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Procedures for the development and testing of public information symbols

Procédures pour le développement et les essais des symboles destinés à l'information du public

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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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 9186 was prepared by Technical Committee ISO/TC 145, *Graphical symbols*.

Annexes A, B, C and D form an integral part of this International Standard.

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Procedures for the development and testing of public information symbols

1 Scope

This International Standard specifies the procedure to be used in gathering the information needed to develop public information symbols, the method to be used in testing which variant of a symbol is the most appropriate, the method to be used in testing the extent to which a variant of a symbol communicates its intended message, and the definition of the proposed standard image content of the most comprehensible symbol.

NOTES

1 At an early stage of the work, any body responsible for proposing a public information symbol should ascertain whether any other public information symbol has been standardized or is under development within ISO for

- the same referent,
- the same function, or
- the same user population.

2 Throughout this International Standard the term "symbol" refers to a public information symbol, and the term "variant" to a variant of a public information symbol.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO/TR 7239 : 1984, *Development and principles for application of public information symbols*.

3 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1 appropriateness ranking test: Procedure for placing symbols, designed for a given referent, in descending order of merit according to their considered appropriateness. [ISO/TR 7239 : 1984.]

3.2 complementary referents: Referents which perform a similar function in the same set.

NOTE — Examples of referents with complementary meanings are "washing machine" and "drier".

3.3 comprehension test: Procedure for eliciting a response from the public which enables measurement of the degree of comprehension of the proposed symbols. [ISO/TR 7239 : 1984.]

3.4 excluded functions: Functions of a referent or of a complementary referent which are not to be denoted by the symbol.

NOTE — An example of an excluded function is that "bath" should not indicate "shower" or "swimming pool".

3.5 image content: The elements of the symbol and their relative disposition. [ISO/TR 7239 : 1984.]

3.6 negation of a referent: Modification of an image, by adding a graphic element, in order to negate a specific function. Negation usually indicates prohibition.

3.7 public information symbol: Graphical symbol, intended to give information to the general public, the understanding of which is not normally dependent on specialist or occupational training. [ISO/TR 7239 : 1984.]

3.8 referent

(1) The subject represented by the symbol. [ISO/TR 7239 : 1984.]

(2) A concise verbal description of the meaning of the proposed symbol.

3.9 standard image content: Image content as described in words for each referent and published in ISO 7001[1]. [ISO/TR 7239 : 1984.]

3.10 variant: Alternative design for a given referent.

1) ISO 7001 : 1980, *Public information symbols*.

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4 Principle

The various stages in the procedure for the development and testing of public information symbols are as follows.

a) The collection of the information needed concerning the request for a standard symbol or standard image content (see 5.1).

b) The collection of a set of existing and proposed variants for each referent (see 5.2).

c) The selection of the most appropriate variants. When there are four or more variants, this is achieved by carrying out an appropriateness ranking test in at least two countries (see 5.3 and 5.4).

d) The testing of the comprehensibility of the most appropriate variants. This is accomplished by conducting a comprehension test in at least four countries (see 5.5).

e) The definition of the standard image content and/or standardization of the most appropriate symbol (see clause 6).

5 Procedure

5.1 Collection of information

Carefully consider the details of the request for the standardization of a symbol or the image content of a symbol. For this purpose, complete the form shown in clause A.1.

NOTES

1 An analysis of all aspects of the communication problem is a necessary first step in determining whether a symbol or the standardization of an image content of a symbol is the correct solution to the communication problem.

2 The form in clause A.1 lists the points to 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 symbol variants

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

5.2.2 If the number of 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 symbols in the collection are very similar except for insignificant differences, include only one of them in the test programme.

5.2.4 Propose for testing only those symbol variants which are suitable in graphic quality and content.

It should be borne in mind that the decision as to whether a given symbol variant should be included in the test programme depends on the willingness of the applicant to implement it.

5.3 Selection of the most appropriate variants

If there are four or more variants for a particular referent, conduct an appropriateness ranking test in order to determine the most appropriate variants. If there are fewer than four variants for a particular referent, an appropriateness ranking test is not needed.

5.4 Appropriateness ranking test

5.4.1 Preparation of test material

5.4.1.1 Information card

Prepare an information card for each referent. The information card 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 standardization of a symbol or the image content of a symbol (see clause A.1).

5.4.1.2 Test cards

For each referent, make a set of test cards (size A7), each showing one of the symbol variants to be tested. Use a standard symbol size of 28 mm (±5 %) × 28 mm (±5 %) and position the symbol in the centre of the card.

On the back of each test card, write a code number identifying the referent, and a code letter identifying the variant.

When presenting the material to respondents, make up all cards for a given referent into a pack. Place the information card on the top of the pack and arrange the variants randomly in the pack each time it is used.

5.4.2 Respondents

Conduct the test in at least two countries.

NOTE — Whenever possible, the countries should have different cultural backgrounds. For example, one European country and one Asian country should be chosen.

The number of respondents in each country, required to test a set of variants of a given referent, shall be at least twice the number of variants of that referent, but never less than 50.

NOTE — Although the composition of the sample of respondents is usually not critical, the validity of the test results will be increased if the sample resembles the eventual user population. The sample should therefore consist preferably of respondents who are familiar with a given referent.

5.4.3 Respondents' task

5.4.3.1 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 form for standardization of a symbol or the image content of a symbol (see clause A.1), draw the attention of the respondent to these excluded functions.

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Instruct the respondents to spread all the test cards for one referent on a flat surface.

5.4.3.2 Where there are 10 or fewer variants for a referent, instruct the respondent to rank them by selecting the "most appropriate", then the "second most appropriate" and so on to the "least appropriate". Assign the rank value of 1 to the variant judged "most appropriate", assign the rank value of 2 to the variant judged "second most appropriate", and so on until all variants have been assigned a rank value.

5.4.3.3 Where there are more than 10 variants for the referent, instruct the respondent to sort the cards into three different classes as follows: "very appropriate", "less appropriate" and "least appropriate". Then instruct the respondent to rank the variants within each class from "most appropriate" to "least appropriate".

Obtain the overall rank order, using the procedure described in 5.4.3.2, by assigning sequential rank values, starting with the rank value of 1, to the complete set of variants. That is, assign sequential rank values to the variants in the following order: "most appropriate" variant of "very appropriate" class, ..., "least appropriate" variant of "very appropriate" class, "most appropriate" variant of "less appropriate" class, ..., "least appropriate" variant of "least appropriate" class.

5.4.4 Analysis of the results of the appropriateness ranking test

5.4.4.1 Tabulate the results in a frequency matrix as shown in clause B.1, so that there is one row for each variant and there are two columns for each rank value. For each variant and rank value, enter the number of respondents who assigned that rank value to the variant in the column labelled "f" (frequency) (see clause B.1). Then, for each variant, calculate the cumulative frequencies, from left to right, and enter the appropriate values in the columns labelled "cf" (see clause B.1).

5.4.4.2 Sum the values of f in each column. Check that the sum of each column and all of the cumulative frequencies for the last ranking position are equal to the number of respondents who took part in the test. If this is not the case there is an error, in which case repeat the operations described in 5.4.4.1 and 5.4.4.2.

5.4.4.3 Calculate the median rank value for each variant as shown in the example given in clause B.2.

5.4.5 Presentation of the results

5.4.5.1 Prepare separate forms for each referent for each country which participated in the test (see clause B.3). 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 appropriateness, as indicated by the median rank values.

5.4.5.2 In the results form for each referent include the following information:

a) the name of 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;

f) copies of the symbol variants tested;

g) identification codes of the variants;

h) the source of each variant;

i) the median rank for each variant.

An example of a completed form is given in clause B.4.

5.4.6 Selection of variants for the comprehension test

5.4.6.1 For each country which participated in the appropriateness ranking test, select the variant judged to be "most appropriate" (i.e. the variant with the lowest median rank value), and the two other variants, which are significantly different in graphic detail from the variant judged to be most appropriate, having the lowest median rank values of the remainder of the test material.

5.4.6.2 Where the results from the various countries agree on the three variants which were selected in 5.4.6.1, select these three variants for the comprehension test. Where the results from the various countries do not agree, select from the variants selected in 5.4.6.1 the two variants from each country which have the lowest median rank values for the comprehension test.

NOTE — Three variants are usually sufficient for the comprehension test.

5.5 Comprehension test

5.5.1 Preparation of test material

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

Submit all symbols in positive form (black on white).

5.5.1.2 Reproduce each variant on an A7 size sheet, utilizing a standard symbol size of 28 mm (± 5 %) × 28 mm (± 5 %), with the symbol centred on the test sheet.

5.5.1.3 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. Collate each test set into a test booklet.

NOTE — The maximum number of variants per referent selected for comprehension testing (usually three) determines the number of test sets.

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

5.5.1.4 Assign each test set a code letter A, B, C, etc., and mark this code letter on the bottom right-hand corner of every test sheet in the test set.

NOTE — It has been found helpful for the test administrator if the pages of the test booklets are also coded by a black stripe, printed along the bottom edge of each test sheet, specific to each test set. When viewed from the side, the length of this stripe can be seen (and hence the code letter can be inferred) without opening the test booklet. This is of particular value in identifying and counting the test booklets of each test set when they are in large piles.

5.5.1.5 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.

5.5.1.6 Begin each test booklet with 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 the test administrator to enter the date of the test session, the location of the test session, the name of the person conducting the test, and the age of the respondent according to the following age groups: between 15 and 30; between 31 and 50; over 50.

On the instruction sheet, instruct the respondent to write down, in the space below each symbol, his/her interpretation of each symbol in the test booklet. 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 symbol, and below it the name of the symbol written by hand.

Arrange the symbols in the test booklets randomly. For each 100 booklets, use at least 20 different random orders of symbols, i.e. no more than 5 booklets in 100 shall have the same order of presentation.

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

5.5.2 Respondents

Conduct the comprehension test in at least four countries.

NOTE — Whenever possible, the countries should have different cultural backgrounds.

The sample of respondents for one symbol set should comprise at least 100 respondents in each country, with an approximately equal number of respondents from each age group.

NOTES

1 Experience suggests, however, that the age groups between 15 and 30 and over 50 provide the most significant results, and therefore if it is necessary to select a reduced number of respondents, the age group between 31 and 50 may be omitted from the sample with minor loss of information.

2 Although the composition of the sample of respondents is usually not critical, the validity of the test results will be increased if the sample resembles the eventual user population. The sample should therefore consist preferably of respondents who are familiar with a given referent.

5.5.3 Respondents' task

Present a single test booklet to each respondent. Tell the respondent to follow the instructions given on the second page of the booklet.

5.5.4 Analysis of the results of the comprehension test

5.5.4.1 Listing the responses

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

NOTE — 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 symbol.

5.5.4.2 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.

Category	Meaning
1	Correct understanding of the symbol is certain
2	Correct understanding of the symbol is likely
3	Correct understanding of the symbol is marginally likely
4	The meaning which is stated is the opposite to that intended
5	The response is wrong
6	The response given is "Don't know"
7	No response is given

To achieve consistent judgement in all participating countries, provide examples of answers from each category.

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.

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 they do not know the meaning of the 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.

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5.5.4.3 Analysing the categorization of responses

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 given to that variant and then multiplying by 100.

5.5.5 Presentation of results for each country

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 name of 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 and the total number of respondents;

g) the qualifications of the three judges who categorized the responses for that referent;

h) copies of the variants tested;

i) the source of each variant;

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

k) the percentage of responses for each variant in each standard category;

l) 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.

5.5.6 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 7), the total frequency of responses from all the participating countries and convert these frequencies into percentage values.

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

a) the name of the referent;

b) the countries in which the test was conducted;

c) the total number of respondents in each age group;

d) the total number of respondents;

e) copies of the variants tested, with their identification codes;

f) the source of each variant;

g) the actual frequencies, the percentages and the cumulative percentage of responses in each category (1 to 7).

5.5.7 Determination of the most comprehensible variant

Consider the combined data from all participating countries in order to determine the most comprehensible variant. For each variant, add the percentage of responses in category 1 to the percentage of responses in category 2 to give the comprehension score. The variant with the highest total percentage of these two categories is the most comprehensible variant.

If the comprehension score for this variant exceeds 66 %, then this variant may be used to define the standard image content.

Where two variants have the same comprehension score, the most comprehensible variant can be identified by taking the one having the lowest percentage of responses in category 5 ("The response is wrong").

For critical referents (e.g. safety symbols) the 66 % criterion shall be rigorously adhered to.

For less important referents the criterion may be relaxed by including category 3 responses in the cumulative value in order to comply with the 66 % criterion.

Further details concerning the required degree of comprehensibility may be found in annex D.

6 Definition of the standard image content

Give a verbal description of the variant which is the most comprehensible and meets the criterion mentioned in 5.5.7 and annex D. This description constitutes the image content to be proposed for adoption as a standard.

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