ASHRAE Addendum a to
ASHRAE Guideline 29-2009

ASHRAE GUIDELINE

Guideline for the Risk Management of Public Health and Safety in Buildings

Approved by the ASHRAE Standards Committee on October 14, 2009, and by the ASHRAE Board of Directors on October 24, 2009.

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ISSN 1049-894X

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SPECIAL NOTE

This Guideline was developed under the auspices of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). ASHRAE Guidelines are developed under a review process, identifying a guideline for the design, testing, application, or evaluation of a specific product, concept, or practice. As a guideline it is not definitive but encompasses areas where there may be a variety of approaches, none of which must be precisely correct. ASHRAE Guidelines are written to assist professionals in the area of concern and expertise of ASHRAE's Technical Committees and Task Groups.

ASHRAE Guidelines are prepared by project committees appointed specifically for the purpose of writing Guidelines. The project committee chair and vice-chair must be members of ASHRAE; while other committee members may or may not be ASHRAE members, all must be technically qualified in the subject area of the Guideline.

Development of ASHRAE Guidelines follows procedures similar to those for ASHRAE Standards except that (a) committee balance is desired but not required, (b) an effort is made to achieve consensus but consensus is not required, (c) Guidelines are not appealable, and (d) Guidelines are not submitted to ANSI for approval.

The Manager of Standards of ASHRAE should be contacted for:

a. interpretation of the contents of this Guideline,
b. participation in the next review of the Guideline,
c. offering constructive criticism for improving the Guideline, or
d. permission to reprint portions of the Guideline.

(This foreword is not a part of this guideline. It is merely informative and does not contain requirements necessary for conformance to the guideline.)

FOREWORD

This addendum to ASHRAE Guideline 29-2009, Guideline for the Risk Management of Public Health and Safety in Buildings, *has been developed to incorporate changes suggested by commenters from the first public review of Guideline 29P. Many of these changes are included in an Informative Appendix D to the published guideline, and, as a result, the informative appendix has been deleted in its entirety. Additional changes have been included to update some normative references.*

Note: In this addendum, changes to the current guideline are indicated in the text by <u>underlining</u> (for additions) and ~~strikethrough~~ (for deletions), except where some other means of showing changes is specifically described.

Addendum a to Guideline 29-2009

[Revise Section 3 Definitions as follows:]

dedicated outdoor air: a ventilation system that delivers 100% outdoor air to each individual space in a building at flow rates equal to or greater than required by *ANSI/ASHRAE Standard 62.1-<u>2007</u>~~2001~~, Ventilation for Acceptable Indoor Air Quality.*[12]

[Revise Section 4.2.4 as follows:]

4.2.4 Assign a Risk Category. The *risk* categories for the purpose of this guideline are as follows:

- Critical—An incident that, if it occurred, would cause failure of the performance of the facility or would have a major impact on occupant health and safety.
- Serious—An incident that, if it occurred, would cause a major disruption in the performance of the facility or would have a significant impact on occupant health and safety.
- Moderate—An incident that, if it occurred, would cause significant disruption in the performance of the facility or would have some impact on occupant health and safety.
- Minor—An incident that, if it occurred, would cause only a small disruption in the performance of the facility; some temporary occupant discomfort might occur but there would be no impact on occupant health and safety.
- Negligible—An incident that, if it occurred, would have little or no effect on the performance of the facility and no impact on occupant health and safety.

<u>Obtain</u>~~Consider obtaining~~ guidance from experts in the diverse hazards that are to be addressed in any specific project or application so that advantage is gained of the vast knowledge that has accumulated. *Risks* should be quantified more precisely so that appropriate cost benefit trade-offs and life-cycle analysis can be prepared to inform design decisions and advice rendered to the ultimate *decision maker*, the engineer's client.

[Revise Section 4.2.7 as follows:]

4.2.7 Develop and Evaluate Intervention. The design professional develops and evaluates the cost of the intervention (alternate solutions) that the *risk* category and evaluation criteria dictate (Sections 4.2.4 and 4.2.5) and presents them to the *decision maker*. For example, where flooding is concerned, the design professional could develop a list of options to mitigate the affects of flooding, such as moving everything to the second or third floor, installing pumps, and providing levees and flood control gates around and within the site. Evaluation may include cost, aesthetics, convenience, etc. ~~See Informative Appendix D.~~<u>Several economic evaluation methods have been standardized and published by ASTM. See *ASTM Standard on Building Economics*[36] for guidance on the use of economic evaluations.</u>

[Revise Table 1 as follows:]

TABLE 1 Examples of Threats

Types of Threats			
Natural	**Accidental**	**Intentional**	
		Criminal	**Terrorism**
Flood	Flood	Arson	Blast
Wind	Fire	Sabotage	Chemical, biological, and radiological (CRB)
Quake	Spills	Vandalism	Utility
Fire		Cyber	Electronic
<u>Infectious Disease</u>		Hostages and kidnapping	

[Update the reference to ASCE/SEI Standard 7 in Section 5.4.2.2 as follows:]

5.4.2.2 Progressive Collapse. For **Serious Risk** and higher, the design professional should avoid designs that facilitate or are vulnerable to progressive collapse. All new facilities should be designed for the loss of a column for one floor above-grade at the building perimeter without progressive collapse. This design and analysis requirement for progressive collapse is not solely part of a blast analysis. It is intended to ensure adequate redundant load paths in the structure should damage occur for whatever reason. Design professionals may apply static and/or dynamic methods of analysis to meet this goal. Ultimate load capacities may be assumed in the analyses. *ASCE/SEI 7-<u>05</u>~~95~~ Minimum Design Loads for Buildings and Other Structures,*[6] describes progressive collapse and offers additional guidelines. ~~See Informative Appendix D.~~

(Remainder of Section 5.4.2.2 remains unchanged.)

[Revise Section 5.4.2.8 as follows:]

5.4.2.8 Building Openings. Where there is no site perimeter barrier and where no screening is performed at the perimeter, the exterior of the building is the first line of defense against a wide variety of *threats*, including vandalism, forced entry, winds, and blast.

Depending on the severity of the *threat*, as determined by the Threat and Risk Assessments, doors, windows, louvers, and other openings may need to be constructed of more robust materials than usual and be firmly anchored in the surrounding construction. This may include forced-entry resistance and ballistic resistance and often consists of construction that enhances protection against storms and floods.

Doors are especially attractive to unauthorized entry, and the door construction and access control hardware should be commensurate with the *threats* identified in the Threat and Risk Assessments. Doors and other openings should be able to be secured against entry by unauthorized persons. Access control may range from ordinary mechanical locks to highly sophisticated electronic card-key and biometric identification systems. It is up to the decision maker to resolve conflict between safety and security control. Although egress should not be hindered, it may not be appropriate in all conditions.

(Remainder of Section 5.4.2.8 remains unchanged)

[Revise Section 5.4.3.4.1as follows:]

5.4.3.4.1 Water Supply. Water supplies for fire protection can be public, private, or a combination of both. Water supplies are addressed in Section 5.3.4 and should be protected in accordance with this section. In addition to the requirements of Section 5.3.4, for **Serious Risk** or higher, consideration should be given to further protection of the water tank from possible sabotage or terrorist attack. Consideration should be given to providing redundant water supply systems and to locating the water tank underground, inside the building, or on top of buildings.

[Revise Section 5.4.3.4.2 as follows:]

5.4.3.4.2 Fire Pumps. Where the fire protection system pressure is not adequate, a fire pump is necessary to boost the pressure. Fire pumps, when provided, are a critical component of the fire protection system to ensure the system will function as designed. Any attack on or failure of the fire pump will have an adverse effect on the success of fire suppression. For **All Risk Levels**, fire pumps should be protected to ensure the pump will run when needed. This should include locating the pump room in areas that are controlled against unauthorized access, ensuring that there is a reliable source of power and backup power for electric driven pumps and an adequate fuel supply for diesel or natural gas driven fire pumps. For **Critical Risk**, consider installing redundant fire pumps, one with an electric motor-driven fire-pump controller and the other with a diesel engine-driven fire-pump controller.

[Revise Section 5.4.3.4.3 as follows:]

5.4.3.4.3 Piping/Distribution System. An attack and breech of the system piping will lead to a failure of the fire protection system. The incoming underground piping can be protected by access control, but much of the piping is either exposed to the public or only slightly protected by ceiling tiles or finished ceilings.

Valves are also a critical component to system operation. Closing riser valves or main valves will impair all of or part of the sprinkler system. Riser valves are located in the sprinkler room, which should be controlled against unauthorized access. Sprinkler main valves are often exposed and visible in stairwells and other public spaces.

For **Moderate Risk** and lower, access to the sprinkler system riser and valves should be through areas that are controlled against unauthorized access. This can be accomplished by lockable doors or locating risers in areas that are not accessible by the public. Valves should be either electrically supervised or locked or chained open.

For **Serious Risk** or higher, access to the sprinkler system riser and valves should be located in areas that are monitored by closed-circuit television (CCTV) as well as controlled against unauthorized access. Valves should be electrically supervised and locked or chained open. When the sprinkler valve room and risers are located in close proximity to areas subject to blasts, such as lobbies or loading docks, consideration should be given to blast *hardening* the space.

For **Critical Risk**, consider providing a minimum of two sprinkler risers in each sprinkler zone. Each sprinkler riser should supply sprinklers on alternate floors. If more than two risers are provided for a zone, sprinklers on adjacent floors should not be supplied from the same riser. Also consider installing sprinkler risers away from exterior walls on floors less than 6.0 m (20 ft) above grade, etc.

[Revise Section 5.4.3.4.5 as follows:]

5.4.3.4.5 Fire Alarm and Detection Systems. Fire alarm systems consist of automatic detection of fire, smoke, and heat, manual pull stations, audio and visual notification appliances (e.g., speakers, bells, and strobes), and interconnections to elevators and fire suppression system components. The fire alarm and detection system is most vulnerable at the fire alarm control panel. Damaging the control panel or interrupting the primary and emergency power supply can disable the entire system. For **Moderate Risk** or higher, Mass Notification Systems should be considered.

For **Moderate Risk** or lower, the fire alarm control panel should be located in an area that is controlled against unauthorized access. The power supply for the control panel should be protected from attack (see Section 5.3.3).

For **Serious Risk** or higher, the fire alarm control panel should be located in an area that is controlled against unauthorized access and monitored. The power supply for the control panel should be protected from attack (see Section 5.3.3). For redundancy, consideration should be given to remote annunciator panels at strategic locations. ~~See Informative Appendix D.~~Consider incorporating *NFPA 72, National Fire Alarm Code,*[31] requirements for survivability regardless of building height.

[Revise Section 5.4.3.6 as follows:]

5.4.3.6 Security Systems—Interior and Exterior. Intrusion detection may be added to secure openings, to notify response personnel, and to document attempted entry. Detection devices range from relatively simple electric contacts to vibration-sensing devices on window glass.

Intrusion detection usually assumes some type of response to interdict the attempted entry, such as by law enforcement officials or facility guards. The time for response determines the degree of resistance to forced and surreptitious entry. Some products are rated by the protection time (15 minutes, 1 hour, etc.). Particular assemblies are designed to resist various types of attempted breach (hand tools, machine tools, lock picks, etc.)

Surveillance of the building exterior by CCTV and roving guard personnel may be a deterrent and provide advance warning of an incident to response personnel. Placement of surveillance cameras and use of pan, zoom, and other technologies will enhance the effectiveness of the surveillance system.

Surveillance systems should be coordinated with lighting to provide useful coverage, to avoid "blinding" cameras and to allow aesthetically acceptable building exteriors. Landscaping close to the building perimeter should be designed to avoid areas of concealment.

Design of the facility for monitoring alarms, CCTV and other security systems, and training of personnel is as important as the design of the systems themselves.

Avoid using access control hardware (that utilizes motion sensors on the egress side of the door to de-energize magnetic locks) as means for securing doors, as this type of equipment can easily be compromised.

[Revise Section 5.4.4.7 as follows:]

5.4.4.7 Passenger Elevators. Elevators in buildings of moderate *risk* and higher where screening is conducted in the building entrance lobby should not open directly to the main public lobby but to a separate lobby and, when applicable, beyond the control door leading out of the lobby after any screening area.

An elevator floor position display should be provided in the Fire Control Center and in the enclosed guard station, where available.

Control of elevator access to any restricted or controlled access floors and interstitial mechanical equipment space may be by key or card reader device in the elevator cab.

Where elevators open directly to a restricted area, the entrance should be monitored by a CCTV camera in the space looking at the entrance.

Access to elevator equipment rooms, including machine rooms and controls, should be controlled and, in facilities of **Moderate Risk**, monitored.

For **Critical Risk**, consider remote separation of elevator shafts to minimize the risk that all elevators will be out of service when needed for emergency responders.

[Revise Section 5.4.4.11 as follows:]

5.4.4.11 Child-Care Centers. Child-care centers may be subject to the provisions of licensure codes and regulations.

Public entrances to child-care centers, including the main entrance and secondary entrances, should be controlled and monitored. Doors should be provided with an intercom to the reception desk with remote access from the desk.

Emergency egress doors from child-care centers should be controlled and monitored. No door may be locked from the inside, and egress must be a first concern.

Consider a 2.4 m (8 ft) high fence around all outdoor play and recreation areas with CCTV coverage of the entire area.

Location of the child-care services within the building should be easily accessible for building and emergency personnel, yet be secure from outside intruders.

[Revise Section 5.5.1 as follows:]

5.5.1 Offices. Office spaces requiring locks should use mortised locksets with high-security cylinders and keys provided and distribution controlled by the owner or management, master keyed as directed or approved by the owner or tenant. ~~See Informative Appendix D.~~Refer to *NFPA 75, Standard for the Protection of Information Technology Equipment*[37] for information on protecting information technology equipment.

[Revise Section 6.1 as follows:]

6.1 Commissioning. Commissioning and recommissioning, as described in *ASHRAE Guideline* *1.1-2007~~1-1996~~, HVA&R Technical Requirements for The Commissioning Process~~The HVAC Commissioning Process~~*,[28] and in *ASHRAE Guideline 0-2005, The Commissioning Process,*[29] should be an integral part of the Risk Management process. The commissioning processes should be augmented by procedures[30] that define specific performance criteria that demonstrate that the building and its systems are performing as intended under normal conditions, and likely to respond to *extraordinary incidents* consistent with the accepted level of *vulnerability*, as determined in the Risk Assessment (Section 4).

Standard 62.1 also contains a number of requirements for system start-up and commissioning that need to be addressed in all buildings, regardless of *risk* categories.

[Update the normative references in Section 7as follows:]

7. REFERENCES

[6]*ASCE/SEI Standard 7-05~~95~~, Minimum Design Loads for Buildings and Other Structures.* Reston, VA: American Society of Civil Engineers, 2006~~1995~~.

[12]*ANSI/ASHRAE Standard 62.1-2007~~2001~~, Ventilation for Acceptable Indoor Air Quality.* Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., 2007~~2001~~.

[16]*2007 ~~2003~~ ASHRAE Handbook—HVAC Applications.* Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., 2007~~2003~~.

[28]*ASHRAE Guideline* 1.1-2007~~1-1996~~, HVAC&R Technical Requirements for The Commissioning Process~~*The HVAC Commissioning Process*~~. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. Atlanta, 2007~~1996~~.

[36]*ASTM Standard on Building Economics*. West Conshohocken, PA: ASTM International, May 1, 2004.

[37]A*NSI/NFPA 75-2003, Standard for the Protection of Information Technology Equipment*. Quincy, MA: The National Fire Protection Association, 2003.

[Delete Informative Appendix D in its entirety.]

~~**(This appendix is not part of this guideline. It is merely informative and does not contain requirements necessary for conformance to the guideline.)**~~

~~Informative Appendix D~~
~~Reference Information~~

~~D1. DEVELOP AND EVALUATION INTERVENTION~~

~~Several economic evaluation methods have been standardized and published by ASTM. See ASTM *Standard on Building Economic*1 for guidance on the use of economic evaluations. *See Section 4.2.7.*~~

~~D2. PROGRESSIVE COLLAPSE~~

~~For **Serious Risk** and higher *ASCE/SEI Standard 7-05, Minimum Design Loads for Buildings and Other Structures,*2 describes progressive collapse and offers additional guidelines. *See Section 5.4.2.2.*~~

~~D3. FIRE ALARM AND DETECTION SYSTEMS~~

~~For **Serious Risk** or higher consider incorporating NFPA 72, *National Fire Alarm Code,*3 requirements for survivability regardless of building height. *See Section 5.4.3.4.5.*~~

~~D4. BUILDING OCCUPANCY TYPES—OFFICES~~

~~Refer to *NFPA 75*, *Standard for the Protection of Information Technology Equipment,*4 for information on protecting information technology equipment. *See Section 5.5.1.*~~

~~D5. REFERENCES~~

~~1*ASTM Standard on Building Economics*. West Conshohocken, PA: ASTM International, May 1, 2004.~~
~~2*ASCE/SEI Standard 7-05, Minimum Design Loads for Buildings and Other Structures.* Reston, VA: American Society of Civil Engineers, 2006.~~
~~3*ANSI/NFPA 72-2002, National Fire Alarm Code®.* Quincy, MA: The National Fire ProtectionAssociation, 2002.~~
~~4*ANSI/NFPA 75-2003, Standard for the Protection of Information Technology Equipment*. Quincy, MA: The National Fire Protection Association, 2003.~~

POLICY STATEMENT DEFINING ASHRAE'S CONCERN FOR THE ENVIRONMENTAL IMPACT OF ITS ACTIVITIES

ASHRAE is concerned with the impact of its members' activities on both the indoor and outdoor environment. ASHRAE's members will strive to minimize any possible deleterious effect on the indoor and outdoor environment of the systems and components in their responsibility while maximizing the beneficial effects these systems provide, consistent with accepted standards and the practical state of the art.

ASHRAE's short-range goal is to ensure that the systems and components within its scope do not impact the indoor and outdoor environment to a greater extent than specified by the standards and guidelines as established by itself and other responsible bodies.

As an ongoing goal, ASHRAE will, through its Standards Committee and extensive technical committee structure, continue to generate up-to-date standards and guidelines where appropriate and adopt, recommend, and promote those new and revised standards developed by other responsible organizations.

Through its *Handbook*, appropriate chapters will contain up-to-date standards and design considerations as the material is systematically revised.

ASHRAE will take the lead with respect to dissemination of environmental information of its primary interest and will seek out and disseminate information from other responsible organizations that is pertinent, as guides to updating standards and guidelines.

The effects of the design and selection of equipment and systems will be considered within the scope of the system's intended use and expected misuse. The disposal of hazardous materials, if any, will also be considered.

ASHRAE's primary concern for environmental impact will be at the site where equipment within ASHRAE's scope operates. However, energy source selection and the possible environmental impact due to the energy source and energy transportation will be considered where possible. Recommendations concerning energy source selection should be made by its members.