

Second edition
2014-10-25

**Water meters for cold potable water
and hot water —**

**Part 2:
Test methods**

ICS 91.140.60



**Mauritius Standards Bureau
Moka**

Gr 16

National foreword

This Mauritian Standard is identical with the International Standard **ISO 4064-2:2014(E)**, *Water meters for cold potable water and hot water -- Part 2: Test methods*. It was adopted by the Mauritius Standards Bureau on the recommendation of the **Metrology Standards Committee** through its **Subcommittee on Water Meters** and approval of the Standards Council on August 2014. It was notified in the Government Gazette on **25 October 2014**.*

For the purposes of this standard the following change should be made:

- Wherever the words 'International Standard' appear, referring to this standard, they should be read as 'Mauritian Standard'.
- the 'decimal comma' should be replaced by the 'decimal point'.

This Mauritian Standard cancels and replaces the Mauritian Standard MS ISO 4064-2:2005 which has been technically revised.

MS ISO 4064 consists of the following parts, under the general title *Water meters for cold potable water and hot water*:

- *Part 1: Metrological and technical requirements*
- *Part 2: Test methods*
- *Part 3: Test report format*
- *Part 4: Non-metrological requirements not covered in ISO 4064-1*
- *Part 5: Installation requirements*

* General Notice No. 2651 of 2014



COPYRIGHT PROTECTED DOCUMENT

© MSB 2014

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, or posting on the internet or an intranet, without prior written permission from Mauritius Standards Bureau at the address below.

*Mauritius Standards Bureau
Villa Road
Moka
Mauritius*

Telephone + (230) 433 3648
Fax + (230) 433 5051/ 433 5150
E-mail msb@intnet.mu

Contents

	Page
Foreword	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Reference conditions	2
5 Symbols, units and equations	3
6 External examination	3
6.1 General.....	3
6.2 Object of the examination.....	3
6.3 Preparation.....	3
6.4 Examination procedures.....	4
7 Performance tests for all water meters	8
7.1 General.....	8
7.2 Required conditions for all tests.....	8
7.3 Static pressure test (ISO 4064-1:2014 OIML R 49-1:2013, 4.2.10).....	9
7.4 Determination of intrinsic errors (of indication) (ISO 4064-1:2014 OIML R 49-1:2013, 7.2.3).....	10
7.5 Water temperature test (ISO 4064-1:2014 OIML R 49-1:2013, 4.2.8).....	18
7.6 Overload water temperature test (ISO 4064-1:2014 OIML R 49-1:2013, 7.2.5).....	18
7.7 Water pressure test (ISO 4064-1:2014 OIML R 49-1:2013, 4.2.8).....	19
7.8 Reverse flow test (ISO 4064-1:2014 OIML R 49-1:2013, 4.2.7).....	19
7.9 Pressure loss test (ISO 4064-1:2014 OIML R 49-1:2013, 6.5).....	21
7.10 Flow disturbance tests (ISO 4064-1:2014 OIML R 49-1:2013, 6.3.4).....	25
7.11 Durability tests (ISO 4064-1:2014 OIML R 49-1:2013, 7.2.6).....	26
7.12 Magnetic field testing.....	31
7.13 Tests on ancillary devices of a water meter.....	31
7.14 Environmental testing.....	32
8 Performance tests related to influence factors and disturbances	32
8.1 General requirements (ISO 4064-1:2014 OIML R 49-1:2013, A.1).....	32
8.2 Dry heat (non-condensing) (ISO 4064-1:2014 OIML R 49-1:2013, A.5).....	36
8.3 Cold (ISO 4064-1:2014 OIML R 49-1:2013, A.5).....	37
8.4 Damp heat, cyclic (condensing) (ISO 4064-1:2014 OIML R 49-1:2013, A.5).....	38
8.5 Power supply variation (ISO 4064-1:2014 OIML R 49-1:2013, A.5).....	39
8.6 Vibration (random) (ISO 4064-1:2014 OIML R 49-1:2013, A.5).....	42
8.7 Mechanical shock (ISO 4064-1:2014 OIML R 49-1:2013, A.5).....	43
8.8 AC mains voltage dips, short interruptions and voltage variations (ISO 4064-1:2014 OIML R 49-1:2013, A.5).....	44
8.9 Bursts on signal lines (ISO 4064-1:2014 OIML R 49-1:2013, A.5).....	45
8.10 Bursts (transients) on AC and DC mains (ISO 4064-1:2014 OIML R 49-1:2013, A.5).....	47
8.11 Electrostatic discharge (ISO 4064-1:2014 OIML R 49-1:2013, A.5).....	48
8.12 Radiated electromagnetic fields (ISO 4064-1:2014 OIML R 49-1:2013, A.5).....	49
8.13 Conducted electromagnetic fields (ISO 4064-1:2014 OIML R 49-1:2013, A.5).....	51
8.14 Surges on signal, data and control lines (ISO 4064-1:2014 OIML R 49-1:2013, A.5).....	53
8.15 Surges on AC and DC mains power lines (ISO 4064-1:2014 OIML R 49-1:2013, A.5).....	54
8.16 Static magnetic field (ISO 4064-1:2014 OIML R 49-1:2013, 7.2.8).....	55
8.17 Absence of flow test.....	56
9 Test program for type evaluation	57
9.1 Number of samples required.....	57
9.2 Performance test applicable to all water meters.....	57
9.3 Performance tests applicable to electronic water meters, mechanical water meters fitted with electronic devices, and their separable parts.....	58

9.4	Type evaluation of separable parts of a water meter	58
9.5	Families of water meters	59
10	Tests for initial verification	59
10.1	Initial verification of complete and combined water meters	59
10.2	Initial verification of separable parts of a water meter	60
11	Presentation of results	61
11.1	Object of the reports	61
11.2	Identification and test data to be included in records	61
Annex A (normative) Type examination and testing of checking facilities of electronic devices		63
Annex B (normative) Calculating the relative error (of indication) of a water meter		69
Annex C (normative) Installation requirements for flow disturbance tests		75
Annex D (normative) Type evaluation of a family of water meters		77
Annex E (informative) Examples of methods and components used for testing concentric water meters		79
Annex F (informative) Determining the density of water		82
Annex G (informative) Maximum uncertainties in the measurement of influence factors and disturbances		84
Annex H (informative) Pressure loss test pressure tappings, hole and slot details		87
Annex I (normative) Flow disturbers		90
Bibliography		101

PREVIEW

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2, www.iso.org/directives.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received, www.iso.org/patents.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

The committees responsible for this document are Technical Committee ISO/TC 30, *Measurement of fluid flow in closed conduits*, Subcommittee SC 7, *Volume methods including water meters* and OIML Technical Subcommittee TC 8/SC 5 *Water meters*.

This fourth edition of ISO 4064-2 cancels and replaces the third edition (ISO 4064-2:2005), which has been technically revised. Provisions of the third edition are addressed in ISO 4064-5:2014.

ISO 4064 consists of the following parts, under the general title *Water meters for cold potable water and hot water*:

- *Part 1: Metrological and technical requirements*
- *Part 2: Test methods*
- *Part 3: Test report format*
- *Part 4: Non-metrological requirements not covered in ISO 4064-1*
- *Part 5: Installation requirements*

This edition of ISO 4064-2 is identical with the corresponding edition of OIML R 49-2, which has been issued concurrently. OIML R 49-2 was approved for final publication by the International Committee of Legal Metrology at its 48th meeting in Ho Chi Minh City, Vietnam in October 2013 and will be submitted to the International Conference on Legal Metrology in 2016 for formal sanction.

PREVIEW

Water meters for cold potable water and hot water —

Part 2: Test methods

1 Scope

This part of ISO 4064|OIML R 49 is applicable to the type evaluation and initial verification testing of water meters for cold potable water and hot water as defined in ISO 4064-1:2014|OIML R 49-1:2013. OIML Certificates of Conformity can be issued for water meters under the scope of the OIML Certificate System, provided that this part of ISO 4064|OIML R 49, ISO 4064-1:2014|OIML R 49-1:2013 and ISO 4064-3:2014|OIML R 49-3:2013 are used in accordance with the rules of the System.

This part of ISO 4064|OIML R 49 sets out details of the test programme, principles, equipment and procedures to be used for the type evaluation, and initial verification of a meter type.

The provisions of this part of ISO 4064|OIML R 49 also apply to ancillary devices, if required by national regulations.

The provisions include requirements for testing the complete water meter and for testing the measurement transducer (including the flow or volume sensor) and the calculator (including the indicating device) of a water meter as separate units.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 4064-1:2014|OIML R 49-1:2013, *Water meters for cold potable water and hot water — Part 1: Metrological and technical requirements*

ISO 4064-3:2014|OIML R 49-3:2013, *Water meters for cold potable water and hot water — Part 3: Test report format*

ISO/IEC Guide 98-3:2008, *Uncertainty of measurement — Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)*

IEC 60068-2-1, *Environmental testing — Part 2-1: Tests — Test A: Cold*

IEC 60068-2-2, *Environmental testing — Part 2-2: Tests — Test B: Dry heat*

IEC 60068-2-30, *Environmental testing — Part 2-30: Tests — Test Db: Damp heat, cyclic (12 h + 12 h cycle)*

IEC 60068-2-31, *Environmental testing — Part 2-31: Tests — Test Ec: Rough handling shocks, primarily for equipment-type specimens*

IEC 60068-2-47, *Environmental testing — Part 2-47: Tests — Mounting of specimens for vibration, impact and similar dynamic tests*

IEC 60068-2-64, *Environmental testing — Part 2-64: Tests — Test Fh: Vibration, broadband random and guidance*

IEC 60068-3-4, *Environmental testing — Part 3-4: Supporting documentation and guidance — Damp heat tests*