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Ergonomics — Accessible design — Controls of consumer products

Ergonomie — Conception accessible — Commandes d'entrée des produits de consommation courante

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This document was prepared by Technical Committee ISO/TC 159, *Ergonomics*, Subcommittee SC 4, *Ergonomics of human-system interaction*.

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.

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Introduction

This document deals with the accessibility requirements and recommendations for controls of consumer products based on ergonomic principles and practices.

This document serves the following user groups:

a) the consumer product designers, who apply specifications of this document during the development process when designing particular consumer products;

b) the buyers, who reference this document during the product procurement process, and whose end users gain from the potential benefits provided by this document; and

c) the customer care service staffs who give consultancy to the end users.

The ultimate beneficiaries of this document are the end users, i.e. the consumers with age or disabilities. Its application by designers, buyers, and evaluators should provide controls that are more accessible, usable, and satisfactory. Furthermore, this document widens the range of consumers as far as possible and is not limited to the ergonomic capabilities of any particular working populations. It constitutes a starting point from which to offer requirements and recommendations for accessible design of controls of most consumer products.

This document is based on current understandings of the characteristics and capabilities of individuals who have particular physical, sensory, or cognitive impairments. The intended users are consumers of everyday products with a wide range of human characteristics and capabilities engaging in the activities of daily living. People with age or disabilities do not need to be considered separately when using this document for design processes.

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This document consists of general recommendations based on extended ergonomic principles as explained above concerning the operation of various controls. The recommendations were developed primarily by reviewing the existing relevant literature and empirical evidence, then generalizing and formulating the derived or gathered knowledge into recommendations for use by designers and consumers.

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This document adopts the concepts of accessibility given in ISO/IEC Guide 71. Designers can obtain general concept of accessibility needs and design requirements in ISO/IEC Guide 71. Together with the ISO 9241-400 series, this document provides principles and requirements when designing controls regardless of their types and forms, for a wider spectrum of users, including persons with disabilities and older persons. This document also presents accessibility specifications for particular types of controls covered by other documents, for example IEC 63008.

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Ergonomics — Accessible design — Controls of consumer products

1 Scope

This document defines design principles of accessibility for controls of consumer products, so that users from a population with the widest range of user needs, characteristics and capabilities are able to use controls to operate and control consumer products in the same manner and ease as users without disabilities.

This document is applicable to all kinds and types of consumer products. This document is applicable to the controls for common main operations of consumer products such as initiation, termination, and cancellation of operation, as well as for specified functions necessary for more detailed operations and fine adjustment.

This document does not deal with controls for some specialized devices intended only for specified user populations and tasks, e.g. assistive and medical devices. Each design consideration in this document is based on ergonomic principles that are necessary for making the controls of consumer products accessible to a wider range of users.

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2 Normative references

There are no normative references in this document.

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3 Terms and definitions

For the purposes of this document, the following terms and definitions 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
accessible design
design focused on diverse users to maximize the number of potential users who can readily use a system in various contexts

[SOURCE: ISO/IEC Guide 71:2014, 2.19]

3.2
main operation
major fundamental function commonly needed to control a consumer product without detailed configuration

Note 1 to entry: Controls are differentiated in type for main operation and for function selection and value adjustment. The main functions of consumer products include start, stop, pause, and cancel operations as well as power control.

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3.3
consumer product
product that is intended to be acquired and used by an individual for personal rather than professional use

[SOURCE: ISO/TS 20282-1:2006, 3.2]

3.4
control
part of a device that is used by a user to operate or control the functions as prescribed by the usage of *consumer products* (3.3) or to adjust and select detailed operations of a function

Note 1 to entry: Typical controls of consumer products include various types of push buttons, dials, or switches.

EXAMPLE Controls of consumer products and products to which this document is applied include, but are not limited to:

— on/off button(s): turn on or off a TV, computer, fan or water purifier;

— start button: start the operation of a microwave oven;

— start/stop button(s): start or stop the operation of a rice cooker;

— start/stop/cancel button(s): start or stop or cancel of a selected program of a washing machine;

— mute button (remote control of a multimedia player): mute sound;

— key pad or dial: setting temperature of a refrigerator or air condition;

— cue/review button(s): listen to the previous or next recordings.

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3.5
control-response ratio
ratio of the movement of the control device to the movement of the result of the system response[7]

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4 Guiding principles for controls

4.1 General considerations for accessible design

Guiding principles given in this clause are generic design rules for a control or combinations of controls. For a specific control, design requirements can be derived from the principles in consideration of the relative importance for each principle, the use and the intended user population.

The guiding principles of this clause are based on the concept of accessibility as defined in ISO/IEC Guide 71. Following the rationale of this concept, a control has no intrinsic accessibility, but can only be used in a particular context.

The concept of universal design and accessible design (as defined in ISO/IEC Guide 71) concerns the extent to which equipment and products can accommodate diverse users' needs as much as possible. The ergonomic consideration for universal design and accessible design in consumer products ensures the accommodation of a wide range of users for intended use. The designer should consider a wide range of users including older persons and persons with disabilities. The required accommodation can be achieved by using any product that provides a design and functionality that meets the user’s accessibility needs in various contexts. For example, there are a variety of controls which enable users to achieve the same results by using different parts of their body (e.g. hand, foot, speech or eye control). Designers need to understand that depending on their specific needs, some users can even use a combination of different controls to achieve the same result.

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Designer should pay attention to ensuring the following so that consumers with a wide range of characteristics and capabilities can achieve a specified and intended goal for the use of the product with effectiveness, efficiency, and satisfaction.

a) Controls should be arranged in a way that can facilitate user manipulation regardless of their characteristics and physical limitations. In particular, controls for main operations should be located on the frontal surface or at the top of the product, and spatially arranged to be the first in order of functional operation.

b) Controls should be discernible based on their shape, colour, tactile point, and markings to facilitate tactile recognition for a wider range of users.

c) Only one function should be dedicated to each control. Assigning two functions into a single control increases the cognitive burden for a wide range of users.

d) Controls for similar functions should be arranged into a group but need to be arranged in a logical order to facilitate easy understanding.

e) Controls serving as a reference point of an arrangement should be distinguishable from other controls based on their shape, colour, tactile point, and marking to facilitate both visual and tactile recognition for a wide range of users.

f) Controls for main operation should be distinguishable from the controls for function selection and value adjustment to facilitate user recognition for a wide range of users.

g) Controls should be clearly marked using visual symbols or texts as well as with tactile symbols to provide information to users with limitations in vision.

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NOTE ISO 24503:2011, 3.2, discusses how tactile dots and bars are to be used on the controls of consumer products for marking for identification of main functions.

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EXAMPLE A control that starts a function can use a tactile dot to indicate initiation. A control that cancels a function may use a tactile bar to indicate cancellation.

4.2 Design considerations relevant for accessible design

4.2.1 Operability

4.2.1.1 General

A control should be operable, i.e. its intended use should be available, predictable, and consistent for all users regardless of user characteristics and physical limitations.

NOTE ISO 9241-400:2007, 4.2.2, discusses operability as one of design requirements for input devices (controls here).

4.2.1.2 Availability

The intended use of a control for any functionality of the consumer product should be easily found and obviously available for all users. This implies that the location, physical form, colour, texture, and size of the control should be considered during the design process.

NOTE Controls can vary in physical form, surface colour and texture, and size for coding to provide useful information for discrimination under adverse conditions as well as helping users with disabilities grasp and manipulate the control with ease.

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