AS 2279.1—1991

Australian Standard®

Disturbances in mains supply networks

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

STANDARDS AUSTRALIA

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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
Monash University
Railways of Australia Committee
Telecom Australia
University of Sydney
University of Wollongong
Water Board, Sydney

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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 1 of this Standard applies to semiconductor controlled domestic electrical appliances and similar equipment, with ratings not exceeding 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 1 specifies the limiting values of harmonic content produced by an electrical appliance when tested under specified conditions. Reference impedance networks are specified along with practical test methods and calculations. Guidance is provided on the implementation of these requirements.

In the preparation of Part 1, recommendations of the International Electrotechnical Commission were followed to the extent considered possible under conditions peculiar to Australian distribution systems.

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FOREWORD

Many household appliances and similar electrical equipment include electronic power supplies and control devices which may introduce disturbances into the mains supply network to which they are connected. In particular, appliances incorporating phase-control or burst-firing circuits may produce substantial harmonics and voltage fluctuations. Appliances equipped with asymmetrical control devices also produce d.c. in the supply system.

Such electrical appliances should not adversely affect 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 these appliances and other electrical equipment.

STANDARDS AUSTRALIA

Australian Standard
Disturbances in mains supply networks

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

1 SCOPE Part 1 of this Standard applies to semiconductor controlled electrical appliances for household and similar purposes, supplied directly from low-voltage distribution networks. Irrespective of the type of control, disturbances, which may be introduced into the mains supply networks by such appliances, include harmonics of the fundamental frequency.

Part 1 specifies:

(a) Maximum permissible values of harmonic content which may be produced by an appliance tested individually under specified conditions.

(b) The reference impedance networks and reference impedances to which these values refer.

(c) Practical methods of test and calculation.

(d) Guidance on practical application of the requirements.

The characteristics given in Part 1 of this Standard relate to appliances with a rating not exceeding 4.8 kV.A that can be connected to a.c. networks with a nominal frequency of 50 Hz and the following nominal voltages:

240/415 V, three-phase, three-wire or four-wire.

240 V, single-phase, two-wire.

NOTES:

1 240 V nominal includes rated voltages of 200 V to 250 V and 415 V nominal includes rated voltages between 380 V and 480 V.

2 4.8 kV.A is the maximum rating of plugs and socket-outlets complying with AS 3112.

Such equipment includes but is not limited to appliances for cooking or space heating, thermal appliances, motor-driven or magnetically driven appliances, portable tools, light dimmers and radio or television receivers.

Part 1 does not apply to the following equipment, for which limits are specified in Part 2:

(a) Equipment subject to individual consideration by the supply authority before it may be connected to the system.

(b) Appliances intended exclusively for industrial, professional or commercial purposes.

(c) Equipment with ratings exceeding 4.8 kV.A.

2 REFERENCED DOCUMENTS The following documents are referred to in this Standard:

AS

1675 Current transformers—Measurement and protection

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

3122 Approval and test specification—Plugs and socket-outlets

3 DEFINITIONS For the purpose of this Standard the following definitions apply:

3.1 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.

3.2 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.

3.3 Harmonic distortion—the departure of a waveform from sinusoidal shape that is caused by the addition of one or more harmonics to the fundamental.

3.4 Harmonic order (*n*)—the ratio between the harmonic frequency and the fundamental frequency.

3.5 Harmonic component—a component of order greater than 1 of the Fourier series of a periodic quantity.

3.6 Harmonic ratio—for a harmonic (voltage or current) of order *n*, the ratio, expressed as a percentage, of the r.m.s. value of the harmonic to the r.m.s. value of the fundamental.