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**Exchange of information on rare earth  
elements in industrial wastes and end-  
of-life cycled products**

*Échange de données sur les éléments de terres rares dans les déchets  
industriels et les produits en fin de vie en vue de leur recyclage*



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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 298, *Rare earth*.

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

Rare earth elements (REEs) have become essential for a wide range of industrial applications including electric vehicles, batteries, smartphones, displays, transparent lenses, optical fibre and so on. Due to these varied, important applications, REEs are referred to as “vitamins of industry”. In order to ensure the successful use of these vitamins, supply to the industry should be smooth. However, resource scarcity creates an imbalance between supply and demand. Therefore, the importance of REEs is increasingly significant. In order to overcome resource scarcity, the recycling or urban mining of industrial waste and end-of-life (EOL) cycle products is necessary.

For recyclers, it is of utmost importance to know what kind of REEs are present in the waste or scrap material, and how much can be extracted. In order to facilitate recycling, it is important to define what information is required by the recycler, and to establish a standard method of information exchange on REEs in industrial waste and EOL products.

Due to the lack of a standardized system and communication exchange mechanism between waste handlers and recyclers, the ability to recycle currently lags behind what it should be. There are many producers of the same product, but compositions and concentrations are different, which makes it difficult and complicated for recyclers to obtain exact information about the elements being recycled. Furthermore, if the producer and the recycler are located in different countries, information reliability and cross-border transaction of information exchange is problematic. Therefore, a system of information exchange between the waste handler and the recycler is needed.

This document contains a system of information exchange between waste handlers and recyclers about REEs in industrial waste and EOL products. The system of information exchange involves a data exchange mechanism such as quick response (QR) codes and radio frequency identification (RFID).



# Exchange of information on rare earth elements in industrial wastes and end-of-life cycled products

## 1 Scope

This document specifies methods of information exchange between waste handlers and recyclers for rare earth elements (REEs) contained in industrial waste and end-of-life (EOL) products. This document facilitates the efficient recycling of REEs so that dependency on mining can be reduced by promotion of REE recycling.

This document also includes a generic life cycle of the REE recycling process.

## 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 22444-1, *Rare earth — Vocabulary — Part 1: Minerals, oxides and other compounds*

ISO 22444-2, *Rare earth — Vocabulary — Part 2: Metals and their alloys*

ISO 22450, *Recycling of rare earth elements — Requirements for providing information on industrial waste and end-of-life products*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 22444-1, ISO 22444-2, ISO 22450 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/>

### 3.1

#### **industrial waste**

waste produced by industrial activity, which includes any material that is rendered useless during a manufacturing process such as that of factories and industries

Note 1 to entry: Industrial waste originates from downstream processing operations of manufacturing industries. In this document, downstream operations refer to processes during the production stages such as machining, milling, chamfering, etc.

SOURCE: ISO 22450:2020, 3.5, modified — “mining and milling operations” has been deleted from the definition and Note 1 to entry has been replaced.]

### 3.2

#### **life cycle**

consecutive and interlinked stages of a product system, from raw material acquisition or generation from natural resources to final disposal

[SOURCE: ISO 14040:2006, 3.1, modified — “of a product system” has been added.]