

Measurement of fluid flow in closed conduits — Methods of evaluating the performance of electromagnetic flow-meters for liquids

The European Standard EN 29104:1993 has the status of a
British Standard

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Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Industrial-process Measurement and Control Standards Policy Committee (PCL/-) to Technical Committee PCL/2, upon which the following bodies were represented:

- British Compressed Air Society
- British Gas plc
- Department of Energy (Gas and Oil Measurement Branch)
- Department of Trade and Industry (National Engineering Laboratory)
- Electricity Industry in United Kingdom
- Energy Industries Council
- GAMBICA (BEAMA Ltd.)
- Institute of Measurement and Control
- Institute of Petroleum
- Institute of Trading Standards Administration
- Institution of Mechanical Engineers
- Society of British Gas Industries
- Water Services Association of England and Wales

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

- Engineering Equipment and Materials Users Association
- United Kingdom Atomic Energy Authority
- Water Research Centre

This British Standard, having been prepared under the direction of the Industrial-process Measurement and Control Standards Policy Committee, was published under the authority of the Standards Board and comes into effect on 31 October 1991

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The following BSI references relate to the work on this standard:
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Amendments issued since publication

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National foreword

This British Standard has been prepared under the direction of the Industrial-process Measurement and Control Standards Policy Committee. It is identical with ISO 9104:1991 “*Measurement of fluid flow in closed conduits — Methods of evaluating the performance of electromagnetic flow-meters for liquids*”, published by the International Organization for Standardization (ISO).

In 1993 the European Committee for Standardization (CEN) accepted ISO 9104:1991 as European Standard EN 29104:1993. As a consequence of implementing the European Standard this British Standard is renumbered as BS EN 29104 and any reference to BS 7526:1991 should be read as a reference to BS EN 29104.

Cross-references

International Standard	Corresponding British Standard
ISO 3966:1977	BS 1042 <i>Measurement of fluid flow in closed conduits</i> Section 2.1:1983 <i>Method using Pitot static tubes</i> (Identical)
ISO 4006:1991	BS 5875:1991 <i>Glossary of terms and symbols for measurement of fluid flow in closed conduits</i> (Identical)
BS 4185:1980	BS 6199 <i>Measurement of liquid flow in closed conduits using weighing and volumetric methods</i> Part 1:1981 <i>Weighing method</i> (Identical)
ISO 5168:1978 ^a	BS 5844:1980 <i>Methods of measurement of fluid flow: estimation of uncertainty of a flow-rate measurement</i> (Identical) BS 7118 <i>Measurement of fluid flow: assessment of uncertainty in the calibration and use of flow measurement devices</i>
ISO 7066-1:1989	Part 1:1990 <i>Linear calibration relationships</i> (Identical)
ISO 7066-2:1988	Part 2:1989 <i>Non-linear calibration relationships</i> (Identical)
ISO 8316:1987	BS 6199 <i>Measurement of liquid flow in closed conduits using weighing and volumetric methods</i> Part 2:1988 <i>Method for measurement by collection of the liquid in a volumetric tank</i> (Identical)
IEC 68	BS 2011 <i>Environmental testing</i>
IEC 68-2-3:1969	Part 2.1Ca:1977 <i>Test Ca. Damp heat, steady state</i> (Identical)
IEC 68-2-4:1960 ^b	
IEC 68-2-6:1982	Part 2.1Fc:1983 <i>Test Fc. Vibration (sinusoidal)</i> (Identical)
IEC 68-2-27:1972	Part 2.1Ea:1988 <i>Test Ea. Shock</i> (Identical)
IEC 770:1984	BS 4509:1985 <i>Methods for evaluating the performance of transmitters for use in industrial-process control systems</i> (Identical)

^a Reference in the text to ISO 5168 is to the revision currently in preparation. It is envisaged that, when the revised edition of ISO 5168 is published, a revised edition of BS 5844 will be published.

^b IEC 68-2-4:1960 has now been replaced by IEC 68-2-30:1980. BS 2011 “*Environmental testing — Part 2.1Db:1981 Test Db and guidance: Damp heat, cyclic (12 + 12 hour cycle)*” is identical with IEC 68-2-30:1980.

The Technical Committee has reviewed the provisions of ISO 6817 and IEC 160, to which reference is made in the text, and has decided that they are acceptable for use in conjunction with this standard.

There are no related British Standards to these standards.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, the EN title page, pages 2 to 20, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

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Descriptors: Liquid flow, pipe flow, flow measurement, electromagnetic equipment, flowmeters, tests, performance tests

English version

Measurement of fluid flow in closed conduits — Methods of evaluating the performance of electromagnetic flow-meters for liquids

(ISO 9104:1991)

Mesure de débit des fluides dans les conduites
fermées — Methodes d'évaluation de la
performance des débitmètres
électromagnétiques utilisés pour les liquides
(ISO 9104:1991)

Durchflußmessung von Fluiden in
geschlossenen Leitungen — Verfahren zur
Beurteilung des Betriebsverhaltens von
magnetisch-induktiven Durchflußmeßgeräten
für Flüssigkeiten
(ISO 9104:1991)

This European Standard was approved by CEN on 1993-06-18. CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

The European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

Foreword

In 1991, ISO 9104:1991 *Measurement of fluid flow in closed conduits — Methods of evaluating the performance of electromagnetic flow-meters for liquids* was submitted to the CEN Primary Questionnaire procedure.

Following Resolution BT C 42/1992, ISO 9104:1991 was submitted to the formal vote; the result was positive.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 1993, and conflicting national standards shall be withdrawn at the latest by December 1993.

According to the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

NOTE The European references to international publications are given in Annex ZA (normative).

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Introduction

The methods of evaluation specified in this International Standard are intended for use by manufacturers to determine the performance of their products and by users or independent testing establishments to verify manufacturer's performance specifications and to demonstrate suitability of application.

The test conditions specified in this International Standard, for example the range of ambient temperatures and the power supply, represent those which commonly arise during use. Consequently, the values specified herein should be used where no other values are specified by the manufacturer.

The tests specified in this International Standard are not necessarily sufficient for instruments specifically designed for unusually arduous duties. Conversely, a restricted series of tests may be suitable for instruments designed to perform within a limited range of conditions.

1 Scope

1.1 This International Standard recommends methods of test for the evaluation of the performance of electromagnetic flow-meters for liquids flowing in closed conduits. It specifies a uniform procedure to verify the performance characteristics when the flow-meter is subjected to identified influence quantities and methods of representing the results of performance measurements.

NOTE 1 When a full evaluation in accordance with this International Standard is not required, those tests which are required should be performed and the results reported in accordance with those parts of this International Standard which are relevant.

1.2 This International Standard applies only to industrialized pipe-mounted electromagnetic flow-meters. It is not applicable to insertion-type flow-meters, liquid-metal flow-meters and medical flow-meters, although some of the tests described may be applied to such instruments if agreed to between the manufacturer and the user or evaluating body.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards. ISO 3966:1977, *Measurement of fluid flow in closed conduits — Velocity area method using Pitot static tubes*.

ISO 4006:1991, *Measurement of fluid flow in closed conduits — Vocabulary and symbols*.

ISO 4185:1980, *Measurement of liquid flow in closed conduits — Weighing method*.

ISO 5168:—, *Measurement of fluid flow — Evaluation of uncertainties*¹⁾.

ISO 6817:—, *Measurement of conductive liquid flow in closed conduits — Method using electromagnetic flow-meters*²⁾.

ISO 7066-1:1989, *Assessment of uncertainty in the calibration and use of flow measurement devices — Part 1: Linear calibration relationships*.

ISO 7066-2:1988, *Assessment of uncertainty in the calibration and use of flow measurement devices — Part 2: Non-linear calibration relationships*.

ISO 8316:1987, *Measurement of liquid flow in closed conduits — Method by collection of the liquid in a volumetric tank*.

IEC 68-2-3:1969, *Basic environmental testing procedures — Test Ca: Damp heat, steady state*.

IEC 68-2-4:1960, *Basic environmental testing procedures — Test D: Accelerated damp heat*.

IEC 68-2-6:1982, *Basic environmental testing procedures — Test Fc and guidance: Vibration (sinusoidal)*.

IEC 68-2-27:1972, *Basic environmental testing procedures — Test Ea: Shock*.

¹⁾ To be published. (Revision of ISO 5168:1978)

²⁾ To be published. (Revision of ISO 6817:1980)