SLOVENSKI STANDARD
SIST EN ISO 748:2022

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Nadomešča:
SIST EN ISO 748:2008

Hidrometrija - Merjenje pretoka tekočin v odprtih kanalih - Metode za določanje območja hitrosti z uporabo točkovnih meritev hitrosti (ISO 748:2021)

Hydrometry - Measurement of liquid flow in open channels - Velocity area methods using point velocity measurements (ISO 748:2021)

Hydrometrie - Durchflussmessung in offenen Gerinnen mittels Fließgeschwindigkeitsmessgeräten (ISO 748:2021)

Hydrométrie - Mesurage du débit des écoulements à surface libre - Méthodes d'exploration du champ des vitesses utilisant le mesurage de la vitesse par point (ISO 748:2021)

Ta slovenski standard je istoveten z: **EN ISO 748:2021**

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17.120.20 Pretok v odprtih kanalih Flow in open channels

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

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English Version

Hydrometry - Measurement of liquid flow in open channels - Velocity area methods using point velocity measurements (ISO 748:2021)

Hydrométrie - Mesurage du débit des écoulements à surface libre - Méthodes d'exploration du champ des vitesses utilisant le mesurage de la vitesse par point (ISO 748:2021)

Hydrometrie - Durchflussmessung in offenen Gerinnen mittels Fließgeschwindigkeitsmessgeräten (ISO 748:2021)

This European Standard was approved by CEN on 24 October 2021.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (EN ISO 748:2021) has been prepared by Technical Committee ISO/TC 113 "Hydrometry" 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of an identical text or by endorsement, at the latest by June 2022, and conflicting national standards shall be withdrawn at the latest by June 2022.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN ISO 748:2007.

Any feedback and questions on this document should be directed to the users’ national standards body/national committee. A complete listing of these bodies can be found on the CEN website.

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, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Endorsement notice

The text of ISO 748:2021 has been approved by CEN as EN ISO 748:2021 without any modification.

INTERNATIONAL STANDARD

ISO 748

Fifth edition
2021-11

Hydrometry — Measurement of liquid flow in open channels — Velocity area methods using point velocity measurements

Hydrométrie — Mesurage du débit des écoulements à surface libre — Méthodes d'exploration du champ des vitesses utilisant le mesurage de la vitesse par point

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 113, *Hydrometry*, Subcommittee SC 1, *Velocity area methods,* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 318, *Hydrometry,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This fifth edition cancels and replaces the fourth edition (ISO 748:2007), which has been technically revised. The main changes compared with the previous edition are as follows:

— the document has been updated to take account of technological developments;

— Clause 7 has been revised to reduce uncertainties in measurements;

— ISO 9196 regarding measurement under ice conditions has been incorporated.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Hydrometry — Measurement of liquid flow in open channels — Velocity area methods using point velocity measurements

1 Scope

This document specifies methods for determining the velocity and cross-sectional area of water flowing in open channels and for calculating the discharge employing point velocity measurement devices.

It is applicable to methods using rotating-element current meters, acoustic doppler velocimeters (ADVs), acoustic doppler current profiler (ADCP) stationary method, surface velocity measurement including floats and other surface velocity systems.

Although some general procedures are discussed, this document does not describe in detail how to use or deploy these systems.

NOTE For detailed procedures, refer to guidelines from instrument manufacturers and the appropriate public agencies.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 772, *Hydrometry — Vocabulary and symbols*

ISO 25377:2020, *Hydrometric uncertainty guidance (HUG)*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

4 Principle of the methods of measurements

The principle depends upon determining velocity and cross-sectional area.

This is characterized as shown by Formula (1):

$$Q = \bar{V}A \tag{1}$$

where

Q is the flow (m^3/s);

$\bar{V}$ is the mean velocity (m/s) (averaged over the cross-section);

A is the cross-sectional area (m^2).

A measuring site shall be chosen conforming to the specified requirements.

The cross-sectional area shall be measured by a method specified in this document, appropriate to the dimensions.

Velocity observations shall be made by a method specified in this document.

The discharge shall be calculated by a method specified in this document.

5 Site selection

5.1 Selection of site

The site selected should conform to the following requirements.

a) The channel at the measuring site shall be straight and of uniform cross-section and slope in order to minimize abnormal velocity distribution. The straight length should be at least six times the width of the channel upstream, and at least three times the downstream width.

b) Flow directions for all points on any vertical across the width shall be parallel to one another and at right angles to the measurement section.

c) The bed and margins of the channels shall 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.

d) The curves of the distribution of velocities shall be regular in the vertical and horizontal planes of measurement.

e) Conditions at the section and in its vicinity shall 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 shall be avoided.

g) The measurement section (including approach and exit) shall be clearly visible across its width and unobstructed by trees, aquatic growth or other obstacles.

h) When gauging from a bridge with divide piers, each section of the channel shall be measured separately. Particular care shall be taken in determining the velocity distribution when bridge apertures are surcharged or obstructed.

i) The depth of water at the section shall be sufficient at all stages to ensure whichever device is deployed it conforms to the manufactures minimum criteria for use.

j) If the site is to be established as a permanent station, it shall be easily accessible at all times with all necessary measurement equipment appropriate to the flow conditions.

k) The section shall be sited away from pumps, sluices and outfalls, if their operation during a measurement is likely to create unsteady flow conditions.

l) Sites where there is converging or diverging flow shall be avoided.

m) If a suitable straight section includes a bridge, wading and boat measurements shall be made away from the effects of the bridge.

n) The measurement of flow under ice cover is dealt with in Annex E. For streams that are subject to formation of ice cover, the main part of this document shall be used when the stream is free flowing.

o) It may, under certain conditions of river flow or level, prove necessary to carry out measurements on sections upstream or downstream of 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.

NOTE Ideal measurement conditions can be found when all requirements are satisfied. If ideal conditions are not available, it is still possible to make a measurement, but uncertainty will be increased.

5.2 Demarcation of site

5.2.1 A permanent station, or one likely to be used frequently for future measurement, shall be provided with means for demarcation of the cross-section and for determination of stage.

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 natural objects and, if possible, the position noted using a global navigation satellite system (GNSS).

5.2.3 The stage shall be read from a gauge at the start and end of the measurement period. If the water level changes rapidly, a level measurement is recommended to be taken at least every 30 min.

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. 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.

6 Measurement of cross-sectional area

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 and to minimize the uncertainty in the calculation of the cross-sectional area.

6.2 Measurement of width

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

6.3 Measurement of depth

Measurement of depth shall be made at intervals close enough to define the cross-sectional profile accurately. The number of points at which depth is to be measured shall be at each vertical where velocity is measured.

The number of sampling verticals depends on the variability of the water depth in the cross-section. This number is adequate when the number of points does not significantly change the value of the cross-section obtained.

Where it is impracticable to take more than one reading of the depth, the uncertainty in measurement may be increased (see Clause 9).

When measuring depths with a wire not normal to the surface, see Annex F.