
**Graphical symbols — Test methods —
Part 1:
Method for testing comprehensibility**

Symboles graphiques — Méthodes d'essai —

Partie 1: Méthode de vérification de la compréhensibilité

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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).

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).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 145, *Graphical symbols*.

This second edition cancels and replaces the first edition (ISO 9186-1:2007), which has been technically revised. Annex B has been removed.

ISO 9186 consists of the following parts, under the general title *Graphical symbols — Test methods*:

- Part 1: Method for testing comprehensibility
- Part 2: Method for testing perceptual quality
- Part 3: Method for testing referent association

Introduction

The reason for the publication of this part of ISO 9186 is the increasing use of non-verbal presentation of information in buildings and other places, and for services to the public.

Continued growth of international travel, tourism, and trade requires graphical symbols to be understood. This part of ISO 9186 specifies methods for assessing the comprehensibility of graphical symbols.

This part of ISO 9186 is intended to be used by all Technical Committees within ISO charged with developing specific graphical symbols for their industry, to ensure that there is only one symbol for each meaning. It is also intended to be used by any other organization concerned with establishing the comprehensibility of graphical symbols.

This part of ISO 9186 specifies a method of testing what proportion of people can comprehend a graphical symbol correctly.

ISO 9186-2 specifies a method of testing how well people can identify the elements which make up a graphical symbol.

ISO 9186-3 specifies a method of testing what proportion of people who are familiar with a number of referents relevant to a graphical symbol can associate the graphical symbol with its referent.

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Graphical symbols — Test methods —

Part 1: Method for testing comprehensibility

1 Scope

This part of ISO 9186 specifies a method for testing the comprehensibility of graphical symbols. It provides a measure of the extent to which a variant of a graphical symbol communicates its intended message. The purpose of this part of ISO 9186 is to ensure that graphical symbols and signs using graphical symbols are readily understood. The intention is to encourage the development of graphical symbols which are correctly understood by users when no supplementary (i.e. explanatory) text is presented. When such a graphical symbol cannot be developed, it might be necessary to present a graphical symbol together with supplementary text explaining its meaning in the language of the intended users.

NOTE 1 Alternatively, it could be necessary to inform people about the meaning of the graphical symbol by including its meaning in manuals, instructions, or training.

NOTE 2 ISO 9186-2 specifies a method for testing the perceptual quality of graphical symbols by measuring the extent to which the elements of the graphical symbol can be correctly identified. ISO 9186-3 is under development; it is intended to specify a method of testing the association of graphical symbols with their referents and be applicable to those situations where the viewer tested might initially be unfamiliar with the referents.

2 Normative references

ISO 9186-1:2014

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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 9241-303, *Ergonomics of human-system interaction — Part 303: Requirements for electronic visual displays*

ISO 9241-400, *Ergonomics of human-system interaction — Part 400: Principles and requirements for physical input devices*

ISO 9241-5, *Ergonomic requirements for office work with visual display terminals (VDTs) — Part 5: Workstation layout and postural requirements*

ISO 9241-12, *Ergonomic requirements for office work with visual display terminals (VDTs) — Part 12: Presentation of information*

ISO 17724, *Graphical symbols — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions in ISO 17724 and the following apply.

3.1

comprehension test

procedure for quantifying the degree of understanding of a proposed graphical symbol

3.2

function

meaning of a referent which the symbol is intended to convey

3.3

referent

idea or object that a graphical symbol is intended to represent

3.4

variant

alternative graphical symbol design for a given referent

4 Principle

Variants of referents are assessed for the ease with which they can be understood by carrying out the comprehension test on them. In the comprehension test, each respondent is presented with one variant for any single referent and asked "What do you think this symbol means?" To clarify the answer to this question or if the referents being tested require some specific action, each person may be asked a second question, "What action should you take in response to this symbol?" Each variant is scored in terms of the percentage of correct answers.

NOTE 1 The findings from the comprehensibility testing can be used by the submitter of the variants as supporting information when variants are submitted for standardization.

NOTE 2 The submitter of the variants might intend to submit a variant as a proposal for standardization by organizations such as ISO, CEN, and national or international standards bodies. These organizations can require that testing for comprehensibility is conducted in a minimum number of countries and can lay down the score which is essential for a variant to attain before it can be recommended as the most acceptable one for that referent.

NOTE 3 This part of ISO 9186 refers to testing using printed or screen presentation of the materials. Screen presentation can involve conducting the test using the internet. Guidance on administering the test over the internet is given in [6.2.8](#) and [6.3.5](#).

5 Preliminary steps

Before embarking on testing, the submitters shall obtain a copy of whatever forms are required by the standards organization for submitting the graphical symbol for standardization and shall ensure that they will be in a position to provide whatever information is required on those forms.

NOTE 1 Application forms for submission of public information symbols for standardization by ISO/TC 145/SC 1 and criteria of acceptance are available on www.iso.org/tc145/sc1 or from the ISO/TC 145/SC 1 secretary. Application forms for submission of safety signs for standardization by ISO/TC 145/SC 2 and criteria of acceptance are available on www.iso.org/tc145/sc2 or from the ISO/TC 145/SC 2 secretary. Application forms for submission of symbols on equipment for standardization by ISO/TC 145/SC 3 are available on www.iso.org/tc145/sc3 or from the ISO/TC 145/SC 3 secretary.

NOTE 2 If necessary, the secretary of the relevant standards committee can provide supporting information. For example, the minimum comprehension scores required before a variant can be recommended for standardization, whether testing is required in a number of countries. There may also be requirements regarding the format in which symbols should be submitted.

The submitters shall ensure that the symbol variant or variants to be tested have been designed in accordance with the relevant design principles and design criteria.

NOTE 3 Design principles and design criteria for public information symbols for standardization in ISO 7001 are specified in ISO 22727; design principles and design criteria for safety signs for standardization in ISO 7010 are specified in ISO 3864-1 and ISO 3864-3; design principles and design criteria for graphical symbols for use on equipment for standardization in ISO 7000 are specified in IEC 80416-1 and ISO 80416-2.

It is recommended that three is the maximum number of variants for any one referent in the comprehension test.

NOTE 4 A standards organization can require a minimum number of referents or variants to be tested.

Where the test is to be conducted in a number of countries, the submitters shall ensure that all materials, including computer presentations when they are used, are of the same quality.

With both paper and computer presentation it is essential that all presentations are of an equivalent legibility and that all images are of an equivalent quality.

6 Comprehension test

6.1 General

Carry out the test using either printed presentation or computer screen presentation, depending on which is most practicable. Computer screen presentation includes internet presentation (see 6.2.8).

NOTE 1 The word “page” is used for a predefined presentation of text and/or graphic elements and their layout on a sheet of paper or a computer screen.

NOTE 2 When necessary (e.g. due to a respondent having difficulty with reading), the test administrator can read the instructions to the respondent who can give responses orally so that the test administrator can enter them.

6.2 Preparation of test material

6.2.1 Variants should be black on white. Colour should only be used if it is an integral part of the coding of information, for example when safety graphical symbols are being tested. If a coloured variant is used, it is necessary to ensure the contrast between figure and background is sufficient for the variant to be readily visible, and that the colours and contrast levels are reproduced accurately in the materials presented to respondents.

Print or display one variant for one referent on one single test page (size A5 or larger). When multiple graphical symbols are tested as a set on a single signboard, print or display the set on one test sheet

Inform the respondents in words or pictorial form of the general context in which they would expect to see the symbol. If the context is given in words, they shall be in a language in which the respondent is fluent. Present this information adjacent to the graphical symbol on each test page.

NOTE 1 Context can be provided in words by using a phrase such as “at an airport” or “on the wall of a public building”, or it can be provided in pictorial form by presenting a photograph showing in its actual location a sign bearing the graphical symbol. A photographic context is preferable, but if a photograph is used, careful consideration should be given to the amount of information shown so that it does not show the viewer the meaning of the symbol.

NOTE 2 In some cases, the context itself needs to be comprehended. For example, a graphical symbol can be presented as part of a set of graphical symbols with similar or related meanings, which are presented as a set on a single signboard and for which the viewer needs to understand the meaning of the signboard, in addition to the meaning of the individual graphical symbols. In such cases it might be necessary to test the comprehension of the meaning of the signboard as a whole.

NOTE 3 A variant can consist of multiple symbols (for example, one conveying what to do and one conveying what not to do), which are tested as a single variant.

6.2.2 For each respondent provide an instruction page, a respondent self-report page, and an example page written in the language of the respondent.

On the instruction page, instruct the respondent to write down, on the line below the graphical symbol on each test page, his/her answer to the question: “What do you think this symbol means?” Instruct the respondent to write the response “Don’t know” if he or she is unable to assign a meaning to the symbol. If the referents to be tested require some specific action when encountering the graphical symbol, also instruct the respondent to write down, in the second space below the symbol, his/her answer to the question: “What action should you take in response to this symbol?”

When symbols being tested are to be used within a particular shape or with a particular colour of border or background and those shapes or colours incorporate a system of encoding information, this system shall be explained on the instruction page.

NOTE 1 An example of the explanation of a system of using colour to encode information is given below.

- Symbols on a yellow background are warning symbols.
- Symbols on a green background indicate a safety message.
- Symbols on a blue background indicate an instruction.
- Symbols within a red ring and diagonal bar indicate prohibited actions.
- Symbols accompanied by a flame on a red background indicate fire equipment.

If respondents have difficulty using the chosen presentation method, it might be necessary to have an assistant read the instructions out loud and obtain an oral answer to the question on each test page, which should then be entered on the test page. Obtain the consent of the respondent to this procedure.

On the respondent's self-report page, provide spaces for entering

- the date of the test session,
- the name of the person conducting the test,
- the respondent's age according to the following age groups:
 - between 15 and 30;
 - between 31 and 50;
 - over 50,
- the respondent's sex, and
- the respondent's educational level.

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NOTE 2 If the submitters judge it appropriate and necessary, additional questions can be asked for the respondents to indicate their country of residence, ethnic or cultural background, whether they are disabled, and if so whether the disability involves problems with physical mobility, with hearing, with seeing, or some combination of these.

NOTE 3 In asking respondents to indicate their educational level, the aim is to distinguish between

- those who left school at the minimum school-leaving age,
- those who have a post-school qualification which is not degree-level, and
- those with a university degree or its equivalent.

The wording of the particular alternatives will vary according to the customs of the country in which the test is conducted and respondents should be offered alternative responses which fit those customs.

On the example page, show a commonly known graphical symbol. Above the graphical symbol, in conspicuous lettering (e.g. bold and large), show the word "Example". Below this word display the text or picture informing the respondents of the context in which they would expect to see the graphical symbol. In the box below the graphical symbol, have the meaning already entered. If referents that require some specific action when encountering the graphical symbol are tested, present the actions that should be taken on the example page in the second box below the graphical symbol.

With screen presentation, it is good practice to indicate either how many pages there are or how long the test is likely to take. A means for returning to the instruction screen page shall be provided and it shall be indicated to the respondent how to do so.

NOTE 4 An example of printed booklet test material is given in A.1 to A.4.

6.2.3 Make a set of printed test pages or screen test pages for each referent. On each page show in the centre of the page one of the graphical symbol variants to be tested and below it a line for the subject's response. Ensure the whole symbol is visible on the page. Except where the graphical symbol in actual use is likely to be presented less than 28 mm on its longest dimension, for printed presentation, print the variant within a square not less than 28 mm × 28 mm such that the graphical symbol fills the square.

For screen presentation, use a screen size for each image of at least 28 mm × 28 mm, assuming a viewing distance between 400 mm and 700 mm. Where other viewing distances are used, the same angular size should be maintained. If there is any doubt, then consideration should be given to the angular size at which the image would normally be seen when in use.

When the graphical symbol is likely in use to be presented less than 28 mm on its longest dimension, the variants presented in the test should be the same size as the symbol in actual use. The image presentation on paper or on screen should provide detail that is equivalent to the detail that would be seen when the image is in use.

NOTE For referents requiring some specific action when encountering the symbol, judging the responses can be improved by asking the following additional question: "What action should you take in response to this symbol?" In this case, both questions are to be presented in the space below the graphical symbol in such a way that, if printed presentation is used, enough room is available for writing down the answers or, if screen presentation is used, a rectangular box for each question is provided which is intended for the respondent's response and which offers space for four lines of text with at least 50 characters per line.

6.2.4 Allocate the different variants of all referents to different test sets, which can contain a number of different referents but shall contain only one variant of a given referent. Ensure the number of referents in any given test set does not exceed 15.

NOTE The number of sets is determined by the maximum number of variants for a referent. If the number of variants per referent varies, the sets do not necessarily contain the same number of test sheets or pages.

6.2.5 When using printed materials, collate each test set into a booklet. Arrange the graphical symbols in the test booklet randomly. For every 50 booklets, use at least 10 different random orders of symbols (or as many different orders as possible), i.e. when 10 or more referents are being tested, no more than 5 booklets in 50 shall have the same order of presentation.

With screen presentation, present the test pages in a different random order for each respondent where possible. If this is not practicable, ensure that no more than 5 presentations in 50 have the same order of presentation (or use as many different orders as possible for presentations of fewer than 10 referents).

6.2.6 When screen presentation is used in an environment controlled by the test administrator, ensure the workstation layout, the visual display, and the keyboard are in the positions recommended in ISO 9241-303, ISO 9241-400, ISO 9241-5, and ISO 9241-12.

6.2.7 Assign each test set a code letter A, B, C, etc. With printed presentation, assign a number to each booklet in the set and print the code letter and booklet number on the first sheet of each booklet. With screen presentation, verify that the test set viewed by the respondent will be associated with the respondent's data.

6.2.8 If the test is to be conducted over the internet, the requirements for screen presentations apply to ensure the graphical symbols are clearly legible to the respondents. With internet testing, include on the self-report page an additional question showing an example symbol and ask the respondent to indicate which alternative applies to the display being used:

Is this symbol and the text on this page clearly legible on your screen? (i) Yes (ii) No