AS/NZS 60479.4:2010
IEC/TR 60479-4, Ed. 1.0 (2004)

AS/NZS 60479.4:2010

Australian/New Zealand Standard™

Effects of current on human beings and livestock

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

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee EL-001, Wiring Rules. It was approved on behalf of the Council of Standards Australia on 14 April 2010 and on behalf of the Council of Standards New Zealand on 23 April 2010.
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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee EL-001, Wiring Rules.

The objective of this Standard is to summarize 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.

The intention is to show the differences of effects on human beings and livestock due to lightning strokes versus those effects of electric shocks derived from electrical systems.

This Standard is identical with, and has been reproduced from IEC/TR 60479-4, Ed. 1.0 (2004), *Effects of current on human beings and livestock – Part 4: Effects of lightning strokes on human beings and livestock*.

As this Standard is reproduced from an International Standard, the following applies:

(a) Its number does not appear on each page of text and its identity is shown only on the cover and title page.

(b) In the source text ‘this technical report’ should read ‘this Australian/New Zealand Standard’.

(c) A full point should be substituted for a comma when referring to a decimal marker.

The terms ‘normative’ and ‘informative’ are used to define the application of the annex to which it applies. A normative annex is an integral part of a Standard, whereas an informative annex is only for information and guidance.

CONTENTS

INTRODUCTION

IEC 60479 parts 1 to 3, deals with the effect of electric shock derived from electrical systems on the bodies of human beings and livestock. This part, which is a technical report, describes the influence and effect of natural electricity in the form of lightning strokes during thunderstorms. Lightning current can consist of several uni-polar and/or bi-polar impulses with different peak values and durations; Chapter 6 of IEC 60479-2 does not cover these effects.

The interaction of a lightning stroke with the victim's body is quite different from the usual experience with electric shock derived from electrical systems. The pathway often includes the head in lightning accidents. This implies a probable inclusion of the brain stem, which includes the respiratory centre, in contrast with pathways of shock current arising from electrical systems. In particular it must be pointed out that differences exist between accidents caused by a direct flash compared with those interactions which are caused by step voltages. Even very short single impulses of lightning can cause cardio-pulmonary arrest [5][1], [6], [12] and [13].

The intense electric interactions with living organisms are very dangerous but, surprisingly in many cases, not always lethal. It is accepted that 70 % or more lightning accidents involving humans are not fatal (see [1] and [9]. Corresponding reliable data for livestock are 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 [1] and [5].

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 consequences for the life of the victim.

[1] Figures in square brackets refer to the bibilography.

STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

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1 Scope and object

This technical report summarizes the basic parameters for lightning and their 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.

The intention is to show 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 referenced documents are indispensable for the application 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 60479-1:1994, *Effects of current on human beings and livestock – Part 1: General aspects*

IEC 61024-1:1997, *Protection of structures against lightning*

3 Terms and definitions

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

3.1 Definitions of technical terms

3.1.1
lightning flash
atmospheric discharge consisting of one or more strokes

3.1.2
lightning stroke
single electrical discharge in a lightning flash

3.1.3
lightning channel
conducting path of the lightning current

3.1.4
stepped and connecting leader
pre-discharge with low current and with low light emission, which opens the lightning channel as it grows