



DRAFT INTERNATIONAL STANDARD ISO/DIS 4375

ISO/TC 113/SC 5

Secretariat: **ANSI**

Voting begins on
2013-05-09

Voting terminates on
2013-10-09

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

Hydrometric determinations — Cableway systems for stream gauging

Déterminations hydrométriques — Systèmes de suspension par câbles aériens pour le jaugeage en rivière

[Revision of second edition (ISO 4375:2000)]

ICS 17.120.20

ISO/CEN PARALLEL PROCESSING

This draft has been developed within the International Organization for Standardization (ISO), and processed under the **ISO-lead** mode of collaboration as defined in the Vienna Agreement.

This draft is hereby submitted to the ISO member bodies and to the CEN member bodies for a parallel five-month enquiry.

Should this draft be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month approval vote in ISO and formal vote in CEN.

To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.

Pour accélérer la distribution, le présent document est distribué tel qu'il est parvenu du secrétariat du comité. Le travail de rédaction et de composition de texte sera effectué au Secrétariat central de l'ISO au stade de publication.

THIS DOCUMENT IS A DRAFT CIRCULATED FOR COMMENT AND APPROVAL. IT IS THEREFORE SUBJECT TO CHANGE AND MAY NOT BE REFERRED TO AS AN INTERNATIONAL STANDARD UNTIL PUBLISHED AS SUCH.

IN ADDITION TO THEIR EVALUATION AS BEING ACCEPTABLE FOR INDUSTRIAL, TECHNOLOGICAL, COMMERCIAL AND USER PURPOSES, DRAFT INTERNATIONAL STANDARDS MAY ON OCCASION HAVE TO BE CONSIDERED IN THE LIGHT OF THEIR POTENTIAL TO BECOME STANDARDS TO WHICH REFERENCE MAY BE MADE IN NATIONAL REGULATIONS.

RECIPIENTS OF THIS DRAFT ARE INVITED TO SUBMIT, WITH THEIR COMMENTS, NOTIFICATION OF ANY RELEVANT PATENT RIGHTS OF WHICH THEY ARE AWARE AND TO PROVIDE SUPPORTING DOCUMENTATION.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
Full standard:
<https://standards.iteh.ai/catalog/standards/sist/0c63f71b-4ef3-4f31-9c85-440b0e19c7d2/iso-4375-2014>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2013

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested 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

Page

1	Scope	1
2	Normative references	1
3	Terms and definitions	1
4	General description of a cableway system	2
4.1	Elements of a cableway system	2
4.2	Cableway supports	4
4.3	Main track or main cable	4
4.4	Anchorage	4
4.5	Tow cable for a bankside system	4
4.6	Suspension cable	4
4.7	Instrument carriage for a bankside system	4
4.8	Personnel carriage	4
4.9	Winch arrangements for a bankside system	4
4.10	Winch arrangements for a personnel carriage	4
4.11	Lightning protection	5
5	Functional requirements of cableway components	5
5.1	Safety factors	5
5.1.1	General	5
5.1.2	Suspension cable	5
5.1.3	Tow cable	5
5.1.4	Track cable	5
5.1.5	Marking	5
5.2	Cableway supports	6
5.2.1	Approaches	6
5.2.2	Design load	6
5.2.3	Foundation placement	6
5.2.4	Height	6
5.2.5	Corrosion protection	6
5.3	Selection of main cable or track	6
5.4	Anchorage	6
5.4.1	Design	6
5.4.2	Inspection accessibility	6
5.5	Backstays	6
5.6	Tow cable	7
5.7	Carriages	7
5.7.1	Instrument carriage for a bankside system	7
5.7.2	Personnel carriage	7
5.8	Winches	8
5.8.1	General	8
5.8.2	Winches in bankside systems	8
5.8.3	Winches on personnel carriages	9
6	Maintenance, examination and testing	9
6.1	General examination	9
6.2	Routine inspection	9
6.2.1	Bankside systems	9
6.2.2	Systems with suspended personnel carriage	10
6.3	Static testing	10
6.3.1	Bankside system	10
6.3.2	Systems with suspended personnel carriage	10
6.4	Lubrication	10

6.5	Checking the sag	10
A.1	Loadings	11
A.2	Cable selection — Examples	11
A.3	Safety Factors	13
A.4	Guidance on cable size selection	13
A.5	Forces on towers and anchorages	13
A.5.1	General remarks.....	13
A.5.2	Common configurations	14
B.1	Existing Installations	26
B.2	Difficult Sites	26
B.3	Safety Factors	26
B.4	Load limiting devices	27
B.5	Weak Links	27

iTeh STANDARD PREVIEW
(standards.iteh.ai)
Full standard:
<https://standards.iteh.ai/catalog/standards/sist/0c63f71b-4ef3-4f31-9c85-440b0e19c7d2/iso-4375-2014>

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 3.

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 International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 4375 was prepared by Technical Committee ISO/TC 113, *Hydrometric determinations*, Subcommittee SC 5, *Instruments, equipment and data management*.

This second edition cancels and replaces the first edition (ISO 4375:1979), which has been technically revised.

This corrected version of ISO 4375:2000 incorporates the following corrections.

In Annex A, clause A.1, the equations used for calculating F_{hr} and F_{at} have been corrected.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Full standard:
<https://standards.iteh.ai/catalog/standards/sist/0c63f71b-4ef3-431-9c85-440b0e19c7d2/iso-4375-2014>

Hydrometric determinations — Cableway systems for stream gauging

1 Scope

This International Standard defines the requirements for equipment, anchorage, supports and accessories for cableway systems for use in stream gauging. Systems which are operated either entirely from the river bank or from a suspended personnel carriage (also called a “cable car”) are discussed. This International Standard does not concern methods for making a discharge measurement which are described in ISO 748.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 80000:2006, *Quantities and units -- Part 4: Mechanics*.

ISO 748:2007, *Hydrometry -- Measurement of liquid flow in open channels using current-meters or floats*.

ISO 772:2011, *Hydrometry -- Vocabulary and symbols*.

3 Terms and definitions

For the purposes of this International Standard, the terms and definitions given in ISO 772 and ISO 80000-4, as well as the following apply.

3.1

cable

wire rope of simple or complex structure or wire cord, fixed or moving in a cableway system

4 General description of a cableway system

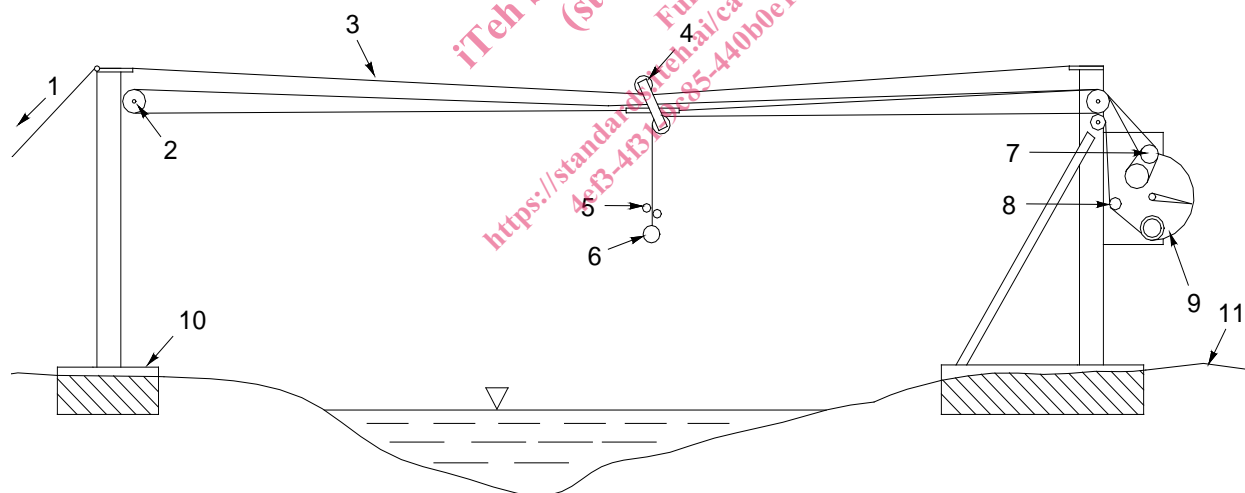
4.1 Elements of a cableway system

A cableway system can be designed to be operated from the river bank (see Figures 1 and 2) or be designed to be operated from a suspended personnel carriage (Figure 3). The general arrangement of the following elements are common to both systems:

- a) towers or cableway supports;
- b) track or main cable;
- c) anchorage;
- d) backstays;
- e) suspension cable.

The main differences are:

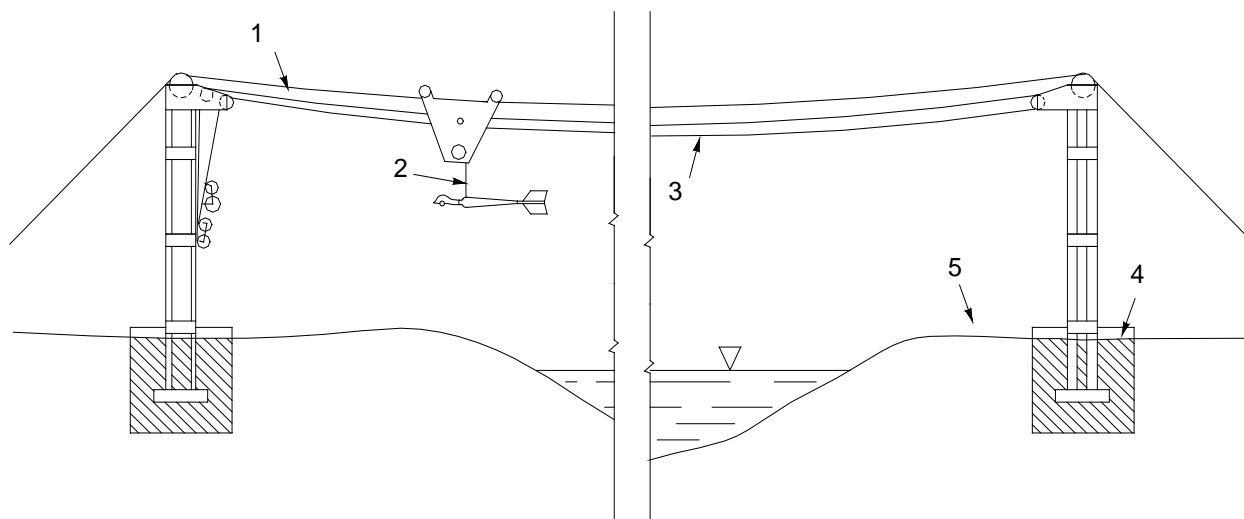
- the carriage of a bankside system requires a tow cable;
- a bankside system requires a more complicated winch arrangement;
- the personnel carriage has to provide a safe platform for the operator;
- more stringent design requirements may apply to a system which employs a personnel carriage.



Key

- | | |
|--|------------------------|
| 1 Backstay | 7 Distance measurement |
| 2 Traversing cable return pulley | 8 Depth measurement |
| 3 Track or main cable | 9 Cable drum |
| 4 Traveller and/or instrument carriage | 10 Footing |
| 5 Current meter | 11 Ground level |
| 6 Sinker or sounding weight | |

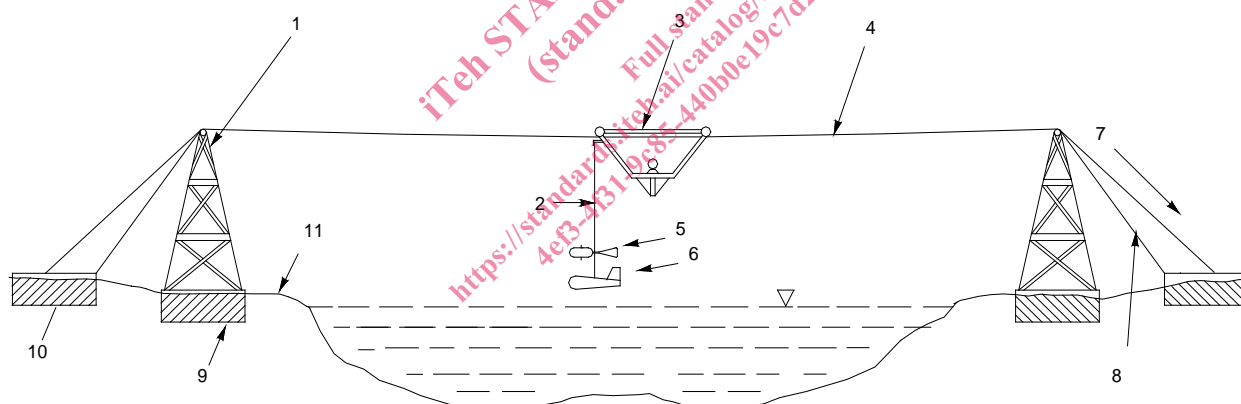
Figure 1 — Cableway system — Bankside operation, with loop-traversing cable and spooled sounding cable



Key

- | | |
|-----------------------|----------------|
| 1 Track or main cable | 4 Footing |
| 2 Suspension cable | 5 Ground level |
| 3 Tow cable | |

Figure 2 — Cableway system — Bankside operation, with spooled tow cable and spooled sounding cable



Key

- | | |
|-----------------------|-----------------|
| 1 Tower | 7 To anchorage |
| 2 Suspension cable | 8 Stayline |
| 3 Personnel carriage | 9 Footing |
| 4 Track or main cable | 10 Anchorage |
| 5 Current meter | 11 Ground level |
| 6 Sounding weight | |

Figure 3 — Cableway system — Suspended personnel carriage

4.2 Cableway supports

The cableway supports, one on each bank, support the main cable span across the stream. They may also provide mountings for the winch and the pulleys (sheaves) carrying the tow and suspension cables.

4.3 Main track or main cable

The track or main cable is designed to carry the whole suspended load. The track may be attached directly to stayed cableway supports or be supported on saddles on the cableway supports and led directly to an anchorage.

4.4 Anchorage

Anchorage is required to carry the loads induced in the cableway and tower system. Depending upon the design of the system, they may be anchorage points for track and backstays or guy-lines, tower foundations subject to compression or tower foundations subject to compression and moment.

4.5 Tow cable for a bankside system

The tow cable is required to move and position the instrument carriage. Generally the tow cable is arranged as an endless loop from the instrument carriage over guiding sheaves on the winch tower, round a driving pulley or drum, across to an idler pulley (sheave) on the tower on the opposite bank and back to the carriage (Figure 1). An alternate arrangement uses a spooled tow cable with a single fixing point on the carriage. This arrangement depends upon the equal and opposite force provided by the suspension cable (Figure 2).

4.6 Suspension cable

The suspension cable provides the means of raising and lowering sensing or sampling equipment in the stream. The free end of the cable is fitted with connectors to attach equipment and sounding weights. The suspension cable is likely to contain an insulated conducting core to provide a signal path from suspended instruments.

4.7 Instrument carriage for a bankside system

The instrument carriage is provided with one or more track wheels running on the main cable (track), a pulley to support the suspension cable and a point of attachment for the tow (traveller) cable.

4.8 Personnel carriage

The carriage from which gauging observations are made, travels along the main cable. It is suspended from track wheels running on the main cable. The carriage may be moved along the main cable manually or by a power unit. The carriage can be designed to be operated from either the standing or sitting position or both. A cableway employing a personnel carriage shall comply with the safety requirements for passenger cableways where such standards exist specially for horizontal fixed cableways, in all aspects not covered by this International Standard.

4.9 Winch arrangements for a bankside system

A double drum winch is one that provides both traversing and sounding functions within one piece of equipment. One drum controls the suspension cable, the other controls the movement of the carriage. The latter may be a spooling drum or take the form of a friction drive pulley driving an "endless" loop. Both drums may be driven simultaneously in traversing mode or, in sounding mode, the traversing drum may be locked to allow operation of the suspension cable drum only. This operation may also be carried out using two single drum winches. Measuring counters may be fitted to record horizontal and vertical cable movement.

4.10 Winch arrangements for a personnel carriage

A winch (sounding reel) is attached to the carriage (cable car) to raise and lower the sounding weight. The winch is required to operate properly under the load of the sounding weight but both the winch and its mountings should be capable of accommodating the breaking load of the suspension cable with a factor of safety of two. The winch may be hand operated or power driven.

4.11 Lightning protection

In areas where electrical storms are considered a risk to cableway operators, provision shall be made to reduce the likelihood of injury from a lightning strike on the cableway system. In countries where lightning is infrequent and lightning protection not considered necessary, work instructions should allow for abandonment of operations in the event of an electrical storm.

5 Functional requirements of cableway components

5.1 Safety factors

5.1.1 General

Factors of safety shall be applied to ensure that the equipment is able to cope with normal working without failure and to protect the operator in case of abnormal but foreseeable incidents.

The most likely risk of failure of properly maintained cableway systems lies with the possibility of the suspended equipment becoming caught up on a large floating object. Trees being carried down on a flood are the most likely source of this danger. The excess loading is applied to the system through the suspension cable. In a bankside system, the tension in this cable is equal to, and balanced by, the tension in the "return" side of the tow cable. In both bankside systems and systems with personnel carriages, the load in the suspension cable is also applied to the main cable (track) through the carriage.

For both arrangements, the factor of safety for normal working shall be achieved by specifying the suspension cable in relation to a maximum working load. The specification of all other cables shall be with respect to the breaking load of the specified suspension cable.

5.1.2 Suspension cable

The suspension cable shall be selected to provide a minimum factor of safety of 5 in relation to the maximum authorized suspended load. The maximum authorized suspended load is the sum of the maximum authorized sounding weight plus an allowance for the mass of sensing/sampling equipment.

5.1.3 Tow cable

The tow (traversing) cable shall be selected to provide a factor of safety of 1,25 with respect to the breaking load of the suspension cable.

5.1.4 Track cable

The track cable shall be selected to provide a factor of safety, with respect to the breaking load of the suspension cable, as follows:

- a) bankside cableway system with instrument carriage: 2
- b) cableway with suspended personnel carriage: 5

5.1.5 Marking

Cableways shall be clearly marked to indicate maximum authorized sounding weights and approved suspension cable specification. At an established site, the use of a suspension cable with a breaking load greater than specified at an established site reduces the factor of safety with respect to the track cable.