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Explanation ~~of the mathematical addition of working voltages, insulation between circuits and use of PELV~~ and background information on electrical safety requirements in TC 34 standards

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CONTENTS

FOREWORD 3
INTRODUCTION 5
1 Scope 6
2 Normative references 6
3 Terms and definitions 6
4 Calculation of increased working voltage in case of insulation failure 6
5 Insulation between circuits 9
5.1 General 9
5.2 Insulation requirements between live parts and accessible conductive parts 9
5.3 Possible failure conditions 12
6 Circuits analysis 13
7 Use of PELV 15
7.1 General 15
7.2 Characteristics of PELV (protective extra low voltage) circuits 16
7.3 Description of requirements for PELV circuits in addition to SELV 16
7.3.1 Voltage limitations 16
7.3.2 Touch current and protective conductor current 17
7.4 Summary of the proposed changes to IEC 60598-1 [4] and IEC 61347-1 [5] 18
8 Insulation between LV supply and control line conductors 19
9 Summation of touch currents in a connected lighting system 19
10 Examples of insulation coordination situations between controlgear and luminaire 21
Bibliography 23

Figure 1 – Input/output failure simulation 8
Figure 2 – Examples of controlgear with different insulation systems 11
Figure 3 – Condition A: Failure between input and output circuits 12
Figure 4 – Condition B: Earth failure/equipotential bonding failure (interruption of athe connection continuity) 12
Figure 5 – Condition C: Insulation failure between output circuits and accessible earthed metal part 12
Figure 6 – Condition D: Insulation failure between output circuit to conductive parts which are connected together (equipotential bonding) 13
Figure 7 – Condition E: Insulation failure between output circuit and different conductive parts not connected together (no equipotential bonding) 13
Figure 8 – PELV circuit in the most adverse condition (touch voltage is the sum of U_E and U_2) 17
Figure 9 – PELV circuit with a person located in an equipotential location (touch voltage is U_2 only) 17
Figure 10 – Possible danger of electric shock in a connected lighting system. 20
Figure 11 – Situation in non-connected luminaire 21
Figure 12 – Example of schematic drawings, showing the insulation coordination with different controlgear situations 22

Table 1 – Addition of voltages 7
Table 2 – Insulation requirements between ~~active~~ live parts and accessible conductive parts 10
Table 3 – Circuit analysis overview 13

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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IEC TR 63139 has been prepared by IEC technical committee 34: Lighting. It is a Technical Report.

This second edition cancels and replaces the first edition published in 2018. This edition constitutes a technical revision.

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

a) new title and scope to enable the adding of further new subjects to the content of this document in the future;
b) new Clause 9 providing background information regarding the possible addition of currents in a lighting installation where luminaires are interconnected via their control ports;
c) new Clause 10 transferring Annex S of IEC 61347-1:2015 [1] (Examples of controlgear insulation coordination) from the controlgear safety standard into this document.

The text of this Technical Report is based on the following documents:

Draft	Report on voting
34/1416/DTR	34/1435/RVDTR

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 Technical Report 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.

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, or
– revised.

INTRODUCTION

This document provides background information to the following subjects being introduced into IEC TC 34 standards to cover new technologies associated with the use of LED light sources and controllable products.

This document consists of the following subdivisions:

Clause 4 - ~~Mathematical addition of working voltages~~ Calculation of increased working voltage in case of insulation failure;

Clause 5 - Insulation between circuits following the circuits analysis in Clause 6;

Clause 7 - Use of protective extra low voltage (PELV);

Clause 8 - Insulation between LV supply and control line conductors;

Clause 9 - Summation of touch currents in a connected lighting system;

Clause 10 - Examples of insulation coordination situations between controlgear and luminaire.

1 Scope

~~This document is related to the insulation coordination in TC 34 standards and provides explanations on mathematical addition of working voltages, insulation between circuits, use of protective extra low voltage (PELV) and insulation between LV supply and control line conductors in order to cover new technologies associated with the use of LED light sources and controllable products.~~

~~It describes in which way the addition of supply voltages and working voltages can be arranged for an assessment of the electrical insulation requirements (e.g. creepage distances and clearances) in a system if a first failure occurs.~~

~~Furthermore the actual failure scenarios given in IEC 60598-1:2014 and IEC 60598-1:2014/AMD1:2017, Annex X and IEC 61347-1:2015, Clause 15 are explained in greater detail and the rationale behind the protective requirement for each situation is given (e.g. possible LV primary to ELV secondary does not lead to an overburden of the insulation in the second circuit).~~

~~This document also describes the possibility to increase immunity and reliability of electronic circuits, used in combination with LEDs, with the use of PELV and the associated safety consequences for this system.~~

~~The insulation between LV supply and control line conductors is also important and this document explains why this is an essential safety consideration for a complete installation system.~~

This document provides explanations and background information on electrical safety requirements in TC 34 standards.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

– IEC Electropedia: available at https://www.electropedia.org/

– ISO Online browsing platform: available at https://www.iso.org/obp

4 ~~Mathematical addition of working voltages~~ Calculation of increased working voltage in case of insulation failure

Insulation requirements between live parts and accessible conductive parts as a function of the controlgear input/output insulation classification and the insulation class of the luminaire are given in ~~IEC 60598-1:2014, Table X.1 and IEC 61347-1:2015, Table 6~~ IEC 60598-1:2024 [2], Table T.1 and IEC 61347-1:2024 [3], Table M.1.

Insulation requirements in TC 34 standards are based on a hazard assessment with the assumption that a certain failure will occur.

The required insulation is normally based on the working voltage U_{OUT}, but in some specific failure cases when the basic insulation between supply and output of a controlgear fails, the