

AS 2279.2—1991

Australian Standard<sup>®</sup>

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**Disturbances in mains supply  
networks**

**Part 2: Limitation of harmonics  
caused by industrial equipment**

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This Australian Standard was prepared by Committee EL/34, Electric Waveform Distortion. It was approved on behalf of the Council of Standards Australia on 15 March 1991 and published on 13 May 1991.

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The following interests are represented on Committee EL/34:

Australian Electrical and Electronic Manufacturers Association  
Bureau of Steel Manufacturers of Australia  
Confederation of Australian Industry  
Department of Defence  
Electricity Supply Association of Australia  
Institution of Engineers, Australia  
Institution of Radio and Electronics Engineers, Australia  
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## PREFACE

This Standard was prepared by the Standards Australia Committee on Electric Waveform Distortion. It is one part of a Standard on disturbances in mains supply networks, the four parts being as follows:

Part 1 — *Limitation of harmonics caused by household and similar electrical appliances*

Part 2 — *Limitation of harmonics caused by industrial equipment*

Part 3 — *Limitation of voltage fluctuations caused by household and similar electrical appliances*

Part 4 — *Limitation of voltage fluctuations caused by industrial equipment*

This Standard should be read in conjunction with the Regulations, Service Rules and Installation Rules of the supply authority approving the connection.

Part 2 of this Standard applies to equipment intended for industrial, professional and commercial purposes, and household appliances rated above 4.8 kV.A and provides guidance, for electricity suppliers, manufacturers of electrical appliances or equipment and users of the appliance or equipment, on tolerable harmonic content which may be produced by the appliance or equipment. The use of a common Standard by all parties is intended to improve the electromagnetic compatibility of electrical equipment connected to the mains, by the reduction of interfering waveforms and disturbances.

Part 2 provides guidance on the maximum power of harmonic producing equipment that may be supplied from high and low voltage electricity supply systems and on the limits of harmonic voltage which may be caused at the point of common coupling.

In the preparation of Part 2, close attention was given to Engineering Recommendations G5/3—*Limits for Harmonics in the U.K. Electricity Supply System* and VDE Specification 0160—*Specification of Electrical Equipment for Electrical Power Installations with Electronic Devices*. Acknowledgment is made of the assistance received from these sources.

Consideration should be given to the Electricity Supply Association's (ESAA) Publication D(b)35–1989, *Wave Form Distortion Guidelines*, to avoid interference to telecommunication networks and ripple control systems.

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## FOREWORD

Much industrial electrical equipment includes electronic power supplies and control devices which may introduce disturbances into the mains supply network to which it is connected. In particular, equipment incorporating phase-control or burst-firing circuits may produce substantial harmonics and voltage fluctuations. Equipment with asymmetrical control devices also produces d.c. in the supply system.

Such electrical equipment should not be permitted to affect adversely the supply network characteristics, the supply voltage, or the performance of any other equipment connected to the supply network. Provision must, therefore, be made to limit such disturbing effects to achieve electromagnetic compatibility (EMC) between this equipment and other electrical equipment.

STANDARDS AUSTRALIA  

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Australian Standard  
**Disturbances in mains supply networks**

Part 2 — Limitation of harmonics caused by industrial equipment

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**1 SCOPE** Part 2 of this Standard provides guidance on the maximum size of harmonic producing industrial equipment that may be supplied from high or low voltage electricity supply systems and on the limits, of harmonic voltage distortion resulting at the point of common coupling, appropriate to the equipment.

Part 2 of this Standard is applicable to all electrical equipment other than that covered by Part 1. In particular, Part 2 is intended for application where one or more of the following conditions apply:

- (a) The equipment is intended for industrial, professional or commercial purposes.
- (b) Consent from a supply authority is required before the equipment can be connected to the supply system.
- (c) The voltage at the point of common coupling (see Clause 4.1) is greater than 240/415 V.
- (d) Appliances are rated above 4.8 kV.A.

**2 REFERENCED DOCUMENTS** The following document is referred to in this Standard:

AS

3100 Approval and test specification—Definitions and general requirements for electrical materials and equipment

### 3 GENERAL

**3.1 Guidance** The limits contained in Part 2 have been based on certain simplifying assumptions. They are a guide to good engineering practice when handling harmonic voltage distortion.

This guide covers up to the 40th harmonic but, in general, measurements of harmonics greater than the 25th should not be required unless higher frequency harmonics are of particular interest or it is suspected that significant higher order harmonics exist.

Adherence to the recommended values should reduce the risks of damage to, or malfunctioning of, other consumers' or the supply authorities' equipment, or overloading of a section of the network due to resonances.

The limits of voltage distortion are given quantitatively in terms of maximum individual harmonic currents because most instances of voltage distortion are the result of harmonic currents.

Voltage distortion at frequencies close to a harmonic frequency should be treated in a similar fashion to that of the harmonic frequency.

Part 2 of this Standard is confined to matters related to harmonic voltage distortion but other aspects of system disturbance such as sub-harmonic disturbances, voltage fluctuation and light flicker may impose additional or overriding limitations.

**3.2 Supply authority right of approval** Part 2 of this Standard shall not override the Regulations, Service Rules and Installation Rules of the supply authority which will approve the connection of the equipment.

The limits contained in Part 2 apply directly to equipment without mains connected harmonic filters containing resonating elements; such filters should only be connected in consultation with the appropriate supply authority.

NOTE: Supply authorities may impose additional limits on harmonics of specific order to avoid interference to telecommunication networks or to ripple control systems.

**4 DEFINITIONS** For the purpose of Part 2 the following definitions apply:

**4.1 Point of common coupling (PCC)** — the point in the public supply network, electrically nearest to the consumer in whose installation the appliance under consideration is, or is to be, connected, at which other consumers' installations are, or may be, connected.

**4.2 Harmonics** — sinusoidal quantities, the frequencies of which are whole multiples of a frequency selected as the fundamental.

NOTE: For this Standard the fundamental frequency is the supply system frequency, i.e. 50 Hz.

**4.3 Harmonic distortion** — the departure of a waveform from sinusoidal shape, caused by the addition of one or more harmonics to the fundamental.



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