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TECHNICAL REPORT

Unified fluorescent lamp dimming standard calculations

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FOREWORD

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IEC 62750, which is a technical report, has been prepared by subcommittee 34A: Lamps, of IEC technical committee 34: Lamps and related equipment.

The text of this technical report is based on the following documents:

Enquiry draft	Report on voting
34A/1511/DTR	34A/1546/RVC

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

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

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

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- withdrawn,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

A bilingual version of this publication may be issued at a later date.

UNIFIED FLUORESCENT LAMP DIMMING STANDARD CALCULATIONS

1 Scope

This Technical Report applies to fluorescent lamp dimming systems. It deals with the interface of fluorescent lamps and dimming electronic controlgear. A unified framework for standardization of fluorescent lamp dimming systems and the associated parameter calculation method are described in this Technical Report.

Dimming of fluorescent lamps is becoming increasingly important as a strategy for conserving global energy resources. This report is the result of many years of effort by global experts to understand and test fluorescent dimming systems with the objective of standardizing these systems to grow confidence and reliability in the marketplace. Two theoretical frameworks have been merged to create this unified dimming standardization method: the SoS (sum of squares of lead-in-wire currents) and CV (cathode voltage) models. The application of dimming to actual fluorescent lamp and electronic controlgear (ECG) systems is the primary concern for reliability in the application and end-user confidence. Characteristics of the dimming parameter limits described in this report and observed in real system applications such as in situ field diagnostics are offered as informative. The practical need to use substitution resistors for ECG qualification is described in this report and also given as normative parameters in the lamp and ECG standards. No attempt to treat the informative real lamp-ECG system parameters as normative will be made in either the lamp or the controlgear standards.

2 Explanation of the dimming requirements

2.1 General

This clause gives a general explanation of the dimming requirements found in the fluorescent lamp and controlgear standards. Subclause 2.2 provides an overview of the theoretical framework for the unified dimming standard. Subclause 2.3 provides an explanation of informative limits for the cathode heating based on physical lamp and ECG systems. Subclause 2.4 provides the basis for normative controlgear qualification using substitution resistors. In this Technical Report, the use of primed quantities will signify values obtained when measuring on actual fluorescent lamp and ECG systems. Unprimed quantities refer to standardised quantities when testing ECG on substitution resistors. Although lead wire and lamp discharge currents pertain to actual lamps, they will remain unprimed quantities in this report.

2.2 Additional heating

It is a well-known fact that, when lowering the lamp current to decrease the luminous flux (dimming) below a certain current value, the cathode is not heated sufficiently any more by the lamp current. At these dimmed conditions without added ohmic heating, the cathode fall will increase to sustain the lamp current and this results in an increased sputtering of the cathode and thereby a decrease in lamp life. So additional cathode heating is necessary to keep the cathode at a sufficiently high temperature for thermionic emission. The amount of this additional heating current through the cathodes as a function of the lamp current is however dependent on the controlgear circuit layout. There may be a phase shift between these currents like in circuits with a capacitor parallel to the lamp. In other circuits, the additional heating current is delivered by separate heating sources, in which case it is not clear through which lead-in wire which part of the lamp current flows. For a generalized description, these different circuits are included when describing the controlgear requirements.