

## CHAPTER 17

# FIRE IMPACT MANAGEMENT

### SECTION 1701 FIRE IMPACT MANAGEMENT

**1701.1 Objective.** To provide an acceptable level of fire safety performance when facilities are subjected to fires that could occur in the fire loads that may be present in the facility during construction or alteration and throughout the intended life.

**1701.2 Functional statements.** Facilities shall be designed with safeguards against the spread of fire so that no person not directly adjacent to or involved in the ignition of a fire shall suffer serious injury or death from a fire, and so that the magnitude of the property loss is limited as follows:

Performance Group I—High  
Performance Group II—Moderate  
Performance Group III—Mild  
Performance Group IV—Mild

**1701.2.1 Fire potential.** Facilities and contents shall be maintained in a manner that limits the potential for fire.

**1701.2.2 Fire impact.** Facilities shall be designed, constructed and maintained to limit the fire impact to people and property.

**1701.2.3 Time for evacuation.** Facilities shall be designed, constructed, maintained and operated with appropriate safeguards in place to limit the spread of fire and products of combustion so that occupants have sufficient time to escape the fire.

**1701.2.4 Limitation on fire spread.** Facilities shall be designed, constructed, maintained and operated in such a manner that the spread of fire through a building is restricted, and that fire does not spread to adjacent properties.

**1701.2.5 Wildland fires.** In wildland interface areas, facilities and vegetation shall be designed, constructed, arranged and maintained in such a manner to limit the impact to the building and the facilities during a wildland fire event.

**1701.2.6 Emergency responder needs.** Facilities shall be arranged, constructed, maintained and operated with appropriate safeguards in place to allow fire-fighting personnel to perform rescue operations and to protect property.

**1701.2.7 Structural integrity.** Facilities shall be arranged, constructed and maintained so as to limit the impact of a fire on the structural integrity of the facility.

**1701.2.8 Capability of building or facility users.** All facilities open to persons of varying physical and mental capabilities shall provide reasonably equivalent levels of fire safety protection for those persons to the levels it provides for persons without disabilities.

**1701.3 Performance requirements.** Facilities or portions thereof shall be designed, constructed and operated to normally prevent any fire from growing to a stage that would cause life loss or serious injury, taking into account all anticipated

and permitted fire loads that would affect their performance. Facilities shall be designed to sustain local fire damage, and the facility as a whole will remain intact and not be damaged to an extent disproportionate to the original local damage.

**1701.3.1 Interior surface finishes.** Interior surface finishes on walls, floors, ceilings and suspended building elements shall resist the spread of fire and limit the generation of unacceptable levels of toxic gases, smoke and heat appropriate to the design performance level and associated hazards, risks, and fire safety systems or features installed.

**1701.3.2 Building materials, processes and contents.** Limit quantities, configurations and combustibility of building materials, processes and contents so that fire growth and size can be controlled.

**1701.3.3 Emergency responders.** Where necessary, provide appropriate measures to limit fire and smoke spread and damage to acceptable levels so that fire fighters are not unduly hindered in suppression or rescue operations.

**1701.3.4 Detection and notification.** Where human intervention or system or equipment response is necessary to limit the fire impact, provide appropriate means for detection and notification of fire.

**1701.3.5 Activation of detection systems.** Fire detection systems, when provided, shall activate at a fire size appropriate to the fire and life safety strategies selected.

**1701.3.6 Activation of suppression systems.** Automatic fire suppression systems, when provided as a means of controlling fire growth or to suppress the fire, shall deliver sufficient suppression agent to control or suppress the fire as appropriate.

**1701.3.7 Control of smoke.** Smoke control systems, when provided, shall limit the unacceptable spread of smoke to nonfire areas as appropriate.

**1701.3.8 Concealed spaces.** Construction in concealed spaces shall inhibit the unseen spread of fire and unacceptable movement of hot gases and smoke, appropriate to associated hazards, risks, and fire safety systems or features installed.

**1701.3.9 Vertical openings.** Vertical openings shall be constructed, arranged, limited or protected to limit fire and smoke spread as appropriate to the fire and life safety strategies selected.

**1701.3.10 Wall, floor, roof and ceiling assemblies.** Wall, floor, roof and ceiling assemblies forming compartments including their associated openings shall limit the spread of fire appropriate to the associated hazards, risks, and fire-safety systems or features installed.

**1701.3.11 Structural members and assemblies.** Structural members and assemblies shall have a fire resistance appropriate to their function, the fire load, the predicted fire

intensity and duration, the fire hazard, the height and use of the building, the proximity to other properties or structures, and any fire protection features.

**1701.3.12 Exterior wall and roof assemblies' restriction of fire spread.** Construction of exterior wall and roof assemblies shall restrict the spread of fire to or from adjacent buildings and from exterior fire sources, appropriate to the associated hazards, risks, and fire safety systems or features installed.

**1701.3.13 Exterior wall and roof assemblies' contribution to fire growth.** Construction of exterior wall and roof assemblies shall resist the spread of fire by limiting their contribution to fire growth and development, appropriate to the associated hazards, risks and fire safety systems or features installed.

**1701.3.14 Air handling and mechanical ventilation systems.** Air handling and mechanical ventilation systems, when provided, shall be designed to avoid or limit the unacceptable spread of fire and smoke to nonfire areas as appropriate.

**1701.3.15 Magnitude of fire event.** Design fire events shall realistically reflect the ignition, growth and spread potential of fires and fire effluents that could occur in the fire load that may be present in the facility by its design and operational controls.

**1701.3.15.1 Design fire events.** Magnitudes of design fire events shall be described in terms of the potential spread of fire and fire effluents given the proposed design, arrangement, construction, furnishing and use of a building.

**1701.3.15.2 Range of fire sizes.** Magnitudes of design fire events shall be defined as small, medium, large and very large, based on the quantification of the design fire event as a function of the building use and associated performance group.

**1701.3.15.3 Engineering analyses of potential fire scenarios.** Quantification of the magnitudes of design fire events shall be based on engineering analyses of potential fire scenarios that can be expected to impact a building through its intended life. For each design fire scenario considered, the analyses shall include the ignitability of the first item, the peak heat release rate of the item first ignited, the rate of heat release and expected fire growth, and the overall fuel load, geometry, and ventilation of the space and adjoining spaces.

**1701.3.15.3.1 Relationship of design fire to tolerable damage.** When determining (assigning) the magnitude of a design fire event, the physical properties of the fire and its effluents shall only be considered in terms of how they impact the levels of tolerable damage. The magnitude of the fire event is not required to be characterized solely on the basis of the physical size of the fire in terms of its heat release and smoke production rates.

**1701.3.15.3.2 Design parameters.** Multiple design fire scenarios, ranging from small to very large design

fire events, shall be considered to ensure that associated levels of tolerable damage are not exceeded as appropriate to the performance group.

**1701.3.15.3.3 Factors in determining design fire scenarios.** The development of design fire scenarios shall consider the use of the room of fire origin and adjoining spaces, in terms of impact on occupant, property and community welfare.

**1701.3.15.3.4 Justification.** Justification of the magnitudes of design fire events and design fire scenarios shall be part of the analysis prepared by the design professional and shall take into consideration the reasonableness, frequency and severity of the design fire event and design fire scenarios.

**1701.3.15.3.5 Safety factors.** Design fires and fire scenarios shall be chosen to provide appropriate factors of safety to provide adequate performance by accounting for the following factors:

1. Effects of uncertainties arising from construction activities.
2. Variations in the properties of materials and the characteristics of the site.
3. Accuracy limitations inherent in the methods used to predict the fire safety of the building.
4. Variations in the conditions of facilities, systems, contents and occupants.