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**Water reuse in urban areas —  
Guidelines for decentralized/  
onsite water reuse system — Design  
principles of a decentralized/onsite  
system**

*Réutilisation de l'eau en milieu urbain — Lignes directrices  
concernant les systèmes décentralisés/sur site de réutilisation de l'eau  
— Principes de conception d'un système décentralisé/sur site*



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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](http://www.iso.org/directives)).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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](http://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*.

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](http://www.iso.org/members.html).

## Introduction

With economic development, climate change, rapid urbanization and increases in population, 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 the sustainable development of society. To address these shortages, reclaimed water is increasingly being used to satisfy water demands that do not require potable water quality. This strategy has proven useful in increasing the reliability of long-term water supplies in many water-scarce areas. The applications of reclaimed water depending on the volumes of reclaimed water available include restricted or unrestricted 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 car washing.

While centralized water reuse facilities have been widely implemented under different ownership and management structures, there is also a need to develop decentralized/onsite water reuse systems in cost-effective and resource-efficient ways, which can improve flexibility and convenience. Depending on the size and scope of the system, private and community owned systems can increase the flexibility of the system to the needs of the owner(s). Decentralized/onsite water reuse systems have the advantage that they can be installed for a short-term when needed and have a lower cost than centralized systems due to sewers systems large investments. Moreover, they allow the local reuse of water and therefore increase water productivity. Compared to centralized systems, decentralized/onsite systems still involve local wastewater collection and treatment. They are considered to be much smaller with fewer people connected (single, several or tens or hundreds of households) and less costly, especially when greywater components have been separated from the blackwater for reuse. If the systems are properly situated, designed, operated and managed, they can provide substantial environmental and social benefits (e.g. reduction of freshwater consumption and wastewater generation) as well. The concentrated blackwater can be treated using several treatments (e.g. septic tanks, cesspools, soil drain fields, chemicals, bio-digesters, composting toilets and blackwater recycling systems). Decentralized/onsite water reuse systems can also be integrated into the broader centralized systems in terms of clustered or contracting schemes for decentralized technology with centralized operation.

The design of a decentralized/onsite water reuse system requires a thorough understanding taking into account of scale, system components, end use requirements and other issues. This guideline can be useful for the application of design principles as well as feasible and cost-effective approaches for safe and reliable fit-for-purpose water reuse.



# Water reuse in urban areas — Guidelines for decentralized/onsite water reuse system — Design principles of a decentralized/onsite system

## 1 Scope

This document provides guidelines for the planning, design principles and considerations of a decentralized/onsite water reuse system and water reuse applications in urban areas.

This document is applicable to practitioners and authorities who intend to implement principles and decisions on decentralized water reuse in a safe, reliable and sustainable manner.

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

This document provides:

- standard terms and definitions;
- description of system components and possible models of a decentralized/onsite water reuse system;
- design principles of a decentralized/onsite 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.

Design parameters and regulatory values of a decentralized/onsite water reuse system are out of the scope of this document.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes 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 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/>