AS 4777.2—2005

Australian Standard™

Grid connection of energy systems via inverters

Part 2: Inverter requirements

STANDARDS AUSTRALIA

This Australian Standard was prepared by Committee EL-042, Renewable Energy Power Supply Systems and Equipment. It was approved on behalf of the Council of Standards Australia on 6 April 2005. This Standard was published on 20 May 2005.

The following are represented on Committee EL-042:

Alternative Technology Association
Australian Electrical and Electronic Manufacturers Association
Business Council for Sustainable Energy
Electrical Regulatory Authorities Council
Electrical Safety Organisation, New Zealand
Electricity Engineers Association, New Zealand
ElectroComms & Energy Utilities Industries Skills Council
Energy Efficiency & Conservation Authority of New Zealand
Energy Networks Association
Institution of Professional Engineers, New Zealand
Ministry of Economic Development, New Zealand
National Electrical and Communications Association
New Zealand Electrical Institute
Research Institute for Sustainable Energy
Sustainable Energy Authority, Victoria
University of New South Wales

Keeping Standards up-to-date

Standards are living documents which reflect progress in science, technology and systems. To maintain their currency, all Standards are periodically reviewed, and new editions are published. Between editions, amendments may be issued. Standards may also be withdrawn. It is important that readers assure themselves they are using a current Standard, which should include any amendments which may have been published since the Standard was purchased.

Detailed information about Standards can be found by visiting the Standards Web Shop at www.standards.com.au and looking up the relevant Standard in the on-line catalogue.

Alternatively, the printed Catalogue provides information current at 1 January each year, and the monthly magazine, *The Global Standard*, has a full listing of revisions and amendments published each month.

Australian Standards™ and other products and services developed by Standards Australia are published and distributed under contract by SAI Global, which operates the Standards Web Shop.

We also welcome suggestions for improvement in our Standards, and especially encourage readers to notify us immediately of any apparent inaccuracies or ambiguities. Contact us via email at mail@standards.org.au, or write to the Chief Executive, Standards Australia, GPO Box 5420, Sydney, NSW 2001.

This Standard was issued in draft form for comment as DR 04341.

Australian Standard™

Grid connection of energy systems via inverters

Part 2: Inverter requirements

Originated as AS 4777.2—2002.
Second edition 2005.

COPYRIGHT

© Standards Australia

All rights are reserved. No part of this work may be reproduced or copied in any form or by any means, electronic or mechanical, including photocopying, without the written permission of the publisher.

Published by Standards Australia GPO Box 5420, Sydney, NSW 2001, Australia

ISBN 0 7337 6701 X

PREFACE

This Standard was prepared by the Australian members of the Joint Standards Australia/Standards New Zealand Committee EL-042, Renewable Energy Power Supply Systems and Equipment and is based on requirements developed by a group of utility, photovoltaic and inverter industry experts coming together under the auspices of the Energy Networks Association. After consultation with stakeholders in both countries, Standards Australia and Standards New Zealand decided to develop this Standard as an Australian, rather than an Australian/New Zealand Standard. This Standard replaces AS 4777.2—2002 on publication.

The objective of this Standard is to provide regulators, electricity distributors and manufacturers with the requirements and tests for inverters intended for the injection of electric power through an electrical installation to the electricity distribution network.

It is Part 2 of AS 4777, *Grid connection of energy systems via inverters* which is published in parts as follows:

AS 4777.1 Part 1: Installation requirements

AS 4777.2 Part 2: Inverter requirements (this Standard)

AS 4777.3 Part 3: Grid protection requirements

This Standard has been revised to—

(a) simplify requirements for EMC;

(b) clarify harmonic limits;

(c) clarify test parameters and tolerances; and

(d) resolve some issues found as a result of application of the Standard.

This Standard was developed with the assistance of the following organisations—

(i) Australian Greenhouse Office;

(ii) Research Institute for Sustainable Energy, Murdoch University; and

(iii) University of New South Wales.

The term ‘normative’ has been used in this Standard to define the application of the appendix to which it applies. A ‘normative’ appendix is an integral part of a Standard.

CONTENTS

Page

1 SCOPE 4
2 NORMATIVE REFERENCES 4
3 DEFINITIONS 5
4 INVERTER REQUIREMENTS 5

APPENDICES
A POWER FACTOR TEST 9
B HARMONIC CURRENT LIMIT TEST 10
C TRANSIENT VOLTAGE LIMIT TEST 12

STANDARDS AUSTRALIA

Australian Standard
Grid connection of energy systems via inverters

Part 2: Inverter requirements

1 SCOPE

This Standard specifies the requirements for inverters, with ratings up to 10 kVA for single-phase units or up to 30 kVA for three-phase units, for the injection of electric power through an electrical installation to the electricity distribution network.

NOTES:

1 Although this Standard does not apply to larger systems, similar principles can be used for the design of such systems.

2 Although this Standard is written on the basis that the renewable energy is from a d.c. source (e.g. photovoltaic array), this Standard may be used for systems where the energy is from a variable a.c. source (e.g. wind turbine or micro-hydro system) by appropriate changes to the tests.

3 This Standard does not include EMC requirements. These are mandated by the Australian Communications Authority (ACA). Users attention is drawn to Australian Communication Authority's document '*Electromagnetic Compatibility—Information for suppliers of electrical and electronic products in Australia and New Zealand*' for guidance.

2 NORMATIVE REFERENCES

The following normative documents contain provisions which, through reference in this text, constitute provisions of this Standard.

AS

4777 Grid connection of energy systems via inverters

4777.3 Part 3: Grid protection requirements

60038 Standard voltages

AS/NZS

3100 Approval and test specification—General requirements for electrical equipment

60950 Information technology equipment—Safety

60950.1 Part 1: General requirements

61000 Electromagnetic compatibility (EMC)

61000.3.3 Part 3.3: Limits—Limitation of voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current less than or equal to 16 A per phase and not subject to conditional connection

61000.3.5 Part 3.5: Limits—Limitation of voltage fluctuations and flicker in low-voltage power supply systems for equipment with rated current greater than 16 A

IEC

60255 Electrical relays

60255-5 Part 5: Insulation coordination for measuring relays and protection equipment—Requirements and tests