



**Performance of household
electrical appliances — Swimming
pool pump-units**

**Part 1: Measurement of energy
consumption and performance**



AS 5102.1:2019

This Australian Standard® was prepared by EL-058, Energy Efficiency for Swimming Pool pumps. It was approved on behalf of the Council of Standards Australia on 09 October 2019.

This Standard was published on 7 November 2019.

The following are represented on Committee EL-058:

- Australian Industry Group
- Consumer Electronics Suppliers Association
- Department of the Environment and Energy (Australian Government)
- Electrical Compliance Testing Association of Australia
- Energy Networks Australia
- Engineers Australia
- International Copper Association Australia
- Swimming Pool and Spa Association of Australia

This Standard was issued in draft form for comment as DR AS 5102.1:2019.

Keeping Standards up-to-date

Ensure you have the latest versions of our publications and keep up-to-date about Amendments, Rulings, Withdrawals, and new projects by visiting:

www.standards.org.au

ISBN 978 1 76072 610 2



Performance of household electrical appliances — Swimming pool pump-units

Part 1: Measurement of energy consumption and performance

Originates as AS 5102.1—2009.
Second edition 2019.

COPYRIGHT

© Standards Australia Limited 2019

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, unless otherwise permitted under the Copyright Act 1968 (Cth).

Preface

This Standard was prepared by the Australian members of the Joint Standards Australia/Standards New Zealand Committee EL-058, Energy Efficiency for Swimming Pool Pumps, to supersede AS 5102.1—2009, *Performance of household electrical appliances — Swimming pool pump-units, Part 1: Energy consumption and performance*.

The objective of this Standard is to describe procedures to determine the energy consumption, energy efficiency and sound levels of swimming pool pump units.

The major changes in this edition are as follows:

- (a) Change in title and scope.
- (b) Classification of single-speed, two-speed, multi-speed and variable speed pump units.
- (c) Specification of input power range for pump-units covered by this Standard.
- (d) Introduction of weighted energy factor based on high flow rate and low flow rate measured performance to characterize multi-speed and variable speed pump units.
- (e) Pump unit performance now directly measured while operating on a specified hydraulic resistance curve.
- (f) Modification of construction and operation of the hydraulic circuit.
- (g) Change of instrumentation error specifications.
- (h) Specification of operating procedure needed to achieve pump unit operation on the required hydraulic resistance curve.
- (i) Introduction of weighted energy factor uncertainty quantification.
- (j) Change of reporting requirements.

The terms “normative” and “informative” are used in Standards to define the application of the appendices to which they apply. A “normative” appendix is an integral part of a Standard, whereas an “informative” appendix is only for information and guidance.

Contents

Preface	ii
Introduction	v
Section 1 Scope and general	1
1.1 Scope	1
1.2 Normative references	1
1.3 Terms and definitions	1
1.4 Notation	6
Section 2 Pump unit classification and input power range	8
2.1 Scope	8
2.2 Classification criteria	8
2.3 Input power range	8
Section 3 Performance rating procedure	9
3.1 Scope	9
3.2 Operating conditions — Rating points	9
3.2.1 General	9
3.2.2 Single-speed pump units	9
3.2.3 Two-speed pump units	9
3.2.4 Multi-speed and variable speed pump units	9
3.3 Performance factors	10
3.3.1 Performance factors for single-speed pump units	10
3.3.2 Performance factors for two-, multi- and variable speed pump units	10
3.4 Pump unit performance curves	11
Section 4 Test facility	12
4.1 Scope	12
4.2 Test system	12
4.2.1 General	12
4.2.2 Pipe and fittings specifications	13
4.2.3 Pressure tapplings	13
4.2.4 Characteristics of water used in test	14
4.3 Temperature condition	14
4.3.1 Water temperature	14
4.3.2 Air temperature	14
4.4 Electrical supply	14
4.5 Test system flow control	15
Section 5 Operating point and measurements	16
5.1 Scope	16
5.2 Correct operating point	16
5.3 Test facility data acquisition	17
5.3.1 Test facility data acquisition and analysis	17
5.3.2 Pressure and flow rate sensors	17
5.4 Measurements required	17
5.5 Measurement of flow rate	17
5.6 Pressure measurement	17
5.7 Evaluation of pump unit total head	18
5.8 Measurement of pump unit input power and power factor	18
5.9 Measurement of sound power	18
Section 6 Calibration, data sampling and measurement	20
6.1 Scope	20
6.2 Calibration of test equipment	20
6.3 Data recording	20
6.3.1 Sampling rate	20
6.3.2 Sampling period	20

6.4	Steady conditions	20
6.5	Unsteady conditions.....	21
Section 7	Test methods.....	22
7.1	Scope.....	22
7.2	General.....	22
7.3	Preparation.....	22
	7.3.1 Pump unit installation.....	22
	7.3.2 Pump unit operation.....	22
7.4	Measurement of pump unit performance	23
	7.4.1 Single-speed pump units.....	23
	7.4.2 Two-speed pump units.....	23
	7.4.3 Multi- and variable speed pump units.....	23
7.5	Procedure.....	23
	7.5.1 General.....	23
	7.5.2 Measurements when pump unit operating stably on Curve D.....	23
	7.5.3 Measurement of pump unit performance curves.....	24
7.6	Calculations.....	24
7.7	Test report.....	25
Appendix A	(normative) Template report forms.....	26
Appendix B	(informative) Pump performance graphical reporting format.....	29
Appendix C	(informative) Measurement uncertainties.....	31
Bibliography	37

Introduction

Swimming pool pump units are significant users of electricity in homes where swimming pools are installed.

The desire of governments to improve the energy efficiency of appliances has led to the development of energy labelling and Minimum Energy Performance Standards (MEPS) for a range of products. This Standard describes measurements and analysis of data required for energy labelling and MEPS for swimming pool pump units.

Energy labelling and MEPS requirements are set out in the *Greenhouse and Energy Minimum Standards (Swimming pool pump-units) Determination*.

Currently in preview, click buy full version

Australian Standard[®]

Performance of household electrical appliances — Swimming pool pump-units

Part 1: Measurement of energy consumption and performance

Section 1 Scope and general

1.1 Scope

This Standard specifies requirements for the determination of energy consumption of swimming pool pump units operating on single-phase electricity.

This Standard also specifies the classification of swimming pool pump units, requirements for the test facility, the test procedure and method of calculation and presentation of results.

This Standard applies to swimming pool pump units —

- (a) that are capable of a flow rate equal to or greater than 120 L/min; and
- (b) that have an input power range of —
 - (i) single-speed pump units — 600 W to 1 700 W; or
 - (ii) two-speed, multi-speed and variable speed pump units — 600 W to 3 450 W; and
- (c) that are used for the circulation of water through —
 - (i) pool filters, sanitization devices, cleaning devices, or water heaters (including solar); or
 - (ii) spa or jet outlets or other features forming part of a pool.

1.2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document.

AS 1217, *Acoustics — Determination of sound power levels of noise sources, Part 2: Precision methods for broad-band sources in reverberation rooms*

ISO 3741, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Precision methods for reverberation test rooms*

ISO 3743.1, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering methods for small movable sources in reverberant fields — Part 1: Comparison method for a hard-walled test room*

1.3 Terms and definitions

For the purposes of this Standard, the following terms and definitions apply.

1.3.1 curve D

swimming pool filtering system head versus flow rate friction resistance curve used for rating pump units as shown in [Equation 1.3.1](#):

$$H_D = 0.00018Q_D^2 \text{ (m)} \quad 1.3.1$$