
International Standard



4371

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

Measurement of liquid flow in open channels by weirs and flumes — End depth method for estimation of flow in non-rectangular channels with a free overfall (approximate method)

Mesure de débit des liquides dans les canaux découverts au moyen de déversoirs et de canaux jaugeurs — Méthode d'évaluation du débit par détermination de la profondeur en bout des chenaux non rectangulaires à déversement dénoyé (méthode approximative)

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Descriptors : liquid flow, water flow, open channel flow, weirs, flow measurement.

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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 4371 was prepared by Technical Committee ISO/TC 113, *Measurement of liquid flow in open channels*.

Measurement of liquid flow in open channels by weirs and flumes — End depth method for estimation of flow in non-rectangular channels with a free overfall (approximate method)

0 Introduction

Free overfall occurs in many hydraulic structures when the bottom of a horizontal channel (or gently sloping channel) is abruptly discontinued. Such an overfall forms a control section and offers an approximate means for the estimation of flow. The flow at the brink is curvilinear and, therefore, the depth at the drop is not equal to the critical depth as computed by the principle based on assumption of parallel flow. However, the ratio between the end depth and the critical depth (as in the case of the assumption of parallel flow) has an almost constant value. Therefore, from the depth measured at the drop, the discharge can be estimated.

1 Scope and field of application

This International Standard specifies a method for the estimation of subcritical flow of clear water in smooth, essentially horizontal, straight open channels with a vertical drop and discharging freely. Gentle positive slopes not greater than 1 in 2 000 are admissible. This International Standard covers channels with the following types of cross-section, the nappe being unconfined:

- a) trapezoidal;
- b) triangular;
- c) parabolic;
- d) circular.

Using the measured depth at the end, the flow can be estimated.

2 References

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

ISO 1438/1, *Water flow measurement in open channels using weirs and venturi flumes — Part 1: Thin-plate weirs*.

ISO 3846, *Liquid flow measurements in open channels by weirs and flumes — Free overfall weirs of finite crest width (rectangular broad-crested weirs)*.

ISO 3847, *Liquid flow measurement in open channels by weirs and flumes — End-depth method for estimation of flow in rectangular channels with a free overfall*.

3 Definitions

For the purpose of this International Standard, in addition to the definitions given in ISO 772, the following definition shall apply:

unconfined nappe: The jet formed by the flow where the guide walls of the structure end at the crest (or edge) and permit free lateral expansion of flow and where the nappe is sufficiently ventilated to ensure atmospheric pressure below the nappe.

4 Units of measurement

The units of measurement used in this International Standard are SI units.

5 Selection of site

A preliminary survey shall be made of the physical and hydraulic features of the proposed site to check that it conforms (or may be made to conform) to the requirements necessary for measurement by the end depth method.

Particular attention should be paid to the following features in selecting the site and ensuring the necessary flow conditions:

- a) an adequate straight length (at least $20 h_e$ where h_e is the end depth corresponding to the maximum discharge anticipated) of channel of regular cross-section should be available upstream of the drop;