

SLOVENSKI STANDARD SIST EN ISO 748:2008 01-januar-2008

BUXca Yý U. SIST EN ISO 748:2001

<]XfcaYhf]/Ư!ʿAYf^Yb^Y`dfYhc_ƯhY_c]bʿjʿcXdfh]\ʿ_UbƯ]\ʿn¨idcfUVc`\]XfcaYhf]b]\ _f]`ʿU]ʿd`UjU YjʿfbGC`+(,.&\$\$+Ł

Hydrometry - Measurement of liquid flow in open channels using current-meters or floats (ISO 748:2007)

Hydrometrie - Durchflussmessung in offenen Gerinnen mittels Fließgeschwindigkeitsmessgeräten oder Schwimmern (ISO 748:2007)

(standards.iteh.ai)

Hydrométrie - Mesurage du débit des liquides dans les canaux découverts au moyen de débitmetres ou de flotteurs (ISO 748:2007) ISO 748:2008 https://standards.iteh.ai/catalog/standards/sist/6cb84824-4245-4a90-8bba-

6f74c84a62ef/sist-en-iso-748-2008

Ta slovenski standard je istoveten z: EN ISO 748:2007

ICS:

17.120.20 Pretok v odprtih kanalih

Flow in open channels

SIST EN ISO 748:2008

en

EUROPEAN STANDARD NORME EUROPÉENNE EUROPÄISCHE NORM

EN ISO 748

October 2007

ICS 17.120.20

Supersedes EN ISO 748:2000

English Version

Hydrometry - Measurement of liquid flow in open channels using current-meters or floats (ISO 748:2007)

Hydrométrie - Mesurage du débit des liquides dans les canaux découverts au moyen de débitmètres ou de flotteurs (ISO 748:2007) Hydrometrie - Durchflussmessung in offenen Gerinnen mittels Fließgeschwindigkeitsmessgeräten oder Schwimmern (ISO 748:2007)

This European Standard was approved by CEN on 21 September 2007.

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 CEN Management Centre or to any CEN member.

This 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 CEN Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom. <u>SIST EN ISO 748:2008</u>

> https://standards.iteh.ai/catalog/standards/sist/6cb84824-4245-4a90-8bba-6f74c84a62ef/sist-en-iso-748-2008



EUROPEAN COMMITTEE FOR STANDARDIZATION COMITÉ EUROPÉEN DE NORMALISATION EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

© 2007 CEN All rights of exploitation in any form and by any means reserved worldwide for CEN national Members.

Ref. No. EN ISO 748:2007: E

Contents

Page

iTeh STANDARD PREVIEW (standards.iteh.ai)

Foreword

This document (EN ISO 748:2007) has been prepared by Technical Committee ISO/TC 113 "Hydrometric determinations" in collaboration with Technical Committee CEN/TC 318 "Hydrometry" the secretariat of which is held by BSI.

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 April 2008, and conflicting national standards shall be withdrawn at the latest by April 2008.

This document supersedes EN ISO 748:2000.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

The text of ISO 748:2007 has been approved by CEN as a EN ISO 748:2007 without any modification. (standards.iteh.ai)

INTERNATIONAL STANDARD

Fourth edition 2007-10-15

Hydrometry — Measurement of liquid flow in open channels using currentmeters or floats

Hydrométrie — Mesurage du débit des liquides dans les canaux découverts au moyen de débitmètres ou de flotteurs

iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN ISO 748:2008 https://standards.iteh.ai/catalog/standards/sist/6cb84824-4245-4a90-8bba-6f74c84a62ef/sist-en-iso-748-2008



Reference number ISO 748:2007(E)

PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN ISO 748:2008 https://standards.iteh.ai/catalog/standards/sist/6cb84824-4245-4a90-8bba-6f74c84a62ef/sist-en-iso-748-2008



COPYRIGHT PROTECTED DOCUMENT

© ISO 2007

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, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office Case postale 56 • CH-1211 Geneva 20 Tel. + 41 22 749 01 11 Fax + 41 22 749 09 47 E-mail copyright@iso.org Web www.iso.org Published in Switzerland

Contents

1 Scope 1 2 Normative references 1 3 Terms and definitions 1 4 Principle of the methods of measurements 1 5 Selection and demarcation of site 2 5.1 Selection of site 2 5.2 Demarcation of site 2 5.2 Demarcation of site 3 6 Measurement of cross-sectional area 3 6.1 General 3 6.2 Measurement of volocity 3 6.3 Measurement of velocity 5 7.1 Reasurement of velocity using current-meters 5 7.1.1 Rotating-element current-meters 5 7.1.2 Electromagnetic current-meters 5 7.1.3 Measurement procedure (standards.itch.at) 5 7.1.4 Oblique flow 6 7.1.5 Determination of the mean velocity in a vertical 7 7.1.6 Errors and limitations SISILINISO.7482008 10 7.2 Selection of site 11 11 7.3 Measurement of
2 Normative references 1 3 Terms and definitions 1 4 Principle of the methods of measurements 1 5 Selection and demarcation of site 2 5.1 Selection of site 2 5.2 Demarcation of site 3 6 Measurement of cross-sectional area 3 6.1 General 3 6.2 Measurement of width 3 6.3 Measurement of depth. 4 7 Measurement of velocity using current-meters. 5 7.1 Measurement of velocity using current-meters. 5 7.1.1 Rotating-element current meters. 5 7.1.2 Electromagnetic current meters. 5 7.1.3 Measurement procedure (standards.itch.at) 5 7.1.4 Oblique flow 6 7.1.5 Determination of the mean velocity in a vertical. 7 7.1.4 General 674/55/65/55/25/26/55/26/26/55/26/26/55/26/26/55/26/26/55/26/26/55/26/26/55/26/26/55/26/2
3 Terms and definitions. 1 4 Principle of the methods of measurements. 1 5 Selection and demarcation of site 2 5.1 Selection of site 2 5.2 Demarcation of site 2 6 Measurement of cross-sectional area 3 6.1 General 3 6.2 Measurement of width 3 6.3 Measurement of depth. 3 6.4 Measurement of velocity using current-meters. 5 7.1 Rotating-element current meters. 5 7.1.1 Rotating-element current meters. 5 7.1.2 Electromagnetic current meters. 5 7.1.3 Measurement procedure (standards, it ch.ai) 5 7.1.4 Oblique flow 6 7.1.5 Determination of the mean velocity in a vertical 7 7.1.4 General 67 7.2 Selection of site 11 7.2.1 General 67 7.2 Selectoring the mean velocity in a vertical 7 7.1.4 Oblique flow 10
4 Principle of the methods of measurements 1 5 Selection and demarcation of site 2 5.1 Selection of site 2 5.2 Demarcation of site 3 6 Measurement of cross-sectional area 3 6.1 General 3 6.2 Measurement of vidth 3 6.3 Measurement of velocity 3 6.4 Measurement of velocity using current-meters 5 7.1 Measurement of velocity using current-meters 5 7.1.1 Rotating-element current-meters 5 7.1.2 Electromagnetic current-meters 5 7.1.3 Measurement procedure 5 7.1.4 Oblique flow 6 7.1.5 Determination of the mean velocity using floats 10 7.2 Selection of site 10 7.3 Measurement of velocity using floats 10 7.1.4 Oblique flow 6 7.1.5 Determination of the mean velocity using floats 10 7.2.1 General 11 7.2.2 Selection of site
5 Selection and demarcation of site 2 5.1 Selection of site 2 5.2 Demarcation of site 3 6 Measurement of cross-sectional area 3 6.1 General 3 6.2 Measurement of cross-sectional area 3 6.3 Measurement of width 3 6.4 Measurement of width 3 6.5 Measurement of velocity 3 7.1 Measurement of velocity using current-meters 5 7.1.1 Rotating-element current-meters 5 7.1.2 Electromagnetic current-meters 5 7.1.3 Measurement procedure (standards.iten.ai) 5 7.1.4 Oblique flow 6 7.1.5 Determination of the mean velocity in a vertical 7 7.1.6 Errors and limitations SIST IN ISO 7482008 10 7.2 Selection of site 11 11 7.3 Measurement of velocity using floats.idents/sist/ocb84824.4245.4290.8bha 11 7.1.6 Errors and limitations SIST IN ISO 748.2008 10 7.2
5.1 Selection of site 2 5.2 Demarcation of site 3 6 Measurement of cross-sectional area 3 6.1 General 3 6.2 Measurement of vidth 3 6.3 Measurement of width 3 6.4 General 3 6.5 Measurement of depth. 4 7 Measurement of velocity using current-meters. 5 7.1 Rotating-element current-meters. 5 7.1.2 Electromagnetic current-meters. 5 7.1.3 Measurement procedure (standards.iten.ai) 5 7.1.4 Oblique flow 6 7.1.5 Determination of the mean velocity in a vertical. 7 7.1.6 Errors and limitations. SIST EN ISO 7482008 10 7.2 Measurement of velocity/using floats. 10 7 7.2.1 General. 07482460265554. 10 7.2.2 Selection of site 11 11 7.2.3 Measuring procedure 11 11 7.2.4 General 0748246265554.
5.2 Demarcation of site
6 Measurement of cross-sectional area 3 6.1 General 3 6.2 Measurement of width 3 6.3 Measurement of depth. 3 6.4 Measurement of velocity 3 7 Measurement of velocity using current-meters. 5 7.1 Measurement of velocity using current-meters. 5 7.1.1 Rotating-element current-meters. 5 7.1.2 Electromagnetic current-meters. 5 7.1.3 Measurement procedure (standards.itch.ai) 5 7.1.4 Oblique flow 6 7.1.5 Determination of the mean velocity in a vertical 7 7.1.6 Errors and limitations. SISTEN ISO.748:2008 10 7.2 Measurement of velocity using floats. 11 7.2.1 General 6/74:84:40:25:85:en. so.748:2008 11 7.2.2 Selection of site 11 11 7.2.3 Measuring procedure 11 11 7.2.4 Types of float 11 11 7.2.5 Determination of velocity 12 12
6.2 Measurement of width 3 6.3 Measurement of depth. 4 7 Measurement of velocity 5 7.1 Measurement of velocity using current-meters. 5 7.1.1 Rotating-element current-meters. 5 7.1.2 Electromagnetic current-meters. 5 7.1.3 Measurement procedure. 5 7.1.4 Oblique flow 6 7.1.5 Determination of the mean velocity in a vertical. 7 7.1.6 Errors and limitations. SIST EN ISO 748:2008 7.2 Measurement of velocity using floatsudards/sist/ocb84824-4245-4a90-8bba- 11 7.2.1 General. 6/74:684602efsist-en-iso-748:2008 10 7.2 Selection of site 11 11 7.2.3 Beasuring procedure 11 11 7.2.4 Types of float. 11 11 7.2.5 Determination of velocity. 12 7.2.6 Main sources of error 13 8 Computation of discharge 13 8.1 General. 13 8.2 Craphical
6.3 Measurement of depth
7 Measurement of velocity 5 7.1 Measurement of velocity using current-meters 5 7.1.1 Rotating-element current-meters 5 7.1.2 Electromagnetic current-meters 5 7.1.3 Measurement procedure 5 7.1.4 Oblique flow 6 7.1.5 Determination of the mean velocity in a vertical 7 7.1.6 Errors and limitations SIST EN ISO 748:2008 7.2 Measurement of velocity using floatsindards/sist/6cb84824-4245-4a90-8bha- 10 7.2.1 General 674c84a62cfsist-en-iso-748:2008 11 7.2.2 Selection of site 11 11 7.2.3 Measuring procedure 11 11 7.2.4 Types of float 11 11 7.2.5 Determination of velocity 12 12 7.2.6 Main sources of error 13 3 8 Computation of discharge 13 13 8.1 General 13 13 8.2 Craphical method 13 13
7.1 Measurement of velocity using current-meters. 5 7.1.1 Rotating-element current-meters. 5 7.1.2 Electromagnetic current-meters. 5 7.1.3 Measurement procedure(standards.itch.ai) 5 7.1.4 Oblique flow 6 7.1.5 Determination of the mean velocity in a vertical. 7 7.1.6 Errors and limitations. SIST EN ISO 7482008 10 7.2 Measurement of velocity using floats/ndards/sit/6cb84824-4245-4a90-8bba- 11 7.2.1 General. 6f74684a62cf3sit-en-iso-748-2008 11 7.2.1 General. 6f74684a62cf3sit-en-iso-748-2008 11 7.2.2 Selection of site 11 7.2.3 Measuring procedure 11 7.2.4 Types of float. 11 7.2.5 Determination of velocity. 12 7.2.6 Main sources of error 13 8 Computation of discharge 13 8.1 General. 13
7.1.2 Electromagnetic current-meters 5 7.1.3 Measurement procedure (standards.iten.ai) 5 7.1.4 Oblique flow 6 7.1.5 Determination of the mean velocity in a vertical 7 7.1.6 Errors and limitations SISTEN ISO 748:2008 10 7.2 Measurement of velocity using floats.ndards/sist/6cb84824.4245.4a90.8bba- 11 7.2.1 General 6744c84a62ef/sist-en-iso-748-2008 11 7.2.2 Selection of site 11 7.2.3 Measuring procedure 11 7.2.4 Types of float 11 7.2.5 Determination of velocity 12 7.2.6 Main sources of error 13 8 Computation of discharge 13 8.1 General 13 8.2 Graphical method 13
7.1.3 Measurement procedure (standards.itch.ai) 5 7.1.4 Oblique flow 6 7.1.5 Determination of the mean velocity in a vertical 7 7.1.6 Errors and limitations SIST EN ISO 7482008 10 7.2 Measurement of velocity using floatsmards/sist/6cb84824-4245-4a90-8bba- 11 7.2.1 General 6f74c84a62ef/sist-en-iso-748-2008 11 7.2.2 Selection of site 11 7.2.3 Measuring procedure 11 7.2.4 Types of float 11 7.2.5 Determination of velocity 12 7.2.6 Main sources of error 13 8 Computation of discharge 13 8.1 General 13 8.2 Graphical method 13
7.1.5 Determination of the mean velocity in a vertical 7 7.1.6 Errors and limitations SIST EN ISO 7482008 10 7.2 Measurement of velocity using floats indards/sist/6cb84824-4245-4a90-8bba- 11 7.2.1 General 6f74c84a62ef/sist-en-iso-748-2008 11 7.2.2 Selection of site 11 7.2.3 Measuring procedure 11 7.2.4 Types of float 11 7.2.5 Determination of velocity 12 7.2.6 Main sources of error 13 8 Computation of discharge 13 8.1 General 13 8.2 Graphical method 13
7.1.6 Errors and limitations SISTEN ISO 748:2008 10 7.2 Measurement of velocity using floats indarks/sist/6cb84824-4245-4a90-8bba- 11 7.2.1 General 6f74c84a62ef/sist-en-iso-748-2008 11 7.2.2 Selection of site 11 7.2.3 Measuring procedure 11 7.2.4 Types of float 11 7.2.5 Determination of velocity 12 7.2.6 Main sources of error 13 8 Computation of discharge 13 8.1 General 13 8.2 Graphical method 13
7.2 Measurement of velocity using noassimultation with the second se
7.2.2Selection of site117.2.3Measuring procedure117.2.4Types of float117.2.5Determination of velocity127.2.6Main sources of error138Computation of discharge138.1General138.2Graphical method13
7.2.3 Measuring procedure 11 7.2.4 Types of float 11 7.2.5 Determination of velocity 12 7.2.6 Main sources of error 13 8 Computation of discharge 13 8.1 General 13 8.2 Graphical method 13
7.2.5 Determination of velocity
7.2.6 Main sources of error 13 8 Computation of discharge 13 8.1 General 13 8 2 Graphical method 13
8 Computation of discharge 13 8.1 General 13 8.2 Graphical method 13
8.2 Granhical method
8.2.1 Depth-velocity-integration
8.2.2 Velocity-area integration method (velocity-contour method)
8.3.1 Mean-section method
8.3.2 Mid-section method
8.5 Mean-section method — Horizontal planes
8.6 Determination of discharge from surface-float velocity measurements
8.7.1 General
8.7.2 Computation of discharge
6.7.3 Computation of mean water level 22 0 Uncertainties in flow measurement 22
9 Uncertainties in flow measurement
9.2 Definition of uncertainty
9.3 Method of calculating the uncertainty in discharge by measurement of velocity by
9.3.1 General

9.3.2	Contributory uncertainties	24
9.3.3	Example	26
9.3.4	Combined uncertainty	26
9.4	Method of calculating the uncertainty in discharge by measurement of velocity using	
	floats	27
9.4.1	General	27
9.4.2	Contributory uncertainties	27
9.4.3	Combined uncertainty in discharge	28
9.4.4	Example	28
Annex	A (informative) Correction for sag, pull, slope and temperature in measurement of cross- section width by tape or wire	30
Annex	B (informative) Distance measurement across the cross-section	33
Annex	C (informative) Corrections for wetted length of wire when measuring depths with wire not normal to surface	36
Annex	D (informative) Correction for drift	39
Annex	E (informative) Uncertainties in the velocity-area measurement	40
Annex	F (informative) Determination of mean velocity from float measurements	44
Bibliog	raphy	46

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

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.

ISO 748 was prepared by Technical Committee ISO/TC 113, *Hydrometry*, Subcommittee SC 1, *Velocity area methods*.

This fourth edition cancels and replaces the third edition (ISO 748:1997), which has been technically revised. (standards.iteh.ai)

Hydrometry — Measurement of liquid flow in open channels using current-meters or floats

1 Scope

2

This International Standard specifies methods for determining the velocity and cross-sectional area of water flowing in open channels without ice cover, and for computing the discharge therefrom.

It covers methods of employing current-meters or floats to measure the velocities. It should be noted that although, in some cases, these measurements are intended to determine the stage-discharge relation of a gauging station, this International Standard deals only with single measurements of the discharge; the continuous recording of discharges over a period of time is covered in ISO 1100-1 and ISO 1100-2.

NOTE The methods for determining the velocity and cross-sectional area of water flowing in open channels with ice cover are specified in ISO 9196.

iTeh STANDARD PREVIEW

(standards.iteh.ai)

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies. <u>HTDS//48/2008</u>

ISO 772, Hydrometric determinations — Vocabulary and symbols

ISO 1088, Hydrometry — Velocity-area methods using current-meters — Collection and processing of data for determination of uncertainties in flow measurement

ISO 2537, Hydrometry — Rotating-element current-meters

ISO 3455, Hydrometry — Calibration of current-meters in straight open tanks

ISO/TS 15768, Measurement of liquid velocity in open channels — Design, selection and use of electromagnetic current meters

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 772 apply.

4 Principle of the methods of measurements

4.1 The principle of these methods consists of determining velocity and cross-sectional area. A measuring site is chosen conforming to the specified requirements (see Clause 5); the width, depending on its magnitude, is measured either by means of steel tape or by some other surveying method, and the depth is measured at a number of points (known as verticals) across the width, sufficient to determine the shape and area of the cross-section (see Clause 6).

Velocity observations using current-meters are made at each vertical preferably at the same time as measurement of depth, especially in the case of unstable beds (see 7.1.5).

Velocity observations can also be made using surface floats or velocity-rods (see 7.2).

4.2 The discharge is computed either arithmetically or graphically by summing the products of the velocity and corresponding area for a series of observations in a cross-section. If unit width discharge is required, it is generally computed from the individual observations at each measurement vertical.

5 Selection and demarcation of site

5.1 Selection of site

The site selected should comply as far as possible with the following requirements.

- a) The channel at the measuring site should be straight and of uniform cross-section and slope in order to minimize abnormal velocity distribution. When the length of the channel is restricted, it is recommended for current-meter measurements that the straight length upstream should be at least twice that downstream.
- b) Flow directions for all points on any vertical across the width should be parallel to one another and at right angles to the measurement section.
- c) The bed and margins of the channels should be stable and well defined at all stages of flow in order to facilitate accurate measurement of the cross-section and ensure uniformity of conditions during and between discharge measurements. (standards.iteh.ai)
- d) The curves of the distribution of velocities should be regular in the vertical and horizontal planes of <u>SIST EN ISO 748:2008</u>

https://standards.iteh.ai/catalog/standards/sist/6cb84824-4245-4a90-8bba-

- e) Conditions at the section and in its vicinity should also be such as to preclude changes taking place in the velocity distribution during the period of measurement.
- f) Sites displaying vortices, reverse flow or dead water should be avoided.
- g) The measurement section should be clearly visible across its width and unobstructed by trees, aquatic growth or other obstacles.
- h) Measurement of flow from bridges can be a convenient and sometimes safer way of sampling width, depth and velocity. When gauging from a bridge with divide piers, each section of the channel should be measured separately. Particular care should be taken in determining the velocity distribution when bridge apertures are surcharged or obstructed.
- i) The depth of water at the section should be sufficient at all stages to provide for the effective immersion of the current-meter or float, whichever is to be used.
- j) If the site is to be established as a permanent station, it should be easily accessible at all times with all necessary measurement equipment.
- k) The section should be sited away from pumps, sluices and outfalls, if their operation during a measurement is likely to create unsteady flow conditions.
- I) Sites where there is converging or diverging flow should be avoided.
- m) In those instances where it is necessary to make measurements in the vicinity of a bridge, it is preferable that the measuring site be upstream of the bridge. However, in certain cases and where accumulation of ice, logs or debris is liable to occur, it is acceptable that the measuring site be downstream of the bridge.

- n) The measurement of flow under ice cover is dealt with in ISO 9196. For streams subject to formation of ice cover, the requirements of measurement specified in this International Standard can be used during the free water season.
- o) It may, under certain conditions of river flow or level, prove necessary to carry out current-meter measurements on sections other than the original chosen location. This is quite acceptable if there are no substantial unmeasured losses or gains to the river in the intervening reach and so long as all flow measurements can be related to any stage value recorded at the principal reference section.

5.2 Demarcation of site

5.2.1 If the site is to be established as a permanent station or likely to be used frequently for future measurement, it should be provided with means for demarcation of the cross-section and for determination of stage. Where the site is used only once, or infrequently, and there are no means of determining stage values on site, care should be taken to ensure that the water level and/or flow do not change significantly during the measurement period.

5.2.2 The position of each cross-section, normal to the mean direction of flow, shall be defined on the two banks by clearly visible and readily identifiable markers. Where a site is subject to considerable snow cover, the section line-markers may be referenced to other objects such as rock cairns.

5.2.3 The stage shall be read from a gauge at intervals throughout the period of measurement and the gauge datum shall be related by precise levelling to a standard datum.

5.2.4 An auxiliary gauge on the opposite bank shall be installed where there is likelihood of a difference in the level of water surface between the two banks. This is particularly important in the case of very wide rivers. The mean of the measurements taken from the two gauges shall be used as the mean level of the water surface and as a base for the cross-sectional profile of the stream.

SIST EN ISO 748:2008

6 Measurement of cross-sectionalsareals/sist/6cb84824-4245-4a90-8bba-

6f74c84a62ef/sist-en-iso-748-2008

6.1 General

The cross-sectional profile of the open channel at the gauging-site shall be determined at a sufficient number of points to establish the shape of the bed.

The location of each point is determined by measuring its horizontal distance to a fixed reference point on one bank of the channel, in line with the cross-section. This in turn allows calculation of the area of individual segments separated by successive verticals where velocities are measured.

6.2 Measurement of width

6.2.1 Measurement of the width of the channel and the width of the individual segments may be obtained by measuring the horizontal distance from or to a fixed reference point which shall be in the same plane as the cross-section at the measuring site.

6.2.2 Where the width of the channel permits, these horizontal distances shall be measured by direct means, for example a graduated tape or suitable marked wire, care being taken to apply the necessary corrections given in Annex A. The intervals between the verticals, i.e. the widths of the segments, shall be similarly measured.

6.2.3 Where the channel is too wide for the above methods of measurement, and a boat is used, the horizontal distance may be determined by optical or electronic distance-meters, by the use of a differential Global Positioning System, or by one of the surveying methods given in Annex B.