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Water reuse — Vocabulary

Réutilisation de l'eau — Vocabulaire

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 282, *Water reuse*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Water reuse is the use of treated wastewater which, in turn, can have as sources surface water, groundwater, desalinated brackish water, desalinated seawater and reuse water which can include treated wastewater, greywater, rainwater and stormwater.

With economic development, climate change, increases in population and rapid urbanization, water has become a strategic resource especially in arid and semi-arid regions. Water shortages are considered as one of the most serious threats to sustainable development of society. Although conservation can reduce per capita demand, the remaining supplies may be insufficient to meet overall water demand needs. To address these shortages, reclaimed water is increasingly being considered for use to satisfy water demands that don't require potable water quality, and this strategy has proven useful in increasing the reliability of long-term water supplies in many water-scarce areas of the world.

Reclaimed water is used to satisfy a significant proportion of the water demands in rural and urban areas in many countries including: agricultural irrigation, landscape irrigation, industrial reuse, groundwater recharge, toilet and urinal flushing, firefighting and fire suppression, ornamental water features and other various urban uses including direct and indirect potable reuse.

There is a rapidly growing market on a global scale for water reuse which inevitably demands International Standards applicable world-wide. Today, water shortage is faced in many regions of the world. The reality of water reuse and the lack of uniform and consistent water quality standards are raising concerns for human health, environmental and societal implications of water reuse across the world. Consequently there are growing needs for international standardization from supplier, user, regulator and all stakeholders. Standardization of water reuse of any kind and for any purpose will be very useful around the globe, and a coherent approach to the description of water reuse activities and the use of water reuse terminology from this document will be of benefit to all users and stakeholders.

This document provides an overview of terms and definitions relating to water reuse. The objective of this document is to ensure a coherent approach to the description of water reuse activities and the use of water reuse terminology. It is applicable to all types and sizes of water reuse facilities and systems to all types of stakeholders involved in water reuse. Its purpose is to foster mutual understanding common to the different stakeholders.

An important new concept in water reuse is the "fit for purpose" approach, which entails the production of reclaimed water to a quality that meets the needs of the intended end-uses.

This document presents terms and definitions in the following areas:

— water reuse of any kind and for any purpose;

— treated wastewater use for irrigation purposes;

— water reuse in urban areas;

— risk and performance evaluation of water reuse systems;

— water reuse for industrial purpose.

Water reuse — Vocabulary

1 Scope

This document defines terms and definitions commonly used in water reuse standards.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
advanced treatment
treatment for the removal of total dissolved solids and/or trace *constituents* (3.14) as required for specific water reuse applications (e.g. activated carbon adsorption, reverse osmosis, and advanced oxidation processes)

[SOURCE: ASANO et al., Water Reuse: Issues, Technologies, and Applications, McGraw-Hill, Metcalf & Eddy, New York, 2007 and US EPA, Guidelines for Water Reuse, 2012]

3.2
agriculture
science or practice of farming, including cultivation of the soil for the growing of crops and the rearing of animals to provide food or other products

3.3
aquifer
subsurface layer or layers of rock or other geological strata of sufficient porosity and permeability to allow either a significant flow of groundwater or the abstraction of significant quantities of groundwater

[SOURCE: Directive 2000/60/EC, Article 2, 11]

3.4
augmentation
process of using *reclaimed water* (3.63) to increase the amount of water flowing through a surface body of water or *aquifer* (3.3) (i.e. reservoir, lake, river, stream, wetland, and/or groundwater basin), for beneficial purposes

3.5
background water
freshwater (3.30) supplied for domestic, institutional, commercial and industrial use, from which *wastewater* (3.80) is generated

3.6
barrier
means that reduces or prevents the health and environmental *risks* (3.64), by preventing contact with the treated *wastewater* (3.80) and/or by improving its quality

3.7
beneficial use
water use for overall advantages which include environmental health and wellbeing to promote sustainability

EXAMPLE Municipal water supply, agricultural and urban irrigation, industrial applications, navigation, stream *augmentation* (3.4) for fish and wildlife habitat enhancement, toilet and urinal flushing, and recreational water contact.

3.8
biofilm
growth of surface attached microorganisms within their extracellular polymeric substances, which results in surface slime known as biofilm

3.9
biological stability
maintaining microbial water quality from the point of water production up to the point of consumption

[SOURCE: RITTMAN and SNOEYINK, *Achieving Biologically Stable Drinking Water*, J. AM. Water Works Assoc., 1984, **76** (10), pp.106-114, modified.]

3.10
blackwater
wastewater (3.80) originating from sanitary sources (e.g toilets, urinals, and bidets), as well as drainage from food preparation and utensil cleaning activities (e.g. kitchen sinks and dishwashers)

3.11
brackish water
water containing dissolved solids at a concentration higher than acceptable standards for intended use

Note 1 to entry: The concentration of total dissolved solids in brackish water can vary from 1 000 mg/l to 10 000 mg/l. Brackish water is less saline than sea water (1 000 to 10 000 mg/l of TDS for brackish vs up to 35 000 mg/l for sea water).

Note 2 to entry: The concentration of total dissolved solids of many brackish waters can vary considerably over space and/or time.

Note 3 to entry: See Reference[29].

[SOURCE: ISO 14046:2014, 3.1.2, modified — The words “a concentration less than that of seawater, but in amounts that exceed normally acceptable standards for municipal, domestic and irrigation uses” have been replaced by “a concentration higher than acceptable standards for intended use” in the definition, the values specified in Note 1 to entry have been modified, and Note 3 to entry has been added.]

3.12
centralized water reuse system
water reuse system typically applied on a large scale such as municipal level, and includes the entire *reclaimed water* (3.63) source, treatment, distribution, storage, and monitoring components to produce a final treated effluent for its intended uses

3.13
chemical stability
trend that all kinds of components of the treated water possibly have reactions during the water distribution, storage or use processes (e.g. deposition of calcium carbonate and the formation of *disinfection* (3.21) byproducts) and the scaling, fouling and corrosion effects on pipes and equipment to which the water is exposed (e.g. release of toxic and harmful chemicals from the surface of nonmetallic pipes, corrosion on the surface of metallic pipe)

Note 1 to entry: See Reference [27].

3.14
constituents
individual or group of physical, chemical or biological substances or matter present in water that are the target of removal, reduction or transformation in the *treatment process* (3.75)

3.15
contaminant
physical, chemical, biological or radiological substance or matter in water

Note 1 to entry: The presence of contaminants does not necessarily indicate that the water poses a *health risk* (3.35).

[SOURCE: US Environmental Protection Agency, https://www.epa.gov/ccl/definition-contaminant]

3.16
critical control point
CCP
point, step or procedure at which control can be applied and is essential to prevent or eliminate a *hazard* (3.32) or reduce it to an acceptable level

[SOURCE: ISO 5667-13:2011, 3.3, modified — The abbreviated term "CCP" has been added.]

3.17
cross-connection
actual or potential connection between a potable water system and any source or system that could or does contain *non-potable water* (3.49) or other substances that poses a public *health risk* (3.35)

3.18
decentralized water reuse system
water reuse system applied on a small scale

EXAMPLE Water reuse system which works offline from centralized system, water reuse system at private level. In this context, decentralized water reuse systems refer to specialized reuse projects for individual residential homes, clusters of homes or commercial/institutional facilities.

3.19
desalination
partial or nearly complete removal of ionic species from seawater or *brackish water* (3.11), usually to make it drinkable or usable as processing water, cooling water, or irrigation water

3.20
direct reuse
production and supply of *reclaimed water* (3.63) to a *distribution system* (3.22) via pipelines, storage tanks, and other infrastructure for reuse purposes

3.21
disinfection
process that destroys, inactivates or removes microorganisms until an appropriate level is reached

3.22
distribution system
piping network required to deliver water from a transmission pipeline to the points of connection to users' plumbing systems

Note 1 to entry: Pumping stations are included as part of the distribution system.

3.23
environment
surroundings in which an *organization* (3.50) operates, including air, water, land, natural resources, flora, fauna, humans, and their interrelationships

Note 1 to entry: Surroundings in this context range from the environment within an *organization* (3.50) to the global system in the particular geographical area that can be impacted by *water reuse* (3.23).

Note 2 to entry: Surroundings can be described in terms of biodiversity, ecosystems, climate or other characteristics.

[SOURCE: ISO 14001:2015, 3.2.1, modified — Note 1 to entry has been modified.]

3.24
environmental aspect
element or characteristic of an activity, product, or service that interacts or can interact with the *environment* (3.23)

Note 1 to entry: Environmental aspects can cause *environmental impacts* (3.25). In the case of *water reuse* (3.84), they can have either beneficial impacts or adverse impacts.

[SOURCE: ISO 14001:2015, 3.2.2, modified — The words "element of an organization's activities or products or services" have been replaced by "element or characteristic of an activity, product, or service" in the definition, Note 1 to entry has been modified and Note 2 to entry has been deleted.]

3.25
environmental impact
change to the *environment* (3.23), whether adverse or beneficial, wholly or partially resulting from one or more *environmental aspects* (3.24)

Note 1 to entry: As a rule, *water reuse* (3.84) has beneficial environmental impacts, but potential adverse impacts could also occur depending on *reclaimed water* (3.63) quality and the sensitivity of the *environment* (3.23) of concern.

[SOURCE: ISO 14001:2015, 3.2.4, modified — The words "resulting from an organization's environmental aspects" have been replaced by "resulting from one or more environmental aspects" in the definition, Note 1 to entry has been added.]

3.26
exposure assessment
estimation (qualitative or quantitative) of the magnitude, frequency, duration, route, and extent of exposure to one or more contaminated media

[SOURCE: World Health Organization (WHO), Quantitative Microbial Risk Assessment: Application for Water Safety Management, 2016]

3.27
filtration
physical separation of solid particles from water, by passing the water through a physical porous *barrier* (3.6) to trap and separate suspended solids from the water

Note 1 to entry: Examples of *barrier* (3.6) include media bed, surface or depth filter, screen, or membrane.

3.28
fodder crops
crops not for human consumption

EXAMPLE Pastures and forage, fibre, ornamental, seed, forest crops and natural grasslands.

3.29
food crops
crops for human consumption

Note 1 to entry: Food crops are often further classified according to whether the food crop is to be cooked, processed or consumed raw.

3.30
freshwater
naturally occurring water on the Earth's surface (in ice, lakes, rivers and streams) and underground as groundwater in *aquifers* (3.3)

Note 1 to entry: Freshwater includes desalinated seawater and desalinated *brackish water* (3.11)

Note 2 to entry: Freshwater excludes seawater and brackish water.

3.31
greywater
graywater
wastewater (3.80) from household baths and showers, hand basins and kitchen sinks

Note 1 to entry: Greywater includes used water from showers, bathtubs, bathroom/toilet wash basins and water from clothes washing and laundry tubs.

Note 2 to entry: Greywater excludes used water from toilets, urinals, or *wastewater* (3.80) from food waste (i.e. kitchen sinks and food waste grinders).

3.32
hazard
source or situation with a potential for harm in terms of human injury or ill health (both short and long term), damage to property, the *environment* (3.23), soil and vegetation, or a combination of these

[SOURCE: ISO 30000:2009, 3.4, modified — The words "damage to property, damage to the environment" have been replaced by "damage to property, the environment, soil and vegetation".]

3.33
hazard analysis and critical control point
HACCP
systematic methodology that recognizes and reviews the *hazards* (3.32) throughout a process and identifies *critical control points* (3.16) where preventative measures or set-points can be established and controlled to ensure product quality

Note 1 to entry: The main objective is to establish a monitoring program that can effectively manage the *risks* (3.64) of each individual system in a process, and establish effective procedures to react to excursions of *critical control points* (3.16) to ensure end-product quality.

3.34
hazard identification
process of recognizing the existence of *hazards* (3.32) and defining their characteristics

[SOURCE: ISO 21101:2014, 3.27, modified — The words "a hazard" have been replaced by "hazards".]

3.35
health risk
combination of the likelihood of occurrence of harm to health and the severity of that harm

[SOURCE: ISO 10993-17:2002, 3.8]

3.36
health risk analysis
use of available information to identify health *hazards* (3.32) and to estimate *health risk* (3.35)

[SOURCE: ISO 10993-17:2002, 3.9]

3.37
indicator microorganism
indirect measure or indicator to infer whether pathogenic (disease causing) microorganism may be present

3.38
indirect potable reuse
augmentation (3.4) of a drinking water source (surface or groundwater) with *reclaimed water* (3.63) followed by an environmental buffer that precedes drinking water treatment

[SOURCE: US EPA, Guidelines for Water Reuse, 2012]

3.39
indirect reuse
use of *reclaimed water* (3.63) after discharge in groundwater or surface water where they can be mixed with water sources before *beneficial uses* (3.7)

Note 1 to entry: Indirect *water reuse* (3.84) does not include unplanned uses.

3.40
industrial reuse
reuse of *industrial wastewater* (3.41), or the reuse of *municipal wastewater* (3.48), to satisfy industrial water requirements

EXAMPLE Cooling water from a power generation facility used for manufacturing purposes by a neighbouring industry.

Note 1 to entry: The reuse can occur within a particular industrial facility, as well as between industrial facilities of different natures.

3.41
industrial wastewater
wastewater (3.80) discharge resulting from any industrial or commercial activity

[SOURCE: EN 16323:2014, 2.1.2.8]

3.42
irrigation project
design, development, construction, selection of equipment, operation and monitoring of works to provide suitable water for irrigation

3.43
irrigation system
assembly of pipes, components, and devices installed in the field for the purpose of irrigating a specific area

3.44
landscape
visible feature of an area of land, often considered in terms of their aesthetic appeal, such as public and private gardens, parks, road vegetation including lawns and turfed recreational areas

3.45
membrane filtration
filtration (3.27) by membrane with pore size equal or less than 0,45 µm

Note 1 to entry: Membrane filtration may also be considered as *disinfection* (3.21), according to the log units of pathogen reduction that it achieves.

3.46
minimum treatment requirement
minimum treatment to be adopted to achieve the water quality requirements for protecting and maintaining the safe, reliable and stable *reclaimed water* (3.63) use

3.47
multiple barrier concept
provision of multiple safeguards to maintain finished water quality *reliability* (3.61) to the point of use

EXAMPLE Source control, redundant systems, and *treatment processes* (3.75) arranged sequentially as well as monitoring.

[SOURCE: ASANO et al., *Water Reuse: Issues, Technologies, and Applications*, McGraw-Hill, Metcalf & Eddy, New York, 2007]

3.48
municipal wastewater
water arising from any combination of domestic, commercial activities, surface runoff and any accidental sewer inflow/infiltration water

Note 1 to entry: Municipal wastewater includes collected *stormwater* (3.72) and water discharged to the *environment* (3.23) or sewer.

3.49
non-potable water
water that is not of drinking water quality according to local jurisdiction

3.50
organization
person or group of people that has its own functions with responsibilities, authorities and relationships to achieve its objectives

Note 1 to entry: The concept of organization includes, but is not limited to, sole-trader, company, corporation, firm, enterprise, authority, partnership, association, charity or institution, or part or combination thereof, whether incorporated or not, public or private.

[SOURCE: ISO 9000: 2015, 3.2.1, modified — Note 2 to entry has been deleted.]

3.51
pollutant
substance which either alone or in combination with other substances or through its products of degradation or emissions can have a harmful effect on human health or the *environment* (3.23)

[SOURCE: ISO 16000-32:2014, 3.7, modified — The words "or can lead to a reduction in the value or restriction in the use of the building" have been deleted.]

3.52
potable reuse
use of high quality *reclaimed water* (3.63) as a *raw water* (3.58) source for drinking water treatment and *distribution systems* (3.22)

3.53
potable water
water that meets applicable drinking water standards and is safe for drinking, washing, and food preparation

3.54
public health aspect
element of an organization's activities, projects or products that can interact with the public health

3.55
public health impact
change to public health, whether adverse or beneficial, wholly or partly resulting from an organization's activities, projects or products

3.56
public health parameter
quantifiable attribute of a *public health aspect* (3.54)

3.57
rainwater
water arising from atmospheric precipitation, which has not yet contacted the surface

3.58
raw water
water that is supplied to a water *treatment process* (3.75) for the purpose of removing *constituents* (3.14) that would otherwise impair its intended *beneficial use* (3.7)

3.59
receptor
defined entity that is vulnerable to the adverse effect(s) of a hazardous substance or agent

EXAMPLE Human, animal, water, vegetation, building services.

[SOURCE: ISO 11074:2015, 3.3.29]

3.60
recycled water
water which has been previously used and is then subsequently used for beneficial purposes with or without treatment prior to the subsequent use

Note 1 to entry: The terms "recycled water" is often used as a synonym for "*reclaimed water* (3.63)" or "*reuse water* (3.63)"; however, the latter two terms refer to water that has been treated, whereas "water recycling" refers to using water again for beneficial purposes with or without treatment.

3.61
reliability
<asset, process> probability that a device, system, or process will perform its prescribed function without failure for a given time when operated correctly in a specified *environment* (3.23)

[SOURCE: ISO 24512: 2007, 2.38]

3.62
restricted irrigation
irrigation of areas in which public access during irrigation with *reuse water* (3.63) can be controlled, such as some golf courses, cemeteries, and highway medians

3.63
reuse water
reclaimed water
wastewater (3.80) that has been treated to meet specific water quality for intended *beneficial use* (3.7)

3.64
risk
effect of uncertainty on objectives including the potential for adverse effects of exposure to *hazards* (3.32)

[SOURCE: ISO Guide 73:2009, 1.1, modified — The words "including the potential for adverse effects of exposure to hazards" have been added to the definition. Note 1 to 5 to entry have been deleted.]

3.65
risk analysis
process to comprehend the nature of *risk* (3.64) and to determine the level of risk

[SOURCE: ISO Guide 73:2009, 3.6.1, modified — Note 1 and 2 to entry have been deleted.]

3.66
risk assessment
overall process comprising a *risk analysis* (3.65) and a *risk evaluation* (3.68)

[SOURCE: ISO/IEC Guide 51:2014, 3.11]

3.67
risk characterization
evaluation and conclusion based on the *hazard* (3.32) identification and the exposure and effect assessment

[SOURCE: ISO 15800:2003, 3.15]

3.68
risk evaluation
process of comparing the results of *risk analysis* (3.65) with risk criteria to determine whether the *risk* (3.64) and/or its magnitude is acceptable or tolerable

[SOURCE: ISO Guide 73:2009, 3.7.1, modified — Note 1 to entry has been deleted.]

3.69
risk management
coordinated activities to direct and control an *organization* (3.50) with regard to *risk* (3.64)

[SOURCE: ISO Guide 73:2009, 2.1]

3.70
source water
wastewater (3.80) that is treated in order to generate or supply *reclaimed water* (3.63)

EXAMPLE Secondary treated wastewater, raw sanitary sewage.

3.71
stakeholder
interested party
individuals, groups, *organizations* (3.50) or agencies, with an interest in, involved in, and/or affected by water reuse activities, developments and/or decisions

3.72
stormwater
water resulting from *rainwater* (3.57), melted snow and ice draining from roofs, roads, footpaths and all other ground surfaces

Note 1 to entry: Stormwater can either be collected and stored for direct use, or collected and discharged into a sewer system or *environment* (3.23) and/or infiltrate into the soil.

3.73
surrogate parameter
quantifiable change of a bulk parameter that can measure the performance of a *treatment technology* (3.77) in removing a health or environmental *hazard* (3.32)

[SOURCE: Water Reuse Foundation. Development of Indicators and Surrogates for Chemical Contaminant Removal during Wastewater Treatment and Reclamation. 2008]

3.74
thermo-tolerant coliform
faecal coliform
coliform organism that can ferment lactose to produce acid and gas, and has the same fermentative biochemical properties at 44 °C as they have at 37 °C

Note 1 to entry: In practice, some organisms with these characteristics cannot be of faecal origin and the term "thermotolerant coliform" is, therefore, more correct and is becoming more commonly used. Nevertheless, the presence of thermotolerant coliforms nearly always indicates faecal contamination.

Note 2 to entry: See ISO 6107-7:2006 and ISO 9308-1:2014.

3.75
treatment process
unit process designed to transform the water quality by physical, biological and/or chemical means

3.76
treatment system
set of interrelated or interacting unit *treatment processes* (3.75)

3.77
treatment technology
wastewater (3.80) treatment unit process or group of integrated unit processes designed to transform the water quality by physical, biological and/or chemical means

3.78
unrestricted irrigation
irrigation of areas where public access during irrigation is not restricted

Note 1 to entry: Unrestricted irrigation often requires higher water quality than *restricted irrigation* (3.62) to deal with the *health risks* (3.35) associated with the likelihood of public contact with the *reclaimed water* (3.63).

EXAMPLE Gardens, playgrounds.

3.79
verification
verifying that requirements are met by producing objective evidence

3.80
wastewater
water arising from any combination of domestic, industrial, commercial or institutional activities, surface runoff and any sewer inflow/infiltration water and which can include collected *storm water* (3.72)

3.81
wastewater treatment plant
WWTP
facility designed to treat *wastewater* (3.80) by a combination of physical, chemical and biological processes, for the purpose of reducing the organic, inorganic and some microbial *contaminants* (3.15) in the wastewater

Note 1 to entry: There are different levels of *wastewater* (3.80) treatment, according to the desired quality of treated wastewater and the level of contamination.

3.82
water reclamation
process of treating and processing of *wastewater* (3.80) to make it suitable for *beneficial use* (3.7)

3.83
water recycling
using water again for beneficial purposes with or without treatment