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

Activités relatives aux services de l'eau potable et de l'assainissement — Lignes directrices pour le management des services publics de l'assainissement et pour l'évaluation des services fournis

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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 24511 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 24511 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 21st 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 ISO 24510 (**service**-oriented), this International Standard and ISO 24512 (both **management**-oriented).

ISO 24510 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.**

This International Standard 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 24510 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 24510 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 24510 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 24510 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 24510 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 24510 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 24510 and ISO 24512 is voluntary, in accordance with ISO rules.

This International Standard, ISO 24510 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 24510 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 24510 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 24510 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.

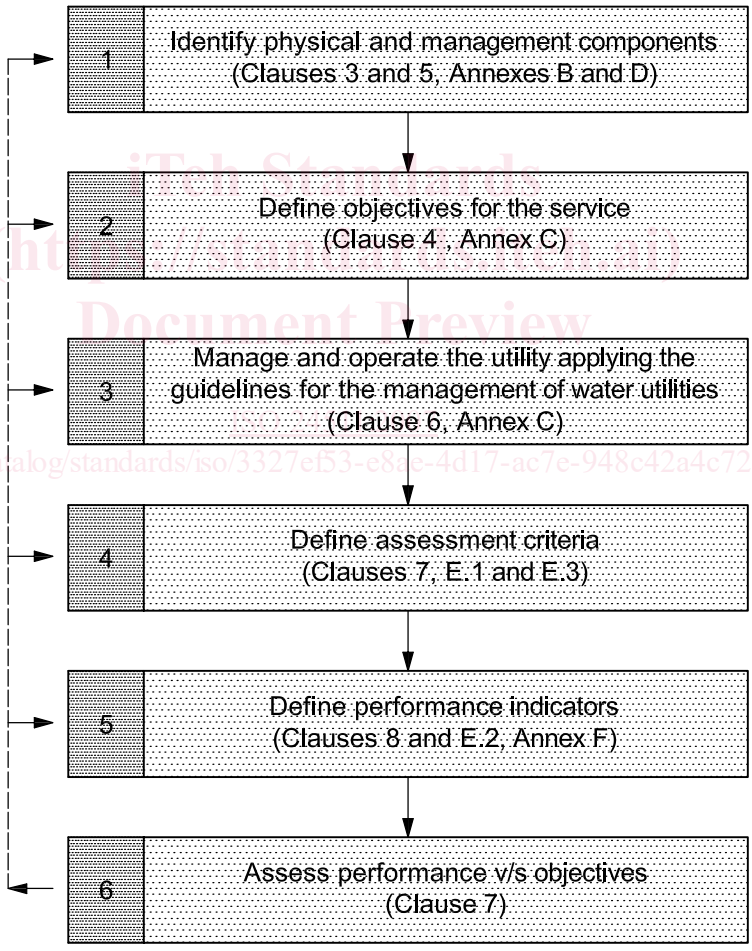

Figure 1 — Content and application of this International Standard

0.4 Wastewater services

Wastewater systems are built and operated mainly to protect public health and the **environment**. The type of **wastewater system** needs to be chosen and adapted in context with the density of the population, climatic conditions, environmental **requirements** for treatment and the technical/socio-economical ability of the **responsible body** to implement it, operate it and maintain it. It needs to be cost effective and sustainable, as well as permitting phased development to overcome the financial constraints while not compromising the stated objectives.

Operationally, the broad objectives of a utility are to provide **wastewater** collection **services** on a continuous or at least intermittent basis (depending on the service mechanism chosen), meeting the related capacity **requirements**. Methods of **wastewater** treatment and/or disposal need to correspond to the chosen collection system.

Appropriately treated **wastewater** is eventually returned to the **environment** and can have significant impact on both quantity and **quality** of natural water resources.

Effective and safe management of **residues** resulting from **wastewater** treatment, including their final disposal or reuse, is becoming increasingly important due to concerns about both environmental protection and resource conservation.

Since it often has a lifetime stretching over several human generations, **wastewater infrastructure** needs to demonstrate intergenerational equity. Consequently, a **wastewater utility**, regardless of ownership, is public in nature and will be subject to public scrutiny and policy. Other criteria, such as cost/**affordability** and **service** sustainability, are addressed in appropriate clauses of this International Standard.

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

1 Scope

This International Standard provides guidelines for the management of wastewater utilities and for the assessment of wastewater services.

This International Standard is applicable to publicly and privately owned and operated wastewater utilities, but does not favour any particular ownership or operational model.

NOTE 1 Wastewater is always generated when water is used or consumed. Accordingly, sources of wastewater can be residential, industrial, commercial or institutional. Collected storm water or (melted) snow can also be considered as wastewater, as it often carries contaminants and pathogens picked up from air or ground surfaces on its way to a collection system. In certain circumstances, especially in undeveloped areas, sanitary waste is collected in an undiluted form.

This International Standard addresses wastewater systems in their entirety and is applicable to systems at any level of development (e.g. pit latrines, on-site systems, networks, treatment facilities).

The following are within the scope of this International Standard:

— the definition of a language common to different stakeholders;

— objectives for the wastewater utility;

— guidelines for the management of wastewater utilities;

— service assessment criteria and related examples of performance indicators, all without setting any target values or thresholds.

The following are outside the scope of this International Standard:

— methods of design and construction of wastewater systems;

— regulation of the management structure and the methodology of wastewater service activities of operation and management;

— regulation of the content of contracts or subcontracts;

— topics related to the systems inside buildings, between the point-of-discharge and the point-of-collection.

NOTE 2 This International Standard, ISO 24510 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 3 The list of terms and definitions in Clause 2 is common to this International Standard, ISO 24510 and ISO 24512.

NOTE 4 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”[9].

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

