AMERICAN NATIONAL STANDARD

ANSI/ASSE Z590.3 – 2011 (R2016)
Prevention through Design

Guidelines for Addressing Occupational Hazards and Risks in Design and Redesign Processes

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AMERICAN SOCIETY OF SAFETY ENGINEERS

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American National Standard

Prevention through Design

Guidelines for Addressing Occupational Hazards and Risks in Design and Redesign Processes

Secretariat

American Society of Safety Engineers
520 N. Northwest Highway
Park Ridge, Illinois 60068

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FOREWORD

This standard was developed to provide consistent procedures for addressing occupational hazards and risks in the design and redesign processes, and to replace Technical Report ASSE TR-Z790.001 – 2009.

In the late 1990s, the Advisory Committee of the Institute for Safety through Design at the National Safety Council concluded that significant benefits will be derived if decisions affecting safety, health and the environment are integrated into the early stages of the design and redesign processes. The benefits noted were:

- Significant reductions will be achieved in injuries, illnesses and damage to property and the environment, and their attendant costs.
- Productivity will be improved.
- Operating costs will be reduced.
- Expensive retrofitting to correct design shortcomings will be avoided.

Developments since then have given additional importance and credence to management, design engineers and safety and health professionals having knowledge of the principles and practices applied in addressing occupational risks in the design and redesign processes. For example, there has been a more frequent inclusion of provisions in safety standards and guidelines requiring that hazards and risks be addressed in the design and redesign processes. This standard is related to, and provides assistance in, fulfilling those requirements.

Another development supports the need for this standard. The National Institute for Occupational Safety and Health (NIOSH) held a workshop in July 2007 to obtain the views of a variety of stakeholders on a major National initiative to “create a sustainable national strategy for Prevention through Design.”

Some participants in that workshop expressed the view that the long-term impact of the NIOSH initiative could be “transformative,” meaning that a fundamental paradigm shift could occur resulting in greater emphasis being given to the higher and more effective decision levels in the hierarchy of controls. For this initiative, the NIOSH Mission is:

> *To reduce the risk of occupationally related injuries, illnesses, fatalities and exposures by including prevention considerations in all designs that affect individuals in the occupational environment.*

This NIOSH initiative is based on its stated premise: “One of the best ways to prevent and control occupational injuries, illnesses and fatalities is to design out and minimize hazards and risks early in the design process.”

Enthusiasm for additional knowledge of prevention through design principles and practices was significant. Several attendees at the workshop said that a guideline, regulation or standard is needed that sets forth the principles and the methodologies to address hazards and risks in the

design and redesign processes. Technical Report Z790 temporarily addressed those needs. This standard refines, expands and replaces the content of the Technical Report.

One of the most significant subjects discussed at the July 2007 workshop was the need to incorporate design concepts pertaining to occupational hazards and risks into academic curricula for all disciplines because of the recognition that few curricula include segments on addressing hazards and risks in the design and redesign processes.

This standard also is in concert with the stated intent of the American Society of Safety Engineers, in a Position Paper that was approved by the Board of Directors in 1994 to promote acquisition of knowledge of and application of "Designing For Safety" concepts. The opening paragraph of that Paper reads as follows.

> *Designing for Safety (DFS) is a principle for design planning for new facilities, equipment, and operations (public and private) to conserve human and natural resources, and thereby protect people, property and the environment. DFS advocates systematic process to ensure state-of-the-art engineering and management principles are used and incorporated into the design of facilities and overall operations to assure safety and health of workers, as well as protection of the environment and compliance with current codes and standards.*

In August 2007, the ASSE Engineering Practice Specialty group within the American Society of Safety Engineers published an article in a Special Issue of its Newsletter "By Design," the title of which was "Prevention through Design: Addressing Occupational Risks in the Design and Redesign Processes." This article, by Fred A. Manuele, CSP, P.E., was also published in the October 2008 issue of *Professional Safety.* That article formed an early basis for the Z790.001-2009 technical report, and now this standard.

On September 23, 2008, NIOSH held a "Kick-off meeting" with respect to its initiative on Prevention through Design. One of the action items discussed was to: "Develop and approve a broad generic voluntary consensus standard on Prevention through Design that is aligned with international design activities and practice." That gave impetus for ASSE to consider further immediate action that resulted in the development of its Technical Report and this standard.

The continuum of similar initiatives is also important as cited in the two references below.

> Namely, ANSI/AIHA Z10, the *Occupational Health and Safety Management Systems* standard sets a benchmark provision requiring that processes be in place "to identify and take appropriate steps to prevent or otherwise control hazards and reduce risks associated with new processes or operations at the design stage." Z10 also states that "The design review should consider all aspects including design, construction, operation, maintenance, and decommissioning." Several stakeholders have pointed out that Z10 states what needed to be done, but more information needs to be provided on how to meet its performance requirements.
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> Secondly, the OSHA Alliance Construction Roundtable developed a video training program titled "Design for Construction Safety" to reduce construction injuries by incorporating features in the design stage of a construction project that make a building or structure safer to build and maintain.

On November 18, 2008, the ASSE Standards Development Committee discussed further developing the paper published by ASSE into a technical report or a standard. A decision was made by the committee to consider further immediate action that resulted in developing a Technical Report and then this standard

Several standards and guidelines were used as references in the preparation of this standard. Particular note is made of the several versions of MIL-STD 882, the Department of Defense, *Standard Practice for System Safety*.

Requirements in the standard are identified by the word “shall.” An organization that chooses to conform to this standard is expected to fulfill those “shall” requirements. Explanatory comments and recommended practices preceded by the word “Note” are informative and not requirements of the standard. Also, addenda are informative and are not normative requirements of the standard.

Revisions: The Z590.3 Committee welcomes proposals for revisions to this standard. Revisions are made periodically (usually five years from the date of the standard) to incorporate changes that appear necessary or desirable, as demonstrated by experience gained from the application of the standard. Proposals should be as specific as possible, citing the relevant paragraph number(s), the proposed wording, and the reason for the proposal. Pertinent documentation would enable the Z590.3 Committee to process the changes in a timelier manner.

Interpretations: Upon a request in writing to the Secretariat, the Z590.3 Committee will render an interpretation of any part of the standard. The request for interpretation should be clear, citing the relevant paragraph number(s) and phrased as a request for a clarification of a specific requirement. Oral interpretations are not provided. No one but ASSE is authorized to provide any interpretation of this standard.

This standard is effective 90 days after the publishing of this standard. The committee recognizes that some period of time after the approval of this document is necessary for organizations, suppliers and users to develop new designs and/or modify existing standards or procedures in order to incorporate the new and/or revised requirements of this standard into their operations. The committee recommends that entities that choose to adopt this standard begin implementing the requirements within 12 months of the approval date.

Approval: Neither ASSE nor the Z590.3 Committee approves, certifies, rates or endorses any item, construction, proprietary device or activity.

Committee Meetings: Persons wishing to attend a meeting of the Z590.3 Committee should contact the Secretariat for information.

Standard Approval: This standard was processed and approved for submittal to ANSI by the American National Standards Committee on Prevention through Design, Z590.3. Approval of the standard does not necessarily imply (nor is it required) that all Committee members voted for its approval. At the time this standard was approved, the Z590.3 Committee had the following members:

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AMERICAN NATIONAL STANDARD Z590.3
PREVENTION THROUGH DESIGN
GUIDELINES FOR ADDRESSING OCCUPATIONAL HAZARDS AND RISKS IN DESIGN AND REDESIGN PROCESSES

1. SCOPE, PURPOSE AND APPLICATION

1.1 Scope. This standard provides guidance on including prevention through design concepts within an occupational safety and health management system. Through the application of these concepts, decisions pertaining to occupational hazards and risks can be incorporated into the process of design and redesign of work premises, tools, equipment, machinery, substances, and work processes including their construction, manufacture, use, maintenance, and ultimate disposal or reuse. This standard provides guidance for a life-cycle assessment and design model that balances environmental and occupational safety and health goals over the life span of a facility, process, or product.

This standard complements but does not replace performance objectives existing in other specific standards and procedures.

The goals of applying prevention through design concepts in an occupational setting are to:

- Achieve acceptable risk levels.
- Prevent or reduce occupationally related injuries, illnesses, and fatalities.
- Reduce the cost of retrofitting necessary to mitigate hazards and risks that were not sufficiently addressed in the design or redesign processes.

1.2 Purpose. This standard pertains principally to the avoidance, elimination, reduction or control of occupational safety and health hazards and risks in the design and redesign process.

Note: Incidents or exposures that have the potential to result in occupational injuries and illnesses can also result in damage to property and business interruption, and damage to the environment. Reference is made in several places in this standard to those additional loss potentials which may require evaluation and resultant action.

1.3 Application. This standard may be applied in any occupational setting. This standard applies to the four major stages of occupational risk management as follows:

1. Pre-operational stage – in the initial planning, design, specification, prototyping, and construction processes, where the opportunities are greatest and the costs are lowest for hazard and risk avoidance, elimination, reduction or control.
2. Operational stage – where hazards and risks are identified and evaluated and mitigation actions are taken through redesign initiatives or changes in work methods before incidents or exposures occur.