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## Guidelines for wastewater treatment and reuse in thermal power plants

*Lignes directrices pour le traitement et la réutilisation des eaux usées  
dans les centrales électriques thermiques*



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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 document 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)).

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

This document was prepared by Technical Committee ISO/TC 282, *Water reuse*, Subcommittee SC 4, *Industrial 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](http://www.iso.org/members.html).

## Introduction

Global water scarcity is becoming increasingly pronounced as a result of the massive demand for water caused by population growth, public life and industrial growth. Due to the increasing cost of water and sewage disposal, wastewater reuse in thermal power plants is being initiated. The number of wastewater recycling projects in thermal power plants is increasing and water treatment and reuse technologies are being developed. Studies have shown that electric power plants account for approximately half the global industrial water withdrawal<sup>[1]</sup>, which means the problem of water shortage will be aggravated with the expansion of thermal power plants.

Although the generation of electricity from renewable sources (e.g. wind, hydro and solar photovoltaic) with almost zero water consumption is growing, the proportion of world gross electricity generated by combustible fuels still accounted for 64,1 % in 2020<sup>[2]</sup>. In addition, the wastewater from thermal power plants (power plants that generate electricity from combustible fuels) is diverse, with a high volume and complex pollutant components<sup>[3]</sup>, and its discharge poses a threat to the ecology of water environments. Therefore, the reuse of wastewater from thermal power plants has dual benefits of water saving and environmental protection.

The increasing efforts to control water scarcity and water pollution in some countries have made industrial wastewater reuse a valuable means of augmenting the existing water supply and reducing wastewater discharge to the environment. In terms of wastewater treatment and reuse in thermal power plants, the United States<sup>[4]</sup>, China<sup>[5]</sup>, Japan<sup>[6]</sup> and International Energy Agency (IEA)<sup>[7]</sup> have all introduced relevant policies to encourage wastewater reuse or even zero discharge in thermal power plants.

However, the reclaimed water quantity of wastewater in thermal power plants is not high, and the different characteristics of wastewater generated from different systems are ignored. Therefore, it is necessary to strengthen the classification and characteristic analysis of wastewater, adopt more reasonable and efficient treatment and reuse technologies in thermal power plants to optimize the reclaimed water quantity of wastewater, to realize zero liquid discharge of wastewater and to improve the benefits of water saving and environmental protection and ultimately achieve the sustainable development goals (see [www.un.org/sustainabledevelopment](http://www.un.org/sustainabledevelopment)).



# Guidelines for wastewater treatment and reuse in thermal power plants

## 1 Scope

This document specifies guidelines for wastewater treatment and reuse in thermal power plants, including the types and characteristics of wastewater and the technologies of wastewater treatment and reuse.

In this document, thermal power plant drainage systems are divided into fuel supply, chemical water treatment, boiler and auxiliary, recirculating cooling, flue gas processing, gasification scrubber and ash handling. Wastewater from these systems is classified in accordance with its system sources. In addition, technical guidelines for wastewater treatment and reuse are provided according to the water requirements of systems in the thermal power plant. This document is formulated to provide feasible technical guidance for the treatment and reuse of wastewater in thermal power plants.

It is applicable to coal-fired, oil-fired, gas-fired (including gas turbine), biomass-fired, waste incineration and integrated gasification combined cycle (IGCC) thermal power plants.

## 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 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 Terms and definitions

#### 3.1.1

##### **advanced treatment for TDS**

##### **advanced treatment for total dissolved solids**

process of further reducing the salt content in wastewater by using advanced treatment technology after pretreatment to achieve certain reuse water targets

#### 3.1.2

##### **ash handling system**

system that includes all the equipment, pipelines and monitoring devices for collecting bottom ash and fly ash from combustion or gasification of fuel in boilers and transferring it out of the power plant

#### 3.1.3

##### **boiler and auxiliary system**

system that includes primary production equipment for the combustion or gasification of fuel and other auxiliary machinery