

TECHNICAL REPORT

RAPPORT TECHNIQUE

A method of temperature-rise verification of low-voltage switchgear and controlgear assemblies by calculation

Méthode de vérification par calcul des échauffements pour les ensembles d'appareillage à basse tension



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

A METHOD OF TEMPERATURE-RISE VERIFICATION OF LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR ASSEMBLIES BY CALCULATION

FOREWORD

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IEC/TR 60890, which is a technical report, has been prepared by subcommittee 17D: Low-voltage switchgear and controlgear assemblies, of IEC technical committee 17: Switchgear and controlgear.

This second edition cancels and replaces the first edition published in 1987 and its Amendment 1:1995. It constitutes a technical revision.

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

- alignment with IEC 61439-1:2011;
- revision of Annex B;
- general editorial review.

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

Enquiry draft	Report on voting
17D/490/DTR	17D/499/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- withdrawn,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.

INTRODUCTION

In IEC 61439-1, in the series of design verifications, a temperature-rise verification of low-voltage power switchgear and controlgear assemblies (hereafter called ASSEMBLIES) is specified. This may be by test, however, alternatives are acceptable in defined circumstances. Selection of the method used for temperature rise verification is the responsibility of the original manufacturer. Where applicable this technical report may also be used for temperature rise verification of similar products in accordance with other standards. The factors and coefficients, set out in this report have been derived from measurements on numerous ASSEMBLIES and the method has been verified by comparison with test results.

A METHOD OF TEMPERATURE-RISE VERIFICATION OF LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR ASSEMBLIES BY CALCULATION

1 Scope

This Technical Report specifies a method of temperature-rise verification of low-voltage switchgear and controlgear ASSEMBLIES by calculation.

The method is applicable to enclosed ASSEMBLIES or partitioned sections of ASSEMBLIES without forced ventilation. It is not applicable where temperature rise verification to the relevant product standard of the IEC 61439 series has been established

NOTE 1 The influence of the materials and wall thicknesses usually used for enclosures can have some effect on the steady state temperatures. However, the generalised approach used in this technical report ensures it is applicable to enclosures made of sheet steel, sheet aluminium, cast iron, insulating material and the like.

The proposed method is intended to determine the temperature rise of the air inside the enclosure.

NOTE 2 The air temperature within the enclosure is equal to the ambient air temperature outside the enclosure plus the temperature rise of the air inside the enclosure caused by the power losses of the installed equipment.

Unless otherwise specified, the ambient air temperature outside the ASSEMBLY is the air temperature indicated for the installation (average value over 24 h) of 35 °C. If the ambient air temperature outside the ASSEMBLY at the place of use exceeds 35 °C, this higher temperature is deemed to be the ambient air temperature.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61439-1:2011, *Low-voltage switchgear and controlgear assemblies – Part 1: General rules*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61439-1 apply.

4 Conditions for application

This method of calculation is only applicable if the following conditions are fulfilled:

- the power loss data for all built in components is available;
- there is an approximately even distribution of power losses inside the enclosure;
- the installed equipment is so arranged that air circulation is not significantly impeded;
- the equipment installed is designed for direct current or alternating current up to and including 60 Hz with the total of supply currents not exceeding 3 150 A;
- conductors carrying currents in excess of 200 A, and the adjacent structural parts are so arranged that eddy-current and hysteresis losses are minimised;
- for enclosures with natural ventilation, the cross-section of the air outlet openings is at least 1,1 times the cross-section of the air inlet openings;