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**Guidelines for performance evaluation  
of treatment technologies for water  
reuse systems —**

**Part 6:  
Ion exchange and electrodialysis**

*Lignes directrices pour l'évaluation des performances des techniques  
de traitement des systèmes de réutilisation de l'eau —*

*Partie 6: Échange d'ions et électrodialyse*



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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 3, *Risk and performance evaluation of water reuse system*.

A list of all parts in the ISO 20468 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](http://www.iso.org/members.html).

## Introduction

“Ion exchange” for purification with ion exchange resin and “Electrodialysis” for desalination and concentration with ion exchange membrane are classified as “Advanced treatment” in ISO 20468-1<sup>[4]</sup>. Raw water compositions and treated water targets are extremely diverse. Such diversity impedes making world-wide guidelines for ion exchange and electrodialysis.

Ion exchange resin (IER) provides a medium for ion exchange. Target ions in solution are trapped within the medium causing other ions contained within the medium to be released into solution. The most common applications are water softening and water purification.

Electrodialysis (ED) is an ion-separation process that utilizes an electrical potential difference across ion exchange membrane as the driving force for moving ion in a solution. The membrane is selective in that it only permits the passage of either anions or cations but not both and can be used to reject opposite charged ions.

The ISO 20468 series is intended to provide international standards for an objective evaluation of the performance of ion exchange and electrodialysis. It introduces the concepts of “Functional requirements” and “Non-functional requirements,” which are suggested and defined in ISO 20468-1, also used for other water reuse technologies that may be used in combination or alternatively, such as membrane, UV, and ozone disinfection and distillation.

# Guidelines for performance evaluation of treatment technologies for water reuse systems —

## Part 6: Ion exchange and electrodialysis

### 1 Scope

This document provides guidelines on methods for evaluating the performance of ion exchange and electrodialysis for water reuse including ion exchange resin and ion exchange membrane.

### 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, definitions, and abbreviated terms

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:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

#### 3.1 Terms and definitions

##### 3.1.1

##### **anion exchange membrane**

polymer sheet that contain positively charged functional groups in its polymer matrix designed to conduct anions while blocking other ions

##### 3.1.2

##### **anion exchange resin**

polymer beads that contain positively charged functional groups in its polymer matrix capable of undergoing exchange reactions with anions

##### 3.1.3

##### **bed**

packed layers of *ion exchange resins* (3.1.19)

##### 3.1.4

##### **block**

unit composed of *cell pairs* (3.1.8) and intermediate frame at both ends

Note 1 to entry: Cell-pairs are stacked from several pairs up to thousands of pairs inside an electrodialyser ion exchange.