IEC 60287-2-3

Edition 1.0 2017-04

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Electric cables – Calculation of the current rating
Part 2-3: Thermal resistance – Cables installed in ventilated tunnels

Câbles électriques – Calcul du courant admissible –
Partie 2-3: Résistance thermique – Câbles posés dans les tunnels ventilés

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ELECTRIC CABLES – CALCULATION OF THE CURRENT RATING –

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FOREWORD

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International Standard IEC 60287-2-3 has been prepared by IEC technical committee 20: Electric cables.

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

FDIS	Report on voting
20/1707/FDIS	20/1720/RVD

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

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

A list of all parts in the IEC 60287 series, published under the general title *Electric cables – Calculation of the current rating*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://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- withdrawn,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.

INTRODUCTION

In the IEC 60287 series, IEC 60287-1 provides general formulae for ratings and power losses of electric cables.

IEC 60287-2 presents formulae or calculation methods for thermal resistances.

IEC 60287-2-1 provides calculation methods for dealing with cables installed in free air (see IEC 60287-2-1:2015,4.2.1).

IEC 60287-2-2 provides a method and data for calculating reduction factors for cables in groups running horizontally in free air.

IEC 60287-2-1 and IEC 60287-2-2 consider heat transfer only in a plane perpendicular to the cables; they assume there is no longitudinal heat transfer.

This part of IEC 60287 deals with the rating for cables installed in ventilated tunnels. In such situations, consideration of longitudinal temperature gradients is involved as the air flowing in the tunnel removes some heat from the cables.

Heat transfer with the moving air is convective and is assumed to be either laminar or turbulent depending on the air velocity. The transition situation between laminar and turbulent air flows is ignored.

A general simplified method is provided to estimate the permissible current-carrying capacity of cables installed in ventilated tunnels, the ventilation being either natural or forced.

Only steady states are considered, where the inlet air temperature and the cable loading are constant for a sufficient time for steady temperatures to be achieved.

Where multiple circuits are involved, their characteristics are assumed to be identical.

The main features of the calculation method for cables in tunnels with forced ventilation can be found in Electra n°143 – 144 (1992)[1][1], as the report of a CIGRE working group, including the erratum in Electra n°209 (2003).

1 Numbers in square brackets refer to the Bibliography.

ELECTRIC CABLES – CALCULATION OF THE CURRENT RATING –

Part 2-3: Thermal resistance – Cables installed in ventilated tunnels

1 Scope

This part of IEC 60287 describes a method for calculating the continuous current rating factor for cables of all voltages installed in ventilated tunnels. The method is applicable to any type of cable.

The method applies to natural as well as forced ventilation.

Longitudinal heat transfer within the cables and the surroundings of the tunnel is assumed to be negligible.

All cables are assumed to be identical within the tunnel and it is assumed that the tunnel cross-section does not change with distance along the tunnel.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60287-1-1, *Electric cables – Calculation of the current rating – Part 1-1: Current rating equations (100 % load factor) and calculation of losses – General*

IEC 60287-2-1:2015, *Electric cables – Calculation of the current rating – Part 2-1: Thermal resistance – Calculation of thermal resistance*

3 Terms, definitions and symbols

3.1 Terms and definitions

No terms and definitions are listed in this document.

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

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.2 Symbols

h	heat dissipation coefficient given in IEC 60287-2-1 for cables in still air	$W/m^2 \cdot K^{5/4}$
n	number of conductors in a cable	-
z	coordinate corresponding to the tunnel axis	m
A_t	inner tunnel cross-sectional area	m^2
C_{av}	heat capacity of the air flow	W/K