



# SLOVENSKI STANDARD SIST CLC/TR 60890:2003

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SIST HD 528 S1:1998  
SIST HD 528 S2:1999

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## A method of temperature-rise assessment by extrapolation for partially type-tested assemblies (PTTA) of low-voltage switchgear and controlgear

A method of temperature-rise assessment by extrapolation for partially type-tested assemblies (PTTA) of low-voltage switchgear and controlgear

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Verfahren zur Ermittlung der Erwärmung von partiell typgeprüften Niederspannungs-Schaltgerätekombinationen (PTSK) durch Extrapolation

[SIST CLC/TR 60890:2003](https://standards.itih.ai/cat-log/standards/sist/9ab3fba2-dcf2-40e6-8161-526cd76cc960/sist-clc-tr-60890-2003)

Méthode de détermination par extrapolation des échauffements pour les ensembles d'appareillage à basse tension dérivés de série (EDS)

Ta slovenski standard je istoveten z: **CLC/TR 60890:2002**

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### ICS:

|           |   |  |
|-----------|---|--|
| 29.130.20 | Nizkonapetostne stikalne in krmilne naprave | Low voltage switchgear and controlgear |
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STANDARD**

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ICS 29.130.20

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TECHNICAL REPORT  
RAPPORT TECHNIQUE  
TECHNISCHER BERICHT

**CLC/TR 60890**

July 2002

ICS 29.120.60

Replaces HD 528 S2:1997

English version

**A method of temperature-rise assessment by  
extrapolation for partially type-tested assemblies (PTTA) of  
low-voltage switchgear and controlgear  
(IEC 60890/TR3:1987 + corrigendum 1988 + A1:1995)**

Méthode de détermination par  
extrapolation des échauffements pour  
les ensembles d'appareillage à basse  
tension dérivés de série (EDS)  
(CEI/TR3 60890:1987 + corrigendum  
1988 + A1:1995)

Verfahren zur Ermittlung der Erwärmung  
von partiell typgeprüften Niederspannungs-  
Schaltgerätekombinationen (PTSK)  
durch Extrapolation  
(IEC/TR3 60890:1987 + Corrigendum 1988  
+ A1:1995)

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This Technical Report was approved by CENELEC on 2002-07-02.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

**CENELEC**

European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

### Foreword

The text of the Technical Report IEC/TR3 60890:1987 + corrigendum March 1988 + A1:1995, prepared by SC 17D, Low-voltage switchgear and controlgear assemblies, of IEC TC 17, Switchgear and controlgear, was approved by CENELEC as HD 528 S2 on 1996-12-09.

At the request of the Technical Committee CENELEC TC 17D, Low-voltage switchgear and controlgear assemblies, this Harmonization Document was submitted to the formal vote for conversion into a European Standard. By decision D112/041 of the CENELEC Technical Board, it was approved as CLC/TR 60890 on 2002-07-02.

Annex ZA has been added by CENELEC.

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### Endorsement notice

The text of the Technical Report IEC/TR3 60890:1987 + corrigendum March 1988 + A1:1995 was approved by CENELEC as a Technical Report without any modification.

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## Annex ZA

### References to international publications with their corresponding European publications

This Technical Report incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this Technical Report only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

| <u>Publication</u>   | <u>Year</u> | <u>Title</u>   | <u>EN/HD</u> | <u>Year</u>        |
|----------------------|-------------|--|--------------|--------------------|
| IEC 60439-1<br>(mod) | 1985        | Low-voltage switchgear and controlgear assemblies<br>Part 1: Requirements for type-tested and partially type-tested assemblies | EN 60439-1   | 1990 <sup>1)</sup> |

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<sup>1)</sup> EN 60439-1 is superseded by EN 60439-1:1999 based on IEC 60439-1:1999.

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# RAPPORT DE LA CEI IEC REPORT

CEI  
IEC  
890

Première édition  
First edition  
1987



Commission Electrotechnique Internationale  
International Electrotechnical Commission  
Международная Электротехническая Комиссия

**Méthode de détermination par extrapolation  
des échauffements pour les ensembles d'appareillage  
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**A method of temperature-rise assessment by extrapolation  
for partially type-tested assemblies (PTTA) of low-voltage  
switchgear and controlgear**

## CONTENTS

|  | Page |
|--|------|
| FOREWORD . . . . .   | 5    |
| PREFACE . . . . .  | 5    |
| Clause   |      |
| 1. Introduction . . . . .  | 7    |
| 2. Scope . . . . .   | 7    |
| 3. Object . . . . .  | 7    |
| 4. Conditions for application . . . . .  | 7    |
| 5. Calculation . . . . .   | 9    |
| 5.1 Necessary information . . . . .  | 9    |
| 5.2 Calculation procedure . . . . .  | 9    |
| 6. Evaluation of the design . . . . .  | 15   |
| APPENDIX A — Examples for the calculation of the temperature rise of air inside enclosures | 37   |

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SIST CLC/TR 60890:2003

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

A METHOD OF TEMPERATURE-RISE ASSESSMENT  
BY EXTRAPOLATION  
FOR PARTIALLY TYPE-TESTED ASSEMBLIES (PTTA)  
OF LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR

## FOREWORD

- 1) The formal decisions or agreements of the IEC on technical matters, prepared by Technical Committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.
- 2) They have the form of recommendations for international use and they are accepted by the National Committees in that sense.
- 3) In order to promote international unification, the IEC expresses the wish that all National Committees should adopt the text of the IEC recommendation for their national rules in so far as national conditions will permit. Any divergence between the IEC recommendation and the corresponding national rules should, as far as possible, be clearly indicated in the latter.
- 4) The IEC has not laid down any procedure concerning marking as an indication of approval and has no responsibility when an item of equipment is declared to comply with one of its recommendations.

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## PREFACE

This report has been prepared by Sub-Committee 17D: Low-voltage Switchgear and Controlgear Assemblies, of IEC Technical Committee No. 17: Switchgear and Controlgear.

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

|                  |                  |
|------------------|------------------|
| Six Months' Rule | Report on Voting |
| 17D(CO)31        | 17D(CO)32        |

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

*The following IEC publication is quoted in this report:*

Publication No. 439-1 (1985): Low-voltage Switchgear and Controlgear Assemblies, Part 1: Requirements for Type-tested and Partially Type-tested Assemblies.

## A METHOD OF TEMPERATURE-RISE ASSESSMENT BY EXTRAPOLATION FOR PARTIALLY TYPE-TESTED ASSEMBLIES (PTTA) OF LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR

### 1. Introduction

In IEC Publication 439-1, in the series of type tests, a temperature-rise test is specified. However, for certain types of assemblies for which the performance of a temperature-rise test is either not feasible or economically not justifiable a calculation of the temperature rise in the form of extrapolation from data found by tests on other assemblies may be made instead. Such assemblies are then called partially type-tested assemblies (PTTA).

Various methods of calculation can be conceived and are acceptable. 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. The method described in this report is therefore one possible method and may for partially type-tested assemblies be used to prove compliance with the requirements of Sub-clause 8.2.1 of IEC Publication 439-1. This report applies to PTTAs only.

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### 2. Scope

The following method is applicable to enclosed PTTA or partitioned sections of PTTA without forced ventilation.

*Notes 1.* — The influence of the materials and wall thicknesses usually used for enclosures are negligible on the steady state temperatures. The method is therefore applicable to enclosures made of sheet steel, sheet aluminium, cast iron, insulating material and the like.

*2.* — For open-type and dead-front PTTA, no temperature-rise assessment is needed if it is obvious that no excessive air temperatures are likely to arise.

### 3. Object

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

*Note.* — 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 PTTA is the air temperature indicated for indoor installation of the PTTA (average value over 24 h) of 35°C. If the ambient air temperature outside the PTTA at the place of use exceeds 35°C, this higher temperature is deemed to be the ambient air temperature of the PTTA.

### 4. Conditions for application

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

- there is an approximately even distribution of power losses inside the enclosure;
- the installed equipment is so arranged that air circulation is but little 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 high currents and structural parts are so arranged that eddy-current losses are negligible;
- for enclosures with ventilating openings, the cross-section of the air outlet openings is at least 1.1 times the cross-section of the air inlet openings;
- there are no more than three horizontal partitions in the PTTA or a section of it;
- where enclosures with external ventilating openings have compartments, the surface of the ventilating openings in each horizontal partition shall be at least 50% of the horizontal cross-section of the compartment.

## 5. Calculation

### 5.1 Necessary information

The following data are needed to calculate the temperature rise of the air inside an enclosure:

- dimensions of the enclosure: height/width/depth;
- the type of installation of the enclosure according to Figure 4, page 25;
- design of enclosure, i.e. with or without ventilation openings;
- number of internal horizontal partitions;
- effective power loss of equipment installed in the enclosure.

*Note.* — The effective power losses of the equipment installed in the circuits of the PTTA used for this calculation are the power losses at the rated currents of the various circuits to be taken from information provided by the manufacturer. The power losses of the conductors are determined by calculation.

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### 5.2 Calculation procedure

For the enclosures specified in columns 4 and 5 of Table I, the calculation of the temperature rise of the air inside the enclosures is carried out using the formulae laid down in columns 1 to 3 of Table I.

The pertinent factors and exponents (characteristics) are obtained from columns 6 to 10 of Table I.

The symbols, units and designations are to be taken from Table II.

For enclosures having more than one section with vertical partitions the temperature rise of the air inside the enclosure shall be determined separately for each section.

Where enclosures without vertical partitions or individual sections have an effective cooling surface greater than 11.5 m<sup>2</sup> or a width greater than about 1.5 m, they should be divided for the calculation into fictitious sections, whose dimensions approximate to the foregoing values.

*Note.* — The form shown on page 35 may be used as a calculation aid.

#### 5.2.1 Determination of the effective cooling surface $A_e$ of the enclosure

The calculation is carried out according to formula (1) in column 1 of Table I.

The effective cooling surface  $A_e$  of an enclosure is the sum of the individual surfaces  $A_o$  multiplied by the surface factor  $b$ . This factor takes into account the heat dissipation of the individual surfaces according to the type of installation of the enclosure.