
**Packaging and the environment —
Optimization of the packaging system**

Emballage et environnement — Optimisation du système d'emballage

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Contents

	Page
Foreword.....	iv
Introduction.....	v
1 Scope.....	1
2 Normative references.....	1
3 Terms and definitions.....	1
4 Requirements.....	3
4.1 Application.....	3
4.2 Packaging assessment.....	3
4.3 Demonstration that the requirements of this International Standard have been met.....	4
5 Critical areas to assess when determining the achievable level for packaging optimization.....	4
Annex A (informative) Guidelines on the use of this International Standard for determining the achievable level for packaging optimization.....	5
Annex B (informative) Examples of the application of this International Standard using the checklist.....	10
Annex C (informative) Assessment and minimization of substances or mixtures hazardous to the environment.....	15
Bibliography.....	26

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 18602 was prepared by Technical Committee ISO/TC 122, *Packaging*, Subcommittee SC 4, *Packaging and environment*.

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Introduction

Packaging plays a critical role in almost every industry, every sector and every supply chain. Appropriate packaging is essential to prevent loss of goods and, as a result, decrease impact on the environment. Effective packaging makes a positive contribution towards achieving a sustainable society by, (e.g.):

- a) meeting consumers' needs and expectation for the protection of goods, safety, handling and information;
- b) efficiently using resources and limiting environmental impact;
- c) saving costs in the distribution and merchandising of goods.

An environmental assessment of packaging may include the manufacturing and distribution system, the wastage of packaging material and goods, the relevant collection systems, as well as recovery or disposal operations. This group of ISO standards and supporting reports provides a set of procedures which aim to:

- d) reduce environmental impact;
- e) support innovation in products, packaging and the supply chain;
- f) avoid undue restrictions on the use of packaging;
- g) prevent barriers and restrictions to trade.

Packaging is designed to provide a number of functions for users and producers such as: containment, protection, information, convenience, unitization, handling, delivery or presentation of goods. A major role of packaging is prevention of damage to or loss of goods. (See ISO 18601, [Annex A](#) for a list of the functions of packaging.)

ISO 18601 defines the interrelationships within the family of ISO standards which cover the environmental impact of packaging throughout its life cycle (see [Figure 1](#)). These standards will help define whether the selected packaging can be optimized and whether the packaging needs to be modified to ensure it can be reused or recovered after use.

Demonstration that the requirements of these standards are met can be performed by a first party (manufacturer or supplier), a second party (user or purchaser), or by the support of a third party (independent body).

Public claims on the environmental attributes of packaging may be addressed by different methods. Some of these are technical aspects on reuse or recovery, others relate to access by the population to reuse or recovery systems or the amount of packaging placed on the market for recovery. This series of standards addresses the technical aspects of the packaging. It does not address the requirements of ISO 14021 needed to support a claim or label.

This International Standard does not use the term “and/or” but, instead, the term “or” is used as an inclusive disjunction, meaning one or the other or both.

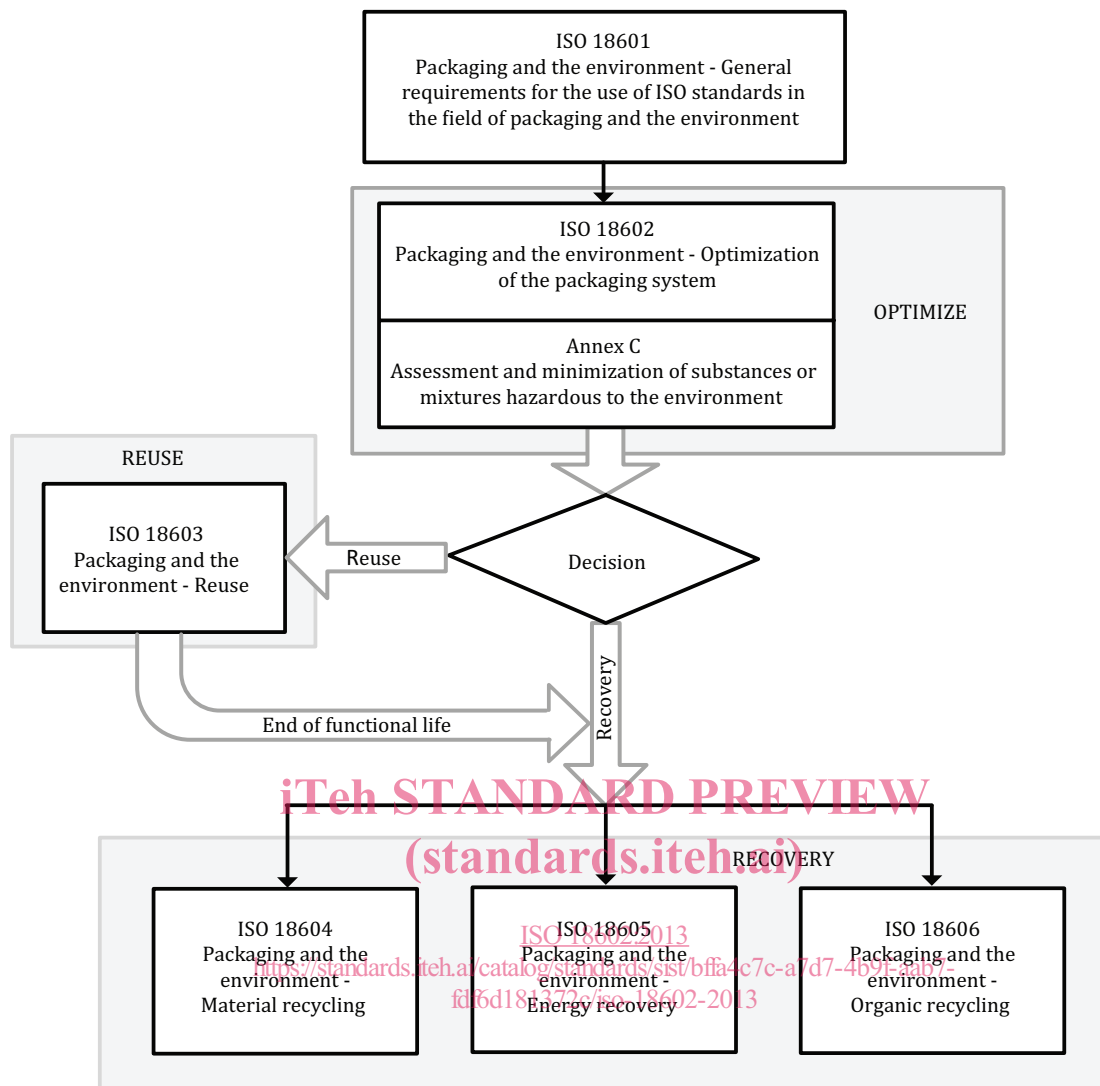


Figure 1 — Relationship of the Packaging and environment standards

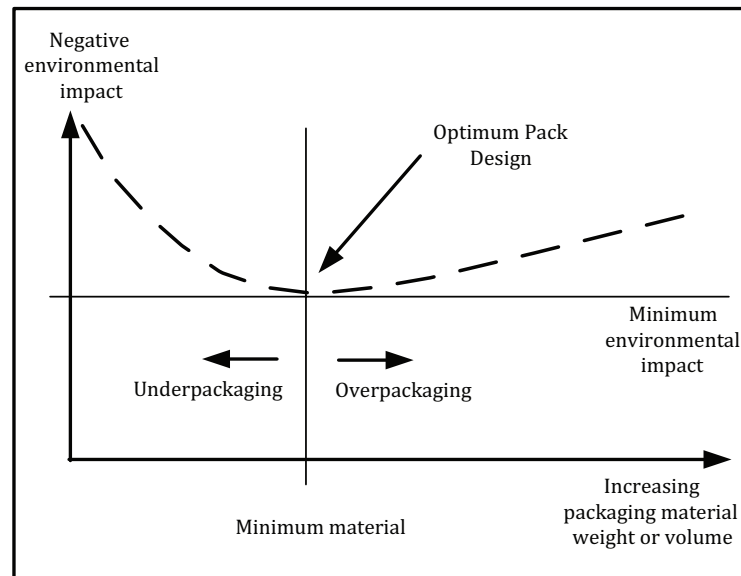


Figure 2 — Packaging optimization^[32]

The model in [Figure 2](#) illustrates how the environmental consequences of product losses caused by excessive packaging reduction are far greater than guaranteeing adequate protection through an incremental excess of packaging. (standards.iten.ai)

This International Standard presents a framework for self-assessment to determine whether the requirements of this standard have been met. Its approach is similar to that of systems standards such as the ISO 9000 series or an environmental management system such as ISO 14001.

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Packaging and the environment — Optimization of the packaging system

1 Scope

This International Standard specifies requirements and a procedure for assessment of packaging to ensure that the weight or volume of its material content is optimized consistent with the functions of packaging. This is one of several options for reducing the impact of packaging on the environment.

This International Standard also provides methodologies and procedures for

- a) determining the amount and minimization of substances or mixtures hazardous to the environment, and
- b) determining the amount of four heavy metals (lead, cadmium, mercury, hexavalent chromium) in packaging.

The potential for such substances to be released into the environment is included in the assessment. The procedures are referenced in [Annex C](#).

The process for packaging design, including material selection, is not part of this International Standard. The purpose is to help ensure and demonstrate that the packaging efficiently uses the selected material.

NOTE 1 For the purposes of this International Standard, the substitution of one packaging material by another is not a basis for packaging optimization.

NOTE 2 Packaging material optimization can include increasing the weight or volume of packaging in order to reduce loss of goods.

The procedure for applying this International Standard is contained in ISO 18601.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 18601, *Packaging and the environment — General requirements for the use of ISO standards in the field of packaging and the environment*

ISO 21067, *Packaging — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 18601, ISO 21067 and the following apply.

3.1

packaging optimization

process for the achievement of a minimum adequate weight or volume (source reduction) for meeting the necessary requirements of primary or secondary or transport packaging, when performance and user/consumer acceptability remain unchanged or adequate, thereby reducing the impact on the environment

3.2

critical area(s)

specific performance criterion/criteria which prevents further reduction of weight or volume without endangering functional performance, safety, and user/consumer acceptability

3.3

supplier

entity responsible for placing packaging or packaged goods on the market

Note 1 to entry: The term “supplier” in normal usage can relate to various points in a supply chain. For the purpose of this document it relates to any point in the supply chain where a transaction relating to packaging or packaged goods takes place

[SOURCE: ISO 18601:2012, definition 3.22]

3.4

packaging component

part of packaging that can be separated by hand or by using simple physical means

[SOURCE: ISO 18601:2012, definition 3.11]

3.5

packaging constituent

part from which packaging or its components are made and which cannot be separated by hand or by using simple physical means

[SOURCE: ISO 18601:2012, definition 3.12]

3.6

packaging system

complete set of packaging for a packaged good, encompassing one or more of the following that are applicable (depending on the packaged goods): Primary packaging, Secondary packaging, Tertiary (distribution or transport) packaging

3.7

substances

chemical elements and their compounds in the natural state or obtained by any production process, including any additive necessary to preserve stability, and any impurity deriving from the production process used, but excluding any solvent which may be separated without affecting the stability of the substance or changing its composition

3.8

mixture

preparation or solutions composed of two or more substances

3.9

safety data sheet

documentation providing comprehensive information about a substance or mixture

Note 1 to entry: The UN Globally Harmonized System (3rd revised edition) — Part 1 and Annex 4 - requires that documentation should be provided to users of the substance or mixtures and to contain the required information.

3.10

used packaging

packaging that has been used by the final consumer or end user and which is destined for reuse or recovery

3.11

packaging waste

packaging that has been used by the final consumer or end user and which is discarded for final disposal and is not intended for reuse or recovery

3.12

substances hazardous to the environment

any substances classified as presenting an environmental hazard according to the UN Globally Harmonized System for Classification and Labelling of Chemicals and its amendments (GHS), 3rd revised edition, Part 4, while meeting the criteria of labeling with the environmental hazard pictogram

Note 1 to entry: This is a general classification of substances hazardous to the environment and cannot be taken as specifically relating to substances used in packaging.

4 Requirements

4.1 Application

The application of this International Standard to any particular packaging shall be as specified in ISO 18601, *Packaging and the environment — General requirements for the use of ISO standards in the field of packaging and the environment*.

4.2 Packaging assessment

4.2.1 Determination of critical area(s)

The supplier shall evaluate the complete list of relevant criteria in [Clause 5](#) to determine the critical area[s] which will govern the achievable limit for packaging optimization. See [Annex A](#) for guidance.

The identification of at least one critical area shall be the basis of meeting the requirements of this International Standard for minimization. If no critical area has been identified the packaging does not meet the requirements of this International Standard and the potential for (further) packaging optimization is to be investigated.

NOTE As some of these critical areas can be interdependent, more than one area can, in some cases, be identified as critical for determining the minimum adequate amount of packaging.

4.2.2 Determination of presence of substances or mixtures hazardous to the environment

The supplier shall determine (with reference to the guidance provided in [Annex C](#)) whether there is a presence of substances or mixtures hazardous to the environment that are likely to be present in emissions, ash or leachate when packaging is incinerated or landfilled.

For example, the packaging manufacturer should receive from its supplier of substances or mixtures a safety data sheet as defined in 3.8.

The heading “composition/information on ingredients” should indicate the concentration or concentration range of substances or mixtures presenting an environmental hazard as outlined in [Annex C](#).

NOTE The packaging manufacturer can calculate and so measure the presence of substances or mixtures hazardous to the environment in its packaging on the basis of information associated with the packaging formulation and manufacturing process.

4.2.3 Determination of the four named heavy metals

The supplier shall determine (with reference to the guidance provided in [Annex C](#)), by means of measurement, calculation or upstream information and data whether there is a presence of any of the four named heavy metals (lead, cadmium, mercury, and hexavalent chromium) in the packaging component.

NOTE The packaging manufacturer can calculate and so measure the presence of the four named heavy metals in its packaging on the basis of information associated with the packaging formulation and manufacturing process.

4.3 Demonstration that the requirements of this International Standard have been met

The supplier shall:

- prepare on request a statement that the requirements of [4.2.1](#), [4.2.2](#), and [4.2.3](#) have been met;
- document the relevant data or other information that has been used to develop the list of relevant performance criteria and in particular to establish the nature and effects of the critical elements;
- use a checklist (examples found in [Annex B](#)) or its own documentation to demonstrate that all critical areas listed in [Clause 5](#) are covered;
- document that relevant safety data sheets and subsequent process information have been used to identify the possible presence of substances or mixtures hazardous to the environment in the packaging components and likely to be present in emissions, ash or leachate from waste management operations;
- if the presence of a substance or mixture hazardous to the environment has been identified document the relevant data and subsequent process information used to demonstrate that minimization has been achieved against the critical areas listed in [Clause 5](#), with reference to the methodology provided in [Annex C](#) of this International Standard;
- determine that the aggregate presence of the four named heavy metals (lead, cadmium, mercury, and hexavalent chromium) in packaging components has been assessed as required by national or regional regulations where the packaging is intended to be used; [Annex C](#) provides guidance as to how this can be done;
- record the results with reference to the methodology in [Annex C](#).

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5 Critical areas to assess when determining the achievable level for packaging optimization

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- protection of goods;
- packaging manufacturing process;
- packaging/filling process;
- logistics (including transport, warehousing and handling);
- presentation and marketing of goods;
- user/consumer acceptance;
- information;
- safety;
- legislation;
- other issues.

NOTE 1 Legislation and safety are examples of non-independent critical areas which have to be considered together.

NOTE 2 See Clause A.3 for description of critical areas.