
**Water reuse in urban areas —
Guidelines for water reuse safety
evaluation — Stability evaluation of
reclaimed water**

*Recyclage des eaux dans les zones urbaines — Lignes directrices
concernant l'évaluation de la sécurité du recyclage de l'eau —
Évaluation de la stabilité de l'eau réutilisée*



This document is a preview generated by EUS



COPYRIGHT PROTECTED DOCUMENT

© ISO 2022

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Abbreviated terms	2
5 Water quality stability	3
5.1 General	3
5.2 Evaluation principles of water quality stability	6
6 Evaluation system of water quality stability	7
7 Evaluation parameters of water quality stability	8
7.1 General	8
7.2 Single parameters	8
7.3 Composite parameters	11
7.3.1 General	11
7.3.2 Langelier saturation index (LSI)	12
7.3.3 Ryznar stability index (RSI)	12
7.3.4 Calcium carbonate precipitation potential (CCPP)	13
7.3.5 Aggressive index (AI)	13
7.3.6 Larson corrosion index (LR)	13
7.3.7 Riddick corrosion index (RI)	14
7.4 Selection principles of evaluation parameters	15
7.5 Case study of evaluation parameters selection	16
8 Evaluation parameters of water quality stability for pipeline networks	17
9 Evaluation parameters of water quality stability for equipment	17
Annex A (informative) Information on corrosion types	19
Annex B (informative) Chemical stability guidelines for water quality in urban water supply systems of some countries	20
Annex C (informative) Guidelines for water conditioning of boiler water in Japan	21
Annex D (informative) Reuse of urban recycling water — Water quality standard for industrial use in China	22
Annex E (informative) Water quality parameter limits of reclaimed water depending on specific use	24
Annex F (informative) Modification methods based on the original AOC method	25
Annex G (informative) Biological stability guideline values for AOC	26
Annex H (informative) Comparison of measurement methods for evaluation parameters of biological stability	27
Annex I (informative) Chemical stability evaluation conclusions for different composite parameters	28
Annex J (informative) Guideline values of reclaimed water used in toilet flushing	29
Annex K (informative) Guideline values of reclaimed water used for recreational purposes	30
Bibliography	31

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).

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).

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.

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.

Introduction

With economic development and population growth, the demand for water resources is steadily increasing. Combined with the exploitation and utilization of water, numerous countries and regions have faced water shortages to different degrees. Increasing efforts have been made to solve the water crisis.

Water reuse has been recognized as a low-cost and effective means to alleviate water resource shortages. Wastewater usually contains a variety of pathogens, chemical pollutants and nutrients. Traditional water treatment cannot remove all pollutants. During the long-term utilization of reclaimed water, residual pollutants will affect human health (e.g. potential health risks to the public and workers handling the reclaimed water), ecological environment (e.g. pollution of receiving water, soil) and production safety (e.g. harmful effects on equipment operation such as corrosion, scaling and fouling). Therefore, water quality stability is a prerequisite to ensure water reuse. It is necessary to monitor and manage the quality of reclaimed water to ensure a safe supply. Chemical stability and biological stability are crucial aspects of water quality stability. Water quality instability usually leads to frequent occurrences of corrosion, scaling and fouling, bacterial regrowth, increasing energy consumption and reduced service life of relevant equipment.

There are limited guidelines or regulations specifically regarding water quality stability for urban purposes of reclaimed water at a global level. For different types of reclaimed water applications, the selection of stability evaluation parameters remains controversial. Stability evaluation and management of water quality are important to ensure safe utilization of reclaimed water. It is necessary to establish a standard for comprehensively evaluating the stability of reclaimed water.

This document aims to provide guidance on water quality stability of reclaimed water and provide stability parameters and methods based on different needs and utilization of reclaimed water. This document includes:

- standard terms and definitions;
- evaluation principles of water quality stability for reclaimed water;
- evaluation parameters of water quality stability for reclaimed water;
- the selection of stability evaluation parameters for pipeline networks and equipment related to reclaimed water;
- evaluation methods of water quality stability for reclaimed water.

Critical values of evaluation parameters for water quality stability are out of the scope of this document. The ranges of different evaluation parameters are provided for reference. The water stability control or management involving the reclamation treatment and/or the distribution system management (e.g. residual disinfectant) are also out of the scope of this document.

This document provides guidance on storage, transportation and application of reclaimed water. The beneficial aspects are reduction of energy consumption, expansion of service life of equipment and reduction of operation costs.

Water reuse in urban areas — Guidelines for water reuse safety evaluation — Stability evaluation of reclaimed water

1 Scope

This document provides parameters and methods for water quality stability evaluation of reclaimed water. This document can be used in various stages of water reclamation projects including storage, transportation, application and post-assessment.

This document considers the needs and utilization of reclaimed water and is applicable to the evaluation and management of water quality stability of reclaimed water from municipal wastewater sources, including chemical stability and biological stability.

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 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

assimilable organic carbon

AOC

organic carbon which can be used by microorganisms for assimilation

[SOURCE: ISO 23070:2020, 3.1]

3.2

corrosion

physicochemical interaction between a metallic material and its environment that results in changes in the properties of the metal and that can lead to significant impairment of the function of the metal, the environment or the technical system, of which these form a part

[SOURCE: ISO 8044:2020, 3.1, modified — Note 1 to entry removed.]

3.3

critical value

boundaries of acceptable values for evaluation parameters when water quality is stable

3.4

fouling

precipitation of suspended solids, including living organisms (biofouling) and chemical substances (inorganic or organic)