61010-2-034

Standard for Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 2-034: Particular Requirements for Measurement Equipment for Insulation Resistance and Test Equipment for Electric Strength

First Edition – January, 2020

Second Edition

October 17, 2024

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

The most recent designation of ANSI/UL 61010-2-034 as an American National Standard (ANSI) occurred on October 17, 2024. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, and Title Page. The National Difference Page and IEC Foreword are 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 ULSE at any time. Proposals should be submitted via a Proposal Request in the Collaborative Standards Development System (CSDS) at https://csds.ul.com.

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CONTENTS

Preface (UL) **7**

NATIONAL DIFFERENCES **9**

FOREWORD **11**

INTRODUCTION **15**

1 Scope and object 17
1.1.1 Equipment included in scope 17
1.1.2 Equipment excluded from scope 17
1.2.1 Aspects included in scope 17
2 Normative references 18
2DV Modification: Add the following 19
3 Terms and definitions 19
4 Tests 19
4.3.2.5 Power supply 19
4.3.2.6 Input and output voltages 20
4.3.2.6 Input and output voltages or currents 20
4.4.2.101 Surge protective devices 20
5 Marking, documentation and HAZARD indicator 20
5.1.5 TERMINALS, connections and operating devices 20
5.4.1 GENERAL 22
5.4.2 Equipment RATINGS 22
5.4.3 Equipment installation 22
5.4.4 Equipment 23
5.101 HAZARD indicator 23
6 Protection against electric shock 24
6.5.2.1 General 24
6.5.2.3 PROTECTIVE CONDUCTOR TERMINAL 24
6.5.2.101 Indirect bonding for testing and measuring circuits 24
6.6 Connections to external circuits 26
6.7.1.3 CREEPAGE DISTANCES 28
6.7.1.5 Requirements for insulation according to type of circuit 28
6.8.1 General 29
6.8.3.1 The a.c. voltage test 29
6.8.3.2 The d.c. voltage test 30
6.101 Protection against HAZARDOUS LIVE outputs 30
6.102 Discharging residual voltages 31
7 Protection against mechanical HAZARDS 32
8 Resistance to mechanical stresses 32
9 Protection against the spread of fire and arc flash 32
9.101 Protection of measuring circuits 32
10 Equipment temperature limits and resistance to heat 38
11 Protection against HAZARDS from fluids and solid foreign objects 39
12 Protection against radiation, including laser sources, and against sonic and ultrasonic pressure 39
13 Protection against liberated gases and substances, explosion and implosion 39
14 Components and subassemblies 39
14.101 Probe assemblies and accessories 39
15 Protection by interlocks 39
16 HAZARDS resulting from application 39
17 RISK assessment 39

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101 Measuring circuits 39
101.1 General 39
101.2 Current measuring circuits 40
101.3 Indicating devices 40

Annexes

Annex K (normative) Insulation requirements not covered by 6.7

K.2 Insulation in secondary circuits 44
K.2.1 General 44
K.3 Insulation for circuits not addressed in 6.7, Clause K.1 , Clause K.2 or Clause K.101, and for measuring circuits where MEASUREMENT CATEGORIES do not apply 44
K.3.1 General 44
K.3.2 CLEARANCE calculation 45
K.3.101 CLEARANCES between MAINS circuits and output circuits 48
K.4 Attenuation of TRANSIENT OVERVOLTAGES levels 51
K.101 Insulation requirements for measuring circuits RATED for MEASUREMENT CATEGORIES 54
K.101.1 General 54
K.101.2 CLEARANCES 54
K.101.3 CREEPAGE DISTANCES 55
K.101.4 Solid insulation 55

Annex L (informative) Index of defined terms

Annex AA (normative) MEASUREMENT CATEGORIES

AA.1 General 61
AA.2 MEASUREMENT CATEGORIES 61
AA.2.1 MEASUREMENT CATEGORY II 61
AA.2.2 MEASUREMENT CATEGORY III 61
AA.2.3 MEASUREMENT CATEGORY IV 61
AA.2.4 Measuring circuits without a MEASUREMENT CATEGORY RATING 61

Annex BB (informative) HAZARDS pertaining to measurements performed in certain environments

BB.1 General 65
BB.2 HAZARDS 65
BB.2.1 General 65
BB.2.2 Electric shock 65
BB.2.3 Arc flash and arc blast 65
BB.2.4 Thermal burns 65
BB.3 Telecommunications networks 66
BB.4 Current measurements in inductive circuits 66
BB.5 Battery-driven circuits 66
BB.6 Measurements at higher frequencies 66
BB.7 Measurements using measuring circuits with a FUNCTIONAL EARTH TERMINAL 66

Annex CC (informative) 4 mm “banana” TERMINALS

CC.1 General 68
CC.2 Dimensions 68

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Annex DD (informative) Flowchart for insulation according to the type of circuit

Annex EE (informative) Determination of CLEARANCES for Table 101

Bibliography

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Preface (UL)

This UL Standard is based on IEC Publication 61010-2-034: second edition, Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 2-034: Particular requirements for measurement equipment for insulation resistance and test equipment for electric strength. IEC publication 61010-2-034 is copyrighted by the IEC.

This edition has been issued to satisfy ULSE Standards policy.

This UL Standard 61010-2-034 Standard for Safety for Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 2-034: Particular Requirements for Measurement Equipment for Insulation Resistance and Test Equipment for Electric Strength, is to be used in conjunction with the lastest edition of UL 61010-1. The requirements for measurement equipment for insulation resistance and test equipment for electric strength 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 61010-2-034, the UL 61010-1 subclause applies.

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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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NATIONAL DIFFERENCES

National Differences from the text of International Electrotechnical Commission (IEC) Publication 61010-2-034, Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 2-034: Particular Requirements for Measurement Equipment for Insulation Resistance and Test Equipment for Electric Strength, copyright 2023, are indicated by notations (differences) and are presented in bold text.

There are five types of National Differences as noted below. The difference type is noted on the first line of the National Difference in the standard. The standard may not include all types of these National Differences.

DR – These are National Differences based on the **national regulatory requirements**.

D1 – These are National Differences which are based on **basic safety principles and requirements**, elimination of which would compromise safety for consumers and users of products.

D2 – These are National Differences from IEC requirements based on existing **safety practices**. These requirements reflect national safety practices, where empirical substantiation (for the IEC or national requirement) is not available or the text has not been included in the IEC standard.

DC – These are National Differences based on the **component standards** and will not be deleted until a particular component standard is harmonized with the IEC component standard.

DE – These are National Differences based on **editorial comments or corrections**.

Each national difference contains a description of what the national difference entails. Typically one of the following words is used to explain how the text of the national difference is to be applied to the base IEC text:

Addition / Add - An addition entails adding a complete new numbered clause, subclause, table, figure, or annex. Addition is not meant to include adding select words to the base IEC text.

Modification / Modify - A modification is an altering of the existing base IEC text such as the addition, replacement or deletion of certain words or the replacement of an entire clause, subclause, table, figure, or annex of the base IEC text.

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FOREWORD

INTERNATIONAL ELECTROTECHNICAL COMMISSION

SAFETY REQUIREMENTS FOR ELECTRICAL EQUIPMENT FOR MEASUREMENT, CONTROL, AND LABORATORY USE – Part 2-034: Particular requirements for measurement equipment for insulation resistance and test equipment for electric strength

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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IEC 61010-2-034 has been prepared by IEC technical committee 66: Safety of measuring, control and laboratory equipment. It is an International Standard.

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

This second edition cancels and replaces the first edition published in 2017. This edition constitutes a technical revision.

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

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a) in 1.2.1, requirements for protection against hazards which could occur from reading a voltage have been added to the scope;

b) Clause 2, all normative references have been dated; new normative references have been added;

c) in 4.3.2.5, requirements for power supply have been modified;

d) in 4.3.2.6, requirements for inputs/outputs have been modified;

e) in 5.1.5.101.2, minimum ratings for voltage of measuring terminals are required;

f) in 5.4.2, new ratings for documentation have been added;

g) in 5.4.4, new instructions for operation have been added;

h) in 5.101.1, hazard indicators shall be functional in normal condition and in single fault condition;

i) in 6.6.101.1, insulating material of group I may be allowed for determination of creepage distances of measuring circuit terminals;

j) in 6.6.101.2, Clearances and creepage distances above 1 000 V a.c. and 1 500 V d.c. for measuring circuit terminals in unmated position have been defined;

k) in 6.6.101.3, requirements for measuring circuit terminals in partially mated position have been specified;

l) in 6.6.101.4, requirements for measuring circuit terminals in mated position have been specified;

m) Subclause 6.102 replaces 6.9.103 and has been rephrased;

n) new Subclause 9.101 to consider the protection of measuring circuits against the spread of fire and arc flash has been added. Table 102 has been replaced by Table K.101;

o) In 9.101.2, relocation of 101.3 of previous edition;

p) In 9.101.3, relocation of 101.4 of previous edition, extension to measurement category II and reference to IEC 61000-4-5 for tests;

q) in 9.101.4, requirements for measuring circuit terminals in mated position have been specified;

r) in 9.101.5, relocation of K.103 of previous edition with numerous technical changes;

s) in 14.101, relocation of 14.102. 14.101 of previous edition has been removed;

t) in 101.3, relocation of 101.5 of previous edition, and more requirements added against hazard occurring from reading a voltage value;

u) in K.2.1, another method for determination of clearances of secondary circuits is proposed;

v) in K.3.2, new Table K.15 and Table K.16 for clearance calculation;

w) in K.3.101, relocation of 6.9.104 of previous edition;

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x) in K.101.4.1, new Table K.103 and Table K.104 replace Table K.102, Table K.103 and Table K.104;

y) in K.101.4, the subclause has been reviewed. Tables and tests for solid insulation have been modified. Table K.105 replaces Table K.9;

z) Table K.101, replacement of Table K.106;

aa) Clause K.4, redraft of the clause to propose a method for determination of Ut for circuits which reduce transient overvoltage;

bb) Annex EE: addition of a new informative annex for determination of clearances for Table 101.

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

Draft	Report on voting
66/778/FDIS	66/784/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at .www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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*, can be found on the IEC website.

This document is to be used in conjunction with IEC 61010-1:2010 and IEC 61010-1:2010/AMD1:2016.

This document supplements or modifies the corresponding clauses in IEC 61010-1 so as to convert that publication into the IEC standard: *Particular requirements for measurement equipment for insulation resistance and test equipment for electric strength*.

Where a particular subclause of IEC 61010-1 is not mentioned in this document, that subclause applies as far as is reasonable. Where this document states "addition", "modification", "replacement", or "deletion", the relevant requirement, test specification or note in IEC 61010-1 should be adapted accordingly.

In this standard:

• 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;

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• subclauses, figures, tables and notes which are additional to those in IEC 61010-1 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 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.

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101DV DE ***Modification to add the following to IEC Foreword:***

The numbering system in the standard uses a space instead of a comma to indicate thousands and uses a comma instead of a period to indicate a decimal point. For example, 1 000 means 1,000 and 1,01 means 1.01.

102DV DE ***Modification to add the following to the IEC Foreword:***

For this Standard, all references to “IEC 61010-1:2010” or “IEC 61010-1:2010/AMD1:2016 ” refer to UL 61010-1.

For this Standard, all references to IEC 61010-2-030, IEC 61010-2-032 and IEC 61010-2-033 refer to UL versions of the particulars.

For this Standard, all references to IEC 61010-031 refer to UL 61010-031.

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INTRODUCTION

IEC 61010-1 specifies the safety requirements that are generally applicable to all equipment within its scope. For certain types of equipment, the requirements of IEC 61010-1 and its amendment will be supplemented or modified by the special requirements of one or more standard from the IEC 61010-2 series which is/are read in conjunction with the requirements of IEC 61010-1.

1) IEC 61010-2-030 specifies the safety requirements for equipment with testing or measuring circuits which are connected for test or measurement purposes to devices or circuits outside the measurement equipment itself.

2) IEC 61010-2-032 specifies the safety requirements for hand-held and hand manipulated current sensors for measuring, detecting or injecting current, or indicating current waveforms on circuits without physically opening the current path of the circuit being measured.

Most of the requirements of IEC 61010-2-030 have been included in IEC 61010-2-032. Equipment within the scopes of both IEC 61010-2-030 and IEC 61010-2-032 are considered to be covered by the requirements of IEC 61010-2-032.

However, for current sensors in combined equipment with protective bonding and automatic disconnection of the supply, IEC 61010-2-030 and IEC 61010-2-032 are read in conjunction.

3) IEC 61010-2-033 specifies the safety requirements for hand-held multimeters and other meters for domestic and professional use, capable of measuring mains voltage, intended to measure voltage and other electrical quantities such as resistance or current.

All relevant requirements of IEC 61010-2-030 have been included in IEC 61010-2-033.

4) This document specifies the safety requirements for measurement equipment for insulation resistance and test equipment for electric strength which are connected to units, lines or circuits for test or measurement purposes.

All relevant requirements of IEC 61010-2-030 have been included in this document. However, for equipment within the scope of IEC 61010-2-032 and of this document, these standards are read in conjunction.

IEC 61010-031 specifies the safety requirements for hand-held and hand-manipulated probe assemblies and their related accessories intended to be used in particular with equipment in the scope of IEC 61010-2-030, IEC 61010-2-032, IEC 61010-2-033 and this document. These probe assemblies are for non-contact or direct electrical connection between a part and electrical test and measurement equipment. They may be fixed to the equipment or be detachable accessories for the equipment.

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SAFETY REQUIREMENTS FOR ELECTRICAL EQUIPMENT FOR MEASUREMENT, CONTROL, AND LABORATORY USE – Part 2-034: Particular requirements for measurement equipment for insulation resistance and test equipment for electric strength

1 Scope and object

IEC 61010-1:2010, Clause 1 and IEC 61010-1:2010/AMD1:2016, Clause 1 apply except as follows:

1.1.1 Equipment included in scope

Replace the existing text with the following:

This document specifies safety requirements to equipment for measuring insulation resistance and to equipment for testing electric strength which have an output voltage exceeding 50 V a.c. or 120 V d.c.

This document also applies to combined measuring equipment which has an insulation resistance measurement function or an electric strength test measurement function.

This group safety publication focusing on safety essential requirements is primarily intended to be used as a product safety standard for the products mentioned in the scope, but is also intended to be used by technical committees in the preparation of publications for products similar to those mentioned in the scope of this document, in accordance with the principles laid down in IEC Guide 104 and ISO/IEC Guide 51.

One of the responsibilities of a technical committee is, wherever applicable, to make use of basic safety publications and/or group safety publications in the preparation of its publications.

1.1.2 Equipment excluded from scope

Add the following new items to the list:

aa) IEC 61557-8 (Electrical safety in low voltage distribution systems up to 1 000 V a.c. and 1 500 V d.c. – Equipment for testing, measuring or monitoring of protective measures – Part 8: Insulation monitoring devices for IT systems);

bb) IEC 61557-9 (Electrical safety in low voltage distribution systems up to 1 000 V a.c. and 1 500 V d.c. – Equipment for testing, measuring or monitoring of protective measures – Part 9: Equipment for insulation fault location in IT systems).

1.2.1 Aspects included in scope

Replace item c) of the second paragraph with the following new item c):

c) spread of fire or arc flash from the equipment (see Clause 9);

Replace the third paragraph with the following two new paragraphs:

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Requirements for protection against HAZARDS arising from NORMAL USE, REASONABLY FORESEEABLE MISUSE and ergonomic factors are specified in Clause 16 and Clause 101.

Annex BB provides guidance to equipment manufacturers on HAZARDS that should be considered for equipment intended for performing tests and measurements on hazardous conductors, including MAINS conductors and telecommunication network conductors.

2 Normative references

IEC 61010-1:2010, Clause 2 and IEC 61010-1:2010/AMD1:2016, Clause 2 apply except as follows:

Replace the following existing normative references:

IEC 60364-4-44:2007, *Low-voltage electrical installations – Part 4-44: Protection for safety – Protection against voltage disturbances and electromagnetic disturbances*
IEC 60364-4-44:2007/AMD1:2015

IEC 61010-031, *Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 031: Safety requirements for hand-held probe assemblies for electrical measurement and test*

IEC 61180 (all parts), *High-voltage test techniques for low-voltage equipment*

IEC 61180-1, *High-voltage test techniques for low-voltage equipment – Part 1: Definitions, test and procedure requirements*

IEC 61180-2, *High-voltage test techniques for low-voltage equipment – Part 2: Test equipment*

IEC 61672-1, *Electroacoustics – Sound level meters – Part 1: Specifications*

IEC 61672-2, *Electroacoustics – Sound level meters – Part 2: Pattern evaluation tests*

with the following new normative references:

IEC 60364-4-44:2007, *Low-voltage electrical installations – Part 4-44: Protection for safety – Protection against voltage disturbances and electromagnetic disturbances*
IEC 60364-4-44:2007/AMD1:2015
IEC 60364-4-44:2007/AMD2:2018

IEC 61010-031:2022, *Safety requirements for electrical equipment for measurement, control and laboratory use – Part 031: Safety requirements for hand-held and hand-manipulated probe assemblies for electrical test and measurement*

IEC 61180:2016, *High-voltage test techniques for low-voltage equipment – Definitions, test and procedure requirements, test equipment*[1]

[1] IEC 61180:2016 replaces everywhere IEC 61180, IEC 61180-1 and IEC 61180-2 are referenced in IEC 61010-1.

IEC 61672-1:2013, *Electroacoustics – Sound level meters – Part 1: Specifications*

IEC 61672-2:2013, *Electroacoustics – Sound level meters – Part 2: Pattern evaluation tests*
IEC 61672-2:2013/AMD1:2017

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Add the following new normative references:

IEC 61000-4-5:2014, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*
IEC 61000-4-5:2014/AMD1:2017

IEC 61010-2-032, *Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 2-032: Particular requirements for hand-held and hand-manipulated current sensors for electrical test and measurement*

2DV DR *Modification: Add the following*

The requirements of this UL Standard shall take precedence over the International Standard on which it is based; any reference within this standard to the International Standard shall be replaced by a reference to the equivalent US Standard.

3 Terms and definitions

IEC 61010-1:2010, Clause 3 and IEC 61010-1:2010/AMD1:2016, Clause 3 apply except as follows:

3.5 Safety terms

Replace the definition of 3.5.4 with the following new definition:

3.5.4
MAINS
electricity supply system

Add the following new term and definition:

3.5.101
MEASUREMENT CATEGORY
classification of testing and measuring circuits according to the type of MAINS to which they are intended to be connected

4 Tests

IEC 61010-1:2010, Clause 4 and IEC 61010-1:2010/AMD1:2016, Clause 4 apply except as follows:

4.3.2.5 MAINS supply

Replace the existing title and text with the following:

4.3.2.5 Power supply

The following requirements apply:

a) the voltage of the power supply connected to the mains shall be between 90 % and 110 % of any RATED supply voltage for which the equipment can be set or, if the equipment is RATED for a greater fluctuation, at any supply voltage within the fluctuation range;

b) the MAINS frequency shall be any RATED frequency;

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