To: Purchasers of ANSI Z535.2-1998

From: Communications Dept., NEMA

Subject: Errata Sheet

Date: June 3, 1998

Enclosed are replacement pages 13 through 20 for the recently completed 1998 version of ANSI Z535.2. Unfortunately, an error in numbering was found subsequent to printing the document. Section B.3.2 was used twice—thereby a misnumbering of subsequent sections occurred.

Please insert this section into your document or renumber your existing document so that the second instance of B.3.2 is numbered as follows:

B.3.3	**Formatting the word message**
B.3.3.1	**Use headline style**
B.3.3.2	**Use succinct statements**
B3.3.2.1	**Action statement**
B.3.3.2.2	**Hazard description statement**
B.3.3.2.3	**Consequence statement**
B.3.3.2.4	**Emergency information**
B.3.3.3	**Use active voice**
B.3.3.4	**Avoid prepositional phrases**
B.3.3.5	**Emphasizing desired action or other message**
B.3.3.6	**Refer to another source**
B.3.3.7	**Separation of word message content**
B.3.3.8	**Text justification**
B.3.3.9	**Upper and lower case letters**
B.3.3.10	**Choice of type style**
B.3.3.11	**Choice of type spacing**
B.3.3.12	**Choice of type color**
B.3.3.13	**Letter size**
B.3.3.14	**Minimum letter height calculations**
B.3.3.15	**Comprehension**

Also references to Section B.3.3.7 (listed as B.3.2.7 in existing document) are made on page 16 and twice on page 19 and have been corrected in this errata.

We apologize for any inconvenience this error may have caused you.

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AMERICAN NATIONAL STANDARD

American National Standard

ANSI Z535.2-1998

AMERICAN NATIONAL STANDARD

ENVIRONMENTAL AND FACILITY SAFETY SIGNS

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ANSI Z535.2-1998

AMERICAN NATIONAL STANDARD

ENVIRONMENTAL AND FACILITY SAFETY SIGNS

Secretariat
National Electrical Manufacturers Association

Approved March 2, 1998
American National Standards Institute

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Foreword (This foreword is not part of American National Standard Z535.2-1998.)

This standard is one of five standards maintained and revised by the ANSI Accredited Standards Committee Z535 on Safety Signs and Colors. The five standards are:

- 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 the Subcommittee Z535-2 on Environmental and Facility Safety Signs.

There are two annexes in this standard. Both Annex A and Annex B are considered to be informative and not considered part of this standard.

This standard was formulated to provide a visual alerting system to aid in identifying potential hazards known to exist in the environment. Together ANSI Z535.1, Z535.2, and Z535.3 contain information needed to specify formats, colors, and symbols for safety signs used in environmental and facility applications. The ANSI Z535.4 and Z535.5 standards are harmonized with this standard to provide appropriate hazard avoidance information for products that might be encountered in the environment (ANSI Z535.4) or temporary changes to the environment (ANSI Z535.5). It is desirable that new signs, symbols, and colors for environmental and facility safety signs specified after the approval of this standard comply with the standard.

The ANSI Z35 Committee on Safety Signs and ANSI Z53 Committee on Safety Colors were combined in 1979 to form the ANSI Z535 Committee on Safety Signs and Colors. At that time, a massive effort began to identify and test various methods of presenting safety information in a manner that would (a) decrease reaction times required to identify hazards and (b) promote appropriate, safe responses. In this process, a new level of safety sign, WARNING, was developed for application in locations where the probability of injury was small but, if the hazard was not avoided, the injury would be permanent or life threatening; such signs are normally used outside an enclosure containing the hazard.

In the same process, specifications were developed for the first time for safety signs and labels to be used on products. Subcommittee Z535-4 on Product Safety Signs and Labels preferred a format for the header panels for product signs and labels that was a clean rectangle of the specified color containing (a) the safety alert symbol and (b) the appropriate signal word, DANGER, WARNING, or CAUTION. This contrasted with the long-standing "raccoon-mask" format of the black rectangle with red oval and white letters used for danger signs. The initial impetus for the new product safety sign and label header format was that products often had limited space for a sign or label and omitting the mask allowed bigger letters for the signal word. The ANSI Z535.2 Standard retained the long-standing danger heading format and created a similar format (using a truncated diamond) for the new warning sign head. Each 1991 standard allowed the user to use the format of the other standard, if desired.

In the intervening years since 1991, research has shown that the cleaner header format of the ANSI Z535.4 Standard can, in some situations, provide a greater hazard awareness value (HAV) than the long-standing ANSI Z535.2 Standard "raccoon-mask" format, primarily due to increased referential color and larger signal word letters. The ANSI Z535.2-1998 Standard now shows the preferred format for environmental safety signs to be the cleaner header style of the ANSI Z535.4 Standard for product safety signs and labels. However, both standards allow the older "raccoon-mask" system to be used. The ANSI Z535.2-1998 Standard also now

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prefers a white background for the message panel, in order to increase contrast and viewing distance. Like the ANSI Z535.4 Standard, the ANSI Z535.2-1998 Standard now requires the sign to give information of the consequences of not avoiding the hazard, if the consequences are not obvious.

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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Anthony L. Martino, Vice Chairman
Ronald R. Runkles, Secretary

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American National Standard

for Environmental and Facility Safety Signs

1 Introduction

This standard covers requirements for environmental and facility safety signs. See ANSI Z535.4-1998 for the requirements for product safety signs and labels. Hazards should be eliminated wherever practical. If they cannot be eliminated, a visual hazard-alerting message should be provided to inform the observer of the type of hazard and the degree of hazard. Sometimes the actions required to avoid the hazard or the consequences of not avoiding the hazard are not obvious to the viewer from the context in which the sign is used. In such situations viewer training, additional messages, or the use of symbols/pictorials on the sign should be used to provide this information. To achieve these objectives, it is most important to have an easily recognizable and highly conspicuous hazard alerting system such as is presented in this document.

The diversity of culture and background in the American society increases the need to standardize a visual alerting identification system for safety signage. The great need to eliminate accidents and suffering among individuals who may be exposed to hazards requires the use of standard formats, sizes, colors, shapes, and a firm understanding of the degree of hazard. This document contains the elements that designate a separation between levels of hazard severity.

This standard sets forth a hazard alert system that uses different signal words and colors to distinguish between levels of hazards. Use of this standard will allow observers of environmental and facility safety signs to determine the type and degree of hazards and take appropriate actions to avoid injury.

To promote standardization and increase effectiveness, the formats used in this standard are intentionally similar to those used in ANSI Z535.4-1998 *Standard for Product Signs and Labels.* However, there are basic differences between environmental/facility safety signs and product safety signs. Environmental and facility safety signs are usually larger and observed at longer distances; they frequently contain lesser amounts of information for visual clarity at a distance. Product safety signs are likely to contain more information within a smaller format, are usually observed at closer distances, and must physically and visually integrate with a wide range of product size, shape and color characteristics.

The ultimate application of the visual alerting messages will be up to those responsible for affixing these messages. This standard is intended to provide specifications for signs to convey a safety alert message that is clearly and rapidly understood regardless of the viewers' background. In certain areas of the country where other languages are used, consideration should be given to providing messages in those languages.

This standard sets forth a hazard communication system which was designed to complement the ANSI Z535.4-1998 standard which covers safety signs and labels for products. While these standards are similar in many respects, they each address different physical and visual requirements. The Z535 Committee on Safety Signs and Colors has recognized and affirmed the need for these two standards.

2 Scope and purpose

2.1 Scope

This standard establishes requirements for a uniform visual system of identification related to potential hazards in the environment. It provides for the design, application and use of signs and placards employing this visual alerting system.

2.2 Purpose

The primary purpose of this standard is to provide an effective means of communicating information concerning environmental hazards to the observer, so that injury resulting from the hazard(s) can be avoided. To this end, this standard establishes a uniform and consistent visual layout intended to limit proliferation of safety sign designs and achieve a

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national system to promote recognition and avoidance of hazards. In addition, communication of other important information for the safety and well-being of the observer is also included. To do this effectively, it is necessary to minimize the number of layouts and design formats while providing flexibility to meet individual consumer needs and situations.

2.2.1 This standard covers safety signs used at fixed locations in the environment such as industrial facilities, as well as larger, movable signs that may be used on a temporary basis. For the requirements of accident prevention tags used with temporary hazards, see ANSI Z535.5-1998 *Accident Prevention Tags for Temporary Hazards.*

2.2.2 There are a number of existing American National Standards which are recognized for particular industries or specific uses. Compliance with these standards may be considered for such particular industry or use. It is not the intent of this ANSI Z535.2 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.

2.2.3 This standard is issued with the objective of minimizing the proliferation of non-standard hazard alerting devices and achieving application of a national uniform system for the recognition of hazards in the environment. Where portions of other standards and regulations can be modified to reflect the concepts of this standards, such modifications should be made.

3 Application and exceptions

3.1 Application

This standard provides guidance for industries, commercial establishments, property owners, employers and others who have a desire to alert persons to potential personal injury hazards or property damage hazards inherent in the environment or facility under their control.

3.2 Exceptions

3.2.1 Should any of the requirements of this standard conflict with federal, state, or municipal regulations, such conflict shall not invalidate other sections of this standard.

3.2.2 These requirements do not include labels or signs for products, containers of chemicals and chemical mixtures and hazardous substances[1], in-plant vehicular movement and wayfinding signs (except as defined in section 5.8), public streets and highways[2], railroads, air transport, marine operations, exit signs, identification of piping or process valves, or safety bulletins and posters.

4 Definitions

4.1 accident: An occurrence in a sequence of events that produces unintended injury, death or property damage.

4.2 color: Colors specified in this standard shall conform to ANSI Safety Color Code, Z535.1-1998

4.3 decal: See safety sign.

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

4.5 Intent

4.5.1 may: This word is understood to be permissive.

4.5.2 shall: This word is understood to be mandatory.

4.5.3 should: This word is understood to be advisory.

4.6 label: See safety sign.

4.7 panel: Area of a safety sign having a distinctive background color different from adjacent areas of the sign or which is clearly delineated by a line, or margin. There may by up to three (3) panels per sign: signal word, message, and symbol/pictorial.

4.7.1 signal word panel: Area of a safety sign that contains the signal word. For personal injury hazards, the signal word panel also contains the safety alert symbol.

4.7.2 message panel: Area of a safety sign that contains those words related to: identification of the

[1] Note—For chemical products and chemical mixtures, follow ANSI Z129.1–1994, and see Reference 14.

[2] See Reference 7.

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hazard, how to avoid the hazard, and/or the probable consequences of not avoiding the hazard.[3,4]

4.7.3 symbol/pictorial panel: Area of a safety sign that contains the symbol/pictorial.

4.8 pictorial: See symbol/pictorial.

4.9 placard: See safety sign.

4.10 safety alert symbol: (See Annex A) A symbol which indicates a potential personal injury hazard. It is composed of an equilateral triangle surrounding an exclamation mark. The safety alert symbol should not be used to alert persons to property-damage-only accidents.



Figure 1 – Safety alert symbol

4.11 safety sign: A visual alerting device in the form of a sign, label, decal, placard or other marking which advises the observer of the nature and degree of the potential hazard(s) which can cause an accident. It may also provide other directions to eliminate or reduce the hazard and may advise of the probable consequences of not avoiding the hazard.

4.11.1 environmental safety sign: Sign or placard in a work or public area that provides safety information about the immediate environment.

4.11.2 product safety sign: Sign, label, or decal affixed to a product that provides hazard and safety information about that product.[5]

4.12 safety signs and signal words, types of : The seven types of safety signs are DANGER, WARNING, CAUTION, NOTICE, general safety, fire safety and directional arrows. The first five types of safety signs use a signal word or words to designate a degree or level of safety alerting. No signal words are used for fire safety or directional arrow signs. Signal words are the word or words that designate a degree or level of safety alerting. Specific signal words are defined here and the definition repeated where they appear in subsequent sections (see section 5 inclusive). The signal word or words shall always be located in a distinctive panel located in the uppermost portion of the safety sign.

4.12.1 DANGER: Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations. This signal word should not be used for property damage hazards unless personal injury risk appropriate to this level is also involved.

Note: The DANGER signal word is appropriate for signs in the area of, or inside of enclosures containing, a Danger-level hazard.

4.12.2 WARNING: Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. This signal word should not be used for property damage hazards unless personal injury risk appropriate to this level is also involved.

Note: The WARNING signal word is appropriate for signs placed outside of the area of, or on the exterior of the enclosures containing, a Danger-level hazard.

4.12.3 CAUTION: Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices that may cause property damage.

4.12.4 NOTICE signs: Signs used to indicate a statement of company policy directly or indirectly related to the safety of personnel or protection of property. This signal word should not be associated directly with a hazard or hazardous situation and shall not be used in place of "DANGER," "WARNING," or "CAUTION."

4.12.5 general safety signs: (SAFETY FIRST, BE CAREFUL, THINK, SAFETY INSTRUCTIONS, etc.) Signs used to indicate general instructions relative to

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[3] The order in which the content appears in the message panel is flexible. Factors to consider when determining the order of a word message's content include the target audience's degree of prior knowledge of the hazard and the reaction time required to avoid the hazard.

[4] When information on consequence, avoidance, or type of hazard is readily inferred, this information may be omitted from the message panel. See Annex B 3.1.

[5] Note—For chemicals and chemical mixtures, follow ANSI Z129.1–1994.

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safe work practices, remind of proper safety procedures, and indicate the location of safety equipment.

4.12.6 fire safety: Signs used to indicate the location of emergency fire fighting equipment. (Note: These signs indicate the location of, but not the direction to, equipment, etc. For EXIT signs, see Reference 4 in Section 5-10 Marking of Means of Egress).

4.12.7 directional arrow signs: Signs used to indicate the direction to emergency equipment, safety equipment, and other locations important to safety.

4.13 surround/surround shape: A geometric configuration around the symbol/pictorial which can convey additional safety information.

4.14 symbol/pictorial: A graphic representation intended to convey a message. It may represent a hazard, hazardous situation or precaution to avoid a hazard, the result of not avoiding the hazard or any combination of these messages.

5 Safety sign colors and formats

5.1 DANGER signs

5.1.1 Signal word panel. Danger signs should have the signal word "DANGER" in white letters on a rectangular safety red background placed at the top of the sign. The safety alert symbol shall precede the signal word. The base of the symbol shall be on the same horizontal line as the base of the letters of the signal word. The height of the safety alert symbol shall be equal to or exceed the signal word letter height.



Figure 2 — Preferred format for the DANGER signal word panel — white letters on safety red background, safety red exclamation mark.

5.1.2 Alternate signal word panel. Danger signs may, as an alternative, have the signal word "DANGER" in white letters on a safety red oval background with a white border on a black rectangular field; this distinctive panel shall appear in the uppermost portion of the sign. No other signal word or symbol shall be used within this distinctive shape and color arrangement.



Figure 3 — Alternate format for the DANGER signal word panel — white letters on safety red oval with white outline on black rectangle.

5.1.3 Message panel. The message shall be in black or red letters on a white background, or white letters on a black background

5.1.4 Symbol/pictorial panel. The symbol/pictorial panel, if used, shall be square with a black, safety red, or black and safety red symbol on a white background.

5.2 WARNING signs

5.2.1 Signal word panel. Warning signs should have the signal word "WARNING" in black letters on a rectangular orange background placed at the top of the sign. The safety alert symbol shall precede the signal word. The base of the symbol shall be on the same horizontal line as the base of the letters of the signal word. The height of the safety alert symbol shall be equal to or exceed the signal word letter height.



Figure 4 — Preferred format for the WARNING signal word panel — black letters on safety orange background, safety orange exclamation mark.

5.2.2 Alternate signal word panel. Warning signs may, as an alternative, have the signal word "WARNING" in black letters within a safety orange truncated diamond on a black rectangular background. This distinctive panel shall be located at the uppermost portion of the sign. No other word or symbol shall be used within this distinctive shape or color arrangement.

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Figure 5 — Alternate format for the WARNING signal word panel — black letters on safety orange diamond on black rectangle.

5.2.3 Message panel. The message should be in black letters on a white background or white letters on a black background. The message may, as an alternative, be in black letters on a safety orange background.

5.2.4 Symbol/pictorial panel. The symbol/pictorial panel, if used, shall be square with a black symbol on a white background. The symbol panel, if used, may, as an alternative, be square with a black symbol on a safety orange background.

5.3 CAUTION signs— personal injury

5.3.1 Signal word panel. Caution signs should have the signal word "CAUTION" in black letters on a rectangular yellow background placed at the top of the sign. The safety alert symbol shall precede the signal word if the hazard is a potential personal injury hazard. The base of the symbol shall be on the same horizontal line as the base of the letters of the signal word. The height of the safety alert symbol shall be equal to or exceed the signal word letter height.



Figure 6 — Preferred format for the CAUTION signal word panel — black letters on safety yellow background, safety yellow exclamation mark.

5.3.2 Alternate signal word panel. Caution signs may, as an alternative, have the signal word "CAUTION" in safety yellow letters within a black rectangular background, and this distinctive panel shall be located in the uppermost portion of the sign. No other signal word or symbol shall be used with this distinctive color or signal shape arrangement.



Figure 7 — Alternate format for the CAUTION signal word panel — safety yellow letters on black background.

5.3.3 CAUTION signs— property damage only.

5.3.3.1 Signal word panel. The safety alert symbol is omitted on Caution signs used to indicate property damage only accidents. These signs have the signal word "CAUTION" in black letters on a rectangular safety yellow background placed near the top of the sign.



Figure 8 — Property damage only CAUTION signal word panel — black letters on safety yellow background.

5.3.4 Message panel. The message should be in black letters on a white background or white letters on a black background. The message may, as an alternative, be in black letters on a safety yellow background.

5.3.5 Symbol/pictorial panel. The symbol/pictorial panel, if used, shall be square with a black symbol on a white background. The symbol panel, if used, may, as an alternative, be square with a black symbol on a safety yellow background.

5.4 NOTICE and informational signs

5.4.1 Signal word panel. These signs shall have the signal word "NOTICE" in white italic letters on a safety blue background on a rectangular field, and this distinctive panel shall be located in the uppermost portion of the visual alerting device. No other signal word or symbol shall be used within this distinctive shape and color arrangement.



Figure 9 — NOTICE signal word panel — white italic letters on safety blue background.

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5.4.2 Message panels. The message shall be in safety blue or black letters on a white background.

5.4.3 Symbol/pictorial panel. The symbol/pictorial panel, if used, shall be square with a safety blue or black symbol on a white background.

5.5 General safety signs

5.5.1 Signal word panel. These safety signs may have the signal words "SAFETY FIRST," "BE CAREFUL," "THINK," "SAFETY INSTRUCTIONS," etc. in white letters on a safety green background on a rectangular field, and this distinctive panel shall appear in the upper most portion of this sign. Other signal words that convey the general safety message as described in section 4.12.5 are allowed. Signal words that are not in accordance with the definition given in 4.12.5 shall not be used and these include DANGER, WARNING, and CAUTION.



Figure 10 — GENERAL SAFETY signal word panel— white letters on safety green background.

5.5.2 Message panels. The message shall be in safety green or black letters on a white background.

5.5.3 Symbol/pictorial panel. The symbol/pictorial panel, if used, shall be square with a safety green or black symbol on a white background.

5.6 Fire safety signs

5.6.1 Signal word panel. These fire safety signs do not have a signal word.



Figure 11 — A typical fire safety sign.

5.6.3 Message panels. The message panel shall be in safety red letters on a white background in either a square or rectangular field.

5.6.4 Symbol/pictorial panel. The symbol/pictorial panel, if used, shall be safety red on white or white on safety red.

5.7 Directional arrow signs

5.7.1 Directional arrow sign panels. This directional arrow symbol shall be in white on a black or colored background on a rectangular field, and this distinctive symbol shall appear in the uppermost portion of the visual alerting device when used by itself or in conjunction with general safety or fire safety signs. When these directional arrows are used in conjunction with DANGER, WARNING, CAUTION, or NOTICE signs, the arrows shall be in a lower sign panel. The color of the arrows shall be in the same color arrangement as the message or symbol as described in the definition section 5.0 inclusive. Directional arrows shall be designed as illustrated in Figure 12.

5.7.2 Illustration. This distinctive shape shall be designed as illustrated below:

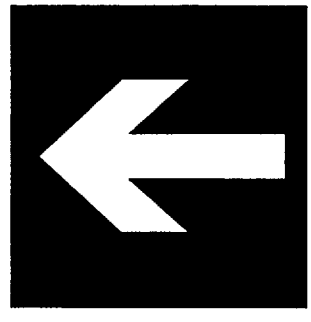

Figure 12 — Directional arrow (indicating movement to the left).

5.8 Special signs

5.8.1 Definitions. These signs have been developed for special uses and have been separated from the other categories of hazard alerting devices by special layout. These visual alerting devices are covered by other standards as listed in the Reference section.

5.9 Sign classification selection

5.9.1 It is not the intent of this standard to define precisely degrees of hazard or where the various hazard level signs are to be used.

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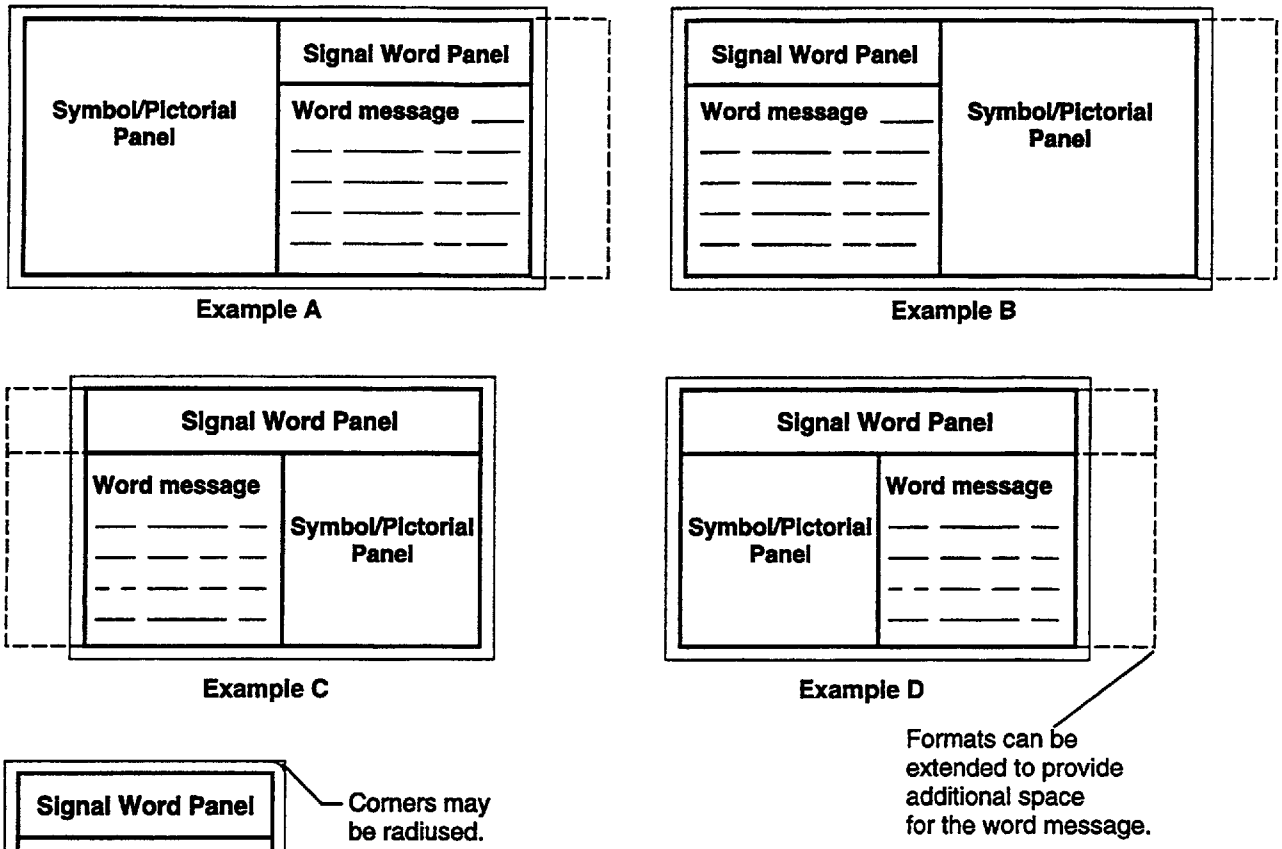

Figure 13 – Three-panel sign formats

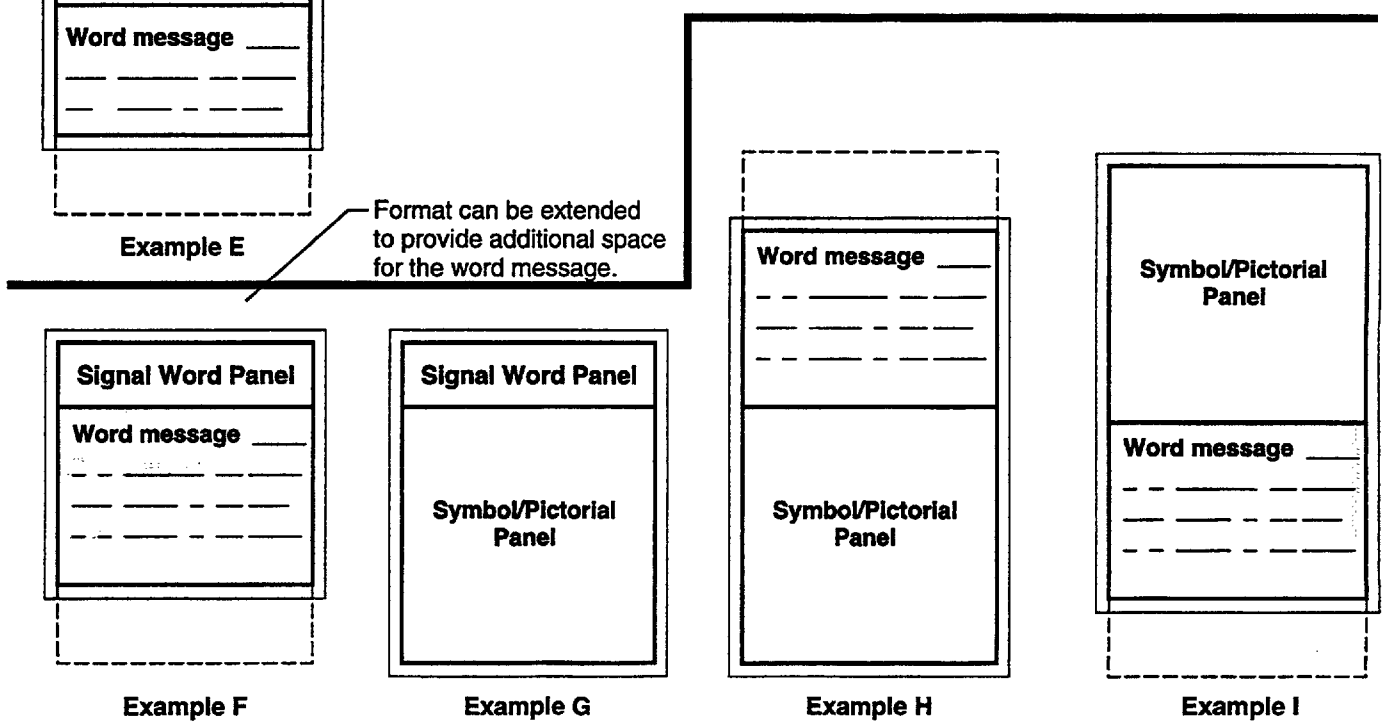

Figure 14 — Two-panel sign formats

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5.9.2 When no federal, state, or local government code, regulation, standard, or guideline specifically requires the use of a particular hazard alerting signal word, it shall be up to those responsible to select the appropriate hazard classification. Each situation requiring the use of a hazard alerting device should be reviewed with regard to the definitions given in section 4.0 inclusive and 5.0 inclusive.

6 Sign design/layout

6.1 Three panel signs. Three panel signs shall be as illustrated as in Figure 13.

6.2 Two panel signs. Two panel signs shall be as illustrated as in Figure 14.

Table 1 — Application of sign panel formats

Sign Classification	Permitted	Prohibited or Not Used
DANGER	A Through G	H And I
WARNING	A Through G	H And I
CAUTION	A Through G	H And I
NOTICE	A Through G	H And I
GENERAL SAFETY	ALL	—
FIRE SAFETY	H And I	A Through G
DIRECTIONAL	C,D,E,F,G	A,B,H,I
SPECIAL	Not Applicable	—

6.3 Application of panel layouts by sign classification as defined in section 5.0 inclusive shall be as follows: (See Table 1 and Figures 13 and 14 in this standard).

7 Sign color specifications

The color of sign finishes shall conform to the ANSI Z535.1-1998 *Safety Color Code.*

8 Symbols/pictorials

8.1 General

8.1.1 Symbols and pictorials are graphic representations chosen to clearly convey a specific alerting message.

8.1.2 The conveyed message of a symbol/pictorial is to describe the type of hazard, potential consequences of the hazard, or evasive/avoidance actions to be taken. When used, the symbol/pictorial must be compatible with the word message(s).

8.2 Symbol/pictorial use

Symbols and pictorials may be used to clarify, supplement or substitute for a portion of the word message found in the message panel of product safety signs. Only symbols validated for recognition should be used. Symbol/pictorial recognition is defined as inclusion in U.S. or international standards, achievement through training, or meeting the comprehension test criteria outlined in ANSI Z535.3-1998 Annex B.

Symbols/pictorials that have not been validated for recognition may only be used to supplement or clarify the word message on the sign.

9 Letter style and size

Note—For additional reference on letter style and size, see Annex B).

9.1 Letter style

9.1.1 Signal words shall be sans serif letters in upper case only.

9.1.2 Message panel lettering should be a combination of upper and lower case sans serif letters. Upper case only lettering may be used for short messages or emphasis of individual words.

9.1.3 Examples of acceptable lettering styles include: Arial, Arial Bold, Folio Medium, Franklin Gothic, Helvetica, Helvetica Bold, Meta Bold, News Gothic Bold, Poster Gothic, and Univers.

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9.2 Letter size

9.2.1 Balance and legibility shall be determined by the combination of the signal word message panel length and the size of a symbol or pictorial, if used. Legibility is influenced by letter height, width, spacing and stroke width.

9.2.2 The overall size of the lettering shall be determined by the total length of the message and the distance from which the sign can be easily read. The message should be as concise as practical. Letters shall be adequately spaced and not crowded.

9.2.3 Minimum letter height shall be one unit in height for every 150 units of safe viewing distance from the hazard alerting device for signal words and one unit in height for every 300 units viewing distance for the majority of other words contained on the word message panel (see Reference 15). This distance will be determined by the user for each specific case where a safety sign is needed. Safe viewing distances for the signal word panel may be longer than required for the word message panel.

10 Sign finish

10.1 Sign finish shall be of durable materials with colors in accordance with ANSI Z535.1-1998 *Safety Color Code.*

11 Sign placement

11.1 Signs shall be so placed to alert and inform the viewer in sufficient time to take appropriate evasive actions to avoid the potential harm from the hazard.

11.2 Safety signs shall be so placed that they are legible, non-distracting, and not hazardous in themselves.

11.3 Safety signs shall not be located in areas where they may be removed by the motion of the hazardous device, or rendered ineffective by situational conditions of the hazard. These alerting devices shall not be blocked by moveable panels such as doors, windows, racks, gates, etc.

12 Illumination

12.1 All hazard alerting devices shall be displayed with illumination or retroreflectorization as needed for adequate legibility under normal operating conditions. Where illumination is inadequate or colors not recognizable, use supplemental illumination[6] (see Reference 14).

12.2 Consideration should be given for situations other than normal operating conditions, such as emergency conditions, visibility, power failure, etc. Where illumination may be interrupted, the sign should be equipped with emergency lighting or retroreflective materials, or both.

13 References

1. American National Standards Institute (ANSI). *Safety Color Code.* ANSI Z535.1-1998.

2. American National Standards Institute (ANSI). *Criteria for Safety Symbols.* ANSI Z535.3-1998.

3. American National Standards Institute (ANSI). *Product Safety Signs and Labels.* ANSI Z535.4-1998.

4. American National Standards Institute (ANSI). *Accident Prevention Tags (for Temporary Hazards).* ANSI Z535.5-1998.

5. American National Standards Institute (ANSI). *Radio Frequency Radiation Hazard Warnings Symbol.* ANSI C95.2-1982 (R1988).

6. American National Standards Institute (ANSI). *Radiation Symbol.* ANSI N2.1-1989.

7. Department of Transportation, Federal Highway Administration. *Manual on Uniform Traffic Control Devices* (MUTCD) Title 23, CFR, Washington, D.C. 1979.

8. National Fire Protection Association. ANSI/NFPA 70 (1990), *National Electrical Code.*

9. National Fire Protection Association. *Symbols for Fire Fighting.* NFPA 178-1986.

[6] Supplemental illumination includes portable illumination such as flashlights.

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10. Society of Automotive Engineers (SAE). *Slow Moving Vehicle Identification Symbol* - ANSI/SAE S276.2. Warrendale, PA: SAE, June 1968.

11. International Organization for Standardization (ISO) 3864, *Safety Signs and Colors,* ISO: Geneva, Switzerland, 1984-03-01.

12. American National Standards Institute (ANSI). *Standard for Hazardous Industrial Chemicals - Precautionary Labeling.* ANSI Z129.1-1994.

13. Smith, S.L. Letter Size and Legibility. *Human Factors,* 1979, 21, 661-670.

14. Collins, B.L., Kuo, B.Y., Mayerson, S.E., Worthey, J.A., and Howett, G.L. *Safety Color Appearance Under Selected Light Sources,* NBSIR 86-3493, December 1986.

15. Howett, Gerald L., *Size of Letters Required for Visibility as a Function of Viewing Distance and Observer Visual Acuity*, National Bureau of Standards, 1983.

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Annex A

(Informative)

Guidelines for increasing recognition of safety sign components

A1 Scope

It is important that the meaning of a safety sign is clearly understood by those who may come in contact with the hazard. To increase the understanding of a safety sign's components, the ANSI Z535 committee encourages safety sign manufacturers and owners of facilities to publish and exhibit the following information on safety posters, safety bulletins or the like. Doing so will assist in the objective of achieving a national uniform system for the recognition of potential personal injury hazards and accident prevention.

A1.1 The safety alert symbol

Explain the meaning of the safety alert symbol. Then use this symbol whenever a safety-related message is written that warns of a potential personal injury hazard. In literature that makes note of potential personal injury hazards, the safety alert symbol can be used alone or in combination with the proper signal word to call attention to the hazard information. The following artwork may be used for this purpose.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

A1.2 The signal words

Explain the meaning of the different signal words as defined by the ANSI Z535.2 standard. Such training is necessary to increase understanding of the three-tier personal injury hazard classification system and the meaning of other signal words. The following artwork may be used for this purpose (Note: The use of the appropriate color for each signal word panel is desirable. See the color chart at the front of this standard).



DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.



CAUTION used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.



NOTICE indicates information or a company policy that relates directly or indirectly to the safety of personnel or protection of property.



General safety signs indicate general instructions relative to safe work practices, reminders of proper safety procedures, or the location of safety equipment.

A1.3 The symbols/pictorials

Explain the meaning of the symbols and pictorials used on your safety signs. This enables viewers to better understand the meaning of the graphics and makes future recognition of the symbols/pictorials more instantaneous. See ANSI Z535-3 *Criteria for Safety Symbols* for more information about symbol/pictorial selection, design and testing.

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Annex B

(Informative)

Principles And Guidelines for the Design of Environmental and Facility Safety Signs

B1 Scope

Good consistent visual design helps to effectively communicate hazard information. The purpose of this annex provides the designer with information on widely recognized principles that can aid in the development of effective safety signs.[1]

B2 Signal word panel arrangement

For those signal words that require the use of the safety alert symbol (i.e. DANGER, WARNING, AND CAUTION, the safety alert symbol and signal word should be positioned close together and centered in the signal word panel. For those signal words that do not require the safety alert symbol (i.e. NOTICE, SAFETY INSTRUCTIONS, CAUTION, SAFETY FIRST, etc.), the signal word should be positioned in the center of the signal word panel. For property-damage-only safety signs, the signal word CAUTION is used without the safety alert symbol *(see Annex A)*.



Figure 1 — Examples of Correct Signal Word and Safety Alert Symbol Placement



Figure 2 — Examples of Incorrect Signal Word and Safety Alert Symbol Placement

B3 Developing the word message

B3.1 The content of the word message

The word message on a safety sign typically communicates information to an observer on the type of hazard, the consequence of not avoiding the hazard and how to avoid the hazard. Many factors must be considered when determining whether to omit consequence, avoidance or type of hazard information in the word message. Factors to consider include whether the message can be inferred from a symbol/pictorial, other text messages, user training or the context in which the safety sign is used.

B3.2 Ordering the content of the word message

The order in which the content appears in the message panel is flexible. Factors to consider when determining the order of a word message's content include the target audience's degree of prior knowledge of the hazard and the reaction time required to avoid the hazard.

Figure 3 illustrates a word message that explains the type of hazard and consequences of interaction with the hazard before it describes the hazard avoidance information. Placing the information in this order would be

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[1] Note—Every safety sign must be considered on its own terms. Limitations on space or other unique conditions may justify variance from these principles. Examples of word messages are provided to illustrate how principles related to grammatical structure, writing style and print layout can enhance the safety sign. These examples are not intended to prescribe standardized word messages for the hazards mentioned in the examples.

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appropriate if it is found that the audience needs to know what the hazard is before they would follow the avoidance information presented on the label. This format assumes that there is time to read the entire word message and still avoid the hazard.

Figure 4 illustrates a word message that places the hazard avoidance information first. Ordering the word message in this way would be appropriate if a person needs to immediately follow the avoidance information in order to prevent interaction with the hazard.

Type of Hazard and Consequence Statement

Avoidance Statements

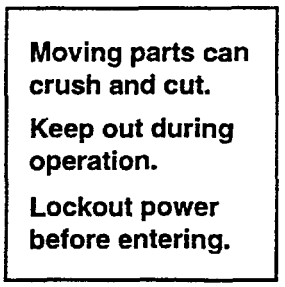
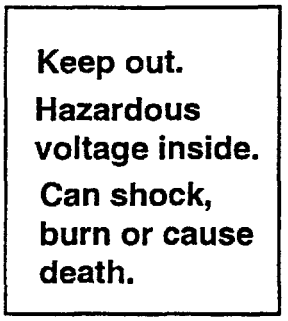


Figure 3



Avoidance Statement

Type of Hazard Statement

Consequence Statement

Figure 4

B3.3 Formatting the word message

There are many issues that must be considered when developing a word message; from sentence structure to typesetting specifications. The length of the word message depends on the amount of information that needs to be communicated to a person to allow them to understand and avoid the hazard. Once this information is determined, it should be written and formatted in a manner that is concise and easily understood. The following are several principles that can be applied to the word message to achieve this objective.

B3.3.1 Use headline style

Write in a "headline style." Compare the sample word messages shown below. The "headline style" example eliminates nonessential words and omits pronouns ("this," "that," "they,") articles ("a," "the," "an,") and forms of the verb "to be" ("is," "are," "were"). Avoid hyphenation when at all possible.

Headline Style Message	*Non-Headline Style Message*
Hazardous voltage. Keep out! Keep access door locked.	**Hazardous voltage is very dangerous and should be avoided at all times. Keep the access door closed at all times and do not enter this area.**

B3.3.2 Use succinct statements

Safety signs are intended to communicate appropriate information to the viewer fast enough to allow the viewer to comprehend the information and take the necessary actions to avoid the hazard. Faster reaction times are promoted by using succinct statements. The information required on a safety sign should be arranged to provide the most important information first. Where reaction time is an issue, the action statement will be the most important portion of the word message and should be placed first. In other cases, the hazard description statement will be the most important information to communicate first. The statement concerning the consequences of interaction with the hazard is generally best understood when placed after the hazard description statement, or used integrally with the hazard description statement.

B3.3.2.1 Action statement

The action statement gives the viewer instructions on how to avoid the hazard. The statement should be simple, direct, and applicable to the hazard. The following are examples:

Keep Out!	**Wear hard hats**	**No smoking**
Keep away	**Call *before* you dig**	

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B3.3.2.2 Hazard description statement

The hazard description statement identifies the specific hazard in clear, simple language. Where the desired action and the consequence of not avoiding the hazard are obvious from the hazard description statement (such as "Slippery when wet"), the action and consequence statements may be omitted. The following are examples of concise hazard description statements:

Hazardous voltage inside	**Confined space**	**Biological hazard**
Laser radiation	**Hot pipes above**	**Buried fiber optic cable**

B3.3.2.3 Consequence statement

The consequence statement tells the viewer in clear, simple language what will happen if the warning is ignored. The following are examples of consequence statements:

Will burn	**Can cause serious burns or death**	**Can irritate skin**
Can cause infertility	**Will disrupt electrical service**	
Exposure can cause nausea, dizziness, and a headache		

B3.3.2.4 Emergency information

Where it is important for viewers or accident responders to know the ownership of the affected facilities, a telephone number or other useful information should be placed after the Action, Hazard Description and Consequence statements.

B3.3.3 Use active voice

Write sentences in the active voice, rather than the passive voice. This means placing the subject of the sentence first, the action (verb) next, and the object (noun) last. Often the subject "you" or "your" can be inferred from the sentence and is unnecessary.

Active Voice Messages	*Passive Voice Messages*
Keep hands away from rotating blade.	**Your hands must be kept away from rotating blade.**
Lock out power before servicing equipment.	**Power must be locked out before servicing equipment.**
Replace guards immediately after repair or adjustment.	**After repair or adjustment, immediately replace guards.**

B3.3.4 Avoid prepositional phrases

Avoid the use of prepositional phrases. Prepositional phrases can often be eliminated or replaced with one word.

Messages Without Prepositional Phrases	*Messages With Prepositional Phrases*
Disconnect power before servicing equipment.	**Disconnect power in order to service equipment.**
Turn off power if jam occurs.	**Turn off power in the event a jam occurs.**

B3.3.5 Emphasizing desired action or other message

Where room is available and it is desired to emphasize the desired action or other message, key words may be shown in larger letters, in all capital letters, in bolder letters, in a different type face, with an exclamation mark, or with a combination of thereof. The following are examples:

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Various Ways to Emphasize Portions of a Word Message

Hazardous voltage inside.	**Hazardous voltage inside.**	**Hazardous voltage inside.**
Keep Out!	**KEEP OUT!**	**KEEP OUT!**
Keep access door locked.	**Keep access door locked.**	**Keep access door locked.**

B3.3.6 Refer to another source

Keep only essential hazard-related information in the safety sign. If necessary, consideration can be given to referring the viewer to another source for additional safety information or for permission to proceed. Examples of such sources include safety instruction labels, operation manuals, service manuals, operating procedures and safety bulletins.

B3.3.7 Separation of word message content

To enhance readability, the word message may be arranged in an outline format. The addition of bullets may also be considered to help separate portions of the word message.

Outline Format

Moving parts can crush and cut.

Keep out during operation.

Lockout power before entering.

Outline With Bullet Format

Moving parts can crush and cut.

- **Keep out during operation.**
- **Lockout power before entering.**

Continuous Format

Moving parts can crush and cut. Keep out during operation. Lockout power before entering.

B3.3.8 Text justification

Left aligned "ragged right" text should be used for all but one-line text messages (which can be either left aligned or centered). Left alignment aids in readability by creating a vertical line that the eye naturally locates when searching for the next line of text. Justified text should be avoided because the added space between words makes it more difficult to read.

Left Aligned Ragged Right Text

Moving parts can crush and cut. Keep out during operation. Lockout power before entering.

Centered Text

Moving parts can crush and cut.
Keep out during operation.
Lockout power before entering.

Justified Text

Moving parts can crush and cut. Keep out during operation. Lockout power before entering.

B3.3.9 Upper and lower case letters

The preferred format for text is the use of mixed upper and lower case where only the first letter of the first word in a sentence is capitalized. The use of all upper case letters for the word message is discouraged because it is more difficult to read quickly than lower case type. On occasion, a single word or phrase may be set in upper case letters to provide emphasis.

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Mixed Case Lettering

Moving parts can crush and cut.
Keep out during operation.
Lockout power before entering.

Selective Use of Upper Case

Moving parts can crush and cut.
KEEP OUT during operation.
LOCKOUT power before entering.

All Upper Case

MOVING PARTS CAN CRUSH AND CUT.
KEEP OUT DURING OPERATION.
LOCKOUT POWER BEFORE ENTERING.

B3.3.10 Choice of type style

Sans serif typestyles are preferred. The important specification to look for when choosing a typestyle is the stoke "width-to-height" ratio. This ratio refers to the width of the letter and the strokes used to create the letter. For black type on a white background the stoke width-to-height ratio should be 1:6 –1:8. For white type on a black background the stoke width-to-height ratio should be 1:8 –1:10 *(see reference 15).*

B3.3.11 Choice of type spacing

The correct spacing between lines of text, between words, and between letters helps to make a word message easier to read. The amount of space between lines of text is called leading. Lines of text should be separated by leading that is approximately 120% of the type point size (e.g. 10 point type should have 12 point leading, 14 point type should have 16.8 point leading, etc.). Additional leading can be added to separate portions of a word message, as shown in the outline format illustrated in B3.3.7. The space between words and between letters is called tracking. For purposes of legibility, it is important to use proper word and letter spacing when typesetting the word message.

Figure 6 — Examples of Correct and Incorrect Type Spacing

This is an example of a word message with proper leading and word/letter spacing.

This is an example of a word message with too much leading and too much word/letter spacing.

This is an example of a word message with not enough leading and not enough word/letter spacing.

B3.3.12 Choice of type color

The word message's type can be black on a white background or white on a black background. This choice should be based on which is more legible. But legibility is dependent on more than type color. Factors such as type size, amount of text, reading distance, contrast with the product surface, and lighting conditions must all be considered.

Figure 7 — Examples of Type Color Choice

Black type on a white background

Moving parts can crush and cut.
Keep out during operation.
Lockout power before entering.

Moving parts can crush and cut.
Keep out during operation.
Lockout power before entering.

White type on a black background

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B3.3.13 Letter size

Legibility of the word message at the minimum safe viewing distance[3] determines the proper letter size for the word message. The letter size/safe viewing distance guidelines in Table 1 define the type size required to achieve legibility at the given viewing distance. The height of the capital letter "H" is used to determine the proper measurement. Note that the type sizes shown in column two in Table One below indicate the recommended word message letter size for favorable light conditions. If people are normally expected to read a sign in unfavorable lighting conditions, larger type size may be necessary, as shown in column 3. A larger type size may also be desired in order to warn persons at distances greater than the minimum safe viewing distance. Portions of a word message may appear in a larger type size for special emphasis. Final determination of letter height should be based on a visual examination of the formatted word message in light conditions similar to the reasonably expected environment of use.

B3.3.14 Minimum letter height calculations

Type size is defined in "points," a term that was used to describe the space required for lead type characters. Point sizes measure from the top of the capital letters to the bottom of the lower case letters with descenders (e.g. the bottom of the letter "g" or "j" etc.). One point equals 0.01384 inches, or approximately 1/72 of an inch. Although type faces vary slightly, a practical guide for defining type size is based on using the capital letter "H" for measurement purposes. Since the character "H" has no descender, it is possible to use a conversion factor of 0.01 inches = 1 point of type size. Thus, 12 point type yields a capital "H" approximately 0.12 inches high. For metric purposes, use a conversion factor of 3.9 points =1 mm of height for a capital "H."

Favorable Reading Conditions:
Viewing Distance (in.) / 300

Unfavorable Reading Conditions (All Distances):
Viewing Distance (ft.) x .084

Table 1 – Examples of word message letter heights and minimum safe viewing distances

Minimum Safe Viewing Distance[3]	Recommended Letter Height For FAVORABLE Reading Conditions	Recommended Letter Height For UNFAVORABLE Reading Conditions
4 Feet or less*	.16 Inches	.336 Inches
6 Feet	.24 Inches	.504 Inches
8 Feet	.32 Inches	.588 Inches
10 Feet	.40 Inches	.840 Inches
15 Feet	.60 Inches	1.26 Inches
20 Feet	.80 Inches	1.68 Inches
30 Feet	1.20 Inches	2.12 Inches
40 Feet	1.60 Inches	3.36 Inches
60 Feet	2.40 Inches	4.24 Inches
80 Feet	3.30 Inches	6.72 Inches
100 Feet	4.00 Inches	8.40 Inches
125 Feet	5.00 Inches	10.5 Inches
150 Feet	6.00 Inches	12.6 Inches
200 Feet	8.00 Inches	16.8 Inches

*.16 inch type is the suggested minimum type size for use on environmental/facility safety signs.

B3.3.15 Comprehension

The word message should be written so that it can be understood by the target audience (i.e. those who are expected to be in the vicinity of the hazard). This means choosing words that accurately describe the specific hazard and avoidance information in terms the intended audience will understand.

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[3] The minimum safe viewing distance refers to the closest distance a person can be to the sign and still have time to follow the safety signs message to avoid the hazard.

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B4 The use of symbols/pictorials

Well designed symbols and pictorials can often communicate hazard information quickly and across language barriers. Although the ANSI Z535.2 standard allows word-message-only formats for safety labels, the use of symbols and pictorials is encouraged whenever practical. See *ANSI Z535.3 Criteria For Safety Symbols* for additional information concerning symbol/pictorial selection, design and testing.

B5 Multi-lingual formats

The selection of additional languages for safety signs is an extremely complex issue. Experts suggest that nearly 150 foreign languages are spoken in the United States and over 23 million Americans speak a language other than English in their homes. If it is determined that additional languages are desired on a safety sign, the following formats may be considered. In all examples, the use of symbols/pictorials is strongly encouraged in order to better communicate the sign's hazard information across language barriers. White type on a black background is used in these examples to highlight the symbol/pictorial and word message panels.

B5.1 Vertical formats

The vertical bilingual format shown in Figure 7 can be modified to include a longer word message by lengthening the word message panels.



Figure 7

B5.2 Horizontal formats

Figures 8 and 9 illustrate horizontal formats for bilingual safety labels. In Figure 8, the English word message and signal word may appear on either the right or left side. The text and signal word panels may be widened to accommodate longer word messages.

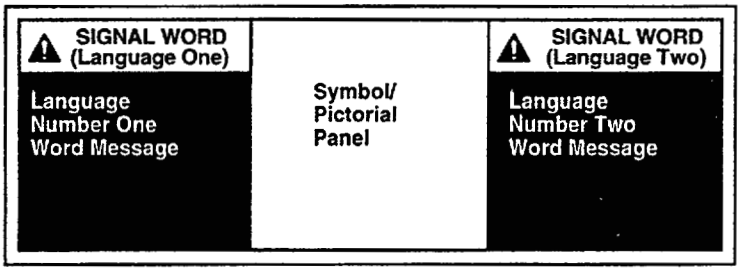

Figure 8

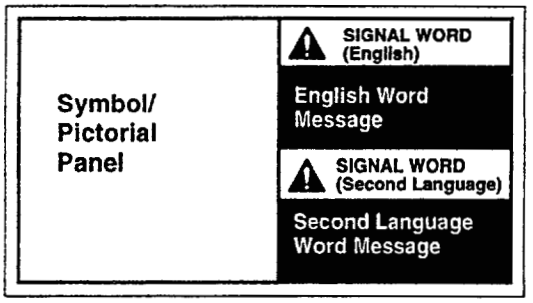

Figure 9

B5.3 Signal word panel arrangement

The safety alert symbol and signal word should be positioned close together and centered in each signal word panel of a bilingual safety label *(see B2)*.

B5.4 Letter size

A slightly smaller type size may be needed to accommodate the length of a translated signal word or word message.

B6 Multi–hazard formats

If multiple hazards exist at one location on a product or if there is only enough space for a single safety label, a multi-hazard label may need to be considered. The use of symbols/pictorials in multi-hazard formats is optional but encouraged. Additional symbols/pictorials can be added to these formats as needed. The signal word corresponding to the hazard with the greatest seriousness level should be used. The hazard with the greatest seriousness level should be ordered first in the word message. White type on a black background is used in these examples to highlight the pictorial and word message panels. The following options can be considered when designing multi-hazard labels.

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B6.1 Three-panel formats

Use one of the standard three-panel formats shown in Figure 1 of the ANSI Z535.2 standard and use a single symbol/pictorial to communicate the most important hazard. Use the outline format to separate the various hazard word messages (see B3.3.7).

B6.2 Two-panel formats

Use the two-panel signal word/word message formats shown in Figure 2 of the ANSI Z535.2 standard. Use the outline format to separate the various hazard word messages (see B3.3.7).

B6.3 Multi-pictorial formats

Use one of the multi-symbol/pictorial formats shown in Figures 10 through 14. In formats 10 and 11, place the most important hazard symbol/pictorial in the upper left panel so that it is "read" first and order the word message segments so they correspond to the order of the symbol/pictorials ("reading" the symbols/pictorials from left to right or top to bottom). If the format shown in Figure 11 is used, arrange the word message segments so they line up opposite the appropriate symbol/pictorial panel.

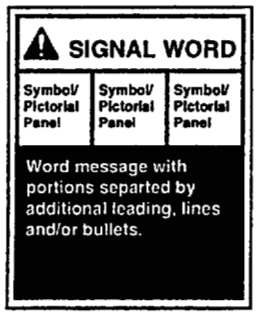

Figure 10

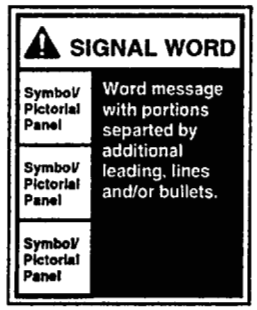

Figure 11

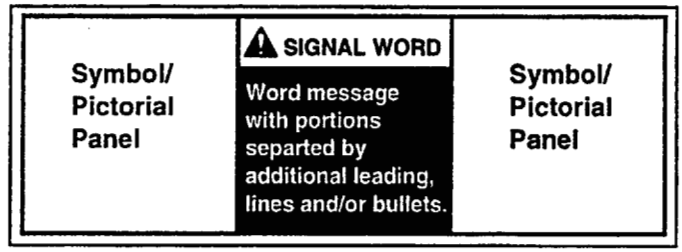

Figure 12

Figures 13 and 14 illustrate the multi-hazard/multi-signal word formats. In these formats, each hazard is ordered according to its seriousness level and placed below the appropriate signal word. Additional pictorials or word messages may be located under each signal word as needed. Use the outline format to separate portions of the word message with additional leading, lines or bullets (see B3.3.7).

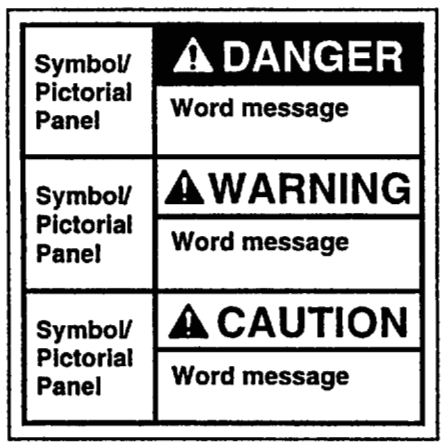

Figure 13

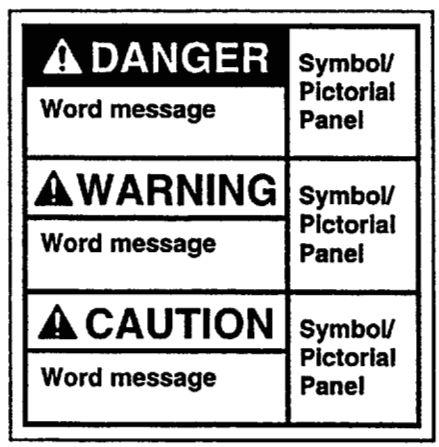

Figure 14

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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

Return to: Secretary, ANSI ASC Z535
National Electrical Manufacturers Association
1300 North 17th Street, Suite 1847
Rosslyn, VA 22209

Date_____ Name_____ Telephone #_____

Address_____

Representing_____
(Please indicate organization or self.)

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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