

INTERNATIONAL STANDARD

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Liquid flow measurement in open channels — Sampling and analysis of gravel-bed material

*Mesure de débit des liquides dans les canaux découverts —
Échantillonnage et analyse des matériaux du lit graveleux*



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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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 9195 was prepared by Technical Committee ISO/TC 113, *Measurement of liquid flow in open channels*, Subcommittee SC 6, *Sediment transport*.

Introduction

Bed material sampling techniques are used to obtain samples of sediment from the bed of a water course.

Information with respect to sediment sizes is required for estimating resistance to flow in open channels and, together with hydraulic data, for calculating bed material load and in making morphological forecasts.

Liquid flow measurement in open channels — Sampling and analysis of gravel-bed material

1 Scope

1.1 This International Standard specifies methods for sampling surface and subsurface gravel-bed material and the analytical procedures to determine the size distribution of gravel-bed material in open channels.

1.2 This International Standard applies to material having diameters of 2 mm and over.

1.3 In practice, gravel-bed material may consist of two components: a coarser layer on the surface and finer subsurface material. Surface material is particularly relevant to investigations of the initiation of bed material movement and flow resistance, while subsurface material is mainly relevant to investigations of bed material transport. This International Standard does not attempt to correlate these two distinct populations.

1.4 There are two sampling techniques applicable to graded gravel-bed material. One method is to collect a definable *in situ* volume of material which is subsequently dealt with as a bulk sample. The second method is to sample material from the surface using one of several procedures. These two methods are discussed separately in this International Standard, and conversion factors are presented which are derived from idealized homogeneous material.

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 in-

dicated 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*.

ISO 4364:1977, *Liquid flow measurement in open channels — Bed material sampling*.

3 Definitions

For the purposes of this International Standard, the definitions given in ISO 772 apply.

4 Sampling equipment and procedures

4.1 Surface samples

4.1.1 Grid sampling

A grid is established over the surface of the gravel deposit and the pebbles immediately below the grid intersection points constitute the sample. Variants on this method include the use of a set of regularly spaced points, for example footsteps, as grid points and collecting the stone immediately underfoot after one or more steps, by reaching down with eyes closed and collecting the stone first touched by an outstretched finger. For small square grid samples, less than 1 m², a vertical photograph can be taken of the grid-covered area or a scaled photograph can be taken and a grid applied to the photograph.

4.1.2 Areal sampling

All the surface pebbles within a selected area constitute the sample. If the gravel is exposed above water, it can be marked with spray paint to facilitate collection of the surface material.

4.1.3 Transect sampling

All the stones exposed under a straight line (wire or string) across the sampling area are collected.