INTERNATIONAL STANDARD

ISO 24510

First edition
2007-12-01

Activities relating to drinking water and wastewater services — Guidelines for the assessment and for the improvement of the service to users

Activités relatives aux services de l'eau potable et de l'assainissement — Lignes directrices pour l'évaluation et l'amélioration du service aux usagers

Reference number
ISO 24510:2007(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.

COPYRIGHT PROTECTED DOCUMENT

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

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 24510 was prepared by Technical Committee ISO/TC 224, *Service activities relating to drinking water supply systems and wastewater systems - Quality criteria of the service and performance indicators*.

ISO 24510 is one of a series of standards addressing water services. The full series consists of the following International Standards:

— ISO 24510, *Activities relating to drinking water and wastewater services — Guidelines for the assessment and for the improvement of the service to users*

— ISO 24511, *Activities relating to drinking water and wastewater services — Guidelines for the management of wastewater utilities and for the assessment of wastewater services*

— ISO 24512, *Activities relating to drinking water and wastewater services — Guidelines for the management of drinking water utilities and for the assessment of drinking water services*

Introduction

NOTE Words in bold are key terms which are defined in Clause 2.

0.1 Water issues: global context and policies framework

Water constitutes a worldwide challenge for the XXIst century, both in terms of the **management** of available water resources and the provision of access to **drinking water** and sanitation for the world's population. In 2000, the United Nations (UN) recognized that access to water is an essential human right, and in conjunction with national governments, it set ambitious goals (the "Millennium Development Goals") to increase access to **drinking water** and **wastewater services,** including safe disposal or reuse of **residues** (hereinafter jointly referred to as "water **services**"), particularly in developing countries. International conferences on **sustainable development** and water (e.g. the World Summit on Sustainable Development in Johannesburg in September 2002, the third World Water Forum in Kyoto in March 2003 and the fourth World Water Forum in Mexico City in March 2006) have highlighted this issue, and UN agencies (including WHO and UNESCO) have developed recommendations and programmes to establish a framework in which to advance.

The United Nations' Commission on Sustainable Development (CSD13) has emphasised that governments (referred to as "**relevant authorities**" in this International Standard) have a primary role in promoting improved access to safe **drinking water** and basic sanitation through improved governance at all levels and appropriate enabling **environments** and regulatory frameworks, with the active involvement of all **stakeholders**. This **process** should incorporate institutional solutions to make the water sector more productive and the **management** of water resources more sustainable. In this respect, the Ministerial declarations from the Third and Fourth World Water Forum recommended that governments endeavour to reinforce the role of parliaments and local public authorities, particularly with regard to the provision of adequate water **services**, and recognized that an effective collaboration with and between these actors is a key factor for meeting water-related challenges and goals.

Examples of key issues for efficient **drinking water** and sanitation services policy frameworks are:

— clear definition of the roles of the different **stakeholders**;

— definition of sanitary rules and organization for **assessment** of compliance;

— processes to assure consistency between the policies regarding urban development and **water utility infrastructure**;

— regulation for water withdrawal and **wastewater** discharge;

— information to the **users** and to the **communities**.

0.2 Water utilities: general objectives

In addition to public health protection, sound **management** of the **drinking water** and **wastewater utilities** (hereinafter jointly referred to as "**water utilities**") is an essential element of integrated water resources **management**. When applied to these utilities, sound **management** practices will contribute, both quantitatively and qualitatively, to **sustainable development**. Sound utility **management** also contributes to social cohesion and economic development of the **communities** served, because the **quality** and **efficiency** of water **services** have implications for virtually all activities of society.

As water is considered a "social good" and activities related to water **services** support the three aspects (economic, social and environmental) of **sustainable development**: it is logical that the **management** of **water utilities** be transparent to and inclusive of all **stakeholders** identified in accordance with the local context.

There is a broad array of types of **stakeholders** that can play a role in activities related to water **services**.

Examples of such **stakeholders** include:

— governments or public agencies (international, national, regional or local) acting with legal or legislative authority;

— associations of the utilities themselves (e.g. international, regional/multinational and national **drinking water** or **wastewater** associations;

— autonomous bodies seeking to play an overview role (e.g. organizations concerned, such as non-governmental organizations);

— **users** and associations of water **users**.

The relationships between **stakeholders** and **water utilities** vary around the world. In many countries, there are bodies that have responsibility (in whole or in part) for overseeing the activities related to water **services**, whether the utilities are publicly or privately owned or operated and whether they are regulated by **relevant authorities** or acting in a system of technical self-regulation. Standardization and technical self-regulation are possible ways of ensuring involvement of all **stakeholders** and meeting the subsidiarity principle.

The aim of **water utilities** is logically to offer **services** to everybody in the area of responsibility of the utility, and to provide **users** with a continuous supply of **drinking water** and the collection and treatment of **wastewater**, under economic and social conditions that are acceptable to the **users** and to the utility. **Water utilities** are expected to meet the requirements of **relevant authorities** and the expectations specified by the **responsible bodies** in conjunction with the other **stakeholders**, while ensuring the long-term sustainability of the service. In a context of scarcity of resources, including financial resources, it is advisable that the investments made in installations be appropriate and that necessary attention be paid to proper maintenance and effective use of the installations. It is advisable that water **tariffs** generally aim at meeting cost-recovery principles and at promoting **efficiency** in the use of the resources, while striving to maintain affordable basic access to water **services**.

It is advisable that the **stakeholders** be involved in both setting **service** objectives and assessing the adequacy and **efficiency** of **service.**

0.3 Objectives, content and implementation of this International Standard

The objective of this International Standard is to provide the relevant **stakeholders** with guidelines for assessing and improving the **service** to **users**, and with guidance for managing **water utilities**, consistent with the overarching goals set by the **relevant authorities** and by the international intergovernmental organizations noted above. This International Standard is intended to facilitate dialogue between the **stakeholders**, enabling them to develop a mutual understanding of the functions and tasks that fall within the scope of **water utilities**.

The series of standards addressing water services consists of this International Standard (**service**-oriented), ISO 24511 and ISO 24512 (both **management**-oriented).

This International Standard addresses the following topics:

— a brief description of the components of the **service** relating to the **users**;

— core objectives for the **service**, with respect to **users**' needs and expectations;

— guidelines for satisfying **users**' needs and expectations;

— **assessment** criteria for **service to users** in accordance with the provided guidelines;

— examples of **performance indicators** linked to the **assessment** criteria that can be used for assessing the **performance** of the **service.**

ISO 24511 and ISO 24512 address the following topics:

— a brief description of the physical/infrastructural and managerial/institutional components of **water utilities**;

— core objectives for **water utilities**, considered to be globally relevant at the broadest level;

— guidelines for the **management** of the **water utilities**;

— guidelines for the **assessment** of the water **services** with **service assessment** criteria related to the objectives, and **performance indicators** linked to these criteria.

The **performance indicators** presented in this International Standard, ISO 24511 and ISO 24512 are simply for purposes of illustration, because assessing the **service** to **users** cannot be reduced to a single or universal set of **performance indicators**.

The scope formally excludes the installations inside a user's premises. However, attention is drawn to the fact that the **quality** of the supplied water (or discharged **wastewater**) can be adversely impacted between the **point-of-delivery** (or, in the case of wastewater, the **point-of-collection)**, and the **point-of-use** (or, in case of wastewater, the **point-of-discharge**) by the installations inside the premises. Some **stakeholders**, e.g. **relevant authorities**, owners, contractors and **users,** can have a role to play regarding this issue.

Because the organization of **water utilities** falls within a legal and institutional framework specific to each country, this International Standard does not prescribe the respective roles of various **stakeholders**, nor does it define required internal organizations for local, regional or national bodies that can be involved in the provision of water **services**. In particular, this International Standard does not interfere with the free choice of the **responsible bodies** regarding the general organization and the **management** of their **utilities**. This International Standard is applicable to publicly and privately owned and operated **utilities** alike, and does not favour any particular ownership or operational model.

The guidelines given in this International Standard, ISO 24511 and ISO 24512 focus on **users'** needs and expectations and on the water **services** themselves, without imposing a means of meeting those needs and expectations, the aim being to permit the broadest possible use of this International Standard, ISO 24511 and ISO 24512 while respecting the cultural, socio-economic, climatic, health and legislative characteristics of the different countries and regions of the world. It should therefore be understood that, in the short term, it might not always be possible to meet the expectations of local **users**. This can be due to factors such as climate conditions, resource availability and difficulties relating to the economic sustainability of the water **services**, particularly regarding financing and the **users'** ability to pay for improvements. These conditions can limit the achievement of some objectives or restrict the implementation of some recommendations in developing countries. However, this International Standard is drafted with such constraints in mind and, for example, allows for differing levels of fixed networks and the need for on-site alternatives. Notwithstanding the need for flexibility in terms of engineering and hardware, many recommendations in this International Standard, such as consultation mechanisms, are intended to apply universally.

In order to assess and improve the **service to users** and to ensure proper monitoring of the improvements, an appropriate number of **performance indicators (PIs)** or other methods for checking compliance with **requirements** can be established. The use of **PIs** is only one of the possible support tools for continuous improvement. Stakeholders can select **PIs** from the examples given or develop other relevant **PIs**, taking into account the principles described in this International Standard, ISO 24511 and ISO 24512. The **PIs** logically relate to the objectives for which they are defined through the **assessment** criteria, and are used to measure **performance**. They can also be used to set required or targeted values. This International Standard does not impose any specific **indicator** or any minimum value or **performance** range. It respects the principle of adaptability to local contexts, facilitating local implementation.

While it is in no way intended that this International Standard, ISO 24511 and ISO 24512, and more specifically the **performance indicators** given as examples, be considered as a prerequisite or condition for the implementation of a water policy or for the financing of projects or programmes, they can serve to assess progress towards policy goals and the objectives of financing programmes.

The objective of this International Standard, ISO 24511 and ISO 24512 is not to lay down systems of specifications supporting direct certification of conformity, but to provide guidelines for the continuous

improvement and for the **assessment** of the **service**. Use of this International Standard, ISO 24511 and ISO 24512 is voluntary, in accordance with ISO rules.

This International Standard, ISO 24511 and ISO 24512 are consistent with the principle of the "plan-do-check-act" (PDCA) approach: they propose a step-by-step process, from identifying the components and defining the objectives of the utility to establishing **performance indicators**, with a loop back to the objectives and to the **management**, after having assessed the **performances**. Figure 1 summarizes the content and application of this International Standard. Implementation of this International Standard, ISO 24511 and ISO 24512 does not depend upon adoption of the ISO 9000 series and/or the ISO 14000 series of standards. Nevertheless, this International Standard, ISO 24511 and ISO 24512 are consistent with those **management systems** standards. Implementation of an overall ISO 9001 and/or ISO 14001 **management system** can facilitate the implementation of the guidelines contained within this International Standard, ISO 24511 and ISO 24512; conversely, these guidelines can help to achieve the technical provisions of ISO 9001 and ISO 14001 for organizations choosing to implement them.

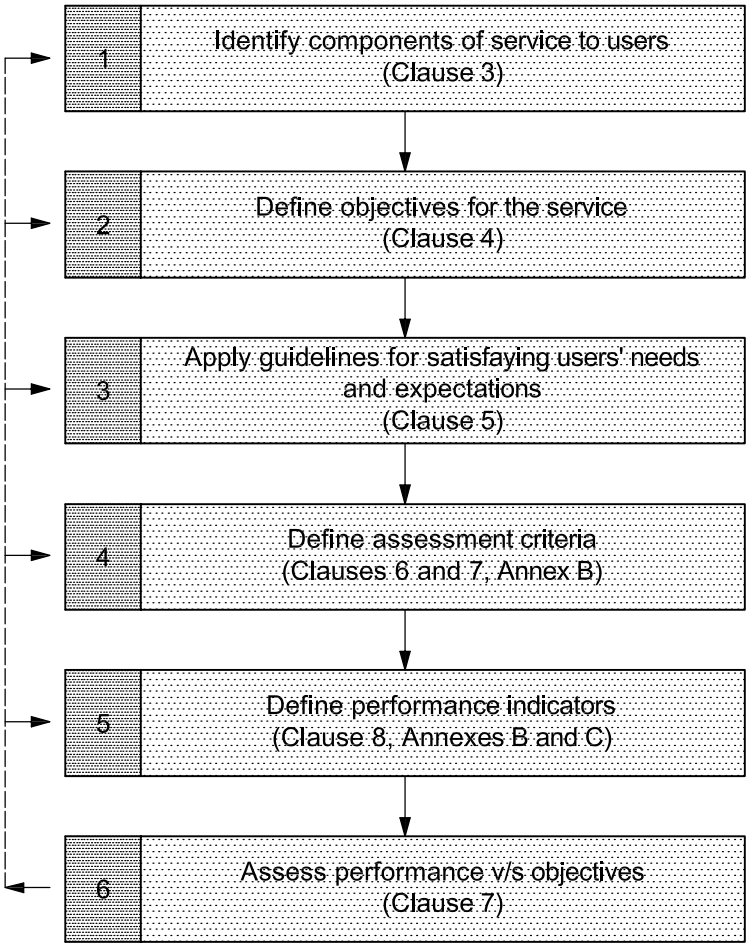

Figure 1 — Content and application of this International Standard

0.4 Service to users

This International Standard is different in nature from ISO 24511 and ISO 24512. The target audience of this International Standard addresses **users**' expectations that pertain to **relevant authorities**, **responsible bodies** and **operators**. It is written from the perspective of the **users** rather than from that of the **water utility**. Consequently, parts of this International Standard, ISO 24511 and ISO 24512 relate to the same issues, but the guidelines they contain are complementary, due to their differences in perspective and target audience.

Activities relating to drinking water and wastewater services — Guidelines for the assessment and for the improvement of the service to users

1 Scope

This International Standard specifies the elements of drinking water and wastewater services of relevance and interest to users. It also provides guidance on how to identify users' needs and expectations and how to assess whether they are being met.

The following are within the scope of this International Standard:

— the definition of a language common to the different stakeholders;

— the definition of key elements and characteristics of the service to users;

— the objectives for the service with respect to users' needs and expectations;

— guidelines for satisfying users' needs and expectations;

— service to users assessment criteria;

— introduction to performance indicators;

— examples of performance indicators.

The following are outside the scope of this International Standard:

— methods of design and construction of drinking water and wastewater systems;

— the regulating management structure and methodology of operation and management of activities relating to drinking water and wastewater services, including contracting;

— topics relating to the system inside buildings.

NOTE 1 This International Standard, ISO 24511 and ISO 24512 comprise a series of standards addressing water services. It is therefore advisable to use these three International Standards in conjunction with each other.

NOTE 2 The list of terms and definitions in Clause 2 is common to this International Standard, ISO 24511 and ISO 24512.

NOTE 3 Annex A contains three tables of correspondence between equivalent terms in English, French and Spanish.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1
accuracy
closeness of agreement between a measure and the accepted reference value

NOTE 1 The term “accuracy”, when applied to a set of measures, involves a combination of random components and a common systematic error or bias component.

NOTE 2 Adapted from ISO 5725-1:1994.

2.2
affordability
ability to be economically bearable for the **users** (2.50)

NOTE The affordability can be estimated through the degree to which charges for **services** (2.44) can be paid by targeted social groups of users without significant adverse economic or social impact, taking into account allowances for subsidies and payment assistance programmes for low-income users.

2.3
assessment
process (2.31), or result of this process, comparing a specified subject matter to relevant references

2.4
asset
capital-forming goods used for the provision of the **service** (2.44)

NOTE 1 Assets can be tangible or intangible. Examples of tangible assets are: land, buildings, pipes, wells, tanks, treatment plants, equipment, hardware. Examples of intangible assets are: software, databases.

NOTE 2 Contrary to consumables, assets can be depreciated in accounting systems.

2.5
asset management
processes (2.31) that enable a **water utility** (2.53) to direct, control and optimize the provision, **maintenance** (2.19) and disposal of **infrastructure** (2.17) **assets** (2.4), including the necessary costs for specified **performances** (2.24), over their life-cycle

2.6
availability
extent to which the **infrastructure** (2.17), **assets** (2.4), resources and employees of a **water utility** (2.53) enable effective provision of **services** (2.44) to **users** (2.50) according to specified **performances** (2.24)

2.7
community
one or more natural or legal persons and, in accordance with national legislation or practice, their associations, organizations or groups, having interests in the area where the **service** (2.44) is provided

2.8
confidence grade
assessment (2.3) of the **quality** (2.32) in terms of **accuracy** (2.1) and **reliability** (2.37)

2.9
connection
set of physical components ensuring the link between a **point-of-delivery** (2.26) and the local water main or the **point-of-collection** (2.25) and the sewer

NOTE 1 For **drinking water systems** (2.12), the term “service pipe” is currently used, but the connection can include components other than the service pipe, such as valves, meters, etc.

NOTE 2 In English speaking countries, for **wastewater systems** (2.52), the term “drain” can also be used; the connection can also be equipped with ancillaries.

2.10
coverage
extent to which the **assets** (2.4) of a **water utility** (2.53) allow **services** (2.44) to **users** (2.50), within its defined area of responsibility

2.11
drinking water
water intended for human consumption

NOTE **Requirements** (2.40) for drinking water **quality** (2.32) specifications are generally laid down by the national **relevant authorities** (2.36). Guidelines are established by the World Health Organization (WHO).

2.12
drinking water system
tangible **assets** (2.4) necessary for abstracting, treating, distributing or supplying **drinking water** (2.11)

2.13
effectiveness
extent to which planned activities are realized and planned results achieved

[ISO 9000:2005]

2.14
efficiency
relationship between the result achieved and the resources used

[ISO 9000:2005]

2.15
environment
surroundings in which an organization operates, including air, water, land, natural resources, flora, fauna, humans, and their interrelation

NOTE 1 Surroundings in this context extend from within an organization to the global system.

[ISO 14001:2004]

NOTE 2 For the application of this International Standard, environment is considered as a specific **stakeholder** (2.47). The interests of this specific **stakeholder** (2.47) can be represented by **relevant authorities** (2.36), by the **communities** (2.7) or by other groups, such as non-governmental organizations (NGOs).

2.16
indicator
parameter, or a value derived from parameters, which provides information about a subject matter with a significance extending beyond that directly associated with a parameter value

NOTE 1 Adapted from OECD works on “Core sets of indicators for environmental performance reviews”[10].

NOTE 2 Indicators can refer to context, conditions, means, activities or **performances** (2.24).

2.17
infrastructure
system of tangible fixed **assets** (2.4) needed for the operation of a **water utility** (2.53)

NOTE 1 Adapted from ISO 9000:2005.

NOTE 2 It may also be necessary for the **water utility** (2.53) to use technical equipment for transport which is not fixed (e.g. trucks, vans, bottles) on a permanent or occasional basis, or in emergency situations. It is advisable to reserve the term “infrastructure” for fixed equipment and installations.

2.18
interruption
situation where the **service** (2.44) is not available

NOTE Interruptions can be planned or unplanned.

2.19
maintenance
combination of all technical, administrative and managerial actions during the life cycle of an **asset** (2.4) intended to retain it in, or restore it to, a state in which it can perform the required function

2.20
management
coordinated activities to direct and control an organization

NOTE 1 In English, the term “management” sometimes refers to people, i.e. a person or group of people with authority and responsibility for the conduct and control of an organization. When “management” is used in this sense, it should always be used with some form of qualifier to avoid confusion with the concept “management” defined above. For example, “management shall…” is deprecated whereas “top management shall…” is acceptable.

[ISO 9000:2005]

NOTE 2 The term “management” can be qualified by a specific domain it addresses. Examples are: public health management, environmental management, risk management, etc.

2.21
management system
system to establish policy and objectives and to achieve those objectives

[ISO 9000:2005]

NOTE A management system of a **water utility** (2.53) can include different management systems, such as a **quality** (2.32) management system, a financial management system or an environmental management system.

2.22
on-site system
set of physical **assets** (2.4) necessary for supplying **drinking water** (2.11) or collecting and treating **wastewater** (2.51) without physical **connection** (2.9) to centralized installations from a **water utility** (2.53)

2.23
operator
person or organization performing day-to-day **processes** (2.31) and activities necessary for the provision of the **service** (2.44)

NOTE 1 There can be one or several operators for a given **water utility** (2.53), e.g. distinct operators for installations operation, billing and recovering **service** (2.44). Their missions are determined by the **responsible body** (2.42). An operator may subcontract some of its operations to other contractors, if allowed by the responsible body.

NOTE 2 The operator(s) can be legally distinct, or not, from the **responsible body** (2.42). They can be public or private. Examples where responsible body and operator are not legally distinct: a technical department in a municipality, a

specific division of a regional authority. Examples of legally distinct entities: a public organization, a private corporate company, a small contractor, an NGO, a cooperative.

NOTE 3 In the context of this International Standard, an “operator” is not a person employed within an organization to operate a piece of equipment or **process** (2.31).

2.24
performance
achievements of an activity, a **process** (2.31) or an organization

2.25
point-of-collection
⟨wastewater⟩ physical fixed interface, upstream of which the **water utility** (2.53) does not have the overall legal responsibility for the **service** (2.44) or **infrastructure** (2.17)

EXAMPLE The limit boundary between private and public property.

NOTE 1 The point-of-collection is generally defined in the **service agreement** (2.45).

NOTE 2 In general, the water utility employees have no legal empowerment for obtaining direct physical access to the installations upstream of the point-of-collection.

2.26
point-of-delivery
⟨drinking water⟩ physical fixed interface, downstream of which the **water utility** (2.53) does not have the overall legal responsibility for the **service** (2.44) or **infrastructure** (2.17)

EXAMPLES A **connection** (2.9) box, a meter, the limit boundary between public and private property.

NOTE 1 The point-of-delivery is generally defined in the **service agreement** (2.45).

NOTE 2 In general, water utility employees have no legal empowerment for obtaining direct physical access to the installations downstream of the point-of-delivery.

2.27
point-of-discharge
physical fixed interface where the **user** (2.50) normally discharges **wastewater** (2.51) for its collection and disposal

EXAMPLES A sink, a toilet.

2.28
point-of-use
physical fixed interface where the **user** (2.50) normally takes the water for the intended use

EXAMPLES A tap, a public drinking fountain.

NOTE 1 The point-of-use can be in private or public property.

NOTE 2 The point-of-use can be the same as the **point-of-delivery** (2.26), e.g. in the case of a public drinking fountain.

2.29
price
counterpart in money or alike paid for the supply or provision of a product or **service** (2.44)

NOTE When relevant, price is expressed relating to a unit of product or service.

EXAMPLE Price of a cubic metre of **drinking water** (2.11**)**, price of a **connection** (2.9) of xx metres in length.

2.30
procedure
specified way of carrying out an activity or a **process** (2.31)

NOTE Procedures can be documented or undocumented.

2.31
process
set of interrelated or interacting activities which transforms inputs into outputs

[ISO 9000:2005]

2.32
quality
degree to which a set of inherent characteristics fulfils **requirements** (2.40)

[ISO 9000:2005]

NOTE There is a clear distinction between quality of the product [**drinking water** (2.11) or treated **wastewater** (2.51)] and quality of the **service** (2.44). This International Standard does not give specifications for product quality.

2.33
rate of return
percent measure of project profitability, equal to project income divided by project investment

NOTE The time period of measurement can be annual or over the lifetime of the investment.

2.34
registered user
customer
user (2.50) for whom relevant information is recorded by the **responsible body** (2.42) or **operator** (2.23)

NOTE The term “customer” can be considered as a synonym, given that a customer has a commercial relationship, e.g. a **service agreement** (2.45), with the **water utility** (2.53). The term “customer” is currently used in such expressions as “customer relations”.

2.35
rehabilitation
operation on an **infrastructure** (2.17) that restores it to a defined level, or improves it to a higher level of **performance** (2.24)

2.36
relevant authority
public body entitled to set general policies, plans or **requirements** (2.40), or to check compliance with these rules, concerning all the **water utilities** (2.53) included in its area of jurisdiction

EXAMPLES National, regional or local governments, public agencies, regulators.

NOTE For a given water utility, there can be several relevant authorities, which have jurisdiction in different domains.

2.37
reliability
〈information〉 degree of confidence in the information for representing or for qualifying the relevant subject matter

NOTE Information can be data, **indicators** (2.16) or estimations.

2.38
reliability
⟨asset, process⟩ probability that a device, system, or **process** (2.31) will perform its prescribed function without failure for a given time when operated correctly in a specified environment

2.39
repair
action on a non-conforming product, equipment or facility to make it acceptable for the intended use, but not changing the original parameters of the product, equipment or facility

NOTE 1 Adapted from ISO 9000:2005.

NOTE 2 Repair includes remedial action taken on a previously conforming product to restore it for use, e.g. as part of **maintenance** (2.19).

NOTE 3 Repair can affect or change parts of the non-conforming product.

NOTE 4 Repair can be planned [e.g. preventive **maintenance** (2.19)] or unplanned (e.g. in the case of damage).

2.40
requirement
need or expectation that is stated, generally implied or obligatory

[ISO 9000:2005]

NOTE "Generally implied" means that it is custom or common practice for the drinking water or wastewater utilities, the **users** (2.50) of the **service** (2.44) and other interested parties, that the need or expectation under consideration is implied.

2.41
residues
subproducts resulting from the different **processes** (2.31) applied to **drinking water** (2.11) or **wastewater** (2.51)

NOTE Residues can be liquid, solid, gaseous or mixtures.

EXAMPLES Sludge, septage, sand or grit, grease, debris.

2.42
responsible body
body that has the overall legal responsibility for providing **drinking water** (2.11) or **wastewater** (2.51) **services** (2.44) for a given geographic area

EXAMPLE A local or municipal government (i.e. for a village, town or city), a regional government, or a national or federal government through a specified agency, or a private company.

NOTE 1 The responsible body can be public or private.

NOTE 2 The responsible body acts within a framework of law and governance established by the **relevant authorities** (2.36); it generally establishes the strategy, the specific policies adapted to the characteristics of its area of responsibility and the general organization of the relevant **water utility** (2.53).

NOTE 3 The responsible body can operate the water utility directly with its own means through an internal **operator** [direct or internal **management** (2.20) or "in house"] or entrust one or several **operators** (2.23) for the operations ("outsourced" or contracted management).

2.43
restriction
situation where the **service** (2.44) does not meet the availability conditions specified in the **service agreement** (2.45)

NOTE Restrictions can be planned or unplanned.

2.44
service
result of a **process** (2.31)

NOTE 1 Adapted from the definition of "product" in ISO 9000:2005.

NOTE 2 Services are one of the four generic categories of products with software, hardware and process materials. Many products comprise elements belonging to different generic product categories. Whether the product is then called "service" depends on the dominant element.

NOTE 3 Service is the result of at least one activity necessarily performed at the interface between the provider of the service and, in the first place, its **user** (2.50) and, in the second place, a **stakeholder** (2.47). Service is generally intangible. Provision of a service can involve for example the following:

— activity performed on a tangible product supplied by the user, e.g. **wastewater** (2.51),

— activity performed on an intangible product coming from the user, e.g. processing new **connection** (2.9) requests,

— delivery of an intangible product, e.g. delivery of information,

— creation of ambience for the user, e.g. reception offices.

NOTE 4 The word "service" in common English can also refer to the entity providing the actions related to the subject in question, as is implicit in such phrases as "bus service", "police service", "fire service" and "water or wastewater service". In this context and usage, "service" implies the entity that is delivering the service, e.g. "the public transport of passengers", "the provision of public security", "fire protection and response", and "delivering drinking water or collecting wastewater". If "service" can be understood in this way, "water service" becomes synonymous with "**water utility**" (2.53); hence in this International Standard, in order to avoid confusion, only the definition in 2.44 applies.

2.45
service agreement
establishment of an accord between the **registered user** (2.50) and the **water utility** (2.53) on the conditions of **service** (2.44) provisions

EXAMPLE A contract.

NOTE It may be implicit or explicit.

2.46
service area
local geographic area where an organization has the legal or contractual responsibility to provide a **service** (2.44)

NOTE The service area can be established by political boundaries (e.g. citywide utility), by legislative action (e.g. formation of a utility district), or by interjurisdictional agreements [e.g. intercity agreements to provide **wastewater** (2.51) services].

2.47
stakeholder
person or group or organization having an interest in the **performance** (2.24) or success of an organization

EXAMPLES **Users** (2.50) and building owners, **relevant authorities** (2.36), **responsible bodies** (2.42), **operators** (2.23), employees of the operator, external product suppliers and providers of other **services** (2.44), contractors, **communities** (2.7), customers and environmental associations, financial institutions, scientific and technical organizations, laboratories.

NOTE 1 Adapted from the definition of "interested party" in ISO 9000:2005.

NOTE 2 For the application of this International Standard, **environment** (2.15) is considered as a specific stakeholder (see 2.15, Note 2).

2.48
sustainable development
development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs

2.49
tariff
structured publicly available elements permitting calculation of the **price** (2.29) paid for a product or **service** (2.44)

EXAMPLE Flat (uniform) tariff for a cubic metre of **drinking water** (2.11), blocks with progressive or decreasing **prices** (2.29), prices of **connections** (2.9) depending on the pipe diameter.

2.50
user
person, group or organization that benefits from **drinking water** (2.11) delivery and related **services** (2.44), or from **wastewater** (2.51) service activities

NOTE 1 Users are a category of **stakeholder** (2.47).

NOTE 2 Users can belong to various economic sectors: domestic users, commerce, industry, tertiary activities, agriculture.

NOTE 3 The term “consumer” can also be used, but in most countries the term “user” is more frequent when referring to public services. It is not appropriate for wastewater services.

2.51
wastewater
water arising from any combination of domestic, industrial or commercial activities, surface runoff and any accidental sewer inflow/infiltration water and which can include collected storm water, discharged to the **environment** (2.15) or sewer

NOTE 1 The definition of wastewater in this International Standard also includes sanitary waste in undiluted form.

NOTE 2 Wastewater can flow in separate or combined sewer systems.

2.52
wastewater system
tangible **assets** (2.4) necessary for collecting, treating and disposing or reusing **wastewater** (2.51), as well as wastewater **residues** (2.41)

2.53
water utility
whole set of organization, **processes** (2.31), activities, means and resources necessary for abstracting, treating, distributing or supplying **drinking water** (2.11) or for collecting, treating and disposing of **wastewater** (2.51) and for providing the associated **services** (2.44)

NOTE 1 Some key features for a water utility are:

— its mission, to provide drinking water services or wastewater services, or both:

— its physical area of responsibility and the population within this area,

— its **responsible body** (2.42),

— the general organization with the function of **operator** (2.23) being carried out by the responsible body, or by legally distinct operator(s),

— the type of physical systems used to provide the services, with various degrees of centralization.

NOTE 2 Drinking water utility addresses a utility dealing only with drinking water; wastewater utility addresses a utility dealing only with wastewater.

NOTE 3 When it is not necessary or it is difficult to make a distinction between responsible body and operator, the term "water utility" covers both.

NOTE 4 In common English, "water service" can be used as a synonym for "water utility" (see 2.44, Note 4), but this International Standard does not recommend using the term in this way.

3 Elements of the service relating to users

3.1 General

To promote the continuous improvement of service to users, its elements should first be identified. The essential elements of service to users are:

— access to and provision of the service,

— contract management and billing,

— promoting a good relationship with the users,

— protection of the environment, and

— safety and emergency management.

Unless stated otherwise, most of the elements of the service with regard to users are common to both drinking water services and wastewater services.

3.2 Access to water services

Access to service means not only connection to networked drinking water and wastewater systems, but also, if these are not available, access to other means of service. For drinking water supply, other options, such as wells, mobile water delivery, regulated bottle water vendors and drinking water points, can be used. For wastewater service, it could include septic tanks, pit latrines, composting toilets and other forms of disposal.

3.3 Provision of the service

3.3.1 Application for service

Application for the service comprises all the procedures for users to apply for water services.

3.3.2 Drinking water supply/wastewater collection, treatment and disposal

The drinking water supply includes all the procedures for supply and maintenance of the quality of drinking water services. The wastewater collection, treatment and disposal include all the procedures for provision and maintenance of the quality of wastewater services.

3.3.3 Drinking water quality

The quality of drinking water comprises the health and aesthetic aspects of the provided drinking water.

3.4 Contract management and billing

3.4.1 Service agreement

The service agreement includes the establishment of an agreement, implicit or explicit, between the registered user and the water utility.

3.4.2 Billing

Billing encompasses the conditions relating to billing for service, terms of payment and information on applicable rates.

3.5 Promoting a good relationship with the users

3.5.1 General information

General information includes all procedures to provide the users with information on the service (name, address, contact information, standard procedures, etc.).

3.5.2 Contact with users

Contact with users involves all forms of communication between the user and the water utility.

3.5.3 Processing of requests and enquiries

Such processing includes all written or verbal responses to the user and any resulting actions necessary to address the user's request, complaint or notification.

3.5.4 Participation of users

Participation of users includes the different processes that enable users

— to take part in how the service is provided,

— to propose improvements, and

— to request information.

3.6 Protection of the environment

This protection encompasses all the permanent or temporary impacts of the water utilities' service activities on the environment. It includes the quality of the wastewater discharged, which can have an impact on the water bodies within the environment, and the appropriate management of any residues produced. The protection of the environment includes the maintenance of the infrastructure and the long-term protection of the water resources.

3.7 Safety and emergency management

Safety and emergency management procedures include the information, plans and solutions to maintain or restore service in the event of major incidents or natural disasters.

4 Objectives for the service in respect of users' needs and expectations

4.1 General

This clause should be used to identify the needs and expectations of users. The quality of the service provided to the users depends on the ability of the institutions providing the water services to meet the users' needs and expectations under sustainable conditions. All elements of need and expectation listed relate to both drinking water services and wastewater services, unless stated otherwise.

In addition to the needs and expectations included in this clause, the users expect that all applicable laws and regulations related to water and wastewater services are met at all times.

4.2 Access to water services

Because water services are considered a basic human need, the users and potential users expect that all practical steps be taken to ensure their access to those services. Users expect to have access to the service, even if the access does not include a physical connection to the infrastructure. Users also expect that the relevant authority or responsible body plan the development and provision of water services within the service area, and inform them on the timing of providing such access.

4.3 Provision of the service

4.3.1 Time to establish new service provisions

The user expects to be provided with the service in a reasonable and specified time within the service area. An explanation may be required on the specific conditions under which the service can be provided, and when.

4.3.2 Repairs

The user expects repairs that affect the provision of the service to be completed within a reasonable time, as well as to be warned in advance of planned repairs that would affect the service. In all cases, the user expects the inconvenience to be minimized.

4.3.3 Price of service

The user expects the service to be fairly priced and that the relevant authority and/or responsible body use their best endeavours to ensure that affordability is not a barrier to access.

4.3.4 Quantity of drinking water supply

The user expects to receive sufficient water at the point-of-delivery to satisfy his/her needs reflecting general user expectations.

4.3.5 Drinking water quality

The user expects to be supplied with water suitable for human consumption.

4.3.6 Aesthetic aspects of water

The user expects to be supplied with drinking water that is aesthetically pleasing with respect to taste, colour and odour.

The user expects to perceive no objectionable odours from the wastewater service.

4.3.7 Pressure of drinking water supply

Where the user is physically connected to the drinking water supply system, the user expects an adequate level of water pressure at the point-of-delivery at all times.

4.3.8 Continuity of drinking water supply

Where the user is physically connected to the drinking water supply system, the user expects the drinking water supply to be continuous. In the event that a continuous supply is not possible, the user expects the supply to be managed in an equitable manner and to be informed of the conditions and schedule of interruptions.

Where the user is not physically connected to the drinking water supply system (e.g. community stand-pipes or trucked water supplies), the user expects the supply to be available on a regular basis.

4.3.9 Coverage and availability of drinking water services

Where there is a service based on physical connections in a service area, the user expects that drinking water supply be provided throughout the service area and that where it is not, alternative delivery systems for water supply be made available.

4.3.10 Coverage and availability of wastewater services

Where there is a service based on physical connections, the user expects that wastewater service be provided throughout the service area. In such systems, the user expects to be able to discharge wastewater directly into the wastewater system at any time and without delay or risk to human health.

Where the wastewater system is not based on physical connections, the user expects alternative services for wastewater collection to be made available. In such systems, the user expects to be able to dispose septage by other means as necessary, at regular intervals and without undue delay or risk to human health.

4.3.11 Property flooding by wastewater

The user expects that no flooding or backup from the wastewater system affect properties or streets. In the case of a backup or flooding event, the user expects that the duration and effects are minimized and that remediation assistance be provided by the water utility or other appropriate body.

4.4 Contract management and billing

4.4.1 Availability of a clear service agreement

The user expects a service agreement with conditions that are clear, fair and well-documented. The user expects to be informed of any change to the agreement or its conditions, in a reasonable amount of time prior to the changes taking effect. The user also expects procedures for the establishment and cancellation of the agreement.

4.4.2 Accuracy of billing

The user expects to be fairly and accurately billed for the service provided.

4.4.3 Response to billing complaints

Where a billing complaint has been made by the user, the user expects a response from the water utility. The user expects the response to clarify and/or resolve the problem in a reasonable amount of time, with fair consideration of any monetary issues caused by billing errors.

4.4.4 Clarity of billing

The user expects clear, accurate and detailed information on the structure and content of bills.

4.4.5 Methods of payment

The user expects regular billing and a variety of convenient payment methods.

4.5 Promoting a good relationship with users

4.5.1 General

The user expects:

— any enquiry addressed to the responsible body, operator or relevant authority by any appropriate means to be clarified and/or resolved within a reasonable amount of time;

— guaranteed confidentiality;

— current available information;

— competent and respectful contact persons.

4.5.2 Written contacts

The user expects written contacts [e.g. letter, e-mail, fax, short message service (sms)] to be responded to and dealt with in a reasonable amount of time and in a respectful manner.

4.5.3 Telephone contacts

Where telephone service is available, the user expects telephone calls to be responded to and dealt with in a reasonable amount of time, either directly or by being transferred to the appropriate service department. The user expects to be able to notify the water utility at any time during an emergency related to the service.

4.5.4 User visits to the offices of the water utility

The user expects to be welcomed and assisted effectively and directed to the appropriate person. The user also expects:

— convenient opening hours that are respected;

— reasonable, well-managed waiting times;

— a suitable public reception area offering confidentiality;

— a convenient office location.

4.5.5 Visits to the user

The user expects employees of the operator to respect the appointment time, to show proper identification and to minimize any inconvenience to the user.

4.5.6 Complaints and requests

The user expects that any complaint or request (including verbal communication, electronic media such as e-mails and faxes, etc.) be carefully considered. The user expects a clear, accurate, adequate response in a reasonable time.

4.5.7 Notification of restrictions and interruptions

The user expects to be notified of unsafe conditions or any restrictions or interruptions of the service.

4.5.8 Availability of service information

The user expects that all information regarding public aspects of the service, in accordance with local conditions, including the designation of responsibilities and performance of the service, be issued in an open and transparent manner.

4.5.9 Community activities

The user expects the water utility to proactively provide information regarding the utility through community activities and outreach efforts.

4.5.10 Participation of the users

The user expects that participation is encouraged and enabled by a transparent participatory process and the right to put forward the users' interest in such matters as prices, standards and physical connection or alternative service development.

4.6 Protection of the environment

4.6.1 Sustainable use of natural resources

The user expects that the operator, responsible body and relevant authorities promote and practice a sustainable use of the water resources, as well as other natural resources.

4.6.2 Wastewater treatment

The user expects the efficient and effective treatment of wastewater before it is returned to the environment. The user also expects that sludge and other residues are disposed of or beneficially reused in a way that is safe and protective of public health and the environment.

4.6.3 Environmental impact

The user expects that any negative environmental impacts resulting from the service be minimized.

4.7 Safety and emergency management

In the event of an emergency affecting the service or the safety of the users, the user expects that the service be restored in a reasonable time and that risks and inconveniences be reduced as far as practically possible in accordance with local conditions, in order to prevent:

a) disruptions of the service due to problems with quantity or quality;

b) pollution of water resources or the environment.

In addition, in the event of an emergency, the user also expects timely information on the following:

— the nature of the incident and the risks (if any) involved;

— contact details for appropriate water utility representatives;

— what the user should do (if anything);

— the time before normal service is returned and whether temporary alternatives are available.

5 Guidelines for satisfying users' needs and expectations

5.1 General

The service to the users can be improved by taking into account the users' needs and expectations. In order to satisfy those needs and expectations, it is necessary to define actions to follow that will have these needs and expectations as their objectives. When not stated in the guidelines, the stakeholder responsible for the implementation of each action (relevant authority, responsible body or operator) should be defined beforehand.

This clause provides guidelines to define those actions. The results of these actions should be assessed following the criteria presented in Clause 6.

Given the varying degrees of economic development, the full implementation of the guidelines presented in this clause may not yet be attainable in some countries, in which case they should be considered as goals for continuous improvement.

In any case, providing a good service to the users should always be based on complying with the laws and regulations applicable to the service. In the absence of specific laws and regulations, the relevant stakeholders should agree on the necessary conditions to guarantee a good service.

For further guidance on the management of water utilities in such a way that users' needs and expectations are satisfied, readers of this International Standard should refer to ISO 24511 and ISO 24512.

5.2 Access to water services

Relevant authorities and responsible bodies within their service areas should define and implement institutional and economic or financial measures to put in place drinking water supply and wastewater systems, which could include resource management, physical infrastructure extension and alternative means of water supply or wastewater collection, and treatment for those who are not connected.

The fact that certain communities and/or users are not connected to water and wastewater physical infrastructure should not be taken to mean that there is no service to which this International Standard should apply. There should be other service provisions considered, e.g.

— wells;

— mobile drinking water delivery;

— regulated vendors and drinking water points;

— latrines;

— septic tanks;

— septage removal and transport;

— other forms of provision, including on-site self-provision.

Relevant authorities and responsible bodies should take measures to ensure equitable and affordable access. These measures may include grants (including support for financing connections for the poor), loans, social tariffs (including possible zero rate tariff blocks targeted on the poorest), subsidies, cross subsidies between households at different income levels, or other aids.

Responsible bodies should take measures to ensure that all users have access to enough water to meet basic human needs, in accordance with local conditions and the advice of those bodies responsible for sanitary controls. The choice of such measures, which may be temporary, should take into account the cost and effectiveness of cross subsidies between users and the financial viability and sustainability of the service.

5.3 Provision of the service

5.3.1 Time to establish new service provisions

The water utility should establish a standard time for new service provision in network systems, and commit to achieve this target for all regular connections.

In all systems, the water utility should be able to estimate and clearly communicate to the user the time that it takes to establish a new service or connection. The estimate should include a reasonable allowance for unexpected local conditions or delays, as outlined below.

— The standard time should be defined as the period from the time the user application procedure is completed to when the service is available for the user.

— The application procedures should be clearly specified by the water utility.

In the absence of a piped network system, the user should be informed about when the service is to be provided, either through an infrastructure extension or through alternative means of service.

5.3.2 Repairs

For planned repairs, the water utility should inform the affected users in advance with an estimate of the time and duration of the interruption to the service. For unplanned repairs that affect the service, the water utility should take measures to inform the affected users about the estimated time until normal service is restored. In all repairs, the water utility should minimize the inconvenience to the affected users.

5.3.3 Price of service

The operator, responsible body and relevant authorities should aim to provide the service at a “fair price”. In order to identify what is meant by a fair price, the following elements should be taken into consideration:

— affordability;

— total cost;

— historic price levels and inflation;

— rate of return;

— impact on water use.

The acceptability to users of a fair price may require providing the public with information regarding the components of the price and the extent to which the costs of providing the service are covered by revenues from the users.

The extent, nature and purpose of relevant subsidies should be identified, as should any calculations of affordability for users. Information on those factors influencing variations in price (e.g. cost inflation, cost of

capital, environmental laws and regulations, emergencies, network extensions, water quality and availability, taxes) should also be provided.

5.3.4 Quantity of drinking water supply

The operator, responsible body and relevant authorities should use their best endeavours to ensure that the current demand for water is met. For their part, users should be expected to strive towards a rational and efficient use of water and should be encouraged in that direction by the operator, responsible body and relevant authorities.

The operator, responsible body or relevant authorities should make adequate estimations of future demands. The estimates should lead to a reliable and sustainable drinking water supply in the future, which meets those demands.

5.3.5 Drinking water quality

The operator, responsible body and/or relevant authorities should prevent the supply of drinking water which has a detrimental effect on the health of the people using the water. The operator, responsible body and/or relevant authorities should carry out regular collection and analysis of water samples taken at relevant points, including points-of-use, to determine that it is safe for human consumption and use.

These analyses should show compliance with applicable laws or regulations. In the absence of applicable laws or regulations, drinking water should at least comply with guidelines from the World Health Organization.

The operator, responsible body and/or relevant authorities should make the results of these analyses available to users and include in a periodic report (e.g. the annual report) a summary of water quality and any related problems.

Where an emergency situation causes the release into the water distribution system of drinking water that may be detrimental to health, the water utility or another relevant body should take all possible measures to remove the contaminated water from the system. Where removal of the contaminated water is not possible, the water utility, relevant authority or another relevant body should inform potential users of the risks of the situation and provide them with an alternative means of supply of drinking water.

5.3.6 Aesthetic aspects of water

The drinking water utility should implement measures affordable to the user to provide aesthetically pleasing water on a regular basis. The drinking water utility should monitor complaints on the aesthetic quality of water (taste, colour and odour) and/or carry out user surveys on water quality aesthetics on a periodic basis.

The wastewater utility should implement measures affordable to the user to minimize unpleasant odours emanating from the wastewater system.

5.3.7 Pressure of drinking water supply

When the drinking water service is provided through a piped network, the water utility should provide water at adequate pressure and should inform the users of the minimum and maximum pressure values. In any case, the water utility should ensure that the state of the piped network is not an impediment to providing adequate pressure levels.

5.3.8 Continuity of drinking water supply

The water utility should take all necessary steps to provide a drinking water supply on a continuous basis. Where this is not possible, supply should be made available on a basis that is equitable to the users.

The water utility should take the necessary steps to minimize the impact of events such as system failures or on-going repair or rehabilitation works that cause the drinking water supply to users to be interrupted. The water utility should inform users regarding supply interruptions in a timely manner.

In non-networked supply systems, the water utility should provide a drinking water supply on a regular basis and inform users of the locations, intervals and timing of the provision of drinking water.

5.3.9 Coverage and availability of drinking water services

Responsibility for geographical coverage by the drinking water service rests with the relevant authority and responsible body, which should take all reasonable steps to provide service on an equitable basis within and between all rural and urban areas. This objective of maximum coverage may require differences in methods of service delivery, in accordance with local conditions.

Where populations are not served by piped network systems, the responsible body should plan on the basis of alternative forms of provision, such as public water points, tanker trucks, etc. The possibility that a geographical area may not be profitable in commercial terms should not constitute an obstacle to service. The range of possible models of service provision should include low cost alternatives and prices adapted to the needs of economically disadvantaged zones, with a view to expanding service.

The volume of drinking water made available to the user should at least meet the user's basic water requirements defined by the World Health Organization and should also provide protection against illnesses linked to lack of and poor quality of water.

Coverage and availability of the service should be environmentally and financially sustainable.

5.3.10 Coverage and availability of wastewater services

Responsibility for geographical coverage by the wastewater service rests with the relevant authority and responsible body, which should take all reasonable steps to provide service on an equitable basis within and between all rural and urban areas. This objective of maximum coverage may require differences in methods of service provision in accordance with local conditions.

Where networked wastewater collections systems exist, the wastewater utility should control the quality of the installed connection and the waste discharged into the system. The water utility should clearly inform the users about what may or may not be discharged into the wastewater system. The users should be expected to comply with such requirements.

Where populations are not served by network systems, the responsible body should plan to provide users with alternative forms of wastewater collection and treatment, such as latrines, septic tanks, etc. The possibility that a geographical area may not be profitable in commercial terms should not constitute an obstacle to service. The range of possible models of service provision should include low cost alternatives and prices adapted to the needs of economically disadvantaged zones, with a view to expanding service.

The wastewater utility should develop and operate a programme of operations and maintenance to repair or restore assets or systems to ensure that the user has the ability to discharge wastewater or septage.

The wastewater utility should provide reliable service and minimize unplanned interruptions to the users' ability to discharge wastewater or septage.

Coverage and availability of the service should be environmentally and financially sustainable.

5.3.11 Property flooding by wastewater

The water utility should take all reasonable steps to minimize the risk of flooding originating from the wastewater system. The water utility or local relevant authority should provide clear information about the flooding risks from wastewater in the service area and the measures which users and property owners can adopt to minimize the possible impact of system backup or flooding (e.g. proper use of the wastewater system, adequate internal installations, use of non-return valves, pumping installations). The operator should develop a plan to react in an appropriate way, in the case of failures in the wastewater system.

5.4 Contract management and billing

5.4.1 Availability of a clear service agreement

The water utility should enter into clear and fair service agreements with users. The service agreement should have clear and available conditions and comply with applicable regulations and guidelines. In any case, individual contracts or written contracts may not be necessary.

Where the water utility uses a standard service agreement, this should be made publicly available and easily accessible.

Where the water utility proposes to change an existing service agreement, customers should be given reasonable notice of the details of the change and should be able to provide comment on the final decision.

The water utility should prepare and make available to users procedures for the establishment and cancellation of agreements. The cancellation procedures should be simple.

5.4.2 Accuracy of billing

The water utility should take all reasonable steps to ensure that billing to customers is accurate. In the event of a complaint about the accuracy of a meter used to measure use of service, the operator should perform a meter test, and replace it when appropriate. There should be a clear procedure for adjustment in the event of an error disadvantageous to the user.

In the event of billing on the basis of methods other than metering, the operator should make clear the basis for the calculation of the bill and allow for mechanisms that safeguard against billing inconsistencies or errors. Depending on the terms of the service agreement, in the event of failure to supply, the bill should be reduced accordingly.

5.4.3 Response to billing complaints

The water utility should provide a timely response to the registered user, which clarifies the problem or resolves the complaint within a reasonable time.

The water utility should maintain a local service commitment (which may be included in the service agreement) to users, which specifies a maximum response time for billing complaints.

Depending on the terms of the service agreement, the water utility should give consideration to monetary issues caused by billing errors and should provide acceptable solutions to these issues.

5.4.4 Clarity of billing

The water utility should operate a billing system which provides users with paper or electronically based bills, or other means which are clear, comprehensible, accurate, timely and complete.

The water utility should provide the users with detailed information regarding the structure and contents of bills. This information should be clear and easy to understand, using plain language and unambiguous presentation. Examples of documents that could be used to provide this information to users include tariff schedules, special cases, etc.

In the case of different services sharing a common bill with drinking water or wastewater services, the contents should be clearly distinct, with each service being clearly identified.

5.4.5 Methods of payment

The water utility should establish systems to facilitate payment by the user in terms of

a) regularity of billing,

b) choice and flexibility of payment methods,

c) frequency of payment, and

d) minimum inconvenience (e.g. in terms of physical placement of payment locations or long queues).

In accordance with local custom and practice, payment methods could include

— cash,

— cheques,

— bank transfer,

— pre-purchased “water stamps”,

— credit cards, or

— other methods.

The water utility should bear in mind that poorer customers often prefer to make frequent payments of small amounts and adjust the billing systems to accommodate this preference, if possible.

Systems of payment records need to be maintained accordingly, with the possibility for users to verify payments made against amounts due.

5.5 Promoting a good relationship with users

5.5.1 General

The water utility should address user expectations. The water utility should have procedures promoting understanding good relationships, and participation by the users in general. The water utility should provide accessible contact information for user communication. The water utility should also have procedures which deal with enquiries from users and which clarify and/or resolve them in a reasonable amount of time. The procedures should also guarantee confidentiality to the user and be carried out in a competent and respectful manner by people who have access to the most current information.

The water utility should maintain a local service commitment (which may be included in the service agreement), which specifies a maximum response time to the enquiries.

5.5.2 Written contacts

The water utility should specify the forms of written communication available that are adapted to the needs of the users and provide the response in a reasonable time. The water utility should provide suitable solutions or answers to users.

The water utility should maintain a local service commitment (which may be included in the service agreement), which specifies a maximum response time for written contacts.

5.5.3 Telephone contacts

Where telephones are available, the water utility should provide a service, which responds to received calls in a reasonable time, and also provides suitable solutions or answers to users.

The telephone service provided should be available at all times to respond to calls regarding emergencies. The water utility should maintain a local service commitment (which may be included in the service agreement), which specifies a maximum waiting time and a maximum response time for telephone contacts.

In areas where a telephone service is not available, the water utility should provide an alternative system for responding to enquiries or emergency contacts from users.

5.5.4 User visits to the offices of the water utility

The water utility should provide designated facilities, which are appropriate for the reception of users. The facilities should have established opening hours, which are respected and provide reasonable and well-managed waiting times for visitors. The facilities should be at offices that are convenient to users. In rural or low-density areas, where fixed offices are not cost effective, the water utility should provide alternatives (e.g. mobile offices, electronic desks).

The facilities should offer visitors confidentiality, and the employees of the water utility that provide assistance to them should be clearly identified.

Easily understandable documents that relate to the main features of the service should be made available proactively to visitors of the designated facilities. These should include information that sets out in simple terms the water utility's application procedure for a service.

5.5.5 Visits to the user

The water utility should adopt procedures which ensure that their employees observe appointment times agreed for visits to users. The procedures should also require that employees who visit the users carry appropriate identification and that they show it to the users. Users should be made aware of this requirement.

Employees of the water utility should minimize any inconvenience to the user and provide confidentiality during and after the visit. Employees making visits to users should be competent regarding the reason for the visit and should always behave in a courteous manner.

5.5.6 Complaints and requests

The water utility should have procedures for answering and/or resolving complaints and requests made by users. The water utility should maintain a local customer service commitment (which may be included in the service agreement), which should specify maximum response times for the users' complaints and requests. For all complaints and requests, the water utility should put in place a monitoring system to assess the response time.

Complaint and request methods could include:

— written;

— by telephone;

— by e-mail;

— by facsimile;

— verbal by visit or otherwise of the user;

— verbal by visit of employees of the water utility.

For further guidance on handling complaints and requests, readers of this International Standard should refer to ISO 10002.

5.5.7 Notification of restrictions and interruptions

The water utility should use the most appropriate method to notify affected users about unsafe conditions or any planned restrictions or interruptions of the service. In the case of unplanned or exceptional service

restrictions or interruptions, the water utility should as soon as is reasonably possible inform affected users of the reason for, and the expected duration of, the restriction or interruption.

It is recommended that the water utility should maintain a local customer service commitment (which may be included in the service agreement), which specifies the minimum period for notification to affected users of planned restrictions or interruptions of the service.

5.5.8 Availability of service information

The operator, responsible body and relevant authorities should openly and transparently provide the users with general information regarding publicly available aspects of the service, including the designation of responsibilities and the performance of the services in accordance with local conditions. This information should be provided in such a manner as to be of the greatest use to the greatest number of users.

Users may request the operator, responsible body and/or relevant authorities to disclose information. There are some cases where information disclosure is controlled by law. Information may be made available and not necessarily publicly disseminated. However, when possible, the operator, responsible body and relevant authorities should provide all legally available information actively when requested to do so.

EXAMPLE Depending on local conditions, public aspects of the service can include:

- public health matters:
  - quality tests results;
  - periodic reports on water quality;
  - periodic reports on wastewater quality and residues disposal;
- customer service:
  - contact details (office hours, telephone contacts);
  - complaints procedures;
  - billing procedures and payment procedures;
  - how to seek available help to pay the bill (e.g. social security);
- legal framework:
  - customer contracts;
  - rights of users;
  - responsibilities of users;
  - tariffs;
  - tariff setting procedures;
  - existing contracts (e.g. concessions, management agreements);
  - proposals for new or renewed contracts (e.g. concessions, management agreements);
  - procedures for contract awards (e.g. concessions, management agreements);

— operational matters:

  — time lines for service extension;

  — emergency procedures.

— financial matters:

  — cost structure;

  — pricing formula;

— performance of the service:

  — performance data as published, for example, by relevant authorities.

5.5.9 Community activities

The water utility should participate in local community activities, whenever these are relevant to the service, or should organize its own activities, such as facility open houses and tours. The water utility should promote good relationships with the local community by providing information proactively and being aware of local expectations (as this could result in, for example, cooperation from the community and volunteer participation in the case of emergency).

5.5.10 Participation of the users

The operator, responsible body and/or relevant authorities should encourage and promote participation by users (legal framework, funding, etc.), which can take several forms. Examples are:

— ongoing consultation through standing user committees which may monitor complaints and standards of service;

— participation in dispute resolution for individual cases;

— consultation at key decision points, such as new programmes to extend the network, set prices for a new period, considering the content of new operating contracts and/or changes of the responsible body; consultation can take place between users and operators, responsible bodies and/or relevant authorities, either jointly or separately.

5.6 Protection of the environment

5.6.1 Sustainable use of natural resources

The water utility should strive for efficiency and sustainability in the use of water and other resources (e.g. energy).

The water utility should also undertake actions such as:

— minimizing leakage;

— minimizing contamination of the environment;

— establishing source water protection, including long term resources allocation mechanisms;

— monitoring the quantity and quality of water resources in catchment areas;

— participating in commissions responsible for river basin management;

— providing education and general information to users about efficient use of water and other natural resources;

— setting tariffs and/or taking measures which promote efficient water use.

For further guidance, readers of this International Standard should refer to ISO 24511 and ISO 24512.

5.6.2 Wastewater treatment

The responsible body and/or relevant authorities should ensure the adequate treatment of wastewater to prevent risks to public health and to minimize adverse environmental impact.

The operator, responsible body and/or relevant authorities should provide the users with information regarding any applicable regulations and guidelines, and the level of compliance with those regulations and guidelines.

For further guidance, readers of this International Standard should refer to ISO 24511.

5.6.3 Environmental impact

The operator, responsible body, and relevant authorities should take positive actions to minimize the impact of their activities on the environment. The results of implementation should be communicated to the stakeholders. These activities should be in accordance with applicable regulations and guidelines and could be enhanced by an environmental management system (e.g. ISO 14001). The operator, responsible body and/or relevant authorities should provide regular information about the environmental impact of the activities relating to water services.

For further guidance, readers of this International Standard should refer to ISO 24511 and ISO 24512.

5.7 Safety and emergency management

The operator, responsible body and relevant authorities should develop and regularly test appropriate emergency and prevention plans based on risk management principles that include

a) prevention measures,

b) the internal organization to deal with emergencies,

c) training procedures for employees,

d) appropriate information for users, and

e) procedures for the restoration of normal service operation.

Emergency plans should be designed to restore the service to users in a reasonable time and reduce risks and inconveniences as far as practically possible in accordance with local conditions. The emergency plans should also be designed to prevent disruptions of the service due to problems with quantity or quality of the supplied water or degradation of water resources or the environment.

Emergency plans should be in accordance and integrated with general emergency plans for the area. The operator, responsible body and/or relevant authorities should provide easily accessible means of contact during an emergency. Such means may be common to all kinds of emergencies in a given area.

During any emergency, the operator, the responsible body or the relevant authority should provide timely information to the users on the following:

— the nature of the incident and the risks (if any) involved,

— contact details for appropriate water utility representatives,

— what (if anything) the user should do,

— the estimated time before normal service is resumed and what temporary solutions are available.

The information should be distributed to users by appropriate and available methods under the circumstances of the emergency.

For further guidance, readers of this International Standard should refer to ISO 24511 and ISO 24512.

6 Assessment criteria for service to users

6.1 General

The service to the users should be assessed taking into account the users' needs and expectations and the results of the actions defined from the guidelines presented in Clause 5. The fulfillment of these needs and expectations and the degree of success of the actions can be measured by means of performance indicators.

In such cases, in order to define specific performance indicators, this clause presents key assessment criteria needed to evaluate the fulfillment of the related objectives. For every user need and expectation in Clause 4, a guideline is listed in Clause 5 and corresponding assessment criteria are given in this clause. For each objective chosen for the utility, one or more performance indicators should be developed by the appropriate stakeholder to use in assessing the service for this objective. The specific performance indicators to be used depend on local conditions (e.g. in populations with high illiteracy rates, performance indicators based on written complaints are not valuable; in non-network systems, performance indicators related to pressure measures are not relevant, etc.). In every case, the performance indicators should be developed using one or more of the assessment criteria outlined in this clause and the methodology presented in Clause 8. Examples of performance indicators are provided in Annex B.

6.2 Access to water services

The assessment criteria include:

— quantity of water available to users,

— equity in the access to drinking water and wastewater services,

— access to drinking water and wastewater services in rural areas and poor areas,

— access of low income households to drinking water and wastewater services,

— affordability of the water supply and wastewater services,

— implementation of public policy to support access to drinking water and wastewater services for the poor and vulnerable people,

— availability of feasible and affordable alternatives to the service,

— sustainability of the water supply and wastewater services.

6.3 Provision of the service

6.3.1 Time to establish new service provisions

The assessment criteria include:

— compliance with the standard service connection time,

— simplicity of establishing a new service connection,

— average time to establish alternative forms of service provision.

6.3.2 Repairs

The assessment criteria include:

— effects on users of service interruptions (planned/unplanned),

— extent of information to users on interruptions (planned/unplanned),

— degree of success in finishing planned repairs in the specified time.

6.3.3 Price of service

The assessment criteria include:

— variation in price regarding historic price levels (taking into account currency fluctuations),

— degree of cost-recovery and degree of coverage by subsidies,

— affordability of the service,

— comparison to other forms of provision of the water services (e.g. ratio of vendor prices to piped water prices),

— comparison to other networked services.

6.3.4 Quantity of drinking water supply

The assessment criteria include:

— existence of a service development plan,

— balance between demand and capacity of the drinking water supply system,

— efficiency in the use of water and of water resources,

— quantity or rate of water losses.

6.3.5 Drinking water quality

The assessment criteria include:

— results of analyses of samples and their compliance with applicable regulations and guidelines,

— drinking water related complaints.

6.3.6 Aesthetic aspects of water

The assessment criteria include:

— complaints related to aesthetic quality of drinking water,

— complaints related to odours from wastewater system.

6.3.7 Pressure of drinking water supply

The assessment criteria include:

— compliance with pressure guidelines and regulations,

— pressure related complaints.

6.3.8 Continuity of drinking water supply

The assessment criteria include:

— degree of continuity of the supply,

— regularity of non-network means of supply,

— continuity related complaints.

6.3.9 Coverage and availability of drinking water services

The assessment criteria include:

— degree of coverage or availability,

— equity of coverage or availability.

6.3.10 Coverage and availability of wastewater services

The assessment criteria include:

— degree of coverage or availability,

— equity of coverage or availability,

— interruptions of wastewater or septage collection and discharge.

6.3.11 Property flooding by wastewater

The assessment criteria include:

— damage by wastewater flooding,

— existence of wastewater flood prevention measures,

— existence of action plans including communication in the event of wastewater flooding,

— complaints related to wastewater flooding.

6.4 Contract management and billing

6.4.1 Availability of a clear service agreement

The assessment criteria include:

— existence of a clear publicly available service agreement,

— service agreement related complaints,

— existence of a publicly available template for service agreement.

6.4.2 Accuracy of billing

The assessment criteria include:

— corrected bills,

— metering errors,

— results of meter tests.

6.4.3 Response to billing complaints

The assessment criteria include:

— efficiency in complaint handling,

— effectiveness in complaint handling,

— conformity with the standard response time.

6.4.4 Clarity of billing

The assessment criteria include:

— contacts regarding the bill,

— existence of additional information regarding the bill,

— customer surveys regarding the bill.

6.4.5 Methods of payment

The assessment criteria include:

— choice of payment methods,

— variety of payment methods,

— convenience of local payment points,

— efficiency of payment records systems.

6.5 Promoting a good relationship with users

6.5.1 General

The assessment criteria include:

— the existence of a management unit in charge of relations with users,

— the existence of a participation scheme for users,

— user surveys regarding the relationship with the water utility,

— the degree of privacy or confidentiality enjoyed by users.

6.5.2 Written contacts

The assessment criteria include:

— effectiveness in handling written contacts,

— conformity with the maximum specified response time.

6.5.3 Telephone contacts

The assessment criteria include:

— effectiveness in handling telephone contacts,

— conformity with the maximum specified response time,

— conformity with the maximum specified waiting time.

6.5.4 User visits to the offices of the water utility

The assessment criteria include:

— availability and convenience of offices,

— efficiency in handling user visits to the offices,

— effectiveness in handling user visits to the offices.

6.5.5 Visits to the user

The assessment criteria include:

— the existence of procedures for visits to the user including identification procedures,

— complaints regarding visits to the user.

6.5.6 Complaints and requests

The assessment criteria include:

— the existence and use of a procedure for handling complaints and requests or a monitoring system (e.g. ISO 10002),

— efficiency in handling complaints and requests,

— effectiveness in handling complaints and requests.

6.5.7 Notification of restrictions and interruptions

The assessment criteria include:

— efficiency in notifying users of interruptions to the service,

— effectiveness in notifying users of interruptions to the service,

— conformity with the specified notification time.

6.5.8 Availability of service information

The assessment criteria include:

— the availability of information regarding the service to the general public (website, periodic reports, etc.),

— complaints regarding availability of the information,

— accessibility to the available information (potential number of users with access to the information channels).

6.5.9 Community activities

The assessment criteria include:

— existence of a policy for community participation by the water utility,

— stakeholders involved directly in activities with the water or wastewater service (visits to operating facilities, school programmes, information packs distributed, etc.).

6.5.10 Participation of the users

The assessment criteria include:

— existence of a legal framework or collective agreements to establish user's participation,

— degree of user participation in consultation processes regarding the governance of the service,

— interventions delivered by users' committees.

6.6 Protection of the environment

6.6.1 Sustainable use of natural resources

The assessment criteria include:

— existence of an environmental management system (e.g. 14001),

— water losses,

— efficiency in energy consumption,

— efficiency of use of water by domestic and non-domestic users.

For additional criteria, readers of this International Standard should refer to ISO 24511 and ISO 24512.

6.6.2 Wastewater treatment

The assessment criteria include:

— wastewater treatment capacity,

— results of wastewater and ambient water analyses,

— environmental impact of wastewater discharge,

— effects of wastewater discharge on public health.

For additional criteria, readers of this International Standard should refer to ISO 24511.

6.6.3 Environmental impact

The assessment criteria include:

— existence of an environmental management system (e.g. ISO 14001),

— compliance with applicable regulations and guidelines,

— total pollutant emission from the water or wastewater system (gas/liquid/solid phase),

— environmental impact of water abstraction.

For additional criteria, readers of this International Standard should refer to ISO 24511 and ISO 24512.

6.7 Safety and emergency management

The assessment criteria include:

— the existence and regular testing of an emergency plan (including prevention measures),

— availability of means of enquiry during an emergency,

— efficiency in providing emergency information,

— effectiveness in providing emergency information.

For additional criteria, readers of this International Standard should refer to ISO 24511 and ISO 24512.

7 Assessment of water services

7.1 General

Assessment as a process should be managed to achieve a clear and precise purpose and refer to the objectives outlined in Clause 4. The following should be established as part of a comprehensive policy (see 7.2):

— the goal and scope of the assessment (see 7.3);

— the parties involved in the assessment (see 7.4);

— the methodology of assessment (see 7.5);

— the necessary service assessment criteria (see 7.6);

— the resources necessary to conduct the assessment (see 7.7);

— the production of output and recommendations for the use of the output (7.8).

How and by whom the assessment information is to be used, should also be identified.

If not precisely specified, the assessment can cause confusion or conflicts among the parties involved.

There is a great variety of types of assessments, depending on the characteristics listed above.

EXAMPLE Environmental performance assessment, conformity assessment relating to best practice, risk assessment, audits.

The output of this process (i.e. assessment as a result) should facilitate the further decision-making process for the stakeholder requesting the assessment.

7.2 Assessment policy

The responsible body should establish a comprehensive policy for the assessment of service.

A sound assessment policy is a key component of the continuous improvement of the service. It should give a general framework for the assessment. It facilitates the determination of the actual situation and how strategic planning and decision making influences performance.

The assessment policy should address the overall efficiency and effectiveness of the strategic planning and decision-making activities. It should be designed to encompass all of the various management systems and procedures, and include self-assessment in the management component.

It should assist in the measurement of achievements of the various functions and activities performed for providing the services, closing the cycle and linking

— the set of objectives stipulated in Clause 4,

— the guidelines for satisfying users' needs and expectations in Clause 5, and

— the selected assessment criteria in Clause 6.

Assessment should be designed and implemented as a tool for promoting the development of collective learning and feedback to decision making.

7.3 Goal and scope of the assessment

The general goal of assessment is to check if the water service objectives concerning the users have been met. Objectives for the service to users are defined in Clause 4.

The goal and scope for a specific assessment should be clearly defined.

This International Standard does not deal with the assessment of the management of the utility.

Service assessments should be focused on service performance, on the satisfaction of users and on meeting the objectives for the service, but not on the means used or the detailed organization implemented for meeting the objectives.

Part of the assessment of water services deals with the assessment of service to users. For service to users, assessment should focus on the interface between the utility and the user (e.g. measuring user satisfaction). Assessment of service to users should involve effectively the users in the process. With regard to assessment of water services (in addition to the assessment of service to users), the general recommendation is to focus on the service performance. Nevertheless, some activities do not fit well with direct measurement of their performance. In such cases, indirect assessment of the performance can be accomplished through the evaluation of some management systems (e.g. risk management, security management, asset management). More guidance is given in ISO 24511 and ISO 24512 for the assessment of water services.

7.4 Parties involved in the assessment

The responsible parties and all other parties (e.g. the assessment team) involved in the assessment should be clearly defined. Their responsibilities, their role in the process and the framework of operation for each party should be specified.

When the responsible body and the operator(s) are not the same legal body, assessment procedures, if not fixed by legal requirements from the relevant authorities, should be agreed to in advance to provide coherent assessment results from all involved parties, in accordance with respective rights and responsibilities. Concerning service to users, the responsible body and its operator(s) should take a consistent position relevant to the assessment procedures concerning service to users.

7.5 Methodology of assessment

Due to the diversity of legal, institutional and managerial systems governing water services, this International Standard does not present detailed service assessment procedures. However, this International Standard should be used to configure assessment procedures appropriate to local conditions.

The selection of the assessment tools should fit the assessment goals and scope. Performance indicator systems are one of these tools (see Clause 8).

NOTE In some cases, specifications for assessments can be required by relevant authorities or by financial investors.

Assessment methodology and procedures should be:

— developed with a capacity for repeated measurement to determine trends;

— periodically reviewed to check their efficiency and effectiveness, paying attention notably to avoidance of duplication;

— flexible to adjust to changes in goals, framework, assessment criteria and indicators as new insights are gained.

Some types of assessment procedures may be already standardized. In such cases, it is recommended that the relevant standards be used.

EXAMPLE Review [ISO 9000:2005, 3.8.7]; environmental performance evaluation [ISO 14031:1999, 2.9].

If, at a geographically relevant level (country, region and city), specifications are established for the water services, then these specifications should also include provisions concerning assessment processes (e.g. user satisfaction).

7.6 Service assessment criteria

The necessary service assessment criteria should be selected in accordance with the objectives and requirements of interest as determined by stakeholders taking into account local conditions.

Service assessment criteria are the link between objectives and performance indicators. The example below shows, for one of the objectives proposed in Clause 4, possible service assessment criteria. Clause 6 presents assessment criteria for service to users for every objective listed in Clause 4.

It should be noticed that a service assessment criteria can be related to more than one objective.

EXAMPLE

Objective: written contacts

Possible service assessment criteria:

— effectiveness in handling written contacts

— conformity with the maximum specified response time

7.7 Resources to conduct the assessment

The responsible party for the assessment should ensure that the necessary resources, including human, financial, organizational and required information technology, are available. The team with the responsibility for carrying out the assessment should be clearly defined. This team should be empowered to specify and steer the assessment process within the given framework (e.g. goals, scope, resources, parties involved, methodology, outputs).

7.8 The production of output and recommendations for the use of the output

The output of assessment should be a report about the assessment process and its results. It should include additional guidelines for the use of these outputs. The output should make transparent the distinction between the defined targets and the actual service.

8 Performance indicators

8.1 General

Performance indicators are used to measure the efficiency and effectiveness of a utility in achieving its objectives (particularly those identified in Clause 4).

Performance indicator systems should be considered as a key assessment tool among the various existing assessment tools (see Clause 7).

Performance indicators should be used within the context of a comprehensive service assessment system. This system should include, amongst other tools, a coherent set of indicators and the related components that allow for a clear definition of these performance indicators and assist in their interpretation.

8.2 Performance indicators systems

8.2.1 Key components of a performance indicator system

A performance indicator system comprises a set of the following key components:

— performance indicators,

— context information, and

— variables.

In addition, specific targets for each indicator should be established and routinely monitored, tracked and adjusted as needed.

8.2.2 Performance indicators

Individual performance indicators should be unique and collectively appropriate for representing the relevant aspects of the service in a true and unbiased way.

Each performance indicator should:

— be clearly defined, with a concise and unequivocal interpretation;

— be assessed from variables that are easily and reliably measured at a reasonable cost;

— contribute to the expression of the level of actual performance achieved in a certain area;

— be related to a specified geographical area (and, in the case of comparison analysis, it should be for the same geographical area);

— be related to a specific time period (e.g. annual, quarterly);

— allow for a clear comparison with targeted objectives and simplify an otherwise complex analysis;

— be verifiable;

— be simple and easy to understand;

— be objective and avoid any personal or subjective appraisal.

Performance indicators are typically expressed as ratios between variables. These ratios may be commensurate (e.g. %) or non-commensurate (e.g. $\$/m^3$). In the case of non-commensurate ratios, the denominator should represent one dimension of the system (e.g. number of service connections; total water main length; annual costs). This allows for comparisons through time, or between systems.

Variables that may vary substantially in time (e.g. annual extraction/discharge volumes), particularly if not under the control of the utility, should be avoided as denominators in the indicator ratios. An exception can be made when the numerator varies in the same proportion as the denominator.

A clear processing rule should be defined for calculating each indicator. The rule should specify all the variables required and their algebraic combination. The variables may be data generated and managed within the utility (utility data) or externally (external data). In either case, the quality of the data should be assessed (see 8.3) and verified. The interpretation of the performance indicators should not be carried out without taking into account the context, particularly if it is based on comparisons with other cases. Therefore, complementary to the performance indicators, the context information should consider also the characteristics of the system and the region in which the services are provided.

Additional information on performance indicators and grading systems for performance indicators are provided in Annexes B and C.

8.2.3 Variables

Each variable should:

a) fit the definition of the performance indicator or context information it is used for;

b) refer to the same geographical area and the same period of time or reference date as the performance indicator or context information it will be used for;

c) be as reliable and accurate as the decisions made based on it require.

Some of the variables are external data and mainly informative, and their availability, accuracy, reference dates and limits of the corresponding geographical area is generally out of the control of the utility. In this case, variables should also:

— whenever possible be collected from official sources, which include information on the accuracy and reliability of the variable(s);

— be essential for the performance indicator assessment or interpretation.

8.2.4 Context information

Context information defines inherent characteristics of a system that are relevant for the interpretation of the performance indicators. There are two possible types of context information:

— information describing pure context and external factors that are not under the control of the utility (e.g. demographics, topography, climate), and

— characteristics that can only be influenced by management decisions in the long term (e.g. age of the infrastructures).

8.3 Quality of the information

The quality of the data should reflect the importance of the assessment being conducted.

A scheme providing information on data quality is needed so that users of the performance indicators and context information are aware of the reliability of the information available. The value of the performance indicators can be questionable without this scheme.

The confidence grade of a performance indicator can be assessed in terms of its accuracy and reliability. The accuracy accounts for measurement errors in the acquisition of input data. The reliability accounts for uncertainties in evaluating the reliability of the source of the data.

An example of a confidence-grading scheme is presented in Annex C.

8.4 Example of a performance indicator

Performance indicators are relevant to service assessment criteria to which they link. The example below shows, for one of the objectives proposed in Clause 4, possible performance indicators relevant to one of the service assessment criteria shown in Clause 6. More examples are given in Annex B.

EXAMPLE

Objective: written contacts

The user expects written contacts [letter, e-mail, fax, short message service (sms), etc.] to be responded to and dealt with within a reasonable amount of time and in a respectful manner.

Possible service assessment criteria: conformity with the maximum specified response time

Possible performance indicator: response to written complaints

Performance indicator: response to written complaints (%)

Definition: (number of written responses within the target time during the assessment period / number of written complaints during the assessment period) × 100 %

Processing rule: $I_{\mathrm{QS34}} = \frac{F_{22}}{F_{23}} \times 100\ \%$

where

I_{QS34} is the performance indicator of efficiency in responding to written complaints, in percent

F_{22} is the number of written responses

F_{23} is the number of written complaints

Comment: This indicator may be assessed for periods shorter than one year, but special care is required in result interpretation when used for both internal and external comparisons. This indicator is applicable in case there is a Guaranteed Standards Scheme.

IWA[1)] **code:** QS34

1) IWA: International Water Association.

Annex A
(informative)

Tables of corresponding terms in English, French and Spanish

This annex contains three tables of correspondence between equivalent terms in English, French and Spanish. Table A.1 lists the English terms defined in Clause 2 in alphabetical order together with the corresponding French and Spanish terms. Table A.2 lists the French terms in alphabetical order together with the corresponding English and Spanish terms. Table A.3 lists the Spanish terms in alphabetical order together with the corresponding English and French terms.

Table A.1 — Table of corresponding terms, English alphabetical order

Numerical term	English	French	Spanish
2.1	accuracy	exactitude	exactitud
2.2	affordability	accessibilité économique	asequibilidad
2.3	assessment	évaluation	evaluación
2.4	asset	bien	activo
2.5	asset management	gestion du patrimoine	gestión de infraestructura
2.6	availability	disponibilité	disponibilidad
2.7	community	communauté	comunidad
2.8	confidence grade	niveau de confiance	nivel de confianza
2.9	connection	branchement	conexión
2.10	coverage	couverture	cobertura
2.11	drinking water	eau potable	agua potable
2.12	drinking water system	système d'alimentation en eau potable	sistema de agua potable
2.13	effectiveness	efficacité	eficacia
2.14	efficiency	efficience	eficiencia
2.15	environment	environnement	medio ambiente
2.16	indicator	indicateur	indicador
2.17	infrastructure	infrastructures	infraestructura
2.18	interruption	interruption	interrupción
2.19	maintenance	maintenance	mantenimiento
2.20	management	management	gestión
2.21	management system	système de management	sistema de gestión
2.22	on-site system	système autonome	sistema local
2.23	operator	opérateur	operador
2.24	performance	performance	desempeño
2.25	point-of-collection	point de collecte	punto de recolección
2.26	point-of-delivery	point de livraison	punto de suministro

Table A.1 (*continued*)

Numerical term	English	French	Spanish
2.27	point-of-discharge	point de rejet	punto de descarga
2.28	point-of-use	point de consommation	punto de uso
2.29	price	prix	precio
2.30	procedure	procédure	procedimiento
2.31	process	processus	proceso
2.32	quality	qualité	calidad
2.33	rate of return	taux de retour	tasa de retorno
2.34	registered user	abonné	cliente registrado
2.35	rehabilitation	réhabilitation	rehabilitación
2.36	relevant authority	pouvoirs publics	autoridad competente
2.38	reliability ⟨asset or process⟩	fiabilité ⟨bien ou processus⟩	confiabilidad ⟨activo o proceso⟩
2.37	reliability ⟨information⟩	fiabilité ⟨informations⟩	credibilidad ⟨información⟩
2.39	repair	réparation	reparación
2.40	requirement	exigence	requisito
2.41	residues	résidus	residuos
2.42	responsible body	organisme responsable	organismo responsable
2.43	restriction	restriction	restricción
2.44	service	service	servicio
2.45	service agreement	contrat d'abonnement	acuerdo de servicio
2.46	service area	zone de compétence	área de servicio
2.47	stakeholder	partie intéressée	parte interesada
2.48	sustainable development	développement durable	desarrollo sostenible
2.49	tariff	tarif	tarifa
2.50	user	usager	usuario
2.51	wastewater	eaux usées	agua residual
2.52	wastewater system	système d'assainissement	sistema de agua residual
2.53	water utility	service public de l'eau	entidad prestadora de serviciosde agua

Table A.2 — Table of corresponding terms, French alphabetical order

Numerical term	French	English	Spanish
2.34	abonné	registered user	cliente registrado
2.2	accessibilité économique	affordability	asequibilidad
2.4	bien	asset	activo
2.9	branchement	connection	conexión
2.7	communauté	community	comunidad
2.45	contrat d'abonnement	service agreement	acuerdo de servicio
2.10	couverture	coverage	cobertura
2.48	développement durable	sustainable development	desarrollo sostenible
2.6	disponibilité	availability	disponibilidad
2.11	eau potable	drinking water	agua potable
2.51	eaux usées	wastewater	agua residual
2.13	efficacité	effectiveness	eficacia
2.14	efficience	efficiency	eficiencia
2.15	environnement	environment	medio ambiente
2.3	évaluation	assessment	evaluación
2.1	exactitude	accuracy	exactitud
2.40	exigence	requirement	requisito
2.38	fiabilité ⟨bien ou processus⟩	reliability ⟨asset or process⟩	confiabilidad ⟨activo o proceso⟩
2.37	fiabilité ⟨informations⟩	reliability ⟨information⟩	credibilidad ⟨información⟩
2.5	gestion du patrimoine	asset management	gestión de infraestructura
2.16	indicateur	indicator	indicador
2.17	infrastructures	infrastructure	infraestructura
2.18	interruption	interruption	interrupción
2.19	maintenance	maintenance	mantenimiento
2.20	management	management	gestión
2.8	niveau de confiance	confidence grade	nivel de confianza
2.23	opérateur	operator	operador
2.42	organisme responsable	responsible body	organismo responsable
2.47	partie intéressée	stakeholder	parte interesada
2.24	performance	performance	desempeño
2.25	point de collecte	point-of-collection	punto de recolección
2.28	point de consommation	point-of-use	punto de uso
2.26	point de livraison	point-of-delivery	punto de suministro
2.27	point de rejet	point-of-discharge	punto de descarga
2.36	pouvoirs publics	relevant authority	autoridad competente

Table A.2 (*continued*)

Numerical term	French	English	Spanish
2.29	prix	price	precio
2.30	procédure	procedure	procedimiento
2.31	processus	process	proceso
2.32	qualité	quality	calidad
2.35	réhabilitation	rehabilitation	rehabilitación
2.39	réparation	repair	reparación
2.41	résidus	residues	residuos
2.43	restriction	restriction	restricción
2.44	service	service	servicio
2.53	service public de l'eau	water utility	entidad prestadora de serviciosde agua
2.22	système autonome	on-site system	sistema local
2.12	système d'alimentation en eau potable	drinking water system	sistema de agua potable
2.52	système d'assainissement	wastewater system	sistema de agua residual
2.21	système de management	management system	sistema de gestión
2.49	tarif	tariff	tarifa
2.33	taux de retour	rate of return	tasa de retorno
2.50	usager	user	usuario
2.46	zone de compétence	service area	área de servicio

Table A.3 — Table of corresponding terms, Spanish alphabetical order

Numerical term	Spanish	English	French
2.4	activo	asset	bien
2.45	acuerdo de servicio	service agreement	contrat d'abonnement
2.11	agua potable	drinking water	eau potable
2.51	agua residual	wastewater	eaux usées
2.46	área de servicio	service area	zone de compétence
2.2	asequibilidad	affordability	accessibilité économique
2.36	autoridad competente	relevant authority	pouvoirs publics
2.32	calidad	quality	qualité
2.34	cliente registrado	registered user	abonné
2.10	cobertura	coverage	couverture
2.7	comunidad	community	communauté
2.9	conexión	connection	branchement
2.38	confiabilidad ⟨activo o proceso⟩	reliability ⟨asset or process⟩	fiabilité ⟨bien ou processus⟩
2.37	credibilidad ⟨información⟩	reliability ⟨information⟩	fiabilité ⟨informations⟩
2.48	desarrollo sostenible	sustainable development	développement durable
2.24	desempeño	performance	performance
2.6	disponibilidad	availability	disponibilité
2.13	eficacia	effectiveness	efficacité
2.14	eficiencia	efficiency	efficience
2.53	entidad prestadora de serviciosde agua	water utility	service public de l'eau
2.3	evaluación	assessment	évaluation
2.1	exactitud	accuracy	exactitude
2.20	gestión	management	management
2.5	gestión de infraestructura	asset management	gestion du patrimoine
2.16	indicador	indicator	indicateur
2.17	infraestructura	infrastructure	infrastructures
2.18	interrupción	interruption	interruption
2.19	mantenimiento	maintenance	maintenance
2.15	medio ambiente	environment	environnement
2.8	nivel de confianza	confidence grade	niveau de confiance
2.23	operador	operator	opérateur
2.42	organismo responsable	responsible body	organisme responsable
2.47	parte interesada	stakeholder	partie intéressée
2.29	precio	price	prix
2.30	procedimiento	procedure	procédure

Table A.3 (*continued*)

Numerical term	Spanish	English	French
2.31	proceso	process	processus
2.27	punto de descarga	point-of-discharge	point de rejet
2.25	punto de recolección	point-of-collection	point de collecte
2.26	punto de suministro	point-of-delivery	point de livraison
2.28	punto de uso	point-of-use	point de consommation
2.35	rehabilitación	rehabilitation	réhabilitation
2.39	reparación	repair	réparation
2.40	requisito	requirement	exigence
2.41	residuos	residues	résidus
2.43	restricción	restriction	restriction
2.44	servicio	service	service
2.12	sistema de agua potable	drinking water system	système d'alimentation en eau potable
2.52	sistema de agua residual	wastewater system	système d'assainissement
2.21	sistema de gestión	management system	système de management
2.22	sistema local	on-site system	système autonome
2.49	tarifa	tariff	tarif
2.33	tasa de retorno	rate of return	taux de retour
2.50	usuario	user	usager

Annex B
(informative)

Example of performance indicators

B.1 General

This annex presents specific examples of performance indicators developed in accordance with the assessment criteria contained in Clause 6 and the methodology presented in Clause 8. The performance indicators should be used to assess the performance of the service against the objectives set in accordance with users' needs and expectations included in Clause 4.

Some of the assessment criteria listed in Clause 6 for service to users require some qualitative assessment or estimation of data. Even though the principles of performance indicator use are contrary to the use of estimated data, when necessary, these estimated data should be obtained in a systematic way and in agreement with all the stakeholders involved in the assessment process.

The examples given below are not exhaustive. Other similar examples of performance indicators could be developed or found in other references (e.g. see References [11], [12]) for application of this International Standard. Performance indicators are sensitive to local conditions and need to be adapted. The performance indicators in this annex are offered as examples only and should not be used without confirmation of their relevance and applicability.

The interpretation of the performance indicators should refer to the context information, which includes the characteristics of the system and the region.

B.2 Access to drinking water services

Performance indicator: population per public tap or standpipe (persons/tap)

Definition: resident population served by the water undertaking through public taps or standpipes per number of public taps and standpipes

Processing rule: $I_{\mathrm{QS9}} = \dfrac{F_3}{F_8}$

where

I_{QS9} is the performance indicator of population per public tap or standpipe, in persons/tap

F_3 is the number of persons served by public taps or standpipes

F_8 is the number of public taps and standpipes

Comment: This indicator is assessed for a reference date. This indicator is relevant only for developing regions where a significant part of the supply is provided by public taps and standpipes.

IWA code: QS9

B.3 Provision of the service

B.3.1 Time to establish new service provisions

Performance indicator: new connection efficiency (days)

Definition: total time spent for establishing new connections during the assessment period/number of new connections installed during the assessment period

Processing rule: $I_{\mathrm{QS23}} = \dfrac{F_9}{F_{10}}$

where

I_{QS23} is the performance indicator of new connection efficiency, in days

F_9 is the new connections establishment time, in days

F_{10} is the number of new connections established

Comment: This indicator should not be assessed for periods shorter than one year, since this may lead to misleading conclusions. If a shorter assessment period cannot be avoided, special care is required in interpreting results. External comparisons on such time bases shall be avoided. This indicator refers to new contracts, when service connections already exist.

IWA code: QS23

B.3.2 Repairs

B.3.2.1 Interruptions per connection

Performance indicator: interruptions per connection (number/1 000 connections/year)

Definition: [(total number of interruptions during the assessment period × 365)/
(assessment period × number of service connections)] × 1 000

Processing rule: $I_{\mathrm{QS14}} = \dfrac{D_{36} \times 365}{H_1 \times C_{24}} \times 1\ 000$

where

I_{QS14} is the performance indicator of interruptions per connection, in number/1 000 connections/year

C_{24} is the number of service connections

D_{36} is the number of service interruptions

H_1 is the assessment period, in days

Comment: This indicator should not be assessed for periods shorter than one year, since this may lead to misleading conclusions. If a shorter assessment period cannot be avoided, special care is required in interpreting results. External comparisons on such time bases shall be avoided.

IWA code: QS14

B.3.2.2 Average interruption time

Performance indicator: average interruption time (days)

Definition: average duration of all interruptions taking place during the assessment period

Processing rule: total time of interruptions during the assessment period (in days)/total number of interruptions during the assessment period

Comment: This indicator should not be assessed for periods shorter than one year, since this may lead to misleading conclusions.

B.3.3 Price of service

Performance indicator: affordability of connection charges (%)

Definition: price of a new service connection in an area requiring network extension with respect to the average income in the area.

Processing rule: (price of a new connection to the service in an area requiring network extension/average monthly household income in the area) × 100 %

Comment: The procedure to estimate the monthly household income in the area should be clearly specified beforehand and in agreement with all the stakeholders involved.

B.3.4 Quantity of drinking water supply

Performance indicator: time with water use restriction in place (%)

Definition: percentage of time each year where a voluntary or legally enforceable water use restriction was in place

Processing rule: [days during a year when a voluntary water use restriction was in place (number) + days during the year when a legally enforceable water use restriction was in place (number)] × (100/365)

Comment: The figure 365 should be replaced by 366 when the year is a leap year. Only water use restrictions that are due to insufficient water quantity at source should be included in the calculation of this performance indicator. Water utilities may choose to indicate voluntary and legally enforceable restrictions with separate performance indicators.

B.3.5 Drinking water quality

Performance indicator: quality of supplied water (%)

Definition: (total number of treated water tests complying with the applicable standards or legislation during the assessment period/total number of tests of treated water carried out during the assessment period) × 100 %

Processing rule: $I_{QS18} = \frac{\left(D_{62} + D_{63} + D_{64} + D_{65}\right)}{D_{51}} \times 100\,\%$

where

I_{QS18} is the performance indicator of the quality of supplied water, in percent

D_{51} is the number of treated water quality tests carried out

D_{62} is the number of complying aesthetic tests

D_{63} is the number of complying microbiological tests

D_{64} is the number of complying physical-chemical tests

D_{65} is the number of complying radioactivity tests

Comment: This indicator may be assessed for periods shorter than one year, but special care is required in interpreting results when used for both internal or external comparisons.

IWA code: QS18

B.3.6 Aesthetic aspects of water

Performance indicator: water quality complaints (%)

Definition: (number of water quality complaints during the assessment period/number of service complaints during the assessment period) × 100 %

Processing rule: $I_{QS30} = \frac{F_{18}}{F_{15}} \times 100\,\%$

where

I_{QS30} is the performance indicator of water quality complaints, in percent

F_{15} is the number of service complaints

F_{18} is the number of water quality complaints

Comment: This indicator may be assessed for periods shorter than one year, but special care is required in interpreting results when used for both internal or external comparisons.

IWA code: QS30

B.3.7 Pressure of drinking water supply

Performance indicator: pressure complaints (%)

Definition: (number of pressure complaints during the assessment period/number of service complaints during the assessment period) × 100 %

Processing rule: $I_{QS28} = \frac{F_{16}}{F_{15}} \times 100\,\%$

where

I_{QS28} is the performance indicator of pressure complaints, in percent

F_{15} is the number of service complaints

F_{16} is the number of pressure complaints

Comment: This indicator may be assessed for periods shorter than one year, but special care is required in interpreting results when used for both internal or external comparisons.

IWA code: QS28

B.3.8 Continuity of drinking water supply

B.3.8.1 Continuity of supply

Performance indicator: continuity of supply (%)

Definition: [number of hours when the system is pressurised during the assessment period/ (24 × assessment period)] × 100 %

Processing rule: $I_{QS12} = \frac{H_2}{H_1 \times 24} \times 100\,\%$

where

I_{QS12} is the performance indicator of continuity of supply, in percent

H_1 is the assessment period, in days

H_2 is the time system is pressurized, in hours

Comment: This indicator should not be assessed for periods shorter than one year, since this may lead to misleading conclusions. If a shorter assessment period cannot be avoided, special care is required in interpreting results. External comparisons on such time bases shall be avoided. This indicator is relevant for intermittent supply systems. Interruptions due to unplanned system failures, on-going repair, or rehabilitation works shall not be accounted for by this indicator. When there are subsystems supplied in different periods, the indicator shall be assessed individually for each subsystem and the result is a weighted average using the number of service connections of each subsystem as weighting factor.

IWA code: QS12

B.3.8.2 Frequency of delivery of drinking water in non-network systems

Performance indicator: frequency of delivery of drinking water in non-network systems (number/day)

Definition: frequency of delivery of water in non-network systems

Processing rule: number of water deliveries per user in a year/365 days

Comment: This performance indicator can only be used in non-network systems where the service is delivered to the user. The figure of 365 should be replaced by 366 where the year is a leap year.

B.3.9 Coverage and availability of drinking water services

B.3.9.1 Population coverage

Performance indicator: population coverage (%)

Definition: (resident population served by the water utility/total resident population) × 100 %

Processing rule: $I_{\mathrm{QS3}} = \frac{F_1}{E_5} \times 100\,\%$

where

I_{QS3} is the performance indicator of population coverage, in percent

E_5 is the resident population, in number of persons

F_1 is the resident population served, in number of persons

Comment: This indicator is assessed for a reference date.

IWA code: QS3

B.3.9.2 Distance from waterpoints to households

Performance indicator: distance from waterpoints to households (m)

Definition: summation for all water points of the distance between each water point and the farthest household served by it over the total number of water points

Processing rule: total distance from water points to households/total number of water points

Comment: This indicator is assessed for a reference date. Water points refer to consumption points where one or more public taps or standpipes are located. This indicator is relevant only for developing regions where a significant part of the supply is provided by public taps and standpipes.

B.3.10 Coverage and availability of wastewater services

Performance indicator: resident population connected to sewer system (%)

Definition: (resident population connected to the sewer systems managed by the utility/resident population) × 100 %, at the reference date

Processing rule: $I_{\mathrm{wQS1}} = \frac{w_{\mathrm{E4}}}{w_{\mathrm{E1}}} \times 100\,\%$

where

I_{wQS1} is the performance indicator of resident population connected to sewer system, in percent

w_{E1} is the resident population, in number of persons

w_{E4} is the population connected to sewer system, in number of persons

IWA code: wQS1

B.3.11 Property flooding by wastewater

B.3.11.1 Flooding of properties from combined sewers in wet weather

Performance indicator: flooding of properties from combined sewers in wet weather (number/1 000 properties/year)

Definition: [(number of properties affected by flooding from combined sewers in wet weather, during the assessment period × 365)/(assessment period × number of connected properties at the reference date)] × 1 000

Processing rule: $I_{\mathrm{wQS13}} = \frac{w_{\mathrm{F5}} \times 365}{w_{\mathrm{H1}} \times w_{\mathrm{C28}}} \times 1\ 000$

where

I_{wQS13} is the performance indicator of flooding of properties from combined sewers in wet weather, in number/1 000 properties/year

w_{C28} is the number of connected properties

w_{F5} is the number of wet weather flooding of properties from combined sewers

w_{H1} is the assessment period, in days

Comment: This PI may be assessed for periods shorter than one year, but it is recommended that it be used only where data for the variables have been collected for at least a year. Where it has been used for shorter time periods, special consideration is required when used for comparisons, either internal or external to the utility.

IWA code: wQS13

B.3.11.2 Interruption of wastewater collection and transport services

Performance indicator: interruption of wastewater collection and transport services (%)

Definition: (sum, for the assessment period, of the number of properties affected by service interruption multiplied by the respective duration of interruptions in hours)/(number of connected properties at the reference date × 24 × assessment period) × 100 %

Processing rule: $I_{\mathrm{wQS15}} = \dfrac{w_{\mathrm{F7}}}{\left(w_{\mathrm{C28}} \times 24 \times w_{\mathrm{H1}}\right)} \times 100\,\%$

where

I_{wQS15} is the performance indicator of interruption of wastewater collection and transport services, in percent

w_{C28} is the number of connected properties

w_{F7} is the sum, for the assessment period, of the number of properties affected by service interruption multiplied by the respective duration of interruptions, in hours

w_{H1} is the assessment period, in days

Comment: This indicator may be assessed for periods shorter than one year, but special consideration is required when used for comparisons, either internal or external to the utility.

IWA code: wQS15

B.4 Contract management and billing

B.4.1 Availability of a clear service agreement

Performance indicator: service agreement complaints and queries (number/customer/year)

Definition: (number of service agreement complaints and queries during the assessment period × 365)/(assessment period × number of registered users)

Processing rule: analogue to IWA's QS32 (see B.4.2)

B.4.2 Accuracy of billing

Performance indicator: billing complaints and queries (number/customer/year)

Definition: (number of billing complaints and queries during the assessment period × 365)/ (assessment period × number of registered customers)

Processing rule: $I_{\mathrm{QS32}} = \dfrac{F_{20} \times 365}{H_1 \times E_{10}}$

where

I_{QS32} is the performance indicator of billing complaints and queries, in number/customer/year

E_{10} is the number of registered customers

F_{20} is the number of billing complaints and queries

H_1 is the assessment period, in days

IWA code: QS32

B.4.3 Response to billing complaints

Performance indicator: timely resolution of billing complaints (%)

Definition: percentage of the total number of billing complaints that are resolved within the maximum time specified in a local service commitment

Processing rule: [billing complaints made in a calendar period that were resolved within the time specified to the user in a local service commitment (number)/billing complaints made in the calendar period (number)] × 100 %

B.4.4 Clarity of billing

Performance indicator: clarity of the bill complaints and queries (number/customer/year)

Definition: (number of complaints and queries regarding the clarity of the bill during the assessment period × 365)/(assessment period × number of registered users)

Processing rule: analogue to IWA's QS32 (see B.4.2)

B.4.5 Methods of payment

Performance indicator: distance from payment points to households (m)

Definition: summation for all payment points, of the distance between the payment point and the farthest household covered by it/total number of payment points

Processing rule: total distance from payment points to households/total number of payment points

Comment: This indicator is assessed for a reference date. Payment points refer to locations where a payment for the service can be made. This indicator is relevant only for regions where alternative methods of payment are not well developed.

B.5 Promoting a good relationship with the users

B.5.1 General

B.5.1.1 Existence of a participation scheme with users

Performance indicator: existence of a participation scheme with users (yes/no)

Processing rule: is there a scheme in which users can participate in the governance of the service? (yes/no)

B.5.1.2 Customer service personnel

Performance indicator: customer service personnel (%)

Definition: (number of full time equivalent employees dedicated to accounting and control and to customer relations and management activities/number of full time employees of the water utility) × 100 %

Processing rule: $I_{\mathrm{Pe6}} = \frac{B_5}{B_1} \times 100\,\%$

where

I_{Pe6} is the performance indicator of customer service personnel, in percent

B_1 is the number of total personnel

B_5 is the number of customer service personnel

Comment: This indicator is assessed for a reference date.

IWA code: Pe6

B.5.2 Written contacts

Performance indicator: response to written complaints (%)

Definition: (number of written responses within the target time during the assessment period/number of written complaints during the assessment period) × 100 %

Processing rule: $I_{\mathrm{QS34}} = \frac{F_{22}}{F_{23}} \times 100\,\%$

where

I_{QS34} is the performance indicator of response to written complaints, in percent

F_{22} is the number of written responses

F_{23} is the number of written complaints

Comment: This indicator may be assessed for periods shorter than one year, but special care is required in interpreting results when used for both internal and external comparisons. This indicator is applicable in case there is a Guaranteed Standards Scheme.

IWA code: QS34

B.5.3 Telephone contacts

Performance indicator: telephone contacts answered on time (%)

Definition: percentage of the total number of telephone contacts from users that were answered by a person qualified to deal with the contact issue within the specified time

Processing rule: [telephone contacts from users in a calendar period that were dealt with by a person qualified to deal with the contact issue within the maximum time stated in a local service commitment (number)/user telephone contacts made in the calendar period (number)] × 100 %

Comment: Times should be measured from the point of first telephone contact by the user.

B.5.4 User visits to the office of the water utility

Performance indicator: visits to the water utility assisted on time (%)

Definition: percentage of the total number of users visiting an office of the water utility who were assisted within an advertised time

Processing rule: [visitors to the office in a calendar period who were assisted within the advertised time (number)/user visitors to the office in the calendar period (number)] × 100 %

Comment: Measurement may take the form of a waiting time response slip completed by user visitors to the office. Individual performance indicators may be measured for each office of the water utility in which case the overall performance indicator could be the weighted average of the percentages for the offices weighted by the number of users in the geographic area served by the office.

B.5.5 Visits to the user

Performance indicator: clarity of the bill complaints and queries (number/customer/year)

Definition: (number of clarity of the bill complaints and queries during the assessment period × 365)/(assessment period × number of registered customers)

Processing rule: analogue to IWA's QS32 (see B.4.2)

B.5.6 Complaints and requests

Performance indicator: complaints and requests resolved on time (%)

Definition: percentage of the total number of user complaints and requests that were resolved within the time notified to the user

Processing rule: [complaints and requests made in a calendar period that were resolved within the time notified to the user (number)/complaints and requests made in the calendar period (number)] × 100 %

Comment: Time should be measured from the moment when the water utility receives the complaint or request until the complaint or request is resolved. This form of performance indicator could be adapted to measure performance where the complaint or request is made by specific methods such as in written form, by telephone, by e-mail or by facsimile.

B.5.7 Notification on restrictions and interruptions

Performance indicator: notification period of planned restrictions and interruptions (days)

Definition: average notification period to the user (by the most appropriate method) in days for planned restrictions and interruptions

Processing rule: [total number of days of notification given to users in the case of a planned restrictions or interruptions in a year (days)/number of notifications of planned restrictions and interruptions given to users in a year (number)]

Comment: Average notification time below the minimum period specified in the local service commitment indicates less than satisfactory performance and average notification equal to or greater than the minimum period specified in the local service commitment indicates satisfactory performance (on average).

B.5.8 Availability of service information

Performance indicator: coverage of service information (%)

Definition: percentage of service users, which are able to access information regarding the service

Processing rule: (estimated number of users which can potentially access the information made available on the service/total number of users of the service) × 100 %

Comment: This performance indicator always depends on estimates of target audiences for a certain communication channels. Its calculation should be made in a realistic manner (a website is potentially accessible by 100 % of the population, but only those with access to the Internet and the necessary knowledge can visit it). The procedure to estimate the number of users that can access the information should be clearly specified beforehand and in agreement with all the stakeholders involved.

B.5.9 Community activities

Performance indicator: users involved directly in activities with the drinking water or wastewater service (%)

Definition: percentage of users that are involved directly in activities with the drinking water or wastewater service in a year

Processing rule: (number of users that are involved directly in activities with the drinking water or wastewater service in a year/population in the area which is responsibility of the service) × 100 %

B.5.10 Participation of the users

Performance indicator: rights for participation of the users (yes/no)

Definition: existence of a legal framework or collective agreements to establish users' participation in the governance of the service

Processing rule: presence of legal framework or collective agreements to establish users' participation (yes/no)

B.6 Protection of the environment

B.6.1 Sustainable use of natural resources

Performance indicator: reactive energy consumption (%)

Definition: (reactive energy consumption for pumping during the assessment period/total energy consumption for pumping during the assessment period) × 100 %

Processing rule: $I_{\text{Ph6}} = \frac{D_4}{D_1} \times 100\,\%$

where

I_{Ph6} is the performance indicator of reactive energy consumption, in percent

D_1 is the pumping energy consumption, in kWh

D_4 is the reactive energy consumption, in kVAr

Comment: This indicator may be assessed for periods shorter than one year, but special care is required in interpreting results when used for both internal or external comparisons. Reactive energy is normally expressed in kVAr and the energy consumption in kWh. However, they are equivalent and their ratio is adimensional.

IWA code: Ph6

B.6.2 Wastewater treatment

Performance indicator: WWTPs compliance with discharge consents (%)

Definition: percentage of the population equivalent (if applicable) that is served by wastewater treatment plants that comply with the applicable discharge consents

Processing rule: [population equivalent that is served by wastewater treatment plants complying with applicable standards (number)/population equivalent served by wastewater treatment plants managed by the utility (number)] × 100 %

Comment: Each relevant authority should establish legislated requirements for safe discharge consents from WWTP into the environment and use acceptable methods of measurement. Discharge consents refer to the effluent quality standards that apply. The compliance is assessed regarding the loads or concentrations and their potential environmental impacts. This indicator should normally be assessed for one-year period. It may also be assessed for periods shorter than one year, but special care is required in interpreting results when used for internal or external comparisons.

B.6.3 Environmental impact

Performance indicator: existence of an environmental management system (yes/no)

Definition: is there an environmental management system implemented within the service? (yes/no)

B.7 Safety and emergency management

Performance indicator: existence and regular testing of an emergency plan (including prevention measures) (yes/no)

Definition: is there an emergency plan (including prevention measures) and is it regularly tested? (yes/no)

Annex C
(informative)

Example of confidence-grading scheme for performance indicators systems

The quality of input data should be assessed in terms of the reliability of the source and of the accuracy of data. The reliability of the source accounts for uncertainties in how reliable the source of the data may be, i.e. the extent to which data source yields consistent, stable and uniform results over repeated observations or measurements under the same conditions each time. The accuracy accounts for measurement errors in the acquisition of input data.

NOTE 1 No measurement device is completely accurate, and some of the data for use in assessing the performance indicators may have been obtained by less accurate methods.

NOTE 2 Old records can be reliable in terms of depicting the current situation of assets.

Practice shows that, in general, data providers do not have detailed information on reliability and accuracy, but are able to provide informed estimates, if broad bands are adopted. An example of possible data accuracy bands is given in Table C.1.

Table C.1 — Example of data accuracy bands

Accuracy band %	Associated uncertainty
0 to 5	Better than or equal to ± 5 %
5 to 20	Worse than ± 5 %, but better than or equal to ± 20 %
20 to 50	Worse than ± 20 %, but better than or equal to ± 50 %
> 50	Worse than ± 50 %

An example of possible bands for the reliability of the source is given in Table C.2.

Table C.2 — Example of data source reliability bands

Reliability band	Definition
★★★	Highly reliable data source: data based on sound records, procedures, investigations or analyses that are properly documented and recognized as the best available assessment methods.
★★	Fairly reliable data source: worse than ★★★, but better than ★.
★	Unreliable data source: data based on extrapolation from limited reliable samples or on informed guesses.

For instance, a variable measured with an estimated uncertainty of ± 12 % and from a highly reliable source will have a confidence grade of [5 % to 20 %/***].

Data source reliability and data accuracy should be assessed for every input variable.

Clearly, a [0 % to 5 %/***] confidence grade can be achieved for some input variables, although it may not be generally attainable for every variable. Utilities should aim for a grade of at least [5 % to 20 %/**].

Confidence grades can only be estimated directly for the variables. Based on these, uncertainty assessment of the resulting PI should be assessed as well, either quantitatively or, at least, qualitatively. Quantitative assessment should be based on the uncertainty propagation theory, in accordance with the *Guide to the expression of uncertainty in measurement (GUM)*[9].

Confidence grades should be assessed for every water service and for every indicator. To make it possible for comparisons to be carried out between services, confidence grades should be chosen appropriately and applied consistently.

Bibliography

[1] ISO 5725-1:1994, *Accuracy (trueness and precision) of measurement methods and results — Part 1: General principles and definitions*

[2] ISO 9000:2005, *Quality management systems — Fundamentals and vocabulary*

[3] ISO 9001, *Quality management systems — Requirements*

[4] ISO 10002, *Quality management — Customer satisfaction — Guidelines for complaints handling in organizations*

[5] ISO 14001: 2004, *Environmental management systems — Requirements with guidance for use*

[6] ISO 14031:1999, *Environmental management — Environmental performance evaluation — Guidelines*

[7] ISO 24511, *Activities relating to drinking water and wastewater services — Guidelines for the management of wastewater utilities and for the assessment of wastewater services*

[8] ISO 24512, *Activities relating to drinking water and wastewater services — Guidelines for the management of drinking water utilities and for the assessment of drinking water services*

[9] *Guide to the expression of uncertainty in measurement (GUM),* BIPM, IEC, IFCC, ISO, IUPAC, IUPAP, OIML, 1993, corrected and reprinted in 1995

[10] OECD works on “Core sets of indicators for environmental performance reviews”, OCDE/GD (93) 179 Paris 1993

[11] IWA Performance Indicators for Wastewater Services; Manual of Best Practice Services (MBP), ISBN 1900222906, 174 p.; MATOS, M. R.; ASHLEY, R.; CARDOSO, M. A.; DUARTE, P.; MOLINARI, A.; SHULZ, A; London; 2003;

[12] IWA Performance Indicators for Water Supply Services — Second Edition, Manual of Best Practice Series, IWA Publishing, London, ISBN: 1843390515, 305 p; Alegre, H.; Baptista, J.M.; Cabrera JR., E., Cubillo, F.; Duarte, P.; Hirner, W.; Merkel, W.; Parena, R.; 2006.

[13] NF P 15-900-1, *Local public services — Guidelines for service activities relating to drinking water supply and sewerage — Part 1: User services,* AFNOR, *Paris, 2000*

[14] JWWA Q 100, *Guidelines for the management and assessment of a drinking water supply service,* Japan Water Works Association, 2005

[15] AWWA, 2005. *Benchmarking Performance Indicators for Water and Wastewater Utilities: Survey Data and Analyses Report,* American Water Works Association, Denver, CO.

ICS 03.080.30; 13.060.20; 13.060.30

Price based on 62 pages