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Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”
Mazdoor Kisan Shakti Sangathan
“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”
Jawaharlal Nehru
“Step Out From the Old to the New”

IS 15503 (2004): Graphical Symbols - Test Methods for judged comprehensibility and for comprehension [PGD 1: Basic Standards]
Indian Standard

GRAPHICAL SYMBOLS — TEST METHODS FOR JUDGED COMPREHENSIBILITY AND FOR COMPREHENSION

ICS 01.080.110

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

December 2004
NATIONAL FOREWORD

This Indian Standard which is identical with ISO 9186:2001 'Graphical symbols — Test methods for judged comprehensibility and for comprehension' issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendations of the Basic Standards Sectional Committee and approval of the Medical Instruments, General and Production Engineering Division Council.

The text of the 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 in the International standards while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

CROSS REFERENCES

In this adopted standard, reference appears to certain International Standards for which Indian Standards also exist. The corresponding Indian Standards which are to be substituted in their place are listed below along with their degree of equivalence for the editions indicated:

<table>
<thead>
<tr>
<th>International Standard</th>
<th>Corresponding Indian Standard</th>
<th>Degree of Equivalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO 7000 : 1989 Graphical symbols for use on equipment — Index and synopsis</td>
<td>IS 12857 : 1989 General principles for the creation of graphical symbols for use on equipment</td>
<td>do</td>
</tr>
<tr>
<td>ISO 7001 : 1990 Public information symbols</td>
<td>IS 15504 : 2004 Public information symbols</td>
<td>Identical</td>
</tr>
</tbody>
</table>

Where there are no corresponding Indian Standards for the International Standards referred in this Indian Standard reference to the relevant International Standards may be made.

1) This standard has been revised as ISO 3864-1 : 2002 and ISO 3864-2 : 2004 brought out in two parts.
Indian Standard

GRAPHICAL SYMBOLS — TEST METHODS FOR JUDGED COMPREHENSIBILITY AND FOR COMPREHENSION

1 Scope

This International Standard specifies:

— the procedure to be used in gathering the information needed to request standardization of graphical symbols;
— the method to be used in testing which variant of a graphical symbol is judged the most comprehensible; and
— the method to be used in testing the extent to which a variant of a graphical symbol communicates its intended message.

The purpose of this International Standard is to ensure that graphical symbols, and signs using graphical symbols, are readily understood. It in no way ensures that prohibitions or warnings using graphical symbols or symbol signs designed in accordance with this International Standard will, once understood, be complied with.

NOTE Appropriate attitudes and motivation are required before compliance with any sign will result. A pictorial sign is not intended as an easy alternative to surveillance, physical barriers, education, or other means of achieving a safe situation.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 7000, Graphical symbols for use on equipment — Index and synopsis.
IEC 60417-1, Graphical symbols for use on equipment — Part 1: Overview and application.
IEC 60417-2, Graphical symbols for use on equipment — Part 2: Symbol originals.

3 Terms and definitions

For the purposes of this International Standard, the following terms and definitions apply.
3.1 complementary referents
referents which perform a related function in the same set

NOTE Examples of referents with related meanings are "Squash" and "Tennis".

3.2 comprehensibility judgement test
procedure for eliciting judgements of the comprehensibility of proposed graphical symbols

3.3 comprehension test
procedure for quantifying the degree of understanding of proposed graphical symbols

3.4 excluded function
function of a referent or of a complementary referent which is not to be denoted by the graphical symbol

EXAMPLE "Bath" should not indicate "shower" or "swimming pool".

3.5 graphical symbol
visually perceptible figure with a particular meaning used to transmit information independently of language

NOTE It may be produced by drawing, printing or other means.

3.6 image content
elements of the graphical symbol and their relative disposition

3.7 negation of a referent
modification of an image, by adding a graphic element, in order to negate a specific function

NOTE Negation usually indicates prohibition.

3.8 referent
idea or object that the graphical symbol is intended to represent

3.9 safety sign
general safety message obtained by a combination of colour and geometric shape and which, by the addition of a graphical symbol, gives a particular safety message

3.10 safety symbol
graphical symbol used together with a safety colour and safety shape to form a safety sign

3.11 variant
alternative design for a given referent
4 Principle

The various stages in the procedure are:

a) the collection of the information needed concerning the request for standardization of a graphical symbol (see 5.1);

b) the collection of a set of existing and proposed variants for each referent (see 5.2). At an early stage of the work, any body responsible for proposing a graphical symbol should ascertain whether any other graphical symbol has been standardized or is under development within ISO for
   — the same referent,
   — the same image content,
   — the same function, or
   — the same user population;

c) when there are four or more variants for one referent, testing them using the comprehensibility judgement test in at least two countries (see 5.3, 6.1 and 7.1);

d) when there are three or fewer variants for one referent, testing them using the comprehensibility judgement test in at least two countries (see 5.3, 6.1 and 7.1) or the comprehension test in at least three countries (see 5.3, 6.2 and 7.2);

e) when any variant for one referent exceeds the minimal score to justify further testing, but no variant reaches the criterion of acceptability on the comprehensibility judgement test, testing the comprehension of the variants judged most comprehensible using the comprehension test in at least three countries (see 6.2 and 7.2);

f) acceptance as a standard graphical symbol of the graphical symbol which either is judged the most comprehensible and surpasses the criterion of acceptability (see 6.2.7 and 7.2.7), or surpasses the criterion of acceptability on the comprehension test (see clause 8).

5 Procedure

5.1 Collection of information

Carefully consider the details of the request for the testing and standardization of a graphical symbol. For this purpose, complete the form shown in clause A.1.

Check existing and draft International Standards. If there is an existing standard graphical symbol for the referent which has been developed by the ISO method described in this document, or by the earlier method described in ISO 9186:1989, it shall be used. If there is a standard graphical symbol which was not developed using the ISO method described in this document or the earlier method described in ISO 9186:1989, there shall be strong grounds for not using it; such grounds might include duplication of graphical symbols in different International Standards, or evidence concerning the inadequacy of the graphical symbol. In such cases, the ISO Technical Committee which produced the standard graphical symbol shall be approached with a request for the graphical symbol to be reviewed at the next updating of the International Standard.

If a graphical symbol for the referent is undergoing testing, await the outcome of the testing programme. If there is an existing or draft International Standard, or a graphical symbol for the referent is undergoing testing, it is not necessary to continue with the remainder of this procedure.

An analysis of all aspects of the communication problem is a necessary first step in determining whether a graphical symbol is the correct solution to the communication problem.
The form in clause A.1 lists the points which shall be considered and the information required. Guidance on filling in the form is given in clause A.2, and an example of a completed form is given in clause A.3.

5.2 Collection of graphical symbol variants for each referent

5.2.1 Collect as many existing graphical symbol variants as possible. Ensure that graphical symbols already in international use are included.

5.2.2 If the number of graphical symbol variants collected appears to be insufficient, encourage the development of additional trial designs so as to improve the chances of obtaining positive results from the test programme.

5.2.3 Where two or more graphical symbols in the collection are very similar in graphical content, include only one of them in the test programme.

5.2.4 Exclude from the test programme any graphical symbol variants that are very similar in graphical content to an existing graphical symbol in the International Standards for public information, equipment or safety, including those in ISO 7000, ISO 7001, IEC 60417-1, IEC 60417-2 and ISO 3864.

NOTE This is intended to prevent the testing of variants that are easily confused with existing graphical symbols.

5.2.5 Propose for testing only those graphical symbol variants which meet the requirements of ISO/TR 7239 in graphic quality. Check that no variants are subject to copyright or are licensed trademarks.

5.3 Selection of the test to apply

A variant can be accepted as a standard graphical symbol for a particular referent if it reaches the criterion level of acceptability on the comprehensibility judgement test or the comprehension test.

If there are four or more variants for a particular referent, conduct a comprehensibility judgement test in at least two countries in order to determine the variants judged highest on comprehensibility. If no variant reaches the criterion of acceptability on judged comprehensibility, then the comprehension test can be administered.

If there are fewer than four variants for a particular referent, either the comprehensibility judgement test or the comprehension test shall be administered.

Carry out the tests in one of two ways, either using printed presentation (see clause 6) or using computer screen presentation (see clause 7), depending on which is most practicable.

6 Tests using printed presentation

6.1 Comprehensibility judgement test

6.1.1 Preparation of test material

6.1.1.1 Make any necessary adjustments to the graphical representations of the test symbols so that they meet the recommendations of ISO/TR 7239.

To ensure that all graphic materials are of the same standard, they should all be prepared at one production site and then distributed to the test administrators in each participating country.

The variants for one referent should be printed on one single sheet.

Variants should be black on white. Colour should only be used if colour is used for coding information. If a coloured variant is used, ensure that the contrast between the figure and its 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.
6.1.1.2 Prepare an information card for each referent. The information card shall state
— the referent,
— its function,
— its field(s) of application,
— excluded functions (if any).

Extract this information from the completed form for testing and standardization of a graphical symbol (see clause A.1).

6.1.1.3 All the variants for one referent should be printed in the standard dimensions of 28 mm (± 5 %) × 28 mm (± 5 %) on a sheet of paper of size A4 or similar. The variants should be positioned equally-spaced around the circumference of a circle with a radius of 80 mm, which has its centre at the centre of the sheet. A line for the response should be drawn under each variant. Write the name of the referent on the sheet.

6.1.1.4 Give each respondent a copy of the information card on top of the sheet showing the variants.

The variants for a number of different referents can be tested on each group of respondents. A separate sheet shall be used for the set of variants for each referent.

6.1.2 Respondents

6.1.2.1 Conduct the test in at least two countries. Whenever possible the countries chosen should have different cultural backgrounds, for example one European country and one Asian country.

To test a set of variants for a given referent, at least 50 respondents in each country are required.

6.1.2.2 The sample of respondents should resemble the eventual user population in terms of age, sex, educational level, occupation, cultural background and (when relevant) physical ability. This information should be recorded.

Respondents who have taken part in one test (comprehensibility judgement or comprehension) for any referent should not be used in any other test on that same referent.

6.1.2.3 The sample should preferably consist of respondents who can be expected to be familiar with a given referent.

6.1.3 Respondents' task in the comprehensibility judgement test

6.1.3.1 For each referent, instruct the respondent to read the information card showing the function and field(s) of application of the referent, and to bear these in mind when making judgements. Where the referent has excluded functions specified on the request for standardization (see clause A.1), draw the attention of the respondent to these excluded functions.

6.1.3.2 Before the respondent makes any judgement, he/she should examine all the variants shown on the single sheet.

Instruct the respondents to judge the comprehensibility of each variant by following this instruction:

"Each symbol is supposed to mean (provide the intended meaning). Please write the percentage of the population that you expect would understand this meaning."

Instruct the respondents to write their response on the line directly below each variant.
6.1.4 Analysis of the results of the comprehensibility judgement test

Tabulate the results for each country that participated in the test in a matrix as shown in clause B.1, so that there is one column for each variant and one row for each respondent. For each respondent, enter in one row the responses given by the respondent to each variant. Then for each variant calculate the mean and median of the responses and enter the appropriate values in the rows labelled “Mean” and “Median”.

If the responses of the comprehensibility judgement test are not normally distributed, the median of the responses should be used instead of the mean score.

6.1.5 Presentation of results

6.1.5.1 Prepare separate forms for each referent for each country which participated in the test (see clause B.2). Include the data from one country for all variants of the referent in a single form. Within each form, present variants in descending order of comprehensibility, as indicated by the mean responses.

6.1.5.2 In the results form for each referent, include the following information:
   a) the referent;
   b) the function of the referent;
   c) the field(s) of application;
   d) the country in which the test was conducted;
   e) the number of respondents in each age group, the sex of the respondents, their educational level, occupations, cultural backgrounds and if relevant their physical ability;
   f) copies of the graphical symbol variants tested with a statement of their colour;
   g) identification codes of the variants;
   h) the source of each variant;
   i) the mean and median of the responses for each variant;
   j) the information about the respondents collected in 6.1.2.2.

An example of a completed form is given in clause B.3.

6.1.6 Combination of the results from different countries

Take the data from all the countries which participated in the test. Calculate for each individual variant the mean and median of the responses from all participating countries.

Construct a results form similar to that described in 6.1.5.2 for each referent, showing the aggregated data from all countries which participated in the comprehensibility judgement test.

6.1.7 Determination of the variant judged most comprehensible

Study the mean responses obtained in stage 6.1.6. If any single variant obtained a mean higher than the criterion of acceptability for the comprehensibility judgement test, this variant may be accepted as the standard graphical symbol for the referent.

If more than one variant obtained a mean higher than the criterion of acceptability, select the one least likely to be confused with an existing standard graphical symbol (a graphical symbol which has been tested using the ISO procedure).
If any variants obtained a mean higher than the minimal score to justify further testing but no variant obtained a mean more than the criterion of acceptability, these variants should be subjected to the comprehension test.

If no variant obtained a mean higher than the minimal score to justify further testing, do not administer the comprehension test. Further variants shall be collected or designed, and this fresh set of variants subjected to the test procedure.

NOTE The criteria of acceptability may be obtained from the Secretary of ISO/TC 145.

6.1.8 Selection of variants for the comprehension test

6.1.8.1 When there are three or fewer variants for a particular referent, the comprehension test may be used instead of the comprehensibility judgement test.

NOTE When there are four or more variants for a particular referent, the comprehension test is used if the comprehensibility judgement test has failed to yield a variant with a mean response higher than the criterion of acceptability and has yielded one or more variants with a mean response higher than the minimal score to justify further testing.

6.1.8.2 For each country which participated in the comprehensibility judgement test, select the variant having the highest mean of responses and the two other variants which are significantly different in graphic detail from the highest-scoring variant, and which have the highest mean responses.

6.1.8.3 Where the results from the various countries agree on the three variants which were selected in 6.1.8.2, select these three variants for the comprehension test. Where the results from the various countries do not agree, select from the variants selected in 6.1.8.2 the two variants from each country which have the highest mean score.

NOTE Three variants are usually sufficient for the comprehension test, which assesses the degree to which respondents interpret the graphical symbol correctly when they see it for the first time.

6.2 Comprehension test

6.2.1 Preparation of test material

6.2.1.1 Make a set of test sheets (size A6 or similar) for each referent. Each sheet should show one of the graphical symbol variants to be tested and below it a line for the subject's response. Use a standard symbol size of 28 mm (± 5 %) x 28 mm (± 5 %) and position the symbol in the centre of the sheet.

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; for example, "at an airport", "on the wall of a public building". This information should be printed adjacent to the graphical symbol on each printed sheet.

For referents requiring some specific action when encountering the symbol, judging the quality of the responses can be improved by asking the following two questions: "What do you think this symbol means?" and "What action would you take in response to this symbol?" In this case both questions are to be printed in the space below the graphical symbol in such a way that enough room is available for writing down the answers.

6.2.1.2 Allocate the different variants of all referents to different test sets, which may contain a number of different referents, but shall contain only one variant of a given referent. 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.

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.

The number of referents in any given test set shall not exceed 20.
6.2.1.3 Assign each test set a code letter A, B, C, etc. Mark this code letter on the bottom right-hand-corner of every test sheet in the test set.

6.2.1.4 Assign each referent an identification number. Print this number after the code letter used to identify the test set on each test sheet in the test set.

6.2.1.5 Provide for each respondent a title sheet, an instruction sheet and an example sheet written in the language of the country in which the test is to be conducted.

On the title sheet, provide spaces for entering

— the date of the test session,
— the location 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,
— the respondent's educational level,
— the respondent's occupation,
— the respondent's cultural background,
— where relevant, the respondent's physical ability,

On the instruction sheet, instruct the respondent to write down, on the line below the graphical symbol, 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.

On the example sheet show a commonly known graphical symbol, and below it the name of the symbol written by hand.

If referents are tested that 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?".

In this case, on the example sheet show a commonly known graphical symbol, and print both questions below it with enough space for the answers. Insert into this space the name of the symbol as well as the actions that should be taken, both written by hand.

NOTE An example of booklet test material is given in clause C.1.

6.2.2 Respondents

6.2.2.1 Conduct the comprehension test in at least three countries.

NOTE Whenever possible the countries should have different cultural backgrounds.

The sample of respondents for one symbol set should comprise at least 50 respondents in each country.

6.2.2.2 The principles regarding the sample of respondents are described in 6.1.2.2.

6.2.2.3 The sample should preferably consist of respondents who can be expected to be familiar with a given referent.
6.2.2.4 Ensure that the groups which 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.

6.2.3 Respondents' task in the comprehension test

6.2.3.1 Present a single test booklet to each test respondent.

6.2.3.2 Tell the respondent to follow the instructions given on the instruction sheet. If there is any doubt about respondents' ability to understand the written instructions, read them out loud. Confirm that all respondents say they understand their task.

6.2.4 Analysis of the results of the comprehension test

6.2.4.1 Listing the responses

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

As the list of responses may be used to resolve any anomalies in the results from different countries, it should be kept available. It also provides information which may be useful for improving the design of the graphical symbol.

6.2.4.2 Categorizing the responses

To reduce data for subsequent evaluation, appoint three judges to assign each response on the list to one of the seven standard categories shown below.

<table>
<thead>
<tr>
<th>Category</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Correct understanding of the symbol is certain (estimated probability of correct understanding over 80 %)</td>
</tr>
<tr>
<td>2</td>
<td>Correct understanding of the symbol is very probable (estimated probability of correct understanding between 66 % and 80 %)</td>
</tr>
<tr>
<td>3</td>
<td>Correct understanding of the symbol is probable (estimated probability of correct understanding between 50 % and 65 %)</td>
</tr>
<tr>
<td>4</td>
<td>The meaning which is understood is opposite to that intended</td>
</tr>
<tr>
<td>5</td>
<td>Any other response</td>
</tr>
<tr>
<td>6</td>
<td>The response given is &quot;Don't know&quot;</td>
</tr>
<tr>
<td>7</td>
<td>No response is given</td>
</tr>
</tbody>
</table>

This categorization should be carried out with each of the judges working independently, each judge considering the function and field(s) of application of the corresponding referent as well as the examples of categorization provided. To achieve consistent judgement in all participating countries, provide examples of responses from each category.

Where the respondent has made no response at all on a given page of the booklet, instruct the judges to categorize this "response" as "No response is given". This case has to be distinguished from all other cases where the respondent has indicated by a question mark, a dash, a cross, or any other sign on the page, that he/she does not know the meaning of the graphical symbol. Categorize such responses as "Don't know".

If the judges do not agree on the category to which any particular response should be assigned, ask them to reach an agreed judgement. Where the judges are unable to agree on the judgement for a response, assign it to the category to which it was assigned by the majority of the judges.

NOTE Different judges may be used for different referents.
6.2.4.3 Analysing the categorization of responses

Tabulate the results for each country that participated in the test in a matrix as shown in clause C.2, so that there is one column for each variant and one row for each category of response.

For each variant, count the number of responses in each category for each country separately. Convert the frequencies thus obtained into percentage values by dividing them by the total number of responses in categories 1 to 6 given to that variant, and then multiplying by 100.

Complete the column headed “score” as follows:

— the percentage of responses in category 1 should be entered in the column headed “Score”;
— the percentage of responses in category 2 should be multiplied by 0.75 and entered in the column headed “Score”;
— the percentage of responses in category 3 should be multiplied by 0.5 and entered in the column headed “Score”.

Calculate the sum of the “Score” column entries, and enter the resulting value in the row labelled “Sum”. Subtract from the value in the cell labelled “Sum” the percentage frequency in the “Opposite meaning” response category (category 4), and enter the result in the cell labelled “Overall score”.

6.2.5 Presentation of results

Present the results for each referent in a table such as that shown in clause C.2, giving all the variants for one referent in a single table.

In the table for each referent, include the following information:

a) the year of the comprehension test;
b) the referent;
c) the function of the referent;
d) the field(s) of application;
e) the country in which the test was conducted;
f) the number of respondents in each age group, the sex of the respondents, their educational level, occupations, cultural backgrounds and if relevant their physical ability;
g) the academic qualifications or occupation of the three judges who categorized the responses for that referent;
h) copies of the variants tested, with a statement of their colour;
i) the source of each variant;
j) the number of respondents for each variant (i.e. the sample size);
k) the percentage of responses in each standard category for each variant;
l) the score for each of the appropriate standard categories for each variant;
m) the overall score for each variant, calculated as described in 6.2.4.3;
n) for each variant, a list of the five most frequent responses given in each of the response categories 1 to 5. Show the category into which each response was put, and the number of respondents who gave that response; 

o) the context information presented when the variants were tested.

6.2.6 Combination of the results from different countries

Take the data from all the countries which participated in the comprehension test. Calculate for each individual variant and for each response category 1 to 6 the total frequency of responses from all participating countries and convert these frequencies into percentage values. Complete the column headed “Score” as explained in 6.2.4.3, using the percentages for all respondents.

Construct a table (see the example in clause C.3) for each referent, showing the comprehension data from all countries which participated in the comprehension test. Include in these tables the following information:

a) the referent;

b) the countries in which the test was conducted;

c) the total number of respondents;

d) the number of respondents in each age group, the sex of the respondents, their educational level, occupations, cultural backgrounds and if relevant their physical ability;

e) the context information presented when the variants were tested;

f) copies of the variants tested, with their identification codes and a statement of their colour;

g) the source of each variant;

h) the number of respondents for each variant (i.e. the sample size);

i) the total actual frequency and overall percentage of responses in each standard category for each variant;

j) the score for each of the appropriate standard categories for each variant;

k) the overall score for each variant, calculated as described in 6.2.4.3.

6.2.7 Determination of the most comprehensible variant

Consider the combined data from all participating countries in order to determine the most comprehensible variant. The variant with the highest overall score is the most comprehensible variant.

If the overall score for this variant exceeds the criterion of acceptability on the comprehension test, then this variant may be used as the standard graphical symbol for the referent.

Where two variants exceed the criterion of acceptability on the comprehension test and have the same overall score, select the one least likely to be confused with an existing graphical symbol.

If no variant obtained an overall score exceeding the criterion of acceptability on the comprehension test, collect new designs and recommence the test procedure.

NOTE The criteria of acceptability may be obtained from the Secretary of ISO/TC 145.
7 Tests using computer screen presentation

7.1 Comprehensibility judgement test

7.1.1 Preparation of test material

7.1.1.1 For the description of the tests using 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.

To ensure that all pages are of the same standard, they should be prepared at one programming site and the programs and files than made available to the test administrators in each participating country in the format they need.

The screen size should be at least 15 inches, with minimum resolution of 800 x 600 pixels. This screen size and resolution are to ensure that the graphical symbol images presented are not distorted and that sufficient graphical symbol variants can be displayed simultaneously. If presented graphical symbol images show jagged lines or curves to the extent that the symbol image or self-contained image elements cannot be correctly interpreted, anti-aliasing methods shall be applied or minimum screen resolution shall be increased to improve the quality of the image.

The symbol image of the variants should be presented in black on a white background with the symbol image separated from the field of presentation by a square enclosure, or other shape if the symbol is in a safety geometric shape, for example a triangle or circle. For both the achromatic colours, the usual setting of the screen for white and black for text presentation should be used. Chromatic colour should only be used if it is necessary for colour coding. If a variant with chromatic colours is used, it is essential to ensure that the contrast between figure and background is sufficient for the variant to be readily visible and that the colours meet their CIE (Commission Internationale de l’Éclairage) specification (when necessary this specification can be derived from the surface colour specification).

7.1.1.2 Prepare an information page for each referent. This page shall state the name of the referent, its function, its field(s) of application and excluded functions (if any). Extract this information from the completed form for testing and standardization of a graphical symbol (see clause A.1).

7.1.1.3 Prepare an all-variants page for each referent, separate from the information page. Present a maximum of 12 graphical symbols sufficiently large for all details to be distinguishable. The side of the enclosure of a graphical symbol should be 20 mm (± 5%), with a minimum of 60 pixels. The graphical symbols should be positioned equally spaced around the circumference of a circle (white on white) with a radius of 80 mm, which has its centre coinciding with the centre of the screen. When required (in the case of 11 or 12 variants), the circle can be elongated into an ellipse to accommodate symbol variants better. The small axis of the ellipse should be kept at 160 mm.

In the middle of the all-variants page, again state the name of the referent, its function, its field(s) of application and excluded functions (if any).

A rectangular data-entry field should be defined under each graphical symbol. A horizontal line should be shown at the bottom of this field with a percent (%) sign at the right-hand end of the data-entry field. It should be possible to position the cursor in the data-entry field (in front of the % sign) to key in the response. Feedback should be provided to identify the data-entry field selected as well as the corresponding graphical symbol (e.g. by highlighting both elements).

7.1.1.4 The presentation of each all-variants page should be preceded by two pages: the instruction page and the information page. Both pages are referent-specific. The instruction page should mention the name of the referent and instruct the respondent to read the next page (the information page) carefully because it will describe the referent and will point to any excluded functions. The information page describes the function and field(s) of application of the referent. It specifies excluded functions if these are listed on the request for standardization of the referent (see clause A.1). Both pages should have a “next page” and a “previous page” button so that the respondent can move from one page to the other by using the cursor keys or mouse.

7.1.1.5 The workstation layout, the visual display and the keyboard should be in the positions recommended in ISO 9241-3, ISO 9241-4, ISO 9241-5 and ISO 9241-12.
7.1.1.6 For each respondent, the variant graphical symbols should be positioned in a different random order around the circle on the screen.

During the test, a respondent may have available a printed version of the information display for the referent.

7.1.2 Respondents

7.1.2.1 Conduct the test in at least two countries.

Whenever possible the countries chosen should have different cultural backgrounds, for example, one European country and one Asian country.

To test a set of variants for a given referent, at least 50 respondents in each country are required.

7.1.2.2 The sample of respondents should resemble the eventual user population in terms of age, sex, educational level, occupation, cultural background and (when relevant) physical ability. This information should be recorded.

Respondents who have taken part in one test (comprehensibility judgement or comprehension) for any referent should not be used in any other test on that same referent.

7.1.2.3 The sample should preferably consist of respondents who can be expected to be familiar with a given referent.

7.1.3 Respondents' task in the comprehensibility judgement test

Before the test-specific instruction is presented, the respondent should be informed on how to move the cursor and to navigate between the various pages. Verify that the respondent is familiar with this task of interacting with the computer.

Before the respondents make any judgement, they should examine all the variants shown in the all-variants page.

Instruct the respondents to assign a percentage to each of the variants. The comprehensibility of each variant should be judged by following this instruction:

"Each symbol is supposed to mean (provide intended meaning). Please insert the percentage of the population you expect would understand this meaning by moving the cursor in front of the % sign underneath each symbol and keying in the number."

7.1.4 Analysis of the results of the comprehensibility judgement test

The data entered by the respondents in the all-variant pages should be processed in such a way that the following requirements can be met.

Tabulate the results for each country that participated in the test in a matrix as shown in clause B.1, so that there is one column for each variant and one row for each respondent. Enter in one row the responses given by one respondent to each variant. Then for each variant calculate the mean and median of the responses and enter the appropriate values in the rows labelled "Mean" and "Median".

If the responses of the comprehensibility judgement test are not normally distributed, the median of the responses should be used instead of the mean score.

7.1.5 Presentation of results

7.1.5.1 Prepare separate forms for each referent for each country which participated in the test (see clause B.2). Include the data from one country for all variants of the referent in a single form. Within each form, present variants in descending order of comprehensibility, as indicated by the mean responses.
In the results form for each referent, include the following information:

a) the referent;
b) the function of the referent;
c) the field(s) of application;
d) the country in which the test was conducted;
e) the number of respondents in each age group, the sex of the respondents, their educational level, occupations, cultural backgrounds and if relevant their physical ability;
f) copies of the graphical symbol variants tested, with a statement of their colour;
g) identification codes of the variants;
h) the source of each variant;
i) the mean and median of the responses for each variant;
j) the information about the respondents collected in 7.1.2.2.

An example of a completed form is given in B.3.

7.1.6 Combination of the results from different countries

Take the data from all the countries which participated in the test. Calculate for each individual variant the mean and median of the responses from all participating countries.

Construct a results form similar to that described in 7.1.5.2 for each referent, showing the aggregated data from all countries which participated in the comprehensibility judgement test.

7.1.7 Determination of the variant judged most comprehensible

Study the mean responses obtained in stage 7.1.6. If any single variant obtained a mean higher than the criterion of acceptability for the comprehensibility judgement test, this variant may be accepted as the standard graphical symbol for the referent.

If more than one variant obtained a mean higher than the criterion of acceptability, select the one least likely to be confused with an existing standard (a graphical symbol which has been tested using the ISO procedure).

If any variants obtained a mean higher than the minimal score to justify further testing, but no variant obtained a mean higher than the criterion of acceptability, these variants should be subjected to the comprehension test.

If no variant obtained a mean higher than the minimal score to justify further testing, do not administer the comprehension test. Further variants shall be collected or designed, and this fresh set of variants subjected to the test procedure.

-NOTE The criteria of acceptability may be obtained from the Secretary of ISO/TC 145.

7.1.8 Selection of variants for the comprehension test

7.1.8.1 When there are three or fewer variants for a particular referent, the comprehension test may be used instead of the comprehensibility judgement test.

When there are four or more variants for a particular referent, the comprehension test is used if the comprehensibility judgement test has failed to yield a variant with a mean response higher than the criterion of
acceptability and has yielded one or more variants with a mean response higher than the minimal score to justify further testing.

7.1.8.2 For each country which participated in the comprehensibility judgement test, select the variant having the highest mean response and the two other variants which are significantly different in graphic detail from the highest-scoring variant and which have the highest mean responses.

7.1.8.3 Where the results from the various countries agree on the three variants which were selected in 7.1.8.2, select these three variants for the comprehension test. Where the results from the various countries do not agree, select from the variants selected in 7.1.8.2 the two variants from each country which have the highest mean score.

NOTE Three variants are usually sufficient for the comprehension test, which assesses the degree to which respondents interpret the graphical symbol correctly when they see it for the first time.

7.2 Comprehension test

7.2.1 Preparation of test material

7.2.1.1 The instructions concerning mode and quality of presentation as defined in 7.1.1.1 also apply to the comprehension test.

Make a series of test pages, one for each of the graphical symbols in the test. A test page should show one of the graphical symbols positioned in the centre of the page. The dimensions of the graphical symbol should be at least 40 mm x 40 mm.

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 graphical symbol; for example, "at an airport", "on the wall of a public building". This information should be shown adjacent to the graphical symbol on each test page.

Below the graphical symbol should be a rectangular box with a long side of length at least 80% of the maximum length of line in the graphical symbol. The box is intended for the respondents' response and should provide space for four lines of text with at least 50 characters per line. This box should be headed by the question: "What do you think this symbol means?".

For referents requiring some specific action when encountering the graphical symbol, judging the quality of the responses can be improved by asking the following additional question: "What action would you take in response to this symbol?" In this case a second rectangular box for entering the response should be displayed, headed by this question and providing space for four lines of text.

7.2.1.2 Allocate the different variants of all referents to different test sets, which may contain a number of different referents, but shall contain only one variant of a given referent. 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 pages.

The number of referents in any given test set shall not exceed 20.

7.2.1.3 Assign each test page a unique code consisting of a code for the set and a code for the referent. Assign each set of test pages a unique identification code (e.g. a code letter A, B, C, etc.). This code should not be shown on the test page, as it is only intended for internal use. Assign each referent a unique code (e.g. a number), and combine the two codes to identify each test page by set and referent.

7.2.1.4 In each test session a set of test pages has three preceding pages: an identification page, an instruction page and an example page.

The identification page has the format of a questionnaire. The questions are the following: Date of the test session, name of the person conducting the test, age of the respondent defined by age groups (between 15 and 30, between 31 and 50, over 50), sex of the respondent, their educational level, their occupation, their cultural background and if relevant their physical ability.
The instruction page presents three instruction items, as follows.

a) The respondent should enter in the box below the graphical symbol the answer to the question: “What do you think this symbol means?”.

b) The respondent should enter in the box below the graphical symbol the response “Don’t know” if he/she is unable to assign a meaning to the graphical symbol.

c) The respondent is told that the next page will show a completed testpage.

If referents are tested that require some specific action when encountering the graphical symbol, the instruction page presents an additional item:

d) The respondent should enter, in the second box below the graphical symbol, his/her answer to the question: “What action would you take in response to this symbol?”.

The example page should show a commonly known public-information graphical symbol. Above the graphical symbol, in conspicuous lettering (e.g. bold and large), is shown the word “Example”. Below this word should be displayed the text informing the respondents of the general context in which they would expect to see the graphical symbol. In the box below the graphical symbol, the meaning should already be entered. If referents that require some specific action when encountering the graphical symbol are tested, on the example page the second box below the graphical symbol should be presented with the actions that should be taken already entered.

At the bottom of the 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.” (The number of pages should be entered in the space shown in the second sentence.)

7.2.1.5 For each respondent, the test pages should be presented in a different random order.

7.2.2 Respondents

7.2.2.1 Conduct the comprehension test in at least three countries.

Whenever possible the countries chosen should have different cultural backgrounds.

The sample of respondents for one graphical symbol set should comprise at least 50 respondents in each country.

7.2.2.2 The principles regarding the sample of respondents are described in 7.1.2.2.

7.2.2.3 The sample should consist preferably of respondents who can be expected to be familiar with a given referent.

7.2.2.3 Ensure that the groups which 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.

7.2.3 Respondents' task in the comprehension test

7.2.3.1 The viewing conditions described in 7.1.3.2 for computer presentation should be used.

7.2.3.2 Before the test-specific instruction is presented, the respondent shall be informed on how to move the cursor and to navigate between the various pages.

Tell the respondent to follow the instructions in the instruction page. A respondent should confirm that he/she understands the task. Verify that the respondent is well versed in the use of a personal computer, i.e. can use the keyboard to enter text, can use the cursor keys or the mouse, and knows how to interact with the page. Respondents not familiar with the use of a personal computer should be asked to read the instructions out loud and provide an oral answer to the question on each test page. The answer should be entered in the computer page by
the person conducting the test. The text entered shall be verified by the respondent. This procedure should have the consent of the respondent.

7.2.4 Analysis of the results of the comprehension test

7.2.4.1 Listing the responses

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

As the list of responses may be used to resolve any anomalies in the results from different countries, it should be kept available. It also provides information which may be useful for improving the design of the graphical symbol.

7.2.4.2 Categorizing the responses

To reduce data for subsequent evaluation, appoint three judges to assign each response on the list to one of the seven standard categories shown below.

<table>
<thead>
<tr>
<th>Category</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Correct understanding of the symbol is certain (estimated probability of correct understanding over 80 %)</td>
</tr>
<tr>
<td>2</td>
<td>Correct understanding of the symbol is very probable (estimated probability of correct understanding between 66 % and 80 %)</td>
</tr>
<tr>
<td>3</td>
<td>Correct understanding of the symbol is probable (estimated probability of correct understanding between 50 % and 65 %)</td>
</tr>
<tr>
<td>4</td>
<td>The meaning which is understood is opposite to that intended</td>
</tr>
<tr>
<td>5</td>
<td>Any other response</td>
</tr>
<tr>
<td>6</td>
<td>The response given is &quot;Don't know&quot;</td>
</tr>
<tr>
<td>7</td>
<td>No response is given</td>
</tr>
</tbody>
</table>

This categorization should be carried out with each of the judges working independently, each judge considering the function and field(s) of application of the corresponding referent as well as the examples of categorization provided. To achieve consistent judgement in all participating countries, provide examples of responses from each category.

Where the respondent has made no response at all, instruct the judges to categorize this “response” as “No response is given”. This case has to be distinguished from all other cases where the respondent has indicated by a question mark, a dash, a cross, or any other sign on the page, that they do not know the meaning of the graphical symbol. Categorize such responses as “Don’t know”.

If the judges do not agree on the category to which any particular response should be assigned, ask them to reach an agreed judgement. Where the judges are unable to agree on the judgement for a response, assign it to the category to which it was assigned by the majority of judges.

NOTE Different judges may be used for different referents.

7.2.4.3 Analysing the categorization of responses

Tabulate the results for each country that participated in the test in a matrix as shown in clause C.2, so that there is one column for each variant and one row for category of response.
For each variant, count the number of responses in each category for each country separately. Convert the frequencies thus obtained into percentage values by dividing them by the total number of responses in categories 1 to 6 given to that variant, and then multiplying by 100.

Complete the column headed “Score” as follows:

— the percentage of responses in category 1 should be entered in the column headed “Score”;

— the percentage of responses in category 2 should be multiplied by 0.75 and entered in the column headed “Score”;

— the percentage of responses in category 3 should be multiplied by 0.5 and entered in the column headed “Score”.

Calculate the sum of the “Score” column and enter the resulting value in the row labelled “Sum”. Subtract from the value in the cell labelled “Sum” the percentage frequency in the “Opposite meaning” response category (category 4), and enter the result in the cell labelled “Overall score”.

7.2.5 Presentation of results

Present the results for each referent in a table such as that shown in clause C.2, giving all the variants for one referent in a single table. In the table for each referent, include the following information:

a) the year of the comprehension test;
b) the referent;
c) the function of the referent;
d) the field(s) of application;
e) the country in which the test was conducted;
f) the number of respondents in each age group, the sex of the respondents, their educational level, occupations, cultural backgrounds and if relevant their physical ability;
g) the context information presented when the variants were tested;
h) the academic qualifications or occupation of the three judges who categorized the response for that referent;
i) copies of the variants tested, with a statement of their colour;
j) the source of each variant;
k) the number of respondents for each variant (i.e. the sample size);
i) the percentage of responses in each standard category for each variant;
m) the score for each of the appropriate standard categories for each variant;
n) the overall score for each variant, calculated as described in 7.2.4.3.
o) for each variant, a list of the five most frequent responses given in each of the response categories 1 to 5. Show the category into which each response was put, and the number of respondents who gave that response.
7.2.6 Combination of the results from different countries

Take the data from all the countries which participated in the comprehension test. Calculate for each individual variant and for each response category 1 to 6 the total frequency of responses from all participating countries and convert these frequencies into percentage values. Complete the column headed "Score" as explained in 7.2.4.3, using the percentages for all respondents.

Construct a table (see the example in clause C.3) for each referent, showing the comprehension data from all countries which participated in the comprehension test. Include in these tables the following information:

a) the referent;
b) the countries in which the test was conducted;
c) the number of respondents in each age group, the sex of the respondents, their educational level, occupations, cultural backgrounds and if relevant their physical ability;
d) the total number of respondents;
e) copies of the variants tested, with their identification codes and a statement of their colour;
f) the source of each variant;
g) the context information presented when the variants were tested;
h) the number of respondents for each variant (i.e. the sample size);
i) the total actual frequency and overall percentage of responses in each standard category for each variant;
j) the score for each of the appropriate standard categories for each variant;
k) the overall score for each variant, calculated as described in 7.2.4.3.

7.2.7 Determination of the most comprehensible variant

Consider the combined data from all participating countries in order to determine the most comprehensible variant. The variant with the highest overall score is the most comprehensible variant.

If the overall score for this variant exceeds the criterion of acceptability on the comprehension test, then this variant may be used as the standard graphical symbol for the referent.

Where two variants exceed the criterion of acceptability on the comprehension test and have the same overall score, select the one least likely to be confused with an existing graphical symbol.

If no variant obtained an overall score exceeding the criterion of acceptability on the comprehension test, collect new designs and recommence the test procedure.

NOTE The criteria of acceptability may be obtained from the Secretary of ISO/TC 145.

8 Accepting a variant as a standard graphical symbol

The variant which has met the criterion of acceptability on the comprehensibility judgement test or the comprehension test is that which should be accepted as the standard graphical symbol for the referent.
Annex A
(normative)

Collection of information

A.1 Request form for standardization of a graphical symbol

(See pages 21 to 23.)
APPLICATION FORM

ISO/ID No. Date:

Information required prior to testing and standardization of a graphical symbol

<table>
<thead>
<tr>
<th>1</th>
<th>Description of the existing communication problem</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Describe the communication problem:</td>
</tr>
<tr>
<td></td>
<td>The communication problem is <em>(tick one box)</em></td>
</tr>
<tr>
<td></td>
<td>□ unrelated to region and culture</td>
</tr>
<tr>
<td></td>
<td>□ related to region and culture with regard to:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2</th>
<th>Why is a graphical symbol likely to solve the existing communication problem?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tick all those which apply:</td>
</tr>
<tr>
<td></td>
<td>□ The information should be comprehensible to people who do not speak the language of the country.</td>
</tr>
<tr>
<td></td>
<td>□ The information is frequently displayed with other information (e.g. in airports, travel brochures, etc.) and a sequence of symbols can be more easily scanned than a sequence of verbal instructions.</td>
</tr>
<tr>
<td></td>
<td>□ The information concerned requires a prompt reaction and must be comprehensible at a glance.</td>
</tr>
<tr>
<td></td>
<td>Can the problem be overcome by other means, such as providing physical barriers, better maintenance, etc.?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>3</th>
<th>Function of the graphical symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Give a precise description of the information to be conveyed by the graphical symbol</td>
</tr>
<tr>
<td>b)</td>
<td>List any related but excluded functions (i.e. what the graphical symbol should not stand for)</td>
</tr>
</tbody>
</table>
### Field(s) of application

<table>
<thead>
<tr>
<th>Identify the contexts in which the graphical symbol is to be used</th>
<th>Identification signs in buildings or other locations</th>
<th>Always without text</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Directional signs or signposts</td>
<td>Usually with text</td>
</tr>
</tbody>
</table>

(Tick whichever boxes apply)

- □ Floorplans, orientational diagrams, maps
- □ Brochures and guidebooks
- □ Timetables
- □ Household appliances, vehicles, etc
- □ Other locations (please specify)

☐ If there are any colour requirements, please describe them and explain why they are necessary:

### Target audience

| Identify the audience intended to receive the information | All user groups |

☐ Specific audiences:

- Age group from .. to .. years
- Educational level:
- Occupations:
- Sex:
- Cultural background:
- Other factors:

### Subdivision of the referent

Identify any subgroups of the referent. If subgroups are necessary, list them, explain why they are necessary and review the entries made under 1 to 5.

### Related/complementary referents

Identify any related or complementary referents

If there are any related or complementary referents, list them and review the entries made under 1 to 6.

### Existing test data

Are there any data available on the judged comprehensibility or comprehension of graphical symbols intended for this referent? **Yes/No**

Are data available on the judged comprehensibility or comprehension of graphical symbols intended for this referent?

If the answer is Yes, please give a contact name:

NOTE Please attach any test data.
9  Graphical symbols

Please insert reproducible
28 mm × 28 mm copies 1) of
proposed graphical symbols,
wherever possible quoting
originator and/or source

Originator:

Source:

10  Applicant (institution or person)

Name:

Address:

Signature:

Expert to be contacted if necessary:

Name:

Address:

If additional information material is enclosed, please tick this box: ☐

1) When the number of existing graphical symbols exceeds three, please use an additional sheet.
A.2 Guidance on filling in the application form

The following information shall be given in the request form illustrated in clause A.1.

Heading – Referent

A concise verbal description of the meaning of the proposed graphical symbol shall be given.

Section 3 – Function of the graphical symbol

A precise description of the information to be conveyed shall be given. Where a graphical symbol is specifically not to be used for some functions, these shall be listed under the heading “excluded functions” in section 3 b) of the form.

Section 4 – Field(s) of application

As complete a list as possible of the areas in which the message needs to be conveyed shall be given.

Section 5 – Target audience

Probable audiences shall be specified. When it is appropriate, their cultural background shall be stated.

Section 6 – Subdivision of the referent

Any subgroups that need individual referents shall be listed. If there are any subgroups, the specification of the original referent, its function, field(s) of application and target audience shall be reviewed and modified where necessary.

Section 7 – Related/complementary referents

The need for related referents, such as negation, opposites and complements of the referent, shall be considered. If related referents are needed, the specifications of the original referent shall be reviewed and modified where necessary.

Section 8 – Existing test data

If the graphical symbols are known to have been subjected to the comprehensibility judgement test and/or the comprehension test, the name of a contact from whom the data can be obtained shall be entered. If possible, the data from the test(s) should be submitted with the form.

A.3 Example of a completed request form for testing and standardization of a graphical symbol

(See pages 25 to 27.)
### Information required prior to testing and standardization of a graphical symbol

**ISO/ID No. X 248/00**

**Date:** MAY 2000

**Referent:** BATH  
**Applicant:** AUSTRIA

<table>
<thead>
<tr>
<th>1</th>
<th>Description of the existing communication problem encountered in conveying information</th>
</tr>
</thead>
</table>
| | Description of the communication problem:  
| | Travellers need to know where they can obtain a bath in a transit area (e.g. an airport) or in a longer-stay area such as a hotel or a campsite.  
| | Travellers are often unfamiliar with the language of the country they are in.  
| | The communication problem is  
| | ☐ unrelated to region and culture  
| | ☐ related to region and culture with regard to: |

<table>
<thead>
<tr>
<th>2</th>
<th>Why is a graphical symbol likely to solve the existing communication problem?</th>
</tr>
</thead>
</table>
| | ☒ The information should be comprehensible to people who do not speak the language of the country.  
| | ☒ The information is frequently displayed with other information (e.g. in airports, travel brochures, etc.), and a sequence of graphical symbols can be more easily scanned than a sequence of verbal instructions.  
| | ☐ The information concerned requires a prompt reaction and must be comprehensible at a glance.  
| | Can the problem be overcome by other means, such as providing physical barriers, better maintenance, etc.?  
| | No |

<table>
<thead>
<tr>
<th>3</th>
<th>Function of the graphical symbol</th>
</tr>
</thead>
</table>
| | a) Give a precise description of the information to be conveyed by the graphical symbol  
| | To indicate and identify a location where an indoor facility for submersion of the human body in water in a near-horizontal position is available.  
| | b) List any related but excluded functions (i.e. what the graphical symbol does not stand for)  
| | Shower, swimming pool, seashore, beach, toilets. |
### Field(s) of application

Identify the contexts in which the graphical symbol is to be used

- ✔ Identification signs in buildings or other locations
- ✔ Directional signs or signposts
- ✔ Floorplans, orientational diagrams, maps
- ✔ Brochures and guidebooks
- ✔ Timetables
- ✔ Household appliances, vehicles, etc
- ✔ Other locations (please specify)

- If there are any **colour requirements**, please describe them and explain why they are necessary:

### Target audience

Identify the audience intended to receive the information

- ✔ All user groups
- ✔ Specific audiences:
  - Age group from ....... to ...... years
  - Educational level:
  - Occupations:
  - Sex:
  - Cultural background:
  - Other factors:

### Subdivision of the referent

Identify any subgroups of the referent. If subgroups are necessary, list them, explain why they are necessary and review the entries made under 1 to 5

- In some countries it might be necessary to show different signs for "bath for men" and "bath for women".

### Related/complementary referents

Identify any related or complementary referents

- The term "bath-room" may be applied as well.

If there are any related or complementary referents, list them and review the entries made under 1 to 6

- Complementary referent: shower. There should be a separate graphical symbol for this referent. Both graphical symbols are frequently applied in an information system. If a shower is available at the same location it seems important to indicate this fact. The graphical symbol "bath" should be combined with a separate graphical symbol for "shower".

### Existing test data

Are data available on the judged comprehensibility or comprehension of graphical symbols intended for this referent?  **Yes / No**

If the answer is Yes, please give a contact name:

**NOTE** Please attach any test data.
9  

Graphical symbols

Please insert reproducible 28 mm x 28 mm copies of proposed graphical symbols, wherever possible quoting originator and/or source

Originator: unknown

Source: Symbol source book by Henry Dreyfuss
         Tokyo Olympics 1964

Falkner, A.
Austria

10  

Applicant (institution or person)

Name: Österreichisches Normungsinstitut

Address: A-1020 Vienna, Heinestraße 38, Austria

Signature:

Expert to be contacted if necessary:

Name: Österreicher Peter

Address: A-1020 Vienna, Hoffnungsstraße 3, Austria

If additional information material is enclosed, please tick this box: □

2) When the number of existing graphical symbols exceeds three, please use an additional sheet.
### B.1 Frequency matrix for analysing the results of the comprehensibility judgement test

<table>
<thead>
<tr>
<th>Referent number:</th>
<th></th>
<th>Variant</th>
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<td>Referent name:</td>
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<td>Respondent</td>
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<td>B</td>
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<tr>
<td>Median</td>
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</tr>
</tbody>
</table>

1) $V_n$ is the code letter identifying the $n^{th}$ variant and $n$ is the number of variants for the specific referent.

2) $x$ is the number of respondents.
B.2 Form for presenting the results of the comprehensibility judgement test

Referent:

Function:

Field(s) of application:

Country which provided data:

<table>
<thead>
<tr>
<th>Total number of respondents:</th>
<th>15 to 30</th>
<th>31 to 50</th>
<th>over 50</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Number of respondents in each age group:</th>
<th>15 to 30</th>
<th>31 to 50</th>
<th>over 50</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Number of respondents of each sex:</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Number of respondents of each educational level:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Occupations of respondents:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Cultural backgrounds of respondents:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Physical abilities of respondents:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Variants tested:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Colour:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code:</td>
</tr>
<tr>
<td>Source:</td>
</tr>
<tr>
<td>Mean:</td>
</tr>
<tr>
<td>Median:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variants tested:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Colour:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code:</td>
</tr>
<tr>
<td>Source:</td>
</tr>
<tr>
<td>Mean:</td>
</tr>
<tr>
<td>Median:</td>
</tr>
</tbody>
</table>
B.3 Example showing a completed form for presenting the results of the comprehensibility judgement test

Referent name: BATH

Function: To indicate and identify a location where an indoor facility for submersion of the human body in water in a near-horizontal position is available.

Field(s) of application: Signs at airports and railway stations, in hotels, campsites, recreation centres, hospitals, accommodation lists, guidebooks.

Country which provided data: United Kingdom

Total number of respondents: 60

Number of respondents in each age group: 15 to 30 ...20...; 31 to 50 ......20...; over 50 ......20...

Number of respondents of each sex: Males ...32...; Females ......28...;

Number of respondents of each educational level: 15 school-leavers; 40 with post-school qualifications but not a degree; 5 with degree

Occupations of respondents: 8 nurses, 2 labourers, 32 office workers, 3 managers, 2 teachers, 3 students, 10 kitchen staff

Cultural backgrounds of respondents: 52 white English, 4 Indian English, 4 Pakistan resident in England over 5 years

Physical ability of respondents: 1 registered partially sighted, 2 physically impaired (wheelchair users), 57 with no impairments

Variants tested:

<table>
<thead>
<tr>
<th>Colour</th>
<th>Black</th>
<th>Black</th>
<th>Black</th>
<th>Black</th>
<th>Black</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code:</td>
<td>C</td>
<td>D</td>
<td>E</td>
<td>B</td>
<td>A</td>
</tr>
<tr>
<td>Mean:</td>
<td>92</td>
<td>88</td>
<td>86</td>
<td>52</td>
<td>21</td>
</tr>
<tr>
<td>Median:</td>
<td>100</td>
<td>90</td>
<td>85</td>
<td>48</td>
<td>10</td>
</tr>
</tbody>
</table>
C.1 Example of test material for a comprehension test

Each country shall prepare an equivalent translation of the title, instruction and example sheets. The actual size of the test sheets shall be A6 or similar.

Title sheet

**COMPREHENSION TEST**
Date: Location: Conducted by:
Respondent's age: 15 to 30_; 31 to 50_; over 50_ Respondent's sex: M F
Educational level: Occupation: Cultural background: Physical ability:

On each page of this booklet is a symbol. Study each symbol in turn and write down on the line below the appropriate symbol what you think that symbol means. Write down "Don't know" if you are unable to assign a meaning to the symbol. On the second line, write down what you would do if you saw this symbol. An example is given overleaf.

**This is an example**
Context: In a hotel or on sign post

![Symbol](accommodation)

**Accommodation**

Context: In the street of a seaside town

![Symbol](ship)

**Context:** In the street of a seaside town

Identification of test set and referent
### C.2 Table for presenting the results of the comprehension test

Referent:  
Function:  
Field(s) of application:  
Country:  
Number of respondents  

<table>
<thead>
<tr>
<th>Age</th>
<th>Sex: Male</th>
<th>Educational levels</th>
<th>Occupations</th>
<th>Cultural backgrounds</th>
<th>Physical ability</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 to 30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31 to 50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>over 50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Qualifications or occupations of judges  
Judge 1:  
Judge 2:  
Judge 3:  

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Symbol</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variant A</th>
<th>Variant B</th>
<th>Variant C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

**Context information:**  
Colo:  
Source:  
Sample size:  

<table>
<thead>
<tr>
<th>Category</th>
<th>...... %</th>
<th>Score</th>
<th>...... %</th>
<th>Score</th>
<th>...... %</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Almost certain (estimated probability over 80 %)</td>
<td>(≈ %)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Very probable (estimated probability 66 % to 80 %)</td>
<td>(≈ % × 0.75)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Probable (estimated probability 50 % to 65 %)</td>
<td>(≈ % × 0.5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Opposite meaning</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Other response</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Don't know</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 No response</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sum</th>
<th>Overall score</th>
<th>(= Sum - % opposite meaning)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## C.3 Table for showing the combined data from participating countries for the comprehension test

Referent name:  
Participating countries:  
Number of respondents  

<table>
<thead>
<tr>
<th>Age</th>
<th>Sex</th>
<th>Educational levels</th>
<th>Occupations</th>
<th>Cultural backgrounds</th>
<th>Physical ability</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 to 30</td>
<td>Male:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31 to 50</td>
<td>Female:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>over 50:</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Total:</td>
<td></td>
<td></td>
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</tbody>
</table>

Context information:
<table>
<thead>
<tr>
<th>Response category</th>
<th>F.................%</th>
<th>Score</th>
<th>F.................%</th>
<th>Score</th>
<th>F.................%</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Almost certain (estimated probability over 80 %)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>2 Very probable (estimated probability 66 % to 80 %)</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>3 Probable (estimated probability 50 % to 65 %)</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>4 Opposite meaning</td>
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<td></td>
<td></td>
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<tr>
<td>5 Other response</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Don't know</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>7 No response</td>
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<tr>
<td>Sum</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Overall score</td>
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</tbody>
</table>
Annex D
(normative)

Approved testing

Testing graphical symbols requires certain levels of competence and knowledge. To ensure that the results of any testing programme are valid and to be considered for the standardization process, a full report of the testing programme shall be submitted, in addition to the tables summarizing the outcome. The report and results tables shall be submitted to the Secretary of the relevant subcommittee of ISO/TC 145, who will ask experts to provide a peer review of the report before the results are put before the subcommittee. Experts with experience in testing graphical symbols will be assigned the task of judging the credibility of the results, based on a detailed analysis of the raw data submitted.
Bibliography


[2] ISO 9241-4, Ergonomic requirements for office work with visual display terminals (VDTs) — Part 4: Keyboards requirements.

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

[4] ISO 9241-12, Ergonomic requirements for office work with visual display terminals (VDTs) — Part 12: Presentation of information.
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This Indian Standard has been developed from Doc: No. MGP 01 (0453).

Amendments Issued Since Publication

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