STD.NEMA Z535.3-ENGL 1998 ■ 6470247 0513895 541 ■

AMERICAN NATIONAL STANDARD



ANSI Z535.3-1998

AMERICAN NATIONAL STANDARD

CRITERIA FOR SAFETY SYMBOLS

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CRITERIA FOR SAFETY SYMBOLS

Secretariat
National Electrical Manufacturers Association

Approved April 9, 1998
American National Standards Institute

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Foreword (This foreword is not part of American National Standard Z535.3-1998.)

In 1979, the ANSI Z53 Committee on Safety Colors was combined with the ANSI Z35 Committee on Safety Signs to form the ANSI Z535 Committee on Safety Signs and Colors. This committee has the following scope:

> To develop standards for the design, application, and use of signs, colors, and symbols intended to identify and warn against specific hazards and for other accident prevention purposes.

Five subcommittees were created and assigned the tasks of updating the ANSI Z53 and Z35 Standards, and writing two new standards. The five standards include:

- ANSI Z535.1, Safety Color Code [ANSI Z53.1-1979 was updated and combined into this standard in 1991.]
- ANSI Z535.2, Environmental and Facility Safety Signs [ANSI Z35.1-1972 and Z35.4-1972 were updated and combined into this standard in 1991.]
- ANSI Z535.3, Criteria for Safety Symbols [new in 1991]
- ANSI Z535.4, Product Safety Signs and Labels [new in 1991]
- ANSI Z535.5, Accident Prevention Tags (For Temporary Hazards) [ANSI Z35.2-1974 was updated and combined into this standard in 1991.]

This standard was prepared by Subcommittee Z535-3 on Criteria for Safety Symbols.

There are three annexes in this standard. Annexes A, B, and C are considered to be informative and not considered part of this standard.

Together, the five standards contain information needed to specify formats, colors, and symbols for safety signs used in environmental and facility applications, product applications, and accident prevention tags. All three types of signs have provisions for an optional center symbol panel containing a graphic depiction of the message in the message panel, using the safety symbol criteria contained in this standard.

This 1998 revision refines and adds substance to the structure in the 1991 version. The forty-one referents in the original ANSI Z535.3 Standard were selected because they address some of the most common, general, or critical hazards. The ANSI Subcommittee Z535-3 on Criteria for Safety Symbols reassessed the symbol examples illustrating these referents, both to assure that the symbols had passed comprehension testing and to improve the depiction of these symbols in the standard. Further, the ANSI Z535 Committee recognized that this finite set of referents addressed only a fraction of the hazard referents for which safety symbols should be needed. Since the committee's philosophy was not to alter the scope of referents in the standard, their approach to meeting the need for new symbols was twofold: 1) provide the guidance necessary to create legible, standardized symbols, and 2) supply the testing procedures required to perform comprehension testing on those symbols. Therefore, this revision contains the following changes.

Symbol Example and Depiction Changes. Non-passing symbols were 1) replaced with passing symbols or deleted, or 2) in the case of borderline comprehension, moved from the body of the standard to an annex. These changes resulted from researching the symbol testing results and determining that some symbols had not passed the required 85% recognition testing. The subcommittee had non-passing and non-tested symbols comprehension tested, along with other symbol alternatives addressing the same referents, in an attempt to identify symbols that could pass the comprehension testing for those referents.

The use of surround shapes was discouraged from use with most symbols, except for prohibition and the safety alert symbol. Illustrating the symbols in the 1991 version with surround shapes, mislead users to think that surround shapes were preferred, when in fact, a surround shape competes with the actual symbol for the available space.

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It was clarified that color generally should be used only for the red prohibition symbol and fire related symbols. The 1991 version was misleading in that it appeared to mandate symbols with background colors.

Test references were added so potential users could access testing details to determine whether previous testing is analogous to their situation or whether they may need to retest before using a symbol on their respective product.

Addition of Symbol Creation Guidelines. In order to encourage both good symbol design and a degree of consistency between new symbols, the revision included expanded guidelines for the creation of new symbols for new referents.

Test Procedure Changes. Multiple choice tests were discouraged since these tests are typically less accurate in measuring the subjects' comprehension of symbols, primarily because they limit the range of answers allowed.

Testing symbols in context was encouraged, since using words or pictures to convey where a label would be located is a fairer test of a symbol.

Progressive testing was described and encouraged to screen out poor symbols early, thereby limiting resource expenditures prior to full open-ended testing.

Information on how to conduct comprehension tests was improved and expanded, including providing detailed guidance and actual examples of test administration materials.

In revising the ANSI Z535.3 Standard, work to retest the symbol examples and to rewrite the testing procedures was carried out simultaneously. Using this process, the subcommittee received valuable feedback not only on the symbols being tested, but on the problems and features of the test methodologies themselves. Lessons learned from each test iteration were used to improve test procedures and clarify test instructions. As a result, in addition to thoroughly-tested symbol examples, this revision provides well-tested procedures for evaluating symbols.

The subcommittee believes that these ANSI Z535.3 Standard improvements facilitate the creation of symbols with improved legibility and consistency that are reliably comprehension tested.

This standard was processed and approved for submittal to ANSI by the Accredited Standards Committee on Safety Signs and Colors, ANSI Z535. Committee approval of this standard does not necessarily imply that all committee members voted for its approval. At the time it approved this standard, the Z535 Committee had the following members:

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Federal Highway Administration	Byron E. Dover
FMC Corporation	James F. Bennett
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Hand Tools Institute	Russ Szpot
Hazard Communication Systems, Incorporated	Geoffrey Peckham
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	Lee Stone (Alt.)
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Society of the Plastics Industry, Machinery Division	Loren Mills
	Drex Winsted (Alt.)
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American National Standard

for Criteria for Safety Symbols

1 Introduction

The U.S. population is multi-ethnic, highly mobile, and derived from a multiplicity of social and educational backgrounds, with different reading skills and word comprehension. These factors complicate the effectiveness of word-only signs. Effective safety symbols have demonstrated their ability to provide critical information for accident prevention and for personal protection. Illustrated or pictorial signs can promote greater and more rapid communication of the safety message, and therefore, greater safety for the general population. An initial set of such selected symbols is presented here. Methodologies for designing and evaluating safety symbols for additional applications are also presented.

2 Scope and purpose

2.1 Scope

This standard provides general criteria for the design, evaluation, and use of safety symbols to identify and warn against specific hazards, and to provide information to avoid personal injury.

2.2 Purpose

It is the purpose of this standard to promote the adoption and use of uniform and effective safety symbols for safety communications. The standard also provides a procedure for evaluating image effectiveness in communicating the intended message, as well as considerations for graphic design of symbols.

3 Application

3.1 This standard is intended to provide guidance in selecting symbols to alert persons to hazards and to provide general safety messages. This may include applications and information associated with products, the immediate environment, and workplaces. For chemical products and chemical mixtures follow ANSI Z129.1-1994.

3.2 There are a number of existing American National Standards which are recognized for particular industries or specific uses. Compliance with such a standard may be considered for such particular industries or uses. It is not the intent of this ANSI Z535.3 standard to replace existing standards or regulations, which are uniquely applicable to a specific industry or use. It is the intent to encourage adoption of this standard in subsequent revisions of other standards and regulations.

4 Definitions

4.1 critical confusion: When a symbol elicits the opposite, or prohibited action. For instance, when a symbol meaning "No Fires Allowed" is misunderstood to mean "Fires Allowed Here."

4.2 environmental safety signs: Sign (or placard) in a work or public area that provides safety information about the immediate environment.

4.3 excluded functions: Situations or environments where the symbol would not be appropriate to use.

4.4 hazard: A source of potential injury to a person.

4.5 image: That portion of the symbol which is a graphic rendering, either abstract or representational, of the safety message.

4.6 panel: An area of a safety sign which has a distinctive background color different from adjacent areas of the sign, or which is clearly delineated by a line, border, or margin. There may be up to three (3) panels per sign: signal word, message, and symbol.

4.7 product safety sign: Sign (or label) on product that provides safety information about that product.

4.8 referent: The message intended to be associated with the symbol.

4.9 respondent: Test taker who is a member of the targeted audience likely to see a warning or safety symbol.

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4.10 safety sign: A method of visual communication to alert persons to hazards and their consequences, as well as to provide general safety information (see ANSI Z535.2-1998).

4.11 signal word: The word or words that designate a degree or level of hazard (see ANSI Z535.2, ANSI Z535.4, and ANSI Z535.5 -1998).

4.12 surround shape: A geometric configuration around the image, which can convey additional safety information.

4.13 symbol: A configuration, consisting of an image, with or without a surround shape, which conveys a message without the use of words. As used in this standard, the word symbol includes graphic art, such as pictograms, pictorials and glyphs.

4.14 symbol variant/candidate symbol: One of many symbols designed to best represent a referent or hazard or meaning.

5 Symbol types and colors

5.1 General

Symbols are an optional component of the mult-panel safety sign, label and tag formats described in the ANSI Z535.2, ANSI Z535.4 and ANSI Z535.5 Standards. Use of a surround shape around a safety symbol may be considered but is usually not recommended for safety signs to be used in the United States.[1] A surround shape greatly decreases the available space for a symbol, causing possible legibility problems. However, surround shapes are required for the Safety Alert Symbol (an exclamation mark within an equilateral triangle, see Section C1) and the Prohibition Symbols (symbols within a circular band with a diagonal slash, see Section 5.5).

There are four types of symbols that communicate different messages: Hazard Alerting, Mandatory Action, Information and Prohibition.

5.2 Hazard alerting

The preferred symbol panel consists of a black image (or safety red image for some symbols) on a white background. For the alternative formats found in ANSI Z535.2-1998, the white background may be replaced with a safety orange background for Warning (ANSI Z535.2, Section 5.2.4), a safety yellow background for Caution (ANSI Z535.2 Section 5.3.5), or a safety red background for Fire Safety symbols (ANSI Z535.2, Section 5.6.4). If a surround shape is desired, the hazard alerting symbol should be drawn within an equilateral triangle.

5.3 Mandatory action

These symbols are generally used on ANSI Z535.2 Notice signs (see ANSI Z535.2-1998 Section 5.4) to convey mandatory action.

If a surround shape is desired, the symbol should consist of a white image within a solid safety blue or black circular surround shape which in turn is on a white symbol panel background.

When a surround shape is not used, the dark and light parts of the symbols are reversed.

5.4 Information

These symbols are generally used on ANSI Z535.2 *General Safety or Fire Safety Signs* (See ANSI Z535.2 Section 5.5 and 5.6) to convey equipment location, egress, permitted actions, and fire equipment location.

For non-fire related symbols, the symbol shall consist of a safety green or black image on a white background.

For fire-related symbols, the symbol shall consist of a safety red image on a white background or a white image on a safety red background.

5.5 Prohibition

For prohibition, use of the surround shape is mandatory. A circular band with a diagonal slash at 45 degrees from upper left to lower right is used to indicate prohibition. The prohibition symbol shall consist of a black image, safety red or black circular band with slash, and white background. When both the image and the circular band/slash are black, the black slash should have a white border to delineate the slash from the image.

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[1] Surround shapes are required for international safety sign formats in use outside the U.S., see ISO 3864 in the reference section.

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6 Graphic design considerations

6.1 Procedure for the design of new symbols

Where a symbol is desired for a referent not covered in section 8, considerations located in Annex A and below are suggested as guidelines for designing a new symbol or for modifying an existing symbol.

Individual symbols should be designed, wherever possible, as elements of a consistent visual system. Visual consistency within a system can be strengthened by attention to the following graphic guidelines.

6.2 Specific design considerations

The following factors are specified as elements that contribute to good symbol design.

6.2.1 Proportion. Avoid long, narrow forms.

6.2.2 Symmetry. Generally, symbols should be designed to be symmetrical about a vertical or horizontal axis.

6.2.3 Direction. Conflicts or ambiguities in direction between elements of a graphic symbol must be avoided. When a symbol with directional characteristics is combined with another directional element, the combination shall give the same directional information. An example is the exit symbol and the arrow.

6.2.4 Form. Solid forms are preferred to outline forms. An outline form, if used, should be bold and discriminated from its background.

6.2.5 Detail. Simple geometric forms are preferred. The use of superfluous detail or decoration shall be avoided. The critical details of the symbol should be able to be discriminated at the intended viewing distance.

6.3 General considerations

Because symbols are used in a variety of conditions which vary widely, some of the following considerations should be considered when designing or implementing symbols.

6.3.1 Symbol size. Since symbols may be used on large and small products or areas, they should be legible at the intended viewing distance.

6.3.2 Symbol placement. Symbols used on safety signs should be placed within the normal field of view, and near the hazard or area for which action is required.

6.3.3 General concerns. Attention should be paid to environmental factors such as dirt, degradation, light level and light quality which may impair the effectiveness of a symbol.

7 Symbol selection criteria

7.1 A symbol should have demonstrated understandability as verified by acceptable selection procedures involving an appropriate test group. A methodology for testing is contained in Annex B.

7.2 A symbol used without demonstrated understandability shall be reinforced by a word message explaining the intent of the symbol. Its format shall follow that given for multi-panel signs.

7.2.1 A symbol training/recognition procedure is recommended to familiarize intended users with symbols and their meanings. This procedure should be conducted by the employer or product manufacturer who plans to use the symbol. (See Annex A of the ANSI Z535.2, ANSI Z535.4 and ANSI Z535.5 Standards).

7.3 If a new symbol has been tested and found to be acceptable, it and the results of the testing procedure may be forwarded to symbol sources (see Reference Section) for consideration for inclusion in a revision of their publications.

8 Symbol examples

The following symbols are examples. They are used in communicating hazard information and safety messages. These symbols are based on data from a procedure similar to that outlined in Annex B and have passed the 85% criteria for acceptance with no more than 5% critical confusion answers (See Annex B 2.5.6).

The reader is directed to the reference section for a listing of relevant standards and sources for symbols for more specialized applications (see Annex C for examples).

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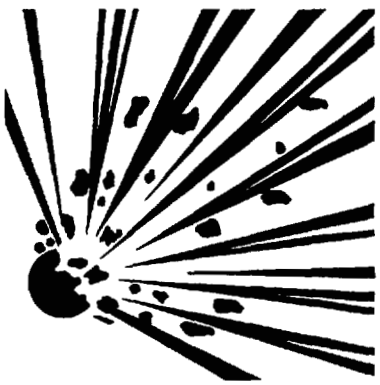
8 Symbol examples

8.1 Hazard alerting symbols

Referent And Image Content	Symbol Example	References: Comprehension Testing
Explosion Object exploding		Collins, Lerner, and Pierman (1982) Collins (1983) Frascara and Yau (1986) Snap-On Tools Corp. (1994) Lirtzman (1987)
Electrical Body with wire and lightning bolt		Collins (1983) Frascara and Yau (1986) Wolff (1995)
Electrical Hand with wire		Collins, Lerner, and Pierman (1982) Frascara and Yau (1986)

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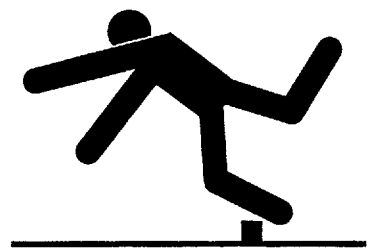
8.1 Hazard alerting symbols

Referent And Image Content	Symbol Example	References: Comprehension Testing
Slip Person falling on surface		Collins, Lerner, and Pierman (1982) Collins (1983) Wolff (1995)
Trip Person tripping over object		Collins (1983) Frascara and Yau (1986)
Fall Person falling from surface backward or forward		Collins, Lerner, and Pierman (1982) Collins (1983)

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8.1 Hazard alerting symbols

Referent And Image Content	Symbol Example	References: Comprehension Testing
Entanglement Hand* and rollers		Collins, Lerner, and Pierman (1982) Collins (1983) Wolff (1995) Snap-On Tools Corp. (1994)
Pinch Hand* and rollers		Collins (1983)
Cut/Sever Hand and sharp object		Collins (1983) Frascara and Yau (1986)

**Other portions of the body may be substituted as needed.*

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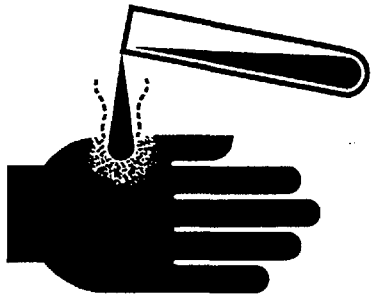
8.1 Hazard alerting symbols

Referent And Image Content	Symbol Example	References: Comprehension Testing
Corrosion Test tube, hand, drops		Braun & Deppa (In preparation)
Poison Skull and cross-bones		Braun & Deppa (In preparation)

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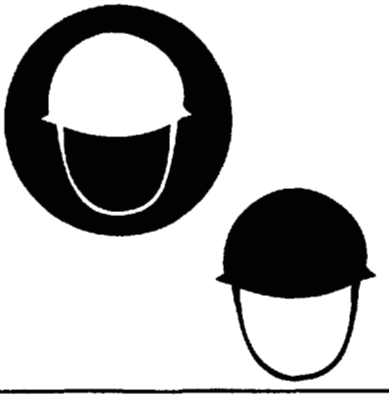
8.2 Mandatory action symbols

Referent And Image Content	Symbol Example	References: Comprehension Testing
Eye Protection Head with eye glasses or goggles		Collins (1983) Frascara and Yau (1986) Snap-on Tools Corporation(1994)
Ear Protection Head with ear protection		Collins (1983) Snap-on Tools Corporation(1994)
Head Protection Head with hard hat		Collins (1983)

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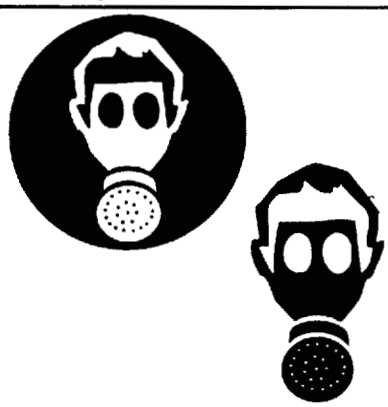
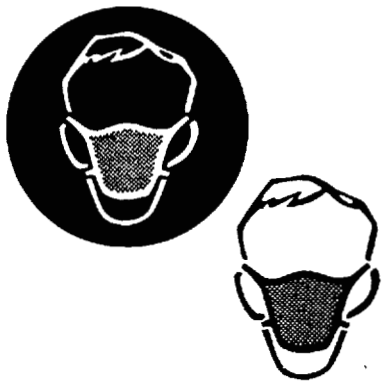
8.2 Mandatory action symbols

Referent And Image Content	Symbol Example	References: Comprehension Testing
Respiratory Protection Head with Respirator		Collins, Lerner, and Pierman (1982) Collins (1983) Snap-on Tools Corporation(1994)
Respiratory Protection Head with Mask		Collins, Lerner, and Pierman (1982)
Foot Protection Safety Shoe		Collins (1983) Frascara and Yau (1986) Wolff (1995)

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8.2 Mandatory action Symbols

Referent And Image Content	Symbol Example	References: Comprehension Testing
Hand Protection Two gloves		Collins, Lerner, and Pierman (1982) Collins (1983)

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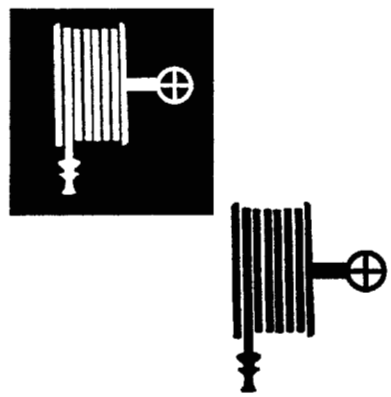
8.3 information Symbols

Referent And Image Content	Symbol Example	References: Comprehension Testing
First Aid Cross		Collins, Lerner, and Pierman (1982) Collins (1983)
Fire Hose and Reel Hose and reel		Collins, Lerner, and Pierman (1982) Collins (1983)
Extinguisher Extinguisher		Collins, Lerner, and Pierman (1982) Collins (1983)

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8.4 Prohibition symbols

Referent And Image Content	Symbol Example	References: Comprehension Testing
No Open Flame Flame		Collins, Lerner, and Pierman (1982) Collins (1983) Frascara and Yau (1986) Snap-on Tools Corporation (1994)
No Smoking Lighted Cigarette		Collins, Lerner, and Pierman (1982) Collins (1983)
No Open Flame Lighted Match		Collins, Lerner, and Pierman (1982) Collins (1983)

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9 References

9.1 Scope

The following references were used in creating the ANSI Z535.3 standard and its Annexes. Several caveats about these references should be noted.

First, references that cover more than one heading are listed under the heading found most useful in drafting this standard. For example, most references that cover symbol procedures naturally contain sources of symbols. However, if they contain extensive discussions of symbol procedures, they are listed under the Procedures heading rather than the Sources of Symbols heading.

Second, the inclusion of references in this document is not to be construed as an endorsement. Users of these references must evaluate them on their own merits. For example, symbols included in the references may not have been tested, or may have been tested using less stringent testing methods.

Third, the following list of references is not an all inclusive list. When additional references are identified, they will be considered for inclusion in future revisions to this standard. The ANSI Z535.3 subcommittee welcomes knowledge of additional sources, which can be sent to the address listed on the cover of the standard.

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Annex A
(Informative)
Principles and Guidelines for Graphical Design of Hazard Symbols

A1 Scope

This annex provides principles and guidelines for good graphical design of symbols as well as instructions for drawing the human figure and other symbol elements. Consistent visual design is important for conveying the meaning of both hazard description and hazard avoidance symbols.

A2 Guidelines for creating symbols

Although each safety sign and each symbol must be considered on its own terms, the following are a number of general guidelines for good symbol design.

A2.1 Use representational rather than abstract symbols.

A2.2 Use a solid graphical representation of human body elements or the full human figure. An outline representation may be used when depicting a person whose presence is necessary to complete the symbol but who is not directly involved with the hazard.

A2.3 Use a simplified graphical representation of the elements that create the hazard. Use filled (solid) graphics of the hazardous elements unless these filled areas detract from easy recognition of the hazard or human figure. For example, use outline graphics of complete machines or of substantial portions of machines to locate hazardous areas or machine elements in context.

A2.4 When objects, faces, or the full human body are shown, use the view (generally front or side) that is most easily recognized. (Recognition can be verified using the testing procedures in Annex B).

A2.5 Use symbols that depict dramatic action and show involvement of the human figure or body elements with the hazard.

A2.6 Be specific in depicting hazards, especially when the nature or location of the hazard is not readily apparent. Be generic in depicting hazards and hazardous situations only when generality is possible and adequately communicates the necessary information.

A2.7 Arrows can be added to show actual or potential movement. In many cases, movement is implicit in the symbol and arrows need not be added. If arrows are to be used, be consistent in selecting and using arrow graphics to represent different types of movement or spatial relationships: falling or flying objects, direction of motion of machine components, direction of motion of entire machines, the exertion of pressure or force, and keeping a safe distance away from a hazard. Figure 1 shows the various arrows defined in ISO 11684.

A2.8 Do not use red to represent blood.

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A3 Human figure

A3.1 Drawing the basic human figure

The human figure is frequently the main component in the symbol and must be depicted in a simple, consistent and believable form. Interpretation must be instant and not require the viewer to study the symbol to determine what part of the body is involved or in what way. The human figure presented in Figure 2 was designed to satisfy these specific requirements. Its purpose is to alert persons who see the safety sign in order to prevent accidents; it is not meant to be an artistic presentation.

A3.2 Human figure unit system

The symbol of the human figure is based on a grid system of uniform sized squares, or units. The full human figure is 12 units tall, 2 units wide at the trunk, and has a circular head 1.75 units in diameter. The precise unit measurements for drawing the figure are shown in Figure 2. The hands and feet end in semicircles, except as noted in sections 6.2 and 7.2 in this annex.

A3.3 Human figure animation

By using pivot points on the figure, action or movement of the figure can be depicted. The unit proportions remain the same, except in situations where the overlapping of limbs causes a visual foreshortening of the limbs. When foreshortening occurs, it is compensated for by adding 0.5 unit to the limb.

Figure 3 shows the human figure in various positions. The position the figure will assume in the symbol is usually determined by:

- The nature of the hazard
- The direction or orientation of the hazard
- Movements or positions resulting from involvement with the hazard
- The type of injury caused by the hazard
- Movements or positions involved in the operation of equipment

When depicting a hazard, the body, hand, or face position or implied movement should convey a reaction consistent with the hazard's impact or likely pain. For example, showing a passive hand near a hazard might convey the message, "Put hand here." Instead, show the hand as it would look interacting with the hazard, including distortion of the hand to indicate crushing, cutting, etc. (see Figure 9).

A3.4 Solid representation versus outline drawing of the human figure

Solid representation of the human form is more effective than an outline drawing of the same human form because it focuses more attention on the person at risk. However, if more than one human figure appears in the symbol, a person not directly exposed to the hazard may be drawn as

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an outline figure. An example of such a situation could be the driver of a machine in a runover hazard symbol. The driver would be shown in outline form and the person being run over would be shown in solid form. The outline drawing of a human figure may be used:

- For representing persons not directly at risk in the hazardous situation.
- When combined with the solid human form, the combination results in a symbol that is easier to understand.

A3.5 Stationary, free-standing human figure (viewed from front or rear).

The symbol for the human figure is modified when the person is depicted in a stationary, free-standing position. Use the stationary human figure for hazard avoidance symbols that communicate the idea of keeping a safe distance away from a hazard. A stationary, free-standing human figure is shown in Figure 4.

A4 Profile head

When the head is involved with the hazard, the profile version is used facing either left or right. The profile head can also be used whenever the full figure or upper torso is to appear in profile to create an impression that the figure or torso itself is in the profile position. See Figure 5 for an example of the profile head.

A5 Upper torso

Hazards that involve the arms, hands, or head may best be dramatized by using the upper torso rather than the full torso. In most cases the upper torso would appear in profile and the profile head would be used rather than the frontal or circular head. When depicted in a profile position, the upper torso can also be effective in conveying directional movement with the hazard. If hands are involved in the hazard, or if the depiction of hands would aid in visual dramatization, they should be added to the figure, as described in section 6.2 in this annex. See Figure 6 for an example of a hazard symbol that uses the upper torso.

A6 Hands

A6.1 Drawing the human hand and fingers

The complexity of the human hand and the many possible finger movements, make hands one of the most difficult symbol elements to depict. The design shown in Figure 7 was given careful attention to simplify shape and form for easy recognition. In the full palm view, the fingers and thumb do not move to other positions (i.e. they should not be spread). In other full hand views, fingers may be spread.

A6.2 Adding Hands to the Human Figure

When hazards involve the hands or arms, hands are added to the figure to increase recognition of the limb elements. Two basic hand positions are shown in Figure 8:

- Position A shows the thumb extended along the same axis as the arm.
- Position B shows the hand rotated several degrees around the hand pivot point.

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Selection of Position A versus Position B should be based on which position is judged to best dramatize the involvement with the hazard. For design consistency, hands are added to both arms (when both arms are shown) even when only one arm is involved with the hazard.

A6.3 Hand profiles

Hand profiles are best used to convey a feeling of depth, which can improve understandability of the symbol. Although the hand is not actually drawn in perspective, the positioning of the fingers can create a three-dimensional impression.

Hand profiles are the most difficult elements of the human figure to design. The hand profiles shown in Figure 9 maintain visual consistency. Valuable time can be saved when creating hand profiles by taking existing symbols and modifying or repositioning elements of the hand as necessary. Situations that require various finger movements can be depicted by selecting the hand closest to the desired position and modifying it. Note the finger treatment. The fingers are not tapered, although they may appear to be. Fingertips are created using a 0.25 circle. The profile view uses only three fingers plus the thumb.

A7 Feet

A7.1 Foot development

When a symbol illustrates just the lower leg or foot, the stylized shoe or boot (foot) shown in Figure 10 may be used. It can be used facing either left or right.

A7.2 Adding feet to the human figure

Some hazards which involve the feet or lower limbs are most effectively dramatized by using the full human figure; adding feet to the figure can increase recognition of the limb elements. For such symbols, the feet shown in Figure 10 may be added to the foot pivot points.

A8 Representation of non-human symbol components

Use a simplified graphical representation of the non-human elements that create the hazard. Use solid (filled) graphic form to represent hazardous elements and outline graphic form to put the hazardous elements in context. For example, for a hazard involving moving gears on a machine, the moving gears would be illustrated in solid form and the rest of the machine would be illustrated in outline form.

Representations of individual components of a symbol may be outline or solid, depending upon which alternative provides better visual recognition and graphical clarity. In general, solid areas result in the perception of greater mass and solidity; however, outline forms often encourage inclusion of enough graphical detail that the identity of actual components and the nature of the hazards they present may be discerned more easily. Smaller solid areas, or outlines using a wider line thickness, can assist in highlighting the hazard-creating component.

A9 Use of the prohibition symbol

The prohibition symbol (a red or black circle with diagonal slash) can be used to communicate the idea of a prohibited action (see Figure 11). Avoid using the prohibition symbols where the symbol

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would obscure identification of the prohibited action or where the meaning of the prohibition symbol is not explicitly clear.

A prohibition symbol may be placed across pictorial elements that depict the prohibited action; this symbol communicates the negative message that the depicted action is prohibited. In general, the prohibition symbol should not be used over a symbol that depicts a person interacting with a hazardous component (see Figure 12).

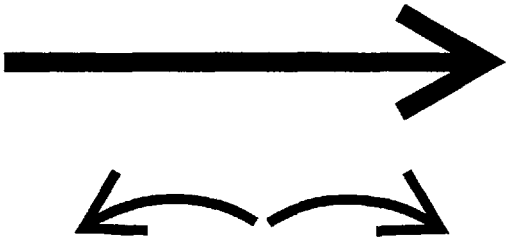
The slash is always oriented from the upper left to the lower right of the circle; a 45° angle from the horizontal is standard, although this may be adjusted a few degrees more or less to avoid obscuring important pictorial information.



Arrow to be used to represent motion of falling or flying objects and their direction of motion.



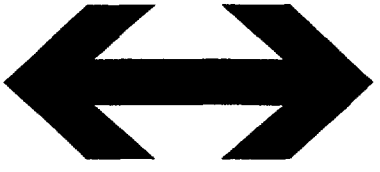
Arrow to be used to represent motion of components.



Arrow to be used to represent motion of entire objects such as machines.



Arrow to be used to represent the exertion of pressure or force.



Arrow to be used to represent the idea of keeping a safe distance away from a hazard.

Figure 1 – Arrows as defined in ISO 11684

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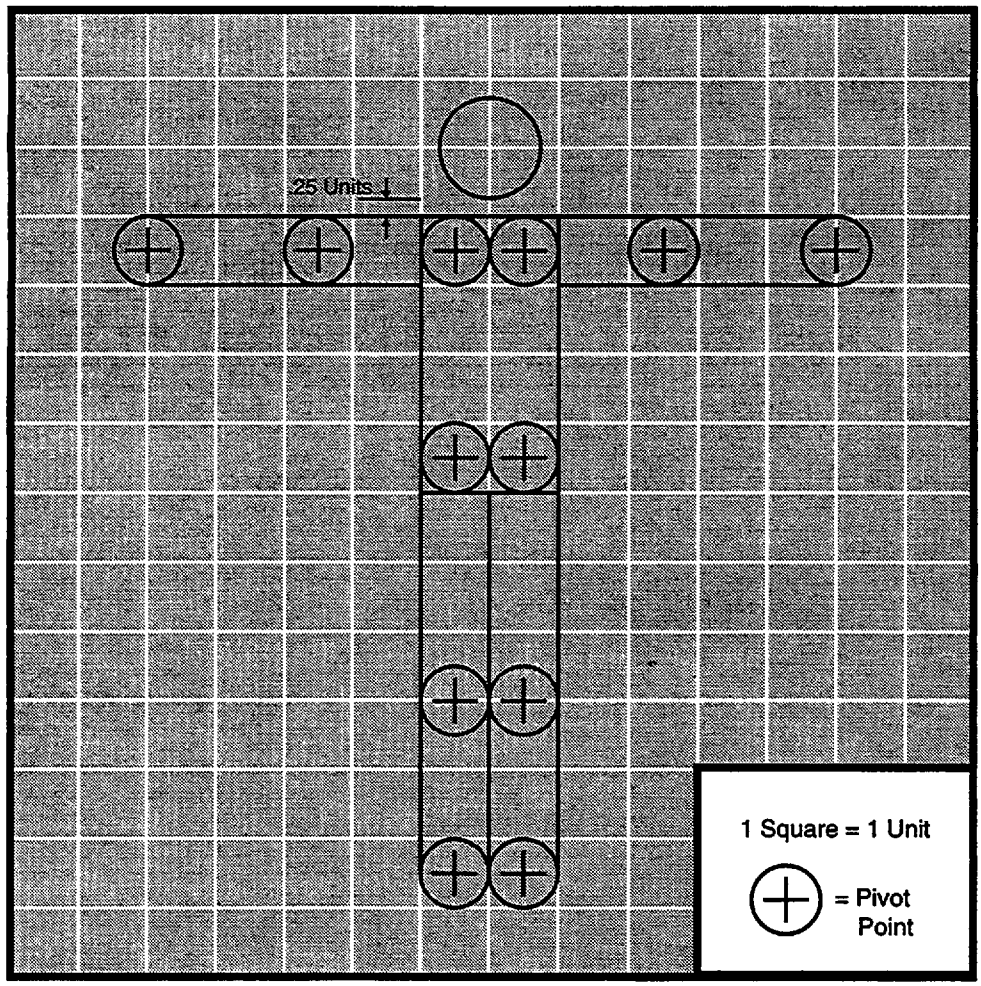

Figure 2 – The human figure unit system



Figure 3 – Drawing the human figure

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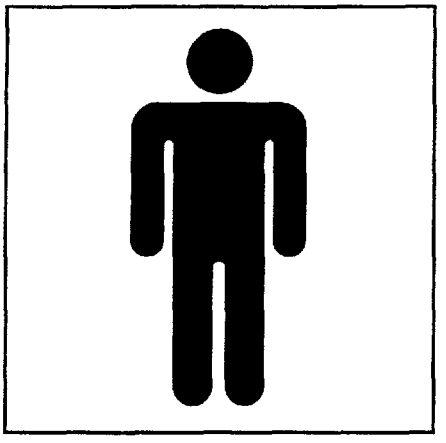

Figure 4 – A stationary, free-standing human figure (viewed front or rear)

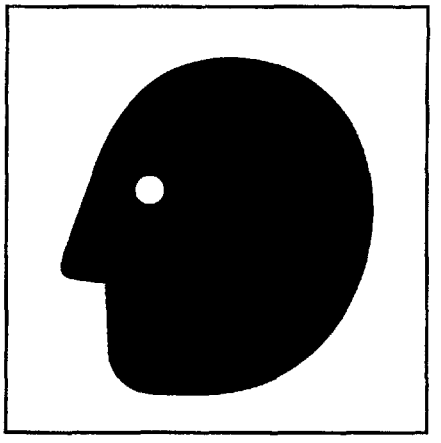

Figure 5 – Profile of a head



Figure 6 – Example of a symbol that uses an upper torso

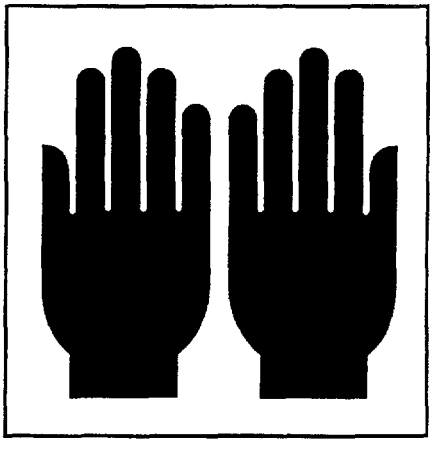

Figure 7 – Hands

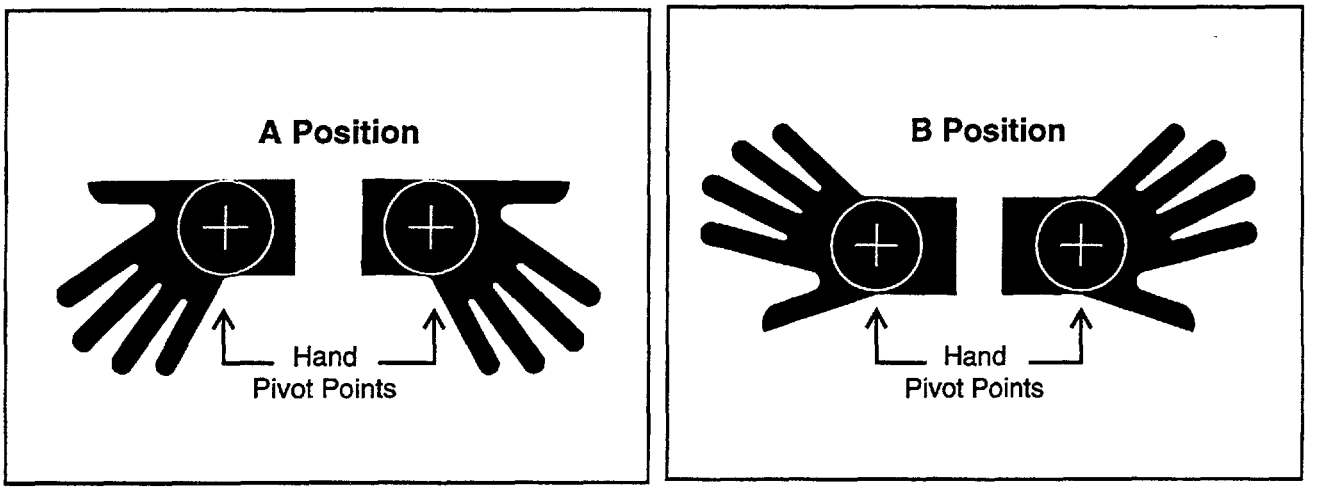

Figure 8 – Hand positions

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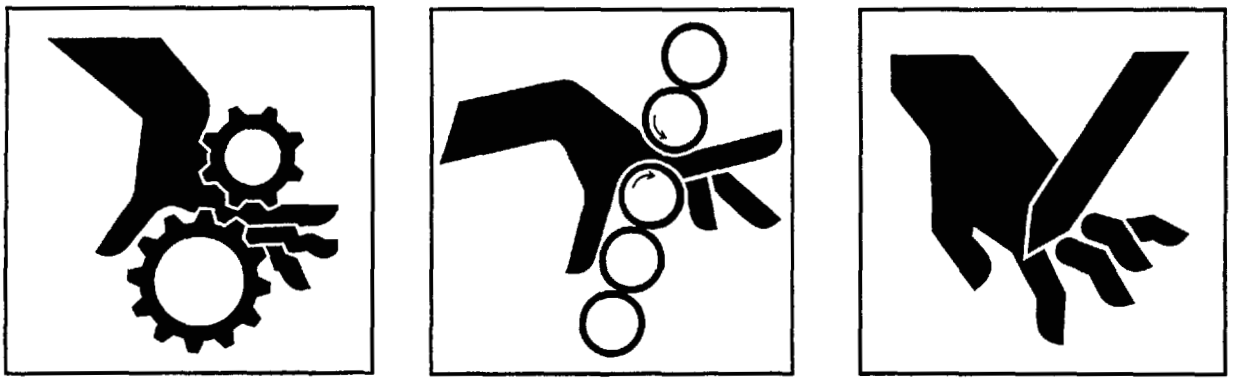

Figure 9 – Examples of symbols using hand profiles

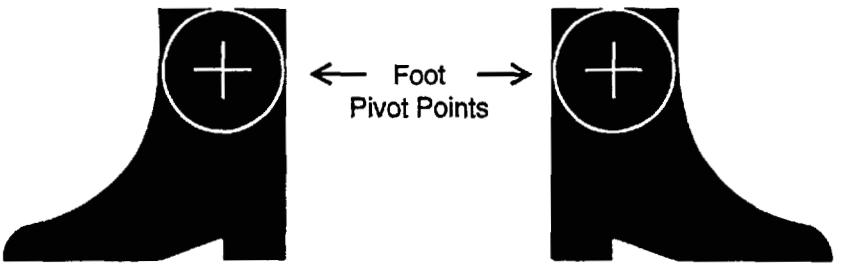

Figure 10 – Feet

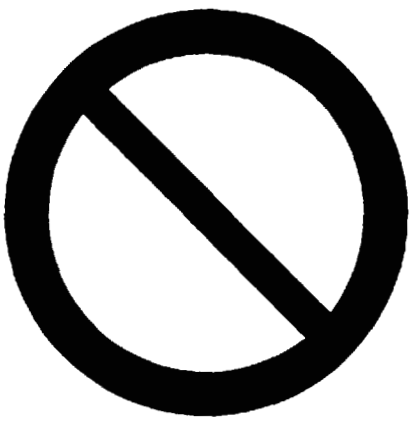

Figure 11 – The prohibition symbol



Figure 12 – Improper use of the prohibition symbol

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Annex B
(Informative)
General Procedures for Evaluating Candidate Symbols

B1 Rationale

The following testing procedure is an objective, empirical approach for evaluating the comprehensibility of symbols for safety messages. The procedure is intended to choose a symbol which best conveys the message so that reliance upon word messages and/or symbol training is minimized. This procedure also provides feedback for those situations where no symbol tests well, thus indicating the need for supplementary word messages or training to aid understandability. Use of this or another valid procedure can provide objective, reliable data for selecting the most effective symbol for a given referent.

The primary criterion for determining symbol effectiveness is that of understandability; in other words, that the symbol clearly conveys the intended message to the appropriate target population. A criterion of 85 percent correct responses with a maximum of 5 percent critical confusions (assuming a sample of 50 respondents) is suggested for acceptance of a given symbol. The following steps are recommended for determining the necessary understandability data.

B2 General procedures for evaluating candidate symbols

B2.1 Selection of test procedures

B2.1.1 Suggested testing procedures
The detailed selection and testing procedures shown in this Annex have been demonstrated to produce reliable results (ISO 9186, Brugger 1994). The procedures consist of tests in which selected members of a target audience provide comprehension data for proposed symbols. The goal is to determine the meaningfulness of each symbol proposed, and where more than one symbol is proposed for a given referent, to compare the relative performance. See Flow Chart, Figure 1.

The purpose of the preliminary testing procedures outlined in this Annex is to identify poor symbols before time and expense are incurred to fully test these symbols. The preliminary test procedures allow poor symbols to be discarded or improved so fewer symbols need to be completely tested. Such preliminary testing also increases the likelihood that the remaining symbols will pass final comprehension testing. (Magurno 1994).

Other procedures producing similar statistical reliability with smaller samples or more streamlined procedures may be used.

B2.1.2 Extent of testing needed
The following procedure generally recommends three tests: A preliminary open ended test, a comprehension estimation procedure, and the final open ended test. If the majority of the potential users include the elderly, children, the illiterate, and non-English speaking or reading, full testing is recommended.

However, there are situations where less testing is appropriate. For example, when the hazard is well known and there are only a few, but excellent, candidate symbols to test for the most understandable, one may only need to perform the final open ended testing. Another example is when only a few pieces of large equipment are being manufactured and the operators are being trained, informal testing may be acceptable.

B2.1.3 Preliminary informal testing
Preliminary comprehension testing may be useful in several ways. It can serve as a verification procedure to determine whether the intended users can specify both the hazard and the measures needed to avoid the

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hazard. Preliminary informal testing can also be a quick way to identify poor symbols that need to be discarded or modified (See B2.2.2).

Preliminary testing can also be used to identify the range of answers. This is especially important if the final test is multiple choice (See B2.5.5.2). The range of answers is also useful in establishing criteria for open-ended testing (See B2.5.4).

Using small numbers of participants (though no less than five) from the target population, conduct a preliminary open-ended comprehension test (see B2.5.1) of the symbols. It is important NOT to use experts at this stage. Naive users similar in demographics to the target population may be substituted if no actual users are available. This test is to obtain qualitative information, not numerical scores. More than five respondents may be used, but research suggests that 80% of problems can be identified with five respondents. (Virzi 1990).

If responses indicate that symbols may fail final testing, redesign symbols to correct identified problems (see B2.2.2).

B2.2 Select candidate symbols to test

B2.2.1 Collect existing symbols

Obtaining an acceptable symbol begins by gathering existing symbol alternatives. Sources for existing symbols are listed in the Reference Section. In addition, symbols that look similar to the desired referent but may have opposite or different meanings should also be identified and care should be taken to distinguish the two. For example, a symbol for "Slippery" may be very similar to a symbol indicating "Fall from Heights". Consider including symbols that are already in use. Do not assume that a symbol already in use has been tested. Testing both old and new symbols under the same conditions gives the best comparison between the two. Since introducing a new symbol, even if it is better, may be expensive, this comparison may provide justification for using the new symbol. If an existing symbol was identified that has already been tested for comprehension with a similar context and target audience, no further testing may be needed.

B2.2.2 Design new candidate symbols, if needed

If symbols exist but seem to be of poor quality, consider redesigning or developing new symbols for testing. When undertaking this task, it may be helpful for the symbol design team to review past testing results including "wrong answers" (see reference section) so that symbol meaning and communication problems can be identified and addressed in the new symbol design. If no past test results exist, informal preliminary open-ended testing of the existing symbols may be done at this time to determine how to redesign symbols.

When no candidate symbols exist, in-depth interviews with individuals or focus groups with the intended target audience can be used to obtain data for use in drawing new symbols. Individually or in focus groups, ask participants to draw symbols of the intended message or to describe as specifically as possible the kinds of images that would best depict the concept. Count the number of occurrences of different images and symbols, association of action or prohibited action. Develop the most common or unique ideas into symbols (Wolff and Wogalter, 1993).

B2.2.3 Make symbols comparable

Remove surround shapes if they are not an integral part of the symbol. Be sure that all symbols are of similar size (see 2.3.3). Adjust lines and detail so that they reproduce similarly well.

B2.3 Determine testing specifications

B2.3.1 Identify target audience

The population(s) of potential users of a symbol must be carefully determined. Any testing should use a smaller, target audience representative of the population(s). Particular attention should be given to subgroups that are anticipated to have greater comprehension problems or information needs, such as the elderly, children, illiterate, non-English speaking or reading or disabled. If the intended user population is the general public, subjects between 15 and 30 years old and over 50 years old should be overrepresented in the testing group (ISO 9186, Brugger 1994).

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Biographical information should be collected on each respondent to determine that the subjects meet the test criteria including: age, sex, education, race, occupation, and first language. This information may then be used to determine if wrong answers are correlated with particular sample characteristics (see Figure 2) .

B2.3.2 Determine the intended message

Determine the meaning of the symbol by clearly establishing the intended referent or message. Use this message as the correct answer when scoring.

B2.3.3 Other specifications

Typical size or sizes of the final symbol should be determined and those sizes used in testing. Any restriction in color or materials should also be determined and, if practical, used in testing. The context for use, (e.g. on pill bottle, in workplace, on equipment, etc.) should be identified and used in determining context for testing. Also, any exclusions for use (e.g. NOT to be used in home or schools, etc.) should be determined and used in testing.

B2.4 Use comprehension estimation procedure to eliminate poor candidates, if needed

If there are more candidate symbols than can be cost effectively tested by the open-ended comprehension testing method, the symbols may be ranked to eliminate the poorest candidates. At least three of the top candidates should to be tested by open-ended comprehension testing (ISO 9186, Brugger 1994).

The Comprehension Estimation Procedure is performed as follows:

Print each of the candidate symbols in a circle on a card with the intended message (referent) printed in the center. Use no more than six variants on a page (Akerboom, 1995). Under the referent, mention some general context (e.g. in the airport, in the workplace, placed on packages, attached to electrical wire, etc.). Include any excluded functions (not to be used on products, does not apply to home showers, etc.). Ask the respondent to estimate what percentage of the population would understand the message (Zwaga 1989). See Figure 3 for an example of this procedure. Use at least 50 respondents (ISO 9186).

Comprehension Estimation has a 20% margin of error. This means that scores below 65% on this test are unlikely to meet the 85% criterion on final open-ended testing. The average (mean) value and the median estimates should be computed for each symbol. If scores are below the established critera, more candidate symbols need to be designed and tested (see B2.2.2).

Other alternative methods, such as Ranking Procedure and Rating Procedure may be used (Brugger, 1994).

B2.5 Open-ended comprehension testing

B2.5.1 Procedure description

The open-ended comprehension test procedure is the most reliable method of determining symbol understandability. It is strongly recommended for use during preliminary stages of evaluation when the greatest range of feedback is needed. It should also be used in the final stages of evaluation in order to achieve valid, reliable test scores (see Figure 4)[1].

Collect short definitions of the meaning of each symbol from the appropriate target audience. Respondents should be asked what the symbol means and what action they would take in response to seeing the symbol. Both questions need to be asked in order to reduce the likelihood that answers are vague or difficult to interpret. These definitions can be collected in either written form or face-to-face interviews. There are several advantages associated with face-to-face interviews including the ability to probe for complete answers, the elimination of legibility problems, and the ability to gather responses from illiterate respondents.

B2.5.2 Identify context for testing symbols

Consider using actual, verbal or pictorial context (or a combination thereof) to imitate the actual conditions in which the safety symbol will be viewed. Context can eliminate out-of-context responses resulting from a respondent's preconceptions.

[1] Testing protocol and format on pages 34-37 adapted with permission from Olgyay's Safety Symbol Art: The Testing Protocol, Materials & Results.

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Consider conducting tests at the actual work site or showing the symbol to the test respondent as it would appear on the actual product or equipment (i.e. in the size and color in which it will be printed).

If actual context is not possible, verbal and/or pictorial context may be used separately or together in the testing situation. Verbal context creates a mental picture in the respondents' mind of the actual environment where the symbol would be placed. A verbal scenario describes where the symbol would be placed and if applicable, status of the actions of the respondent prior to encountering the symbol. Verbal context is typically included next to the symbol on the test sheet (for an example, see Figure 4). However, care must be taken not to select a context that is too limited.

Pictorial context shows the environment where the symbol would be placed. Do not show photographs of persons engaging in the prohibited or recommended behavior. This could bias information from subjects. Photographs which are simple and show an environment without people are preferred. Photographs should not give cues beyond those that would normally occur in a real-world situation (for an example, see Figure 5).

Paper and pencil tests and color photocopies are one method of providing pictorial context. Slide projection of symbols allow larger audiences but prevents random presentation. Computerized multimedia equipment may be used so that color photographic images and accompanying symbols can be shown randomly for each respondent. Video is useful to present symbols seen while moving, such as highway signs. Portable computers allow testing to be conducted outside of the laboratory. Computers may be used to manipulate or distort images to simulate poor vision, low light, glare, smoke, movement or other poor visibility conditions.

B2.5.3 Determine judging criteria

Use information gathered from Preliminary testing to establish judging criteria. A subject-area expert may be consulted to determine which interpretations could result in hazardous behavior and should therefore be marked wrong or assigned a critical confusion score. Other wrong answers may not result in hazardous behavior and may be given partial credit or marked wrong. This information should be given to the judges as criteria for scoring.

Identify all acceptable responses for judging an answer correct. Variations on the intended meaning may be acceptable for a correct answer. Symbols should be defined not only in concrete terms but conceptually as well. Many responses do not use the exact word of the definition yet still convey the intended or conceptual meaning. The creation of concise definitions can be difficult. One method is to use a thesaurus to identify potential synonyms and then informally rank these from most to least appropriate. This ranking will help define a set of appropriate terms. These terms will aid not only in simplifying the evaluation of responses, but also improves inter-rater reliability (See B2.5.4).

B2.5.4 Determine scoring criteria

Score and analyze the data collected for each symbol. It is suggested that the data be scored using binary ratings: A correct answer would receive 1 point and an incorrect answer would be given a 0. Incorrect answers include answers that are wrong, no answer, or answers that are critical confusions (i.e. the opposite action is conveyed). Since the set of terms to be considered as correct answers has already been determined (See B2.5.3), the binary scoring method is easiest to score and facilitates inter-rater reliability. After scoring, the critical confusion answers must be separately identified within the wrong answer category and tabulated.

Other scoring methods can be used that give partial credit for incomplete answers by weighting these answers lower than the weight for complete answers.

Determination of the correctness of answers may be difficult for judges. If there is low inter-rater reliability, (the judges do not agree), either the correct meaning is unclear, or the respondent's language is ambiguous. In such cases, it may be necessary to orally interview respondents to determine their understanding of the symbol, particularly if the population is of low literacy.

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Calculate the percentage of correct responses and critical confusions for each symbol variant.

B2.5.5 Final comprehension testing of best symbols
This procedure is intended as a final step, after preliminary testing has determined a high probability of symbol comprehension at this stage.

A minimum size of 50 persons is suggested as the best balance between statistical reliability and ease of testing (Australian Standard, 2342, Part 3, 1980) (ISO 9186). If possible, each respondent should see no more than one variation of a symbol of a particular referent. This would necessitate 150 subjects (50 subjects each see one of three candidate symbols). If this is not practical, respondents should receive the symbols in random order. It is suggested that the number of referents in any given test should not exceed twenty (ISO 9186).

There are two testing methods from which to choose: The preferred open-ended comprehension testing method and the multiple choice testing method.

B2.5.5.1 Open-ended comprehension testing
The open-ended testing method is the preferred procedure for evaluating symbols because it allows the respondent to answer without being given "clues" from the suggested responses as occurs when using the multiple-choice test method. The open-ended testing procedure is described in section B2.5.1 and Figure 4. This procedure can be performed with face-to-face interviews (which can produce more complete and legible results) or with written tests (which are often more efficient to administer). If subjects are unable or unwilling to write answers, alternatives to paper tests may be used such as the use of video or audio tape or the use of a computer. Verbal answers may be entered into a portable computer by an interviewer. This allows the interviewer to ask for more information when responses are not clear.

B2.5.5.2 Multiple-choice testing
There are several reasons why the multiple-choice test method is not recommended including the following: It is difficult to develop reasonable distractors (alternative answers); multiple-choice tests limit the range of answers allowed and may unfairly lead the respondent to the correct answer; and multiple-choice tests fail to identify rare problems such as perceptual confusions. In sum, the multiple-choice method of testing is more vulnerable than the open-ended testing method to method biases, and is therefore subject to possible criticism.

However, multiple choice testing does have some advantages such as ease of scoring, and readable and complete answers. If the multiple choice test method is used, precautions must be taken by performing adequate preliminary testing. Preliminary testing must be done to assure that the alternative answers cover the likely range of participant's wrong answers. Tests should not be arbitrarily limited to four answers if the common range of answers is larger. This will help assure that correct selection is not based on irrelevant or absurd alternatives.

A useful method to determine that distractors are "reasonable" is as follows. Evaluate each distractor using a 7.0 Likert-type scale (see Figure 6). The distractors should receive a "plausibility" score of 4.0 or better, so that passing results are not due to irrelevant/absurd answers (Wolff, 1995). The scale is as follows: 1 = symbol does not match message; 2 = symbol matches message very poorly; 3 = symbol matches message poorly; 4 = matches somewhat; 5 = symbol matches well; 6 = symbol matches very well; 7= symbol matches perfectly. If three plausible distractors cannot be derived, then the open-ended comprehension test method must be used (see B2.5.1)

It is not recommended that symbols with critical confusions be tested using multiple choice. Two opposite answers next to each other draw attention to themselves and may make guessing easy. Further, multiple-choice should not be used when a symbol has perceptual confusions, (when a figure is mistaken for something else, such as a lock and key), because the answers give away the correct perception.

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B.2.5.6 Criteria for acceptance

The following criteria for acceptance of a symbol are recommended. A criterion of 85 percent correct responses with a maximum of 5 percent critical confusions (assuming a sample of 50 respondents) is suggested for acceptance of a given symbol. Higher criteria for acceptance may be used depending on the importance of the message or severity of the hazard. Any symbol which fails to meet these criteria should be either rejected, modified and retested, used with a supplementary word message, or be supplemented by specialized training. The symbol should also satisfy, whenever possible, the graphic considerations discussed in Annex A.

If all three symbols tested meet the criteria for acceptance, one or more of the following general considerations may be useful for selecting the symbol to use:

- Select the symbol that requires the least amount of context in order to be understood.
- Select the symbol that is less abstract.
- Select the symbol that best describes the consequence of interaction with the hazard.
- Select the symbol that has the highest relative degree of subjective danger associated with a referent hazard (Lirtzman 1987).

Other considerations include: high discrimination, recall, legibility, learnability, and measures of physiological arousal.

B2.6 General considerations

It is not the intent of this Annex to specify an exhaustive list of potential variables or to outline procedures on how to accommodate all situations. Procedures to accommodate a particular situation should be determined for each individual case. Some of the additional factors evaluators will need to consider are: establishment of baseline criteria for test respondents such as age, education, experience, visual capabilities, etc.; uniformity of test instructions; manner of presentation of symbols to respondents; size of test symbols; amount of time that respondents are allowed to view the symbols; and the specific number of respondents.

Therefore, a comprehensive and uniform procedure for evaluating all potential symbols is not possible here. Evaluators are encouraged to review the references contained in this document as well as other texts on human factors and psychology to familiarize themselves with the procedures and techniques used by other experimenters.

The methods described in this Annex are not intended to discourage use of new methods and technology if new research demonstrates the effectiveness of alternative methods for evaluating safety symbols. For example, since understandability does not always predict behavior, other evaluation methods can include laboratory and field evaluations that measure actual behavior, subjective perceptions of a hazard, behavioral intentions, and physiological arousal.

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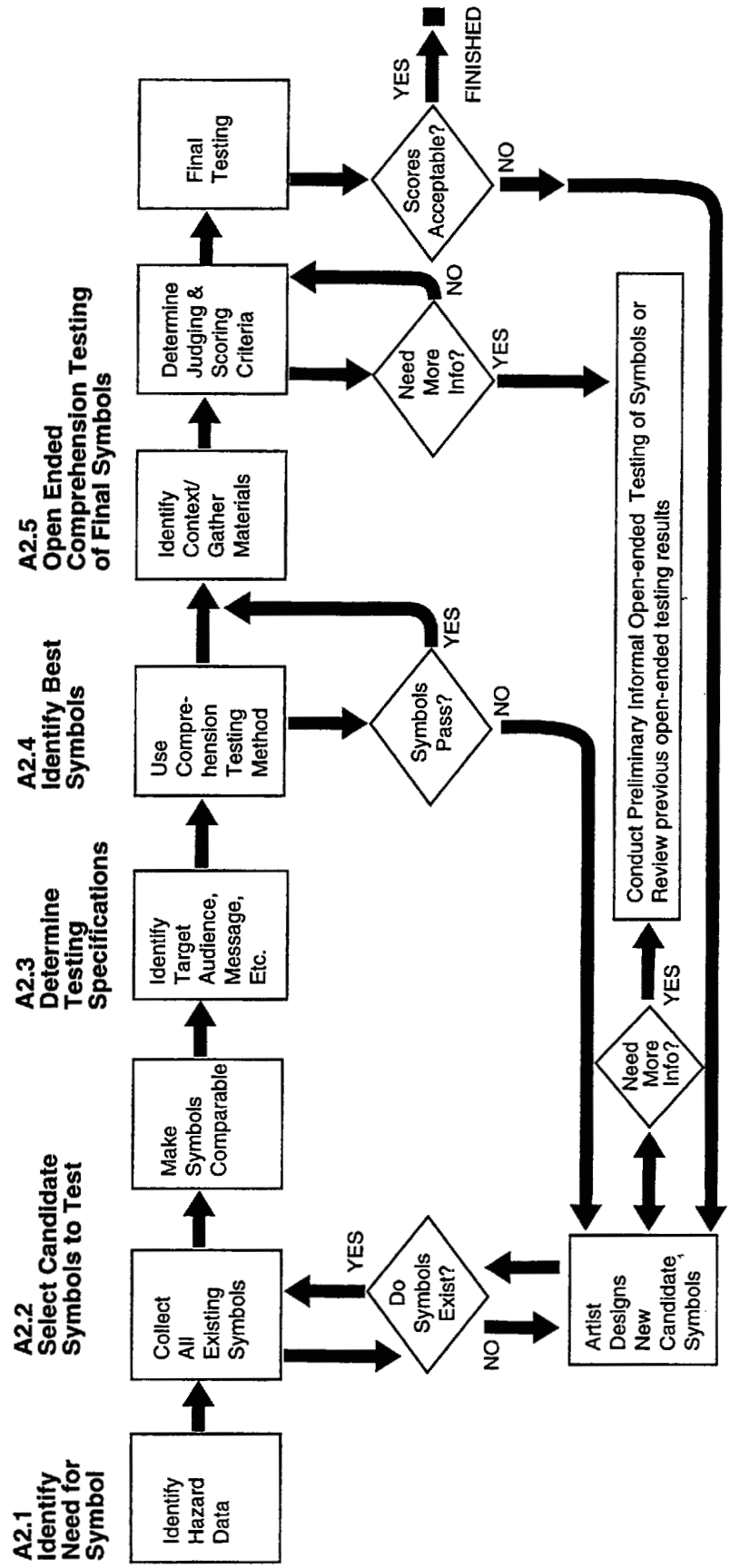

Figure 1 – Flow chart

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Safety Symbol Respondent Biographical Information

Date of Interview _____

Interviewer's Name_____

Respondent: (Name or Number)_____

Age:_____

Sex: ❑ **Male** ❑ **Female**

Education: (What was the last grade you finished in school?)

_____

Race: (White, Hispanic, Asian, Middle Eastern, Indian, Native American, Mixed Race)_____

Is English the first language? ❑ **Yes** ❑ **No If not, what is?**

_____

Occupation:_____

Type of Business Establishment:_____

Figure 2 — Example of respondent information sheet

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INSTRUCTIONS:

A group of symbols and the message they are intended to convey are shown below. Your task is to estimate the percentage of people you believe would understand the meaning of the symbols. Compare each of the symbols with the meaning shown in the middle and write your answers below each symbol. If no one would understand the symbol put 0. If you believe everyone would understand the symbol put 100. Feel free to use any numbers in between 0 and 100. You may use any number as often as you like.



____%  ____%  ____%

These symbols would be used to indicate a:

Corrosion Hazard

These symbols would be used on:
- Labels for comsumer and industrial products.
- Safety signs in the workplace.



____%  ____%

Figure 3 – Example of questionnaire for comprehension estimation procedure

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Test Administration Instructions

Introduction

"Each of you has a booklet that contains many examples of different symbols. These are symbols that you might encounter on product labels, on machines, in workplaces or in public areas. We want to see how well each of the symbols is understood. You will be helping us do this by writing down what you think each symbol means."

"It is very important that you write down exactly what the message is. If your answer is too vague or general, we will not be able to determine whether the correct message is getting across."

"Turn to the page one of the booklet. This is an example of what you will be seeing. Each page will have an illustration of a symbol that you might encounter on a sign or label. There is a blank for you to write down exactly what the symbol means and another blank for you to write down the action that you should take in response to this symbol."

"This page shows you an example of a poor answer."

"The example on page two is a much better answer. It describes the exact meaning of the symbol and tells just what actions would be taken. Make sure that all of your answers are clear and precise, like the good example."

Note: When practical, experimenters should write down responses. This would address the problems of illegible writing, incomplete answers, and non-English reading respondents.

Figure 4 – Sample symbol test administration instructions and booklet

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Test Administration Instructions (continued)

"There are many different kinds of symbols in your booklets. Some may be familiar to you and others you may have never seen before. Just do the best you can for each, and take an "educated guess" if you are not sure of the meaning. Remember, it is the symbols that are being tested not you. When you think about what the symbol might mean, remember that these are signs or labels that could be encountered on products, on machines, in workplaces or in public places."

"It is important that you work alone. Do not talk to anyone or make comments out loud. Work through the booklet a page at a time. Once you finish a page, do not go back over it. There is no time limit, but there are a large number of symbols, so try not to spend too much time on each one. If you don't know the meaning, just make your best guess and go on. When you have completed the entire booklet, please bring it to me."

"Are there any questions before we begin?"

"Now please turn the page and begin the symbol booklet. Remember to print your responses clearly."

Figure 4 – Sample symbol test administration instructions and booklet

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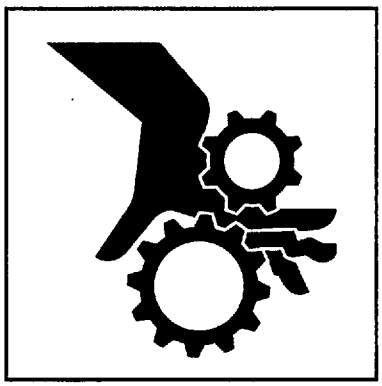
Example of a poor answer

Page 1



Context: This symbol appears on appliances and machines used in the home and workplace.

Exactly what do you think this symbol means?

gears and hand

What action would you take in response to this symbol?

be careful

Participant No. _____

Figure 4 – Sample symbol test administration instructions and booklet

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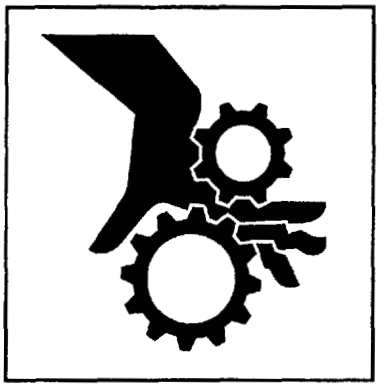
Example of a good answer

Page 2



Context: This symbol appears on appliances and machines used in the home and workplace.

Exactly what do you think this symbol means?

Caution. Moving Gears. Do not stick hand near machine while it is running.

What action would you take in response to this symbol ?

I would stay away and not put my hand near the machine until someone stopped it.

Participant No. _____

Figure 4 – Sample symbol test administration instructions and booklet

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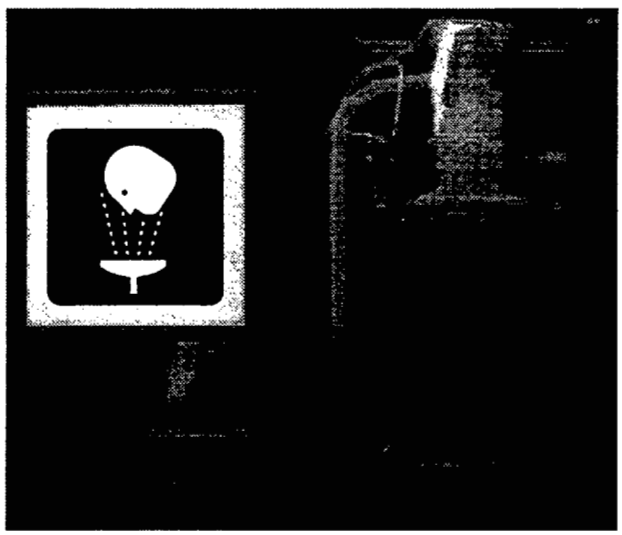



Exactly what do you think this symbol means?

_____

_____

_____

What action would you take in response to this symbol ?

_____

_____

Participant No. _____

Figure 5 – Sample pictorial context

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Preliminary Testing to determine whether distractors are "reasonable" or "absurd." Distractors should receive a "plausibility" score of 4.0 or better.

Using the 7 point scale shown below, rate how well you think the symbol matches the message by circling the number that best matches your opinion.

1	2	3	4	5	6	7
Symbol does not match message	Symbol matches message very poorly	Symbol matches message poorly	Symbol matches somewhat	Symbol matches well	Symbol matches very well	Symbol matches perfectly

Participant No. _____

Figure 6 – Sample multiple choice Likert scale

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Annex C

(Informative)

Symbol Examples Not Meeting Comprehension Testing Criteria for Acceptance

The symbols in this Annex have not passed the 85% recognition testing required to be placed in the body of the Standard.

C1 The following symbols should be used with supplementary word messages since they scored between 50% and 83% in recognition testing (Braun and Deppa, in preparation).

Hazard alerting symbols

Referent And Image Content	Symbol Examples	
Safety Alert Exclamation point and triangle. Surround shape is mandatory. This symbol should NOT be used in place of a more specific symbol.	Pictoral Panel Only	Symbol Word Panel
Flammable Flames		
Electrical Lightning Bolt		

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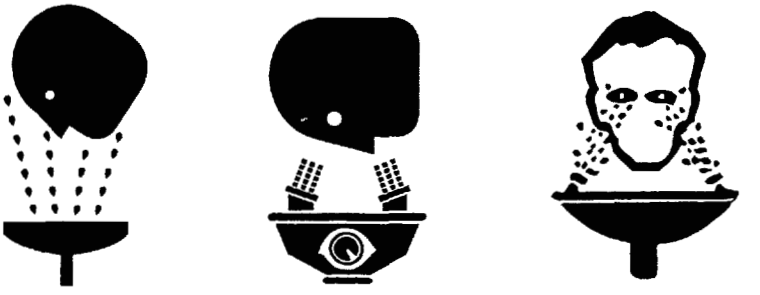
C1 (Continued)

Hazard alerting symbols

Referent And Image Content	Symbol Examples
Hot Surfaces Hand* and radiating surface*. Other portions of the body may be substituted as needed.	

Information Symbols

Safety Shower Person, shower head, drops	
Eyewash Head, drops, basin	

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C1 (Continued)

Information symbols

Referent And Image Content	Symbol Examples
Exit Person, open door	

Prohibition symbols

Do Not Touch Hand, surface	
No Entrance, No Admittance for People Standing Person	

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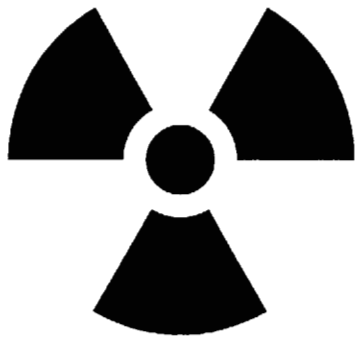
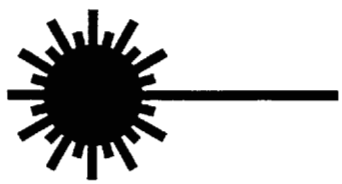
C2 The following symbols should be used only with supplementary word messages since there is poor understandability of them. Fewer than 50 percent of the groups of individuals studied identified these correctly. Major confusions with opposite to correct meanings were also identified. It is recognized, however, that understandability may improve with the increased use of these symbols with accompanying word messages.

Hazard alerting symbols

Referent And Image Content	Symbol Example	Comprehension Testing
Radiation Abstract three bladed object		Collins, Lerner, and Pierman (1982) Collins (1983) Frascara and Yau (1986)
Laser Radiating sunburst and line		Collins, Lerner, and Pierman (1982) Collins (1983)

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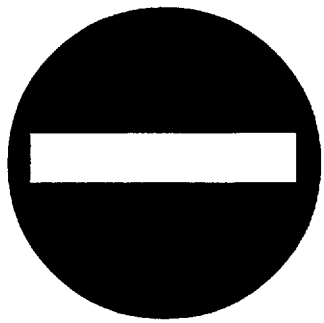
Hazard alerting symbols

C2 (Continued)

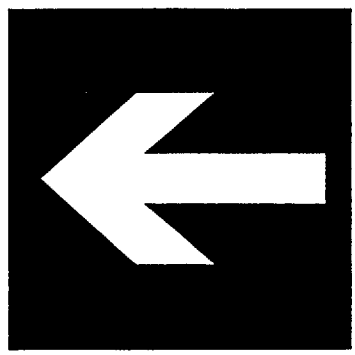
Referent And Image Content	Symbol Example	Comprehension Testing
Biohazard Abstraction No surround shape is provided for in the referenced standard		Collins, Lerner, and Pierman (1982)

Prohibition Symbols

No Entry for Vehicle Circle, horizontal bar		Collins, Lerner, and Pierman (1982)

C3 The following symbol has not been tested to our knowledge.

Information Symbols

Direction Arrow to be used only in conjunction with another safety symbol. Direction of travel must be consistent with that of exit figure, and with true direction of exit, when used with exit symbol.		

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C4 These symbols are examples of symbols for specific industries from specific standards. To our knowledge, these symbols have not been tested.

Hazard alterting symbols

Referent And Image Content	Symbol Example
Radio Frequency Hazard Abstraction	

Mandatory Action Symbols

Respiratory Protection Airline Respirator	
Hand Tools Institute symbol The surround shape as shown is not preferable but is included due to acceptance in the hand tools industry.	

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Revisions 2001

The ANSI Accredited Standards Committee Z535 plans to issue the next revisions of the Z535 Standards (.1 through .5) in December 2001. In order to meet that deadline, the committee developed the following tentative timetable:

All proposed changes are due:	June 30, 1999
Revisions will be finalized for letter balloting:	April 11, 2000
Letter balloting will be completed by:	July 18, 2000
Public reviews will be completed by:	March 1, 2001
Drafts will be ready to submit to the publisher:	May 21, 2001
Published:	December 15, 2001

All proposed changes must be submitted by June 30, 1999. Any proposals received after that date will be deferred to subsequent revisions. In order to facilitate the next revision, proposed changes must be submitted on a form for that specific purpose, which is on the back of this page. Please send this form to:

Secretary, ANSI Committee Z535
National Electrical Manufacturers Association
1300 North 17th Street, Suite 1847
Rosslyn, VA 22209

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ANSI Accredited Standards Committee Z535
On Safety Signs and Colors

FORM FOR PROPOSALS

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Date_____ Name_____ Telephone #_____

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Representing_____
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1. a. Standard Title_____

   b. Section/Paragraph_____

2. Proposal recommends (check one): New Text
   Revised Text
   Deleted Text

3. Proposal (Include the proposed new or revised text, or identify the words to be deleted.)

4. Statement of the Problem or Substantiation for the Proposal

5. Check one. This proposal is original material.
   This proposal is not original material; its source is as follows:

   _____

   _____

(This original material is the submitter's own idea based upon his own experience, thought, or research, and to the best of his/her knowledge, is not copied from another source.

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Signature

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