Standards Developments

Hotlinks

ANSI
American National
Standards Institute
www.ansi.org

ASSE
American Society
of Safety Engineers
www.asse.org

ASTM
ASTM International
www.astm.org

CEN
European Committee
for Standardization
www.cenorm.be

ISO
International
Organization for
Standardization
www.iso.ch

JCAHO
Joint Commission
on Accreditation
of Healthcare
Organizations
www.jcaho.org

NFPA
National Fire
Protection Assn.
www.nfpa.org

NIST
National Institute
of Standards and
Technology
www.nist.gov

SCC
Standards Council
of Canada
www.scc.ca

UL
Underwriters
Laboratories Inc.
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A Look at ANSI Z535 on Safety Signs, Labels & Messages

In this interview conducted by ASSE's Council on Practices & Standards staff, Gary Bell, chair of the ANSI Z535 Accredited Standards Committee (ASC), provides a history of the ANSI Z535 standards series, describes the latest revisions to these standards and discusses the committee's activities and goals for this year.

CoPS: What are the role and scope of the ANSI Z535 standards?

GB: These standards provide a uniform and systematic approach for the visual layout of safety signs, labels, tags, barricade tapes and now also safety messages found in instructional materials such as owners' manuals, assembly instructions, use and care guides. A uniform system provides the best opportunity for maximum recognition and understanding of important safety information.

When it began its work in the late 1970s, the ANSI Z535 ASC found little consistency with respect to graphics between safety signs and labels. Different signs or labels that addressed the same hazard could be found in the marketplace, but they looked totally different in color, text layout, use of symbols and choice of signal words. These inconsistencies would become a problem in an era when the reliance on "warnings" was increasing. For example, early research showed that just changing the primary color of a safety sign or label from red to yellow would give the impression that the hazard covered by the yellow sign or label was a lesser risk than the exact same sign or label with the red color.

Gary Bell is the product safety manager for Sauder Woodworking Co. in Archbold, OH. He has more than 25 years' experience in product safety and liability prevention. He is chair of the ANSI Z535 ASC, and chair of the ANSI/SOHO S6.5 Committee on testing for small office/home office furniture. He holds an undergraduate degree from Bowling Green State University and a master's degree from the University of Arkansas.

Other research showed that issues such as print layout significantly affected readability. For example, text that is centered in the middle of a sign or label (a popular format) is much harder to read than text that follows a typical justified left/ragged right print layout. This is not good because safety-related signs and labels must communicate important safety information clearly and often in a time-critical situation.

The standards provide direction on "how" to warn. They do not prescribe "when" to use any particular safety sign, label or instructional message in collateral materials.

CoPS: What are your responsibilities as chair of the ANSI Z535 ASC?

GB: The chair's job can best be described as a combination of manager, facilitator, diplomat and "cat herder." The committee produces six different technical standards. While each has a specific area of focus, they must all harmonize in terms of their content and publication cycle. Six different subcommittees are each responsible for the research and development of one of the technical standards, so keeping those groups coordinated is a key function.

As an ANSI ASC, the group must address a broad constituency, with no bias toward any particular group. I am fortunate to work with many outstanding people who have expertise in a wide range of areas, including consumer product safety, industrial product safety, facility safety/OSHA, human factors and psychology. We also have had input from various government agencies over the years, including Consumer Product Safety Commission, OSHA, Federal Highway Administration, National Institute of Standards and Technology, Rural Utilities Service and various military branches. When it comes to the standards' content, it is definitely a consensus effort. My position only counts as one vote among many.

However, as chair managing a consensus effort on a topic that can bring such a wide range of focus and opinion, diplomacy plays a large role. In every significant issue, there is always a large group of representatives who want to pursue the middle ground, along with those often very vocal individuals who represent their own, sometimes opposing, views. Due process and giving everyone a fair chance to hear all sides must be balanced with the need to decide on a course of action and to move on.

CoPS: How long has the ANSI Z535 series been available and what does it encompass?

GB: The initial editions of the ANSI Z535 series were available in 1992. At that time, the series had five different standards, each with a specific focus area. We have just added a sixth standard.

We divide the standards into two groups. The "foundation" standards cover the basic issues of colors and symbols, while the "application" standards describe how to apply our uniform safety alerting system in specific types of applications. These two standards apply to all of the application standards. The foundation standards are:

•**ANSI Z535.1, Standard for Safety Colors.** This standard gives the precise color specifications for our defined safety colors. It is most important for those who print or manufacture signs, labels and other graphics that depict safety information. (A safety color chart is also available as a supplement to the standard. It accurately depicts the specified safety colors and provides the Pantone and/or ink color formulation for those colors.)

•**ANSI Z535.3, Criteria for Safety Symbols.** This standard provides guidelines on how to design safety symbols and pictorials, and how to test those items to ensure that they clearly communicate their intended message.

The application standards are:

•**ANSI Z535.2, Environmental and Facility Safety Signs.** This standard addresses signs and labels used in the workplace as well as in public spaces.

•**ANSI Z535.4, Product Safety Signs and Labels.** This standard focuses on signs and labels used for product safety and liability prevention.

•**ANSI Z535.5, Safety Tags and Barricade Tapes for Temporary Hazards.** Safety tags in particular can be used in the workplace, public spaces and in product safety applications. This standard provides specific guidance on the construction and use of safety tags and barricade tapes.

•**ANSI Z535.6, Product Safety Information in Product Manuals, Instructions and Other Collateral Materials.** The newest standard explains how to present safety information in printed materials.

CoPS: What industry events or issues led to the development of the series?

GB: These standards have a rich history. In fact, ANSI Z535.1 is a descendant of an American War Standard developed in the 1940s. Our standards fundamentally deal with communication and they specifically address how to communicate important safety-related information. Changes in technology and culture profoundly affect human communication. Our standards have evolved in a way that reflects these changes. In that regard, two distinct episodes drove these standards to prominence.

In the early 1970s, the OSH Act incorporated ANSI Z53, Standard on Safety Colors, and ANSI Z35, Standard on Safety Signs, into its requirements. This was a first, although somewhat limited, introduction to the concept that safety signs and labels play an important role in safety management. (The two committees responsible for the development of those standards merged in 1979 to become the present ANSI Z535 Committee.)

In the period following the passage of the OSH Act, a flurry of developments emerged involving the country's social awareness, regulatory environment and legal climate. These intended to protect the consumer and physical environment and to better ensure the "right to know" concerning hazardous materials and conditions.

In particular, product liability tort law expanded, developed rapidly and became a significant issue. The theory referred to as "the duty to warn" emerged from the broad area of product liability tort law. In addition to the more traditional theories, which held that a manufacturer could be held liable for damages caused by design defects or manufacturing defects, the duty to warn theory held that there was a potential cause of action when "adequate warnings" were not provided. Such warnings were necessary to alert the product consumer concerning hazards that may exist during the reasonably foreseeable use and misuse of the product.

The committee realized that the duty to warn theory created new and different demands for safety signs and labels. At the same time, the committee also recognized that the importance of creating a uniform visual system also required similarities in the way safety messages were presented, regardless of whether they appeared in the workplace or on a product. For a time, the committee operated on the idea that one standard could serve all. However, the essential differences ultimately led to the development of two distinct standards—ANSI Z535.2 for workplace applications and ANSI Z535.4 for product safety applications.

The duty to warn issue provided the impetus for the most significant growth and interest in the ANSI Z535 standards. Sales of ANSI Z535.4 have historically eclipsed the sales of all other Z535 standards.

CoPS: The ASC is finalizing revisions to the standards. How will the revised standards differ from previous versions? What new requirements, recommendations or features will they include?

GB: We try to be very careful about how we "evolve" the standards. We build upon existing requirements by deleting things that are no longer relevant and by adding things that will make application of the standards clearer. Those who have used the standards in the past will not have to completely change their signs and labels because we decided to "change the look."

Perhaps the most exciting change is the addition of a new informative annex that will appear in ANSI Z535.2, 535.4, 535.5 and 535.6. This annex is titled "Risk Estimation and Signal Word Selection." One common element between the standards is the definition and use of specific signal words—*danger, warning, caution* and *notice.* Using these terms consistently is key in a uniform safety alerting system.

By consistently using specific signal words, along with a consistent use of color and format, the degree of risk is instantly recognized.

For example, whenever a person sees a red *danger,* regardless of whether it is on a product, in the workplace or on a sign, label or tag, there will be a consistent understanding that the particular hazard is severe and capable of immediately causing death or severe injury. The same objective holds true for the other signal words and their definitions.

In the past, we tried to rely on a simple, one-sentence definition to define the correct application of these signal words. These definitions were very nuanced and the debate about how to best phrase them carried on for a while. During this revision, the committee changed its approach and decided that rather than try to distill these definitions down to a cleverly written single sentence, the users of the standards might be better served if they were taken through the risk analysis process in a step-by-step manner using simple flowcharts and matrixes. We hope that this process will add a better degree of understanding and uniformity.

CoPS: The ASC has also developed a new standard that will specifically address how to convey important safety information in printed materials such as assembly instructions, repair manuals and use-and-care booklets. How do you believe this standard will improve injury and accident rates?

GB: Look under the hood of a classic car from the 1950s or 1960s, then look under the hood of a car made today. In the last 50 years, society has changed from one in which some degree of mechanical aptitude, a basic knowledge of electric circuits and a little bit of training could help someone work with most of the technology encountered in everyday life to one in which you need an extensive instruction manual just to operate the sound systems in new cars.

Along with increasing technological complexity, social and legal demands for "full disclosure" of safety information have made printed instructions an essential part of most consumer products, industrial equipment and workplace environments. The ANSI Z535 standards are based on principles that should help the widest possible audience better recognize and understand the importance of safety information conveyed in printed instructions as well as safety signs and labels.

CoPS: What challenges did the ASC face during this process?

GB: Development of ANSI Z535.6 started on a positive note because it addressed an area where there was a strong sense of need. Perhaps the biggest challenge was assessing the approaches already in use, determining which seemed to offer the best approaches, and incorporating and possibly improving them.

The subcommittee reviewed existing standards, regulations and more than 100 different product manuals. Existing standards and regulations all seemed clear about the need for certain instructions as well as the topics that needed to be addressed. However, the subcommittee found that none of them really considered the issues of format, writing style and location in the document in a way which could have served as a template for the standard.

Much like when we first developed the other standards, we needed to rely on the committee's expertise and on the findings of proprietary research projects to help develop this standard from scratch.

CoPS: When will the revised standards be published?

GB: ANSI Z535.6 is available through Global Engineering Documents (http://global.ihs.com). The other standards are in their final review stages. I am optimistic that they will be available before mid-year.

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CoPS: How is the Z535 ASC working to address signs and symbols used in multilingual workplaces?

GB: From the beginning, one important design consideration we have addressed has been how to effectively communicate safety information in a diverse cultural setting. We address not only multilingual environments, but also situations in which there are literacy problems.

Our standards specifically address how to properly format multilingual safety signs, labels and instructional messages, as well as how to design and evaluate symbols that can be used for "wordless" communication. These standards incorporate and prescribe the use of specific safety colors as an additional wordless way to help communicate the relative severity and probability of safety issues.

CoPS: How has the ASC integrated the need for signs and symbols into the traditional hierarchy of safety engineering? Is this hierarchy concept included in the ANSI Z535 series?

GB: This is very important. In a simpler world, the traditional hierarchy that you refer to should be the framework against which the use of safety signs and labels is applied. However, in reality, the role of warnings and instructions is affected not just by engineering principles, but also by social mores and expectations, which manifest in our legal, legislative and consensus standard development systems. In the nearly 30 years I have been involved in this area, our cultural expectations have continually increased regarding such things as "zero-defects" and full disclosure of information about potential risks.

The traditional design hierarchy calls for a judicious use of "warnings" only after first attempting to either design out or guard against reasonably foreseeable risks. In contrast, those higher societal expectations have driven a "full-court-press" type of approach. In addition to addressing the issue by design or guarding, the use of a safety sign, label or safety instruction is now typically expected "just in case."

It is easy to say that there are many unneeded and irrelevant safety signs or labels in use today. While I wish that were not the case, the fact is that if you carefully investigate the reason for the labels, there is usually some history behind their use.

The committee does not get into the prescription of when a safety sign, label or instructional message must be used. Those decisions are driven by corporate philosophy, field failure/warranty experience, litigation experience, industry standards, regulatory directives and the traditional hierarchy of controls.

If it is ultimately determined that a safety sign, label or instructional message is necessary, the Z535 standards provide guidance on how to maximize their recognition and readability. In essence, we are like parachute makers. We do not decide when to jump out of the airplane. However, once that decision is made, it is our responsibility to provide a product that ensures the intended safe landing.

CoPS: How can SH&E professionals best incorporate the ANSI Z535 standards into their safety practices?

GB: When situations arise in which there is a need for a safety sign, label or instructional message, the ANSI Z535 standards should be used for determining their proper visual layout, including such factors as the use of proper signal words, colors, print layout and language style.

Many safety signs, labels and tags can be purchased. Before purchase, SH&E professionals should make sure the item follows the ANSI Z535 format. They should also ensure that the signal word and color combination used are in agreement with the level of risk in the particular situation.