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Powered industrial trucks — Safety signs and hazard pictorials — General principles

Chariots de manutention automoteurs — Signaux de sécurité et de danger — Principes généraux

Reference number
ISO 15870:2000(E)

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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

Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 15870 was prepared by Technical Committee ISO/TC 110, *Industrial trucks*, Subcommittee SC 2, *Safety of powered industrial trucks*.

Annexes A to E of this International Standard are for information only.

Powered industrial trucks — Safety signs and hazard pictorials — General principles

1 Scope

This International Standard establishes general principles for the design and application of safety signs and hazard pictorials permanently affixed to all types of industrial truck including those defined in ISO 5053. This International Standard outlines safety sign objectives, describes the basic safety sign formats and colours, and provides guidance on developing the various panels that together constitute a safety sign.

2 Normative reference

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

ISO 5053:1987, *Powered industrial trucks — Terminology.*

3 Objectives of safety signs

3.1 The objectives of a safety sign are

— to alert persons to an existing or potential hazard,

— to identify the hazard,

— to describe the nature of the hazard,

— to explain the consequences of potential injury from the hazard, and

— to instruct persons about how to avoid the hazard.

3.2 In achieving these objectives, a safety sign

— should be distinctive on the equipment,

— should be in a clearly visible location,

— should be protected to the greatest extent practicable from damage and obliteration, and

— should have a reasonably long life expectancy.

3.3 Safety signs and hazard pictorials shall be located on the machine or in the operating service instruction manuals, as appropriate. Safety signs and hazard pictorials located on the machine shall be located near the location of the hazard or the control area to prevent the hazard.

3.4 Care shall be taken to prevent excessive need/use of safety signs and hazard pictorials on the machine, because overuse can reduce their effectiveness.

NOTE Experience has indicated that the effectiveness of safety signs and hazard pictorials is reduced when they begin to exceed approximately seven in number, particularly if they are in close proximity to one another.

3.5 Safety signs and hazard pictorials can be used in operator and service instruction manuals to highlight areas requiring special care. Their use in manuals is not subject to the requirement in 3.4.

4 Formats for safety signs

4.1 General

A safety sign is composed of a border surrounding two or more rectangular panels that convey information about hazards associated with the operation of a product.

There are four standard formats for safety signs:

— two-panel safety sign: signal panel, message panel (see 4.2);

— three-panel safety sign: signal panel, pictorial panel, message panel (see 4.3);

— two-panel safety sign: pictorial panel, message panel (see 4.4);

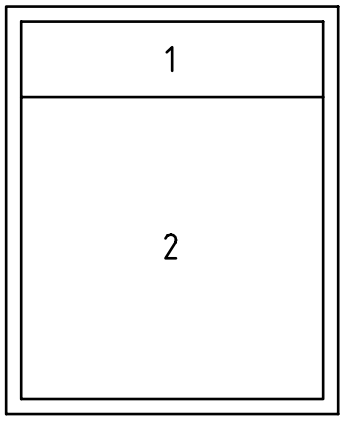
— two-panel safety sign: two pictorial panels (see 4.5).

Variations on these standard formats may be appropriate for some situations.

A vertical configuration is usually preferred, although a horizontal configuration is acceptable. The final choice of safety sign format and configuration should be determined by whichever alternative is judged to communicate most effectively, by the geographical and language areas where the product will be marketed, by legal requirements, and by the space available for the safety sign.

4.2 Two-panel safety signs: signal panel, message panel

The signal panel contains the safety alert symbol and one of the three signal words (CAUTION, WARNING, DANGER). The message panel contains a text message that describes the hazard, explains the consequences of exposure to the hazard, and instructs how to avoid the hazard. See Figure 1.



Key

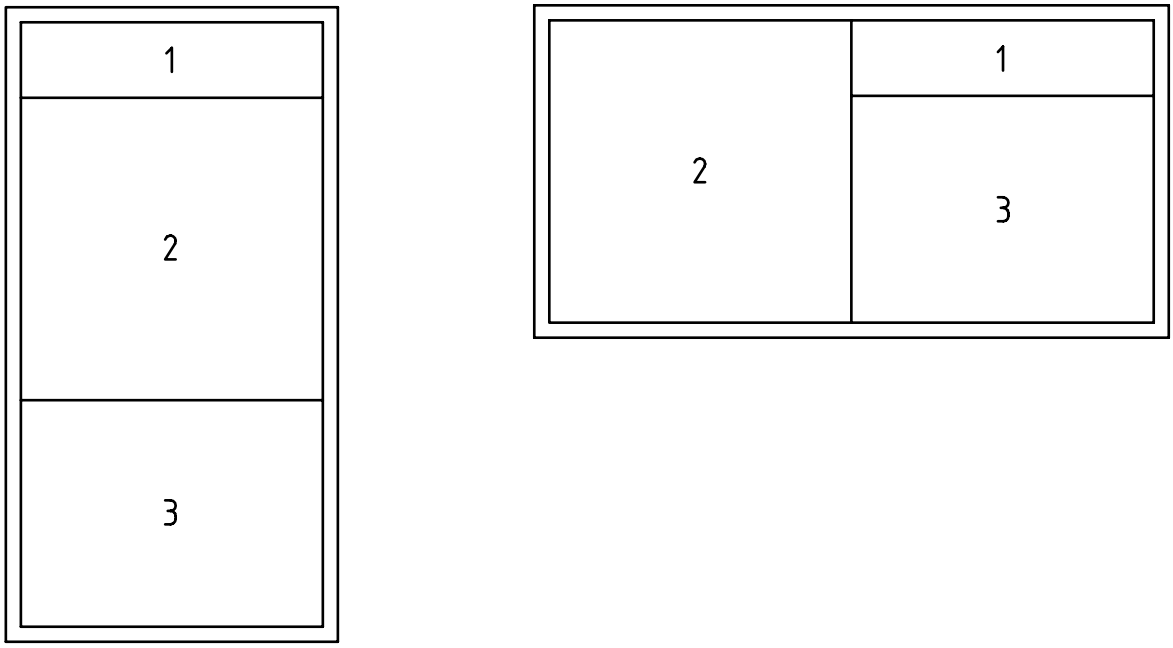
1 Signal panel

2 Message panel

Figure 1 — Two-panel safety sign: signal panel, message panel (vertical configuration)

4.3 Three-panel safety signs: signal panel, pictorial panel, message panel

The signal panel contains the safety alert symbol and one of the three signal words. The pictorial panel contains a hazard description pictorial or, in some cases, a combined hazard description and hazard avoidance pictorial. The message panel contains a text message that describes the hazard, explains the consequences of exposure to the hazard, and instructs how to avoid the hazard. See Figure 2.



a) Vertical configuration **b) Horizontal configuration**

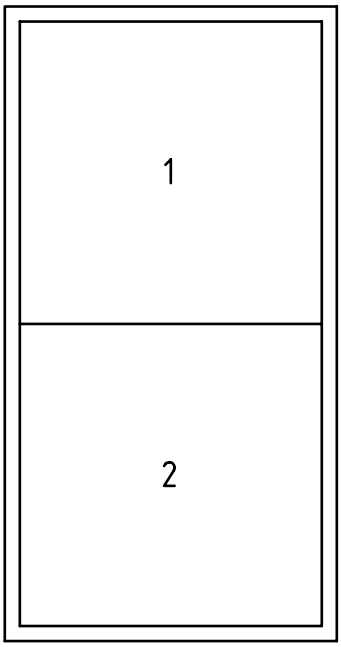
Key

1 Signal panel
2 Hazard description pictorial panel
3 Message panel

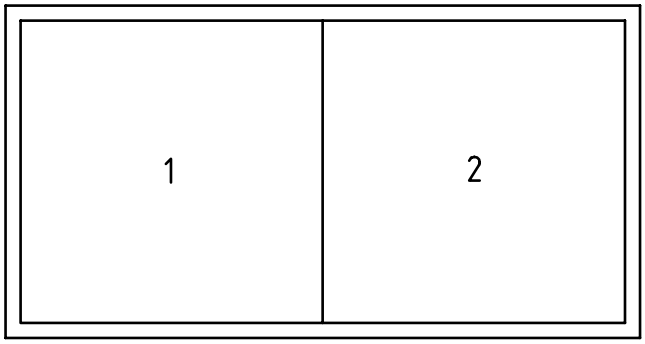
Figure 2 — Three-panel safety signs: signal panel, pictorial panel, message panel

4.4 Two-panel safety signs: pictorial panel, message panel

The pictorial panel contains either a hazard description pictorial enclosed by the safety alert triangle or the safety alert symbol alone. The message panel contains a text message that describes the hazard, explains the consequences of exposure to the hazard, and instructs how to avoid the hazard. See Figure 3.



a) Vertical configuration



b) Horizontal configuration

Key

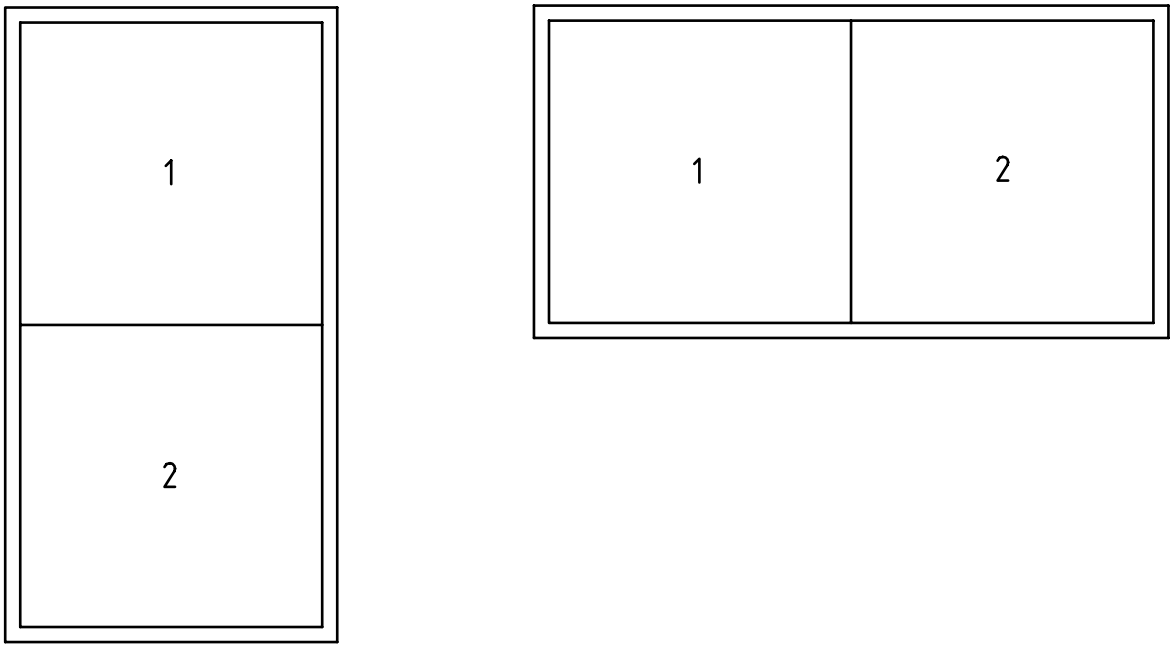
1 Pictorial panel with safety alert symbol or with hazard description pictorial enclosed by the safety alert triangle

2 Message panel

Figure 3 — Two-panel safety signs: pictorial panel, message panel

4.5 Two-panel safety signs: two pictorial panels

The first pictorial panel is the hazard description pictorial panel and contains either a hazard description pictorial enclosed by the safety alert triangle or the safety alert symbol alone. The second pictorial panel is the hazard avoidance pictorial panel and contains a hazard avoidance pictorial. See Figure 4.



a) Vertical configuration **b) Horizontal configuration**

Key

1 Pictorial panel with safety alert symbol or with hazard description pictorial enclosed by the safety alert triangle

2 Hazard avoidance pictorial panel

Figure 4 — Two-panel safety signs: two pictorial panels

5 Signal panel

5.1 The signal panel of a safety sign contains the safety alert symbol and one of the three signal words.

5.2 The safety alert symbol for safety signs that contain one of the signal words shall be as shown in Figure 5 and shall be used for safety signs that contain one of the three signal words.

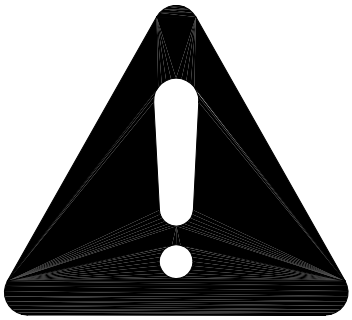


Figure 5 — Safety alert symbol for safety signs that contain a signal word

5.3 Safety signs may be classified according to the relative seriousness of the hazard situation by use of the signal word.

There are three signal words: DANGER, WARNING, and CAUTION. The signal word alerts viewers to the existence and relative seriousness of a hazard.

The three signal words are reserved for personal injury hazards. The choice of the signal word is based upon an estimate of the likelihood of exposure to the hazard and of the probable consequences of exposure to the hazard.

— **DANGER:** The signal word DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. Safety signs identified by the signal word DANGER should be used sparingly and only for those situations presenting the most serious hazards.

— **WARNING:** The signal word WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. Hazards identified by the signal word WARNING present a lesser degree of risk of injury or death than those identified by the signal word DANGER.

— **CAUTION:** The signal word CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. CAUTION may also be used to alert against unsafe practices associated with events that could lead to personal injury.

6 Pictorial panels

6.1 A pictorial panel of a safety sign contains a hazard description pictorial, a hazard avoidance pictorial, or the safety alert symbol alone.

6.2 There are two basic types of pictorials for use on safety signs: hazard description and hazard avoidance.

— **Hazard description pictorial:** A hazard description pictorial presents a visual description of the hazard and, in general, the consequences of not avoiding the hazard.

— **Hazard avoidance pictorial:** A hazard avoidance pictorial presents visual instructions on how the hazard should be avoided.

A well-developed hazard description pictorial should clearly identify the hazard and portray the potential consequences of a failure to follow instructions. A well-developed hazard avoidance pictorial should clearly identify the actions necessary to avoid interaction of persons with the hazard.

It is possible that both types of pictorial may be combined into a single pictorial, although this generally is quite difficult. Most often, a hazard description pictorial is used. A hazard avoidance pictorial may be used to supplement or to replace the text message.

In a few cases, a pictorial may address more than one hazard. In general, however, avoid addressing more than one hazard by a single pictorial unless the hazards are closely related.

6.3 On two-panel safety signs, the hazard description pictorial shall be enclosed by the safety alert triangle to identify the sign as a safety sign. The safety alert triangle is shown in Figure 6.

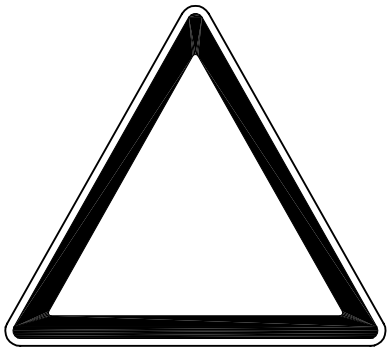


Figure 6 — Safety alert triangle

6.4 If no hazard description pictorial is used inside the safety alert triangle, an exclamation mark is placed within the triangle to create the outline safety alert symbol shown in Figure 7.

Figure 7 — Outline safety alert symbol

7 Message panel

7.1 The message panel of a safety sign contains a text message that, either alone or in combination with a pictorial panel, describes the hazard, explains the potential consequences of exposure to the hazard, and instructs how to avoid the hazard.

7.2 If a hazard description pictorial adequately portrays the hazard and its potential consequences, one or both of these elements may be deleted from the message panel. If a hazard avoidance pictorial adequately portrays how to avoid the hazard, that element may be deleted from the message panel. If no pictorial is used, the message panel shall convey all three elements. When possible, the message should be written in simple sentences not exceeding a few lines.

8 Languages, translations and multi-language safety signs

8.1 Safety signs that contain a signal word or a text message should be in one of the languages of the country where the product is to be used. Safety signs without text obviously require no language translation. However, products that use no-text safety signs require both of the following:

— a special safety sign that instructs the operator to consult the operator's manual for an explanation of the safety signs applicable to that product (see Figures 8 and 9); and

— appropriate text messages, corresponding to the no-text safety signs, printed in the operator's manual in the appropriate language.

8.2 Figure 8 shows, as an example, a four-language “Read operator's manual" safety sign in German, French, English and Dutch. Other language combinations, or a single language, are also permitted, so long as the safety sign includes the language of the geographical area where the product is to be used.

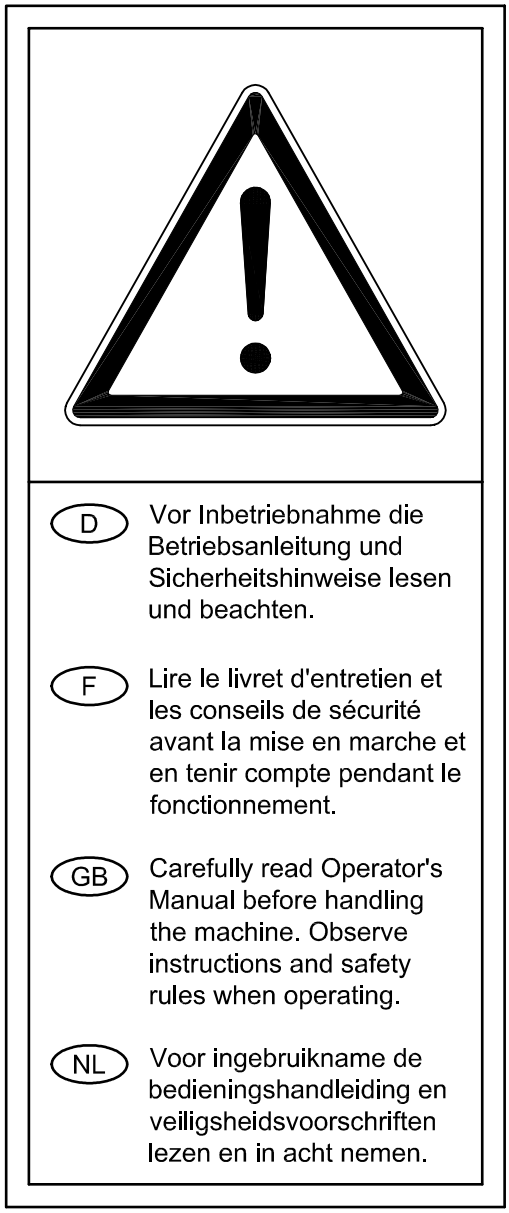


Figure 8 — Example of four-language “Read operator's manual” safety sign for use on products with no-text safety signs

8.3 Figure 9 shows the no-text “Read operator's manual safety” sign. This safety sign may be used as an alternative to a single or multiple language safety sign of the type shown in Figure 8.

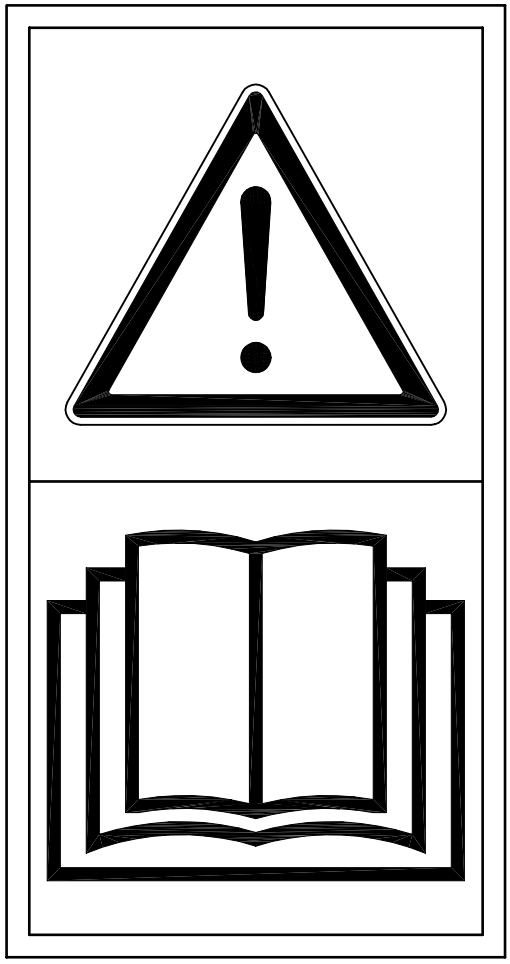


Figure 9 — No-text “Read operator's manual” safety sign for use on products with no-text safety signs

9 Colours of safety signs

9.1 Colours of signal panel

The colour of the signal panel depends on the selection of the signal word.

a) The signal panel of DANGER signs shall have a white signal word on a red background. The safety alert symbol shall have a red exclamation mark on a white background triangle (see Figure 5).

b) The signal panel of WARNING signs shall have a black signal word on an orange background. The safety alert symbol shall have an orange exclamation mark on a black background triangle (see Figure 5).

c) The signal panel of CAUTION signs shall have a black signal word on a yellow background. The safety alert symbol shall have a yellow exclamation mark on a black background triangle (see Figure 5).

9.2 Colours of pictorial panel

The colours of the pictorial panel depend on whether the safety sign contains one of the three signal words.

Pictorial panels of safety signs that contain one of the three signal words shall have a black pictorial on a white background.

Pictorial panels of safety signs that contain the safety alert triangle or the outline safety alert symbol shall have a black pictorial and triangle on a yellow background.

If prohibition of an activity is indicated by ✕ or ⊘ or the word **STOP** (see annex A, A.9.1), the prohibition indicator shall be red.

9.3 Colours of message panel

The colours of the message panel depend on whether the safety sign contains one of the three signal words.

The message panel of safety signs that contain a signal word shall have white letters on a black background or black letters on a white background.

The message panel of safety signs that do not contain a signal word shall have black letters on a yellow background or black letters on a white background.

9.4 Colour of border

The colour of the border depends on the selection of the signal word and whether the safety sign contains the safety alert triangle.

a) The border of DANGER signs shall be red. If necessary to differentiate the safety sign from the colour of the surface on which it is affixed, an additional outside border of white may be used.

b) The border of WARNING signs shall be orange. If necessary to differentiate the safety sign from the colour of the surface on which it is affixed, an additional outside border of white or black may be used.

c) The border of CAUTION signs shall be yellow. If necessary to differentiate the safety sign from the colour of the surface on which it is affixed, an additional outside border of white or black may be used.

d) The border of safety signs that contain the safety alert triangle shall be yellow. If necessary to differentiate the safety sign from the colour of the surface on which it is affixed, an additional outside border of white or black may be used.

9.5 Colour of panel separation lines

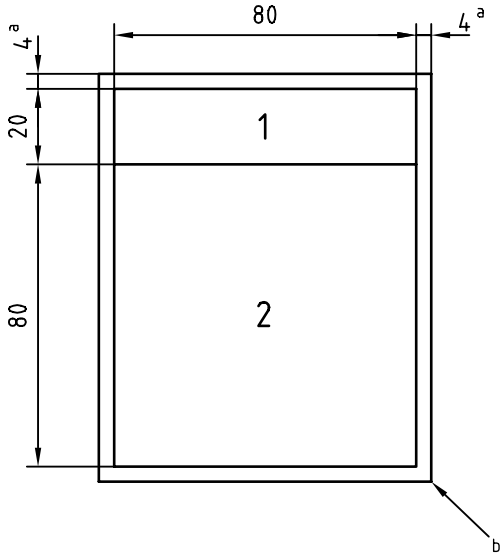
Any panel separation lines shall be black.

10 Dimensions

10.1 Recommended dimensions in millimetres of safety signs are shown in Figures 10 to 13. Smaller or larger sizes may be used as required. Proportions may be varied as necessary to provide a sufficiently large signal panel or to provide adequate space for the message panel to be set in a legible type size.

10.2 Guidance on the size of a graphic symbol and text within the safety sign is given in the informative annex E.

Dimensions in millimetres

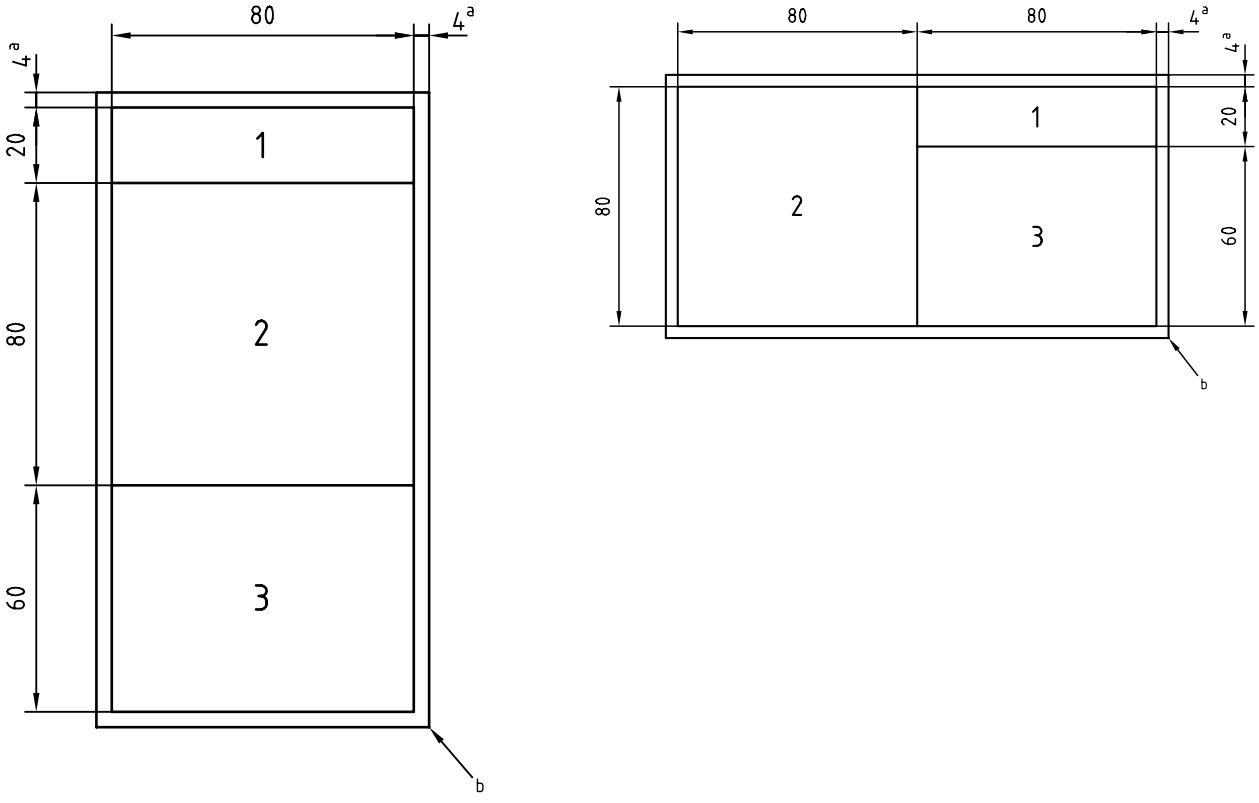


Key

1 Signal panel
2 Message panel
[a] Border width.
[b] Corner radius equals border width.

Figure 10 — Recommended dimensions for two-panel format: signal panel, message panel
(vertical configuration)

Dimensions in millimetres



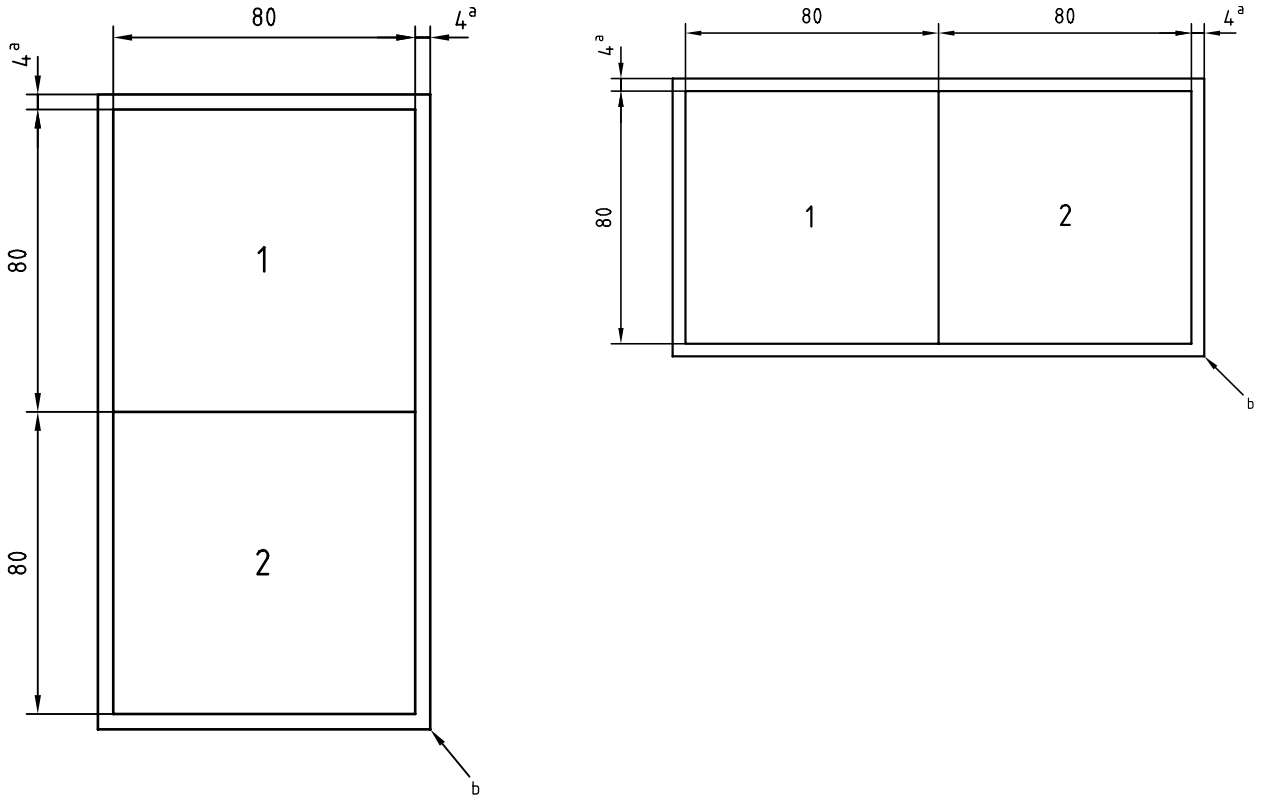
a) Vertical configuration **b) Horizontal configuration**

Key

1 Signal panel
2 Hazard description pictorial panel
3 Message panel
[a] Border width.
[b] Corner radius equals border width.

Figure 11 — Recommended dimensions for three-panel format: signal panel, pictorial panel, message panel

Dimensions in millimetres



a) Vertical configuration **b) Horizontal configuration**

Key

1 Pictorial panel with safety alert symbol or with hazard description pictorial enclosed by the safety alert triangle

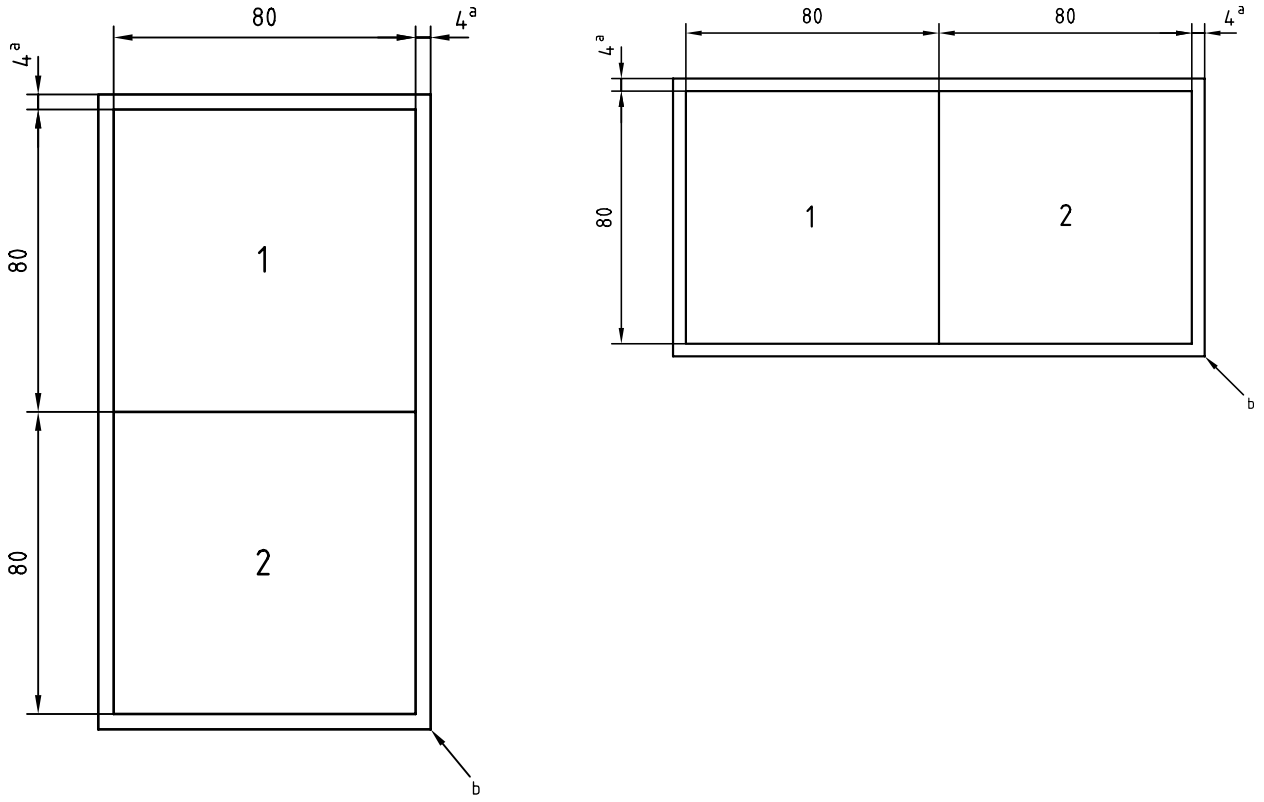
2 Message panel

[a] Border width.

[b] Corner radius equals border width.

Figure 12 — Recommended dimensions for two-panel format: pictorial panel, message panel

Dimensions in millimetres



a) Vertical configuration **b) Horizontal configuration**

Key

1 Pictorial panel with safety alert symbol or with hazard description pictorial enclosed by the safety alert triangle
2 Hazard avoidance pictorial panel
a Border width.
b Corner radius equals border width.

Figure 13 — Recommended dimensions for two-panel format: two pictorial panels

11 Principles and guidelines for graphical design of hazard pictorials

Annex A provides principles and guidelines for good graphical design of hazard pictorials as well as instructions for drawing the human figure and other pictorial elements. Good consistent visual design is important in order to convey the meaning of both hazard description and hazard avoidance pictorials.

12 Hazard description pictorials

Annex B presents examples of hazard description pictorials intended for use on safety signs. Alternative hazard description pictorials may be used as appropriate, and additional hazard description pictorials may need to be developed.

13 Hazard avoidance pictorials

Annex C presents examples of hazard avoidance pictorials intended for use on safety signs. Alternative hazard avoidance pictorials may be used as appropriate, and additional hazard avoidance pictorials may need to be developed.

14 Examples of safety signs

14.1 Examples of safety signs with text

The signal word and text message appropriate to a hazard depend upon a combination of highly variable factors, including legal precedents. No detailed examples of safety signs with text are presented in this International Standard. Safety signs with text should be developed as necessary in conformance to the objectives and principles explained in preceding clauses.

14.2 Examples of safety signs without text

Annex D presents examples of no-text safety signs for a number of hazards. Additional safety signs may need to be developed for other hazards.

Annex A
(informative)

Principles and guidelines for graphical design of hazard pictorials

A.1 Introduction

This annex provides principles and guidelines for good graphical design of hazard pictorials as well as instructions for drawing the human figure and other pictorial elements. Good consistent visual design is important to convey the meaning of both hazard description and hazard avoidance pictorials.

A.2 Guidelines for creating pictorials

Although each safety sign and each safety sign pictorial should be considered on its own terms, a number of general guidelines for good pictorial design may be articulated.

a) Use representational pictorials rather than abstract symbols.

b) 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 pictorial but who is not directly involved with the hazard.

c) When objects, faces or the full human body are shown, use the view (generally front or side) that is most easily recognized.

d) Use pictorials depicting dramatic action and showing the involvement of the human figure or body elements with the hazard.

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

f) 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.

g) Use arrows where necessary to show actual or potential movement. In some cases, movement of a machine component is implicit in the pictorial graphics and arrows need not be added. Be consistent in selecting and using alternative 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.

h) Avoid using the prohibition symbols (diagonal cross, circle with diagonal slash) where the symbol would obscure identification of the prohibited action or where the meaning of the prohibition symbol is not explicitly clear.

i) Do not use red to represent blood.

A.3 Human figure

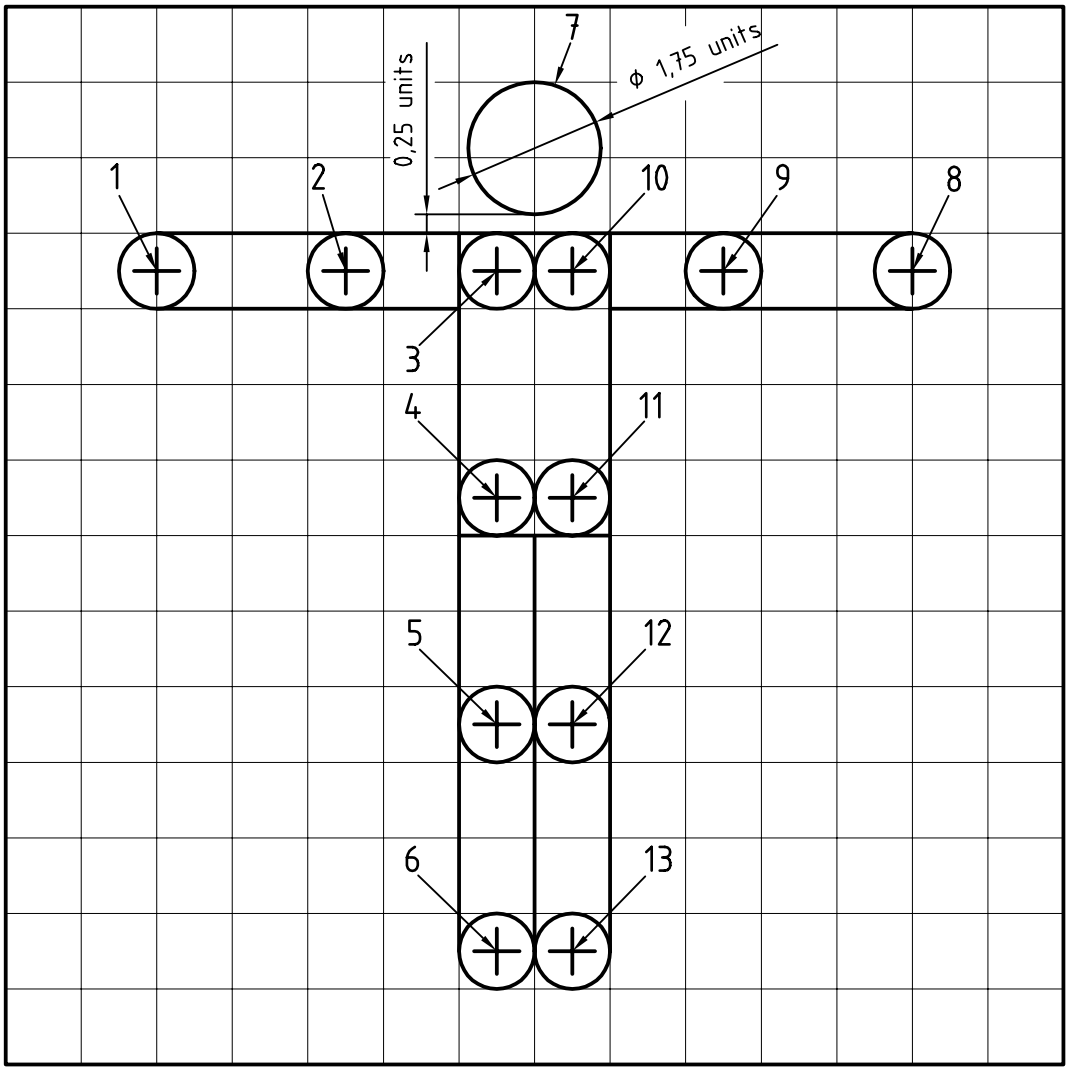
A.3.1 Drawing a basic human figure

The human figure is frequently the main component in the pictorial and should be depicted in a simple but believable form. For the greatest long-range benefit, it should always be pictured consistently. Interpretation should be instantaneous and not require the viewer to study the pictorial to determine what part of the body is involved or

in what way. The human figure presented in this annex was designed to satisfy these specific requirements. Therefore, it should not be distorted or reproportioned, except as noted in A.3.5. Its purpose is to **alert persons** who see the safety sign and to **prevent accidents**, not to be an artistic presentation.

A.3.2 Human figure unit system

The standard pictorial 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 A.1. The hands and feet end in semicircles.



Key

1 Right-hand pivot
2 Right-elbow pivot
3 Right-shoulder pivot
4 Right-hip pivot
5 Right-knee pivot
6 Right-foot pivot
7 Head
8 Left-hand pivot
9 Left-elbow pivot
10 Left-shoulder pivot
11 Left-hip pivot
12 Left-knee pivot
13 Left-foot pivot

NOTE One square is one unit.

Figure A.1 — Human figure unit system

A.3.3 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 A.2 shows the human figure in various positions. The position the figure will assume in the pictorial is usually determined by the following:

— 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.

Figure A.2 — Drawing a human figure

A.3.4 Bold representation versus outline drawing of a human figure

This bold representation of the human form is more effective than a line drawing of the same human form in focusing the observer's attention on the person whose potentially hazardous situation is the subject of the pictorial. However, if more than one human figure appears in the pictorial, a person not directly exposed to the hazard may be a line drawing (e.g. the driver of a machine in a runover hazard pictorial or a falling rider hazard pictorial). The line drawing of a human figure may be used

— only for representing persons not directly at risk in the hazardous situation, and

— only when, by being combined with the bold human form, the combination results in a pictorial that is easier to understand and communicates better.

A.3.5 Stationary, free-standing human figure (viewed from front or rear)

The standard pictorial human figure is modified when the person is depicted in a stationary, free-standing position. The IEC symbol denoting “Heavy (obese) patient — For use on medical equipment" (symbol No. 5391 from IEC 60417:1973) is used as the pictorial human figure in hazard avoidance pictorials that communicate the idea of keeping a safe distance away from a hazard (see A.8.6) and in some hazard avoidance pictorials that communicate the idea of keeping away from a hazardous location (see A.9.2). Figure A.3 shows a stationary, free-standing human figure.

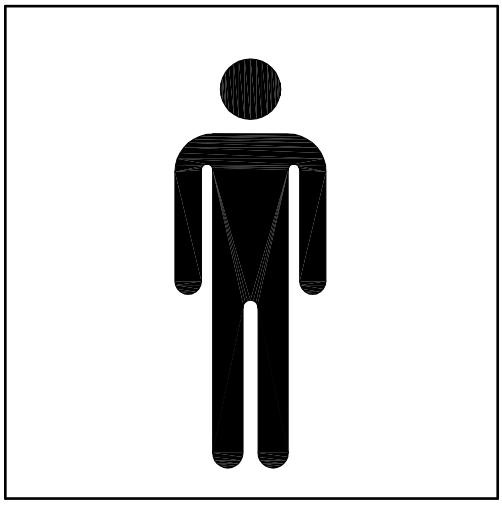


Figure A.3 — Stationary, free-standing human figure (viewed from front or rear)

A.3.6 Profile head

Whenever 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. Figure A.4 gives an example of a hazard pictorial that uses a profile head.

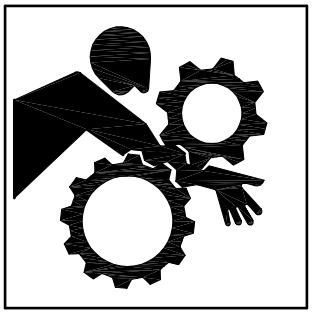


Figure A.4 — Example of pictorial using a profile head

A.4 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 appears in profile and the profile head is 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 shown in A.5.2. Figure A.5 gives examples of hazard pictorials that use the upper torso.

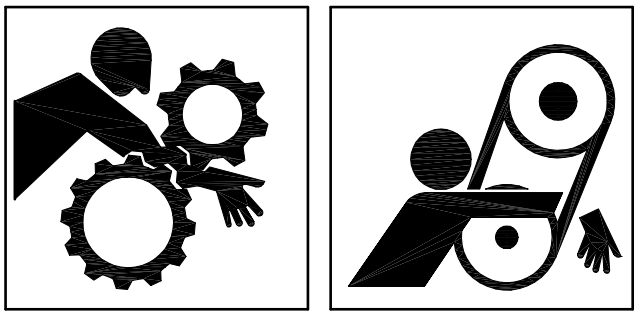


Figure A.5 — Examples of pictorials using upper torso

A.5 Hands

A.5.1 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 pictorial elements to work with. The design shown in Figure A.6 was given careful attention to simplify the shape and form for easy recognition. In the full-palm view, the fingers and thumb do not move to other positions. In other full-hand views, fingers may be spread. Figure A.7 gives examples of hazard pictorials that use the full-view hand.

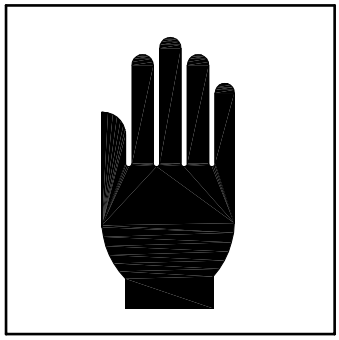


Figure A.6 — Full-palm view of hand

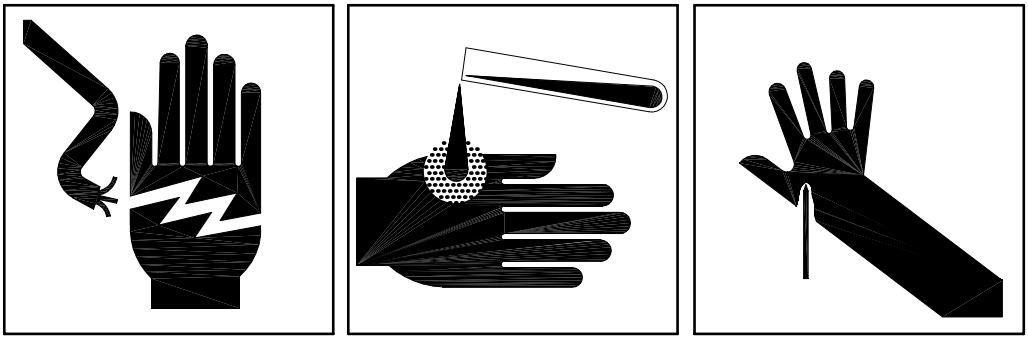


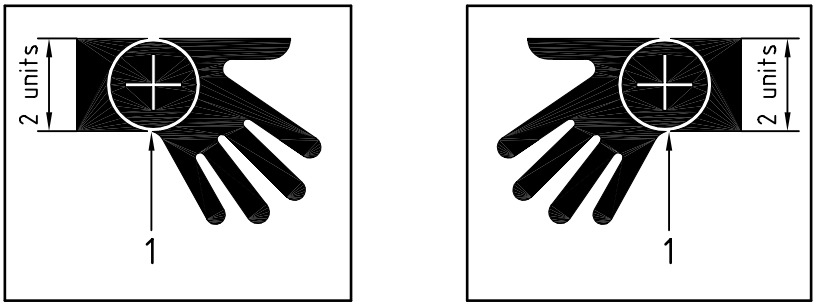
Figure A.7 — Examples of pictorials using the full-view hand

A.5.2 Adding hands to human figure

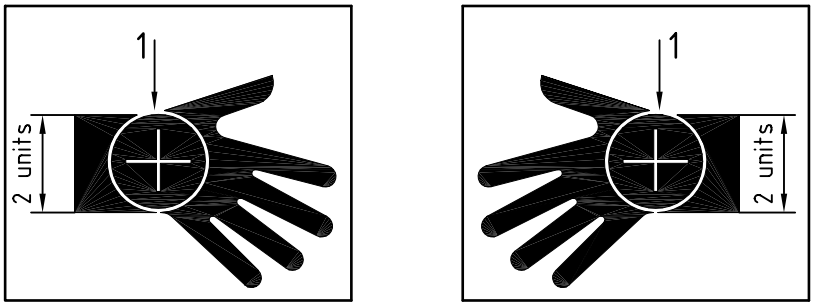
When hazards involve the hands or arms, hands are added to the figure to increase the recognition value of the limb elements. Two basic hand positions are shown in Figure A.8:

— 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.



a) Position A: Hand with thumb extending along arm axis



b) Position B: Hand rotated around hand pivot point

Key

1 Hand pivot point

Figure A.8 — Adding hands to the human figure

The 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. Figure A.9 gives examples of hazard pictorials where hands have been added to the human figure.

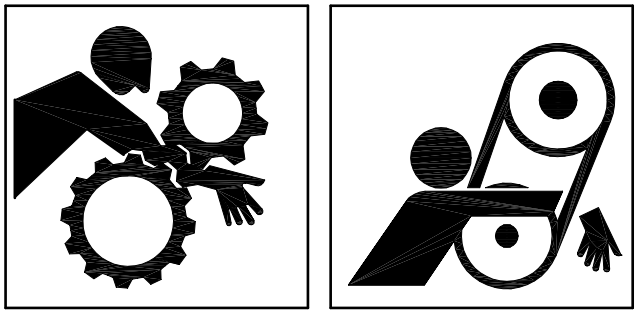


Figure A.9 — Examples of pictorials using human figure with hands

A.5.3 Hand profiles

Hand profiles are best used to convey a feeling of depth, which can add realism, dramatization and understandability to the pictorial. 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 A.10 represent the design style to be used in pictorials to maintain visual consistency. Valuable time can be saved when creating hand profiles by taking existing pictorials 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 treatment of the fingers. 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.

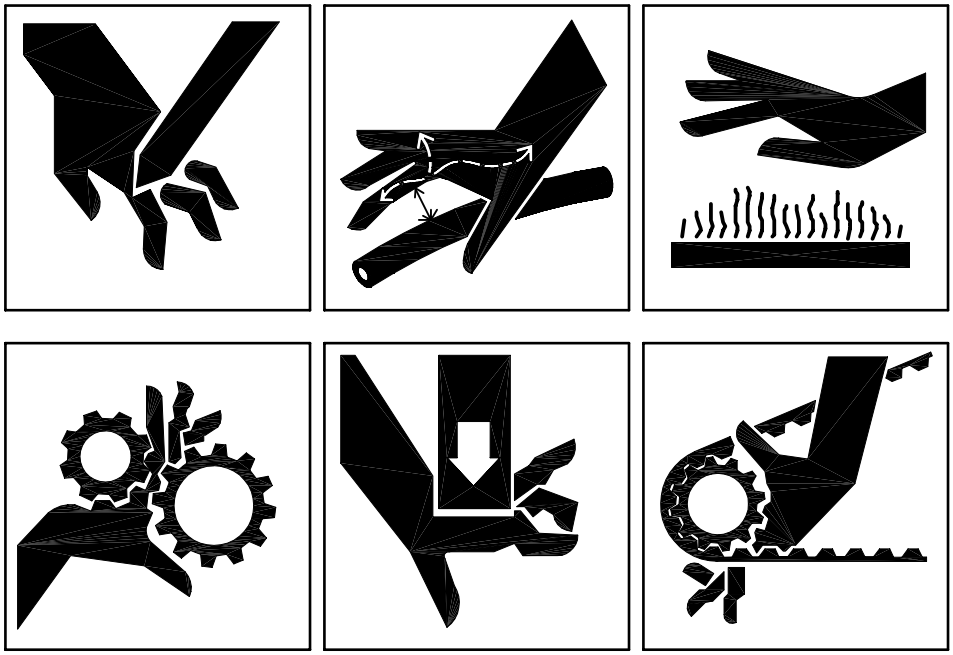


Figure A.10 — Examples of pictorials using hand profiles

A.6 Feet

A.6.1 Foot development

When a pictorial illustrates just the lower leg or foot, the stylized shoe or boot (foot) shown in Figure A.11 should be used. It may be used facing either left or right. Figure A.12 gives examples of hazard pictorials that use a foot.

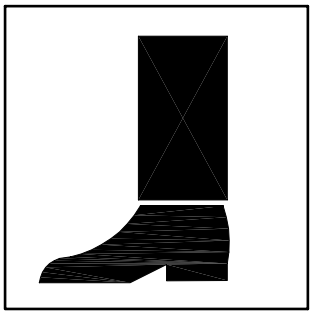


Figure A.11 — Foot development

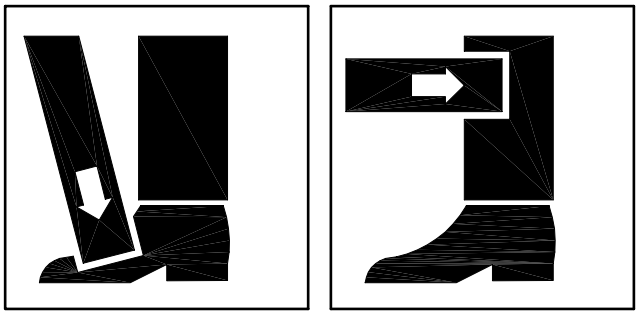
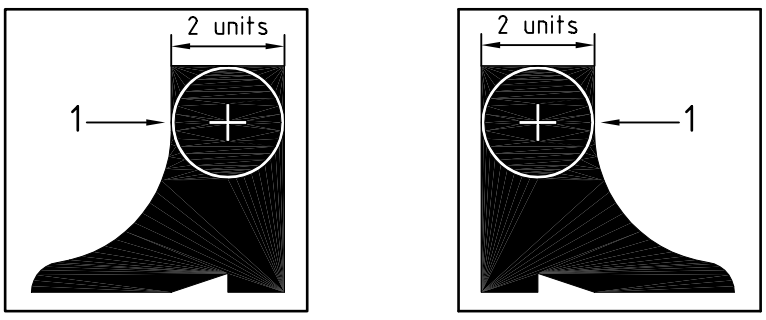


Figure A.12 — Examples of pictorials using feet

A.6.2 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 increases recognition value of the limb elements. For such pictorials, the feet shown in Figure A.13 should be added to the foot pivot points. For design consistency, they should not be altered or distorted.



Key

1 Foot pivot point

Figure A.13 — Adding feet to the human figure

A.7 Representation of machines, equipment and components

In general, use outline representations for whole machines or substantial portions of machines. This is to avoid large filled (black) areas that may detract from recognition of the human figure relative to the machine or the hazard-creating component or equipment on the machine. This is especially true when the human figure is depicted in close proximity to the machine representation. Representations of individual components may be outline or filled, depending upon which alternative provides better visual recognition and graphical clarity. In general, filled areas result in the perception of greater mass and solidity. However, outlines of machines 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 filled areas, or outlines using a wider line thickness, can assist in highlighting the hazard-creating component or equipment on a machine.

A.8 Arrows

A.8.1 Using arrows

To communicate basic safety sign information, pictorials should use visual elements to represent a variety of items, situations and ideas. The following are important:

— flying or falling objects and their direction of motion;

— the direction of motion of machine component;

— the direction of motion of entire machine;

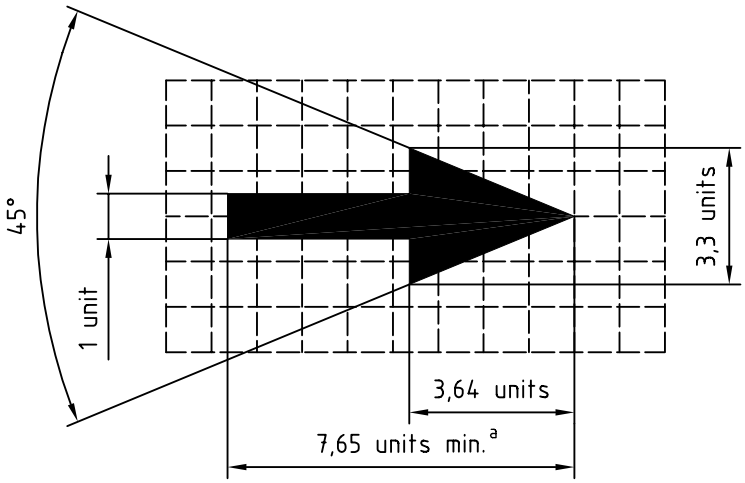
— the exertion of pressure or force; and

— the idea of keeping a safe distance away from a hazard.

Five types of arrow design are used to denote these elements of pictorial communication.

A.8.2 Arrows representing falling or flying objects and their direction of motion

The arrow generally used is a black arrow on a white background. It may be straight, angled or curved. The tail of the arrow should appear solid when a single object or a few objects are involved; the tail should be broken when a continuous barrage of objects or particles is involved. See Figure A.14 for arrow dimensions. This arrow is normally sized in proportion to the size of the falling or flying object that it represents in a given pictorial. Figure A.15 gives an example of a hazard pictorial that uses this arrow to represent falling or flying objects and their direction of motion.



NOTE One square is one unit.

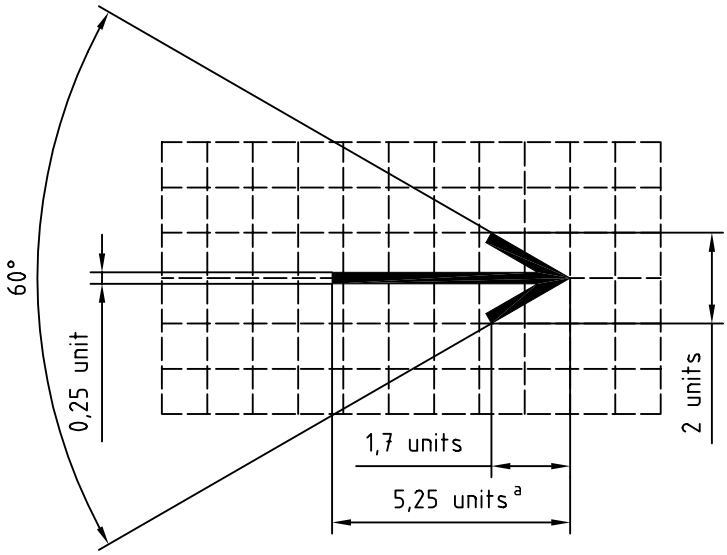
[a] Length as needed.

Figure A.14 — Arrow to represent falling or flying objects and their direction of motion

Figure A.15 — Example of pictorial using arrows to represent falling or flying objects and their direction of motion

A.8.3 Arrows representing the direction of motion of machine components

The arrow generally used is a black arrow on a white background. It may be straight, angled or curved. See Figure A.16 for arrow dimensions. This arrow is normally used at 100 % of the actual size shown in Figure A.16, although it may be sized differently as appropriate to individual pictorials. This arrow conforms to the direction of movement arrow specified in ISO 4196, with a 60° included angle for the arrowhead. Figure A.17 gives an example of a hazard pictorial that uses this arrow to represent the direction of motion of machine components. Because relative line thickness is the only significant difference between the arrows in Figures A.16 and A.18, situations may arise when the two arrows appear almost identical. When possible, however, use the arrow in Figure A.16 to represent the direction of motion of machine components and the arrow in Figure A.18 to represent the direction of motion of entire machines.



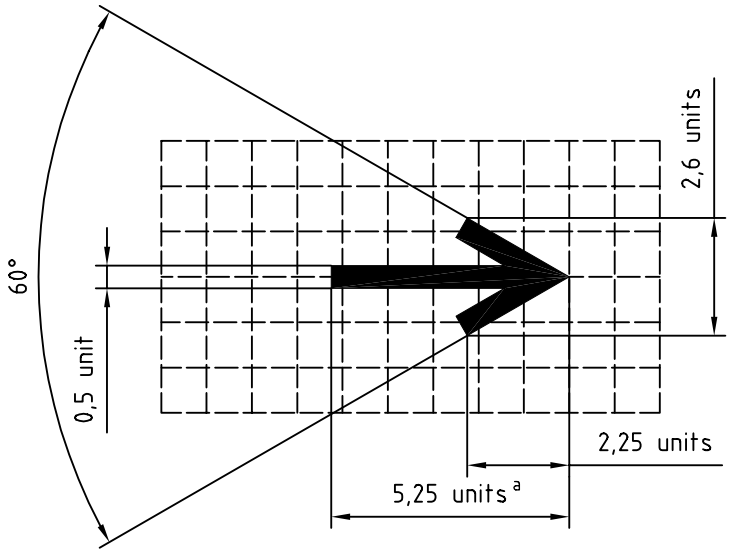
[a] Or as needed.

Figure A.16 — Arrow to represent the direction of motion of machine components

Figure A.17 — Example of pictorial using arrows to represent the direction of motion of machine components

A.8.4 Arrows representing the direction of motion of entire machines

The arrow generally used is a black arrow on a white background. It may be straight, angled or curved. See Figure A.18 for arrow dimensions. This arrow is normally used at 100 % of the actual size shown in Figure A.18, although it may be sized differently as appropriate to individual pictorials. This arrow conforms to the direction of movement arrow specified in ISO 4196, with a 60° included angle for the arrowhead. Because relative line thickness is the only significant difference between the arrows in Figures A.16 and A.18, situations may arise when the two arrows appear almost identical. When possible, however, use the arrow in Figure A.16 to represent the direction of motion of machine components and the arrow in Figure A.18 to represent the direction of motion of entire machines.



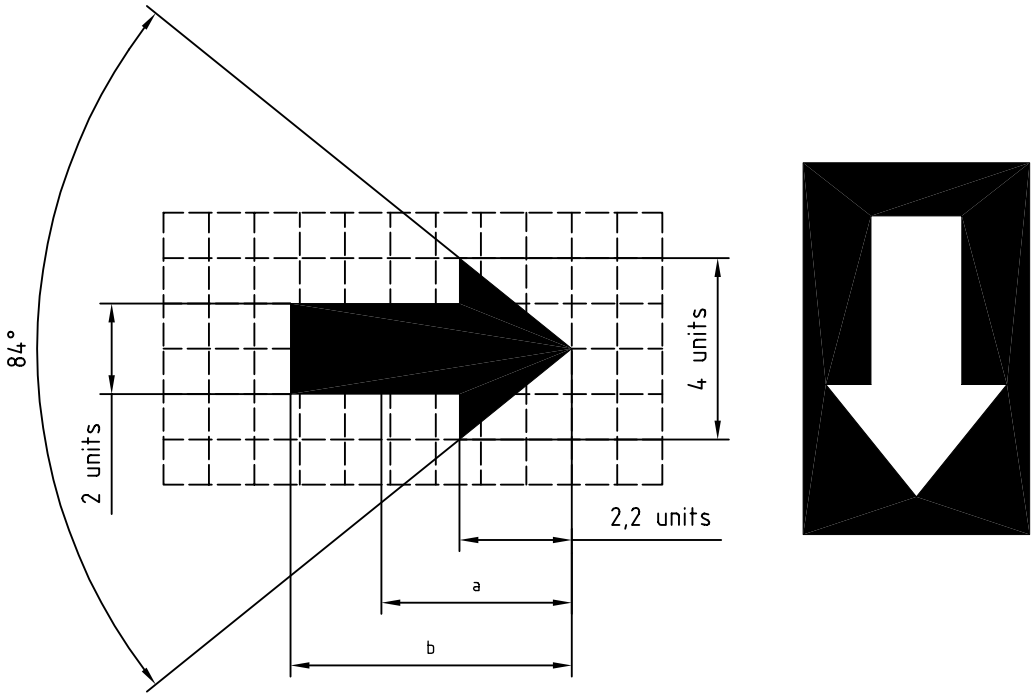
NOTE One square is one unit.

[a] Or as needed.

Figure A.18 — Arrow to represent the direction of motion of entire machines

A.8.5 Arrows representing the exertion of pressure or force

The arrow generally used is a white arrow in a black silhouette representing the source of the force or pressure. It may also appear as a black arrow on a white background when the specific source of the force or pressure is depicted. See Figure A.19 for arrow dimensions. This arrow is normally used at 100 % of the actual size shown in Figure A.19, although it may be sized differently as appropriate to individual pictorials. This arrow conforms to the force arrow specified in ISO 4196, with an 84° included angle for the arrowhead. Figure A.20 gives examples of hazard pictorials that use a pressure or force arrow.



NOTE One square is one unit.

[a] Shortest stem is 4,2 units.

[b] Longest stem is 6,2 units.

Figure A.19 — Arrow to represent the exertion of pressure or force

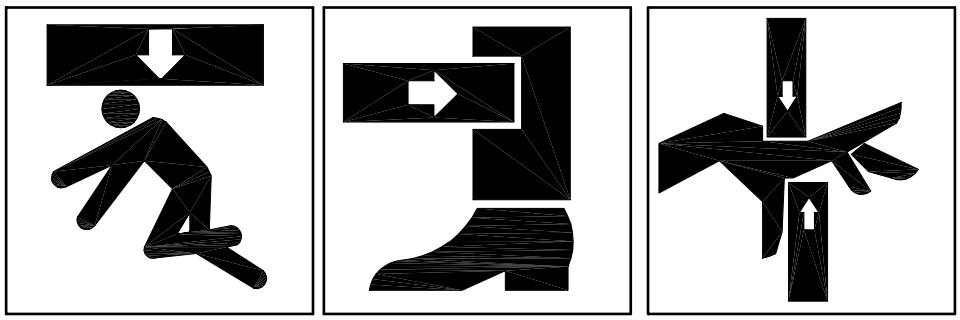
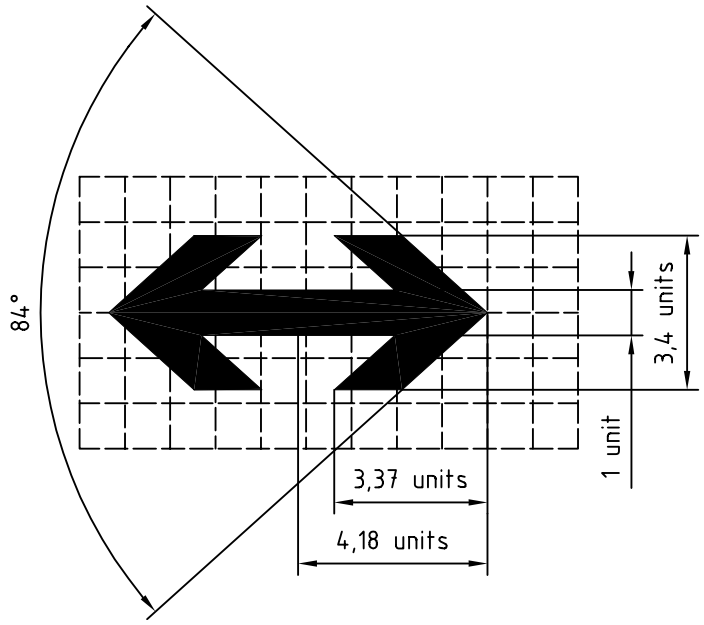


Figure A.20 — Examples of pictorials using arrows to represent the exertion of pressure or force

A.8.6 Arrows representing the idea of keeping a safe distance away from a hazard

The arrow generally used on hazard avoidance pictorials is a black arrow on a white background (for safety signs with text) or as a black arrow on a yellow background (for safety signs without text). See Figure A.21 for arrow dimensions. This arrow is normally used at 60 % of the actual size shown in Figure A.21, although it may be sized differently as appropriate to individual pictorials. This arrow conforms to the direction of movement arrow specified in ISO 4196 for public information symbols that direct persons, except that two arrows are combined tail-to-tail. Figure A.22 gives an example of a pictorial that uses this arrow to represent the idea of keeping a safe distance away from a hazard.



NOTE 1 The left portion of the arrow is a mirror image of the right portion.

NOTE 2 One square is one unit.

Figure A.21 — Arrow to represent the idea of keeping a safe distance away from a hazard

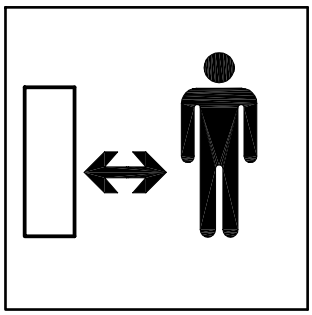


Figure A.22 — Example of pictorial using arrows to represent the idea of keeping a safe distance away from a hazard

A.9 Communicating the idea of prohibited action or hazardous location

A.9.1 Hazard-avoidance pictorials often communicate the idea that an action is prohibited or that a person's presence in a specified location may be hazardous. In general, use a red diagonal cross (✕) to communicate the idea of a hazardous location. Use either a red diagonal cross or a red circle with diagonal slash (⊘) to communicate the idea of a prohibited action; the red cross is generally preferred. These graphical elements are shown in Figure A.23. Sizing of the ✕ and ⊘ depends on how they are used in a particular pictorial. It is important that they be sufficiently large as to be easily recognized, but care should be taken to avoid obscuring any important portion of the pictorial.

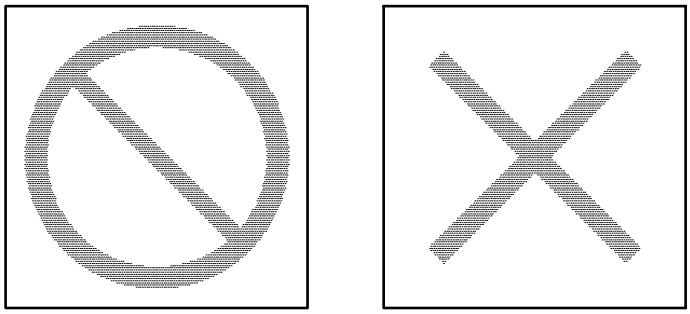


Figure A.23 — Red circle with diagonal slash and diagonal cross to communicate the idea of prohibited action or hazardous location

A.9.2 A red diagonal cross (✕) is used to communicate the idea of prohibited action or hazardous location. A red diagonal cross may be placed across a human figure who is engaged in the prohibited action or who is present in a hazardous location; the red diagonal cross communicates the negative message that the depicted action is prohibited or that the indicated location may be hazardous and should be avoided. The arms of the diagonal cross are perpendicular to each other and at a 45° angle to the pictorial frame. Figure A.24 gives examples of hazard pictorials that use a red diagonal cross to communicate the idea of a prohibited action or a hazardous location.

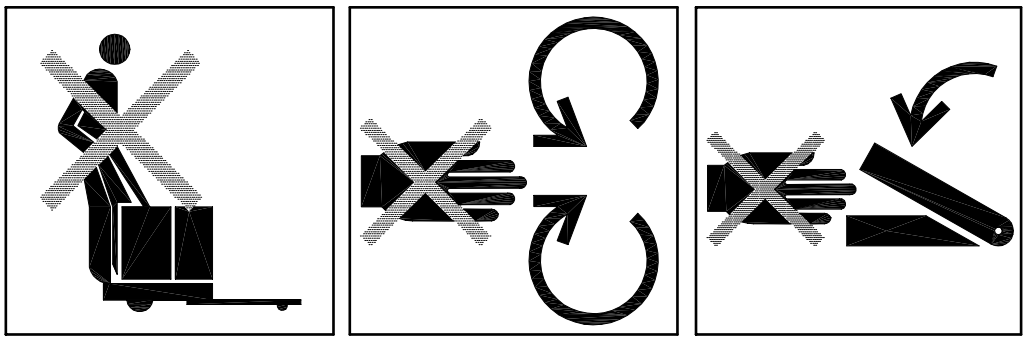


Figure A.24 — Examples of pictorials using a red diagonal cross to communicate idea of prohibited action or hazardous location

A.9.3 A red circle with a diagonal slash (⊘) is used to communicate the idea of prohibited action. A red ⊘ may be placed across pictorial elements that depict the prohibited action; the symbol ⊘ communicates the negative message that the depicted action is prohibited. 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.

Annex B
(informative)

Hazard description pictorials

This annex presents examples of hazard description pictorials intended for use on safety signs. Alternative hazard description pictorials may be used as appropriate, and additional hazard description pictorials may need to be developed. The following examples are shown:

a) electrical (shock/burn) hazards (see Figure B.1);

b) falling hazards (see Figure B.2);

c) mechanical: crushing hazards (see Figure B.3);

d) mechanical: cutting hazards (see Figure B.4);

e) stability hazards(see Figure B.5).

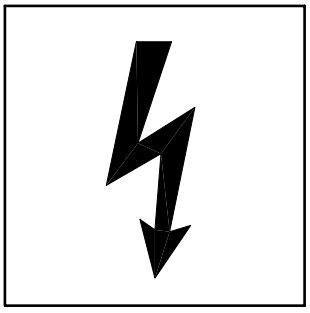


Figure B.1 — Electrical shock/electrocution

Figure B.2 — Falling from a high place

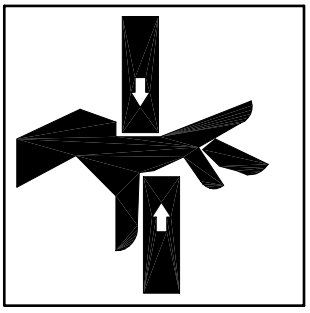


Figure B.3 — Crushing fingers or hands (force applied from above and below)

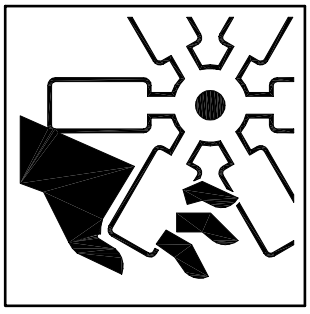


Figure B.4 — Severing fingers or hand in engine fan

Figure B.5 — Truck overturn/tip

Annex C
(informative)

Hazard avoidance pictorials

This annex presents examples of hazard avoidance pictorials intended for use on safety signs. Alternative hazard avoidance pictorials may be used as appropriate, and additional ones may need to be developed.

Examples of hazard avoidance pictorials are shown in Figures C.1 to C.7.

Figure C.1 — Do not ride on the truck

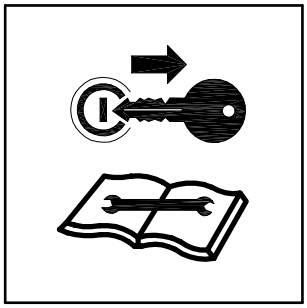


Figure C.2 — Shut off the engine and remove the key before performing maintenance or repair work

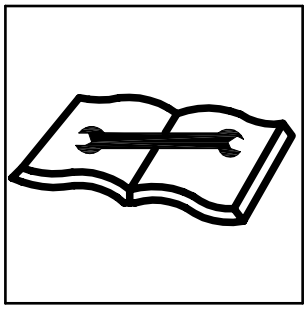


Figure C.3 — Consult the technical manual for proper service procedures

Figure C.4 — Do not stand on the forks

Figure C.5 — Do not stand under the forks

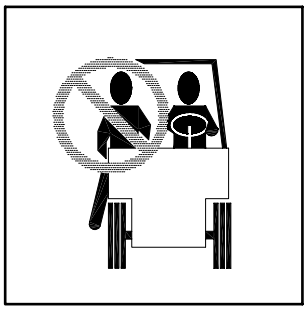


Figure C.6 — No passengers

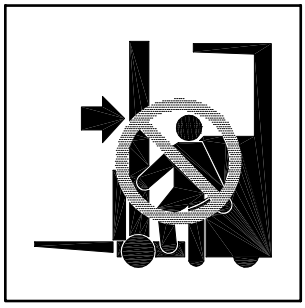


Figure C.7 — Do not go into reach mechanism area

Annex D
(informative)

Examples of safety signs without text

This annex presents examples of no-text safety signs for a number of hazards. These sample safety signs are shown in the vertical configuration two-panel format (no signal panel, two pictorial panels, no message panel). Additional safety signs may need to be developed for other hazards.

The text description for each safety sign provides a sample of explanatory text appropriate for inclusion in the operator's manual. This operator's manual text may be expanded or otherwise adapted as required for the specific use of the safety sign.

Examples of no-text safety signs are given in Figures D.1 and D.2.

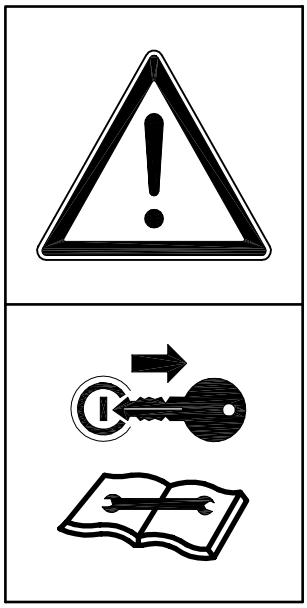


Figure D.1 — Shut off the engine and remove the key before performing maintenance or repair work

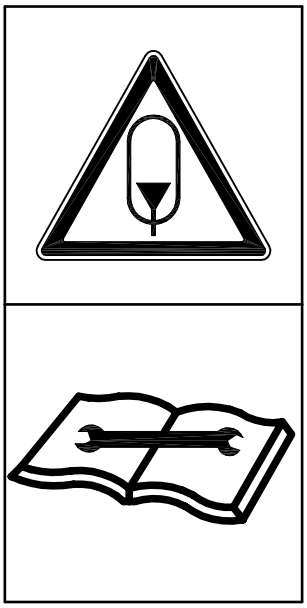


Figure D.2 — Avoid fluid escaping under pressure: consult technical manual for service procedures

Annex E
(informative)

Sizes of graphic symbols and text

E.1 Introduction

This annex presents guidance on the selection of a suitable size for the graphic symbol and text that may be included in a safety sign or hazard pictorial. The advised size will vary depending on the viewing distance.

E.2 Size of graphical symbol

To ensure correct recognition of an actual symbol, the minimum value of its nominal dimension, a, in units equivalent to those of the viewing distance, L, should be:

$$a = L/100$$

See ISO 3461-1 for details.

For example, if L = 1 000 mm, then a = 10 mm.

E.3 Size of text

To ensure correct recognition of text, the minimum value of its upper-case height, H, in units equivalent to those of the viewing distance, should be:

$$H = 0{,}007\ L$$

For example, if L = 1 000 mm, then H = 7 mm.

Bibliography

[1] ISO 3461-1:1988, *General principles for the creation of graphical symbols — Part 1: Graphical symbols for use on equipment.*

[2] ISO 3864:1984, *Safety colours and safety signs*.

[3] ISO 4196:1984, *Graphical symbols — Use of arrows.*

[4] ISO 7000:1989, *Graphical symbols for use on equipment — Index and synopsis.*

[5] ISO 9244:1995, *Earth-moving machinery — Safety signs and hazard pictorials — General principles*.

[6] ISO 11684:1995, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Safety signs and hazard pictorials — General principles.*

[7] ISO/TR 12100-1:—[1)], *Safety of machinery — Basic concepts and general principles for design — Part 1: Basic terminology and methodology.*

[8] ISO/TR 12100-2:—[1)], *Safety of machinery — Basic concepts and general principles for design — Part 2: Technical principles.*

[9] [ISO 13200:1995, *Cranes — Safety signs and hazard pictorials — General principles*.

[10] IEC 60417:1973, *Graphical symbols for use on equipment —- Index, survey and compilation of the single sheets, and its supplements* (IEC 60417A:1974, IEC 60417B:1975, IEC 60417C:1977, IEC 60417D:1978, IEC 60417E:1980, IEC 60417F:1982, IEC 60417G:1985, IEC 60417H:1987, IEC 60417J:1990, IEC 60417K:1991, IEC 60417L:1993; IEC 60417M:1994, IEC 60417N:1995).

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