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American National Standard for Criteria for Safety Symbols

National Electrical Manufacturers Association

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Reaffirmation of
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American National Standard
Criteria for Safety Symbols

Secretariat:

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Foreword

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

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

While the basic mission and fundamental purpose of the ANSI Z535 Committee is to develop, refine, and promote a single, uniform graphic system used for communicating safety and accident prevention information, the Z535 Committee recognizes that this information can also be effectively communicated using other graphic systems.

The Z535 Committee created subcommittees to update the ANSI Z53 and Z35 standards, and to write new standards. To date, the following six standards comprise the ANSI Z535 series:

ANSI Z535.1	*Safety Colors* [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	*Safety Tags and Barricade Tapes (for Temporary Hazards)* [ANSI Z35.2-1974 was updated and combined into this standard in 1991]
ANSI Z535.6	*Product Safety Information in Product Manuals, Instructions, and Other Collateral Materials* [new in 2006]

Together, these six standards contain information needed to specify formats, colors, and symbols for safety signs used in environmental and facility applications, product applications, temporary safety tags and barricade tapes, and for safety information in literature that accompanies products.

Published separately is the ANSI Z535 *Safety Color Chart*. This chart gives the user a sample of each of the safety colors: red, orange, yellow, green, blue, purple, brown, grey, white and black. It also describes each color's ink formulation and closest PANTONE® color.

This ANSI Z535.3 standard was prepared by Subcommittee Z535.3 on Criteria for Safety Symbols. Other Z535 standards have provisions for a safety sign with an optional center symbol panel containing a graphic depiction of the message in the message panel, using the safety symbol criteria contained in this standard. The foreword and all annexes in this standard are considered to be "informative" which, in the vocabulary of standards writing, means that the content presented is for informational purposes only and is not considered to be mandatory or prescriptive in nature. The body of this standard is “normative” which means that the content is considered to be mandatory or prescriptive.

The ANSI Z535.3 standard was first published in 1991 and revised in 1998. The 1998 revision refined and added substance to the structure of the 1991 version (see Deppa et al., 1997; Annex C5, Reference 6). The thirty-one referents in the original ANSI Z535.3 standard were selected because they addressed some of the most common, general, or critical hazards. The ANSI Subcommittee Z535.3 on Criteria for Safety Symbols reassessed the symbol examples illustrating these referents, both to ensure that the symbols had passed comprehension testing, and to improve the depiction of these symbols in the standard. Further, the ANSI Z535 Committee recognized that this finite set of referents addressed only a fraction of the hazard referents for which safety symbols are needed. Since the committee's philosophy was not to alter the scope of referents in the standard, their approach to meeting the need for new symbols was twofold: 1) provide the guidance necessary to create legible, standardized symbols; and 2) provide general procedures for comprehension testing symbols. Therefore, the 1998 revision contained the following changes:

- <u>Safety Symbol Example and Depiction Changes</u>

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

  Surround shapes were discouraged from use with most symbols, except for prohibition and the safety alert symbol. Illustrating the symbols in the 1991 version with surround shapes misled users to think that surround shapes were preferred, when in fact, a surround shape competes with the actual symbol for the available space. It was clarified that color generally should be used only for the safety red Prohibition symbol and safety red fire-related symbols. The 1991 version was probably not clear enough in that it appeared to mandate symbols with background colors. Test references were added so potential users could access testing details to determine whether previous testing is analogous to their situation or whether they may need to retest before using a symbol on their product.

- <u>Addition of Safety Symbol Creation Guidelines</u>

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

- <u>Test Procedure Changes</u>

  Multiple choice tests were discouraged since these tests are typically less accurate than open-ended testing in measuring the subjects' comprehension of symbols, primarily because they limit the range of answers allowed. Testing safety symbols in context were encouraged, since using words or pictures to convey where a label would be located is a fairer test of a symbol than testing without giving context. Progressive testing was described and encouraged to screen out poor symbols early, thereby limiting resource expenditures prior to full open-ended testing. Information on how to conduct comprehension tests was improved and expanded, including providing detailed guidance and actual examples of test administration materials.

In revising the ANSI Z535.3-1998 standard, work to retest the symbol examples and to rewrite the testing procedures was carried out simultaneously. Using this process, the subcommittee received valuable feedback not only on the symbols being tested but also on the problems and features of the test methodologies themselves. Lessons learned from each test iteration were used to improve test procedures and clarify test instructions. As a result, in addition to thoroughly-tested symbol examples, this revision provided well-tested procedures for evaluating symbols. The Z535.3 Subcommittee believed that these improvements to ANSI Z535.3 facilitated the creation of symbols with improved legibility and consistency that are reliably comprehension tested.

In the 2002 revision, only minor revisions were made. In the 2007 revision, the safety alert symbol was expanded to harmonize with color alternatives contained in the ISO 3864-2 standard. In Annex A, Principles and Guidelines for Graphical Design of Safety Symbols, guidance was expanded, and more figures were added to illustrate the principles and guidelines presented. No significant changes were made to Annex B, General Procedures for Evaluating Candidate Safety Symbols. In Annex C, Safety Symbol Examples, guidance was also expanded. Safety symbols were moved from the normative body of the standard to this informative annex, and information symbols were added related to fire safety and safe condition that are contained in the ISO 7010 standard. A new Annex D, Informative References, was created which contained references relocated from the body of the standard.

The biggest revision in the 2011 edition was to delete the separate Annex C, Safety Symbol Examples, and move relevant parts to Annex A. Over the years since the committee's philosophy was not to alter the scope of referents, some of these symbols might be outdated, or ISO 7010 might have adopted other symbols. Instead of "symbol examples" in a separate annex, many of the safety symbols were moved to Annex A to illustrate principles and guidelines for graphical design. Further, graphical design guidelines duplicated in the body of the standard were deleted, so they now are in one location. Other revisions included refining Annex B General Procedures for Evaluating Candidate Safety Symbols by 1) adding a table of equivalent scoring if less than 50 subjects must be used; 2) providing controls and safeguards if the comprehension test must be administered over the Internet; 3) providing a minimum symbol size to test when the actual symbol size is unknown; and 4) adding an optional test question about the consequences of not following instructions.

Because of the differences in color printing technologies and color monitors, the appearance of colors in this document may not be accurate. See the ANSI Z535-2011 Safety Color Chart for the purpose of viewing accurate colors.

The 2011 version of this standard was reaffirmed in 2017.

Proposals for improvement of this standard are welcome. Information concerning submittal of proposals can be found at the back of this standard.

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

Geoffrey Peckham, Chair
J. Paul Frantz, Vice Chair
Paul Orr, Secretary

Organization Represented:	*Name of Representative:*
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American Welding Society	August F. Manz
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At the time of preparation for this edition of ANSI Z535.3, the Subcommittee Z535.3 on Criteria for Safety Symbols had the following members:

Michael Kalsher, Chair
Paul Orr, Secretary

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Eric Boelhhouwer	Dorris and Associates
Brett Cohen	Power Tool Institute
Robert J. Cunitz	System Safety Society
Nathan Dorris	Dorris and Associates International, LLC
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Valerie Lynch	Association of Equipment Manufacturers
Larry Nelson	Browning Arms Co.
David Roy	Travelers Insurance Company
Michael Weber	Association of Manufacturers

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1 Introduction

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

2 Scope and Purpose

2.1 Scope

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

2.2 Purpose

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

3 Application

3.1 Intent

This standard is intended to provide guidance in selecting safety symbols to alert persons to hazards and to provide general safety messages. This may include applications and information associated with products, the immediate environment, and workplaces.

3.2 Existing American National Standards

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

4 Definitions

4.1 **accident:** An incident that results in harm, property damage, or both.

4.1.1 **harm:** Any degree of physical injury, including death.

4.1.2 **incident:** An unintended and undesired event.

4.2 **colors:** Colors specified in this standard shall conform to ANSI Z535.1.

4.3 **critical confusion:** When a safety symbol elicits the opposite or prohibited action. For instance, when a safety symbol meaning “No Fires Allowed” is misunderstood to mean “Fires Allowed Here.”

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

4.5 **hazard:** A potential source of harm.

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

4.7 **intent**

4.7.1 **may:** This word is understood to be permissive.