

by Geoffrey Peckham

The New Era in Product Safety Labeling

IEEE Long Island Chapter
October 9, 2014

Geoffrey Peckham
CEO – Clarion Safety Systems
Chair – ANSI Z535 Committee
Chair – U.S. TAG to ISO/TC 145

The ANSI Z535 Standards 1991-2011

- U.S. voluntary consensus standards that define the “state-of-the-art” in this country
 - ANSI Z535.1-2011 Safety colors
 - ANSI Z535.2-2011 Safety signs for the environment & facilities
 - ANSI Z535.3-2011 Safety symbol design and testing
 - ANSI Z535.4-2011 Product safety labels
 - ANSI Z535.5-2011 Temporary safety tags and barricade tapes
 - ANSI Z535.6-2011 Product safety information in manuals

ANSI Z535: 1991 1998 2002 2007 2011

Reducing Risk, Protecting People

April 6, 1987 Industry Week Magazine

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The ANSI Z535 Standards


- The U.S. industry consensus standards for **visual safety communication** for practically all other safety signs, tags and labels



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The ISO/TC 145 Standards 1996-2013


- International voluntary consensus standards that define the "state-of-the-art" on a global basis
 - ISO 9186, Parts 1-3 Symbol testing (perception, comprehension, recognition)
 - ISO 3864-1 Safety signs (for the environment & facilities)
 - ISO 3864-2 Product safety labels
 - ISO 3864-3 Safety symbol design
 - ISO 3864-4 Safety colors
 - 20+ other standards related to graphical symbols and their use



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Failure to Warn / Failure to Instruct / Inadequate Warnings

An ever-increasingly percentage of product liability & premises liability lawsuits contain these allegations



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Restatement of the Law, Third, Torts: Products Liability

- Design defect
- Manufacturing defect
- Warnings defect



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The Rise of Liability Exposure & the need for Warnings

- The legal **"duty to warn"** can apply to premises
- Where the public, visitors, guests, &/or subcontractors have access
- Examples include parks, hotels, beaches, golf courses as well as factories and industrial sites,




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260 Pages of Warnings Cases...and Growing

- "The increase in the number of warnings cases is a warning itself - a warning to manufacturers. Makers of products must respond to the increasing creativity of claimants' lawyers and the frequent sensitivity of courts to products claims based on the lack of an adequate warning."

Professor Marshall Shapo,
The Law of Products Liability (CCH, 4th edition, 2001 + supplements 2002-2006)



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Liability Prevention Documents

- Your product's safety signs
- Your product's manual



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The Legal U.S. Market Requirements

- Manufacturers must meet or exceed **current** standards relevant to their products (ANSI Z535.4-2011)
- Standards provide a "common ground" baseline of expected:
 - Function
 - Performance
 - Safety



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Safety labels are critical for exporting products

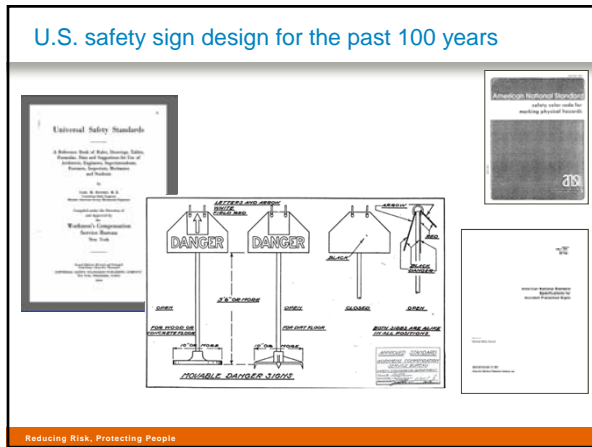
- Safety labels are a **highly visible** component of your product that must be considered for meeting **export requirements** (e.g. the CE mark)

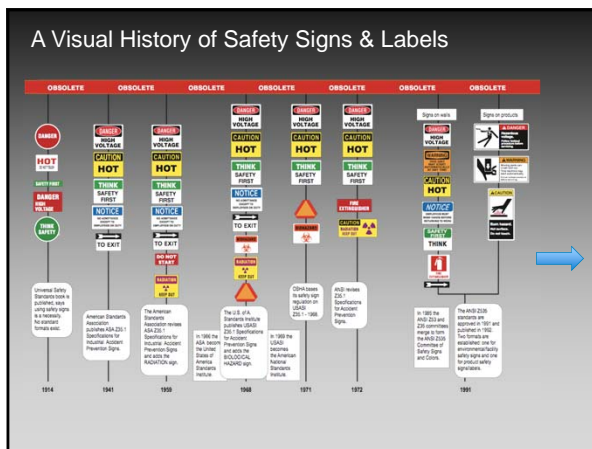


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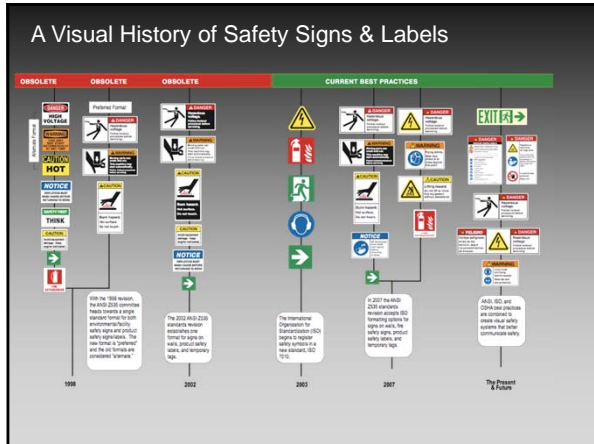
by Geoffrey Peckham



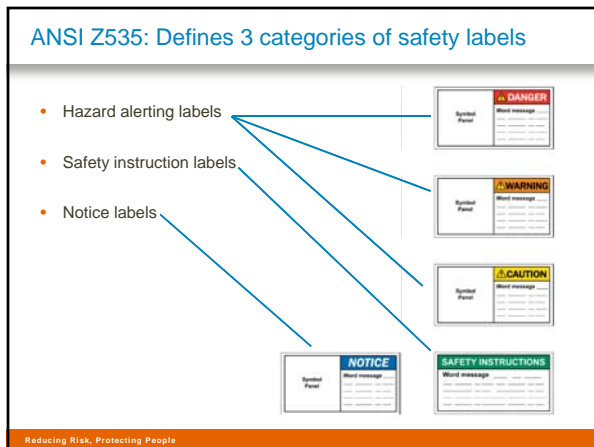




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ANSI Z535 Signal Word Definitions - 2011

4.13 **signal words:** The words used in the signal word panel. The signal words for hazard alerting signs are "DANGER," "WARNING," and "CAUTION." Safety notice signs use the signal word "NOTICE." Safety instruction signs use signal words that are specific to the situation. See Annex E for guidance in selecting a signal word.


4.14.1 **DANGER:** Indicates a hazardous situation that, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations.

4.14.2 **WARNING:** Indicates a hazardous situation that, if not avoided, could result in death or serious injury.

4.14.3 **CAUTION:** Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

4.14.4 **NOTICE:** Indicates information considered important, but not hazard related (e.g., messages relating to property damage). The safety alert symbol shall not be used with this signal word.

4.14.5 **SAFETY INSTRUCTIONS** or similar words: Indicates a type of safety sign, or a separate panel on a safety sign, where specific safety-related instructions or procedures are described. More definitive signal words are encouraged, where practical (e.g., SAFE SHUTDOWN PROCEDURE, SAFE OPERATING PROCEDURES, BOILER SHUTDOWN PROCEDURE, LOCKOUT PROCEDURE, SAFE INSTALLATION INSTRUCTIONS, EMERGENCY SHUTDOWN INSTRUCTIONS). The safety alert symbol shall not be used with this classification of signal word. This signal word may also be used as a heading for a safety instructions panel incorporated into a hazard alerting sign to convey lengthy instructional information. See Annex B3.3.6 and B7.




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ANSI Z535: Content for hazard alerting labels

- The degree of **seriousness**
- The **nature** of the hazard
- The **consequence** of interaction and
- How to **avoid** the hazard

Derived from:

- **Case law** for what constitutes an adequate warning
- **Human factors research** on how people comply with warnings




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What's conveyed?

Hazard:

- Nature?
- Consequence?
- Seriousness?
- Avoidance?




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ANSI Z535.4 component #1

Signal Words and Signal Word Panel Colors

Purpose: To convey the level of **severity** and the **probability** of injury

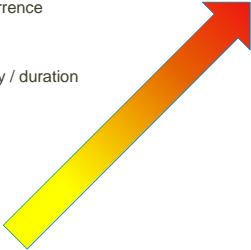


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Risk Assessment – ANSI B11

Risk =

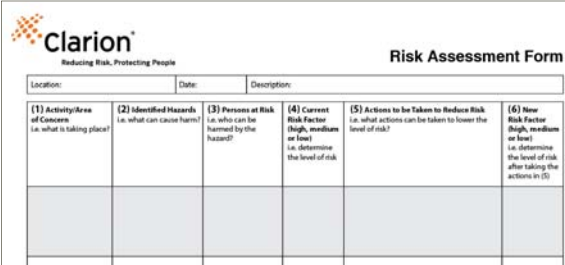
- Probability of occurrence
- Severity of harm
- Exposure frequency / duration



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Risk assessment is the foundation

Step 1: Use the **Risk Assessment Form** to begin to assess areas of concern



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Risk assessment is the foundation

Step 2:
Score the level of risk before the control measure

ANSI Z10-2012

MILSTD 882

Clarion Risk Assessment Scoring Matrix

Likelihood of OCCURRENCE or EXPOSURE for a selected unit of time or activity	Severity of Injury or Illness Consequence				Notes
	Negligible	Marginal	Critical	Catastrophic	
Frequent	Medium	Medium	High	High	
Probable	Medium	Medium	High	High	
Occasional	Low	Medium	Medium	High	
Rare	Low	Medium	Medium	High	
Improbable	Low	Low	Low	Medium	

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Terms: ANSI Z10-2012 Appendix F Risk Assessment

Likelihood:
 Frequent: Likely to Occur Repeatedly
 Probable: Likely to occur several times
 Occasional: Likely to occur sometime
 Rare: Not likely to occur
 Improbable: Very unlikely – may assume exposure will not happen

Severity/Consequence:
 NEGLIGIBLE: First Aid or Minor Medical Treatment
 MARGINAL: Minor injury, lost workday accident
 CRITICAL: Disability in excess of 3 months
 CATASTROPHIC: Death or permanent total disability

Risk Level:
 LOW: Risk Acceptable, Remedial Action Discretionary
 MEDIUM: Take Remedial action at appropriate time
 SERIOUS: High priority remedial action
 HIGH: operation not permissible

Note: These definitions are provided for illustrative purposes only and each organization will need to define these terms for their own process.

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Risk assessment is the foundation

Step 3: Choose the appropriate control measure

ANSI Z10-2012 Annex G

Hierarchy of Health and Safety Controls

CONTROL	EXAMPLES
1) Elimination	• Design to eliminate hazards, such as lifts, hazardous materials, noise, confined spaces, and manual material handling
2) Substitution	• Substitute for less hazardous materials • Reduce energy. For example, linear screws, torix, airwheels, pressure, temperature, and noise
3) Engineering Controls	• Ventilation systems • Machine guarding • Guard enclosures • Circuit breakers • Platforms and guard railing • Interlocks • Lift tables, scissorlifts, and balancers
4) Warning	• Signs • Backup alarms • Beepers • Horns • Labels
5) Administrative Controls	• Procedures • Safe job procedures • Rotation of workers • Safety equipment inspections • Changing work schedule • Training • Hazard Communication Training • Confined Space Entry
6) Personal Protective Equipment	• Safety glasses • Hearing protection • Face shields • Safety harnesses and lanyards • Gloves • Respirators

Most Effective

Least Effective

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If a safety sign is the chosen control measure

Step 4: Choose the right signal word




DANGER

Indicates a hazardous situation which, if not avoided, **will** result in **serious injury or death**.



WARNING

Indicates a hazardous situation which, if not avoided, **could** result in **serious injury or death**.




CAUTION

Indicates a hazardous situation which, if not avoided, **could** result in **minor or moderate injury**.

ANSI Z535 accurately defines risk level signal words


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ANSI Z535 accurately defines signal words



NOTICE

Indicates information considered important but **not hazard [personal injury] related** (e.g. property damage, security, sanitation, housekeeping rules).

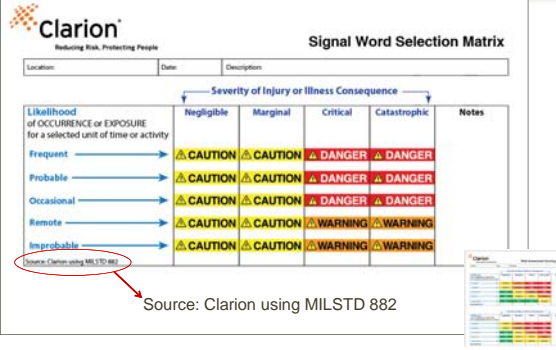


SAFETY INSTRUCTIONS

(or similar words): Indicates a type of safety sign, or separate panel on a safety sign, where **safety-related instructions or procedures** are described.

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Using the Risk Assessment Scoring Form as the foundation



Clarion
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Signal Word Selection Matrix

Likelihood of OCCURRENCE or EXPOSURE for a selected unit of time or activity	Severity of Injury or Illness Consequence				Notes
	Negligible	Marginal	Critical	Catastrophic	
Frequent	⚠ CAUTION	⚠ CAUTION	⚠ DANGER	⚠ DANGER	
Probable	⚠ CAUTION	⚠ CAUTION	⚠ DANGER	⚠ DANGER	
Occasional	⚠ CAUTION	⚠ CAUTION	⚠ DANGER	⚠ DANGER	
Remote	⚠ CAUTION	⚠ CAUTION	⚠ WARNING	⚠ WARNING	
Improbable	⚠ CAUTION	⚠ CAUTION	⚠ WARNING	⚠ WARNING	

Source: Clarion using MILSTD 882

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ANSI Z535 Signal Word Definitions - 2011

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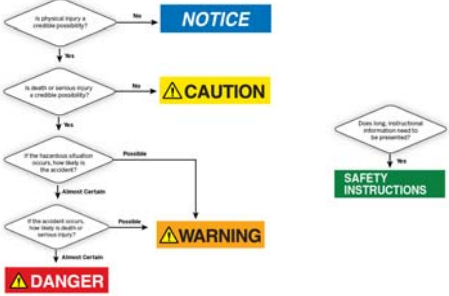
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4.14.5 **SAFETY INSTRUCTIONS or similar words:** Indicates a type of safety sign, or a separate panel on a safety sign, where specific safety-related instructions or procedures are described. More definitive signal words are encouraged, where practical (e.g., SAFE SHUTDOWN PROCEDURE, SAFE OPERATING PROCEDURES, BOILER SHUTDOWN PROCEDURE, LOCKOUT PROCEDURE, SAFE INSTALLATION INSTRUCTIONS, EMERGENCY SHUTDOWN INSTRUCTIONS). The safety alert symbol shall not be used with this classification of signal word. This signal word may also be used as a heading for a safety instructions panel incorporated into a hazard alerting sign to convey lengthy instructional information. See Annex B3.3.6 and B7.



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ANSI Z535 – Choosing the right signal word



Flowchart logic:
1. Is physical injury a credible possibility?
- No: NOTICE
- Yes: 2. Is death or serious injury a credible possibility?
- No: CAUTION
- Yes: 3. If the hazardous situation exists, how likely is the accident?
- Possible: CAUTION
- Almost Certain: WARNING
4. If the accident occurs, how likely is death or serious injury?
- Possible: WARNING
- Almost Certain: DANGER

Additional decision: Does long instructional information need to be presented?
- Yes: SAFETY INSTRUCTIONS

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The safety alert symbol

- Means there is a potential personal injury hazard
- Versions D & E are for ISO harmonization





Old vs New comparison:
Old: DANGER (red), WARNING (yellow), CAUTION (yellow)
New: DANGER (red), WARNING (yellow), CAUTION (yellow) - with ISO symbols



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ANSI Z535-2011 accurately communicates risk

ASA Z35.1-1968 OSHA 1971			
ANSI Z535-2011			


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What's the right signal word?



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Here's where you enter the hazard...



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What you look like after interaction with the hazard...



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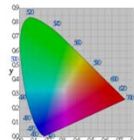
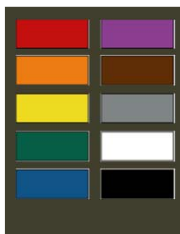
Is this the right signal word?



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ANSI Z535 signal word colors

ANSI Z535.1 safety colors are tightly defined and should be adhered to for proper color discrimination = color coding



 **DANGER**

 **WARNING**

 **CAUTION**

NOTICE

SAFETY INSTRUCTIONS

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Red or orange? See ANSI Z535.1

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ANSI Z535.4 on translation

- Annex D – Translation chart of signal words
- For domestic and export use
- 29 languages
- There is no obligation in ANSI Z535 to translate

ANSI Z535 Signal Word Translation Chart

English	Spanish	French	German	Italian	Japanese	Korean	Portuguese	Russian	Chinese
DANGER	PELIGRO	DANGER	GEFAHR	PERICOLO	危険	危险	PERIGO	ОПАСНО	危险
WARNING	ATENCIÓN	ATTENTION	VORSICHT	ATTENZIONE	注意	注意	ATENÇÃO	ВНИМАНИЕ	注意
CAUTION	PRECAUCIÓN	PRECAUTION	VORSICHT	ATTENZIONE	注意	注意	ATENÇÃO	ВНИМАНИЕ	注意
NO FLAME	NO FUEGO	NO FLAME	KEIN FEUER	NO FUEGO	無炎	无火	SEM FOGO	БЕЗ ОГНЯ	无火
NO OPEN FLAME	NO FUEGO ABIERTO	NO OPEN FLAME	KEIN OFFENES FEUER	NO FUEGO ABIERTO	無明火	无明火	SEM FOGO ABERTO	БЕЗ ОТКРЫТОГО ОГНЯ	无明火
NO SPARKS	NO CHISPAS	NO SPARKS	KEINE SPANNEN	NO SCINTILLE	無火花	无火花	SEM CHISPA	БЕЗ ИСКР	无火花
NO HOT SURFACES	NO SUPERFICIES CALIENTES	NO HOT SURFACES	KEINE HEISSE OBERFLÄCHE	NO SUPERFICIE CALIENTE	無熱表面	无热表面	SEM SUPERFÍCIE QUENTE	БЕЗ ГОРЯЧИХ ПОВЕРХНОСТЕЙ	无热表面
NO HOT SURFACES INSIDE	NO SUPERFICIES CALIENTES DENTRO	NO HOT SURFACES INSIDE	KEINE HEISSE OBERFLÄCHE INNEN	NO SUPERFICIE CALIENTE DENTRO	無熱表面內	无热表面內	SEM SUPERFÍCIE QUENTE DENTRO	БЕЗ ГОРЯЧИХ ПОВЕРХНОСТЕЙ ВНУТРИ	无热表面內
NO HOT SURFACES INSIDE. DO NOT TOUCH.	NO SUPERFICIES CALIENTES DENTRO. NO TOQUE.	NO HOT SURFACES INSIDE. DO NOT TOUCH.	KEINE HEISSE OBERFLÄCHE INNEN. NICHT ANRÜHREN.	NO SUPERFICIE CALIENTE DENTRO. NON TOCCARE.	無熱表面內。勿觸。	无热表面內。勿触。	SEM SUPERFÍCIE QUENTE DENTRO. NÃO TOQUE.	БЕЗ ГОРЯЧИХ ПОВЕРХНОСТЕЙ ВНУТРИ. НЕ ДАВАЙТЕ СЕБЕ ВООРУЖАТЬСЯ.	无热表面內。勿触。

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Trend: Use of translations both for U.S. and export

- Multiple languages on safety labels are not mandatory in the U.S.
- Who is your intended audience?


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ANSI Z535.4 Component #2

The Word Message


Purpose: To convey hazard **nature**, **consequence** and/or **avoidance** information



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The challenge: Balancing completeness with brevity

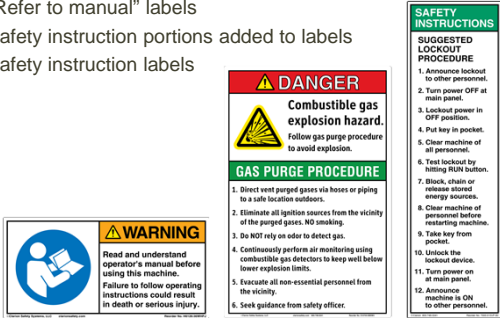
- The word message should be **concise** so it can be readily understood. ANSI Z535.4-2011
- Human factors studies and case law point towards giving people **more complete information** so they can make wise decisions
- Too much information may result in the warning being ignored or becoming illegible



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Handling complexity

- “Refer to manual” labels
- Safety instruction portions added to labels
- Safety instruction labels




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ANSI Z535.4 Component #3

Symbols

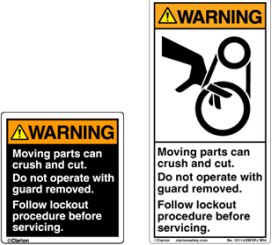
Purpose: To convey hazard **nature**, **consequence** and/or **avoidance** information



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Use of Symbols


- Adding a symbol makes the sign difficult not to **NOTICE**
- **Noticeability** is the first requirement of a safety sign (per human factors experts)



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Symbols represent the state-of-the-art

- Bring a higher level of noticeability to the sign
- Communicate quickly and across language barriers
- Sometimes require training and/or context to understand
- Three categories: public information, safety, function and control



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Symbol design

- ISO symbols represent the global language for safety
- There are ISO rules for safety symbol design best practices




ISO Symbols. We're Talking Global.

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ISO Standards – ISO 3864-1

- Warning Signs
- Mandatory Action Signs
- Prohibition Signs
- Safe Condition/Safety Equipment Location Signs
- Fire Equipment Location Signs



INTERNATIONAL STANDARD
ISO 3864-1
Safety signs and safety colors – Part 1: Principles and basic design
2011

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ISO Product Safety Labels – ISO 3864-2

- First published 2004
- Symbol-only / Symbol with text / Combination signs



INTERNATIONAL STANDARD
ISO 3864-2
Safety signs and safety colors – Part 2: Product safety labels
2004

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Symbol-only labels are an option in ANSI Z535.4-2011


- Began being allowed in ANSI Z535.4-2007
- Used individually or grouped



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Symbol design

- Clarion has developed and implemented best practices for graphical symbol design
- The field is called "Semiotics" – explores how messages are communicated through signs and symbols.



1 2 3

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Changing OSHA – Sign standards updated 9/11/13




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The GHS and ANSI Z535 initiatives



The “Right to Know”



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The GHS and ANSI Z535 initiatives




Has become....

The “Right to Understand”



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GHS proscribes symbols, signal words & content



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OSHA Change: The Double-Reference



1910.261(e)(3)(iv)
Every belt conveyor shall have an emergency stop cable extending the length of the conveyor so that it may be stopped from any location along the line, or conveniently located stop buttons within 10 feet of each work station, in accordance with American National Standard B20.1 - 1957.

1910.261(e)(3)(v)
Signs. When conveyors cross walkways or roadways in the yards, the employer must erect signs reading "Danger--Overhead Conveyor" or an equivalent warning, in accordance with ANSI Z35.1-1964 or ANSI Z35.2-2011, incorporated by reference in § 1910.6.

1910.261(f)
Handling and storage of raw materials other than pulpwood or pulp chips -

1910.261(f)(3)
Whenever possible, all dust, fumes, and gases incident to handling materials shall be controlled at the source, in accordance with American National Standard Z9.2 - 1960. Where control at the source is not possible, respirators with goggles or protective masks shall be provided, and employees shall wear them when handling alum, clay, soda ash, lime, bleach powder, sulfur, chlorine, and similar materials, and when opening rag bales.

1910.261(f)(3)(ii)

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OSHA 2013 – Change to safety sign regulations

The New Replacesthe Old





Compliance with Standards	Clarion Signs, Labels & Tags	The Old Signs, Labels & Tags
OSHA 2013 updated sign/tag regulations	●	— (OSHA 1971)
ANSI Z35-2011 formats	●	— (ANSI 1998)
State-of-the-art graphical symbols	●	— (No)
NFPA formats and symbols	●	— (No)

Capabilities	Clarion Signs, Labels & Tags	The Old Signs, Labels & Tags
Embodies risk reduction best practices	●	— (No)
Provides legally adequate warnings	●	— (No)
Reinforces behavior based safety training	●	— (No)
Communicates across language barriers	●	— (No)
Protects people	●	— (No)

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ANSI Z535 sets the bar for safety communication

- OSHA's acceptance adds even more credibility to ANSI Z535 being recognized as "Best Practice" for workplace safety communication
- **Uniformity** of signs found in facilities with those found on products
- Establishes a **national system** for hazard recognition

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ANSI Z535.4-2011: Various format options for safety labels

Clarion-Tailored

Current Safety Label Format Options to Consider

- 1. Use standard labeling
- 2. Use standard labeling with enhanced readability
- 3. Use standard labeling with enhanced readability and enhanced contrast
- 4. Use standard labeling with enhanced readability and enhanced contrast and enhanced readability
- 5. Use standard labeling with enhanced readability and enhanced contrast and enhanced readability and enhanced contrast
- 6. Use standard labeling with enhanced readability and enhanced contrast and enhanced readability and enhanced contrast and enhanced readability
- 7. Use standard labeling with enhanced readability and enhanced contrast and enhanced readability and enhanced contrast and enhanced readability and enhanced contrast
- 8. Use standard labeling with enhanced readability and enhanced contrast and enhanced readability and enhanced contrast and enhanced readability and enhanced contrast and enhanced readability
- 9. Use standard labeling with enhanced readability and enhanced contrast and enhanced readability and enhanced contrast and enhanced readability and enhanced contrast and enhanced readability and enhanced contrast
- 10. Use standard labeling with enhanced readability and enhanced contrast and enhanced readability and enhanced contrast and enhanced readability and enhanced contrast and enhanced readability and enhanced contrast and enhanced readability

Optional use of translations

Multiple symbols or multiple hazards


A "system" of safety labeling

Durability Considerations

- You must pay attention to this aspect of your labeling program

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Material choices must be right



Compatibility is key


- Overlamine
- Overlamine adhesive
- Ink
- Base material
- Base material adhesive or attachment method
- Backing/masking

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An intelligent decision-making process

Clarion's Method:


- **Listen** to client's needs
- **Design** labels & signs to meet current standards and client's needs
- **Choose** proper materials for expected durability
- **Train** client's installers in application methods to get maximum longevity



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Continued diligence is required

- Safety label programs are an **on-going** process
- Never "once and done"



- ANSI and ISO standards are revised (e.g. new formats, symbols)
- Your own accident history
- Your industry's accident history
- Other industries' accident histories for similar hazards

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Your Goal: Consistency and compliance

- Across product lines
- Across company divisions
- Across marketplaces

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Proof positive the new warnings technology works

50+ million Signs and labels sold
15,000+ Clients
180+ Industries
25 Years in business
0 lawsuits

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If safety communication is not done right...

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www.clarionsafety.com 800-748-0241 Reorder No. S134-MRCHP-02

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