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**Packaging — Accessible design —  
Handling and manipulation**

*Emballages — Conception accessible — Manutention et manipulation*

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Published in Switzerland

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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 122, *Packaging*.

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

While packages have become usable to a wide user range, including older people and people with disabilities, some users have difficulties with handling and manipulating packages. This includes holding, lifting, carrying, and grasping packages. These difficulties can be due to a heavy weight or a large size which is hard to lift or grasp for people with reduced physical abilities because of age or physical impairments. These problems, which are clearly addressing accessibility issues, should be solved with urgent attention for consumer packages to be used widely by users who have weakened or limited physical abilities.

Standards for increasing accessibility in packaging have been developed progressively for some particular issues, such as ease of opening and clear information and marking, as well as some specific cases, such as Braille on medicinal packages. While these standards have contributed effectively to make packages accessible, they still do not cover all the accessibility issues related to handling and manipulation of packages, even though the issues have been clearly addressed in the general framework of a set of accessibility standards in packaging.

This document was developed with an intention to provide requirements and recommendations with regard to handling and manipulation for increasing accessibility of packaging in the concepts and goals which are expressed in ISO/IEC Guide 71<sup>[1]</sup> and ISO/TR 22411<sup>[2]</sup>.

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# Packaging — Accessible design — Handling and manipulation

## 1 Scope

This document provides requirements and recommendations in designing consumer packages, independent of material, to increase accessibility with regard to handling and manipulation. The document considers packaging needs from a wide range of users with diverse human abilities and needs in diverse contexts of use.

Handling and manipulation include human physical abilities like holding, lifting, carrying, pulling, pushing, sliding, grasping, twisting, tearing and any combination of those actions related to portability, opening, re-closing and taking out contents of packages as well as to storage and disposal. Requirements and recommendations with regard to those abilities are provided for people with special needs including older people and people with disabilities in their handling and manipulation of packages. This document focuses on physical handling and manipulation which necessarily includes the processes of opening and closing specifically detailed in ISO 17480. It applies to reclosable and non-reclosable consumer packaging without using any other mechanical means.

This document is primarily for designers, developers and evaluators of packaging and is also useful for other disciplines.

Handling and manipulation for transportation of packaging is not covered in this standard. It does not apply to products regulated for safety or other reasons (e.g. toxic or dangerous goods and substances, medicinal products, and medical devices).

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## 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 17480, *Packaging — Accessible design — Ease of opening*

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

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 17480, ISO 21067-1 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

#### accessibility

extent to which products, systems, services, environments and facilities can be used by people from a population with the widest range of user needs, characteristics and capabilities to achieve identified goals in identified contexts of use

Note 1 to entry: Context of use includes direct use or use supported by assistive technologies.

[SOURCE: ISO 9241-112:2017, 3.15]

### 3.2

#### **reclosable package**

package which, after it has been initially opened, is capable of being reclosed with a similar degree of security and is capable of being used a sufficient number of times to dispense the total contents without loss of security

[SOURCE: ISO 8317:2015, 2.4]

### 3.3

#### **user-based evaluation**

evaluation that uses a method involving users with or without the use of measurement instruments and provides insight into the user's sensory, physical, and cognitive aspects

[SOURCE: ISO 17480:2015, 3.7]

## **4 Design considerations for increasing accessibility in handling and manipulation**

### **4.1 General**

#### **4.1.1 General considerations**

Packaging shall be designed taking into account users with physical, visual, and cognitive disabilities who have increased difficulty when handling and manipulating packaging that is likely to result in undesirable outcomes. Design items that relate to ease of carrying, opening, reclosing, measuring, take-out, storage, and disposal, shall be considered to increase accessibility to those people (see ISO 11156<sup>[18]</sup>).

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#### **4.1.2 Mapping**

The direction of movement in handling and manipulation should correspond with that shown in signs or labels.

EXAMPLE A screw-top of clockwise rotation with a label of arrow(s) showing clockwise.

#### **4.1.3 Affordance**

The action that users need for handling and manipulation of packaging should be easily understood from the design before operation.

EXAMPLE A triangle notch at the edge of packaging to show to tear off for opening.

#### **4.1.4 Feedback**

Feedback of operation in handling and manipulation of packaging should be provided in any form when possible.

EXAMPLE A click sound at reclosing.

#### **4.1.5 Avoidance of simultaneous multiple operations**

Simultaneous multiple operations such as pressing and rotating at the same time should not be used except for the case of secure safety such as child-resistance.



## 4.2 Weight and shape

### 4.2.1 Weight

Packages should be light enough to be held and lifted whether they are intended to be handled by both hands or by one hand. If packages are too heavy, mechanical assistance should be provided for ease of holding, lifting and carrying. Ergonomic knowledge and data for weight of packages are given in [Annex A](#).

NOTE Some older users or users with physical disabilities like rheumatism have difficulty in holding, lifting, and carrying of packages due to their weak muscle strength.

EXAMPLE Handle(s) attached to the side of a package for easy lifting (see [Annex A](#) and [Figure B.1](#)).

### 4.2.2 Shape

The shape of packages should be designed for ease of handling and manipulation in accordance with the types of holding, lifting, and grasping packages.

The shape of packages should be designed so that they accommodate users and situations where only one hand is available.

### 4.2.3 Grip and grip size

Non-slippery surface finish should be used for ease of handling and grasping to exert the hand and arm strength of the user effectively.

EXAMPLE 1 Grooves or dents on the side of a heavy PET bottle (see [Figure B.2](#)).

EXAMPLE 2 Dimple processed edges of a flexible bag (see [Figure B.3](#)).

The width and shape for hand-gripping should be designed for easy gripping and holding by users with the widest range of characteristics and capabilities. Ergonomic knowledge and data for grip size and grip force are given in [Annex A](#).

EXAMPLE 3 Pinched waist of a PET bottle or a cosmetic bottle (see [Figure B.4](#)).

### 4.2.4 Balance and stability

Packages should be designed well balanced in weight so that they do not tip over easily when placed on a flat surface.

NOTE 1 Users with hand tremor have difficulty in fine controlling of placing packages.

NOTE 2 Users with visual disabilities are able to touch and tip over packages unintendedly.

## 4.3 Ease of manipulation for opening and reclosing

### 4.3.1 Opening and reclosing mechanisms

Opening and reclosing mechanisms of packaging shall be easily understood and manipulated for intended actions such as grasping, pinching, rotating, twisting, tearing, pushing and pulling.

Reclosing should provide a mechanism to confirm the packaging is closed providing visual markings, tactile markings, auditory information such as a click sound, or strength limits (see ISO 17480).

#### 4.3.2 Screw-tops

A screw-top shall be easy for pinching. Its diameter should not be too small or too large. A screw-top should have a sufficient purchase or friction (see [Annex A](#)).

EXAMPLE Longitudinal grooves on a screw-top of a PET bottle (see [Figure B.5](#)).

EXAMPLE 30 mm is commonly used for the diameter of a PET bottle for drinking.

#### 4.3.3 Top seals

Packages with a top seal or a soft sheeted lid for opening should provide a tongue of suitable size for easy pinching and pulling.

#### 4.3.4 Tearing

Packaging that needs tearing off or peeling off for opening should not require fine dexterity or excessive strength for pinching and grasping to users.

EXAMPLE A large tab of a top sealed package for easy pinching to open (see [Figure B.6](#)).

#### 4.3.5 Lids

Lids of jars should be opened without the user feeling pain or discomfort. Care should be taken for appropriate torque force and height for lids as affecting factors on ease of opening of jars (see [Annex A](#)).

NOTE Torque force data are found in ISO 17480:2015, Annex C.

### 4.4 Ease of use: taking out contents

#### 4.4.1 Measured dispensing

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Packages should be designed to support measured dispensing when useful and/or required.

EXAMPLE Measured quantity dispenser (see [Figure B.7](#)).

#### 4.4.2 Prevention of splashing or spilling

Packages should be designed to assist users by preventing splashing and minimizing waste.

EXAMPLE Anti-splashing or anti-spilling bottle (see [Figure B.8](#)).

### 4.5 Storage

Accessible packages shall be designed in a shape which allows easy and efficient storage and ensures stability during storage.

EXAMPLE Milk containers of rectangular shape that fit in the refrigerator box (see [Figure B.9](#)).

### 4.6 Disposal and recycle

#### 4.6.1 Disposal and separation

Packages should be designed to enable users for easy disposal and for clear separation of material.

#### 4.6.2 Folding and crushing

Packages should be designed for easy folding and crushing after use for disposal, even for users with weak muscle strength.

EXAMPLE Paper boxes easily folded, and plastic bottles easily crushed for disposal (see [Figure B.10](#)).

### 5 Safety

#### 5.1 General

##### 5.1.1 Foolproof

Packaging should be designed so that any misuse or wrong operation cannot happen during handling and manipulation of packages.

EXAMPLE Child-resistance packaging<sup>[19]</sup>.

##### 5.1.2 Failsafe

Packaging should be designed so that the effects can be recovered to the previous state or minimized even when misuse or wrong operation happened.

EXAMPLE Child pouch cap (see [Figure B.12](#)).

#### 5.2 Specific considerations

##### 5.2.1 Sharp points or edges

Packages shall not have sharp points or harmful edges on the surface.

NOTE People with visual disabilities have a higher risk of being injured by sharp points or edges.

##### 5.2.2 Weight

Packages shall not be too heavy, to avoid unintended drop during use (see [4.2.1](#) and [Annex A](#)).

##### 5.2.3 Heat protection

Packages that are used with hot water in it, such as dried food, should have a heat protection mechanism for handling.

EXAMPLE A package with double-cup structure for foods that need reconstitution with boiled water (see [Figure B.11](#)).

### 6 Evaluation of handling and manipulation

#### 6.1 General

Accessibility of packaging handling and manipulation shall be assessed by both instrument-based and user-based evaluation. In case of direct evaluation of the user on his/her performance on handling and manipulation, the user-based based evaluation should be used even if it involves measuring instruments.

## 6.2 Instrument-based evaluation

Instrument-based evaluation can provide physical quantitative data with regard to certain attributes of handling and manipulation. The data includes size, weight, strength, torque and human muscle strength. ISO 17480:2015, Annex B, should apply for the measurement.

## 6.3 User-based evaluation

User-based evaluation enables packaging designs assessments and allows an understanding to develop of user's performance in handling and manipulation. User-based evaluation should be used in conjunction with other psychological methods, such as questionnaires and structured or unstructured interviews. The data generated by these user-based evaluations can provide insights for improved designs.

Instead of testing with the general population, a test population should be selected from those that are most sensitive based on their characteristics and capabilities in using the packaging. The result can be valid also for general populations that are less sensitive.

General information on how to set up and perform user-based evaluations can be found in ISO 17480 and the ISO 20282 series<sup>[3]</sup>.

## 7 Conformance

Conformance with this document is achieved by satisfying all the requirements. If a package is claimed to have met the requirements in this document, the procedure used to determine how they have been met shall be specified. The detail to which the procedure is specified is a matter of negotiation between the involved parties.

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