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Hydrometric telemetry systems —

Part 2: Specification of system requirements

Systèmes de télémétrie hydrométrique —

Partie 2: Spécification des caractéristiques des systèmes



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Contents

	Page
1 Scope	1
2 Normative references	1
3 Definitions	1
4 Data and information	2
5 Operational context	2
6 System definition	4
7 Operational requirements	5
8 System specification	11

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.

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.

International Standard ISO 6419-2 was prepared by Technical Committee ISO/TC 113, *Measurement of liquid flow in open channels*, Subcommittee SC 5, *Flow measuring instruments and equipment*.

ISO 6419 consists of the following parts, under the general title *Hydro-metric telemetry systems*:

- *Part 1: General*
- *Part 2: Specification of system requirements*
- *Part 3: Criteria for design and implementation*

Introduction

ISO 6419-1 specifies the general functional requirements for hydrometric telemetry and defines the characteristics of a system required to transmit field data to a receiving station, with minimal reference to data processing for subsequent use of the data.

The assembly of systems for hydrometry relies heavily on both hardware and software produced for other telemetry purposes which have larger markets. Therefore the desire to elaborate ISO 6419-1 to cover complete systems unique to hydrometry was resisted.

Nevertheless there are requirements in hydrometric data acquisition and data management which necessitate special considerations in system design and in this part of ISO 6419 these considerations are examined in the context of a total system specification.

As a matter of principle, the content of this part of ISO 6419 is independent of the state of development of the technology current at the time of implementation. It is recommended that this principle should also apply to system specifications except in the recognition of the opportunities which evolution of the technology will allow.

This part of ISO 6419 is intended to form a bridge between the user and the supplier to cover any limitations in the knowledge of the one of the requirements of the other. The objective is to give guidelines for the structure of both the user's specification and the supplier's response as an aid to clarity and to limit ambiguity.

It should be noted that compliance with an International Standard does not in itself confer immunity from legal obligations.

Hydrometric telemetry systems —

Part 2: Specification of system requirements

1 Scope

This part of ISO 6419 outlines a method for specifying hydrometric telemetry systems and identifies factors which influence the design and operation of such systems. It covers the specification of system requirements and those for installing, commissioning, acceptance testing and documentation. Consideration of procurement procedures is not included.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 6419. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 6419 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 772:1988, *Liquid flow measurement in open channels — Vocabulary and symbols*.

ISO 2382-1:1984, *Data processing — Vocabulary — Part 01: Fundamental terms*.

ISO 6419-1:1984, *Hydrometric data transmission systems — Part 1: General*.

ISO 7498:1984, *Information processing systems — Open Systems Interconnection — Basic Reference Model*.

3 Definitions

For the purposes of this part of ISO 6419, the definitions given in ISO 772 and ISO 2382-1 and the following definitions apply.

3.1 system: A set of elements organized to perform a set of designated functions in order to satisfy specific objectives.

An element is a set of resources organized to perform some highly related subset of the desired system functions.

The resources that comprise an element can include people, equipment, materials, facilities, information and money.

3.2 data; raw data: The output resulting directly from the measurement of a basic variable.

3.3 information: The result of applying a process to data.

3.4 default mode: Condition automatically adopted by a system unless it is otherwise directed or to which it reverts when either it is unable to sustain the directed condition or the direction is unclear.

3.5 energy: Quantity characterizing the ability of a system to do work.

3.6 power: The time-rate of transferring or transforming energy or of doing work.

NOTE 1 In this and associated International Standards the term energy is used where only capacity is implied but where either rate or both rate and capacity are implied the term power is used.

3.7 hardware: Tangible equipment associated with the system.

3.8 software: Intangible element of a system which, when applied to the hardware, enables the system to perform in the designed manner.

3.9 real-time: Characteristic which defines the requirement to complete all the necessary procedures in time to influence a process while it is in progress.

4 Data and information

In ISO 6419-1 and this part of ISO 6419 a deliberate distinction is made, or implied, between the terms data (3.2) and information (3.3).

The output resulting from the measurement of a basic variable, i.e. data, is the "best truth" available. In the real-time environment of hydrometry and process control systems, this measurement cannot be repeated.

Data may be accepted (within the specific limits of uncertainty imposed by the sensor and the measurement facility), qualified (as a consequence of validation procedures) or rejected as unusable, but it cannot be modified without compromising its identity as data.

As an example, if a sensor is known to exhibit drift, for example as a result of temperature or time, any correction applied to the data converts it into information.

A further example is the case where the objective is the determination of discharge using the measurement of stage as the input; here, the statements of stage are data whereas those of discharge are information.

Unlike data, information may be modified, as would be the case if a stage/discharge relationship were revised.

For this reason it is recommended that data be treated as the principal record in a data acquisition system and that information be treated as a secondary record (see also 7.3).

5 Operational context

5.1 General

It is not necessary that the elements considered in this clause appear in the system specification under the headings identified. These elements are rather a set of considerations which will contribute to one or more of the elements of the structure of the specification defined in clause 8.

The definitive system specification will be the result of an iterative process both within the user organization and between the user and the supplier(s).

5.2 The operational purpose

As stated in the Introduction, one of the purposes of this part of ISO 6419 is to form a bridge between the user and the supplier. To achieve this objective it is prudent to assume that the supplier has no knowledge of the user's field of application.

The specification should therefore include an objective summary of the purpose for which the user organization exists, and a statement of why actions and activities are necessary, together with a definition of their relative significance since they will influence the data acquisition and information management of the proposed system.

5.3 The functional structure

The functional requirements should be defined under two categories as follows:

- a) obligatory, for example a statutory requirement;
- b) elective, where the user has a choice of whether or how to fulfil the function.

The user should appreciate that merely transferring existing operational philosophies into the specification of the proposed system can limit the full exploitation of the technology and techniques now available. Existing procedures should be analysed so that they may be restated objectively in order to take full advantage of the potential for a novel operating environment.

5.4 The geographical structure

The following elements of the existing system shall be defined:

- a) the points of measurement;
- b) the point(s) where data and/or information are required.

In both these cases, consideration should be given to probable or possible future requirements. Only the user can make judgements regarding these considerations but the system supplier would be expected to quantify their influence on the proposed system configuration. A characteristic of hydro-metric telemetry, is the wide geographical dispersal of measurement points coupled with the fact that, generally, a small number of parameters are measured at each site.

There are opportunities inherent in establishing a telemetry remote station which may be exploited by including, or making provision for, additional facilities for relatively little extra cost. These might take the form of