INTERNATIONAL STANDARD

ISO 772

Fourth edition
1996-04-15

AMENDMENT 2
2004-05-01

Hydrometric determinations — Vocabulary and symbols —

AMENDMENT 2

Déterminations hydrométriques — Vocabulaire et symboles —

AMENDEMENT 2

Reference number
ISO 772:1996/Amd.2:2004(E)

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Foreword

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Amendment 2 to ISO 772:1996 was prepared by Technical Committee ISO/TC 113, *Hydrometric determinations*, Subcommittee SC 3, *Terminology and symbols*.

This amendment consists of the complete revision of Clause 3 "Notches, weirs and flumes" comprising the modification of several definitions and the inclusion of some new terms and definitions. In addition, the terms and definitions have been arranged in a more logical sequence. New terms are also added to Clauses 6 and 8 and some minor changes are made to the definitions of a few terms in Clauses 1, 2, 6 and 8.

Hydrometric determinations — Vocabulary and symbols —

AMENDMENT 2

Contents

Page ii, Contents

Replace the existing title of Clause 3 with "Flow measurement structures".

1 General terms

Page 2, Term 1.6

After the definition for critical flow, add the following Note 1 and renumber the Note as Note 2:

"NOTE 1 This is the generic definition of critical flow. See **critical flow** (3.26) for the specific definition when used in reference to the field of flow measurement structures."

Pages 6, 7 and 9, Clause 1

Replace the definitions for Terms 1.35, 1.41, 1.42, 1.61 and 1.62 as follows:

1.35
transition
crossover
inflection reach between two meander loops in which the main flow crosses from one side of the channel to the other

NOTE The depth of flow in a transition is usually reduced from normal depth and is more uniform than in the curved reach.

1.41
stream gauging
all of the operations necessary for the measurement of discharge of a stream

1.42
discharge measurement
process of measuring the discharge of liquid in an open channel

1.61
converging reach
reach in which the cross-sectional area gradually decreases in the direction of flow

1.62
expanding reach
reach in which the cross-sectional area gradually increases in the direction of flow

2 Velocity area-methods

Page 26, Clause 2

Replace the definition for Term 2.21 as follows:

2.21
moving boat method
method of measuring discharge from a boat by traversing the stream along the measuring section while continuously measuring velocity, depth, distance travelled and angle of current velocity

Page 32, Clause 3

Delete Clause 3, entitled *Notches, weirs and flumes*, and replace the entire Clause 3 by the following new text and figures.

3 Flow measurement structures

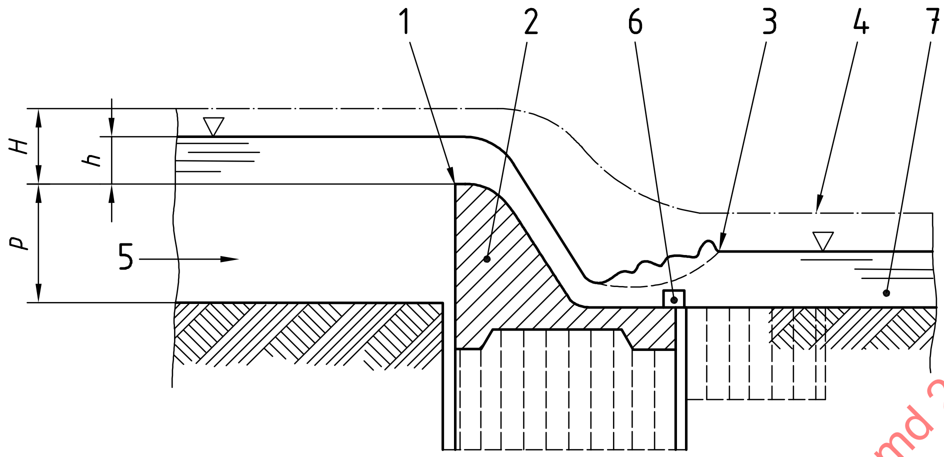
NOTE A classification of flow measurement structures is given in Annex C.

3.1
flow measurement structure
hydraulic structure (e.g. weir, flume or gate) installed in an open channel where in most cases the discharge can be derived from the measured upstream water level

NOTE The structure is an artificial reduction of the cross-sectional area in the channel, where part of the upstream total head is converted into kinetic energy used to obtain critical flow.

3.2
weir
overflow structure that may be used for controlling upstream surface level or for measuring discharge or both.

See Figure 6.



Key

1 weir crest

2 weir block

3 hydraulic jump

4 total head line

5 direction of flow

6 control block

7 stilling basin

Figure 6 — Weir

3.3
height of weir
apex height
height from the upstream bed to the lowest point of the crest

3.4
head over the weir
elevation of the water surface above the lowest point of the crest, measured at a point sufficiently upstream to be unaffected by the drawdown of the weir

NOTE The distance upstream of the point of measurement depends on the type of weir used.

3.5
upstream total head
elevation of the total head relative to the flume invert level or the weir crest level, measured upstream of the structure

3.6
downstream total head
elevation of the total head relative to the flume invert level or weir crest level, measured downstream of the structure

3.7
weir abutment
abutment
wing wall
wall at the side of a channel, generally parallel to the longitudinal axis of the weir, against which the weir terminates

3.8
weir block
weir body
part of a weir lying between the abutments and over which the water flows

See Figure 6.

3.9
full-width weir
suppressed weir
weir whose crest fills the width of the channel in which it is placed, thus eliminating side contraction of the stream

3.10
divide wall
wall running in the direction of flow and separating the individual sections of a compound structure

3.11
glacis
sloping downstream face of a weir block and continuation of the crest

3.12
weir slope
ratio of the horizontal to the vertical components of the upstream face, the downstream face or the cross-slope of a weir

3.13
approach channel
reach of the channel upstream of the gauging structure in which suitable flow conditions have to be established to ensure correct gauging

3.14
straightening vane
guide vane
baffle
device placed in the approach channel to improve flow conditions

cf. **baffle** (3.15)

3.15
baffle
wall or block placed downstream of a structure to dissipate energy or to cause improved velocity distribution

cf. **straightening vane** (3.14)

3.16
control block
baffle pier
energy-breaking block
block constructed in a channel or stilling basin to increase turbulence and thereby dissipate the energy of water flowing at high velocity

NOTE See Figure 6 for the application of a control block to a weir construction.

3.17
stilling basin
basin constructed downstream of a structure to dissipate the energy of fast-flowing water and to protect the bed and banks from erosion

See Figure 6.

3.18
separation pocket
⟨at a corner or at a point of large curvature⟩ region of recirculating flow at a structure caused by separation of the main flow from the structure

cf. **separation pocket** (3.19)

NOTE This phenomenon can occur at broad-crested weirs which do not have rounded upstream or downstream corners or which do not have a crest of sufficient length in the direction of flow.

3.19
separation pocket
⟨triangular-profile weir⟩ near-cylindrical volume of slowly moving water immediately downstream of the crest of the structure

cf. **separation pocket** (3.18)

3.20
throat
that part of a flume at which critical flow occurs; usually where the wetted cross-sectional area is at a minimum

NOTE The throat may be rectangular, trapezoidal, U-shaped or of another specially designed shape.

3.21
modular flow
free flow
flow over or through a structure when the upstream level is independent of the downstream level for a given discharge

3.22
discharge coefficient
coefficient in the discharge equation depending on the type and shape of the measuring structure, and the head over the weir

3.23
modular limit
submergence ratio for flow over a weir at which the upstream level just begins to be affected by the downstream level for a given discharge

3.24
drowned flow
nonmodular flow
submerged flow
flow, over or through a structure, when it is affected by changes in the level downstream

3.25
submergence ratio
ratio of the downstream total head to the upstream total head at a structure

3.26
critical flow
flow conditions for which the total energy head above the invert reaches a minimum at a given discharge and for given channel dimensions

NOTE 1 This is the specific definition of critical flow when used in reference to the field of flow measurement structures. See **critical flow** (1.6) for the generic definition.

NOTE 2 The water depth for these flow conditions is called critical depth and occurs during the transition from subcritical to supercritical flow.

NOTE 3 Critical flow in overflow structures and undershot gates occurs at the critical section, also called the control section. Critical flow in a measuring structure is a condition for modular flow.

3.27
double gauging
measurement of two simultaneous but independent heads to facilitate measurement in the drowned flow range

NOTE The usual head measurement locations lie between $3H_{max}$ upstream of the weir and $3H_{max}$ downstream of the weir, where H_{max} is the maximum total head over the weir crest.

3.28
broad-crested weir
weir with a horizontal longitudinal crest which has a length equal to or greater than half the maximum operating head

See Figure 7.

NOTE The streamlines above the crest are approximately straight and parallel at least over a short distance.

3.28.1
rectangular broad-crested weir
broad-crested weir (3.28) of which the crest is a horizontal rectangular plane surface and of which the upstream face forms a sharp right-angled corner at its intersection with the plane of the crest

See Figure 7.

3.28.2
round-nosed broad-crested weir
broad-crested weir (3.28) of which the crest is a horizontal rectangular plane surface and of which the upstream corner is rounded to avoid flow separation

See Figure 7.

3.28.3
trapezoidal broad-crested weir
broad-crested weir (3.28) of which the crest is an horizontal plane surface and of which the upstream face and the downstream face are sloping

See Figure 7.

3.28.4
V-shaped broad-crested weir
broad-crested weir (3.28) with a triangular cross-sectional profile, rounded off at the upstream corner

See Figure 7.

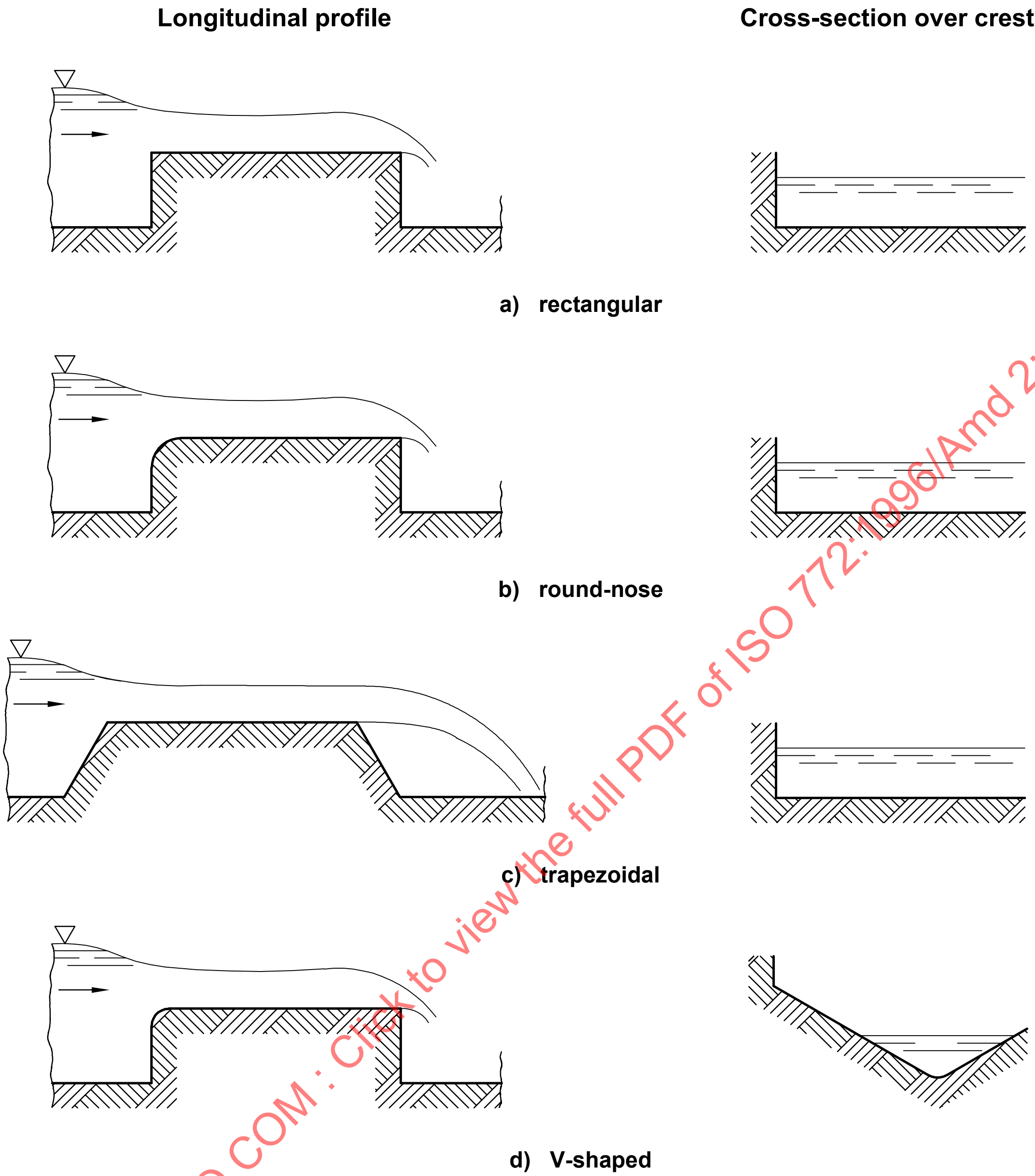


Figure 7 — Broad-crested weirs

3.29
nappe
jet formed by the flow over a weir

See Figure 8.

3.29.1
clinging nappe
nappe (3.29) that maintains contact with the downstream face of a weir

3.29.2
unconfined nappe
nappe (3.29) where the guide walls of the structure end at the crest (or at the edge), thus permitting free lateral expansion of the flow

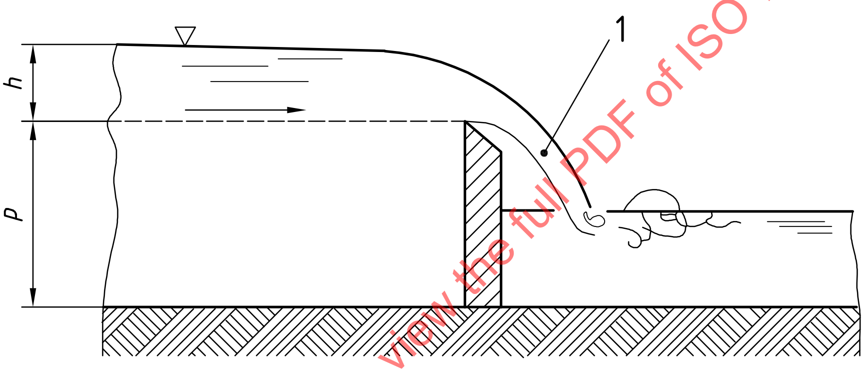
3.29.3
fully ventilated nappe
fully aerated nappe
nappe (3.29) springing clear of the downstream face of the weir with atmospheric pressure on the underside of the nappe

3.29.4
fully developed contraction
⟨of a nappe⟩ contraction that occurs when further increase in the depth or width of the approach channel no longer affects the **nappe** (3.29)

3.30
thin-plate weir
sharp-crested weir
weir constructed of a vertical thin plate from which the nappe springs clear of the crest, provided that the nappe is ventilated

NOTE The streamlines above the crest are strongly curved.

See Figure 8.



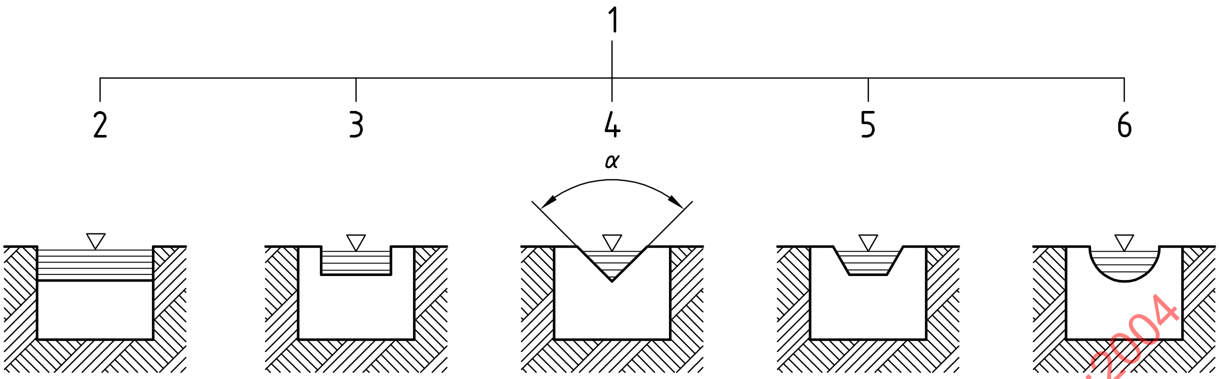
Key

1 nappe

Figure 8 — Thin-plate weir

3.31
thin-plate notch weir
weir whose crest is a notch cut in a thin plate

See Figure 9.



Key

1 thin-plate notch weir
2 full width
3 rectangular
4 triangular (V-notch)
5 trapezoidal
6 circular

Figure 9 — Thin-plate weirs

3.32
short-crested weir
weir with a horizontal longitudinal crest that is shorter in length than half the maximum operating head or with a longitudinal crest which is concave, convex or uneven

NOTE The streamlines above the crest are curved.

3.33
triangular-profile weir
two-dimensional weir with a triangular longitudinal profile

NOTE Usually the upstream slope is 1:2 and the downstream slope is 1:5.

See Figure 10.

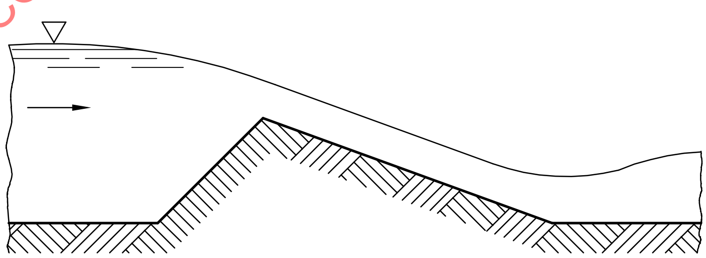


Figure 10 — Triangular-profile weir (longitudinal profile)

3.34
streamlined triangular-profile weir
two-dimensional weir with a triangular longitudinal profile in which the sharp edge between the two sloping faces is replaced by a circular arc connecting the two faces tangentially

3.35
flat-V weir
triangular-profile weir with a crest that is shallow and V-shaped when viewed in the direction of flow

NOTE Usually the cross-slope of the V-shape is 1:10, 1:20 or 1:40.

See Figure 11.

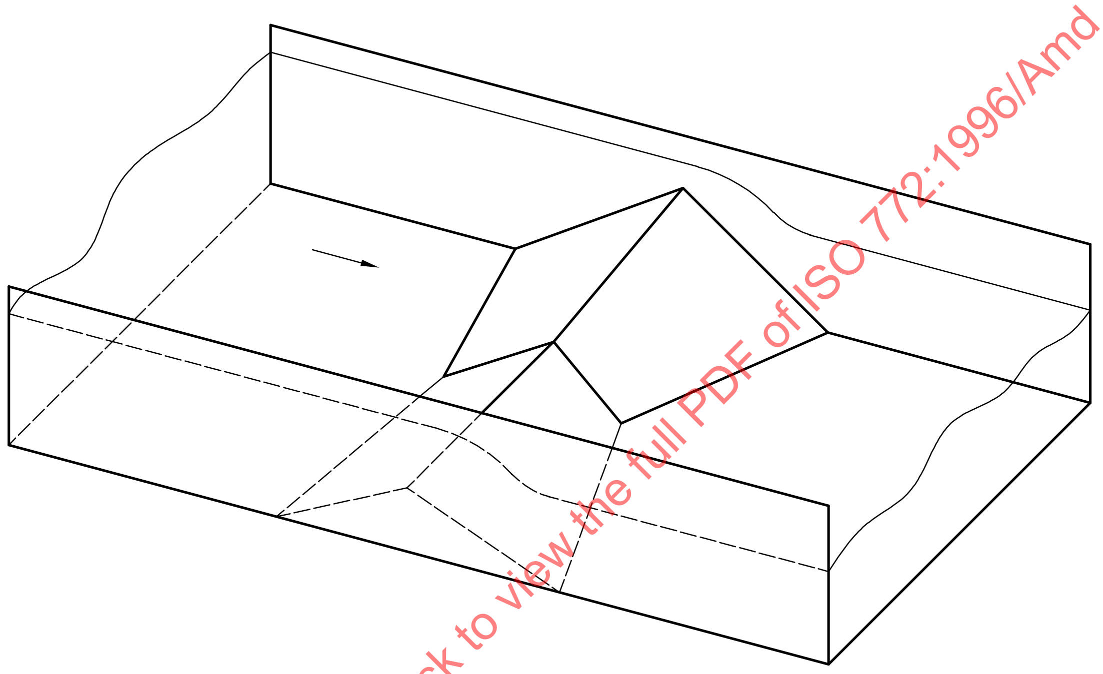
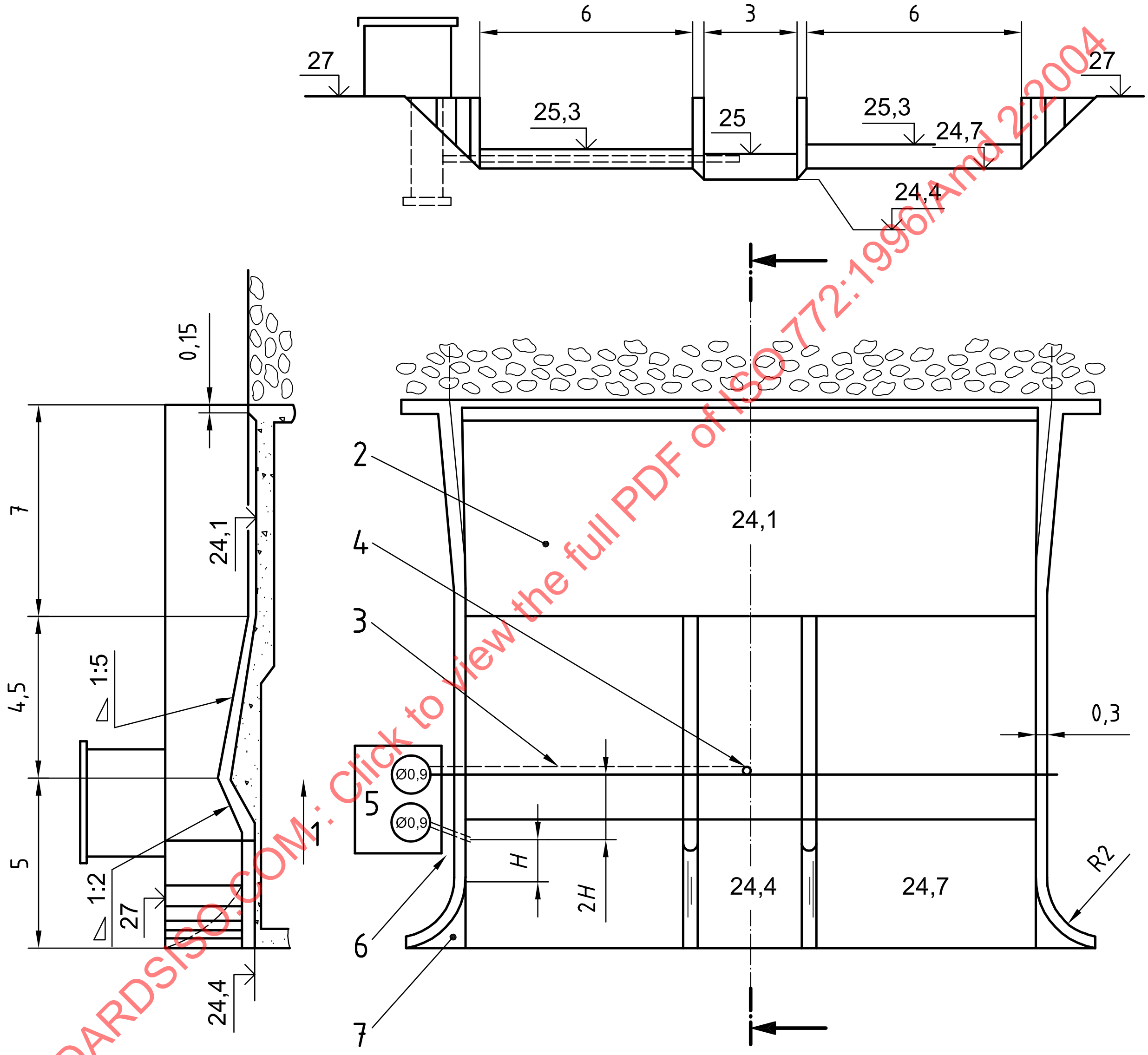


Figure 11 — Flat-V weir

3.36
compound structure
series of weirs and/or flumes that may be of different crest levels and disposed across the width of an open channel and separated by divide walls

See Figure 12.

Dimensions in metres



Key

1 flow
2 stilling basin
3 crest-tapping pipe: ∅ 0,1
4 connecting pipe to crest-tapping box (0,3 × 0,6 × 0,15): ∅ 0,01
5 recorder housing
6 intake: ∅ 0,1
7 transition formed

Figure 12 — Example of compound structure design

3.37
end-depth method
approximate method to estimate the discharge in a horizontal, or gently sloping channel, when the bed is discontinued abruptly, by measuring the head exactly at the commencement of the free overfall

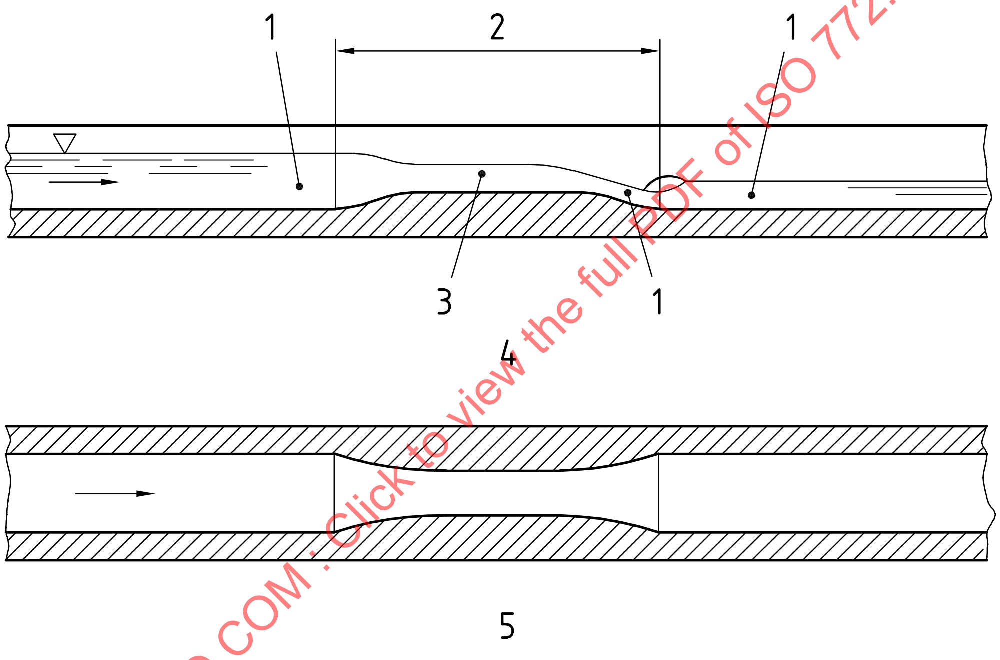
3.38
flume
streamlined constriction in an open channel usually consisting of an entrance section, a throat section and a downstream expansion, that can be used for measurement of flow

3.38.1
critical-depth flume
standing-wave flume
measuring **flume** (3.38) of dimensions which produce critical flow in the throat and in which the measurement of only the upstream water level permits the calculation of discharge

3.38.2
long-throated flume
measuring **flume** (3.38) having a throat length equal to or greater than half the maximum operating head

NOTE The streamlines in the throat section are approximately straight and parallel at least over a short distance.

See Figure 13.



Key

1 subcritical flow
2 throat
3 critical flow
4 longitudinal profile
5 plan view

Figure 13 — Long-throated flume

3.38.3
short-throated flume
measuring **flume** (3.38) having a substantially shorter throat length as compared with long-throated flumes

NOTE The streamlines in the throat section are curved.

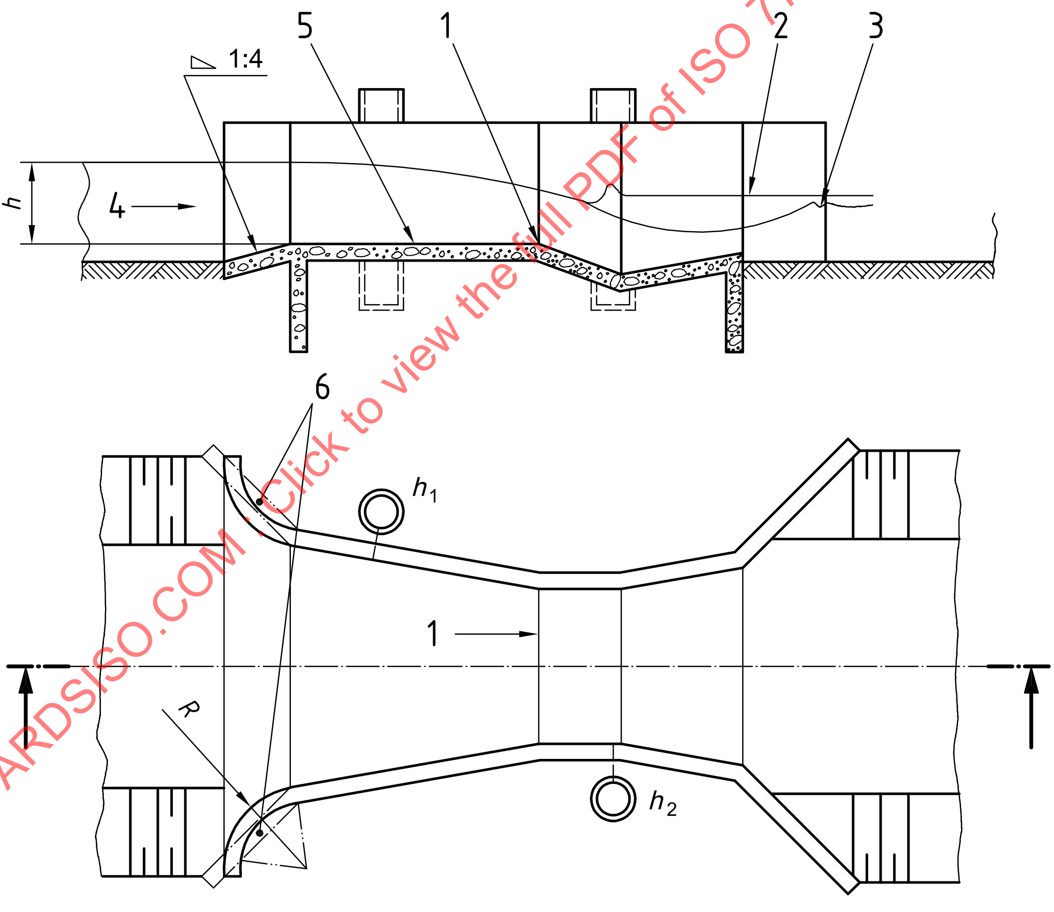
3.38.4
throatless flume
measuring **flume** (3.38) which does not have a parallel-walled throat and which does not generate parallel flow at the critical section

3.38.5
Parshall flume
measuring **flume** (3.38) having a converging entrance section with a level floor, a short-throat section with a floor inclined downwards at a gradient of 3:8, and a diverging exit section with a floor inclined upwards at a gradient of 1:6

See Figure 14 a).

3.38.6
Saniiri flume
measuring **flume** (3.38) with a converging entrance section having a level floor with a fall at its downstream end and vertical walls to join it to the downstream channel

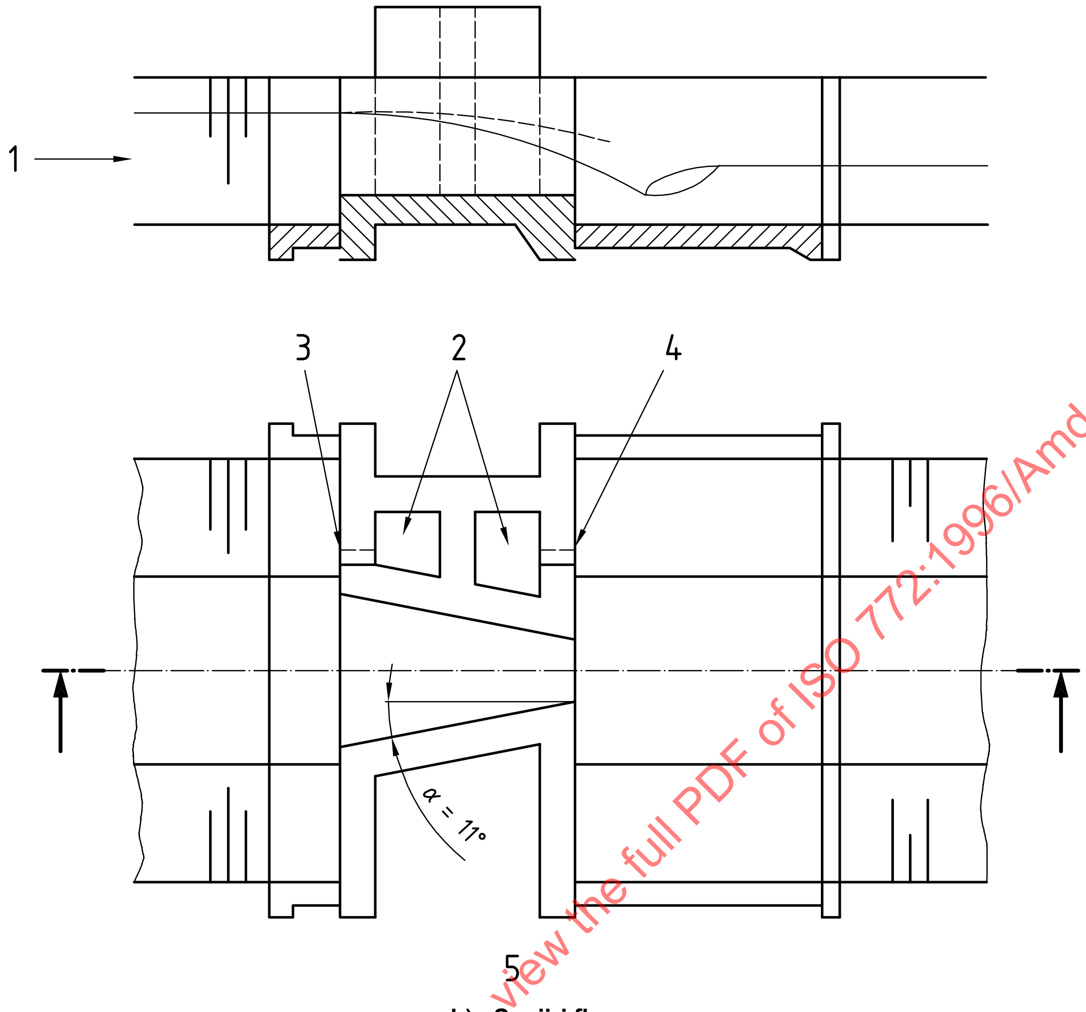
See Figure 14 b).



a) Parshall flume

Key

1 crest
2 partially submerged flow
3 free flow
4 direction of flow
5 level floor
6 alternative 45° wing wall



b) Saniiri flume

Key

1 direction of flow

2 stilling wells

3 h_1 intake

4 h_2 intake

5 plan view

Figure 14 — Measuring flumes with converging entrance section

3.39
vertical underflow gate
vertical gate, situated in a channel of rectangular cross-section with a flat bed, for regulating the water level upstream of the gate or the discharge through the gate opening

NOTE 1 The gate is movable in vertical slots and it can be raised or lowered by hand or mechanically.

NOTE 2 The underflow is two-dimensional except at vertically narrow gate openings.

6 Sediment transport

Page 66, Term 6.17

Replace the definition for Term 6.17 as follows.

6.17
depth-integration method
method of sampling suspended sediment in which, by traversing the depth of the stream both in the downward and upward directions at a uniform speed, the sampler takes, at every point on the vertical, a small specimen of the water-sediment mixture, each increment of which is proportional to the local sediment discharge so that the sampler gets filled to almost its full capacity

Page 71, Clause 6

At the end of Clause 6, add the following terms and definitions.

6.60
point-integration method
method of sampling of suspended sediment in which the sampler, held stationary at a point, is filled at stream velocity to almost its full capacity during the sampling period with water-sediment mixture

NOTE Prior to allowing filling, it is necessary to equalize the pressure inside the sampler with the water pressure at the point of sampling.

6.61
time-integration method
method of sampling of suspended sediment with respect to time, expressed as follows:

$$\bar{g}_{\mathrm{s}} = \frac{1}{t_i}\int_0^{t_i} g_{\mathrm{s}} \mathrm{d}t$$

where

$\bar{g}_{\mathrm{s}}$ is the sediment transport mean flow rate;

t_i is the time interval of integration;

g_{s} is the instantaneous transport flow rate

6.62
range pillar
pillar erected at locations around the shoreline of a reservoir to identify the cross-sections selected for conducting sedimentation surveys

8 Groundwater

Page 15 of ISO 772:1996, Amd 1:2002, Term 8.72

Replace the definition for Term 8.72 as follows.

8.72
lithology
physical character and mineralogical composition that gives rise to the appearance and properties of a rock or sediment

Page 19 of ISO 772:1996, Amd 1:2002, Clause 8

At the end of Clause 8, groundwater, add the following terms and definitions.

8.119
discharge
⟨wells and boreholes⟩ volumetric flow rate

cf. **discharge** (1.37)

NOTE See 1.37 for the generic term.

8.120
well-bore storage
volume of water released from within the well itself during a reduction in head

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Add the following Annex C before the Alphabetical index.

