PD IEC TR 60479-4:2020

BSI Standards Publication

Effects of current on human beings and livestock

Part 4: Effects of lightning strokes

bsi.

National foreword

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A list of organizations represented on this committee can be obtained on request to its secretary.

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Effects of current on human beings and livestock –
Part 4: Effects of lightning strokes

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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EFFECTS OF CURRENT ON HUMAN BEINGS AND LIVESTOCK –

Part 4: Effects of lightning strokes

FOREWORD

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The main task of IEC technical committees is to prepare International Standards. However, a technical committee may propose the publication of a Technical Report when it has collected data of a different kind from that which is normally published as an International Standard, for example "state of the art".

IEC TR 60479-4, which is a Technical Report, has been prepared by IEC technical committee 64: Electrical installations and protection against electric shock.

This third edition cancels and replaces the second edition published in 2011. This edition constitutes a technical revision.

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

a) lightning occurence and climatory effects around the world are depicted;
b) direct strike description is extended;
c) step voltage effects are expanded;
d) upward streamer explanation is enhanced;

e) other direct or indirect related effects to lightning injuries to the human body are specified;

f) various safety procedures and related possibilities with respect to the personsal danger of lightning are presented.

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

Draft TR	Report on voting
64/2369/DTR	64/2398/RVDTR

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

A list of all parts in the IEC 60479 series, published under the general title *Effects of current on human beings and livestock*, 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.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

IEC 60479-1 and IEC 60479-2 deal with the effect of electric shock derived from electrical systems on the bodies of human beings and livestock. This document describes the influence and effect of electricity in the form of lightning strikes. Lightning current can consist of several uni-polar and/or bi-polar impulses with different peak values and durations; IEC 60479-2:2019, Clause 6 does not cover these effects.

The interaction of a lightning stroke with the body is often different from that of electric shock derived from electrical systems. If the head is struck, the electrical path may include the brain stem, which includes the respiratory centre.

IEC 60479-2 includes information related to the effects of short duration impulses which extend to the magnitude and duration of lightning impulses.

It is accepted that more than 70 % of lightning accidents involving humans are not fatal [36], [47][1]. Corresponding reliable data for livestock is not known. There is a large variation in outcome due to different environments, different activities of people and knowledge of first aid and quality of medical care [40],[47].

It has been necessary, therefore, to create a separate document concerning the special effects of lightning strokes. The physical behaviour of lightning is shown as a basis. The interaction with a living body is then described, followed by the ongoing life consequences.

1 Numbers in square brackets refer to the bibliography.

EFFECTS OF CURRENT ON HUMAN BEINGS AND LIVESTOCK –

Part 4: Effects of lightning strokes

1 Scope

This part of IEC 60479 summarizes the basic parameters for lightning and its variability insofar as they apply to human beings and livestock.

The possible direct and indirect interactions of strikes with bodies of living beings are indicated.

The resulting effects caused by lightning currents for the organism are described.

This document shows the differences of effects on human beings and livestock due to lightning strokes versus those effects of electric shocks derived from electrical systems.

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 60479-1, *Effects of current on human beings and livestock – Part 1: General aspects*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60479-1 and the following apply.

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

3.1 Definitions of technical terms

3.1.1
lightning flash
<to earth> electrical discharge of atmospheric origin between cloud and earth consisting of one or more lightning strokes

3.1.2
lightning stroke
lightning impulse
single electrical discharge in a lightning flash to earth

3.1.3
lightning channel
conducting path of the lightning current