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Rare earth — Packaging and labelling

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

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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).

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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.

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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

The purpose of this standard is to ensure quality assurance, enhanced safety and pollution prevention during the global trade of rare earth products.

Rare earth products (ores, concentrates, compounds, metals and alloys) have some unique chemical and physical properties. For example, some rare earth products may readily react with O₂, CO₂, and moisture. Also, some rare earth products, such as monazite, may emit radiation because they contain thorium and uranium. Under certain circumstances, these features may result in accidents, or create hazards (such as an explosion, fire, down-grading the quality of products, radiation exposure, etc.) during transportation and storage. Indeed, several such incidents have been reported and emphasize the possibility of harm to human health, pollution to the environment, and a reduction in product quality. Such problems are likely to have global effects because rare earth products are transported across borders.

It is necessary to package rare earth products properly. It is also essential to share clearly defined information, in a readily accessible format, concerning their physical properties and traceability during global trade. This document provides guidelines that will ensure (1) proper packaging and (2) appropriate labelling of rare earth products. Proper packaging can prevent rare earth products from losing their quality and causing accidents resulting from unwanted chemical reactions. Appropriate labelling with precise information on the properties, traceability, and the ways of handling the product can also reduce the risk of quality degradation and accidents. Compliance with this document will contribute to ensuring quality, guaranteeing safety and preventing environmental pollution during the global trade of rare earths.

It should be noted that there are numerous existing regulations concerning the packaging, labelling, and shipment of materials and these must be recognized and complied with as appropriate. Depending on circumstances, such regulations might include:

- United Nations 2017 “Globally Harmonized System of Classification and Labelling of Chemicals (GHS)”
- United Nations 2015 “Recommendations on the Transport of Dangerous Goods”
- International Atomic Energy Agency, 2012 “Regulations for the safe transport of radioactive material: specific safety requirements. — 2012 edition”
- International Air Transport Association (IATA), 2019 “Dangerous Goods Regulations”
- International Maritime Dangerous Goods (IMDG Code)

Furthermore, local regulations concerning shipments, transport and packaging, beyond those listed above, may apply and have to be complied.

Many jurisdictions require that a Material Safety Data Sheet (“MSDS”) accompany any shipment and this requirement must be complied.

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Rare earth — Packaging and labelling

1 Scope

This document specifies requirements for packaging and labelling of rare earth ores, concentrates, compounds, metals and alloys that are intended for sale or free distribution. It defines requirements for the performance, the structure of packaging and specifies the information that the labelling shall include. These requirements will ensure quality assurance, enhance safety, and prevent environmental pollution during the transportation and storage of rare earth products.

This document includes requirements for packaging and labelling during transactions between companies. Packaging by companies during storage in their own plant is not covered, but it is recommended that they follow this standard for the purpose of quality assurance, and enhanced safety.

The method of labelling defined in this standard enhances safety by indicating properties of rare earth products and ensures appropriate management of the product by indicating the identity of suppliers.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes the 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 15750-1:2002, *Packaging — Steel drums — Part 1: Removable head (open head) drums with a minimum total capacity of 208 l, 210 l and 216,5 l* [ISO/DIS 22927](https://standards.iteh.ai/catalog/standards/sist/6baa91bf-17fa-4d51-bb22-25b843cb9e3d/iso-dis-22927)

ISO 15750-2:2002, *Packaging — Steel drums — Part 2: Non-removable head (tight head) drums with a minimum total capacity of 212 l, 216,5 l and 230 l* [ISO/DIS 22927](https://standards.iteh.ai/catalog/standards/sist/6baa91bf-17fa-4d51-bb22-25b843cb9e3d/iso-dis-22927)

ISO 15750-3:2002, *Packaging — Steel drums — Part 3: Inserted flange-type closure systems*

ISO 21067-1:2016, *Packaging — Vocabulary — Part 1: General terms*

ISO 21898:2004, *Packaging — Flexible intermediate bulk containers (FIBCs) for non-dangerous goods*

ISO 7010:2011, *Graphical symbols — Safety colours and safety signs — Registered safety signs*

ISO/WD 22444-1 Rare earth — Terms and definitions - minerals, oxides and other compounds

ISO/WD 22444-2 Rare Earth — Terms and definitions- metals and their alloys

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 21067-1, ISO/WD 22444-1, ISO/WD 22444-2 and the following apply:

3.1

supplier

company that produces and provides rare earth ores, concentrates, compounds, metals, alloys or solutions for its customer

3.2

inner packaging

container designed to come into direct contact with the product

**3.3
intermediate packaging**

packaging placed between the inner packaging and outer packaging if deemed necessary

**3.4
outer packaging**

container designed to contain inner or intermediate packaging including any protective materials where required

**3.5
protective means of packaging**

means that are applied purposely to shield/protect items/products from any physical or chemical harm and damage.

**3.5.1
protecting/shielding gas**

gas used in packaging, for example, argon or nitrogen, that will displace oxygen and water vapour and will not react with the package contents and therefore prevent product degradation.

**3.5.2
protecting liquid**

oil or other liquid used as coating on, or to totally submerge, a product to isolate it from air and ensure quality stability, usually used in packaging of rare earth target products.

**3.5.3
vacuum packaging**

method of packaging that removes air from the package prior to sealing.

**3.6
minimum packaging unit**

minimum independent packaging unit for sales and delivery, where items/products cannot be broken up.

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4 Packaging

4.1 General principles of packaging

Packaging for rare earth products should prevent the products from being accidentally dispersed or otherwise discharged into the environment and from absorbing moisture or gases. Solid rare earth metals and compounds can react with water, water vapour and other gases, causing damage to the quality of products, exothermic reaction and ignition. For these reasons, a sealed package should be used to contain solid rare earth products. Rare earth liquid products can flow out of the packaging in case of a package losing its integrity, possibly causing damage to products, workers and surroundings. For these reasons, durable packaging should be used. This document specifies requirements for packaging appropriate to the properties of the rare earth product be it an ore, concentrate, compound, metal, alloy, or solution. Recommended packaging is also noted.

Within each minimum packaging unit, products should be of the same batch, grade, specification and form. In the case of different batches of products put in the same minimum packaging unit, they should be separately packaged with clear identification to avoid mixing of products.

Packaging and transportation of rare earth materials shall follow all relevant recommendations or regulations including those of the International Atomic Energy Agency, the International Air Transport Association, the International Maritime Organization, and the United Nations.

4.2 Requirement of packaging

4.2.1 Inner (and intermediate) packaging

4.2.1.1 Polymer bottles

Polymer bottles are vessels made from polymer, having a comparatively narrow neck or mouth, with closure and usually no handle. It should have load-bearing capacity depending on the content and the polymer should be chemically compatible.

4.2.1.2 Glass bottles

Glass bottles are rigid vessels made from glass, having a comparatively narrow neck or mouth, with closure and usually no handle. It should have load-bearing capacity depending on the content.

4.2.1.3 Polymer film bags

Polymer film single-layer or double-layer bags are flexible containers made of polymer layers, generally enclosed on all sides except one, forming an opening that is sealed after filling. It should have load-bearing capacity depending on the content and should be chemically compatible.

4.2.1.4 Aluminized polymer bags

Aluminized polymer bags are flexible containers made from polymer film metallized with aluminium which reduces the permeability of the polymer film. These may be used as inner or intermediate packaging for some rare earth metals and their alloys (such as cerium and cerium alloy). It should have load-bearing capacity depending on the content and should be chemically compatible.

4.2.2 Outer packaging

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4.2.2.1 Metal drums

Metal drums are cylindrical vessels made from iron, steel, or alloys whose bottom end is permanently fixed to the body. The top end (head) is either removable or non-removable. Steel drums with a capacity of over 200L used for rare earth product packaging should meet requirements specified in ISO 15750-1, ISO 15750-2 and ISO 15750-3. Steel drums with a capacity of less than 200L used for rare earth product packaging should have load-bearing capacity depending on the content and should be chemically compatible or else an appropriate inner package used.

4.2.2.2 Polymer drums

Polymer drums are cylindrical vessels made from polymer whose bottom end is permanently fixed to the body and top-end (head) is either removable or non-removable. It should have load-bearing capacity depending on the content and should be chemically compatible or else an appropriate inner package used.

4.2.2.3 Flexible containers

Flexible containers are containers made from a flexible material, and collapsible when empty. Flexible intermediate bulk containers used for rare earth products packaging should meet requirements referred to ISO 21898:2004.

4.2.2.4 Polymer bulk containers

Polymer bulk containers are vessels made from polymer, designed to contain liquids, pastes or powders. It should have load-bearing capacity depending on the content and should be chemically compatible or an appropriate inner package used.