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

Symboles graphiques — Méthodes d'essai —

Partie 1: Méthodes de vérification de la compréhensibilité

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 9186-1 was prepared by Technical Committee ISO/TC 145, *Graphical symbols*, Subcommittee SC 1, *Public information symbols*.

This first edition of ISO 9186-1, together with ISO 9186-2, cancels and replaces ISO 9186:2001, which has been technically revised.

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

- *Part 1: Methods for testing comprehensibility*
- *Part 2: Method for testing perceptual quality*

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Introduction

The reason for the publication of this International Standard 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.

ISO 9186-1 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.

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Graphical symbols — Test methods —

Part 1: Methods for testing comprehensibility

1 Scope

This part of ISO 9186 specifies methods for testing the comprehensibility of graphical symbols. It includes:

- the method to be used in testing the extent to which a variant of a graphical symbol communicates its intended message; and
- the method to be used in testing which variant of a graphical symbol is judged the most comprehensible.

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 develop graphical symbols which are correctly understood by users when no supplementary (i.e. explanatory) text is presented. When such a graphical symbol cannot be obtained, it might be necessary to present a graphical symbol together with supplementary text explaining its meaning in the language of the intended users.

2 Normative references

[ISO 9186-1:2007](https://standards.iteh.ai/catalog/standards/sist/bad7fc8c-ea57-459e-a95c-e57693354c22/iso-9186-1-2007)

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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.

ISO 9241-3, *Ergonomic requirements for office work with visual display terminals (VDTs) — Part 3: Visual display requirements*

ISO 9241-4, *Ergonomic requirements for office work with visual display terminals (VDTs) — Part 4: Keyboard requirements*

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

ISO 9241-8, *Ergonomic requirements for office work with visual display terminals (VDTs) — Part 8: Requirements for displayed colours*

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 given 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

judgement test

procedure for eliciting judgements of the comprehensibility of the proposed graphical symbol

NOTE In previous versions of ISO 9186, the judgement test was referred to as the "comprehensibility judgement test".

3.4

referent

idea or object that a graphical symbol is intended to represent

4 Principle

Variants of referents are assessed for the ease with which they can be understood by carrying out one or two tests 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?" Each variant is scored in terms of the percentage of correct answers. In the judgement test, each participant is presented with all the variants being tested for a single referent and a statement of the intended meaning, and asked to estimate for each variant the percentage of the population that would be expected to understand the meaning. The judgement test results can be used to select variants for the comprehension test, which is normally not conducted on more than three variants for any one referent.

NOTE 1 When there are four or more variants for a single referent, the judgement test can be used to reduce the number of variants which might have to be tested using the comprehension test.

NOTE 2 The findings from the comprehensibility testing can be used by the submitter of the variants as supporting information which is required when variants are submitted for standardization.

NOTE 3 In some circumstances, the submitter of the variants might consider that the findings from the judgement test provide sufficient information and decide not to continue to the comprehension test.

NOTE 4 The submitter of the variants might intend to submit a variant as a proposal for standardization by organizations such as ISO, CEN, national or industry standards bodies. These organizations can require that testing for comprehensibility is conducted in a minimum number of countries, specify which test needs to be conducted and lay down the score which it is essential for a variant to obtain before it can be recommended as the most acceptable one for that referent.

NOTE 5 This part of ISO 9186 refers to testing using printed or screen presentations of the materials. Tests may be conducted using the internet, but only under supervised conditions to ensure that the test is administered as specified in this part of ISO 9186 and particularly, that respondents work alone and enter their personal details and responses correctly.

5 Pre-test information

The submitter of the referents and variants shall provide information which includes the following:

- a) the number of variants for each test;
- b) the name and contact details of the organization to which the test findings are to be submitted;

- c) details of the information that is required from the submitter by that organization;
- d) a completed application form for each variant of a referent as required by the standards organization. Where the standards organization does not have a specified application form for the submission of graphical symbols or safety signs for standardization, the submitter shall complete an application form for each variant.

NOTE 1 Application forms for submission of public information symbols for standardization by ISO/TC 145/SC 1 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 are available on www.iso.org/tc145/sc2 or from the ISO/TC 145/SC 2 Secretary.

- e) any additional information on the meaning of the referent, acceptable answers to the comprehension test, context of use;
- f) confirmation that the proposed graphical symbol or safety sign has been designed in accordance with the relevant design principles and design criteria;

NOTE 2 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.

- g) an eps (or tiff) computer file for each variant as required by the standards organization;
- h) how many countries the testing is to be conducted in;
- i) whether findings from the judgement test or comprehension test or both is required by the standards organization.

NOTE 3 The Secretary to the relevant standards committee can provide necessary information relevant to (f), (g) (h) and (i).

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It is recommended that three is the maximum number of variants for any one referent in the comprehension test. Although the judgement and comprehension tests are applicable to cases where only one variant is tested, a standards organization can require a minimum number of variants for a single referent to be tested in either test.

Where the tests are to be conducted in a number of countries, the submitter shall provide the same necessary information and material to the test administrators involved. If printed materials are used, it is necessary to ensure that all graphical materials are of the same standard and are prepared as one production batch. If a computer screen presentation is used, it is necessary to ensure that all pages are of the same standard. They shall be prepared at one programming site and the programs and files then made available to the test administrators in the format that they need.

6 Comprehension test

6.1 General

Carry out the tests using either a printed presentation or a computer screen presentation, depending on which is most practicable.

NOTE For the description of the tests using a computer screen presentation, the word “page” is used for a predefined presentation of text and/or graphic elements and their layout on a computer screen.

For a screen presentation, use a screen size of at least 380 mm when measured on the diagonal, with minimum resolution of 800 pixels × 600 pixels to ensure that the graphical symbol images presented are not distorted and that a sufficient number of graphical symbol variants can be displayed simultaneously. If the graphical symbol images presented show jagged lines or curves to the extent that the symbol image or image elements cannot be correctly interpreted, apply anti-aliasing methods or increase the minimum screen resolution to improve the quality of the image.

6.2 Preparation of test material

6.2.1 Variants should be black on white. Colour should only be used if colour is used for coding information, for example, when safety graphical symbols are being tested. If a coloured variant is used, ensure that the contrast between the figure and ground 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 one variant for one referent on one single test sheet (size A5 or larger) or display it on one test screen page.

In the comprehension test, it is important to inform the respondents in words or pictorial form of the general context in which they would expect to see the symbol. Present this information adjacent to the graphical symbol on each test sheet or screen page.

NOTE Context can be provided in words by using a phrase such as “at an airport”, “on the wall of a public building” or it can be provided in pictorial form by presenting a photograph showing a sign, in its actual location, bearing the graphical symbol.

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

On the instruction sheet, instruct the respondent to write down, on the line below the graphical symbol on each test page or screen, 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/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 would you take in response to this symbol?”

NOTE 1 When coloured symbols are being tested and the colours incorporate a system of encoding information, this system can be explained on the instruction page.

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.

With a screen presentation, ask respondents not familiar with the use of a personal computer to read the instructions out loud and to provide an oral answer to the question on each test page. Tell the person conducting the test to enter the answer on the computer page and have the text entered verified by the respondent. Obtain the consent of the respondent to this procedure.

On the respondent's self-report sheet, 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:
 - 1) between 15 and 30;
 - 2) between 31 and 50;
 - 3) over 50;
- the respondent's sex;

- the respondent's educational level;
- the respondent's ethnic or cultural background;
- whether they are disabled and, if so, whether the disability involves problems with physical mobility, with hearing or with seeing. Respondents can indicate they are disabled in more than one attribute.

NOTE 2 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;
- 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, on the example page in the second box below the graphical symbol, the actions that should be taken.

With a screen presentation, at the bottom of the example page display the text: "With the next page the session will start. The session consists of ... pages. If you are at any time in doubt about what to do, go back to the instruction page by using the "previous page" button repeatedly." (Enter the number of pages in the space shown in the second sentence.)

NOTE 3 An example of printed booklet test material is given in A.1 to A.4.

6.2.3 Make a set of printed test sheets or test screen pages for each referent. On each sheet or screen page, show one of the graphical symbol variants to be tested and below it a line for the subject's response. Position the symbol in the centre of the sheet or screen. 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 a screen presentation, the dimensions of a square enclosing the graphical symbol should be not less than 28 mm × 28 mm. 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.

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 would 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 a screen presentation is used, a rectangular box 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 each 50 booklets, use at least 10 different random orders of symbols, i.e. no more than 5 booklets in 50 shall have the same order of presentation.

With a screen presentation, present the test pages in a different random order for each respondent.

6.2.6 When a screen presentation is used, ensure the workstation layout, the visual display and the keyboard are in the positions recommended in ISO 9241-3, ISO 9241-4, ISO 9241-5, ISO 9241-8 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 a screen presentation, assign each test page a unique code consisting of a code letter for the set and a code number for the respondent.

6.3 Respondents

6.3.1 Conduct the comprehension test in the number of countries decided by the submitter.

When the test is carried out in more than one country, whenever possible, the countries should be chosen to represent different cultural backgrounds, for example, one European country and one Asian country.

6.3.2 To test a set of variants for a given referent, use at least 50 respondents in each country. Do not use any respondents who have taken part in one test (judgement or comprehension) for any referent in any other test on that same referent.

6.3.3 Check that the respondents are people who can be expected to be familiar with the referent.

The respondents should form a representative sample of the eventual user population in terms of age, sex, educational level, cultural or ethnic background and (when relevant) physical ability. Particular attention should be paid to the inclusion of vulnerable sectors of the population when testing graphical symbols to be used in a safety context. The information collected from the respondents allows a judgement to be made concerning whether the sample is representative of the eventual user population.

6.3.4 Ensure that the groups that are presented with each set of materials are similar to each other in age, sex, occupation and general academic achievement by forming matched groups or by randomly allocating the sets of materials to individuals in the total sample of respondents.

6.4 Respondents' task in the comprehension test

Present a single test booklet or set of screen pages to each test respondent.

Tell the respondent to follow the instructions given on the instruction sheet. Tell the respondents to carry out the test in silence and not confer with anyone while they are doing it. Confirm that all respondents say that they understand their task.

6.5 Analysis of the results of the comprehension test

For every variant for each referent, produce a list of all responses generated.

As the list of responses can be used to resolve any anomalies in the results from different countries, keep it available.

NOTE It also provides information which may be useful for improving the design of the graphical symbol.

6.6 Categorizing the results

In each country, appoint a response-categorizer, who has not been one of the test respondents and is not the submitter, to assign each response on the list to one of the five standard categories 1, 2a, 2b, 3 or 4 shown in Table 1. Categorize responses in categories 2a and 2b as "wrong" (category 2), but list separately those that indicate an interpretation opposite to that intended and record their frequency separately.

NOTE 1 Category 2b responses are counted and listed separately because they are particularly important if the graphical symbol has relevance to safety situations.