भारतीय मानक
Indian Standard

IS 16568 : 2017
ISO 24500 : 2010

श्रमदक्षता शास्त्र — सुलभ डिजाइन — उभोक्ता उत्पादों के लिए श्रवण संकेत

Ergonomics — Accessible Design — Auditory Signals for Consumer Products

ICS 11.180.15, 13.180

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May 2017 **Price Group 4**

Ergonomics Sectional Committee, PGD 15

NATIONAL FOREWORD

This Indian Standard which is identical with ISO 24500 : 2010 ‘Ergonomics — Accessible design — Auditory signals for consumer products’ issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendation of the Ergonomics Sectional Committee and approval of the Production and General Engineering Division Council.

The text of ISO Standard has been approved as suitable for publication as an Indian Standard without deviations. Certain conventions are however not identical to those used in Indian Standards. Attention is particularly drawn to the following:

a) Wherever the words ‘International Standard’ appear, referring to this standard, they should be read as ‘Indian Standard’.
b) Comma (,) has been used as a decimal marker while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

The technical committee has reviewed the provisions of the following International Standard referred in this adopted standard and has decided that it is acceptable for use in conjunction with this standard:

IEC Standard	*Title*
IEC 60050-801	International electrotechnical vocabulary — Chapter 801: Acoustic and electroacoustics

Indian Standard

Ergonomics — Accessible Design — Auditory Signals for Consumer Products

1 Scope

This International Standard specifies the auditory signals used as a means of feedback for operations or conditions of consumer products when used by a person with or without visual or auditory impairment. It is intended to be applied as appropriate to such products depending on the product type and its conditions of use.

It is applicable to auditory signals of a fixed frequency used in general applications (also called “beep sounds”), but not to variable frequency or melodic sounds.

It does not specify fire or gas leak alarm sounds or crime prevention alarm sounds (determined by other laws and regulations), electronic chimes, voice guides or other sounds particular to communication instruments such as telephones; nor is it applicable to auditory danger signals for public or work areas (covered in ISO 7731, ISO 8201, and ISO 11429).

It is not applicable to machines and equipment used for professional work; nor does it specify the sound pressure levels of auditory signals from the consumer products.

NOTE For the determination of these levels, taking into consideration accessible design, see ISO 24501.

2 Normative references

The following referenced documents are indispensable for the application 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.

IEC 60050-801, *International electrotechnical vocabulary — Chapter 801: Acoustic and electroacoustics*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-801 and the following apply.

3.1
auditory signal
sound emitted from a product for the purpose of conveying information to help the user to use the product correctly

3.2
operation
action which the user performs, using a product for achieving a purpose

3.3
operation confirmation signal
sound acknowledging the response of a product immediately after a user's action to operate it

NOTE Operation confirmation signals include reception and start signals, stop signals and starting position signals.

3.3.1
reception and start signal
auditory signal acknowledging receipt of a user's action to start or operate the product

3.3.2
stop signal
auditory signal acknowledging the user's action to stop the operation of the product

3.3.3
starting position signal
auditory signal announcing the reference or starting position for the case in which the user makes a menu selection by repeatedly pushing a button

3.4
end signal
sound announcing the completion of a product action

3.5
caution signal
sound announcing that the product cannot function independently in normal operation (or state)

NOTE 1 Caution signals differ in purpose from auditory emergency signals and auditory warning signals. The latter two signals are used to notify people of a serious dangerous situation in public and work areas and are defined in ISO 7731.

NOTE 2 The caution signal is classified into weak and strong caution signals according to the degree of importance of the information.

3.5.1
weak caution signal
auditory signal which attracts the attention of the user to operation mistakes and requests the user's resetting of the product or assisting in the operation

EXAMPLE An auditory signal of a washing machine announcing that the lid is open.

3.5.2
strong caution signal
auditory signal announcing the necessity of interrupting operation of the product and the user intervening to correct some abnormality before continuation of operation

EXAMPLE An auditory signal of an electric oven announcing that it has stopped heating because of overheating.

3.6
ON time
time during which the signal continues to sound

3.7
OFF time
time without sounding a signal

3.8
ON/OFF pattern
sequence of ON times and OFF times that constitute a signal

4 General aspects of auditory signals for products

4.1 User control of volume level

The user should be able to adjust the volume level of auditory signals based on hearing ability, distance from the product, effects of ambient environmental sounds, etc.

NOTE ISO 24501 describes detailed methods for setting and adjusting the sound pressure level of auditory signals in noise.

4.2 Repetition of caution signals

Caution signals shall be repeated only as long as the cause of signalling exists.

4.3 Fundamental frequency of auditory signals

The fundamental frequency of auditory signals should not be higher than 2,5 kHz.

NOTE 1 The definition of “fundamental frequency” is given in IEC 60050-801.

NOTE 2 Many older users with age-related hearing loss have difficulty hearing high-frequency tones.

NOTE 3 Audibility of signals depends not only on their frequency, but also on their sound pressure level. ISO 24501 gives detailed methods for setting and adjusting the sound pressure level of auditory signals.

4.4 Options for signal frequencies

Products should provide several options for signal frequencies so that users with hearing impairments can select an audible signal.

4.5 Use of complex sound signals

Products should provide a complex sound signal (i.e. a signal with several harmonics, containing more than one frequency component).

NOTE 1 The definition of “complex sound” is given in IEC 60050-801.

NOTE 2 Complex sound signals are more likely to be heard than pure-tone-like signals by people with impaired hearing at some frequencies.

4.6 Turning off auditory signals

Except for caution signals, the user should be provided with a means to turn off auditory signals.

5 Temporal patterns of auditory signals

5.1 General

Auditory signals are more abstract than spoken instructions. For this reason, temporal patterns of auditory signals should be designed so as

— to be understood without giving further instruction to the user, and

— not to be confused with other auditory signals used by the same product or those of another product used at the same time and place.

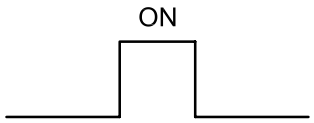
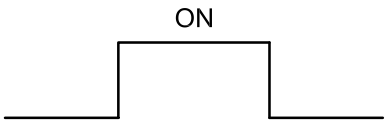
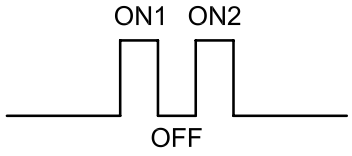
The temporal patterns of auditory signals presented in 5.2 to 5.4 shall be used for each signal category.

NOTE A temporal pattern is a robust cue by means of which the user discriminates auditory signals from one another; it can therefore be used more effectively than other acoustic characteristics such as frequency or timbre.

5.2 Operation confirmation signals

ON/OFF patterns in accordance with Table 1 shall be used for operation confirmation signals.

Table 1 — ON/OFF patterns of operation confirmation signals

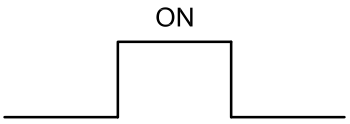
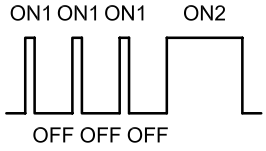
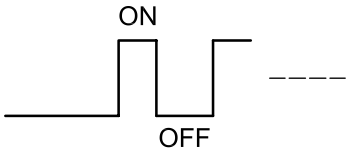
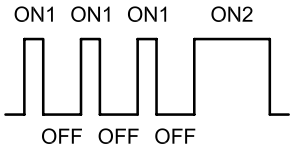
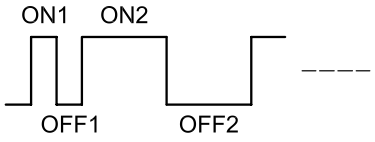
Signal category	ON time s	OFF time s	Repetition	Onomatopoeic description	Pattern
Reception and start signal	0,1 – 0,15	—	Single repetition	Pip	
Stop signal	0,5 – 0,6	—	Single repetition	Peep	
Starting position signal	0,05 – 0,075	0,05 – 0,075	Single repetition	Pip·pip (quick)	 ON1 = ON2 ON1 ⩾ OFF, ON2 ⩾ OFF

5.3 End signals

ON/OFF patterns in accordance with Table 2 shall be used for end signals. Two or more signals may be used in a product if necessary.

The patterns are presented in an arbitrary order, and any signal may be chosen from a signal category, as appropriate.

Table 2 — ON/OFF patterns of end signals

Signal category	ON time s	OFF time s	Repetition	Onomatopoeic description	Pattern
Case of hearing at a position where the product is within reach [a]	0,5 – 1,0	—	Single repetition	Peep	
	ON1 = 0,1 ON2 = 0,8	0,5	Single repetition	Pi,·pi,·pi,·peep (slowly)	
Case of hearing at a position distant from the product [b]	0,3 – 0,8	0,5 – 1,0	Multiple repetition	Pip, pip, pip, pip, … (specified times, slowly)	 ON time ⩽ OFF time The number of repetitions is discretionary, but numerous repetitions are usually beneficial for older users.
	ON1 = 0,5 ON2 = 1,5	0,8	Single repetition	Pip, pip, pip, peep (slowly)	 The number of times of ON1 shall be 3 or 4.
	ON1 = 0,1 ON2 = 0,5	OFF1 = 0,1 OFF2 = 0,5	Multiple repetition	Pip·peep, pip peep, … (specified times, slowly)	 The number of repetitions is discretionary, but numerous repetitions are usually beneficial for older users.

[a] Examples include a signal of a tape recorder telling a nearby user that the tape has been rewound.

[b] Examples include the signal of a washing machine notifying the user that has finished washing when unattended.

5.4 Caution signals

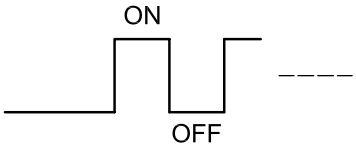
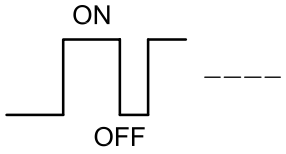
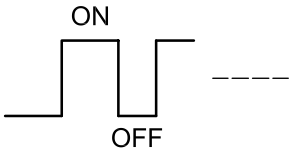
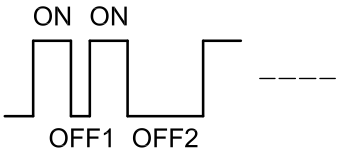
ON/OFF patterns in accordance with Table 3 shall be used for caution signals. Two or more signals may be used in a product if necessary.

EXAMPLE A photocopier gives one signal for running out of paper and another signalling lack of toner.

The patterns are presented in an arbitrary order, and any signal may be chosen from a signal category, as appropriate.

A strong caution signal should repeat until the user intervenes.

Table 3 — ON/OFF patterns of caution signal

Signal category	ON time s	OFF time s	Repetition	Onomatopoeic description	Pattern
Strong caution signal	0,1	0,1	Multiple repetition	Pi·pi·pi, … (quick and consecutive)	 ON time = OFF time
	0,1 – 0,3	0,05 – 0,15	Multiple repetition	Peep·peep·peep, … (consecutive)	 ON time > OFF time
Weak caution signal	0,5	0,2 – 0,25	Multiple repetition	Peetz, peetz, … (consecutive)	
	0,1	OFF1 = 0,05 OFF2 = 0,5	Multiple repetition	Pi·pip, pi·pip, … (intermittent)	

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[1] ISO/IEC Guide 71, *Guidelines for standards developers to address the needs of older persons and persons with disabilities*

[2] ISO 7731, *Ergonomics — Danger signals for public and work areas — Auditory danger signals*

[3] ISO 8201, *Acoustics — Audible emergency evacuation signal*

[4] ISO 11429, *Ergonomics — System of auditory and visual danger and information signals*

[5] ISO 24501[1)], *Ergonomics — Accessible design — Sound pressure levels of auditory signals for consumer products*

[6] ISO/TR 22411, *Ergonomics data and guidelines for the application of ISO/IEC Guide 71 to products and services to address the needs of older persons and persons with disabilities*

[7] IEC 62079, *Preparation of instructions — Structuring, content and presentation*

[8] KURAKATA, K., MIZUNAMI, T. and YOMOGIDA, H. Guidelines on the temporal patterns of auditory signals for electric home appliances: report of the association for electric home appliances. *Acoust. Sci. & Tech.*, **29**, 2008, pp. 176-184

[9] KURAKATA, K., MIZUNAMI, T., GARDNER-BONNEAU, D., PARK, S. and WEGGE, K.-P. Temporal patterns of auditory signals suitable for electric consumer products: comparison of judgments by young and older adults in four countries. *Acoust. Sci. & Tech.*, **30**, 2009, pp. 209-215

[10] KURAKATA, K., MIZUNAMI, T., SHIMOSAKO, H. and MATSUSHITA, K. Further examination of ON/OFF temporal patterns of auditory signals recommended in JIS S 0013. *Proceedings of 16th World Congress on Ergonomics, Beijing*, 2009, 2AU0006

1) To be published.

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Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

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