

TECHNICAL REPORT

ISO
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Measurement of free surface flow in closed conduits —

Part 2: Equipment

*Mesurage du débit des écoulements à surface dénoyée dans les
conduites fermées —*

Partie 2: Matériels



Reference number
ISO/TR 9824-2:1990(E)

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 main task of technical committees is to prepare International Standards, but in exceptional circumstances a technical committee may propose the publication of a Technical Report of one of the following types:

- type 1, when the required support cannot be obtained for the publication of an International Standard, despite repeated efforts;
- type 2, when the subject is still under technical development or where for any other reason there is the future but not immediate possibility of an agreement on an International Standard;
- type 3, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example).

Technical Reports of types 1 and 2 are subject to review within three years of publication, to decide whether they can be transformed into International Standards. Technical Reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

ISO/TR 9824-2, which is a Technical Report of type 2, was prepared by Technical Committee ISO/TC 113, *Measurement of liquid flow in open channels*.

ISO/TR 9824 consists of the following parts, under the general title *Measurement of free surface flow in closed conduits* :

- *Part 1: Methods*
- *Part 2: Equipment*

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Annex A of this part of ISO/TR 9824 is for information only.

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Introduction

The measurement of fluid flow and level in partially filled closed conduits presents particularly difficult problems and is not fully documented. This part of ISO/TR 9824 has been prepared therefore to give guidance to users on the existing equipment employed and on recent developments in this field.

Efficient and effective engineering design requires accurate and reliable flow information. The flows in closed conduits may vary from zero through a free surface flow condition to a surcharged pipe-full condition, and they may contain both floating and suspended solids as well as other contaminants which may be highly corrosive (e.g. contaminants resulting from industrial processes). The determination of flows in these conditions demands the design of specialized equipment. This part of ISO/TR 9824 sets out the performance specifications for such equipment.

Measurement of free surface flow in closed conduits —

Part 2: Equipment

1 Scope

This part of ISO/TR 9824 specifies performance requirements of equipment for the determination of free surface flow in closed conduits. It identifies the conditions within which such equipment is required to operate and specifies the level of uncertainty and reliability of measurement which the equipment is expected to meet.

This part of ISO/TR 9824 is applicable to conduits having an internal cross-sectional area greater than 0,018 m² (e.g. circular conduits of diameter greater than 150 mm).

It is not applicable to the measurement of flows in closed conduits which normally operate under pressure as the result of pumping.

This part of ISO/TR 9824 should be used in conjunction with ISO/TR 9824-1.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this part of ISO/TR 9824. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this part of ISO/TR 9824 are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 772:1988, *Liquid flow measurement in open channels — Vocabulary and symbols*.

3 Definitions

For the purposes of this part of ISO/TR 9824, the definitions given in ISO 772 and the following definition apply.

free surface flows in closed conduits: Flows within closed conduits, under the influence of gravity only, and normally having a free surface.

NOTE 1 Where the total discharge exceeds the free surface capacity of the conduit, i.e. the conduit is surcharged, the free surface of the flow disappears.

4 Characteristics of the closed conduit system

4.1 Structure of the closed conduit system

The general configuration of a closed conduit system is shown in figure 1.

A closed conduit is typically located underground but in certain instances may be above the ground surface. Systems constructed underground typically incorporate means of access through a man-sized shaft (i.e. a manhole) which is sealed at the surface by a heavy but removable cover. For the purposes of this part of ISO/TR 9824, it is assumed that such access is available only at certain times.

Access shafts may be provided at frequent intervals along the length of the conduit at a spacing of perhaps 200 m to 400 m. It is normal practice to locate access shafts or other shafts at points of structural change in the conduit system, such as bends or junctions or where, for some reason, inspection or entry to the system may be required.