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# Ergonomics — Accessible design — Spoken instructions of consumer products

*Ergonomie — Conception accessible — Instructions orales pour les produits de consommation courante*



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# Foreword

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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.

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

This first edition cancels and replaces ISO 24500:2010.

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

Consumer products, as defined in ISO 20282-1, include home electrical appliances, information and telecommunication products, gas-heating equipment, toys, sanitary equipment, health-care products, and cameras, some of which use spoken instructions.

These spoken instructions can assist product users regardless of age, including those with visual impairments or moderate cognitive disorders that can cause reading difficulties, in using the product correctly and safely. The spoken instructions are also helpful for some users who are not accustomed to using the product. Therefore, the instructions should be designed so that they are easy to hear and comprehend.

This document adopts the principles of accessible design given in ISO/IEC Guide 71 and amplified in ISO/TR 22411.

# Ergonomics — Accessible design — Spoken instructions of consumer products

## 1 Scope

This document specifies ergonomic requirements and recommendations for consumer product spoken instructions that are provided to guide users in the operation of a product and/or as a means of providing feedback to users about the status/state of a product. Such instructions can be used by persons with or without visual impairments, and are useful for users who have difficulty reading and/or cognitive impairments.

The applicability of the requirements and recommendations described in this document does not depend on the language of the instructions or whether the instructions are provided via recorded human speech or synthesized speech from text.

The requirements and recommendations in this document are applicable to conventional, stand-alone consumer products in general, whose function is limited by characteristics that prevent a user from attaching, installing or using assistive technology in order to use the product. They are not applicable to machines and equipment used for professional work.

This document does not apply to products for which the instructional content and/or the means of presentation are specified in other standards (e.g. medical devices, fire alarms). It also does not provide recommendations or requirements for spoken instructions of Interactive Voice Response (IVR) systems or digital assistants on personal computers or similar devices.

NOTE ISO 9241-154 provides recommendations or requirements for IVR systems.

This document does not specify voice sounds of text-to-speech systems or narrative speech used in place of printed instruction manuals and independently from the product.

## 2 Normative references

There are no normative references in this document.

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

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

**3.2**
**spoken instruction**
instruction emitted by a product for the purpose of conveying information to help the user to use the product correctly or to know the state of the product

**3.3**
**caution message**
message that informs the user of what they should or should not do at a particular point in the operation of a product, or which provides information (which can include instructions) with respect to an operational problem with the product that can require user action

Note 1 to entry: Caution messages have a function similar to that of caution signals specified in ISO 24500.

## 4 Application of the provisions of this document

This document provides requirements and recommendations for consumer product spoken instructions. Although all the requirements apply to any consumer product, designers shall consider the nature of their product, the environment in which it will be used, and the characteristics of the intended user population when identifying applicable recommendations in this document.

For example, for complex consumer products that require a significant amount of spoken instructions and/or a high degree of user interaction with the spoken instructions, most or all the recommendations are likely to be appropriate. Alternatively, in the case of very simple consumer products, which have few spoken instructions and require only limited interaction with the instructions, following every recommendation would not be practical, feasible, or cost-effective. Designers are advised to consider the features their users will need to have for the spoken instructions to be accessible and usable, and follow the applicable recommendations accordingly.

## 5 General requirements and recommendations

a) Users should be provided with a means of turning on and off spoken instructions, without having to rely on visual cues. Caution messages related to safe use of the product shall not be easily turned off by the user.

NOTE 1 It is possible that some users with hearing impairment want to turn off spoken instructions and auditory signals all at once.

b) Users should be provided with means of activating spoken instructions that is effective even when other types of audio output have been turned off.

NOTE 2 Some audio and audio-visual systems have a separate output channel for spoken instructions other than the main audio output.

c) If a product has audio output other than that for spoken instructions, the sound volume of spoken instructions should be adjustable independently from that of the audio output, including auditory signals.

NOTE 3 Some audio and audio-visual systems have an output channel for spoken instructions whose sound volume is controllable separately from the main audio output.

d) The output state of spoken instructions (i.e. whether they are switched on or off) should be displayed visually.

NOTE 4 Some users with hearing impairments may not realize that spoken instructions are being presented, depending on the volume of the instructions and the extent of the hearing impairment. Thus, a visual indicator is necessary that cues them when instructions are being presented, so that they can raise the volume to hear those instructions, if needed, or turn the instructions off if they do not want to hear them (e.g. because this would disturb other people in the immediate vicinity).

e) Spoken instructions should be repeatable at the user's request.

EXAMPLE A product is equipped with a push button control for playing back the spoken instruction again.

f) An auditory signal should be presented before the spoken instructions when necessary for attracting the user's attention. The signal should be so designed that it can be turned off by the user.

g) Spoken instructions related to a particular user action should terminate as soon as the user takes the action.

h) Caution messages related to abnormal operation or safety issues should be repeated until the user acknowledges them or takes some action to resolve the caution situation.

NOTE 5 A caution message can be repeated at an increasing time interval when it is preferable to do so. Continuous repetitions would be annoying in some situations.

NOTE 6 Caution messages automatically cancel when the caution situation has been resolved.

i) Spoken instructions that notify the user of any error should also indicate what the user needs to do next.

j) Spoken instructions should be presented to the user only (e.g. through earphones) when it is necessary to ensure the user's privacy or avoid causing a noise problem to those around the user.

k) The information conveyed by spoken instructions should be equivalent to that presented by means of other modalities.

l) If the product has a complex set of instructions, the product should have two modes of spoken instructions, a simple instruction mode and a detailed instruction mode, and the user should be able to select either of them.

NOTE 7 Detailed instructions can be annoying for some accustomed users.

# 6 Specifications of spoken instructions

## 6.1 Ease of hearing spoken instructions

a) Digitized human speech, as opposed to synthesized speech, should be used for instructions when possible.

NOTE 1 Some people with hearing impairments and/or older adults have difficulty in understanding synthesized speech.

b) The transmitted frequency range of spoken instructions should be wide enough to ensure high intelligibility.

NOTE 2 Intelligibility of spoken instructions tends to decrease as the upper limit of frequency range becomes lower than 5 kHz, regardless of the user's age.

NOTE 3 The sampling frequency or coding technique can limit the frequency range of digitized human speech.

c) The sound volume of spoken instructions should be adjustable by the user, depending on the user's hearing ability, the distance from the product, noise from the surroundings, etc. For the sound volume setting, see Annex A.

NOTE 4 It is preferable that the volume control is continuous or in small discrete steps.

d) The speech rate of spoken instructions should be controllable by the user. Increases in speech rate should not influence the speech frequency.

NOTE 5 With increased age, intelligibility of speech is improved with a slower speech rate. However, if the speech rate is too slow, it can be less intelligible as well as stigmatizing to older users.

NOTE 6 A longer pause between sentences is beneficial for speech understanding of older users and of those whose first language is not being spoken.

NOTE 7 Some users with visual impairment prefer a higher speech rate.

## 6.2 Ease of understanding spoken instructions

a) Spoken instructions for a single operation should consist of one or two sentences with a limited number of key words.

NOTE 1 Short and grammatically simple sentences are easier to comprehend.

b) Words that are easy to be misunderstood or have multiple meanings (i.e. homonyms) should be avoided.

NOTE 2 Some words are easy to comprehend when read, but not when heard.

c) Common vocabulary words that are comprehensible by general users should be used.

d) Consistent use of vocabulary and expressions should be used across spoken instructions for different purposes.

e) The wording of spoken instructions should be the same as that displayed on the product or that used in instruction manuals.

NOTE 3 Expressions of abbreviated words on the product in Braille can differ from the full spoken instructions.

## 6.3 Making the use of the product easier

a) Spoken instructions for confirming the user's operation or notifying the user of an error should be delivered without a time delay.

b) The duration and timing of spoken instructions shall be designed so that they do not interfere with the user's operation.

NOTE Some users such as those with visual impairment prefer an extremely simplified phrase, rather than a full-sentence instruction, in order to facilitate operating the product rapidly.

c) If possible, spoken instructions should be presented in the order of product operations. If there is not a fixed order of operations, the user should be allowed to select spoken instructions for specific operations or a default order of spoken instructions should be provided by the developer. The default order of operations should be based on such considerations as safety, frequency of use, or importance.

d) For instructions organized into a hierarchy, spoken instructions should indicate how to go back to the previous level of the hierarchy, not only how to proceed to the next level.

# 7 Information about the product that spoken instructions are to provide

The information below should be provided by means of spoken instructions wherever necessary so that the user who has difficulty in perceiving visual information can use the product.

a) Safety instructions for using the product.

b) Explanations about the layout and functions of switches on the control panel if the product has a control panel.

NOTE 1 Some users with visual impairment have difficulty in identifying the location of control buttons.

c) The present settings of the product.

d) The present status of the product (e.g. whether the silent product is operable or not).

NOTE 2 Information about the battery power remaining can be important for battery-powered products such as mobile phones.



 

e) Explanations of how to use the product.

NOTE 3 Some users with visual impairment have difficulty in reading instruction manuals and prefer to hear spoken instructions instead.

## 8 Evaluation of spoken instructions

To ensure that the spoken instructions are designed for making the product accessible, they should be evaluated in a user test. A test method is specified in Annex B.

# Annex A
(informative)

# Sound volume setting of spoken instructions

The sound volume of spoken instructions is determined at the point where the centre of user's head would be located when the user is operating the product.

The sound volume, expressed as an A-weighted equivalent continuous sound level in decibels, should be adjusted as follows.

a) In typical living environments, the sound volume of 55 dB to 65 dB is sufficient for people with normal hearing.

   NOTE A sound level lower than 55 dB can be preferred in a very quiet environment (e.g. at home at midnight).

b) The sound level should be adjustable across a wide range to accommodate people with hearing impairments.