AS/NZS 60479.2:2002
IEC 60479-2:1987

Australian/New Zealand Standard™

Effects of current on human beings and livestock

Part 2: Special aspects

[IEC title: Effects of current passing through the human body—Part 2: Special aspects]

Standards Australia

STANDARDS NEW ZEALAND
Paerewa Aotearoa

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Australian/New Zealand Standard™

Effects of current on human beings and livestock

Part 2: Special aspects

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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee EL-001, Wiring Rules to supersede AS 3859—1991 Chapters 4, 5 and 6.

AS 3859—1991 was produced from IEC 60479, *Effects of current passing through the human body*, 60479-1:1984 *Part 1: General aspects*, and 60479-2:1987 *Part 2: Special aspects*. Subsequently IEC 60479-1 was revised and issued as IEC 60479-1:1994 (third edition). IEC 60479-2 was reconfirmed without change and a new IEC 60479-3:1998 published. AS 3859—1991 has been revised and issued as AS/NZS 60479.1, 60479.2 and 60479.3.

The objective of this Standard is to provide basic guidance on the special aspects of the effects of electric currents on persons for the establishment of electrical safety requirements.

This Standard has been reproduced from IEC 60479-2:1987, *Effects of current passing through the human body—Part 2: Special aspects Chapter 4: Effects of alternating current with frequencies above 100 Hz Chapter 5: Effects of special waveforms of current Chapter 6: Effects of unidirectional single impulse currents of short duration*.

Variations to IEC 60479-2:1987 are indicated at the appropriate places throughout this Standard. Strikethrough (~~example~~) identifies IEC tables, figures and passages of text which, for the purposes of this Australian/New Zealand Standard, are deleted. Where Australian/New Zealand tables, figures or passages of text are added, each is set in its proper place and identified by shading (example). Added figures are not themselves shaded, but are identified by a shaded border.

This Standard is Part Two of a series that includes the following:

AS/NZS	
60479	Effects of current on human beings and livestock
60479.1	Part 1: General aspects
60479.2	Part 2: Special aspects (this Standard)
60479.3	Part 3: Effects of currents passing through the body of livestock

In January 1997, the IEC commenced numbering its Standards from 60000 by adding 60000 to the number of each existing Standard. This coordinates IEC numbering with ISO numbering. During the transition period an IEC Standard might be identified by its new number or its old number (for example, IEC 60050 or IEC 50).

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

In this Standard, the following print types are used:

– requirements proper: in arial type;

– *test specifications: in italic type;*

– explanatory matter: in smaller arial type.

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INTRODUCTION

The second edition of IEC Publication 479 *Effects of current passing through the human body*, was divided into two parts each containing three Chapters as follows:

Part 1: General aspects:

- Chapter 1: Electrical impedance of the human body.
- Chapter 2: Effects of alternating current in the range of 15 Hz to 100 Hz.
- Chapter 3: Effects of direct current.

Part 2: Special aspects:

- Chapter 4: Effects of alternating current with frequencies above 100 Hz.
- Chapter 5: Effects of special waveforms of current.
- Chapter 6: Effects of unidirectional single impulse currents of short duration.

Part 1 has been revised and issued by IEC using a normal clause numbering format without the use of chapters. Part 1 has been reproduced from IEC 60479-1 and issued as AS/NZS 60479.1.

Part 2 has been reconfirmed by IEC without change. Therefore it still contains Chapters 4, 5 and 6. Part 2 has been reproduced from IEC 60479-2 and issued as AS/NZS 60479.2 using the existing chapter format so as to be identical with the existing IEC format.

However where a reference is made in AS/NZS 60479.2 to a chapter in AS/NZS 60479.1 the correct clause number of AS/NZS 60479.1 has been inserted.

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Any IEC table, figure or passage of text that is struck-through is not part of this Standard. Any Australian/New Zealand table, figure or passage of text that is added (and identified by shading) is part of this Standard.

CHAPTER 4: EFFECTS OF ALTERNATING CURRENT WITH FREQUENCIES ABOVE 100 Hz

1 General

Electric energy in the form of alternating current of higher frequencies than 50/60 Hz is increasingly used in modern electrical equipment, for example aircraft (400 Hz), power tools and electric welding (mostly up to 450 Hz), electrotherapy (using mostly 4000 Hz to 5000 Hz), switching mode power supplies (20 kHz to 1 MHz)

Little experimental data is available for this chapter, so that the information given herein should be considered as provisional only but may be used for the evaluation of risks in the ranges of frequencies concerned (see bibliography, page 21). Attention is also drawn to the fact, that the impedance of human skin decreases approximately inversely proportional to the frequency for touch voltages in the order of some tens of volts, so that the skin impedance at 500 Hz is only about one tenth of the skin impedance at 50 Hz and may be neglected in many cases. This holds even more true for higher frequencies. The impedance of the human body at such frequencies is therefore reduced to its internal impedance Z_i (see ~~chapter 1~~ clause 2 of AS/NZS 60479.1).

2 Scope

This chapter describes the effects of sinusoidal alternating current within the frequency ranges:

– above 100 Hz up to and including 1 000 Hz (see clause 4);

– above 1 000 Hz up to and including 10 000 Hz (see (clause 5);

– above 10 000 Hz (see clause 6).

3 Definitions

In addition to the definitions given in ~~part 1~~ AS/NZS 60479.1, the following definition applies:

3.1 Frequency factor F_f

Ratio of the threshold current for the relevant physiological effects at the frequency f to the threshold current at 50/60 Hz.

NOTE – The frequency factor differs for perception, let-go and ventricular fibrillation.