International Standard

ISO 20760-1

Second edition
2025-11

Water reuse in urban areas — Guidelines for centralized water reuse system —

Part 1: Design principle of a centralized water reuse system

Réutilisation de l'eau en milieu urbain — Lignes directrices concernant les systèmes centralisés de réutilisation de l'eau —

Partie 1: Principe de conception d'un système centralisé de réutilisation de l'eau

Reference number
ISO 20760-1:2025(en)

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Published in Switzerland

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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.

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*, Subcommittee SC 2, *Water reuse in urban areas*.

This second edition cancels and replaces the first edition (ISO 20760-1:2018), which has been technically revised.

The main changes are as follows:

— added information regarding the stability evaluation and corresponding evaluation parameters;

— added information regarding the performance evaluation of typical treatment processes.

A list of all parts in the ISO 20760 series can be found on the ISO website.

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.

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Introduction

With economic development, climate change and 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. To address these shortages, reclaimed water is increasingly being used to satisfy water demands and this strategy has proven useful in increasing the reliability of long-term water supplies in many water-scarce areas.

The role of water reuse is growing for urban areas in many countries including landscape irrigation, industrial uses, toilet and urinal flushing, firefighting and fire suppression, street cleaning, environmental and recreational uses (ornamental water features, water bodies' replenishment, etc.) and vehicle washing. These centralized water reuse systems have been developed to the degree that they are now considered as an effective component of urban water management and are used in many cities and countries.

The essential components of a reclaimed water treatment system include water sources, wastewater collection systems (sewers and pumping stations), a wastewater treatment facility, a reclaimed water distribution system, reclaimed water storage, a water quality monitoring system and operation and maintenance provided by experienced and certified operators. The variable nature and diversity in source water present a challenge to ensuring water safety and reliability in each system component. A further complication to distributing the reclaimed water is that different water reuse applications can have different levels of water quality, which would consider more complex water use patterns and system models.

This document provides design principles for centralized water reuse systems in urban areas. It considers and addresses the critical issues and factors in the design of the different system components and is intended to assist water engineers, authorities, decision-makers and stakeholders in considering feasible and cost-effective approaches for safe and reliable fit-for-purpose water reuse. For details on the management of a centralized water reuse system, see ISO 20760-2. Additionally, for details on the design principles of decentralized or onsite water reuse systems in urban areas, see ISO 23056.

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Water reuse in urban areas — Guidelines for centralized water reuse system —

Part 1:
Design principle of a centralized water reuse system

1 Scope

This document provides guidelines for the planning and design of centralized water reuse systems and water reuse applications in urban areas.

This document addresses centralized water reuse systems in their entirety and is applicable to any water reclamation system component (e.g. source water, treatment, storage, distribution, operation and maintenance and monitoring).

This document provides:

— system components and possible models of a centralized water reuse system;

— design principles of a centralized water reuse system;

— common assessment criteria and related examples of water quality indicators, all without setting any target values or thresholds;

— specific aspects for consideration and emergency response.

This document excludes design parameters and regulatory values of a centralized water reuse system.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitute requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 20670, *Water reuse — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 20670 and the following apply.

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

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

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

3.1
backflow
movement of the fluid from downstream to upstream within an installation

[SOURCE: EN 1717:2000, 3.5]

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3.2
backflow protection device
device which is intended to prevent contamination of potable water by *backflow* (3.1)

[SOURCE: EN 1717:2000, 3.6]

3.3
destratification system
use of mechanical devices to reduce water column stratification and increase the vertical transfer of dissolved oxygen and heat in a tank or reservoir, in order to improve chemical water quality and to control phytoplankton growth

Note 1 to entry: Mechanical devices can include bubble plumes, draft-tube mixers or unconfined mixers.

3.4
reliability assessment
formal determination and review of the reliability of reclaimed water system components and equipment

Note 1 to entry: The assessment reviews and details the operating standards, maintainability, critical operating conditions, spare parts requirements and availability, and any other issues that affect the reliability or the treatment performance of the *water reclamation facility* (3.5).

3.5
water reclamation facility
facility for recovering reclaimed water of a quality that is suitable for beneficial use

4 Abbreviated terms

AGP	algal growth potential
AI	alkalinity index
AOC	assimilable organic carbon
BDOC	biodegradable dissolved organic carbon
BGP	bacterial growth potential
BOD	biochemical oxygen demand
CAPEX	capital expense
COD	chemical oxygen demand
HPC	heterotrophic plate count
LR	Larson ratio
LSI	Langelier saturation index
OPEX	operating expense
POU	point-of-use
RSI	Ryznar stability index
TN	total nitrogen
TP	total phosphorus
TSS	total suspended solids

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