NFPA® 101A

Guide on Alternative Approaches to Life Safety

2010 Edition

NFPA, 1 Batterymarch Park, Quincy, MA 02169-7471
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Alternative Approaches to Life Safety

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This edition of NFPA 101A, *Guide on Alternative Approaches to Life Safety*, was prepared by the Technical Committee on Alternative Approaches to Life Safety and released by the Technical Correlating Committee on Safety to Life. It was issued by the Standards Council on May 26, 2009, with an effective date of June 15, 2009, and supersedes all previous editions.

This edition of NFPA 101A was approved as an American National Standard on June 15, 2009.

Origin and Development of NFPA 101A

This 2010 edition of NFPA 101A is the eighth edition. Prior to the development of the 1988 edition of this document, it was published as several appendixes to NFPA *101*, *Life Safety Code*. NFPA 101A is revised every three years on a schedule that lags that of NFPA *101* by one year so as to reflect accurately the requirements of NFPA *101* against which the NFPA 101A Fire Safety Evaluation Systems (FSESs) measure equivalency.

Chapter 4 first appeared as Appendix C in the 1981 edition of the *Life Safety Code*; Chapters 5, 6, and 7 first appeared in the 1985 edition of the *Life Safety Code* as Appendixes E, F, and G; and Chapter 8 was proposed as Appendix H for the 1988 edition but was published as a chapter of this document. These chapters were originally prepared by the Center for Fire Research of the National Institute of Standards and Technology (then the National Bureau of Standards). The Committees on Safety to Life have reviewed and modified the systems as appropriate for inclusion.

Chapter 9 appeared first in the 2004 edition and provides an FSES for educational occupancies.

The figures contained herein are copyrighted by NFPA, but users are hereby given permission to copy the worksheets for private use only.

To the User

This document provides alternative approaches to life safety based on the 2009 *Life Safety Code*. It is intended to be used *with* the *Life Safety Code*, not as a substitute. Section 1.4 of the *Life Safety Code* permits alternative compliance with the *Code* under equivalency concepts where such equivalency is approved by the authority having jurisdiction. The methods contained herein can be used to help determine equivalency where used as part of the technical documentation submitted to the authority having jurisdiction.

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NOTICE: An asterisk (*) following the number or letter designating a paragraph indicates that explanatory material on the paragraph can be found in Annex A.

Changes other than editorial are indicated by a vertical rule beside the paragraph, table, or figure in which the change occurred. These rules are included as an aid to the user in identifying changes from the previous edition. Where one or more complete paragraphs have been deleted, the deletion is indicated by a bullet (•) between the paragraphs that remain.

A reference in brackets [ ] following a section or paragraph indicates material that has been extracted from another NFPA document. As an aid to the user, the complete title and edition of the source documents for extracts in advisory sections of this document are given in Chapter 2 and those for extracts in the informational sections are given in Annex B. Extracted text may be edited for consistency and style and may include the revision of internal paragraph references and other references as appropriate. Requests for interpretations or revisions of extracted text should be sent to the technical committee responsible for the source document.

Information on referenced publications can be found in Chapter 2 and Annex B.

Chapter 1 Administration

1.1 Scope. (Reserved)

1.2 Purpose. (Reserved)

1.3 Application.

1.3.1* This guide consists of a number of alternative approaches to life safety. Each chapter is a different system independent of the others and is to be used in conjunction with the 2009 edition of NFPA *101, Life Safety Code*.

1.3.2 This edition of NFPA 101A contains alternative approaches that are tied to NFPA *101, Life Safety Code*. Each of these systems is recognized by the *Life Safety Code,* in its Annex A, as a method that can be used to assist the authority having jurisdiction in determining equivalent compliance with various chapters of the *Code*.

1.3.3 The method described in this guide is an index method. Index methods are a type of qualitative risk assessment. Quantitative risk assessments can also be used to evaluate designs that are proposed as alternative approaches to life safety. For information on developing fire risk assessments, see the *SFPE Engineering Guide to Fire Risk Assessment*. Guidance on reviewing fire risk assessments can be found in NFPA 551, *Guide for the Evaluation of Fire Risk Assessments*.

1.3.4 For further information on alternative approaches to fire safety, see "Systems Approach to Fire-Safe Building Design," Section 1, Chapter 9, of the 20th edition of the NFPA *Fire Protection Handbook* and the *SFPE Handbook of Fire Protection Engineering*, 3rd edition, Section 3, "Hazard Calculations," and Chapters 5–10, "Fire Risk Indexing."

Chapter 2 Referenced Publications

2.1 General. The documents or portions thereof listed in this chapter are referenced within this guide and should be considered part of the recommendations of this document.

2.2 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

NFPA 13, *Standard for the Installation of Sprinkler Systems,* 2010 edition.

NFPA 13D, *Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes,* 2010 edition.

NFPA 13R, *Standard for the Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height,* 2010 edition.

NFPA 72®, National Fire Alarm and Signaling Code, 2010 edition.

NFPA 90A, *Standard for the Installation of Air-Conditioning and Ventilating Systems,* 2009 edition.

NFPA 92A, *Standard for Smoke-Control Systems Utilizing Barriers and Pressure Differences,* 2009 edition.

NFPA 92B, *Standard for Smoke Management Systems in Malls, Atria, and Large Spaces,* 2009 edition.

NFPA *101®, Life Safety Code®,* 2009 edition.

NFPA 204, *Standard for Smoke and Heat Venting,* 2007 edition.

NFPA 220, *Standard on Types of Building Construction,* 2009 edition.

NFPA 251, *Standard Methods of Tests of Fire Resistance of Building Construction and Materials,* 2006 edition.

NFPA 252, *Standard Methods of Fire Tests of Door Assemblies,* 2008 edition.

NFPA 255, *Standard Method of Test of Surface Burning Characteristics of Building Materials,* 2006 edition.

NFPA 265, *Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile Coverings on Full Height Panels and Walls,* 2007 edition.

NFPA 286, *Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth,* 2006 edition.

NFPA 551, *Guide for the Evaluation of Fire Risk Assessments,* 2007 edition.

NFPA 5000®, Building Construction and Safety Code®, 2009 edition.

NFPA Fire Protection Handbook, 20th edition.

SFPE Handbook of Fire Protection Engineering, 3rd edition.

2.3 Other Publications.

2.3.1 *SFPE Engineering Guide to Fire Risk Assessment*, Society of Fire Protection Engineers, 7315 Wisconsin Avenue, Suite 122 SW, Bethesda, MD 20814.

Webster's Third New International Dictionary of the English Language, Unabridged, Merriam-Webster, Inc., Springfield, MA, 2002.

2.4 References for Extracts in Advisory Sections.

NFPA 5000®, Building Construction and Safety Code®, 2009 edition.

Chapter 3 Definitions

3.1 General. The definitions contained in this chapter apply to the terms used in this guide. Where terms are not defined in this chapter or within another chapter, they should be defined using their ordinarily accepted meanings within the context in which they are used. *Webster's Third New International Dictionary of the English Language, Unabridged,* is the source for the ordinarily accepted meaning.

3.2 NFPA Official Definitions.

3.2.1* Approved. Acceptable to the authority having jurisdiction.

3.2.2* Authority Having Jurisdiction (AHJ). An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure.

3.2.3 Guide. A document that is advisory or informative in nature and that contains only nonmandatory provisions. A guide may contain mandatory statements such as when a guide can be used, but the document as a whole is not suitable for adoption into law.

3.2.4 Labeled. Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

3.2.5* Listed. Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards or has been tested and found suitable for a specified purpose.

3.2.6 Shall. Indicates a mandatory requirement.

3.2.7 Should. Indicates a recommendation or that which is advised but not required.

3.3 General Definitions. (Reserved)

Chapter 4 Fire Safety Evaluation System for Health Care Occupancies

4.1 General.

4.1.1 This chapter is part of an NFPA guide and, therefore, is not mandatory. The term *shall* in this chapter is used to indicate that if the provisions of the chapter are applied, the procedures mandated are to be followed to ensure the effectiveness of the evaluation system.

4.1.2 The Fire Safety Evaluation System (FSES) is a measuring system. It compares the level of safety provided by an arrangement of safeguards that differ from those specified in NFPA *101*, *Life Safety Code*, to the level of safety provided in a building that conforms exactly with the details of the *Code*.

4.1.3 This chapter is provided to assist in completion of Figure 4.7, Worksheets for Evaluating Fire/Smoke Zones. The step-by-step instructions for completion appear on the worksheets. They are not repeated within the chapter. This chapter provides expanded discussion and definition of the various items in the worksheet to assist the user when questions of definition or interpretation arise. The chapter is organized to follow the format of the worksheet progressively.

4.2 Procedure for Determining Equivalency.

4.2.1 Evaluate every fire zone using Figure 4.7 (Worksheets 4.7.1 through 4.7.11). Use the text portion (Section 4.3 through 4.6.13.4.3) of this chapter as a guide.

4.2.2 The Facility Fire Safety Requirements Worksheet (Worksheet 4.7.10) is used to determine any nonconformance with the requirements on the worksheet.

4.2.3 Equivalency is achieved if the fire/smoke zone evaluations show equivalency or better in each and every fire zone and the requirements on the Facility Fire Safety Requirements Worksheet (Worksheet 4.7.10) are met.

4.3 Fire/Smoke Zone.

4.3.1 A fire/smoke zone is a space that is separated from all other spaces by floors, horizontal exits, or smoke barriers. Every zone on a floor that is subdivided into two or more zones shall have exit routes in accordance with 18.2.4.3 or 19.2.4.3 (NFPA *101*). Compartments not meeting these requirements shall be evaluated as part of an adjacent zone. When a floor is not subdivided by horizontal exits or smoke barriers, the entire floor is considered to be the zone.

4.3.2 Selection of Zones to Be Evaluated. A floor that is not subdivided by horizontal exits or smoke barriers is considered a single zone. The entire facility shall be divided into zones. There shall be no areas that are not in a zone. For a complete evaluation, evaluate every zone in the health care facility individually. From a practical standpoint, most health care facilities have repetitive arrangements so that a complete picture can be developed by evaluating typical zones until all combinations are evaluated. The zones selected should include the following:

(1) Each type of patient zone having a different type of mobility, density, or attendant ratio, as specified in Worksheet 4.7.2
(2) Each zone that represents a significantly different type of construction, finish, or protection system
(3) Zones containing special medical treatment or support activities (operating suites, intensive care units, laboratories)
(4) Zones not involving housing, treatment, or customary access for patients; such zones should be evaluated as follows:
   (a) Any zone, whether or not used for patient egress, shall be permitted to be evaluated on the same basis as a patient use zone. In such case, the value of factor *F* in Worksheet 4.7.3 shall be assigned the value of factor *L* ("Zone Location") from Worksheet 4.7.2. In such cases, Safety Parameter 10, "Emergency Movement Routes," from Worksheet 4.7.6 shall be graded "deficient" if the exit capacity is less than that prescribed for the actual occupancy of the space and "<2 routes" if less than 75 percent of the prescribed exit capacity is present.
   (b) If the zone is separated by 2-hour fire-rated construction from all patient use zones (including any members that bear the load of a patient use zone) and if any communicating openings through the 2-hour fire-rated construction are protected by 1½-hour fire-protection–rated fire doors, the zone shall be permitted to be excluded from evaluation. In such case, that

space shall conform with the portion of the *Life Safety Code* appropriate to its use. In addition, appropriate charges under Safety Parameter 8, "Hazardous Areas," in Worksheet 4.7.6 shall be charged against other zones in the facility.

(c) Evaluation of any unoccupied floor(s) located above the highest floor used for health care occupancy is not required, provided each such unoccupied floor meets the construction requirements of 18.1.6 (NFPA *101*) for new buildings or 19.1.6 (NFPA *101*) for existing buildings, or if each unoccupied floor is protected by automatic sprinklers.

(5) Patient sleeping rooms or suites exceeding 1000 ft^2 (92.9 m^2) or nonsleeping rooms or suites exceeding 2500 ft^2 (230 m^2) of floor area, which should be evaluated as follows:

(a) If the room or suite has a single exit access door, it should be evaluated as a single dead-end zone.

(b) A patient sleeping room or suite of sleeping rooms exceeding the 5000 ft^2 (460 m^2) limitation of 18.2.5.7.2.3(A) or 19.2.5.7.2.3(A) (NFPA *101*) should be evaluated as a separate zone.

(c) A patient sleeping suite exceeding the 7500 ft^2 (700 m^2) limitation of 18.2.5.7.2.3(B) or 19.2.5.7.2.3(B) (NFPA *101*) should be evaluated as a separate zone.

(d) A room or suite of rooms other than a patient sleeping room, exceeding 10,000 ft^2 (930 m^2), should be evaluated as a separate zone.

4.4 Maintenance. Any protection system, requirement, or arrangement that is not maintained in a dependable operating condition or that is used in such a manner that the intended fire safety function or hazard constraint is impaired should be considered defective and receive no credit in the evaluation.

4.5 Occupancy Risk (Worksheet 4.7.2). In establishing a system for evaluating occupancy risk, the following facts are recognized:

(1) There is a basic level of risk inherent in every health care facility.
(2) The fuel characteristics of furniture, equipment, and supplies vary with time.
(3) The arrangement of these items within the space available can vary with time.
(4) Consequently, these three factors are not included as parameters in a safety equivalency measurement; to account for these factors, the occupancy risk baseline is set at the inherent risk level, with the presumption that the furniture, equipment, and supplies are the most combustible and adversely located (from a fire safety standpoint) of those items normally found in health care facilities.

4.5.1 Patient Mobility.

4.5.1.1 The single most important factor controlling risk in a health care facility is the degree to which patients need assistance in taking the actions necessary for their safety. The level of capability in health care facilities varies from patients who, if informed or directed, are able to take positive, self-protecting actions to those patients who have no ability to move or even to take the simplest actions to safeguard themselves. In some cases, patients are directly connected to a fixed life-support system and are so dependent on it that, regardless of their physical condition or the availability of assistance, they cannot be moved without jeopardy of death or serious harm. In the measurement of occupancy risk factors, the least mobile category of patient expected in the zone determines the risk factor for that zone. The rationale for this approach is that, if a zone accepts any patient with a reduced mobility status, it might accept other such patients at any time. The impact of this approach is that most health care facilities should be rated in the "not mobile" risk category. Mobility status should be based on the minimum level of mobility in an average 24-hour period.

4.5.1.2 Mobility Status Factor. Patient mobility status is based on the capability of each patient to take actions necessary for self-protection. The four classes are defined as follows:

(1) *Mobile.* Capable of readily rising from bed and taking self-protecting actions at approximately the same rate as a healthy adult. To be classified as mobile, the patient must not need assistance in getting out of bed and must be able to open a closed or locked door. Persons shall be considered to be mobile if they are not restrained or in any other way limited in response capabilities so that the type of arousal mechanism that normally would awaken an adult is not effective.
(2) *Limited Mobility.* Those patients who have all of the capabilities of a mobile person except that their rate of travel is significantly slower.
(3) *Not Mobile.* Patients incapable of removing themselves from danger exclusively by their own efforts. Examples include persons who are totally bedridden; who need assistance getting out of bed or moving; and who are restrained, locked in their rooms, or otherwise prevented from taking complete emergency self-protection evacuation actions without assistance.
(4) *Not Movable.* Patients not capable of being moved from the room in which they are housed during the course of a fire. Examples include patients attached to life-support systems or involved in medical or surgical procedures that prohibit their immediate relocation without extreme danger of death or serious harm.

4.5.2 Patient Density.

4.5.2.1 The occupancy risk evaluation for occupancy density (number of patients within the zone) measures both the inherent increase in the maximum fire death potential that occurs as the number of patients in a zone increases and the problems involved for a limited staff in handling larger numbers of patients during an emergency.

4.5.2.2 Patient Factor. The density of patients is the number of patients who could potentially be housed in the zone. The patient count should be based on the number of assignable beds in the zone, assuming that they might all be occupied at the time of the fire emergency.

4.5.3 Zone Location.

4.5.3.1 This risk factor relates to fire department accessibility to a fire. The rating system recognizes the inherent advantages for the first floor zone. It also recognizes the problems of evacuation from higher floors and the virtual impossibility of using external fire-fighting efforts above the sixth floor in any building.

4.5.3.2 Floor Factor. The measured zone's location shall be considered to be on floor one if the floor has direct access to the exterior at or within less than one-half floor height above or below grade. If a building is on a sloping grade, each floor that has such exterior access shall be considered as a first floor for the purpose of measuring fire zones on those floors. The measured zone shall be considered to be on the second to third floor range and the fourth to sixth floor range, based on the height of the zone above the nearest at-grade floor. The

zone shall be considered to be above the sixth floor if it is more than six floors above the nearest at-grade floor. The risk factor value for zones in basements is the same as for zones at or above the seventh floor. The problems involved in emergency internal access, in fire fighting and rescue, and in the inability to make external attack in basements are approximately equivalent to those in the upper stories of buildings.

4.5.4 Ratio of Patients to Attendants.

4.5.4.1 This risk factor recognizes the importance to patient safety of a staff that is immediately available to respond in an emergency. The emergency actions that might be undertaken by the staff include detection, alarm, fire extinguishment, confinement of the fire, establishment of barriers between the patients and the fire (closing patient room doors), rescue, emergency medical aid, and other related functions. A few of these functions, such as detection and alarming, might not be critically related to the ratio of nursing staff to patients, while those related to rescue and the closing of patient room doors have a strong relationship to the staffing ratio. The staff ratio considered is based on the minimum staffing level immediately available (normally the night shift).

4.5.4.2 Patient–Attendant Factor. The ratio of patients to attendants is based on those patients in the fire/smoke zone and the immediately available attendant staff.

4.5.4.2.1 The ratio calculation shall be based on the minimum staffing level (usually occurring during the night shift). Where nursing stations or other positions of attendants are located at the junction of two or more zones and the location of the station is such that each of the zones has immediate access and is in view of the nursing station, the total staffing assigned to the nursing station can be credited to each of the zones. An exception occurs when staff members are bound by duty assignments (cardiac care units, infant nurseries, operating suites, etc.) that prevent them from responding to other than their assigned zone.

4.5.4.2.2 The evaluation system assesses this risk factor at 4.0 in any case involving periods when no attendants are immediately available to a zone that houses patients but where attendants are available within one floor of all patient floors. This evaluation system is not intended to be used in cases where no staff are present in the building housing patients.

4.5.5 Patient Average Age.

4.5.5.1 This risk factor recognizes the increased susceptibility of the elderly and of infants up to one year old to physical harm by smoke particles, gaseous combustion products, and heated air. A larger risk factor is assigned to zones occupied by a population whose average age is above 65 years or below one year. Basically, imposition of this rating demands additional safety protection in nursing homes for the aged and in nurseries.

4.5.5.2 The mode value is used to arrive at the age factor for the patients in the zone. The calculation should be based on the past record of occupants assigned to the zone. Patients under one year old are classified at the same risk level as those over 65. This factor recognizes the susceptibility of infants to fire.

4.6 Safety Parameters (Worksheet 4.7.6). Safety parameters are a measure of those building factors that bear on or contribute to the safety of those persons (patients, staff, visitors, others) who might be in the particular zone at the time of a fire. Each of the safety parameters was analyzed. Where the current *Life Safety Code* requirements recognize several different approaches to the parameter, the most important alternatives were specified. Also specified were conditions likely to be encountered in situations failing to meet the explicit *Code* requirements and conditions exceeding those required by the *Code*, but available for increased protection.

4.6.1 Construction. Construction types are classified in accordance with the definitions of NFPA 220, *Standard on Types of Building Construction*. Major revisions have been made in the categories and definitions in the recent editions of NFPA 220. Previously, NFPA 220 included requirements for "interior partitions enclosing stairs or other openings through floors." The current edition does not. This change is fully accounted for in this system. *(See 4.6.7.)*

4.6.1.1 Where the facility includes additions or connected structures of different construction, the rating and classification of the structure shall be based on the following:

(1) Separate buildings, if a 2-hour or greater fire resistance–rated separation exists between the portions of the building
(2) Separate buildings, if the additions and connected structure conform to the provisions of applicable sections of Chapter 18 or 19 (NFPA *101*), whether or not separation is provided
(3) The lower safety parameter point score involved, if neither 4.6.1.1(1) nor 4.6.1.1(2) applies

4.6.1.2 The floor level used to determine the parameter value is the floor of the fire zone being evaluated. The *floor* or *zone* is specified relative to, and beginning with, the level of exit discharge as defined by 3.3.77.1 (NFPA *101*).

4.6.1.3 Where the zone is on a floor below the level of exit discharge, the construction value shall be based on the distance of that floor from the level of exit discharge (i.e., one floor below the level of exit discharge equals "second"; two floors below the level of exit discharge equals "third"; three or more floors below the level of exit discharge equals "fourth and above").

4.6.2 Interior Finish (Corridor and Exits). The classification of flame spread is in accordance with Section 10.2 (NFPA *101*). The flame spread classification shall be based on the most combustible surface after deleting trim. No allowance is made in the safety parameter values for Class D or Class E interior finishes. It is not anticipated that such material will be used in health care facilities. In the rare case that such high flame spread interior finish material is involved, an individual appraisal outside the capability of this evaluation system will be required. Interior wall and ceiling finish materials tested in accordance with NFPA 265, *Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile Coverings on Full Height Panels and Walls*, or NFPA 286, *Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth*, as permitted by Section 10.2 (NFPA *101*), and meeting the criteria established in Section 10.2 (NFPA *101*) for those test standards, shall be scored as Class A interior finish materials (flame spread ≤25).

4.6.3 Interior Finish (Rooms). See 4.6.2.

4.6.4 Corridor Partitions/Walls. For the purpose of this evaluation, the fire-rated partitions considered are as defined in 18.3.6 (NFPA *101*) for new buildings and 19.3.6 (NFPA *101*) for existing buildings. All elements of the partition, except the door (considered as a separate element in this evaluation), must be included in the determination of its time-rated fire resistance classification according to NFPA 251, *Standard Methods of Tests of Fire Resistance of Building Construction and Materials*. An exception to the general rule of evaluating doors separately from walls occurs where one or more rooms have no doors *(see 4.6.5)*. In this instance, it is

considered that the worth of the fire resistance capabilities of the corridor partition wall is so reduced that the wall should be graded as having no fire resistance. *(See Worksheet 4.7.6.)*

4.6.4.1 Corridor partitions shall be graded as "none or incomplete" if they do not meet the requirements of 18.3.6 or 19.3.6 (NFPA *101*), as appropriate, including applicable exceptions. In existing buildings, partitions shall be permitted to be graded as "<½ hour," provided the ceiling within the fire/smoke zone is of a design and construction sufficient to resist the passage of smoke and the partition either extends through or terminates at the underside of the ceiling with a smoketight joint.

4.6.4.2 Corridor partitions shall be graded as "≥½ hour but <1 hour" or "≥1 hour" only where the partitions extend to the underside of the floor or roof construction above in accordance with 18.3.6 or 19.3.6 (NFPA *101*), as appropriate.

4.6.5 Doors to Corridor. The classification of doors to the corridor shall be based on the minimum quality of any door in the zone, and the classification shall be determined in accordance with NFPA 252, *Standard Methods of Fire Tests of Door Assemblies*. Doors for protection of vertical openings and hazardous areas that are covered separately in 4.6.7 and 4.6.8 are not included in this evaluation. Doors that do not latch and doors that have louvers shall not be considered in classifying doors to corridors if those doors open to toilet rooms, bathrooms, shower rooms, sink closets, and similar auxiliary spaces that do not contain flammable or combustible materials.

4.6.5.1 No Door. A room shall be considered as not having a door if there is no door in the opening or if there is some other mechanism that prevents closing of the door or otherwise leaves a significant opening between the patient room and the corridor. Doors with louvers or ordinary glass lights shall be classified as "no door." (Ordinary glass lights shall not be considered as making a partition incomplete in locations where both sides of the glass light are fully protected by automatic sprinkler systems.) Doors that have been blocked open by door stops, chocks, tiebacks, or other devices that necessitate manual unlatching or releasing action to close the door shall be classified as "no door." Hold-open devices that release when the door is pushed or pulled (such as friction catches or magnetic catches) shall be permitted, and the door shall be classified under 4.6.5.2, 4.6.5.3, and 4.6.5.4. Also, doors that are not provided with a latch in accordance with 18.3.6.3.5 through 18.3.6.3.8 or 19.3.6.3.5 through 19.3.6.3.7 (NFPA *101*) shall be classified as "no door."

4.6.5.2 Doors of Less Than 20-Minute Fire Protection Rating (<20 min FPR). Doors that are not deficient as described in 4.6.5.1 but that do not meet the requirements of 4.6.5.3 shall be classified as less than 20-minute fire protection rating.

4.6.5.3 Doors of 20-Minute or More Fire Protection Rating (≥20 min FPR). Doors shall be considered as having a 20-minute or greater fire protection rating if they are of 1¾ in. (44 mm) thick, solid, bonded wood core construction or any other arrangement of equal or greater stability and fire integrity. The thermal insulation capability of the door need not be considered. Hollow or sheet steel doors, therefore, meet the 20-minute requirement.

4.6.5.4 Twenty-Minute or More Fire Protection Rating and Automatic Closing (≥20 min FPR & Auto Clos.). Automatic-closing devices shall be considered to be present if the door has an arrangement that holds it open in a manner such that it is released by a smoke detector–operated device (e.g., a magnetic or pneumatic hold-open device) prior to the passage of significant smoke from a room of fire origin into the corridor or from the corridor into a room not involved in the fire. Smoke detectors for operation of such doors shall be permitted to be integral with the door closers, mounted at each opening, or operated from systems meeting the requirements for two or more points of credit under 4.6.12. The requirement for 20-minute fire protection rating is the same as in 4.6.5.3.

4.6.5.5 Self-Closing Patient Room Doors. Traditional self-closing doors on individual patient rooms shall be evaluated in the following manner:

(1) If it can be established that the doors are constantly kept in the normally closed position except when persons are actually passing through the openings, the self-closing device shall be considered as equivalent to an automatic-closing device and credited accordingly.
(2) If the self-closing doors are blocked open, they shall be classified as "no door" and a parameter value of –10 invoked.

4.6.6 Zone Dimensions. Zone dimension shall be as calculated per 18.3.7.1 or 19.3.7.1 (NFPA *101*).

4.6.6.1 The length of a corridor "dead end" shall be measured from the point at which a person egressing from the dead end would have an option of egressing in two separate directions.

4.6.6.2 In assessing the values for this parameter, a single value shall be chosen based on the worst safety level in the zone. For example, if one or more dead ends in excess of 50 ft (15 m) but not more than 100 ft (30 m) exist, the parameter value for dead ends (–4) shall be applied regardless of the actual corridor lengths.

4.6.6.3 Since dead-end corridors and single emergency movement routes *(see 4.6.10)* each confine the occupants of a fire zone to a single means of egress, the effect of these two factors on the parameter value is not cumulative. As indicated by Note b to Worksheet 4.7.6, the parameter value for dead-end corridors is to be 0 instead of either –2, –4, or –6 in the special case where a value of –8 is assessed under 4.6.10 for single emergency movement routes.

4.6.6.4 Zone length applies to the greater dimension of length or width of the zone.

4.6.7 Vertical Openings. These values apply to vertical openings and penetrations, including exit stairways, ramps, and other vertical exits of the type recognized by NFPA *101*, *Life Safety Code*, plus pipe shafts, ventilation shafts, duct penetrations, and laundry and incinerator chutes. Enclosures shall be of construction having a fire resistance rating not less than that prescribed for vertical openings *(see Safety Parameter 7 of Worksheet 4.7.6)*. In addition, they shall be equipped with fire doors or acceptable protection of openings into the shafts, all designed and installed to provide a complete barrier to the vertical spread of fire or smoke.

4.6.7.1 A vertical opening or penetration shall be considered open if it has any of the following characteristics:

(1) It is unenclosed.
(2) It is enclosed but does not have doors.
(3) It is enclosed but has openings other than doorways.
(4) It is enclosed with cloth, paper, or similar materials without any sustained flame-stopping capabilities.

4.6.7.2 Where vertical openings are located outside the fire/smoke zone and the separation between the zone and the vertical opening is of 1-hour or greater fire resistance rating and is of higher fire resistance rating than the protection of the vertical opening itself (for example, an open shaft separated from the zone by a 2-hour fire resistance–rated partition with 1½-hour fire protection–rated self-closing fire doors), the rating of this factor for the zone being measured shall be based on the higher of the two fire resistance categories. In this example, a safety parameter value of 3 would be given for the 2-hour fire resistance rating. Where this occurs, however, the space with the vertical opening cannot be considered an exit route or refuge area for that zone when evaluating the emergency movement route parameter addressed in 4.6.10.

4.6.7.3 A vertical opening shall be considered open for more than three floors if there is unprotected penetration of four or more floors on the same shaft without an intervening slab or other cutoff *(also see same area as an unprotected penetration in 4.6.13)*. If a shaft is enclosed at all floors except one and this results in an unprotected opening between the shaft and one, and only one, fire/smoke zone, the parameter value assigned for that shaft opening in the fire/smoke zone where the unprotected opening occurs shall be 0.

4.6.8 Hazardous Areas. Hazardous area protection is determined in accordance with Section 8.7 (NFPA *101*). The term *adjacent zone* as used in the evaluation form means any zone, either on the same floor or on the floor immediately below, that physically abuts the zone being evaluated and not separated by 2-hour fire resistance–rated construction. The term *outside zone* as used in the evaluation form means any place within the building other than the fire/smoke zone being measured and not separated by 2-hour fire resistance–rated construction.

4.6.8.1 In assessing the parameter value for hazardous areas, only one value shall be chosen. It shall be the most severe value corresponding to the deficiencies present. A double deficiency can exist only where the hazard is severe and the space is not sprinkler protected. Double protection consists of both a fire-rated enclosure and automatic sprinkler protection of the hazardous area. If both of these protections are lacking in a severe hazardous location, the double deficiency value shall be chosen. If double deficiencies exist both within the zone and outside the zone, the higher value (–11) for the condition inside the zone shall be chosen. The values are not cumulative, regardless of how many hazardous areas are present. Table 4.6.8.1 provides a matrix to be used to determine degree of deficiency to be assessed.

Table 4.6.8.1 Hazardous Areas Deficiencies

Protection	Hazard	
	Severe	Not Severe
None	Double	Single
Fire resistance–rated enclosures	Single	None
Automatic sprinklers and smoke partitions	Single	None
Automatic sprinklers and fire resistance–rated enclosures	None	None

4.6.8.2 Where the hazard is not severe, the maximum deficiency that can occur is a single deficiency, which shall be permitted to be countered by either of the following means:

(1) A fire resistance–rated enclosure
(2) Automatic extinguishing equipment and enclosure by smoke partitions

4.6.8.3 A single deficiency situation also is considered to exist where a severe hazard is protected by either of the following means, but not by both:

(1) A fire resistance–rated enclosure
(2) Automatic extinguishing equipment and enclosure by smoke partitions

4.6.9 Smoke Control. Smoke control definitions are provided in 4.6.9.1 through 4.6.9.3.

4.6.9.1 No Control. There are no smoke barriers (or horizontal exits) on the floor, and there is no mechanical smoke control system.

4.6.9.2 Smoke Barrier Serves Zone. A smoke barrier consists of a partition extending across the entire width of the zone equipped with doors that either are self-closing or are closed upon detection by smoke detectors located at the door arches or other release mechanisms as described in 7.2.1.8 (NFPA *101*). To be credited as a smoke barrier, an existing partition also shall conform with the requirements of 19.3.7.2 through 19.3.7.10 (NFPA *101*). New smoke barriers in either new or existing buildings shall meet the more stringent requirements of 18.3.7.2 through 18.3.7.11 (NFPA *101*). A horizontal exit will act as a smoke partition and is credited as both a smoke barrier *(see 4.6.9)* and an emergency movement route *(see 4.6.10)*.

4.6.9.3 Mechanically Assisted Systems — by Zone. Mechanically assisted smoke control on a zone basis shall include a smoke barrier, as in 4.6.9.2, supported by a tested and accepted smoke control system that obstructs the leakage of smoke between zones. One method of judging the acceptability of smoke control systems is contained in NFPA 92A, *Standard for Smoke-Control Systems Utilizing Barriers and Pressure Differences*.

4.6.10 Emergency Movement Routes. A movement route is any means of egress meeting the requirements for such means specified in 7.2.2 through 7.2.6 (NFPA *101*). Horizontal exits also shall meet the requirements specified in 4.6.10.4. Doors exiting directly to the exterior also shall constitute a movement route from the room containing such a door.

4.6.10.1 Fewer Than Two Routes. The means of emergency movement from a zone is classified as fewer than two routes if there are not at least two remote movement routes serving the zone. Movement routes shall be permitted to be outside the physical limits of the zone.

4.6.10.2 Multiple Routes. The emergency movement route is multiple if the zone occupants have the choice of two or more distinctly separated movement routes from the zone.

4.6.10.3 Deficient. The choice of parameter value for deficient emergency movement routes is independent of any values determined in 4.6.7.

4.6.10.3.1 An emergency movement route of a type described by 18.2.2 or 19.2.2 (NFPA *101*) is deficient if the door to a patient room or passage through a smoke barrier is less than 32 in. (810 mm) [41.5 in. (1055 mm) in new buildings] in clear width or if the corridor in the zone between patient rooms and smoke barriers and exits is less than 48 in. (1220 mm) [8 ft (2440 mm)

in new buildings] in clear width. These figures are based on the minimum width for a wheelchair to egress a room and the minimum width for the passage of a wheelchair in one direction and an ambulatory person in the opposite direction.

4.6.10.3.2 Exit routes also shall be considered deficient if they fail to meet the requirements of 18.2.1 through 18.2.7 or 19.2.1 through 19.2.7 (NFPA *101*) for the egress route involved. However, any route where the doors from rooms or through partitions or walls are less than 32 in. (810 mm) in the clear, the corridor(s) involved is less than 34 in. (865 mm) wide, or stair access is less than 28 in. (710 mm) in the clear shall not be credited as an egress route.

4.6.10.3.3 Exit routes shall be considered deficient if the route does not otherwise conform to the requirements of Section 7.1 through 7.2.6 (NFPA *101*), even if the routes have been or are acceptable to the authority having jurisdiction.

4.6.10.3.4 Exit routes shall be considered deficient if the capacity of the exits serving the floor containing the zone being evaluated is insufficient for the calculated occupant load of the floor. For buildings not protected throughout by automatic sprinklers, use the capacity factor of 0.6 in. (15 mm) per person for stairs.

4.6.10.4 Horizontal Exits. The presence of a single horizontal exit from the zone being evaluated shall be assigned a parameter value of 1, provided the space on the opposite side of the horizontal exit is capable of handling all of the patients from affected zones.

4.6.10.4.1 To be credited as a horizontal exit, the existing arrangement also shall conform with the requirements of 19.2.2.5 (NFPA *101*). New horizontal exits in new or existing buildings shall meet the more stringent requirements of 18.2.2.5 (NFPA *101*).

4.6.10.4.2 To receive credit for horizontal exits, the zone credited shall conform to the requirements of 7.5.1.1 through 7.5.1.1.4 (NFPA *101*) with the zone served considered a separate portion of the building.

4.6.10.4.3 To receive credit for horizontal exits, each patient sleeping room in the zone shall be within 150 ft (45 m) of travel of a horizontal exit door or exit to grade.

4.6.10.5 Direct Exits. To be credited for direct exits, each patient-use space (except bathrooms, restrooms, and corridors) in the zone shall have a door that is operable by the room occupant(s) and opens directly to the exterior at grade or onto an exterior balcony with direct access to an exterior exit or a smokeproof enclosure. The direct exit shall be ramped or otherwise without steps or changes in elevation that could prevent or obstruct the movement of wheelchairs or wheel-littered patients through the direct exits to a place of safety and refuge.

4.6.11 Manual Fire Alarm. The manual alarm systems for new construction shall be in accordance with the requirements of 18.3.4 other than 18.3.4.3.2 (NFPA *101*). Existing construction shall be in accordance with 19.3.4 other than 19.3.4.3.2 (NFPA *101*). Connection to the fire department shall be considered as being met if the fire alarm system is connected directly to the fire department through an approved central station or through other means acceptable to the authority having jurisdiction.

4.6.12 Smoke Detection and Alarm. A detection system as used herein is one based on the use of automatic smoke detectors installed in accordance with Section 9.6 (NFPA *101*). Notification shall be in accordance with 18.3.4.3 other than 18.3.4.3.2 or 19.3.4.3 other than 19.3.4.3.2 (NFPA *101*). No recognition is given for thermal detectors; however, credit is given for the use of quick-response sprinklers per Note g of Worksheet 4.7.6. The detection system categories are described in 4.6.12.1 through 4.6.12.5.

4.6.12.1 None. There are no smoke detectors in the zone, or, if present, they are not included in any of the categories of 4.6.12.2 through 4.6.12.5.

4.6.12.2 Corridor Only. Smoke detectors are installed throughout the corridors of the zone involved in accordance with Section 9.6 (NFPA *101*).

4.6.12.3 Rooms Only. Smoke detectors are installed throughout the rooms of the zone involved. These smoke detectors shall be considered as meeting this requirement where there is at least one smoke detector in each room occupied or used by patients. Detectors are not required in restrooms or closets.

4.6.12.4 Corridor and Habitable Spaces. Detection systems installed throughout the corridors of the zone involved and in the habitable spaces (patient rooms, nurses stations, and other areas basically used for human occupancy) shall be considered as meeting the requirements for a corridor and habitable spaces detection system. Closets, toilet rooms, and other auxiliary spaces, as well as ceiling voids, interstitials, and other building spaces not used by humans as a normal part of their regular occupancy, are not required to have detectors.

4.6.12.5 Total Spaces in Zone. Total space provision of detectors includes detector coverage of all spaces, except noncombustible building voids that contain no combustible materials. The total space credit is to be given if the zone measured meets this criterion, regardless of the presence or lack of detectors in other portions of the building.

4.6.13 Automatic Sprinklers.

4.6.13.1 Wherever sprinkler protection is involved in an area having an unprotected vertical opening, the sprinkler protection around that vertical opening shall conform to Chapter 8 (NFPA *101*). This protection is required to allow the credit for sprinkler protection but shall in no way reduce any assessed value under Safety Parameter 7 in Worksheet 4.7.6 resulting from an unprotected vertical opening.

4.6.13.2 In Worksheet 4.7.7, the value for sprinkler protection credited to the people movement safety (S_3) category is divided by 2. This produces a safety parameter value of only one-half the value credited in other categories.

4.6.13.3 Each sprinkler system shall be provided with supervision. Each sprinkler system shall be interconnected electrically with the fire alarm system, and the main sprinkler control valve shall be supervised electrically so that at least a local alarm shall sound in a constantly attended location when the valve is closed.

4.6.13.4 In evaluating sprinkler protection within the zone, the protection or lack of protection of hazardous areas is considered separately and covered under 4.6.8. For all other areas in the zone, sprinklers shall be graded based on the categories specified in 4.6.13.4.1 through 4.6.13.4.3.

4.6.13.4.1 None. No credit is applied if there are no sprinklers or if sprinklers, though present, are not sufficient to qualify for one of the other categories specified.

4.6.13.4.2 Corridor and Habitable Space. Habitable space includes patient rooms, nurses' stations, and other areas used basically for human occupancy. Habitable space does not include closets, bathrooms, toilets, elevators, and similar spaces. This safety parameter value is based on standard sprinkler spacings in the areas covered and is conditional, based on the classification of construction type as covered in 4.6.1.

4.6.13.4.2.1 Safety Parameter 1, "Construction" *(see 4.6.1)*, in Worksheet 4.7.6 is based on a "protected" or "fire-resistive" type of construction. Protected or fire-resistive types of construction include Types I, II(222), II(111), III(211), and V(111). This credit is based on a system that effectively provides coverage for all corridor and habitable space in the zone, plus the establishment of water distribution patterns or other protection in a manner to prevent the advance of fire from nonsprinklered spaces into the sprinklered spaces. In buildings of protected or fire-resistive construction, the credit is to be applied to any zone where these conditions are met, whether or not areas outside the zone are protected similarly.

4.6.13.4.2.2 Safety Parameter 1, "Construction" *(see 4.6.1)*, is based on an "unprotected" type of construction. Unprotected types of construction include Types II(000), III(200), and V(000). In any unprotected type of construction, the credit for corridor and habitable space protection is to be given only if, in addition to the conditions described in 4.6.13.4.2.1, sprinkler protection also is provided in all spaces in the building (including attic or loft spaces) with construction elements that are not sheathed, enclosed, or otherwise protected with fire-resistive materials such as gypsum board, plaster, or masonry block.

4.6.13.4.3 Entire Building. Total space automatic sprinkler protection is to be credited only if the entire structure is protected by automatic sprinklers in accordance with 18.3.5 or 19.3.5 (NFPA *101*). This credit also is given where a smoke zone in an existing hospital is renovated to install quick-response or residential sprinklers in accordance with 18.1.1.4.3 (NFPA *101*); however, the mandatory safety requirements values of Worksheet 4.7.8C for nonsprinklered existing hospitals must be used. Wherever quick-response automatic sprinklers are provided for zones as part of the entire building sprinkler system, additional credit shall be permitted to be taken under Safety Parameter 12, "Smoke Detection and Alarm." *(See 4.6.12 and Worksheet 4.7.6.)*

4.7 Worksheets for Evaluating Fire/Smoke Zones. The worksheets for evaluating fire/smoke zones use a 10-step process found in Figure 4.7.

4.7.1 Step 1 — Complete the Cover Sheet Using Worksheet 4.7.1. See Figure 4.7.

4.7.2 Step 2 — Determine Occupancy Risk Parameter Factors Using Worksheet 4.7.2. For each risk parameter in Worksheet 4.7.2, select and circle the appropriate risk factor value. Choose only one value for each of the five risk parameters.

4.7.3 Step 3 — Compute Occupancy Risk Factor *F* Using Worksheet 4.7.3. The following steps should be taken:

(1) Transfer the circled risk factor values from Worksheet 4.7.2 to the corresponding blocks in Worksheet 4.7.3.
(2) Compute occupancy risk factor *F* by multiplying the risk factor values as indicated in Worksheet 4.7.3.

4.7.4 Step 4 — Compute Adjusted Occupancy Risk Factor *R* Using Worksheet 4.7.4 or Worksheet 4.7.5. The following steps should be taken:

(1) If building is classified as "new," use Worksheet 4.7.4. If building is classified as "existing," use Worksheet 4.7.5.
(2) Transfer the value of *F* from Worksheet 4.7.3 to Worksheet 4.7.4 or Worksheet 4.7.5, as appropriate. Calculate *R*.
(3) Transfer *R* to the block labeled *R* in Worksheet 4.7.9.

4.7.5 Step 5 — Determine Safety Parameter Values Using Worksheet 4.7.6. Select and circle the safety value for each safety parameter in Worksheet 4.7.6 that best describes the conditions in the zone. Choose only one value for each of the 13 parameters. If two or more values appear to apply, choose the one with the lowest point value.

4.7.6 Step 6 — Compute Individual Safety Evaluations Using Worksheet 4.7.7. The following steps should be taken:

(1) Transfer each of the 13 circled safety parameter values from Worksheet 4.7.6 to every available block in the line with the corresponding safety parameter in Worksheet 4.7.7. For Safety Parameter 13, the value entered in the "People Movement Safety" column is recorded in Worksheet 4.7.7 as one-half the corresponding value circled in Worksheet 4.7.6.
(2) Add each of the four columns, keeping in mind that any negative numbers need to be deducted.
(3) Transfer the resulting total values for S_1, S_2, S_3, and S_4 to the corresponding blocks in Worksheet 4.7.9.

4.7.7 Step 7 — Determine Mandatory Safety Requirements Values Using Worksheet 4.7.8A, 4.7.8B, or 4.7.8C as Appropriate. The following steps should be taken:

(1) Using the classification of the building (i.e., new or existing) and the floor where the zone is located, circle the appropriate value in each of the three columns in Worksheet 4.7.8A, 4.7.8B, or 4.7.8C.
(2) Transfer the three circled values from Worksheet 4.7.8A, 4.7.8B, or 4.7.8C to the blocks marked S_a, S_b, and S_c in Worksheet 4.7.9.
(3) The mandatory safety requirements values for basements are based on the distance of the basement level from the closest level of discharge. *(See also 4.6.1.2 and 4.6.1.3.)*

4.7.8 Step 8 — Determine Zone Fire Safety Equivalency Using Worksheet 4.7.9. The following steps should be taken:

(1) Perform the subtractions indicated in Worksheet 4.7.9. Enter the differences in the appropriate answer blocks.
(2) For each row, check "yes" if the value in the answer block is zero (0) or greater. Check "no" if the value in the answer block is a negative number.

4.7.9 Step 9 — Evaluate Considerations Not Previously Addressed Using Worksheet 4.7.10. The equivalency covered by Worksheets 4.7.2 through 4.7.9 includes the majority of the considerations covered by the *Life Safety Code*. Some considerations not evaluated by this method must be considered separately. These additional considerations are covered in Worksheet 4.7.10, Facility Fire Safety Requirements Worksheet. Complete one copy of this separate worksheet for each facility.

4.7.10 Step 10 — Conclude Whether the Level of Life Safety Is at Least Equivalent to That Prescribed by the *Life Safety Code* Using Worksheet 4.7.11. Worksheet 4.7.11, Conclusions, combines the zone fire safety equivalency evaluation of Worksheet 4.7.9 and the additional considerations of Worksheet 4.7.10.

WORKSHEET 4.7.1 COVER SHEET

Fire/Smoke Zone* Evaluation Worksheet for Health Care Facilities

Facility _____ Building _____

Zone(s) evaluated _____

Evaluator _____ Date _____

Complete this worksheet for each zone. Where conditions are the same in several zones, one worksheet can be used for those zones.

*Fire/smoke zone is a space separated from all other spaces by floors, horizontal exits, or smoke barriers.

WORKSHEET 4.7.2 OCCUPANCY RISK PARAMETER FACTORS

Risk Parameters	Risk Factor Values					
1. Patient Mobility (*M*)	Mobility Status	Mobile	Limited Mobility	Not Mobile	Not Movable	
	Risk Factor	1.0	1.6	3.2	4.5	
2. Patient Density (*D*)	No. of Patients	1–5	6–10	11–30	>30	
	Risk Factor	1.0	1.2	1.5	2.0	
3. Zone Location (*L*)	Floor	1st	2nd or 3rd	4th to 6th	7th and Above	Basements
	Risk Factor	1.1	1.2	1.4	1.6	1.6
4. Ratio of Patients to Attendants (*T*)	Patients / Attendant	1–2 / 1	3–5 / 1	6–10 / 1	>10 / 1	One or More* / None
	Risk Factor	1.0	1.1	1.2	1.5	4.0
5. Patient Average Age (*A*)	Age	<65 Years and >1 Year		≥65 Years or ≤1 Year		
	Risk Factor	1.0		1.2		

*A risk factor of 4.0 is charged to any zone that houses patients without any staff in immediate attendance.

WORKSHEET 4.7.3 OCCUPANCY RISK FACTOR CALCULATION

	M		*D*		*L*		*T*		*A*		*F*
Occupancy Risk	☐	×	☐	×	☐	×	☐	×	☐	=	☐

WORKSHEET 4.7.4 ADJUSTED OCCUPANCY RISK FACTOR — NEW BUILDINGS

	F		*R*
1.0 ×	☐	=	☐

WORKSHEET 4.7.5 ADJUSTED OCCUPANCY RISK FACTOR — EXISTING BUILDINGS

	F		*R*
0.6 ×	☐	=	☐

(For use with NFPA 101A-2010/NFPA *101*-2009) (p. 1 of 4)

FIGURE 4.7 Worksheets for Evaluating Fire/Smoke Zones.

WORKSHEET 4.7.6 SAFETY PARAMETER VALUES

Safety Parameters	Parameter Values						
1. Construction	Combustible Types III, IV, and V				Noncombustible Types I and II		
Floor or Zone	000	111	200	211, 2HH	000	111	222, 322, 442
First	–2	0	–2	0	0	2	2
Second	–7	–2	–4	–2	–2	2	4
Third	–9	–7	–9	–7	–7	2	4
4th and Above	–13	–7	–13	–7	–9	–7	4
2. Interior Finish (Corridors and Exits)	Class C	Class B	Class A				
	–5(0)[f]	0(3)[f]	3				
3. Interior Finish (Rooms)	Class C	Class B	Class A				
	–3(1)[f]	1(3)[f]	3				
4. Corridor Partitions/Walls	None or Incomplete	<½ hr	≥½ hr to <1 hr	≥1 hr			
	–10(0)[a]	0	1(0)[a]	2(0)[a]			
5. Doors to Corridor	No Door	<20 min FPR	≥20 min FPR	≥20 min FPR and Auto Clos.			
	–10	0	1(0)[d]	2(0)[d]			
6. Zone Dimensions	Dead End			No Dead Ends >30 ft and Zone Length Is			
	>100 ft	>50 ft to 100 ft	30 ft to 50 ft	>150 ft	100 ft to 150 ft	<100 ft	
	–6(0)[b]	–4(0)[b]	–2(0)[b]	–2(0)[c](0)[h]	0(0)[h]	1	
7. Vertical Openings	Open 4 or More Floors	Open 2 or 3 Floors	Enclosed with Indicated Fire Resist.				
			<1 hr	≥1 hr to <2 hr	≥2 hr		
	–14	–10	0	2(0)[e]	3(0)[e]		
8. Hazardous Areas	Double Deficiency		Single Deficiency		No Deficiencies		
	In Zone	Outside Zone	In Zone	In Adjacent Zone			
	–11	–5	–6	–2	0		
9. Smoke Control	No Control	Smoke Barrier Serves Zone	Mech. Assisted Systems by Zone				
	–5(0)[c]	0	3				
10. Emergency Movement Routes	<2 Routes	Multiple Routes			Direct Exit(s)		
		Deficient	W/O Horizontal Exit(s)	Horizontal Exit(s)			
	–8	–2	0	1	5		
11. Manual Fire Alarm	No Manual Fire Alarm	Manual Fire Alarm					
		W/O F.D. Conn.	W/ F.D. Conn.				
	–4	1	2				
12. Smoke Detection and Alarm	None	Corridor Only	Rooms Only	Corridor and Habit. Spaces	Total Spaces in Zone		
	0(3)[g]	2(3)[g]	3(3)[g]	4	5		
13. Automatic Sprinklers	None	Corridor and Habit. Space	Entire Building				
	0	8	10				

[a] Use (0) where Parameter 5 is –10.
[b] Use (0) where Parameter 10 is –8.
[c] Use (0) on floor with fewer than 31 patients (existing buildings only).
[d] Use (0) where Parameter 4 is –10.
[e] Use (0) where Parameter 1 is based on first floor zone or on an unprotected type of construction (columns marked "000" or "200").
[f] Use ( ) if the area of Class B or C interior finish in the corridor and exit or room is protected by automatic sprinklers and Parameter 13 is 0; use ( ) if the room with existing Class C interior finish is protected by automatic sprinklers, Parameter 4 is greater than or equal to 1, and Parameter 13 is 0.
[g] Use this value in addition to Parameter 13 if the entire zone is protected with quick-response automatic sprinklers.
[h] Use (0) where zone area ≤22,500 ft² and distance from any point to reach a door in smoke barrier ≤200 ft.

For SI units, 1 ft = 0.3048 m; 1 ft² = 0.092 m².

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FIGURE 4.7 ***Continued***

WORKSHEET 4.7.7 INDIVIDUAL SAFETY EVALUATIONS

Safety Parameters	Containment Safety (S_1)	Extinguishment Safety (S_2)	People Movement Safety (S_3)	General Safety (S_4)
1. Construction				
2. Interior Finish (Corr. and Exit)				
3. Interior Finish(Rooms)				
4. Corridor Partitions/Walls				
5. Doors to Corridor				
6. Zone Dimensions				
7. Vertical Openings				
8. Hazardous Areas				
9. Smoke Control				
10. Emergency Movement Routes				
11. Manual Fire Alarm				
12. Smoke Detection and Alarm				
13. Automatic Sprinklers			÷ 2 =	
Total Value	S_1 =	S_2 =	S_3 =	S_4 =

WORKSHEET 4.7.8A MANDATORY SAFETY REQUIREMENTS — NEW HOSPITALS, EXISTING HOSPITALS, OR NEW NURSING HOMES

	Containment (S_a)		Extinguishment (S_b)		People Movement (S_c)	
Zone Location	**New**	**Exist.**	**New**	**Exist.**	**New**	**Exist.**
1st story	11	5	15(12)[a]	4	8(5)[a]	1
2nd or 3rd story[b]	15	9	17(14)[a]	6	10(7)[a]	3
4th story or higher but not high rise	18	9	19(16)[a]	6	11(8)[a]	3
High rise	18	17	19(16)[a]	16	11(8)[a]	7

[a] Use ( ) in zones that do not contain patient sleeping rooms.

[b] For a 2nd story zone location in a *sprinklered* EXISTING hospital, as an alternative to the mandatory safety requirement values set specified in the table, the following mandatory values set shall be permitted to be used: $S_a = 7$, $S_b = 10$, and $S_c = 7$.

WORKSHEET 4.7.8B MANDATORY SAFETY REQUIREMENTS — EXISTING NURSING HOMES

Zone Location	Containment (S_a)	Extinguishment (S_b)	People Movement (S_c)
1st story	0	10	0
2nd story	2	10	2
3rd story	6	14	2
4th story or higher	8	16	2

WORKSHEET 4.7.8C MANDATORY SAFETY REQUIREMENTS — MAJOR REHABILITATION IN NONSPRINKLERED EXISTING HOSPITALS

Zone Location	Containment (S_a)	Extinguishment (S_b)	People Movement (S_c)
1st story	13	17(14)*	8(5)*
2nd or 3rd story	17	19(16)*	10(7)*
4th story or higher	18	19(16)*	11(8)*

*Use ( ) in zones that do not contain patient sleeping rooms.

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FIGURE 4.7 ***Continued***

WORKSHEET 4.7.9 ZONE FIRE SAFETY EQUIVALENCY EVALUATION

								Yes	No
Containment Safety (S_1)	minus	Mandatory Containment (S_a)	≥	0	S_1 ☐ –	S_a ☐ =	C ☐		
Extinguishment Safety (S_2)	minus	Mandatory Extinguishment (S_b)	≥	0	S_2 ☐ –	S_b ☐ =	E ☐		
People Movement Safety (S_3)	minus	Mandatory People Movement (S_c)	≥	0	S_3 ☐ –	S_c ☐ =	P ☐		
General Safety (S_4)	minus	Occupancy Risk (R)	≥	0	S_4 ☐ –	R ☐ =	G ☐		

WORKSHEET 4.7.10 FACILITY FIRE SAFETY REQUIREMENTS WORKSHEET

Complete one copy of this worksheet for each facility.
For each consideration, select and mark the appropriate column.

		Met	Not Met	Not Applic.
A.	Building utilities conform to the requirements of Section 9.1.			☒
B.	In new facilities only, life-support systems, alarms, emergency communication systems, and illumination of generator set locations are powered as prescribed by 18.5.1.2 and 18.5.1.3.			
C.	Heating and air conditioning systems conform with the air conditioning, heating, and ventilating systems requirements within Section 9.2, except for enclosure of vertical openings, which have been considered in Safety Parameter 7 of Worksheet 4.7.6.			☒
D.	Fuel-burning space heaters and portable electrical space heaters are not used.			☒
E.	There are no flue-fed incinerators.			
F.	An evacuation plan is provided and fire drills conducted in accordance with 18.7.1/18.7.2 and 19.7.1/19.7.2.			☒
G.	Smoking regulations have been adopted and implemented in accordance with 18.7.4 and 19.7.4.			☒
H.	Combustibility of draperies, upholstered furniture, mattresses, furnishings, and decorations is limited in accordance with 18.7.5 and 19.7.5.			
I.	Fire extinguishers are provided in accordance with the requirements of 18.3.5.11 and 19.3.5.11.			☒
J.	Exit signs are provided in accordance with the requirements of 18.2.10.1 and 19.2.10.			
K.	Emergency lighting is provided in accordance with 18.2.9.1 or 19.2.9.1.			
L.	Standpipes are provided in all new high-rise buildings as required by 18.4.2.			

All references are to NFPA *101*, *Life Safety Code.*

WORKSHEET 4.7.11 CONCLUSIONS

1. ☐ All of the checks in Worksheet 4.7.9 are in the "Yes" column. The level of fire safety is at least equivalent to that prescribed by the *Life Safety Code*.*
2. ☐ One or more of the checks in Worksheet 4.7.9 are in the "No" column. The level of fire safety is not shown by this system to be equivalent to that prescribed by the *Life Safety Code*.*

* The equivalency covered by this worksheet includes the majority of considerations covered by the *Life Safety Code*. There are some considerations that are not evaluated by this method. These must be considered separately. These additional considerations are covered in Worksheet 4.7.10, the Facility Fire Safety Requirements Worksheet. One copy of this separate worksheet is to be completed for each facility.

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FIGURE 4.7 ***Continued***

Chapter 5 Fire Safety Evaluation System for Detention and Correctional Occupancies

5.1 General.

5.1.1 This chapter is part of an NFPA guide and, therefore, is not mandatory. The term *shall* in this chapter is used to indicate that if the provisions of the chapter are applied, the procedures mandated are to be followed to ensure the effectiveness of the evaluation system.

5.1.2 The Fire Safety Evaluation System is a measuring system. It compares the level of safety provided by an arrangement of safeguards that differ from those specified in NFPA *101*, *Life Safety Code*, to the level of safety provided in a building that conforms exactly with the details of the *Code*.

5.2 Procedure for Determining Equivalency. Evaluate the entire facility using Figure 5.5, Worksheets for Evaluating Fire Safety in Detention and Correctional Occupancies (Worksheets 5.5.1 through 5.5.8), as defined in Sections 22.1 and 23.1 (NFPA *101*), on a single worksheet. Where different use conditions or fire protection features are involved, portions of the facility separated from each other by 2-hour or greater fire resistance–rated construction (including any members that bear the load of detention use, egress, or refuge space and with 1½-hour fire protection–rated doors in any communication opening) shall be permitted to be evaluated separately.

5.3 Maintenance. Any protection system, requirement, arrangement, or procedure that is not maintained in a dependable operating condition, is used in such a manner that the intended fire safety function or hazard constraint is impaired, or is not in a sufficient state of readiness should be considered defective and should receive no credit in the evaluation.

5.4 Safety Parameters (Worksheet 5.5.3). The safety parameters are a measure of those building factors that bear upon or contribute to the safety of those persons who might be in the building at the time of a fire. *(See Worksheet 5.5.3.)* Each of the safety parameters is to be analyzed, and the safety value for each parameter that best describes the condition in the building is to be identified. Only one value for each of the parameters is to be chosen. If two or more values appear to apply, the one with the lowest point value governs.

5.4.1 Construction. Construction types are defined by the fire resistance and combustibility of load-bearing framing members, floor construction, and roof construction in accordance with NFPA 220, *Standard on Types of Building Construction*, which extracts material from *NFPA 5000, Building Construction and Safety Code. (See Table 5.4.1.)*

5.4.1.1 Where the facility includes additions or connected structures of different construction, the rating and classification of the structure shall be based on one of the following:

(1) Separate buildings where a 2-hour or greater fire resistance–rated separation exists between the portions of the building
(2) The lower safety parameter point score involved, where such a separation does not exist

5.4.1.2 The story used to determine the parameter value is the highest story used for confinement purposes. Story height is based on stories starting with the level of exit discharge. Where there are stories below the level of exit discharge, the maximum value assigned to the construction parameter shall be based on a two-story building or the actual story height, whichever is the lower value.

5.4.1.3 A multitiered open cell block in an existing building shall be permitted to be considered a single story, provided that one or more of the following conditions exist:

(1) A smoke control system is provided (*see recommended design criteria in A.23.3.1.3 of* NFPA *101*) to maintain the level of smoke filling from potential cell fires at least 5 ft (1525 mm) above the floor level of any occupied tier.
(2) A smoke control system as described in 5.4.1.3(1) is provided to maintain the level of smoke filling at least 5 ft (1525 mm) above the exit level where either of the following situations exist:
   (a) The cell block is Use Condition II.
   (b) The cell block is Use Condition III, and all persons housed in the cell block can pass through a free access smoke barrier or freely pass below the calculated smoke level with not more than 50 ft (15 m) of travel from their cell.
(3) Complete automatic sprinkler protection is provided.

5.4.2 Hazardous Areas.

5.4.2.1 The assignment of charges for hazardous areas is a four-step process.

5.4.2.1.1 Step 1 — Identify Hazardous Areas. Hazardous areas are defined in 22.3.2 and 23.3.2 (NFPA *101*).

5.4.2.1.2 Step 2 — Determine the Level of Hazard. A hazardous area is classed as severe if it is an area requiring both automatic sprinkler protection and fire-rated enclosure per 22.3.2.1 (and 22.3.5.2) or 23.3.2.1 (NFPA *101*).

5.4.2.1.3 Step 3 — Determine the Fire Protection Provided. The parameter value for hazardous areas is based on the presence or absence of the fire protection necessary to control or confine the hazard. Two levels of fire protection are considered. The first consists of automatic sprinklers or other appropriate extinguishing system covering the entire hazard. The second is based on fire resistance–rated enclosures, including any bearing members in the space, partitions separating the hazardous area from all other spaces, and doors to the space sufficient to exceed the potential of the fire load involved. Any hazardous space that has either protection system is classified as having single protection. Any hazardous space that is both fully enclosed in a capable fire resistance–rated enclosure and sprinklered is classified as having double-level protection. On this basis, any fuel load that has the potential to overwhelm the available structural capability of both its own enclosure and the basic structure could, as a maximum, have single protection.

5.4.2.1.4 Step 4 — Determine the Degree of Deficiency and Assign Parameter Values. The parameter value ultimately is determined by the degree of the deficiencies of the hazardous area based on the level of protection needed.

5.4.2.2 Table 5.4.2.2 provides a matrix to be used to determine the degree of deficiency for this parameter. In some situations, more than one hazardous area with the same or differing levels of deficiency can exist. In this case, the choice is based on the single most serious deficiency for the hazardous area.

5.4.3 Fire Alarm. Fire alarms are defined in 5.4.3.1 through 5.4.3.3.

5.4.3.1 No Alarm. There is no fire alarm system, or the system is incomplete and does not meet the requirements for a higher-scored category.

Table 5.4.1 Fire Resistance Ratings for Type I Through Type V Construction (hours)

	Type I		Type II			Type III		Type IV	Type V	
	442	332	222	111	000	211	200	2HH	111	000
Exterior Bearing Walls[a]										
Supporting more than one floor, columns, or other bearing walls	4	3	2	1	0[b]	2	2	2	1	0[b]
Supporting one floor only	4	3	2	1	0[b]	2	2	2	1	0[b]
Supporting a roof only	4	3	1	1	0[b]	2	2	2	1	0[b]
Interior Bearing Walls										
Supporting more than one floor, columns, or other bearing walls	4	3	2	1	0	1	0	2	1	0
Supporting one floor only	3	2	2	1	0	1	0	1	1	0
Supporting roofs only	3	2	1	1	0	1	0	1	1	0
Columns										
Supporting more than one floor, columns, or other bearing walls	4	3	2	1	0	1	0	H	1	0
Supporting one floor only	3	2	2	1	0	1	0	H	1	0
Supporting roofs only	3	2	1	1	0	1	0	H	1	0
Beams, Girders, Trusses, and Arches										
Supporting more than one floor, columns, or other bearing walls	4	3	2	1	0	1	0	H	1	0
Supporting one floor only	2	2	2	1	0	1	0	H	1	0
Supporting roofs only	2	2	1	1	0	1	0	H	1	0
Floor/Ceiling Assemblies	2	2	2	1	0	1	0	H	1	0
Roof/Ceiling Assemblies	2	1½	1	1	0	1	0	H	1	0
Interior Nonbearing Walls	0	0	0	0	0	0	0	0	0	0
Exterior Nonbearing Walls[c]	0[b]	0[b]	0[b]	0[b]	0[b]	0[b]	0[b]	0[b]	0[b]	0[b]

H: Heavy timber members *(see NFPA 5000 for requirements).*
[a]See 7.3.2.1 of *NFPA 5000.*
[b]See Section 7.3 of *NFPA 5000.*
[c]See 7.2.3.2.12, 7.2.4.2.3, and 7.2.5.6.8 of *NFPA 5000.*
[***5000:*** Table 7.2.1.1]

Table 5.4.2.2 Hazardous Areas — Degree of Deficiency

	No protection	Sprinkler protection	Fire resistance–rated enclosure	Sprinklered and fire resistance–rated enclosure
Hazardous area	Single deficiency	No deficiency		
Severely hazardous area	Double deficiency	Single deficiency	Single deficiency* Double deficiency†	No deficiency* Single deficiency†

*If fire resistance and structural strength exceed maximum potential of hazard.
†If fire resistance and structural strength are not sufficient to withstand potential of hazard.

5.4.3.2 Without Fire Department Notification (W/O F.D. Notification). There is a manual fire alarm system or smoke detection system conforming with the appropriate requirements of 22.3.4 or 23.3.4 (NFPA *101*), except that the requirements of 22.3.4.3.2 or 23.3.4.3.2 covering automatic transmission of the alarm to the fire department are not met.

5.4.3.3 With Fire Department Notification (W/ F.D. Notification). There is a manual fire alarm or smoke detection system conforming with the appropriate requirements of 22.3.4 or 23.3.4 (NFPA *101*).

5.4.3.3.1 Without Manual Alarm. There is no manual alarm system, but a smoke detection alarm system or sprinkler system recognized under Safety Parameter 4 or Safety Parameter 5 of this system is provided and is arranged to transmit an alarm automatically to the fire department under either of the following conditions:

(1) Fire resistance and structural strength exceed maximum potential of hazard.
(2) Fire resistance or structural strength is not sufficient to withstand potential of hazard.

5.4.3.3.2 With Manual Alarm. There is a manual alarm system, and it is arranged to transmit an alarm automatically to the fire department.

5.4.4 Smoke Detection.

5.4.4.1 General. A detection system as used herein is one based on the use of smoke detectors meeting the installation requirements of 22.3.4.4 and 23.3.4.4 (NFPA *101*) and *NFPA 72, National Fire Alarm and Signaling Code*, with the extent of coverage as defined in 5.4.4.2. No credit is given for thermal detectors in habitable spaces.

5.4.4.2 The detection system categories are described in 5.4.4.2.1 through 5.4.4.2.5.

5.4.4.2.1 None. There are no smoke detectors, or, if present, they do not meet the requirements for a higher-scored category.

5.4.4.2.2 Corridors, Common Spaces, and Sleeping Rooms for More Than Four Persons. Smoke detection requirements of such spaces located within the residential housing area are covered by smoke detector installations in accordance with *NFPA 72, National Fire Alarm and Signaling Code*. In Use Condition II dormitory rooms in sprinklered buildings where staff is present whenever the dormitory room is occupied, detectors may be omitted from the dormitory room but not from the corridors and common spaces.

5.4.4.2.3 All Sleeping Rooms. Smoke detectors shall be considered as meeting the requirement when there is at least one smoke detector in each sleeping room occupied or used by prisoners. In rooms having a dimension in excess of 30 ft (9.1 m), additional detectors are provided so that detector spacing does not exceed approximately 30 ft (9.1 m). Detectors are not required in restrooms or closets.

5.4.4.2.4 Full Coverage. The requirements of 5.4.4.2.2 and 5.4.4.2.3 are met.

5.4.4.2.5 Total Building. Total building detector credit requires conformance with the requirements of *NFPA 72, National Fire Alarm and Signaling Code*, for total coverage.

5.4.5 Automatic Sprinklers.

5.4.5.1 General. In evaluating sprinkler protection, the protection or lack of protection of hazardous areas is considered separately and covered under 5.4.2, except that total building protection shall include hazardous areas. In addition, the existence or lack of fire department notification is considered separately under 5.4.3. In all other situations, any sprinkler installations shall conform to 22.3.5 and 23.3.5 (NFPA *101*) and be graded based on the categories specified in 5.4.5.1.1 through 5.4.5.1.3.

5.4.5.1.1 None. No credit is given if there are no sprinklers or if sprinklers, though present, are not sufficient to qualify for one of the other categories specified.

5.4.5.1.2 Residential Housing Areas. The credit for sprinkler protection of residential housing areas is given for arrangements whereby sprinklers are located throughout the areas, such that all space within such areas (including cells or sleeping rooms) is covered by the protection spray pattern of sprinkler heads.

5.4.5.1.3 Entire Building. The building is totally sprinkler protected in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*, for light hazard occupancy (or higher hazard occupancy for any spaces classified as higher hazard by NFPA 13).

5.4.6 Interior Finish.

5.4.6.1 Classification of interior finish is in accordance with Section 10.2 (NFPA *101*).

5.4.6.2 No consideration is included in the safety parameter value for any finish with a flame-spread rating greater than 200 or for any material not rationally measured by NFPA 255, *Standard Method of Test of Surface Burning Characteristics of Building Materials*. Materials not rationally measured include foamed plastics and asphalt-impregnated paper or other materials capable of inducing extreme rates of fire growth and rapid flashover. In any case involving these materials, the resultant risk is considered to classify any such finish area as a hazardous area to be evaluated under 5.4.2. Note that plywood of ¼ in. (6 mm) or greater thickness should be considered as having a flame-spread rating of 200 or less. Interior wall and ceiling finish materials tested in accordance with NFPA 265, *Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile Coverings on Full Height Panels and Walls*, or NFPA 286, *Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth*, as permitted by Section 10.2 (NFPA *101*), and meeting the criteria established in Section 10.2 (NFPA *101*) for those test standards, shall be scored as Class A interior finish materials (flame spread ≤25).

5.4.7 Reserved.

5.4.8 Cell/Sleeping Room Enclosure.

5.4.8.1 The parameter value categories for cell or sleeping room enclosures are divided between those for cells or sleeping rooms that face directly onto a corridor and those for which there is an intervening common space (i.e., day room, group activity space, or other space between the sleeping room and the corridor access).

5.4.8.2 Open. The cell or sleeping room enclosure includes an opening in excess of 0.85 ft^2 (0.08 m^2). In Use Condition V, the closure shall be considered "open" if there are any openings exceeding the minimum necessary for door swing and latch, unless either of the following conditions exists:

(1) The affected cells meet the requirements for mechanically assisted smoke control in 5.4.13.3.
(2) There is a closure for such openings operable from inside the cell.

5.4.8.3 Smoke Resistant <1 Hour. An enclosure qualifies in this category if the walls are complete from slab to slab or to a continuous smoke-resistant ceiling, and if doors are complete, but some wall aspect (wall, ceiling, etc.) is less than 1-hour fire resistance–rated, or the door is not capable of resisting fire for at least 20 minutes.

5.4.8.4 One-Hour Fire Resistance–Rated or Greater (≥1-Hour Fire Resistance). An enclosure qualifies in this category if it meets all of the requirements of 5.4.8.3, all wall aspects have at least a 1-hour fire resistance rating, and the door is capable of resisting fire for at least 20 minutes.

5.4.9 Separation of Residential Housing Areas from Other Areas. A residential housing area includes sleeping areas and any contiguous day room, group activity space, or other common space.

5.4.9.1 The parameter value categories for separation of residential housing areas are based on the quality of the common walls, separating partitions, and doors between residential housing areas and the rest of the building. The parameter value is based on the residential housing area that has the lowest quality separation. Where a building contains more than one residential housing area, the separation of residential housing areas from each other also is to be considered equivalent to the separation of a residential housing area from some other type of space. In buildings entirely composed of a single residential housing area, the separation is considered to be fire resistant if there is at least a 30 ft (9.1 m) separation from other structures and smoke resistant if there is a separation of less than 30 ft (9.1 m).

5.4.9.2 Classification of internal separations is based on the criteria in 5.4.9.2.1 through 5.4.9.2.3.

5.4.9.2.1 Incomplete. Any separation that does not meet the criteria for 5.4.9.2.2 or 5.4.9.2.3 is incomplete.

5.4.9.2.2 Smoke-Resistant Less Than 1 Hour. An enclosure qualifies in this category if the walls are complete from slab to slab or to a continuous smoke-resistant ceiling, and if doors are complete, but some wall aspect (wall, ceiling, etc.) is less than 1-hour fire resistance–rated or the door is not capable of resisting fire for at least 20 minutes.

5.4.9.2.3 One-Hour Fire Resistance or Greater (≥1-Hour Fire Resistance). An enclosure qualifies in this category if it meets all of the requirements of 5.4.9.2.2, all wall aspects have at least a 1-hour fire resistance rating, and the door is capable of resisting fire for at least 20 minutes.

5.4.10 Exit System.

5.4.10.1 General. Exit routes are the paths of travel from the residential housing area to outside of any of the types and arrangements described in Chapter 7 (NFPA *101*). The exit route starts at the corridor interface with the cell or common space as indicated by 5.4.8.

5.4.10.2 Multiple Routes. Multiple routes exist where the occupants of any residential housing area have, either from the residential housing area or through access in a corridor adjacent to the residential housing area, a choice of two separate exit routes in accordance with 22.2.4 or 23.2.4 (NFPA *101*) to the outside of the types specified in 22.2.2 and 23.2.2 (NFPA *101*).

5.4.10.3 Deficient. An exit route is deficient if it is usable with reasonable safety but fails to meet any of the applicable criteria in Chapter 7 (NFPA *101*).

5.4.10.4 Direct Room Exits. To be credited with direct room exits, each cell or other sleeping room must have a door that opens to the exterior at grade or to an unenclosed exterior balcony with direct access to an exterior exit or smokeproof enclosure. The locking of such a door must be no more restrictive than that required for the least restrictive exit or smoke barrier door for the use condition involved. In large rooms, the maximum travel distance from any occupiable location to a direct room exit must not exceed 50 ft (15 m). Where the separation of the individual sleeping rooms from other spaces and from each other is smoke resistant, the credit for direct room exits is applicable even if there are no other exit routes from the involved sleeping rooms.

5.4.10.5 No exit shall be considered in this parameter unless the locking arrangement conforms with the criteria for the use condition being applied to the facility.

5.4.11 Exit Access.

5.4.11.1 Exit access is the travel distance from any point in a room to an exit (or to a smoke barrier in an existing building). In addition, any exit arrangement that does not conform with 22.2.6.2 (NFPA *101*) for new buildings or with 23.2.6.2 (NFPA *101*) for existing buildings shall receive a parameter value no higher than the score for egress travel [i.e., >150 ft (>45 m) and ≤200 ft (≤61 m)].

5.4.11.2 The penalty for dead-end access shall be assessed where any corridor affords access in only one direction to a required exit from that corridor. The calculation of the distance to determine the parameter value is the measurement from the centerline of the doorway exiting to the corridor to the doorway of the exit from the corridor or building, whichever is shorter. Exit travel is the distance from the door to the corridor to the point where the building is exited or a stairwell is entered, whichever is shorter. Where the distance to the stairwell is the shorter distance, that distance shall be based on the distance to the door enclosing the stairwell if the stairwell is enclosed, or to the top tread if the stairwell is open.

5.4.12 Vertical Openings.

5.4.12.1 General. These values apply to vertical openings and penetrations, including exit stairways, ramps, and any other vertical exits, pipe shafts, ventilation shafts, duct penetrations, and laundry and incinerator chutes. The charge for vertical openings shall be based on the presence or lack of enclosure and the fire resistance rating of the enclosure, if provided.

5.4.12.2 Open or Incomplete. A vertical opening or penetration shall be classified as an open or incomplete enclosure if it has any of the following characteristics:

(1) It is unenclosed.
(2) It is enclosed but does not have doors.
(3) It is enclosed but has openings other than doorways.
(4) It is enclosed with cloth, paper, or similar materials without any sustained firestopping capabilities.

5.4.12.2.1 If a shaft other than a credited exit route (i.e., credited as one of the multiple routes required in 5.4.10 or in determining travel distance in 5.4.11) is enclosed on all floors but one, and this results in an unprotected opening between that shaft and one, and only one, floor, the parameter value assigned to that shaft shall be 0. If a required egress route is contained in that shaft, the parameter value shall be –2.

5.4.12.2.2 If vertical firestopping is incomplete, the vertical opening shall be evaluated using the criteria of 5.4.12.2 and 5.4.12.2.1.

5.4.12.3 Communicating Floors. Communicating floor levels shall be permitted without enclosure protection between levels, provided they meet the requirements of 22.3.1 or 23.3.1 (NFPA *101*), as appropriate.

5.4.12.4 Open Tiered Cells. The *open or incomplete enclosures* category does not apply to open, multitiered cell blocks in existing buildings classified as single-story buildings in accordance with 5.4.1.

5.4.12.5 Smoke Resistant. A complete enclosure is provided and is capable of resisting the passage of smoke but does not meet the fire resistance requirements of 8.6.5 (NFPA *101*). Unprotected vertical openings in accordance with 22.3.1(2) and 23.3.1.1(2) (NFPA *101*) shall be considered to be smoke resistant.

5.4.12.6 Fire Resistant. A smoke-resistant enclosure is provided that also meets the fire resistance requirements of 8.6.5 (NFPA *101*). Atriums in accordance with 8.6.7 (NFPA *101*) shall be considered to be fire resistant.

5.4.13 Smoke Control. Smoke control definitions are provided in 5.4.13.1 through 5.4.13.4.

5.4.13.1 No Control. Smoke barriers (or horizontal exits) are nonexistent on the floor or are not accessible to those confined.

5.4.13.2 Smoke Compartment — Passive. Credit for smoke barriers is given to any facility meeting the requirements of 22.3.7 or 23.3.7 (NFPA *101*), as appropriate.

5.4.13.3 Smoke Compartment — Mechanically Assisted. Mechanically assisted smoke control on a compartment basis must include a smoke barrier (or a horizontal exit) supported by a mechanism of automatic control fans, smoke vent shafts, or a combination thereof to provide a pressure differential that assists in confining smoke to the compartment of origin. Fans involved shall be permitted to be special smoke control fans or special adjustments of the normal building air movement fans.

5.4.13.4 Heat and Smoke Vent System. A heat and smoke vent system is a tested and accepted system that handles smoke in order to maintain the level of smoke above head height in the residential housing area. Methods of judging the acceptability of the system are contained in NFPA 92A, *Standard for Smoke-Control Systems Utilizing Barriers and Pressure Differences*; NFPA 92B, *Standard for Smoke Management Systems in Malls, Atria, and Large Spaces*; and NFPA *101*, *Life Safety Code*, A.23.3.1.3. Additional credit for this system shall be given if the operation of the exhaust system is initiated automatically by smoke detection available in the zone.

5.5 Worksheets for Evaluating Fire Safety. The worksheets for evaluating fire safety zones use an eight-step process found in Figure 5.5.

5.5.1 Step 1 — Complete the Cover Sheet Using Worksheet 5.5.1. See Figure 5.5.

5.5.2 Step 2 — Determine the Most Restrictive Use Condition in the Facility Using Worksheet 5.5.2. See Figure 5.5.

5.5.3 Step 3 — Determine Safety Parameter Values Using Worksheet 5.5.3. Select and circle the safety value for each safety parameter that best describes the conditions in the zone. Choose only one value for each of the 13 safety parameters. If two or more values appear to apply, choose the one with the lowest point value.

5.5.4 Step 4 — Compute Individual Safety Evaluations Using Worksheet 5.5.4. The following steps should be taken:

(1) Transfer each of the 13 circled safety parameter values from Worksheet 5.5.3 to every available block in the line with the corresponding parameter title in Worksheet 5.5.4. Where the block is marked "÷ 2 =," enter one-half the value from Worksheet 5.5.3.
(2) Add each of the four columns, keeping in mind that any negative numbers need to be deducted.
(3) Transfer the resulting values for S_1, S_2, S_3, and S_4 to the corresponding blocks in Worksheet 5.5.6.

5.5.5 Step 5 — Determine Mandatory Safety Requirements Using Worksheet 5.5.5A, 5.5.5B, or 5.5.5C as Appropriate. The following steps should be taken:

(1) Select the proper row in Worksheet 5.5.5A, Worksheet 5.5.5B, or Worksheet 5.5.5C. For high-rise buildings, use Worksheet 5.5.5B. Circle the appropriate values.
(2) Transfer the circled values from Worksheet 5.5.5A, Worksheet 5.5.5B, or Worksheet 5.5.5C to the blocks marked S_a, S_b, S_c, and S_d in Worksheet 5.5.6.

5.5.6 Step 6 — Compute the Fire Safety Equivalency Evaluation Using Worksheet 5.5.6. The following steps should be taken:

(1) Perform the subtractions indicated in Worksheet 5.5.6. Enter the differences in the appropriate answer blocks.
(2) For each row, check "yes" if the value in the answer block is zero (0) or greater. Check "no" if the value in the answer block is a negative number.

5.5.7 Step 7 — Evaluate Considerations Not Previously Addressed Using Worksheet 5.5.7. The equivalency covered by Worksheets 5.5.3 through 5.5.6 includes the majority of the considerations covered by the *Life Safety Code*. There are some considerations that are not evaluated by this method. These must be considered separately. These additional considerations are covered in Worksheet 5.5.7, the Facility Fire Safety Requirements Worksheet. Complete one copy of this separate worksheet for each facility.

5.5.8 Step 8 — Conclude Whether the Level of Life Safety Is at Least Equivalent to that Prescribed by the *Life Safety Code* Using Worksheet 5.5.8. Worksheet 5.5.8, Conclusions, combines the zone fire safety equivalency evaluation of Worksheet 5.5.6 and the additional considerations of Worksheet 5.5.7.

WORKSHEET 5.5.1 COVER SHEET

Fire Safety Evaluation Worksheet for Detention and Correctional Occupancies

Building Identification _____

Evaluator _____ Date _____

Complete one worksheet for each building evaluated.

WORKSHEET 5.5.2 USE CONDITION

_____ Use Condition II — Zoned Egress

_____ Use Condition III — Zoned Impeded Egress

_____ Use Condition IV — Impeded Egress

_____ Use Condition V — Contained

NOTE: If Use Condition III or Use Condition IV is involved, staff location, remote release locks, or fire detection, or any combination of these, must be sufficient to ensure the prompt release required by the use condition checked.

WORKSHEET 5.5.3 SAFETY PARAMETER VALUES

Safety Parameters	Parameter Values							
1. Construction	V(000)	V(111)	IV(2HH)	III(200)	III(211)	II(000)	II(111)	II(222) or I (ANY)
1 story	−2	0	0	−2	0	0	2	2
2 story	−2	0	0	−2	0	−2	2	2
3 story	−8(−2)[a]	−2(0)[a]	−2(0)[a]	−8(−2)[a]	0	−5(−2)[a]	2	2
≥4 stories	−10(−2)[a]	−4(0)[a]	−4(0)[a]	−10(−2)[a]	−2(0)[a]	−8(−2)[a]	0	2

2. Hazardous Areas	Within Res. Housing Area		Outside Res. Housing Area		None or No Deficiencies
	Double Deficiency	Single Deficiency	Double Deficiency	Single Deficiency	
	−7	−4	−4(−7)[b]	0	0

3. Fire Alarm	No Alarm	W/O F.D. Notification	W/ F.D. Notification	
			W/O Man. Alarm	W/ Man. Alarm
	−1	0	1	2

4. Smoke Detection	None	Residential Housing Area			Total Bldg.
		Partial Coverage		Full Coverage	
		Corr. + Comm. Spa. + Lrg. Sleeping Rms.	All Sleeping Rms.		
	−4(−1)[a]	0	2	4	5

5. Automatic Sprinklers	None	Residential Housing Areas	Entire Building
	0	8	10

6. Interior Finish (Corrs. and Egress)	Class C	Class B	Class A
	−3	−1	0

7. Interior Finish (Other Areas)	Class C	Class B	Class A
	−2	−1	0

8. Cell/Sleeping Room Enclosure	Cells (Rooms) Face on Corridor (Each Cell is a Separate Residential Housing Area)	Intervening Common Space Within Resid. Housing Area		
		Open	Smoke Resistant <1 Hour	≥1-Hour Fire Resistance–Rated
	0	−3(−5)[c] (0)[d]	0(−2)[c]	2(0)[c]

(Worksheet 5.5.3 continues.)

(For use with NFPA 101A-2010/NFPA *101*-2009) (p. 1 of 4)

FIGURE 5.5 Worksheets for Evaluating Fire Safety in Detention and Correctional Occupancies.

Worksheet 5.5.3 ***Continued***

9. Separation of Resid. Housing Areas from Other Areas	Incomplete				Smoke Resistant <1 Hour		≥1-Hour Fire Resistance–Rated			
	Parameter 5 Value <10		Parameter 5 Value = 10							
	–6		2		2(4)[h]				4(2)[b]	
10. Exit System	<2 Routes		Multiple Routes				Direct Room Exits			
			Deficient		No Deficiencies					
	–6		–2		0		3			
11. Exit Access	Dead Ends				No Dead Ends >50 ft and Travel Is[i]					
	>100 ft		>50 ft[i]		>200 ft		≤200 ft	>150 ft		≤150 ft
	–2(0)[g]		–1(0)[g]		–2(0)[g]		–1(0)[g]			0
12. Vertical Openings	Open or Incomplete Enclosures						Enclosed[e]			
	Thru ≥4 Floors		2–3 Floors		1 Floor		Smoke Resistant			Fire Resistant
	–10(0)[f]		–7(0)[f]		–2(0)[f]		0			2
13. Smoke Control	No Control		Smoke Compartments				Heat + Smoke Vent System			
			Passive		Mechanically Assisted					
	–2		2		3		8			

[a] Use ( ) if Parameter 5 is 10.
[b] Use ( ) if Parameter 1 is based on II(000), III(200), or V(000) construction and Parameter 5 is 0.
[c] Use ( ) for Use Condition V, new construction, where Parameter 5 is 0.
[d] Use ( ):
– For Use Condition II.
– For Use Condition III if intervening space is ≤50 ft.
– For Use Condition IV if Parameter 5 is ≥8 and intervening space is <50 ft.

For existing buildings if either:
– Parameter 13 = 8, or
– Parameter 5 is ≥8 and Parameter 4 is ≥0.

[e] Use 0 in 1-story buildings.
[f] Use ( ) if Parameter 13 is 8.
[g] Use ( ) if Parameter 10 is –6.
[h] Use ( ) for Use Conditions II, III, and IV, new construction, if cells are facing access corridor.
[i] Use 20 ft for Use Condition V.

For SI units, 1 ft = 0.3048 m; 1 ft² = 0.092 m².

WORKSHEET 5.5.4 INDIVIDUAL SAFETY EVALUATIONS

Safety Parameters	Fire Control Provided (S_1)	Egress Provided (S_2)	Refuge Provided (S_3)	General Fire Safety Provided (S_4)
1. Construction				
2. Hazardous Areas		÷ 2 =		
3. Fire Alarm	÷ 2 =			
4. Smoke Detection	÷ 2 =			
5. Automatic Sprinklers		÷ 2 =	÷ 2 =	
6. Interior Finish (Corrs. and Egress)				
7. Interior Finish (Other Areas)	÷ 2 =			
8. Cell/Sleeping Room Enclosure				
9. Separation of Residential Housing Areas from Other Areas		÷ 2 =		
10. Exit System			÷ 2 =	
11. Exit Access				
12. Vertical Openings	÷ 2 =			
13. Smoke Control				
Total	S_1 =	S_2 =	S_3 =	S_4 =

(For use with NFPA 101A-2010/NFPA *101*-2009) (p. 2 of 4)

FIGURE 5.5 ***Continued***

WORKSHEET 5.5.5A MANDATORY SAFETY REQUIREMENTS FOR PARTIALLY SPRINKLERED OR NONSPRINKLERED EXISTING BUILDINGS OTHER THAN HIGH-RISE

Use Condition	Stories in Height	Fire Control (S_a)	Egress (S_b)	Refuge (S_c)	General (S_d)
II + III	1 Story	0	4	2	1
	2 Stories	3	6	6	5
	≥3 Stories	5	6	8	7
IV	1 Story	2	8	2	5
	2 Stories	5	10	6	9
	≥3 Stories	7	10	8	11
V	1 Story	6	9	6	9
	2 Stories	9	11	10	13
	≥3 Stories	9	11	10	13

WORKSHEET TABLE 5.5.5B MANDATORY SAFETY REQUIREMENTS FOR NEW BUILDINGS, TOTALLY SPRINKLERED BUILDINGS, AND HIGH-RISE BUILDINGS

		Fire Control (S_a)		Egress (S_b)		Refuge (S_c)		General (S_d)	
Use Condition	Stories in Height	New	Exist.	New	Exist.	New	Exist.	New	Exist.
II, III, IV	1 and 2 Stories	2	2	4	2	–1	–1	2	0
	≥3 Stories	7	2	6	2	5	–1	8	0
V	1 and 2 Stories	10	10	7	6	7	7	9	8
	≥3 Stories	15	10	9	6	13	7	15	8

WORKSHEET 5.5.5C MANDATORY SAFETY REQUIREMENTS — MODERNIZATIONS OR RENOVATIONS IN NONSPRINKLERED EXISTING BUILDINGS OTHER THAN HIGH-RISE

Use Condition	Stories in Height	Fire Control (S_a)	Egress (S_b)	Refuge (S_c)	General (S_d)
II + III	1 Story	4	6	6	6
	2 Stories	5	8	8	8
	≥3 Stories	7	8	10	10
IV	1 Story	6	10	6	10
	2 Stories	7	12	8	12
	≥3 Stories	9	12	10	14
V	1 Story	8	10	8	12
	2 Stories	9	12	10	14
	≥3 Stories	9	12	10	14

(For use with NFPA 101A-2010/NFPA *101*-2009) (p. 3 of 4)

FIGURE 5.5 ***Continued***

WORKSHEET 5.5.6 FIRE SAFETY EQUIVALENCY EVALUATION

						Yes	No
Control Provided (S_1)	minus	Required Control (S_a)	≥	0	S_1 ☐ – S_a ☐ = C ☐		
Egress Provided (S_2)	minus	Required Egress (S_b)	≥	0	S_2 ☐ – S_b ☐ = E ☐		
Refuge Provided (S_3)	minus	Required Refuge (S_c)	≥	0	S_3 ☐ – S_c ☐ = R ☐		
General Fire Safety (S_4)	minus	Required Gen. Fire Safety (S_d)	≥	0	S_4 ☐ – S_d ☐ = G ☐		

WORKSHEET 5.5.7 FACILITY FIRE SAFETY REQUIREMENTS WORKSHEET

		Yes	No
1.	Utilities and building services conform to the requirements of Sections 22.5 and 23.5, except for enclosure of vertical openings, which have been considered in Safety Parameter 12 of Worksheet 5.5.3.		
2.	24-hour staffing is provided as required by 22.7.1 and 23.7.1.		
3.	Combustibility of furnishing, upholstered furniture, mattresses, and decorations is limited in accordance with 22.7.4 and 23.7.4.		
4.	Portable fire extinguishers are provided at least at staff locations.		
5.	Standpipes are provided in all buildings over two stories in height as required by 22.3.5.5, 22.4.3, or 23.3.5.5.		
6.	If Use Condition III or Use Condition IV is involved, the combination of staff location, remote release locks, and fire detection is sufficient to ensure the prompt release required by those use conditions.		

All references are to NFPA *101*, *Life Safety Code.*

WORKSHEET 5.5.8 CONCLUSIONS

1. ☐ All of the checks in Worksheet 5.5.6 are in the "Yes" column. The level of fire safety is at least equivalent to that prescribed by NFPA *101, Life Safety Code*.*
2. ☐ One or more of the checks in Worksheet 5.5.6 is in the "No" column. The level of fire safety is not shown by this system to be equivalent to that prescribed by NFPA *101, Life Safety Code*.*

* The equivalency covered by this worksheet includes the majority of considerations covered by NFPA *101, Life Safety Code*. There are some considerations that are not evaluated by this method. These must be considered separately. These additional considerations are covered in Worksheet 5.5.7.

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FIGURE 5.5 ***Continued***

Chapter 6 Evacuation Capability Determination for Board and Care Occupancies

6.1 General.

6.1.1 This chapter is part of an NFPA guide and, therefore, is not mandatory. The term *shall* in this chapter is used to indicate that if the provisions of the chapter are applied, the procedures mandated are to be followed to ensure the effectiveness of the system. For ease of reading, only the masculine pronoun is used; however, the contents of this chapter apply equally to females and males.

6.1.2 Chapter 33 (NFPA *101*) specifies three sets of requirements for an existing facility based on its evacuation capability. The three levels of evacuation capability defined are *prompt*, *slow*, and *impractical*.

6.1.3 The evacuation capability shall be determined for the residents of a given facility who are living as a group and are provided with staff assistance prior to application of the fire protection requirements. This chapter describes one method for determining evacuation capability.

6.1.4 The evacuation capability for specific facilities, with residents living as a group with staff assistance, is determined by a mathematical method that includes the following:

(1) Determining the evacuation assistance scores of the individual residents
(2) Computing a relative level of evacuation difficulty faced by the resident of a specific facility based on the response capabilities of the staff
(3) Adjusting for vertical egress travel
(4) Calculating an evacuation capability score

6.1.5 Chapter 33 (NFPA *101*) defines the three evacuation capability levels in terms of residents' performance in a timely response to an emergency evacuation with assistance from staff members or other residents. Utilization of this chapter provides a numerical score that can be translated into one of the three levels of evacuation capability.

6.1.6 The evacuation capability shall be permitted to be used with either Chapter 7 of this guide or Chapter 33 (NFPA *101*).

6.2 Procedure for Determining Evacuation Capability.

6.2.1 Methodology. Evacuation capability shall be determined via the worksheets included in Figure 6.8.

6.2.2 Evacuation Capability by Zones.

6.2.2.1 Small facilities (those with no more than 16 residents) shall have their evacuation capability scores based on all the residents and the available staff measured in accordance with the criteria for evaluating residents and staff in this chapter.

6.2.2.2 Large facilities (those with more than 16 residents) shall be permitted to have their evacuation capability score calculated on the basis of the entire building, as with small facilities, or on the basis of separate fire or smoke zones. The procedure providing the better (i.e., lower) evacuation capability score shall be permitted to be used. A fire or smoke zone is a portion of the building separated from all other portions of the building by one of the following:

(1) Construction having at least 1-hour fire resistance
(2) A smoke barrier conforming to the requirements of Section 8.5 (NFPA *101*), with the smoke barriers constructed with at least a ½-hour fire resistance rating
(3) In buildings protected throughout with an automatic sprinkler system, construction that is sound and smoke-resistant

6.2.3 If a building is zoned, each zone shall be evaluated separately. The evacuation capability score is based on the residents of that zone and the staff available to that zone in accordance with the staff rating criteria in this chapter.

6.2.4 Where using zones, a separate evacuation capability score shall be determined for zones that include common use spaces where the residents of more than one zone congregate for meals, recreation, or other purposes. In such cases, adjust the resident evacuation assistance scores as appropriate to reflect the different needs that residents might have under such conditions.

6.3 Rating Residents.

6.3.1 Worksheets 6.8.1 through 6.8.4 of Figure 6.8 are used for rating individual residents and also for recordkeeping purposes.

6.3.2 This method of determining evacuation capability has been designed to minimize speculation about how a resident might perform in an actual fire emergency by using ratings based on observed performance. Instead of speculating, raters who are not familiar enough with a resident to provide ratings confidently should consult with an individual who has observed the resident on a daily basis.

6.3.3 Due to the stress of an actual fire emergency, it is likely that some residents will not perform at full capacity. Therefore, ratings based on commonly observed examples of poor performance provide the best readily available indication of behavior that could be reduced by the unusually stressful conditions of an actual fire. All persons are less capable on some occasions, and the ratings should be based on examples of resident performance on a typical "bad" day. Ratings should not be based on rare instances of poor performance.

6.4 Rating Residents Using Worksheets 6.8.1 through 6.8.4.

6.4.1 Risk of Resistance (Line I of Worksheet 6.8.2).

6.4.1.1 General.

6.4.1.1.1 Line I rates the risk that the resident might resist leaving the facility during an emergency evacuation. Unless there is specific evidence that resistance might occur, the resident should be rated as "minimal risk." If more than one rating applies, use the rating with the highest numerical score.

6.4.1.1.2 Specific evidence of resistance means that staff have had to use some physical force in the past. However, an episode of resistance should not be counted if it was the result of a situation that was different enough from an actual fire emergency that it probably does not predict behavior in such an emergency. For example, an incident in which a resident refuses to visit with parents probably does not predict behavior in an actual fire emergency and should not be counted as specific evidence. Resistance can be active (the resident might have struck a staff member or attempted to run away) or passive (the resident might have "gone limp" or hidden from staff members). Simply complaining or arguing is not considered resistance.

6.4.1.2 Minimal Risk. This rating indicates that there is no specific evidence to suggest that the resident might resist an evacuation.

6.4.1.3 Risk of Mild Resistance. This rating indicates that there is specific evidence that the resident might resist leaving the facility. Examples of specific evidence are as follows:

(1) The resident has mildly resisted instructions from staff. Further, the resistance was brief or easily overcome by one

staff member and occurred in a situation similar enough to a fire emergency to predict that the behavior could recur during an actual fire emergency.
(2) The resident has hidden from the staff in a situation similar enough to a fire emergency to predict that the behavior could recur during an actual fire emergency. However, once found, the resident offered no further resistance.

6.4.1.4 Risk of Strong Resistance. The resident might offer resistance that necessitates the full attention of one or more staff members. Examples of specific evidence of such risk include the following:

(1) The resident has struggled vigorously in a situation similar enough to a fire emergency to predict that the behavior could recur during an actual fire emergency.
(2) The resident has totally refused to cooperate in a situation that is similar enough to a fire emergency to predict that the behavior could recur during an actual fire emergency.
(3) The resident has hidden in a situation that is similar enough to a fire emergency to predict that the behavior could recur during an actual fire emergency. Moreover, once found, the resident continued to offer resistance.

6.4.2 Impaired Mobility (Line II of Worksheet 6.8.2).

6.4.2.1 General.

6.4.2.1.1 Line II rates the physical ability of the resident to leave the facility. This rating should reflect the current physical environment in the building where the resident lives and should be based on the resident's lying awake on his bed. The resident is rated according to how easily he can leave, given the presence of factors such as physical barriers that hinder movement (e.g., stairs), his ability to get out of bed, or the chairs normally used. The resident should be given credit for being able to use devices that aid movement (e.g., wheelchairs, walkers, crutches, and leg braces). However, the rater shall be permitted to give credit for such devices only if the devices are always available for an emergency evacuation.

6.4.2.1.2 The resident should be rated on his ability to use the most accessible route out of the facility. For example, a resident who is "self-starting" when using the back door but who "needs limited assistance" to get out the front door would be rated as "self-starting."

6.4.2.1.3 The resident should be rated for performance while under the influence of any routinely administered medication that slows movement.

6.4.2.1.4 Where the resident needs physical assistance to make a timely evacuation, the rating of assistance needed is based on the degree of strength used by the staff member to assist the resident. Guiding or directing the resident by giving gentle pushes or leading by the hand is not considered physical assistance. If more than one rating applies, use the rating with the highest numerical score.

6.4.2.2 Self-Starting. The resident is physically able to start and complete an evacuation without physical assistance.

6.4.2.3 Slow. The resident prepares to leave and travels to the exit (or an area of refuge) at a speed significantly slower than normal. Specifically, the resident is rated "slow" if not able to prepare to leave and then travel from his sleeping room to the exit (or area of refuge) within 90 seconds.

6.4.2.4 Needs Limited Assistance. The resident might need some initial or brief intermittent assistance but can accomplish most of the evacuation without assistance. An example of specific evidence of such mobility is that the resident is physically able to start and complete an evacuation, except that the resident needs help to accomplish the following:

(1) Get into a wheelchair
(2) Descend stairs
(3) Get out of bed
(4) Open a door

6.4.2.5 Needs Full Assistance or Very Slow. The resident "needs full assistance" or is "very slow" as defined in 6.4.2.5.1 and 6.4.2.5.2.

6.4.2.5.1 Needs Full Assistance. The resident either needs physical assistance from a staff member during most of the evacuation or must be assisted by staff in one of the following ways:

(1) Carried from the facility
(2) Helped into a wheelchair and wheeled out of the facility
(3) Helped into leg braces and to descend the stairs

6.4.2.5.2 Very Slow. The resident is very slow if the time necessary to prepare to leave and then travel from his sleeping room to the exit is so long that the staff usually assists the resident to evacuate. Specifically, the resident is rated very slow if unable to prepare to leave and then travel to the exit (or area of refuge) within 150 seconds.

6.4.3 Impaired Consciousness (Line III of Worksheet 6.8.2).

6.4.3.1 General.

6.4.3.1.1 Line III rates the risk that a resident could experience a partial or total loss of consciousness in a fire emergency. Unless there is specific evidence that loss of consciousness might occur during a fire emergency, the resident should be rated as "no significant risk."

6.4.3.1.2 Specific evidence is an indication that the resident has experienced some temporary impairment of consciousness of short duration (seconds or minutes) six or more times during the three months preceding the rating of the resident. Regardless of frequency, if there is specific evidence that loss of consciousness might be caused by the stress of a fire emergency, the resident should be rated as having impaired consciousness. An episode of partial loss of consciousness should be counted only if the impairment was severe enough to significantly interfere with the resident's ability to leave the facility. Do not count episodes where the loss of consciousness was the result of a temporary medical problem (e.g., a severe infection). If more than one rating applies, use the rating with the highest numerical score.

6.4.3.2 No Significant Risk. The resident is not subject to loss of consciousness, or the resident has had fewer than six episodes of losing consciousness (partial and total) during the three months preceding the rating.

6.4.3.3 Partially Impaired. The resident has had at least six episodes of losing consciousness in the preceding three months, of which the most severe episode was only a partial loss of consciousness; that is, the resident still is able to participate in an evacuation to some degree. Specific evidence that a resident should be rated in this category includes loss of consciousness resulting from mild (partial or petit mal) seizures, dizzy spells, intoxication, or any other partially incapacitating impairment of consciousness.

6.4.3.4 Totally Impaired. The resident has had at least six episodes of losing consciousness in the preceding three months, the most severe episode involving total or severely incapacitating loss of consciousness; that is, the resident needs the full assistance of at least one staff member to get out of the building. Specific evidence that a resident should be rated in this category includes losses of consciousness resulting from severe (generalized or grand mal) seizures, fainting spells, intoxication, or other total or severely incapacitating loss of consciousness.

6.4.4 Need for Extra Help (Line IV of Worksheet 6.8.2).

6.4.4.1 General.

6.4.4.1.1 Line IV rates the possibility that more than one staff member might be needed to evacuate the resident. Specific evidence is a previous need for two or more persons to assist the resident and an indication that the resident could need assistance from two persons in a fire emergency.

6.4.4.1.2 Where determining the need for additional assistance, the evaluator should disregard the physical strength or weakness of staff members. (For example, a large staff member who is exceptionally strong might be able to assist a resident alone, while a smaller staff member might be unable to assist the resident fully. However, there is no assurance that a staff member who is able to assist alone always will be able to respond to a resident requiring extra assistance.)

6.4.4.2 Needs at Most One Staff Member. There is no specific evidence that the resident might need help from two or more persons in a fire emergency.

6.4.4.3 Needs Limited Assistance from Two Staff Members. The resident might need some initial or brief intermittent assistance from two staff members, but otherwise needs help from no more than one. Specific evidence supporting this rating is that a resident needs assistance from no more than one person except to accomplish the following:

(1) Getting into a wheelchair
(2) Descending stairs

6.4.4.4 Needs Full Assistance from Two Staff Members. The resident might need assistance from two staff members during most of an evacuation. Specific evidence of the need for assistance from two staff members follows:

(1) Two persons are needed to carry the resident from the facility.
(2) Two persons are needed to get the resident into a wheelchair and to get the wheelchair down a flight of stairs.
(3) The resident might resist an evacuation vigorously, and two persons are needed to get the resident out of the facility.

6.4.5 Response to Instructions (Line V of Worksheet 6.8.2).

6.4.5.1 General. Line V rates the resident's ability to receive, comprehend, and follow through with simple instructions during a staff-directed evacuation. Residents often do not respond equally well to all staff members; therefore, a resident should be rated on his responses to staff members whose directions he is least likely to follow. If more than one rating applies, use the rating with the highest numerical score.

6.4.5.2 Follows Instructions. The resident usually can be depended on to receive, comprehend, remember, and follow simple instructions.

6.4.5.3 Requires Supervision. The resident generally is capable of following instruction but is not dependable. Therefore, the resident might need to be guided, reminded, reassured, or otherwise accompanied during evacuation but does not require the exclusive attention of a staff member (e.g., a staff member can lead two or more residents who fit this classification simultaneously).

6.4.5.3.1 This category includes elderly persons who sometimes show early signs of senile dementia or Alzheimer's disease (e.g., confusion, disorientation, frequent "misplacement" of possessions) and young children who cannot be depended on to follow through with instructions.

6.4.5.3.2 Residents in this category generally are capable of following instructions except in one of the following situations:

(1) The resident is deaf or hearing impaired and sometimes misinterprets communications from staff using sign language.
(2) The resident sometimes forgets instructions after a brief period of time.
(3) The resident is sometimes distracted or confused and fails to follow through with instructions.
(4) The resident is sometimes groggy and might fail to listen carefully or follow through with instructions.
(5) The resident is sometimes uncooperative without apparent good reason.
(6) The resident is elderly and sometimes becomes "lost" in a familiar place.
(7) The resident is a young child who might become frightened and not follow through with instructions.

6.4.5.4 Requires Considerable Attention or Might Not Respond.

6.4.5.4.1 The resident might fail to receive, understand, or follow through with instructions; that is, the resident might not respond to instructions or general guidance. Therefore, the resident might require most of the attention of a staff member during an evacuation.

6.4.5.4.2 This category includes elderly persons who have the symptoms of senile dementia or Alzheimer's disease (e.g., severe confusion, disorientation, very limited short-term memory).

6.4.5.4.3 Residents in this category might display one or more of the following characteristics:

(1) The resident sometimes does not understand simple instructions.
(2) The resident might not respond to instructions from a particular staff member.
(3) The resident is sometimes emotionally upset and is therefore unwilling to follow instructions.
(4) The resident is deaf or hearing impaired and the staff cannot communicate reliably with the resident.
(5) The resident is very forgetful, easily confused, or easily distracted.

6.4.6 Waking Response to Alarm (Line VI of Worksheet 6.8.2).

6.4.6.1 General.

6.4.6.1.1 Line VI rates the risk that the fire alarm might fail to awaken the resident.

6.4.6.1.2 Residents should be rated as "response probable" unless any of the following conditions exists:

(1) The building does not have an alarm system meeting the requirements of Chapter 33 (NFPA *101*), or the alarm is not sufficiently loud where the resident sleeps (doors should be

closed and barriers kept in place where determining the audibility of the fire alarm).
(2) Medication taken by the resident before retiring differs in type or amount (i.e., medication is increased) from the medication taken during waking hours.
(3) The resident has a readily apparent hearing impairment, or the resident's hearing aid is removed before sleeping.
(4) There is specific evidence that the resident is an exceptionally sound sleeper. For example, the resident previously failed to be awakened by a particularly loud noise, and staff members have had to shake the resident vigorously to awaken him.

6.4.6.1.3 Where any of the conditions in 6.4.6.1.2 exist, the resident should be rated as "response not probable" unless the resident's ability to wake up has been demonstrated. The demonstration of the resident's ability to wake up in response to the fire alarm should be conducted after the first half hour of sleep and during the first three hours of sleep. In addition, the resident's ability to wake up in response to the alarm should be demonstrated on two different nights under normal conditions (e.g., without hearing aid, under usual medications). Also, the resident should be alert enough to follow simple instructions within 1 minute after waking. To avoid waking other residents during the demonstrations of the capability of a particular resident, a device that makes a sound that is similar to, but not louder than, the fire alarm shall be permitted to be used (e.g., an alarm clock or clock radio with a sound similar to the fire alarm). Listed and approved tactile alarms shall be permitted as alternative devices used to demonstrate a hearing-impaired resident's response probability.

6.4.6.2 Response Probable. Either none of the conditions in 6.4.6.1.2 affect the resident, or, if any of the conditions exist, the resident's ability to be awakened has been demonstrated.

6.4.6.3 Response Not Probable. One or more of the conditions in 6.4.6.1.2 affect the resident, and either the resident has not been tested for the ability to be awakened by the fire alarm or the resident has failed to demonstrate the ability to be awakened by the fire alarm.

6.4.7 Response to Fire Drills (Line VII of Worksheet 6.8.2).

6.4.7.1 General.

6.4.7.1.1 Line VII rates the resident's ability to leave the facility during fire drills, as demonstrated by the resident's performance, without guidance or advice from the staff. A resident must demonstrate three separate responses reliably and without instructions or supervision to be rated "yes" in each case. The resident is rated "yes" only where he has been specifically trained or instructed in the desired reaction and has demonstrated the desired response in at least three of the last four fire drills in which a response was demonstrated. If the resident has not been involved in four fire drills, the rating shall be permitted to be "yes" only if the resident has demonstrated the desired response during the last two opportunities to demonstrate the response. Ratings are based on demonstrated performance, and any resident who has not been trained to participate in fire drills must be rated "no."

6.4.7.1.2 This rating covers the ability of the resident to make decisions but does not relate to mobility, which is covered separately. For example, a resident might need assistance only in transferring from a bed to a wheelchair but otherwise can initiate and complete an evacuation promptly. Such a resident would be rated "yes" for "Initiates and Completes Evacuation Promptly" but would be rated "Needs Limited Assistance," in Line II, Impaired Mobility.

6.4.7.1.3 Residents should be rated assuming that an emergency could occur when they are least likely to respond well. For most residents, this is after being awakened. Determining the rating should not include difficulties in actually awakening the resident, since there are great differences in how easily the same individual awakens at various times.

6.4.7.2 Initiates and Completes Evacuation Promptly. The resident has demonstrated a proper response to an alarm or warning of a fire by starting and completing the evacuation without unnecessary delay. Specific evidence leading to a rating of "no" includes the following responses:

(1) The resident might not react to the alarm until alerted by a staff member.
(2) The resident spends an excessive amount of time preparing to leave (e.g., getting dressed, observing others).
(3) The resident has a hearing impairment and, therefore, needs to be alerted by a staff member.
(4) The resident is sometimes upset or confused and, therefore, might seek out a staff member before evacuating.
(5) The resident consistently begins an evacuation but is easily distracted and needs some supervision.

6.4.7.3 Chooses and Completes Backup Strategy. The resident has demonstrated the ability to select an alternative means of escape or has taken other appropriate action if the primary escape route is blocked. Specific evidence leading to a rating of "no" is where the resident is unlikely to select a good course of action if the primary escape route cannot be used; that is, the resident has not been trained to find alternative escape routes, find an area of refuge, or perform other appropriate action(s). Where the resident lacks the conceptual ability to understand fire hazards and blocked escape routes, and, therefore, requires supervision, the rating should be "no."

6.4.7.4 Remains at Designated Location. The resident must have demonstrated willingness to remain at a designated safe location during fire drills. (The whereabouts of already evacuated residents needs to be confirmed to avoid dangerous return trips to look for residents who might have returned to buildings.)

6.4.7.4.1 Specific evidence leading to a "yes" for this rating includes the following:

(1) The resident has been specifically trained to remain at a designated location in a safe area and has demonstrated this ability without the presence of staff members in three of the previous four fire drills.
(2) The resident is physically immobile and, therefore, cannot leave the designated location.
(3) The facility uses a motor vehicle (e.g., a van or bus) or a building that is detached and remote from the facility (i.e., another building or a remote garage) as the designated location, and the resident has demonstrated in three of the previous four fire drills the ability to remain there without the presence of a staff member.
(4) The resident might tend to wander, but a reliable resident has been assigned to keep the wandering resident at the designated location without using any force or coercion. Furthermore, this arrangement has been demonstrated as effective in at least three of the previous four fire drills.

6.4.7.4.2 Specific evidence leading to a "no" for this rating includes the following:

(1) The resident has not been trained to remain at a designated location without any staff supervision.
(2) The resident has been trained to remain without staff supervision at a designated location but has failed to demonstrate this capability in three of the previous four fire drills.

6.5 Rating the Staff Shift (Worksheets 6.8.5 through 6.8.11).

6.5.1 This rating is intended to predict the promptness of response of a staff member who is present in the facility, at a given time (shift), and who is capable of assisting residents in an evacuation.

6.5.2 Before rating the staff shift, there are five basic requirements relative to the staff response capability, protection plans, and fire drills that shall be met. The determination of whether or not these requirements are met is recorded on Worksheet 6.8.8, Staff Shift Scores. If the corresponding requirements of 6.5.2.1 through 6.5.2.5 have been met, a "yes" rating should be given.

6.5.2.1 A protection plan shall have been promulgated, and all staff members considered in this rating shall have been trained in its implementation. Regardless of the staff's everyday competencies, they cannot be relied upon to innovate effective life safety actions under the extreme stress and time limitation of an actual fire emergency. Notwithstanding the facility's fire protection features, the staff must have a valid and practiced plan of action that can be put into effect immediately in an emergency. The protection plan should include the following features:

(1) A description of all available evacuation, escape, and rescue routes and the procedures and techniques needed to evacuate all the residents using the various routes
(2) A fundamental knowledge of fire growth, containment, and extinguishment necessary to make reasonable judgments about action priorities and viable egress routes

6.5.2.2 Staff shall be provided in accordance with 6.5.2.2.1 or 6.5.2.2.2.

6.5.2.2.1 The total available staff at any given time is able to handle the individual evacuation needs of each resident who might be in the facility. In calculating evacuation capability, it might be possible to have a ratio of staff to residents that appears to be favorable but that still is unacceptable under this system. This would be the case when a resident needs assistance from two staff members but only one staff member is present. Thus, the situation should be such that all residents can be evacuated by the available staff.

6.5.2.2.2 The facility meets the criteria for an evacuation capability level of "impractical," the resident whose evacuation needs cannot be handled is in a sleeping room or other room that provides adequate refuge from fire outside the room, and there is at least one staff member present who can close the door to the room. For example, a very heavy resident is in a facility, meeting the criteria for impractical level of evacuation capability, with one available staff member who cannot transfer the resident from a bed to a wheelchair. Although the staff member is unable to meet all the resident's evacuation assistance needs, the sleeping room provides adequate refuge.

6.5.2.3 Every staff member considered in this rating shall be able to participate meaningfully in the evacuation of every resident. For example, a staff member who, due to his own disability, might be unable to assist one or more physically disabled residents shall not be included in the rating. However, if a staff member's disability does not limit his ability to assist the residents, then the staff member shall be permitted to be included in the rating.

6.5.2.4 All staff members considered in this rating shall be in the facility when on duty, except as otherwise permitted by 6.5.2.4.1 through 6.5.2.4.4. This rating is based on the assumption that there are staff present when residents are in the facility.

6.5.2.4.1 Unstaffed facilities, which are not covered by this system, shall be permitted to be assigned an evacuation capability level based on the demonstrated ability of the residents to meet the criteria of Chapter 33 (NFPA *101*) without staff assistance.

6.5.2.4.2 Residents who receive only the most favorable ratings on Worksheet 6.8.3 for rating residents shall be permitted to be present in the facility without the presence of staff members.

6.5.2.4.3 A staff member shall be permitted to be at a location outside of the facility where his ability to respond to a fire emergency from the location is roughly equivalent to his response ability from within the facility. In determining equivalency, the authority having jurisdiction should consider the following:

(1) Whether the fire alarm meets the minimum loudness criteria *(see 6.5.3.2.2)* at the locations outside the facility or whether another staff member who is required to remain in the facility can immediately report a fire emergency to the staff member who is outside
(2) Travel time to the facility
(3) Detection of fire cues (e.g., smoke, noises) from locations outside the facility
(4) Whether the staff member will be notified immediately about which area of the facility has the fire emergency, if the staff member who is outside is required to report fire emergencies in more than one facility or fire zone

6.5.2.4.4 The authority having jurisdiction shall be permitted to grant partial credit (which shall not exceed the promptness of the response score that the staff member receives where required to remain in the facility) for staff members who are permitted at locations outside the facility and who have the ability to respond promptly.

6.5.2.5 Fire drills shall be conducted monthly, and at least 12 fire drills shall have been conducted during the previous year. A facility in operation for less than one year shall be permitted to have conducted a fire drill for each month of its operation.

6.5.3 Staff Shift Scores (Worksheet 6.8.8).

6.5.3.1 The purpose of this rating is to determine which staff shift is likely to be the least able to respond promptly to assist residents in an evacuation. If it is not obvious which staff shift will be the least able to respond, complete separate forms for each staff shift and use the staff shift having the lowest score.

6.5.3.2 Promptness of Response Scores (Worksheet 6.8.7).

6.5.3.2.1 Staff Availability. This rating determines whether there are circumstances in which a staff member is less able to respond appropriately or might be delayed in his response to a fire emergency. A staff member shall be included in this rating only under the following conditions:

(1) He is required to remain within the facility while on duty.
(2) He sleeps less than 100 ft (30 m) from all locations in the portion of the facility being evaluated.
(3) His travel time to any location in the portion of the facility being evaluated does not exceed 60 seconds.

6.5.3.2.1.1 Standby or Asleep. This rating means that the staff member does not have specific duties that ensure an immediate response to the alarm but is otherwise available to assist in a timely manner. This includes live-in staff who might be asleep, showering, or otherwise unable to respond immediately.

6.5.3.2.1.2 Immediately Available. This rating means that the staff member is required to be on duty to provide immediate assistance but is not required to remain in proximity to the residents (e.g., the staff member is allowed to wash clothes or do bookkeeping).

6.5.3.2.1.3 Immediately Available and Close By. This rating means that the staff member, in addition to satisfying the requirement for "immediately available," also is required to remain in proximity to the residents except for brief periods of time.

6.5.3.2.1.4 If the facility is classed as "large" and has multiple fire or smoke zones, some staff members might have responsibilities for residents outside the fire or smoke zone being evaluated. If a staff member's duties include rescue of residents in the fire zone being evaluated, the staff member shall be permitted to be assigned partial or full promptness of response scores. The authority having jurisdiction shall assign the points based on the proximity of the staff member to the zones and the nature of his duties in a fire emergency. This credit shall be given only if there is a smoke detection system that alerts the staff member and a system or procedure for promptly informing the staff member of the general location of the fire.

6.5.3.2.1.5 Individual residents shall be permitted to be assigned responsibilities similar to those of staff members to assist other residents during fire emergencies. The authority having jurisdiction shall be permitted to assign these individual residents as many as eight points for promptness of response, based on their capabilities and responsibilities.

6.5.3.2.2 Alarm Effectiveness. This rating determines whether smoke detector–activated alarm devices are loud enough to alert the staff to a fire emergency dependably.

6.5.3.2.2.1 Assured. To be rated "assured," the alarm shall be "easily noticeable" in all locations where the staff member is permitted, regardless of his rating on the promptness of response factor. "Easily noticeable" means the alarm shall be a minimum of 55 dBA measured at ear level. The authority having jurisdiction shall be permitted to require the alarm to be louder than 55 dBA where background noises could interfere with alarm audibility. For example, the alarm might need to be more than 55 dBA to be heard over noise such as from a washing machine in the laundry or a television in the day room. If there are staff who are permitted to sleep, the alarm shall be a minimum of 70 dBA measured at "pillow" level in any area where the staff might be asleep. The alarm shall be activated by smoke detectors, an automatic sprinkler system, or both. If the facility has smoke detectors meeting the requirements of Chapter 33 (NFPA *101*), the smoke detectors shall activate the alarm. If the facility has an automatic sprinkler system whose fire protection properties are considered in the evaluation of the facility, activation of the sprinkler system shall activate the alarm.

6.5.3.2.2.2 Not Assured. The alarm does not satisfy the conditions specified under "assured." Doors that normally are closed during the staff shift being rated should be closed when determining the loudness of the fire alarm. Any other barriers that could reduce the loudness of the fire alarm also shall be in place.

6.6 Rating the Facility (Worksheet 6.8.9).

6.6.1 The vertical distance from sleeping rooms to a floor level with exits might affect the risk because of the time and difficulty in moving on the stairs.

6.6.2 Special Terminology.

6.6.2.1 Direct Exit. Direct exit shall mean that there is no more than one step between the inside of the facility and either (1) ground level outside or (2) a level area outside the facility that is at least 32 ft^2 (3 m^2). This level area might be a porch or a stairway landing. Where the vertical distance is greater than one step, a ramp shall be permitted to be used to comply with this definition.

6.6.2.2 Vertical Distance. Vertical distance shall refer to the greatest number of floors that separate any resident sleeping room from its nearest direct exit.

6.6.3 All Sleeping Rooms on Floors with Direct Exit. Every room where residents sleep is on a floor with at least one direct exit. Examples of facilities that fall within this category include the following:

(1) A one-story building without sleeping rooms in the basement
(2) A two-story building without sleeping rooms on the second floor
(3) A split-level building with direct exits at each level
(4) A two-story building with sleeping rooms on the second floor that has an exterior stairway from the second floor, with a landing at the second floor that is greater than 32 ft^2 (3 m^2)

6.6.4 Any Sleeping Room One Floor from Exit. There is at least one room where residents sleep in which the shortest vertical distance to a direct exit is one floor. Examples of facilities that fall within this category include the following:

(1) A two-story building with sleeping rooms on the second floor, in the basement, or both
(2) A one-story building where all the exits have stairs that lead to grade without a landing or porch of, at minimum, 32 ft^2 (3 m^2)

6.6.5 Any Sleeping Room Two or More Floors from Exit. There is at least one room where residents sleep in which the shortest vertical distance to a direct exit is two or more floors. Buildings that fall within this category include the following:

(1) A three-story building with sleeping rooms on the third floor and no exterior fire escape
(2) A three-story building with sleeping rooms on the third floor that has an exterior stairway from the third floor, but where the landing at the third floor is less than 32 ft^2 (3 m^2)

6.6.6 Facilities in an Apartment House. If the facility is located in an apartment house and the unit containing the facility requires ascending or descending stairs to move from any sleeping room to the door to the corridor, a score of 1.2 for "vertical distance from sleeping rooms to exit" should be assigned. In all other apartments, the score for vertical distance from sleeping rooms to exits is 1.0.

6.7 Determining Evacuation Capability (Worksheet 6.8.10).

6.7.1 When the scores for the residents, the staff, and the vertical travel distances have been determined, the scores are entered on Worksheet 6.8.10 and the calculation made to obtain a numerical result.

6.7.2 The numerical evacuation capability score then is translated into a level of evacuation capability of either "prompt," "slow," or "impractical" and recorded on Worksheet 6.8.11. This evacuation capability is a valid assessment that shall be permitted to be used in Chapter 7 of this guide or in Chapter 33 (NFPA *101*).

6.8 Worksheets for Rating Residents. The worksheets for rating residents use a seven-step process found in Figure 6.8.

6.8.1 Step 1 — Complete the Cover Sheet Using Worksheet 6.8.1. See Figure 6.8.

6.8.2 Step 2 — Read Section 6.3 and Section 6.4, then Fill out Worksheets 6.8.2 and 6.8.3. Complete both forms for each resident, basing the ratings on commonly observed examples of poor performance.

6.8.3 Step 3 — Compute the Total Resident Evacuation Assistance Score. The following steps should be taken:

(1) List each resident's name on Worksheet 6.8.4. Use a separate scoresheet for each zone being rated. Use additional scoresheets for a large number of residents.
(2) Enter the score for each resident from Worksheet 6.8.3 that was completed for him.
(3) Total the scores for all residents in the facility or zone being rated, as appropriate.

6.8.4 Step 4 — Consider Prequalifications Related to Computing. The following steps should be taken:

(1) Complete the cover sheet in Worksheet 6.8.5.
(2) Complete Worksheet 6.8.6 for the time of day, week, and so on when the combined ratings for staff and residents yield the highest score. This usually is late at night. Where it is not obvious which staff shift will score highest, complete separate forms for each staff shift and utilize the highest score. Read Section 6.5 before filling out this form.

6.8.5 Step 5 — Determine the Staff Shift Score. Note that in large facilities, staff members might be responsible for assisting residents in a fire or smoke zone but also might have responsibilities for residents in other zones. *(See Section 6.5.)* The following steps should be taken:

(1) On Worksheet 6.8.8, list the names of staff members who are required to be on duty in the facility during the shift being rated.
(2) Determine whether the effectiveness of the alarm is "assured" or "not assured." *(See 6.5.3.2.2.)*
(3) Using the values from Worksheet 6.8.7, determine each staff member's "promptness of response score" for the shift being rated. Enter each staff member's name and score in the appropriate spaces on Worksheet 6.8.8.
(4) Total the "promptness of response scores" for the shift rated.

6.8.6 Step 6 — Rate the Facility Using Worksheet 6.8.9. Rate the facility by checking the circle that indicates the vertical distance a resident must travel from a sleeping room (SR) to an exit.

6.8.7 Step 7 — Determine Evacuation Capability. Determine the facility's evacuation capability, using Worksheet 6.8.10. Calculate the score by multiplying the Total Resident Evacuation Assistance Score (Worksheet 6.8.4) by the Vertical Distance from Sleeping Room to Exit (Worksheet 6.8.9) and then dividing by the Staff Shift Score (Worksheet 6.8.8). The evacuation capability is determined and recorded in Worksheet 6.8.11.

WORKSHEET 6.8.1 COVER SHEET

Worksheet for Rating Residents

Resident's name _____ Evaluator _____

Facility _____ Zone _____ Date _____

Write any explanatory remarks here:

WORKSHEET 6.8.2 RATING THE RESIDENT ON THE RISK FACTORS

Rate the resident on each of the factors below by checking the one circle for each risk factor that best describes the resident. For the first six factors, write the scores for the circles checked in the appropriate score boxes in the far right column. For "Response to Fire Drills," write the three checked scores in the large circles. Write the sum of the three scores in the large box on the right.

					Score Boxes
I. Risk of Resistance (Check only one)	Minimal Risk ◯ score=0	Risk of Mild Resistance ◯ score=6	Risk of Strong Resistance ◯ score=20		
II. Impaired Mobility (Check only one)	Self-Starting ◯ score=0	Slow ◯ score=3	Needs Limited Assistance ◯ score=6	Needs Full Assistance or Very Slow ◯ score=20	
III. Impaired Consciousness (Check only one)	No Significant Risk ◯ score=0	Partially Impaired ◯ score=6	Totally Impaired ◯ score=20		
IV. Need for Extra Help (Check only one)	Needs at Most One Staff ◯ score=0	Needs Limited Assistance from 2 Staff ◯ score=30	Needs Full Assistance from 2 Staff ◯ score=40		
V. Response to Instructions (Check only one)	Follows Instructions ◯ score=1	Requires Supervision ◯ score=3	Requires Considerable Attention/Might Not Respond ◯ score=10		
VI. Waking Response to Alarm (Check only one)	Response Probable ◯ score=0	Response Not Probable ◯ score=6			

VII. Response to Fire Drills (Without guidance or advice from staff)	Initiates and Completes Evacuation Promptly	Yes ◯ score=0	No ◯ score=8	◯ + ◯ + ◯	
	Chooses and Completes Back-up Strategy	Yes ◯ score=0	No ◯ score=4		
	Remains at Designated Location	Yes ◯ score=0	No ◯ score=6		Sum of These Three Scores

(For use with NFPA 101A-2010/NFPA *101*-2009) (p. 1 of 4)

FIGURE 6.8 Worksheets for Rating Residents.

WORKSHEET 6.8.3 DETERMINING THE RESIDENT'S OVERALL NEED FOR ASSISTANCE

Compare the numbers in the seven score boxes filled in on Worksheet 6.8.2. Take the highest score from the score boxes and write it in the box at the right.

Evacuation Assistance Score

Notes:

WORKSHEET 6.8.4 RESIDENT SCORES

Resident Name	Evac. Assistance Score	Resident Name	Evac. Assistance Score
Evacuation Assistance Score Total		**Evacuation Assistance Score Total**	

(For use with NFPA 101A-2010/NFPA *101*-2009) (p. 2 of 4)

FIGURE 6.8 ***Continued***

WORKSHEET 6.8.5 COVER SHEET

Staff Shift Score

Facility _____ Zone _____

Evaluator _____ Date _____

Staff Shift: From _____ To _____

WORKSHEET 6.8.6 STAFF RESPONSE AND TRAINING

	Yes	No
A protection plan has been promulgated and all staff members considered in this rating have been trained in its implementation. *(See 6.5.2.1.)*		
The total available staff at any given time is able to handle the individual evacuation needs of each resident who is in the facility. *(See 6.5.2.2.)*		
Every staff member considered in this rating can meaningfully participate in the evacuation of every resident. *(See 6.5.2.3.)*		
All staff members considered in this rating are required to be in the facility when on duty, except as permitted. *(See 6.5.2.4.)*		
At least 12 fire drills were conducted during the previous year. *(See 6.5.2.5.)*		

All items must score "Yes" before proceeding.

WORKSHEET 6.8.7 PROMPTNESS OF RESPONSE SCORES

	Alarm Effectiveness	
Staff Availablility	Assured	Not Assured
Standby or asleep	16	2
Immediately available	20	2
Immediately available and close by	20	10

WORKSHEET 6.8.8 STAFF SHIFT SCORES

Staff Name	Promptness of Response Score	Staff Name	Promptness of Response Score
Staff Shift Score Total		Staff Shift Score Total	

(For use with NFPA 101A-2010/NFPA *101*-2009) (p. 3 of 4)

FIGURE 6.8 ***Continued***

WORKSHEET 6.8.9 RATING THE FACILITY

	Vertical Distance from Sleeping Rooms to Exits		
	All SR on Floors with Direct Exit	Any SR One Floor from Exit	Any SR Two or More Floors from Exit
Small Facility[a]	◯ Score 0.8	◯ Score 1.0	◯ Score 1.2
Large Facility or Apartment[b]		◯ Score 1.0	

[a] Small facilities have 16 or fewer residents.
[b] See 6.6.6 for apartments.

WORKSHEET 6.8.10 CALCULATION OF EVACUATION CAPABILITY SCORE

Total Resident Evacuation Assistance Score (Worksheet 6.8.4) ☐ X Vertical Distance from Sleeping Room to Exit (Worksheet 6.8.9) ☐

Staff Shift Score (Worksheet 6.8.8) ☐

= Evacuation Capability Score ☐

(go to Worksheet 6.8.11)

WORKSHEET 6.8.11 EVACUATION CAPABILITY SCORE

Evacuation Capability Score	Level of Evacuation Capability	Evacuation Capability for this Facility or Zone
≤1.5	Prompt	
>1.5 to ≤5.0	Slow	
>5.0	Impractical	

(For use with NFPA 101A-2010/NFPA *101*-2009) (p. 4 of 4)

FIGURE 6.8 ***Continued***

Chapter 7 Fire Safety Evaluation System for Board and Care Occupancies

7.1 Introduction.

7.1.1 This chapter is part of an NFPA guide and, therefore, is not mandatory. The term *shall* in this chapter is used to indicate that if the provisions of the chapter are applied, the procedures mandated are to be followed to ensure the effectiveness of the evaluation system.

7.1.2 Chapter 33 (NFPA *101*) defines three levels of evacuation capability for residents (with staff assistance): *prompt*, *slow*, and *impractical*. Chapter 33 (NFPA *101*) also prescribes the fire safety protection requirements for each level of evacuation capability. This chapter describes a procedure for determining whether a combination of fire safety features in a board and care facility provides a level of safety equivalent to that provided by explicit conformance to Chapters 32 and 33 (NFPA *101*). The definition of evacuation capability is given in 3.3.70 (NFPA *101*), and one procedure for determining evacuation capability is presented in Chapter 6 of this document.

7.1.3 Subsystems are provided as follows:

(1) Section 7.2 — Evaluating the fire safety protection in a small facility
(2) Section 7.4 — Evaluating the fire safety protection in a large facility
(3) Section 7.6 — Evaluating the suitability of an apartment building to house a board and care occupancy

7.2 Glossary for Fire Safety Evaluation Worksheet for a Small Facility.

7.2.1 Introduction. This glossary is provided to assist in completing Figure 7.3, Worksheets for Evaluating Fire Safety for a Small Facility, to determine the suitability of a small facility to house a board and care occupancy. The instructions for the mechanisms of completing the worksheet are included in Section 7.3. They are not repeated in this glossary. This glossary provides expanded discussion and definitions for the various items in the worksheet to assist the user where questions of definition or interpretation arise. To the maximum extent possible, the glossary does not repeat the definitions already existing in NFPA *101*, *Life Safety Code*, but rather references the appropriate paragraphs in NFPA *101*.

7.2.2 Areas of Application.

7.2.2.1 The evaluation shall be completed covering the entire home, including spaces that are not used by the residents of the board and care home. See Worksheet 7.3.2. Row houses, townhouses, or other forms of independent living units having all of their entrances and means of escape completely separate from any other unit shall be permitted to be calculated as small facilities where they are separated from any abutting living units. Such separation shall be by fire-resistive partitions or walls having at least a 1-hour fire resistance rating and extending to the roof if it is noncombustible, or through the roof if the roof or its covering is of combustible material.

7.2.2.2 For dwelling units (apartments) in general-use apartment houses, the worksheet shall be used to evaluate the dwelling unit being used as the board and care home. The remainder of the apartment building shall be evaluated using the worksheet to determine the suitability of apartment buildings to house a board and care occupancy.

7.2.3 Maintenance. All protection systems, requirements, arrangements, and procedures shall be maintained in a dependable operating condition and a sufficient state of readiness and shall be used in such a manner that the intended safety function or hazard constraint is not impaired. Otherwise, they shall receive no credit in the evaluation.

7.2.4 Safety Parameters (Worksheet 7.3.2). The safety parameters are a measure of those building factors that bear upon or contribute to the safety of those persons who might be in the building at the time of a fire. Each of the safety parameters is to be analyzed, and the safety value for each parameter that best describes the condition in the building is to be identified. Only one value for each of the parameters is to be chosen. If two or more values appear to apply, the one with the lowest point value shall be used.

7.2.4.1 Construction/Fire Resistance. Construction types are as defined in 7.2.4.1.1 and 7.2.4.1.2, except that sprinkler protection shall not be considered in determining construction classification in any case where credit is given for sprinkler protection as defined in 7.2.4.5.

7.2.4.1.1 Protected (15 minutes). Buildings meeting the requirements of 33.2.1.3.2 (NFPA *101*).

7.2.4.1.2 Protected (1 hour). Buildings meeting the requirements of Type I, Type II(222), Type II(111), Type III(211), Type IV, or Type V(111) construction.

7.2.4.2 Hazardous Areas. The assignment of parameter values for hazardous areas is a four-step process.

7.2.4.2.1 Step 1 — Identify Hazardous Areas. Hazardous areas are as defined in 32.2.3.2 and 33.2.3.2 (NFPA *101*).

7.2.4.2.2 Step 2 — Determine the Area Exposed.

7.2.4.2.2.1 Primary Means of Escape. Hazardous area is on the same floor as and is in or abuts a primary means of escape, as defined in 32.2.3.2 and 33.2.3.2 (NFPA *101*).

7.2.4.2.2.2 Sleeping Area. Hazardous area is on the same floor as and is in or abuts the sleeping area (room).

7.2.4.2.3 Step 3 — Determine the Fire Protection Provided.

7.2.4.2.3.1 Sprinkler Protection. The hazardous area is protected by sprinklers (or other appropriate automatic extinguishing system).

7.2.4.2.3.2 Smoke-Resisting Separation. The hazardous area is separated from exposed sleeping areas and the primary means of escape routes by a separation that resists the passage of smoke. Any doors in such separation are self-closing or automatic-closing upon detection of smoke.

7.2.4.2.3.3 Half-Hour Fire Resistance–Rated Enclosure. Enclosures meeting the requirements of 32.2.3.2.5(1) and 33.2.3.2.5(1) (NFPA *101*).

7.2.4.2.3.4 1-Hour Fire Resistance–Rated Enclosure. Enclosures meeting the requirements of 32.2.3.2.4(1) and 33.2.3.2.4(1) (NFPA *101*).

7.2.4.2.4 Step 4 — Determine Degree of Deficiency and Assign Parameter Values. The parameter value ultimately is determined on the basis of the area exposed and the level of protection provided. Table 7.2.4.2.4 provides a matrix for determining the degree of deficiency to be assessed. In some situations, more than one hazardous area with the same or differing levels of deficiency exists. The parameter value then is based on the single most serious deficiency for the hazardous area.

Table 7.2.4.2.4 Hazardous Areas — Degree of Deficiency

	Nonsprinklered			Sprinklered	
	Fire resistance rating with automatic fire detection				
	½ hour	1 hour	Unenclosed	Smoke-resistive separation	Unenclosed
Does not expose sleeping area or means of escape routes	No deficiency	No deficiency	Single deficiency	No deficiency	No deficiency
Exposes sleeping area or means of escape routes	Single deficiency	No deficiency	Double deficiency	No deficiency	No deficiency

7.2.4.3 Manual Fire Alarm. Manual fire alarms are defined in 7.2.4.3.1 through 7.2.4.3.3.

7.2.4.3.1 None or Incomplete. There is no manual fire alarm system, or the system is incomplete and does not meet the requirements necessary for a higher-scored category.

7.2.4.3.2 Without Fire Department Notification (W/O F.D. Notification). The credit for this level of protection is to be given for any installation that meets the requirements for a manual fire alarm system in 32.2.3.4.1 and 33.2.3.4.1 (NFPA *101*).

7.2.4.3.3 With Fire Department Notification (W/ F.D. Notification). There is a manual fire alarm system meeting the requirements of Section 9.6 (NFPA *101*), including fire department notification as defined in 9.6.4 (NFPA *101*).

7.2.4.4 Smoke Detection and Alarm. A detection system as used herein is one based on the use of smoke detectors. No recognition is given for thermal detectors. The detection system categories are described in 7.2.4.4.1 through 7.2.4.4.5.

7.2.4.4.1 None or Incomplete. There are no smoke detectors in the building, or, if any are present, they do not meet the requirements for a higher-scored category.

7.2.4.4.2 Single-Level Detection, Limited Warning. There are one or more detectors in the building, but they do not meet the criteria for every level detection set forth in 7.2.4.4.3. Detectors credited in this category shall be permitted to be any approved smoke detector, including a single-station detector. At least one detector must be located in the corridor or similar common space (lobbies, lounges, or other spaces that cannot be closed off) in the immediate vicinity of each separate sleeping area. If there is more than one sleeping area, each such area must be protected to obtain this credit.

7.2.4.4.3 Every Level Detection. This credit applies where the detector system meets the requirements of 32.2.3.4.3 and 33.2.3.4.3 (NFPA *101*).

7.2.4.4.4 Every Level Plus Single-Station Detection in Each Bedroom. To receive this credit, the requirements of 7.2.4.4.3 must be met in full with the addition of at least one single-station detector in each bedroom or other sleeping area.

7.2.4.4.5 Total Coverage System. This system provides a minimum of one detector in each occupied room or other habitable space and throughout any basements, storage areas (other than normal clothing closets), or combustible loft spaces. To qualify as a total system, there must be a manual fire alarm system in the building, and the operation of any smoke detector must automatically activate the manual fire alarm system evacuation alarm for the entire building.

7.2.4.5 Automatic Sprinklers. Automatic sprinklers are defined in 7.2.4.5.1 and 7.2.4.5.2.

7.2.4.5.1 Nonsprinklered. No credit is given if there are no sprinklers or if sprinklers, though present, are not sufficient to qualify for the sprinklered category.

7.2.4.5.2 Sprinklered ("Standard Sprinklers" or "Quick-Response or Residential Sprinklers"). The building is sprinklered in accordance with 32.2.3.5.1 through 32.2.3.5.5 and 33.2.3.5.2 through 33.2.3.5.3 (NFPA *101*).

7.2.4.6 Interior Finish. Except as noted in 7.2.4.6.1, classification of interior finish on the walls and ceilings of the occupied space is in accordance with Section 10.2 (NFPA *101*). There are no requirements for interior floor finish. Choose the safety parameter value in Worksheet 7.3.2 based on the interior finish material provided. For example, if the interior wall finish material has a flame spread rating of between 25 and 75, do not take the parameter value associated with a flame spread rating of less than 25, regardless of the presence of automatic sprinkler protection. The mandatory values have been calibrated to take into consideration any sprinkler protection provided.

7.2.4.6.1 Interior wall and ceiling finish materials tested in accordance with NFPA 265, *Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile Coverings on Full Height Panels and Walls*, or NFPA 286, *Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth*, as permitted by Section 10.2 (NFPA *101*), and meeting the criteria established in Section 10.2 (NFPA *101*) for those test standards, shall be scored as Class A interior finish materials (flame spread ≤25).

7.2.4.6.2 No consideration is included in the safety parameter value for any finish with a flame spread rating greater than 200 or for any material not rationally measured by NFPA 255, *Standard Method of Test of Surface Burning Characteristics of Building Materials*. Materials not rationally measured include foam plastics, asphalt-impregnated paper, or other materials capable of inducing extreme rates of fire growth and

rapid flashover. In any case involving these materials, the resultant risk is considered beyond the capacity of this evaluation system and requires individual appraisal. The following should be noted:

(1) Plywood of ¼ in. (6 mm) or greater thickness should be considered as having a flame-spread rating of ≤200.
(2) Exposed wood open-joist construction or other exposed wood construction areas shall be charged as Class C interior finish, in addition to any charges under 7.2.4.1.
(3) If a space is classified as hazardous under 7.2.4.2, no additional charge shall be made as the result of interior finish in such areas.

7.2.4.7 Separation of Sleeping Rooms (from Other Levels and from Corridors). Separation of sleeping rooms is described in 7.2.4.7.1 through 7.2.4.7.3.

7.2.4.7.1 Separation of Sleeping Rooms from Other Levels. The classification of separation of sleeping rooms is categorized under the groups headed "Unprotected Vertical Openings" and "Protected Vertical Openings" (Parameter 7 in Worksheet 7.3.2). Determine the extent of vertical openings and number of stories connected.

7.2.4.7.1.1 Use the category of "Protected Vertical Openings" if any of the following apply:

(1) Single-story building without basement
(2) All vertical openings, other than a two-story open stair in sprinklered building, protected by ½-hour or greater fire resistance–rated smoke partition
(3) All vertical openings, other than a three-story open stair in sprinklered building where primary means of escape from each sleeping area does not require occupants to pass through floor on lower level, protected by ½-hour or greater fire resistance–rated smoke partition
(4) All vertical openings protected by ½-hour or greater fire resistance–rated smoke partition

7.2.4.7.1.2 Where none of the conditions in 7.2.4.7.1.1 apply, use the category of "Unprotected Vertical Openings."

7.2.4.7.2 Separation of Sleeping Rooms from Corridors and Common Spaces. The charge for "None or Incomplete" (Parameter 7 in Worksheet 7.3.2) is assessed in any case where the separation of sleeping rooms from corridors and common spaces is insufficient to meet any of the other classifications in this parameter.

7.2.4.7.3 Criteria for the Other Classifications of Sleeping Room Separation.

7.2.4.7.3.1 Smoke Resisting. Sleeping rooms are separated from corridors or other common spaces in accordance with 32.2.3.6 and 33.2.3.6 (NFPA *101*) without the door closer.

7.2.4.7.3.2 Smoke Resisting with Door Closer. Sleeping rooms are separated in accordance with 32.2.3.6 and 33.2.3.6 (NFPA *101*) with door closer.

7.2.4.7.3.3 Half-Hour Fire Resistance. Meets the requirements of 32.2.3.6 and 33.2.3.6 (NFPA *101*) without the door closer.

7.2.4.7.3.4 Half-Hour Fire Resistance with Door Closer. Sleeping rooms are separated in accordance with 32.2.3.6 and 33.2.3.6 (NFPA *101*) with door closer.

7.2.4.7.3.5 Half-Hour Fire Resistance with Automatic-Closing Doors. Automatic-closing doors shall be permitted if the doors have an arrangement that holds them open in a manner such that they are released by a smoke detector–operated device (e.g., magnetic or pneumatic hold-open device) prior to the passage of significant smoke from the space of fire origin into the corridor or from the corridor into the protected room. Smoke detectors for operation of such doors are either integral with the door closers, mounted at each door, or operated from a total smoke detection system covering both the room and corridor.

7.2.4.8 Means of Escape. Means of escape is defined in 7.2.4.8.1 through 7.2.4.8.6.

7.2.4.8.1 Means of Escape on All Sleeping Levels. A building shall be considered as having means of escape on all sleeping levels, provided the following conditions exist:

(1) The entire building is on a single level.
(2) All guest rooms used for sleeping are on a level having an exit door.

7.2.4.8.2 Primary Route. A normal means of escape that might involve interior or exterior stairs, corridors, doors, or other common means of movement through and out of a dwelling unit.

7.2.4.8.2.1 Protected. A primary route is classed as "protected" if it provides a path of travel to the outside of the building without traversing any corridor or space exposed to an unprotected vertical opening. Also, where the sleeping room is above or below the level of exit discharge, the primary means is an enclosed interior stair in accordance with 32.2.2.4 or 33.2.2.4 (NFPA *101*), an exterior stair, or a horizontal exit.

7.2.4.8.2.2 Unprotected. A primary route is classed as "unprotected" if it does not meet the requirements for "protected."

7.2.4.8.3 Fewer Than Two Remote Routes. The egress capability is classed as "<2 remote routes" if each bedroom does not have access to two routes leading to two separate building exit doorways.

7.2.4.8.4 With Alternative Means. The credit for this level of protection applies to any facility that meets the requirements for a second means of escape in 32.2.2.3 and 33.2.2.3 (NFPA *101*).

7.2.4.8.5 Two Remote Routes. To meet the requirement for "two remote routes," each bedroom must have access to two routes leading to two separate building exit doorways.

7.2.4.8.5.1 Separated. To meet the requirement for "two remote routes separated," the facility must meet the requirements of 32.2.2.2 through 32.2.2.3 and 33.2.2.1 (NFPA *101*).

7.2.4.8.5.2 Unseparated. The two remote routes do not meet the requirements for the classification "separated."

7.2.4.8.6 Direct Exit from Each Bedroom.

7.2.4.8.6.1 To be credited, each bedroom must have a door that is operable by the room occupant(s) and such door opens directly to grade without more than one step, opens directly to a ramp to grade, or opens directly to an external porch or landing with external stairs or other suitable access to grade.

7.2.4.8.6.2 Some buildings have a nonsleeping occupants use area (e.g., staff lounge) on a floor without any exit, and the building otherwise qualifies to receive credit for direct exits or for two remote exits. To receive credit for direct exits or for two remote exits, there must be either a protected egress route or two remote routes from the occupants use area.

7.3 Worksheets for Evaluating Fire Safety for a Small Facility. A small facility is normally one with a capacity for 16 or fewer residents. For each individual residence or apartment used as

a small board and care facility, the seven-step process in Figure 7.3 should be followed when evaluating fire safety.

7.3.1 Step 1 — Complete Cover Sheet Using Worksheet 7.3.1. See Figure 7.3.

7.3.2 Step 2 — Determine Safety Parameter Values Using Worksheet 7.3.2. Select and circle the safety value for each safety parameter in Worksheet 7.3.2 that best describes the conditions in the facility. Choose only one value for each of the eight parameters. If two or more values appear to apply, choose the one with the lowest point value.

7.3.3 Step 3 — Complete Individual Safety Evaluation Using Worksheet 7.3.3. The following steps should be taken:

(1) Transfer each of the eight circled safety parameter values from Worksheet 7.3.2 to every available block in the line with the corresponding safety parameter in Worksheet 7.3.3. Where the block is marked "÷ 2 =," enter one-half the value from Worksheet 7.3.2.
(2) Add each of the four columns, keeping in mind that any negative numbers need to be deducted.
(3) Transfer the resulting values for S_1, S_2, S_3, and S_4 to the corresponding blocks in Worksheet 7.3.5.

7.3.4 Step 4 — Determine Mandatory Requirements Using Worksheet 7.3.4A or 7.3.4B as appropriate. The following steps should be taken:

(1) Select the level of requirements from Worksheet 7.3.4A or 7.3.4B as appropriate. Circle the appropriate values.
(2) Transfer the circled values from Worksheet 7.3.4A or 7.3.4B to the corresponding blocks for S_a, S_b, S_c, and S_d in Worksheet 7.3.5.

7.3.5 Step 5 — Determine the Equivalency Evaluation. The following steps should be taken:

(1) Perform the subtractions indicated in Worksheet 7.3.5. Enter the differences in the appropriate answer blocks.
(2) For each row, check "yes" if the value in the answer block is zero (0) or greater. Check "no" if the value in the answer block is a negative number.

7.3.6 Step 6 — Evaluate Other Considerations Not Previously Addressed, Using Worksheet 7.3.6. The equivalency covered by Worksheets 7.3.2 through 7.3.5 includes the majority of the considerations covered by the *Life Safety Code*. Some considerations are not evaluated by this method and must be considered separately. These additional considerations are covered in Worksheet 7.3.6, Facility Fire Safety Requirements Worksheet.

7.3.7 Step 7 — Conclude Whether the Level of Life Safety Is at Least Equivalent to That Prescribed by the *Life Safety Code*, Using Worksheet 7.3.7. Worksheet 7.3.7, Conclusions, combines the zone fire safety equivalency evaluation of Worksheet 7.3.5 and the additional considerations of Worksheet 7.3.6.

7.4 Glossary for Fire Safety Evaluation Worksheet for a Large Facility.

7.4.1 Introduction. This glossary is provided to assist in completing the "Fire Safety Evaluation Worksheet for a Large Facility" to determine the suitability of a large facility to house a board and care occupancy. The instructions for the mechanisms of completing the worksheet are included in Section 7.5. They are not repeated in this glossary. This glossary provides expanded discussion and definitions for the various items in the worksheet to assist the user where questions of definition or interpretation arise. To the maximum extent possible, the glossary does not repeat the definitions already existing in NFPA *101*, *Life Safety Code*, but rather references the appropriate paragraphs in NFPA *101*.

7.4.2 Areas of Application.

7.4.2.1 The entire residence is evaluated on one set of worksheets to the degree indicated by each item on the worksheets. See Worksheets 7.5.1 through 7.5.7. However, spaces that are not used for living units, not in direct utility or maintenance support of the living units, not provided for resident use, or not in any way involved in resident emergency egress shall be permitted to be omitted from the calculation where such space is separated from all of the resident spaces and resident-support spaces by 2-hour fire resistance–rated construction (including any building members that support the resident areas and emergency egress routes). In such a case, however, any appropriate charges under Safety Parameter 2, "Hazardous Areas," in Worksheet 7.5.2 shall be charged. Also, the assignment of values for Safety Parameter 3, "Manual Fire Alarm"; Safety Parameter 7, "Exit System"; and Safety Parameter 8, "Exit Access," shall not consider conditions in unoccupied spaces that do not involve any egress paths.

7.4.2.2 Note that zoning of buildings shall be permitted, and individual zones shall be permitted to have different safety values (levels). Such zoning shall, however, be limited to considerations of differences in Safety Parameters 6, 7, and 8, which cover exits and separation of sleeping areas. Zoning shall be by separate fire/smoke zones. A fire/smoke zone is a portion of the building separated from all other portions of the building by building construction having at least a 1-hour fire resistance rating or smoke barriers, or both, conforming to the requirements of Section 8.5 of NFPA *101*, *Life Safety Code*, using smoke barriers of at least a ½-hour fire resistance rating. Zoning of the facility also shall be permitted in non–fire-resistive sprinklered buildings, provided the construction separating one zone from another is sound- and smoke-resistant.

7.4.3 Maintenance. All protection systems, requirements, arrangements, and procedures shall be maintained in a dependable operating condition, and a sufficient state of readiness, and shall be used in such a manner that the intended safety function or hazard constraint is not impaired. Otherwise, they shall receive no credit in the evaluation.

7.4.4 Safety Parameters (Worksheet 7.5.2). The safety parameters are a measure of those building factors that bear on or contribute to the safety of those persons who might be in the building at the time of a fire. Each of the safety parameters is to be analyzed, and the safety value for each parameter that best describes the condition in the building is to be identified. Only one value for each of the parameters is to be chosen. If two or more values appear to apply, the one with the lowest point value shall be used.

7.4.4.1 Construction.

7.4.4.1.1 Number of stories in height is defined in 4.6.3 (NFPA *101*).

7.4.4.1.2 Where the facility includes additions or connected structures of different construction, the rating and classification of the structure shall be based on the following:

(1) Separate buildings where a 2-hour or greater fire resistance–rated separation exists between the portions of the building
(2) The lower safety parameter point score involved where such a separation does not exist

WORKSHEET 7.3.1 COVER SHEET

Fire Safety Evaluation Worksheet for a Small Board and Care Facility

Facility Identification _____

Evaluator _____ Date _____

WORKSHEET 7.3.2 SAFETY PARAMETER VALUES — SMALL FACILITY

Safety Parameters		Parameter Values								
1. Construction/ Fire Resistance		Exposed Structural Members			Protected 15 min			Protected 1 hr		
		0			1			3		
2. Hazardous Areas		Double Deficiency			Single Deficiency			None or No Deficiency		
		−7			−4			0		
3. Manual Fire Alarm		None or Incomplete			W/O F.D. Notification			W/ F.D. Notification		
		0			1			2		
4. Smoke Detection and Alarm		None or Incomplete	Single Lev. Det./ Limited Warning		Warning to All Bedrooms: Every Lev. Det.[e]		Warning to All Bedrooms: Every Lev. Plus Det. in Each Bdrm.	Total Coverage System		
		−4	0		2		3(4)[f]	4		
5. Automatic Sprinklers		Nonsprinklered			Standard Sprinklers			Quick-Response or Residential Sprinklers		
		0			8			10		
6. Interior Finish		Flame-Spread Ratings								
		>75 to ≤200			>25 to ≤75			≤25		
		−3			−1			0		
7. Separation of Sleeping Rooms (from other levels and from corridors)		Unprotected Vertical Openings: None or Incomp.	Unprotected Vertical Openings: Smoke Resisting W/O Closers	Unprotected Vertical Openings: Smoke Resisting W/ Closers	Protected Vertical Openings[d]: None or Incomp.	Protected Vertical Openings[d]: Smoke Resisting	Protected Vertical Openings[d]: ½ hr	Protected Vertical Openings[d]: ½ hr Auto-Closing	Protected Vertical Openings[d]: Smoke Res. W/ Door Closer	Protected Vertical Openings[d]: ½ hr W/ Door Closer
		−6	−4	0(0)[c]	−2	0	1(0)[a]	2(0)[a]	1	2(1)[a]
8. Means of Escape	Means of Escape on All Sleeping Levels	<2 Remote Routes: W/O Alt. Means	<2 Remote Routes: W/ Alt. Means		2 Remote Routes Unseparated		2 Remote Routes Separated	Direct Exit from Each Bdrm.		
		−1	0		1(0)[b]		2(0)[b]	3(0)[b]		
	Means of Escape Not on All Sleeping Levels	Primary Route Not Protected: <2 Remote Routes: W/O Alt. Means	Primary Route Not Protected: <2 Remote Routes: W/ Alt. Means	Primary Route Not Protected: 2 Remote Routes	Primary Route Protected: < 2 Remote Routes: W/O Alt. Means	Primary Route Protected: < 2 Remote Routes: W/ Alt. Means	Primary Route Protected: 2 Remote Routes			
		−4	−3	0	−1	0	2(0)[b]			

[a] Use ( ) if Parameter 1 is 0 and Parameter 5 is 0.
[b] Use (0) if Parameter 7 is based on a "none or incomplete" situation.
[c] Use (0) if door is 20-minute and has automatic closer.
[d] Consider a single-level building as having protected vertical openings.
[e] Every level detection is permitted to be omitted with quick-response automatic sprinklers throughout; however, detection in each bedroom is required.
[f] Use (4) in existing buildings if detection in each bedroom and quick-response automatic sprinklers throughout.

(For use with NFPA 101A-2010/NFPA *101*-2009, B & C Small) (p. 1 of 3)

FIGURE 7.3 Worksheets for Evaluating Fire Safety in a Small Facility.

WORKSHEET 7.3.3 INDIVIDUAL SAFETY EVALUATIONS — SMALL FACILITY

Parameters	Fire Control (S_1)	Egress (S_2)	Refuge (S_3)	General Fire Safety (S_4)
1. Construction				
2. Hazardous Areas		÷ 2 =		
3. Manual Fire Alarm	÷ 2 =	*(See note.)*		
4. Smoke Detection and Alarm	÷ 2 =		÷ 2 =	
5. Automatic Sprinklers		÷ 2 =		
6. Interior Finish	÷ 2 =			
7. Separation of Sleeping Rooms				
8. Means of Escape				
Total	S_1 =	S_2 =	S_3 =	S_4 =

NOTE: Maximum value of manual fire alarm for means of escape is 1.

WORKSHEET 7.3.4A MANDATORY SAFETY REQUIREMENTS — NEW SMALL FACILITY

Control Requirement (S_a)	Egress Requirement (S_b)	Refuge Requirement (S_c)	General Fire Safety Requirement (S_d)
10.5	5	11.5	7

WORKSHEET 7.3.4B MANDATORY SAFETY REQUIREMENTS — EXISTING SMALL FACILITY

Level of Evacuation Difficulty	Control Requirement (S_a)	Egress Requirement (S_b)	Refuge Requirement (S_c)	General Fire Safety Requirement (S_d)
Prompt	0	4	2	1
Slow	2	7	4	7
Slow*	1	6	2	5
Impractical	8	9	9	10

* Use these mandatory safety requirements if evacuation time is 8 minutes or less or if the evacuation capability score is 3 or less as determined by Chapter 6.

(For use with NFPA 101A-2010/NFPA *101*-2009, B & C Small) (p. 2 of 3)

FIGURE 7.3 ***Continued***

WORKSHEET 7.3.5 EQUIVALENCY EVALUATION

						Yes	No
Control Provided (S_1)	minus	Required Control (S_a)	≥	0	S_1 ☐ – S_a ☐ = ☐		
Egress Provided (S_2)	minus	Required Egress (S_b)	≥	0	S_2 ☐ – S_b ☐ = ☐		
Refuge Provided (S_3)	minus	Required Refuge (S_c)	≥	0	S_3 ☐ – S_c ☐ = ☐		
General Fire Safety (S_4)	minus	Required Gen. Fire Safety (S_d)	≥	0	S_4 ☐ – S_d ☐ = ☐		

WORKSHEET 7.3.6 FACILITY FIRE SAFETY REQUIREMENTS WORKSHEET

Considerations	Met	Not Met
Complies with the applicable requirements of Sections 32.7 and 33.7 (NFPA *101*).		

WORKSHEET 7.3.7 CONCLUSIONS

1. ☐ All of the checks in Worksheet 7.3.5 are in the "Yes" column. The level of fire safety is at least equivalent to that prescribed by NFPA *101, Life Safety Code*.*
2. ☐ One or more of the checks in Worksheet 7.3.5 are in the "No" column. The level of fire safety is not shown by this system to be equivalent to that prescribed by NFPA *101* for small dwelling units.

* The equivalency covered by this worksheet includes the majority of considerations covered by NFPA *101, Life Safety Code*. There are some considerations that are not evaluated by this method. These must be considered separately. These additional considerations are covered in Worksheet 7.3.6, Facility Fire Safety Requirements Worksheet. One copy of this worksheet is to be completed for each facility.

(For use with NFPA 101A-2010/NFPA *101*-2009, B & C Small) (p. 3 of 3)

FIGURE 7.3 ***Continued***

7.4.4.1.3 The safety parameter values for Type V(000), Type III(200), and Type II(000) receive a higher parameter credit if the building is fully sheathed. This credit is to be given if all portions of the bearing walls, bearing partitions, floor construction, and roofs [or a roof/loft system if the space above the highest ceiling is inaccessible and either is provided with draft stops or other barriers on 30 ft (9.1 m) spacing or is provided with heat- or smoke-actuated fire detectors that sound the building fire alarm], and all columns, beams, girders, trusses, or similar bearing members either have an inherent fire resistance or are sheathed, encased, or otherwise treated to provide approximately a ½-hour or greater fire resistance rating. Buildings fully sheathed with sound lath and plaster, gypsum board, or equivalent sheathing are considered as meeting these criteria.

7.4.4.2 Hazardous Areas. The assignment of parameter values for hazardous areas is a four-step process.

7.4.4.2.1 Step 1 — Identify Hazardous Areas. Hazardous areas are those having a degree of hazard greater than that normal to the general occupancy of the building, such as areas for storage of combustibles or flammables, for heat-producing appliances, or for maintenance purposes.

7.4.4.2.2 Step 2 — Determine the Level of Hazard.

7.4.4.2.2.1 There are two levels of hazard: structurally endangering and not structurally endangering.

(A) Structurally Endangering. A hazardous occupancy with sufficient fire or explosion potential to defeat the basic integrity of the building framing as defined in 7.4.4.1.

(B) Not Structurally Endangering. A hazardous occupancy with sufficient fire potential to build to full involvement and present a danger of propagating through openings or wall partitions but not possessing sufficient total potential to endanger the structural framing or floor decking as defined in 7.4.4.1.

7.4.4.2.2.2 Table 7.4.4.2.2.2 provides an analysis of typical types of hazardous areas relative to inherent potential structural danger to different classes of structural systems.

7.4.4.2.3 Step 3 — Determine the Fire Protection Provided.

7.4.4.2.3.1 The parameter value for hazardous areas is based on the presence or absence of the fire protection necessary to control or confine the hazard. Two different types of fire protection are considered. The first consists of automatic sprinklers or other appropriate extinguishing systems covering the entire hazard. The second is a complete fire resistance–rated enclosure, including the separation of the hazardous area from any bearing members, partitions separating the hazardous area from all other spaces, and doors to the space sufficient to exceed the potential of the fire load involved. Any hazardous space that has either of these protection systems is classed as having single protection. Any hazardous space that is both fully enclosed — as described above— and sprinklered is classed as having both (i.e., double-level protection). On this basis, any hazardous area with a fuel load that has the potential of overwhelming the available structural capability could, as a minimum, have a single deficiency as determined in 7.4.4.2.4.

7.4.4.2.3.2 Note that where the hazardous area is within a living unit or abuts an egress route (exit or exit access) addressed in 7.4.4.7 and 7.4.4.8, the credit for sprinklers shall not be permitted unless the hazardous area is separated from the rest of the living unit or the egress route by reasonably smoke-resisting barriers and doors.

7.4.4.2.4 Step 4 — Determine Degree of Deficiency and Assign Parameter Values. The parameter value ultimately is determined by the degree of the deficiency of the hazardous area based on the level of protection needed. Table 7.4.4.2.4 provides a matrix to be used for determining the degree of deficiency to be assessed. In some situations, more than one hazardous area with the same or differing levels of deficiency exists. The overall parameter value then is based on the single most serious deficiency for the hazardous area.

7.4.4.3 Manual Fire Alarm. Fire alarms are defined in 7.4.4.3.1 through 7.4.4.3.3.

Table 7.4.4.2.2.2 Hazardous Areas — Level of Hazard

Large Facility — Inherent Structural Danger from Typical Hazardous Areas			
Exposure (area, space, activity, condition)	**Minimum Fire Resistance Rating of Bearing Walls, Bearing Partitions, Columns, Beams, Girders, Trusses, and Floor/Ceiling Assemblies Exposed to Hazardous Area**		
	≥2 hours	**≥1 hour to <2 hours**	**<1 hour**
Occupational therapy space	N/SE	Varies*	SE
Craft shop	N/SE	Varies*	SE
General storage area	N/SE	Varies*	SE
Garage	N/SE	N/SE	SE
Boiler, heater, or incinerator rooms	N/SE	Varies*	SE
Fuel storage	N/SE	SE	SE
Trash chutes	N/SE	SE	SE
Trash rooms	N/SE	SE	SE
Small trash collection room	N/SE	N/SE	SE
Laundries (institutional type)	N/SE	N/SE	SE
Repair shops	N/SE	Varies*	SE

N/SE: not structurally endangering. SE: structurally endangering.
*Must be judged on the combustibles involved in the individual situation.

Table 7.4.4.2.4 Hazardous Areas — Degree of Deficiency

	No protection	Sprinkler protection	Fire resistance–rated enclosure	Sprinklered and fire resistance–rated enclosure
Not structurally endangering	Single deficiency	No deficiency		
Structurally endangering	Double deficiency	Single deficiency	No deficiency[*] Double deficiency[†]	No deficiency[*] Single deficiency[†]

[*]If fire resistance and structural strength exceed maximum potential of hazard.
[†]If fire resistance and structural strength are not sufficient to withstand potential of hazard.

7.4.4.3.1 None or Incomplete. There is no fire alarm system, or the system is incomplete and does not meet the requirements for a higher-scored category.

7.4.4.3.2 Without Fire Department Notification (W/O F.D. Notification). There is a fire alarm system that meets the requirements of 32.3.3.4 and 33.3.3.4 (NFPA *101*), as appropriate.

7.4.4.3.3 With Fire Department Notification (W/ F.D. Notification). There is a fire alarm system that complies with 7.4.4.3.2 and automatically transmits a signal to the fire department in accordance with 9.6.4 (NFPA *101*).

7.4.4.4 Smoke Detection and Alarm. All references to detectors herein refer to smoke detectors. No credit is given for thermal detectors in habitable spaces except as specifically noted. Heat detectors can be credited in uninhabitable spaces where ambient temperatures can be expected to exceed 120°F (50°C) or fall below 0°F (–18°C) (such as in unfinished attics or cocklofts), provided separation from inhabited spaces is at least ½-hour fire resistance–rated. The categories under this parameter are described in 7.4.4.4.1 through 7.4.4.4.4.

7.4.4.4.1 None or Incomplete. There are no detectors, or those that are present do not meet the requirements for a higher-scored category.

7.4.4.4.2 Single-Station Units in Each Bedroom. There is one single-station detector (sounds the alarm only at the responding detector) in each bedroom or sleeping room.

7.4.4.4.3 Interconnected System. Interconnected systems are those systems where the operation of any detector sounds alarm devices that alert all of the occupants. The alarm sounding device shall be permitted to be on other interconnected detectors or be other separate alarm devices. Where the systems are of the total building variety, the credit shall be permitted to be given only if the system includes manual fire alarm features or the building has a manual fire alarm system and the operation of the detection system sounds the manual fire alarm as though a fire alarm box on that floor had been operated.

7.4.4.4.3.1 Corridors and Common Spaces Without Bedroom/Suite Detectors. The system meets the requirements of 32.3.3.4.8 and 33.3.3.4.8 (NFPA *101*).

7.4.4.4.3.2 Corridors and Common Spaces with Single-Station Bedroom/Suite Detectors. There is one single-station detector in each bedroom or sleeping room and interconnected detectors in corridors and common spaces that are spaced as described in 7.4.4.4.3.1.

7.4.4.4.3.3 Corridors and Common Spaces with Interconnected Bedroom/Suite Detectors. The system is as in 7.4.4.4.3.2, except bedroom/suite detectors are interconnected with corridor/common space detectors. In buildings in which construction as specified in 7.4.4.1 is based on all members having a fire resistance rating of at least ½ hour or more, a system as described in 7.4.4.4.3.2 that also has a thermal detector in each bedroom/suite connected to the building fire alarm system shall be permitted to be credited in this category.

7.4.4.4.4 Total Building System. This system includes detectors located in every bedroom throughout the building and also provides detector coverage throughout all corridors, common spaces, and hazardous areas, with the system meeting the requirements for an automatic fire alarm system in accordance with *NFPA 72, National Fire Alarm and Signaling Code.*

7.4.4.5 Automatic Sprinklers. Any sprinkler installation that meets the requirements of 32.3.3.5.1 and 33.3.3.5.1 (NFPA *101*).

7.4.4.5.1 None or Incomplete.

7.4.4.5.1.1 No credit is given if there are no sprinklers or if sprinklers, though present, are not sufficient to qualify for one of the other categories specified herein.

7.4.4.5.1.2 Note that any space that is credited as being protected by automatic sprinklers and abuts a hazardous area judged deficient in accordance with 7.4.4.2 shall not be permitted to be considered as sprinkler protected unless the hazardous area also is sprinkler protected.

7.4.4.5.2 Bedrooms/Suites Only. All bedrooms/suites have sprinkler protection.

7.4.4.5.3 Corridors and Common Spaces. Sprinkler protection covers all of the corridors and public spaces that separate, directly expose, or are in the egress path from the bedrooms/suites (except fire resistance–rated, enclosed, noncombustible stairwells). Sprinklers shall be installed along the corridor ceiling, and, in addition, one sprinkler shall be installed opposite the center of and inside of any bedroom door opening onto the corridor.

7.4.4.5.4 Bedrooms/Suites, Corridors, and Common Spaces. Sprinkler protection meets the combined requirements for 7.4.4.5.2 and 7.4.4.5.3 and is equipped with an automatic alarm initiating device that activates the building manual fire alarm system or an alternate evacuation alarm.

7.4.4.5.5 Total Building. The building is totally sprinkler protected and is equipped with an automatic alarm initiating device that activates the building manual fire alarm system or an alternate evacuation alarm.

7.4.4.6 Separation of Sleeping Rooms from Exit Access. Separation of sleeping rooms from exit access is based on the wall partitions that make up the separation and the protection of the openings in those partitions.

7.4.4.6.1 The charge for "None or Incomplete" (Safety Parameter 6 in Worksheet 7.5.2) is assessed in any case where the separation of sleeping rooms from exit access is insufficient to meet any of the other classifications in this parameter.

7.4.4.6.2 Criteria for "Expectation of Door Closing."

7.4.4.6.2.1 Expectation— Not High. This credit is given if the requirements for "expectation — high" are not met.

7.4.4.6.2.2 Expectation— High. High expectation of a door closing (or being closed at time of fire) shall be considered to be met if the requirements of 32.3.3.6.5 and 33.3.3.6.6 (NFPA *101*) are met.

7.4.4.6.3 Smoke Resisting. Sleeping rooms are separated from corridors or other common spaces by walls, partitions, or other constructions that resist the passage of smoke. There are no louvers, transfer grilles, operable transoms, or other air passages penetrating the wall except properly installed heating and utility installations. Doors, in walls or partitions that separate sleeping rooms from corridors or other common spaces, resist the passage of smoke and are provided with latches, door closers, or other mechanisms suitable for keeping the doors tightly closed. Vision panels shall be permitted to be installed in doors or partitions without respect to glass type or size.

7.4.4.6.4 Half-Hour. The credit is given if the requirements of 32.3.3.6.3 through 32.3.3.6.6 and 33.3.3.6.3 through 33.3.3.6.6 (NFPA *101*) are met.

7.4.4.6.5 1-Hour Walls, 20-Minute Doors. Sleeping rooms are separated from corridors or other common spaces by walls or partitions and doors meeting the requirements of 7.4.4.6.4, and the walls and partitions have at least a 1-hour fire resistance rating.

Exception: Where doors meet the requirements of 7.4.4.6.4 and automatic sprinklers are provided on both sides of the door.

7.4.4.7 Exit System. Exit systems are the paths of travel from the facility to the outside. For the purposes of this parameter, however, only those exit routes used in fire drills in accordance with Sections 32.7 and 33.7 (NFPA *101*) shall be credited.

7.4.4.7.1 Exposed Route. An exit route is exposed if a segment of that route is the only available route for one or more residents and that segment of the exit route is not safeguarded by one of the following means:

(1) Separation from all other rooms or areas by walls and doors of equivalent separation to that credited in 7.4.4.6
(2) Protection of the other rooms or spaces by an automatic sprinkler system
(3) Protection of the other rooms or spaces by a smoke detection and alarm system connected to activate the building evacuation alarm; and where furnishings, finishes, and furniture, in combination with all other combustibles within the space, are of such minimum quantity and are so arranged that a fully developed fire is unlikely to occur

7.4.4.7.2 Multiple Routes. Multiple routes exist where the occupants of any sleeping room have, either from the sleeping room or through access in a corridor adjacent to the sleeping room, a choice of two separate exit routes to the outside.

7.4.4.7.3 Deficient. An exit route is deficient if it fails to meet any of the applicable criteria in 32.3.2 and 33.3.2 (NFPA *101*), except those related to travel distances and dead ends. These conditions are evaluated separately in 7.4.4.8.

7.4.4.7.4 Without Horizontal Exit (W/O Horiz. Exit). An egress system is based on this charge if there are multiple routes that are not deficient but the arrangement does not include a horizontal exit as defined in 7.4.4.7.5, or that have an acceptable direct exit from each sleeping room as defined in 7.4.4.7.7.

7.4.4.7.5 With Horizontal Exit (W/ Horiz. Exit). The presence of a single horizontal exit meeting the criteria in 7.2.4 (NFPA *101*) on each floor containing sleeping rooms shall be considered as sufficient criteria to meet this requirement, provided that the space created is of sufficient size to provide at least 3 ft^2 (0.28 m^2) of accessible space for all of the potential occupants already present in or evacuating to such space.

7.4.4.7.6 Smokeproof Enclosure. Credit for a smokeproof enclosure shall be permitted to be given for a stairway designed and tested in accordance with the requirements of 7.2.3 (NFPA *101*) for a smokeproof enclosure. To receive credit for a smokeproof enclosure, all exit stairs credited in Safety Parameter 7, "Exit System," and Safety Parameter 8, "Exit Access," of Worksheet 7.5.2 shall meet the smokeproof enclosure requirements.

7.4.4.7.7 Direct Exit.

7.4.4.7.7.1 To be credited for direct exits, each sleeping room shall have within that unit a door that opens to the exterior at grade level or onto an unenclosed exterior balcony with direct access to an exterior exit or smokeproof enclosure. Where such openings are directly onto grade in a location where any person egressing can move directly away from the building without further exposure, the credit for direct exit shall be permitted, even if there are no other exit routes from the involved living unit.

7.4.4.7.7.2 Note that this parameter value does not cover the charges for the dead-end conditions, travel distance, interior finish in the egress routes (exits or exit access), or enclosure of stairways or other exit routes that pass from floor to floor. These elements are covered separately in 7.4.4.8, 7.4.4.9, and 7.4.4.10.

7.4.4.8 Exit Access. Exit access is a measurement of the travel distance from the sleeping rooms to the outside or to any other point of safety as defined in 3.3.197 (NFPA *101*), whichever is shorter.

7.4.4.9 Interior Finish.

7.4.4.9.1 Classification of interior finish on walls and ceilings of the occupied space shall be in accordance with Section 10.2 (NFPA *101*). Choose the safety parameter value in Worksheet 7.5.2 based on the interior finish material provided. For example, if the interior wall finish material has a flame spread rating of between 25 and 75, do not take the parameter value associated with a flame spread rating of less than 25 regardless of the presence of automatic sprinkler protection. The mandatory values have been calibrated to take into consideration any sprinkler protection provided. Exposed portions of structural members complying with the requirements of Type IV(2HH) construction shall be permitted.

7.4.4.9.2 Interior wall and ceiling finish materials tested in accordance with NFPA 265, *Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile Coverings on Full Height Panels and Walls*, or NFPA 286, *Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth*, as permitted by Section 10.2 (NFPA *101*), and meeting the criteria established in Section 10.2 (NFPA *101*) for those test standards, shall be scored as Class A interior finish materials (flame spread ≤25).

7.4.4.9.3 Only floor coverings in the exit and exit access system are considered. For purposes of assigning the parameter values in Worksheet 7.5.2, such floor coverings are considered as having a flame spread ≤25 if they meet the requirements for Class I or Class II and as otherwise having a flame spread >75. Previously installed floor coverings shall be permitted, subject to the approval of the authority having jurisdiction.

7.4.4.9.4 No consideration is included in the safety parameter value for any finish with a flame-spread rating greater than 200 or for any material not rationally measured by NFPA 255, *Standard Method of Test of Surface Burning Characteristics of Building Materials*. Materials not rationally measured include foam plastics, asphalt-impregnated paper, or other materials capable of inducing extreme rates of fire growth and rapid flashover. In any case involving these materials, the resultant risk is considered beyond the capacity of this evaluation system and requires individual appraisal. Note that plywood of ¼ in. (6 mm) or greater thickness should be considered as having a flame-spread rating of ≤200.

7.4.4.10 Vertical Openings.

7.4.4.10.1 These values apply to vertical openings and penetrations, including exit stairways, ramps, and any other vertical exits, pipe shafts, ventilation shafts, duct penetrations, and laundry and incinerator chutes. The charge for vertical openings shall be based on the presence or lack of enclosure and the fire resistance rating of the enclosure, if provided.

7.4.4.10.2 A vertical opening or penetration shall be classified as open, provided any of the following conditions apply:

(1) It is unenclosed.
(2) It is enclosed but does not have doors.
(3) It is enclosed but has openings other than doorways.
(4) It is enclosed with cloth, paper, or similar materials without any sustained firestopping capabilities, except as permitted by 32.3.3.1 and 33.3.3.1 (NFPA *101*), as appropriate.

7.4.4.10.3 If a shaft other than a credited exit route (i.e., credited as one of the multiple routes required in 7.4.4.7.2 or in determining travel distance in 7.4.4.8) is enclosed on all floors but one and this results in an unprotected opening between that shaft and one, and only one, floor, the parameter value assigned to that shaft shall be 0. If a required egress route is contained in that shaft, the parameter value shall be (–2).

7.4.4.11 Smoke Control. Smoke control definitions are provided in 7.4.4.11.1 through 7.4.4.11.5.

7.4.4.11.1 None. There are no smoke barriers (or horizontal exits) on the floor, the floor is not served by a smokeproof enclosure, and there are no mechanically assisted smoke control systems serving the floor.

7.4.4.11.2 Smoke Barrier. Smoke barriers consist of installations conforming to the requirements of 32.3.3.7 and 33.3.3.7 (NFPA *101*), as appropriate.

7.4.4.11.3 Mechanically Assisted Systems — by Floor. Mechanically assisted smoke control on a corridor basis is a tested and accepted smoke control system initiated by a method of smoke detection that ensures operation of the smoke control system before significant smoke has entered into the corridor involved. One method of judging the acceptability of smoke control systems is contained in NFPA 92A, *Standard for Smoke-Control Systems Utilizing Barriers and Pressure Differences*.

7.4.4.11.3.1 The mechanism must be capable of pressurizing the corridor sufficiently to prevent smoke from the room/suite or space of origin from entering the corridor during the entire course of the fire. Such a system must be able to hold back the smoke through the expected maximum severity of the fire. It also must be capable of exhausting smoke from the corridor based on the assumption that the emergency evacuation procedures and other activities involving the opening and closing of doors will cause occasional brief periods during which the smoke control system is overpowered.

7.4.4.11.3.2 This results in the movement of the smoke from the fire area into the corridor. (The exhausting of the smoke normally would be accomplished by having an exhaust fan of lower capacity than the fan supplying air for pressurization exhaust from the corridor. The net pressurization force would occur from the effect of the pressurizing fan minus the effect of the removal or purging fan.)

7.4.4.11.3.3 The corridor's pressurizing system could involve early warning smoke detection, automatic closing of all room/suite doors, sprinkler protection, or all three. Where these additional protection devices are provided to effect such a smoke control system, the individual credits for each of the involved protection devices are in addition to the credits for the smoke control system.

7.4.4.11.4 Mechanically Assisted Systems — by Zone. Mechanically assisted smoke control on a zone basis shall include a smoke barrier (or a horizontal exit) supported by a tested and accepted smoke control system to provide a pressure differential that assists in confining smoke to the compartment of origin. One method of judging the acceptability of smoke control systems is contained in NFPA 92A, *Standard for Smoke-Control Systems Utilizing Barriers and Pressure Differences*. Special smoke control fans shall be permitted to be used, or special adjustments of the normal building air movement fans shall be permitted to be made.

7.4.4.11.5 Mechanically Assisted Systems — by Room/Suite. Mechanically assisted smoke control on a room/suite basis is a tested and accepted smoke control system so designed as to provide a mechanism of automatically controlled fans, smoke vent shafts, or a combination thereof to ensure a positive pressure differential that prevents intrusion of smoke into any room or suite not involved in fire. One method of judging the acceptability of smoke control systems is contained in NFPA 92A, *Standard for Smoke-Control Systems Utilizing Barriers and Pressure Differences*. In this method, the rooms have a pressure differential higher than that of the corridor and of any room where fire has been detected. Such systems shall be so arranged that there is detection in each room or suite that prevents a room involved in fire from becoming positively pressurized.

7.5 Worksheets for Evaluating Fire Safety in a Large Facility. A large facility normally is one that has a capacity for more than 16 residents. For each such facility to be evaluated, the seven-step process in Figure 7.5 should be followed when evaluating fire safety.

7.5.1 Step 1 — Complete Cover Sheet Using Worksheet 7.5.1. See Figure 7.5.

7.5.2 Step 2 — Determine Safety Parameter Values, Using Worksheet 7.5.2. Select and circle the safety value for each safety parameter that best describes the conditions in the facility. Choose only one value for each of the 11 parameters. If two or more values appear to apply, choose the one with the lowest point value.

WORKSHEET 7.5.1 COVER SHEET

Fire Safety Evaluation Worksheet for a Large Board and Care Facility

Facility Identification _____ Zone(s) Evaluated _____

Evaluator _____ Date _____

WORKSHEET 7.5.2 SAFETY PARAMETER VALUES — LARGE FACILITY

Safety Parameters	Parameter Values							
1. Construction	Combustible					Noncombustible		
Stories in Height	Type V(000)	Type V(111)	Type III(200)	Type III(211)	Type IV (2HH)	Type II(000)	Type II(111)	Type II(222) & Type I
1 Story	−2( )[a]	0	−2( )[a]	0	0	0	2	2
2 Stories	−6( )[a]	0	−6( )[a]	0	0	−5( )[a](0)[s]	2	2
3–4 Stories	−8( )[a]	−2(0)[q]	−8( )[a]	0	−2(0)[q]	−6( )[a]	2	2
5–6 Stories	−8	−2(0)[q]	−8( )[a]	0	−2(0)[q]	−6( )[a]	2	2
Over 6 Stories	−10	−4	−10	−2(0)[q]	−4(0)[q]	−8	0	2

2. Hazardous Areas	Within Bdrms./Suite or on Exit Routes		Elsewhere in Building		None, or No Deficiency
	Double Deficiency	Single Deficiency	Double Deficiency	Single Deficiency	
	NP	−4	−4(−7)[b]	0(−4)[b]	0

3. Manual Fire Alarm	None or Incomplete	Manual Alarm	
		W/O F.D. Notification	W/ F.D. Notification
	0(2)[f]	2	3

4. Smoke Detection and Alarm	None or Incomplete	Single Station Units in Each Bedroom	Interconnected System[i]			Total Building
			W/O Bdrm./ Suite Detectors	Single Station Bdrm./Suite Detectors	Interconnected Bdrm./Suite Detectors	
	−10(0)[j]	0(2)[j]	2(0)[e]	3(0)[e](6)[p]	5(6)[p]	6

5. Automatic Sprinklers	None or Incomplete	Bdrms./Suites Only	Corrs., Common Spaces	Bdrms./Suites, Corrs., Common Spaces	Total Building	
					AS	QRS
	0	2(0)[c]	4(0)[c]	6	8	10

6. Separation of Sleeping Rooms From Exit Access	None or Incomplete	Fire Resistance/Walls and Doors—Expectation of Door Closing				
		Expectation—Not High		Expectation—High		
		Smoke Resisting[g]	½-hr Walls 20-min Doors[g,r]	Smoke Resisting[g]	½-hr Walls 20-min Doors[g,r]	1-hr Walls 20-min Doors[g]
	−6	−1(0)[k]	0(1)[k]	1	2(3)[l]	3(4)[l]

7. Exit System	Single or Exposed Route	Multiple Routes				Direct Exit
		Deficient	W/O Horiz. Exit	W/ Horiz. Exit	Smokeproof Enclosure	
	−6(0)[m]	−2(0)[m]	0	2	2	4

8. Exit Access (from living unit)	Max. Dead End		No Dead End >30 ft and Travel Is:			
	>100 ft	>30 ft to ≤100 ft	>250 ft	>125 ft to ≤250 ft	>50 ft to ≤125 ft	≤50 ft
	−6(0)[d]	−4(0)[d]	−2	−1	0	2

9. Interior Finish	Flame-Spread Ratings					
Exit Routes	>75 to ≤200		>25 to ≤75		≤25	
Rooms/Suites	>75 to <200	≤75	>75 to ≤200	≤75	>25 to ≤200	≤25
	−3	−1	0	1	1	2

10. Vertical Openings	Open (or Incomplete Enclosure)			Enclosed[h]		
	Involving 5 or More Floors	3–4 Floors	2 Floors	<30 min	≥30 min <1 hr	≥1 hr
	−10	−7	−2	−1	0	1(0)[b]

(Worksheet 7.5.2 continues)

FIGURE 7.5 Worksheets for Evaluating Fire Safety in a Large Facility.

Worksheet 7.5.2 ***Continued***

11. Smoke Control			Mechanically Assisted Systems			
			By Floor			
	None	Smoke Barriers	W/O Part.	W/ Part.	By Zone	By Rm./Suite
	0(2)[n]	2	2	3	3	4

[a] In existing facilities and for conversions, use (–1 × stories in height) if building is fully sheathed with plaster, gypsum board, or similar materials, but not < –2 if Parameter 5 is ≥8.
[b] Use ( ) if Parameter 1 is based on Type V(000), Type III(200), or Type II(000), if Note A does not apply, and if Parameter 5 is ≤4.
[c] Use ( ) if Parameter 1 is based on Type V(000), Type III(200), or Type II(000).
[d] Use ( ) if Parameter 7 is –6.
[e] Use ( ) if Parameter 6 is based on "none or incomplete," or "walls or doors" are ½-hour walls/20-minute doors and Parameter 5 is ≤4.
[f] Use ( ) for existing levels "prompt" and "slow" if Parameter 7 is 4 and building height is ≤3 stories.
[g] Rate separation as:
- In existing facilities, ½ hour (or actual rating, if greater) if Parameter 5 is ≥6.
- Smoke resisting if Parameter 1 is based on Type V(000), Type III(200), or Type II(000), if building is not fully sheathed per Note A, and if Parameter 5 is ≥4.

[h] Use 0 in 1-story building.
[i] Interconnected system covers corridors and common spaces plus indicated bedroom or suite detectors.
[j] Use ( ) if Parameter 5 is ≥6.
[k] Use ( ) in facilities where each bedroom/suite has occupant controlled personal security access locks.
[l] Use ( ) if separations between bedrooms/suites also meet criteria.
[m] Use ( ) if requirements for 33.3.3.6.1.2 (NFPA *101*) are met.
[n] Use ( ) if floor travel does not exceed 200 ft.
[p] Use (6) if facility protected throughout by quick-response automatic sprinklers, corridor and common space detectors, and bedroom/suite smoke alarms.
[q] Use (0) if Parameter 5 is ≥8.
[r] In new facilities, rate separation as ½-hour walls/20-minute doors, where doors are smoke resisting and walls are ½-hour fire resistance–rated if Parameter 5 is 10.
[s] Use (0) if Parameter 5 is 10.

NP: Not permitted—system not usable while this condition exists.

For SI units, 1 ft = 0.3048 m; 1 ft² = 0.092 m².

WORKSHEET 7.5.3 INDIVIDUAL SAFETY EVALUATIONS — LARGE FACILITY

Safety Parameters	Fire Control (S_1)	Egress Provided (S_2)	Refuge Provided (S_3)	General Fire Safety Provided (S_4)
1. Construction				
2. Hazardous Areas		÷ 2 =		
3. Manual Fire Alarm	÷ 2 =			
4. Smoke Detection and Alarm	÷ 2 =		÷ 2 =	
5. Automatic Sprinklers		÷ 2 =	÷ 2 = *(See note.)*	
6. Separation of Sleeping Rooms from Exit Access		÷ 2 =		
7. Exit System			÷ 2 =	
8. Exit Access (from living unit)				
9. Interior Finish	÷ 2 =			
10. Vertical Openings	÷ 2 =			
11. Smoke Control				
Total	S_1 =	S_2 =	S_3 =	S_4 =

NOTE: Use full value if Safety Parameter 1 is based on Type V(000), Type III(200), or Type II(000) construction. Divide by 2 (÷2) in all other cases.

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FIGURE 7.5 ***Continued***

WORKSHEET 7.5.4A MANDATORY SAFETY REQUIREMENTS — NEW LARGE FACILITY

Stories in Height	Control Requirement (S_a)	Egress Requirement (S_b)	Refuge Requirement (S_c)	General Fire Safety Requirement (S_d)
≤1 Story	15	17	15	21
≤2 Stories	17	17	17	23
≥3 Stories	19.5	18	15	26

WORKSHEET 7.5.4B MANDATORY SAFETY REQUIREMENTS — EXISTING LARGE FACILITY

Evacuation Capability and Stories in Height	Control Requirement (S_a)	Egress Requirement (S_b)	Refuge Requirement (S_c)	General Fire Safety Requirement (S_d)
Prompt ≤30 residents and 1 Story	1.5	7.5	2	6
Prompt or slow				
1 Story	3.5	8	4	8
2 Stories	2.5	8	3	7
3–6 Stories	4.5	8	5	9
>6 Stories	6.5	8	7	11

WORKSHEET 7.5.4C MANDATORY SAFETY REQUIREMENTS — EXISTING, SPRINKLER PROTECTED, LARGE FACILITIES

Evacuation Capability and Stories in Height	Control Requirement (S_a)	Egress Requirement (S_b)	Refuge Requirement (S_c)	General Fire Safety Requirement (S_d)
Prompt ≤30 residents 1 Story	5.5	3.5	6	5
Prompt or slow				
1 Story	5.5	3.5	6	5
2 Stories	1.5	3.5	2	1
3–6 Stories	5.5	3.5	6	5
>6 Stories	7.5	3.5	4	7

(For use with NFPA 101A-2010/NFPA *101*-2009, B & C Large) (p. 3 of 4)

FIGURE 7.5 ***Continued***

WORKSHEET 7.5.5 EQUIVALENCY EVALUATION

						Yes	No
Control Provided (S_1)	minus	Required Control (S_a)	≥	0	S_1 ☐ – S_a ☐ = ☐		
Egress Provided (S_2)	minus	Required Egress (S_b)	≥	0	S_2 ☐ – S_b ☐ = ☐		
Refuge Provided (S_3)	minus	Required Refuge (S_c)	≥	0	S_3 ☐ – S_c ☐ = ☐		
General Fire Safety (S_4)	minus	Required Gen. Fire Safety (S_d)	≥	0	S_4 ☐ – S_d ☐ = ☐		

WORKSHEET 7.5.6 FACILITY FIRE SAFETY REQUIREMENTS WORKSHEET

	Considerations	Met	Not Met	Not Applic.
A.	Utilities comply with the provisions of 32.3.6.1 and 33.3.6.1.			☒
B.	Heating, ventilating, and air conditioning equipment comply with the provisions of 32.3.6.2 and 33.3.6.2, except for enclosure of vertical openings, which have been considered in Safety Parameter 10 of Worksheet 7.5.3.			☒
C.	Elevators, dumbwaiters, and vertical conveyors comply with the provisions of 32.3.6.3 and 33.3.6.3.			
D.	Rubbish chutes, incinerators, and laundry chutes comply with the provisions of 32.3.6.4 and 33.3.6.4.			☒
E.	Complies with the applicable requirements of Sections 32.7 and 33.7.			

All references are to NFPA *101, Life Safety Code.*

WORKSHEET 7.5.7 CONCLUSIONS

1. ☐ All of the checks in Worksheet 7.5.5 are in the "Yes" column. The level of fire safety is at least equivalent to that prescribed by NFPA *101, Life Safety Code*, for large residential board and care facilities.*
2. ☐ One or more of the checks in Worksheet 7.5.5 are in the "No" column. The level of fire safety is not shown by this system to be equivalent to that prescribed by NFPA *101* for large residential board and care facilities.

* The equivalency covered by this worksheet includes the majority of considerations covered by NFPA *101, Life Safety Code*. There are some considerations that are not evaluated by this method. These must be considered separately. These additional considerations are covered in Worksheet 7.5.6, Facility Fire Safety Requirements Worksheet. One copy of this worksheet is to be completed for each facility.

Notes:

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FIGURE 7.5 ***Continued***

7.5.3 Step 3 — Complete Individual Safety Evaluations Using Worksheet 7.5.3. The following steps should be taken:

(1) Transfer each of the 11 circled safety parameter values from Worksheet 7.5.2 to every available block in the line with the corresponding safety parameter in Worksheet 7.5.3. Where the block is marked "÷ 2 =," enter one-half the value from Worksheet 7.5.2.
(2) Add each of the four columns, keeping in mind that any negative numbers need to be deducted.
(3) Transfer the resulting values for S_1, S_2, S_3, and S_4 to the corresponding blocks in Worksheet 7.5.5.

7.5.4 Step 4 — Determine Mandatory Requirements Using Worksheet 7.5.4A, 7.5.4B, or 7.5.4C. The following steps should be taken:

(1) Select the level of requirements from Worksheet 7.5.4A, 7.5.4B, or 7.5.4(C). Circle the appropriate values.
(2) Transfer the circled values from Worksheet 7.5.4A, 7.5.4B, or 7.5.4C to the corresponding blocks for S_a, S_b, S_c, and S_d in Worksheet 7.5.5.

7.5.5 Step 5 — Evaluate Equivalency. The following steps should be taken:

(1) Perform the subtractions indicated in Worksheet 7.5.5. Enter the differences in the appropriate answer blocks.
(2) For each row, check "yes" if the value in the answer block is zero (0) or greater. Check "no" if the value in the answer block is a negative number.

7.5.6 Step 6 — Evaluate Considerations Not Previously Addressed, Using Worksheet 7.5.6. The equivalency covered by Worksheets 7.5.2 through 7.5.5 includes the majority of the considerations covered by the *Life Safety Code*. Some considerations are not evaluated by this method. These must be considered separately. These additional considerations are covered in Worksheet 7.5.6, the Facility Fire Safety Requirements Worksheet. Complete one copy of this worksheet for each facility.

7.5.7 Step 7 — Conclude Whether the Level of Life Safety Is at Least Equivalent to That Prescribed by the *Life Safety Code*, Using Worksheet 7.5.7. Worksheet 7.5.7, Conclusions, combines the zone fire safety equivalency evaluation of Worksheet 7.5.5 and the additional considerations of Worksheet 7.5.6.

7.6 Glossary for Fire Safety Evaluation Worksheet for an Apartment Building with Board and Care Occupancies.

7.6.1 Introduction. This glossary is provided to assist in completing Figure 7.7, Worksheets for Evaluating Fire Safety in an Apartment Building with Board and Care Occupancies, to determine the suitability of an apartment building to house a board and care occupancy. This is a two-step procedure. The first step is to evaluate the portion of the building used as a board and care home; the second step evaluates the remainder of the building. The instructions for completing Figure 7.7 are included in Section 7.7. They are not repeated in this glossary. This glossary provides expanded discussion and definitions for the various items in the worksheets to assist the user where questions of definition or interpretation arise. To the maximum extent possible, the glossary does not repeat the definitions already existing in NFPA *101, Life Safety Code*, but rather references the appropriate paragraphs in NFPA *101*.

7.6.2 Areas of Application.

7.6.2.1 The entire apartment building is evaluated on a form to the degree indicated by each item on the worksheet. See Worksheet 7.7.1. However, spaces that are not used for living units, are not in direct utility or maintenance support of the living units, are not provided for tenant use, or are not in any way involved in resident emergency egress shall be permitted to be omitted from the calculation where such space is separated from all of the tenant and tenant-support spaces by 2-hour fire resistance–rated construction (including any members that bear the load of tenant-use space and with 1½-hour fire doors in any communicating opening). In such cases, however, any appropriate charges under 7.6.4.2 in Safety Parameter 2, "Hazardous Areas," in Worksheet 7.7.2 shall be charged.

7.6.2.2 The suitability of the apartment unit actually used as the board and care home is evaluated separately and shall be permitted to be evaluated before or after evaluating the suitability of the apartment building.

7.6.2.3 Where evaluating an apartment unit, consider the common corridor as equivalent to the outside where evaluating egress routes. Also, where evaluating egress routes, credit a window only if it can be used in an emergency evacuation.

7.6.3 Maintenance. All protection systems, requirements, arrangements, and procedures shall be maintained in a dependable operating condition and a sufficient state of readiness and shall be used in such a manner that the intended safety function or hazard constraint is not impaired. Otherwise, they shall receive no credit in the evaluation.

7.6.4 Safety Parameters (Worksheet 7.7.2). The safety parameters are a measure of those building factors that bear on or contribute to the safety of those persons who might be in the building at the time of a fire. Each of the safety parameters is to be analyzed, and the safety value for each parameter that best describes the condition in the building is to be identified. Only one value for each of the parameters is to be chosen. If two or more values appear to apply, the one with the lowest point value shall be used.

7.6.4.1 Construction. The construction parameter values are applied to the entire building as defined in 7.6.4.1.1 through 7.6.4.1.3.

7.6.4.1.1 In evaluating the construction values, the height of the building is the story height of the board and care dwelling unit relative to the level of exit discharge, regardless of the total height of the building, which is defined as *stories in height* in 3.3.250 (NFPA *101*) and 4.6.3 (NFPA *101*).

7.6.4.1.2 Where the facility includes additions or connected structures of different construction, the rating and classification of the structure shall be based on the following:

(1) Separate buildings where a 2-hour or greater fire resistance–rated separation exists between the portions of the building
(2) The lower safety parameter point score involved where such a separation does not exist

7.6.4.1.3 The safety parameter values for Type V(000), Type III(200), and Type II(000) receive a higher parameter credit if the building is fully sheathed. This credit is to be given if all portions of the bearing walls, bearing partitions, floor construction, roofs [or a floor/loft system if the space above the highest ceiling is inaccessible and either is provided with draft stops or other barriers on 30 ft (9.1 m) spacing or is provided with heat- or smoke-actuated fire detectors that sound the building fire alarm], and all columns, beams, girders, trusses, or similar bearing members either have an inherent fire resistance or are

sheathed, encased, or otherwise treated to provide approximately a ½-hour or greater fire resistance rating. Buildings fully sheathed with sound lath and plaster, gypsum board, or equivalent sheathing are considered to meet this criterion.

7.6.4.2 Hazardous Areas. The hazardous area parameter applies to the entire building except the apartment(s) actually used for the residential board and care facility. The assignment of charges for hazardous areas is a four-step process.

7.6.4.2.1 Step 1 — Identify Hazardous Areas. Hazardous areas are those having a degree of hazard greater than that normal to the general occupancy of the building, such as areas for storage of combustibles or flammables, for heat-producing appliances, or for maintenance purposes.

7.6.4.2.2 Step 2 — Determine the Level of Hazard. There are two levels of hazard: structurally endangering and not structurally endangering.

7.6.4.2.2.1 Structurally Endangering. A hazardous occupancy with sufficient fire or explosion potential to defeat the basic integrity of the building framing as defined in 7.6.4.1.

7.6.4.2.2.2 Not Structurally Endangering. A hazardous occupancy with sufficient fire potential to build to full involvement and present a danger of propagating through openings or wall partitions but not possessing sufficient total potential to endanger the structural framing or floor decking as defined in 7.6.4.1.

7.6.4.2.3 Step 3 — Determine the Fire Protection Provided. The parameter value for hazardous areas is based on the presence or absence of the fire protection necessary to control or find the hazard. Two different types of fire protection are considered. The first consists of automatic sprinklers or other appropriate extinguishing systems covering the entire hazard. The second is a complete fire resistance–rated enclosure, including the separation of the hazardous area from any bearing members, partitions separating the hazardous area from all other spaces, and doors to the space sufficient to exceed the potential of the fire load involved. Any hazardous space that has either of these protection systems is classed as having single protection. Any hazardous space that is both fully enclosed — as described above — and sprinklered is classed as having double-level protection. On this basis, any hazardous area with a fuel load that has the potential of overwhelming the available structural capability could as a minimum have a single deficiency as determined in 7.6.4.2.4. Note that, where the hazardous area abuts an egress route (exit or exit access) addressed in 7.6.4.7 and 7.6.4.8, the credit for sprinklers shall not be permitted unless the hazardous area is separated from the rest of the living unit or the egress route by reasonably smoke-resisting barriers and doors.

7.6.4.2.4 Step 4 — Determine Degree of Deficiency and Assign Parameter Values. The parameter value ultimately is determined by the degree of the deficiency of the hazardous area based on the level of protection needed. Table 7.6.4.2.4 provides a matrix for determining the degree of deficiency to be assessed. In some situations, more than one hazardous area with the same or differing levels of deficiency exists. The overall charge is based on the single most serious deficiency for the hazardous area.

7.6.4.3 Manual Fire Alarm. Manual fire alarms are defined in 7.6.4.3.1 through 7.6.4.3.3.

7.6.4.3.1 None or Incomplete. There is no manual fire alarm system, or the system is incomplete and does not meet the requirements for a higher-scored category.

7.6.4.3.2 Without Fire Department Notification (W/O F.D. Notification). There is a manual fire alarm system, regardless of the number of stories or units, meeting the appropriate requirements of 30.3.4.1 through 30.3.4.3 (NFPA *101*) and those requirements applicable to existing Option 1 apartment buildings in 31.3.4.1 through 31.3.4.3 (NFPA *101*).

7.6.4.3.3 With Fire Department Notification (W/ F.D. Notification). There is a manual fire alarm system that complies with the requirements of 7.6.4.3.2 and, in addition, automatically transmits a signal to the fire department in accordance with 9.6.4 (NFPA *101*).

7.6.4.4 Smoke Detection and Alarm. These parameter values apply only to apartments other than the group residence and to the areas used for apartment corridors and other common spaces. A detection system as used herein is one based on the use of smoke detectors. No credit is given for thermal detectors.

7.6.4.4.1 None or Incomplete. There are no detectors, or, if any are present, they do not meet the requirements for a higher-scored category.

7.6.4.4.2 Interconnected Systems. Interconnected systems are those systems where the operation of any detector sounds alarm devices on other detectors, or other separate alarm systems, that are spread out sufficiently to alert all of the building occupants. Where the systems are of the total building variety, the credit shall be permitted to be given only if the building has a manual fire alarm system and the operation of the detection system sounds the manual fire alarm as though a fire alarm box on that floor had been operated. Interconnected systems must provide sounding devices that are sufficient in location and loudness to ensure the awakening of persons who sleep normally.

7.6.4.4.2.1 Corridors and Common Spaces. This parameter applies to those situations where there is at least one detector spaced every 30 ft (9.1 m) in corridors and an additional detector in all common use spaces for each 900 ft^2 (83.6 m^2) or less of floor space. Detectors shall be permitted to be omitted from common use spaces that comply with one of the following:

(1) They are both sprinklered and protected from any egress routes or area of refuge or staging that serves the board and care home by the use of automatic-closing doors operated by smoke detection or activation of the sprinkler system.
(2) They are separated from the egress route or area of refuge or staging in 7.6.4.4.2.1(1) by fire resistance–rated construction and by automatic-closing doors of sufficient fire resistance rating to withstand the maximum fire potential in the common space.

7.6.4.4.2.2 Corridors and Common Spaces plus Each Level of Living Units. To be credited in this category, detectors must be provided in both of the following locations:

(1) Each living unit such that there is one detector or more in each single-level living unit or one detector or more on each level of any multilevel living unit
(2) Corridors and common spaces in accordance with the requirements of 7.6.4.4.2.1

7.6.4.4.3 Total Building System. A dwelling has a total building system if it meets the requirements of 31.3.4.4 for Option 2 (NFPA *101*).

7.6.4.5 Automatic Sprinklers. The parameter values for automatic sprinklers are based on the protection of spaces outside the apartment used for group residences.

Table 7.6.4.2.4 Hazardous Areas — Degree of Deficiency

	No protection	Sprinkler protection	Fire resistance–rated enclosure	Sprinklered and fire resistance–rated enclosure
Not structurally endangering	Single deficiency	No deficiency		
Structurally endangering	Double deficiency	Single deficiency	No deficiency[*] Double deficiency[†]	No deficiency[*] Single deficiency[†]

[*]If fire resistance and structural strength exceed maximum potential of hazard.
[†]If fire resistance and structural strength are not sufficient to withstand potential of hazard.

7.6.4.5.1 None or Incomplete. No credit is given if there are no sprinklers or if sprinklers, though present, are not sufficient to qualify for one of the other categories specified herein. Note that any space that is credited as being protected by automatic sprinklers and abuts a hazardous area judged deficient in accordance with 7.6.4.2 shall not be permitted to be considered as sprinkler protected unless that hazardous area also is sprinkler protected.

7.6.4.5.2 Corridors, Public Spaces. Sprinkler protection covers all of the corridors and public spaces that separate, directly expose, or are in the egress path from the living units (except fire resistance–rated, enclosed, noncombustible stairwells). Sprinklers shall be installed along the corridor ceiling, and, in addition, one sprinkler shall be installed opposite the center of and inside of any living unit door opening onto the corridor.

7.6.4.5.3 Living Units Only. All living units have sprinkler protection complying with the requirements for light hazard protection in NFPA 13, *Standard for the Installation of Sprinkler Systems*; NFPA 13D, *Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes*; or NFPA 13R, *Standard for the Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height*, as appropriate.

7.6.4.5.4 Corridor and Habitable Space. Such space meets the combined requirements for 7.6.4.5.2 and 7.6.4.5.3.

7.6.4.5.5 Total Building. The building is totally sprinkler protected in accordance with Section 9.7 (NFPA *101*) and is equipped with an automatic alarm initiating device that activates the building manual fire alarm system. Credit for total sprinkler protection shall not be given unless the living unit used for board and care purposes also is provided with total sprinkler protection.

7.6.4.6 Separation of Board and Care Home Unit and Its Exit Route from Other Spaces.

7.6.4.6.1 This parameter applies to all living units abutting corridors that might be used or involved in the exit system or to any areas of refuge or staging servicing the board and care unit. The separation requirements also apply to any common wall partitions between the board and care unit and any other living unit in the building.

7.6.4.6.2 Separation of living units from each other and from common spaces shall be based on the wall partition that makes up the separation and the protection of the openings in those partitions.

7.6.4.6.3 Duct penetrations where the duct is open on only one side of the partition and is of sheet steel construction shall be considered as equivalent to doors having a fire protection rating of at least 20 minutes. Where there are duct openings on both sides of the partition, the opening shall be considered unprotected unless there is a fire damper in the duct opening or the duct otherwise meets the requirements for omission of fire dampers as specified in NFPA 90A, *Standard for the Installation of Air-Conditioning and Ventilating Systems*.

7.6.4.6.4 The partition shall be considered as "none or incomplete" if it has unprotected openings (louvers, gaps, transfer grilles, plain glass windows, or plain glass transoms) between the floor and the ceiling. If openings exist above the ceiling level (or even if the partition stops at the ceiling level), the walls shall be considered as complete if the ceiling itself is a complete membrane (such as plasterboard or lath and plaster). In this case, the fire resistance rating shall be based on that of the wall or ceiling system, whichever is less.

7.6.4.6.5 Walls shall be considered to have less than a ½-hour fire resistance rating if they are not equivalent to ½ in. (13 mm) gypsum wallboard, on both sides of studs, that is well nailed or fastened to the studs with appropriate taping and finishing of joints and fasteners. Walls shall be considered to be equivalent to or greater than a 1-hour fire resistance rating if they are part of any of the established systems recognized as having 1-hour or more fire resistance in accordance with recognized tests or approved listings.

7.6.4.6.6 Doors shall be considered as "none or incomplete" if any living unit does not have a door, or if the living unit has a door but there is some mechanism or obstruction that prevents closing of the door or otherwise leaves a significant opening between the door and the corridor, or the door has open louvers, or the door has ordinary glass lights or transoms. Doors that have been blocked open by doorstops, chocks, tiebacks, or other devices that need manual unlatching or releasing action to close the door shall be classified as "none or incomplete." Doors that are not provided with a latch or other device suitable for keeping the door tightly closed also shall be classified as "none or incomplete." Note that ordinary glass lights shall not be considered as requiring the "none or incomplete" classification in locations where both sides of the glass light are protected by automatic sprinklers.

7.6.4.6.7 Doors shall be considered as having 20-minute or greater fire protection rating if they are of 1¾ in. (44 mm) thick solid bonded wood core construction or an arrangement of equivalent or greater stability in fire integrity. The thermal

insulation capability of the door is not considered. Hollow steel or sheet steel doors, therefore, meet the 20-minute requirement.

7.6.4.6.8 Doors shall be considered automatic-closing if they are provided with either traditional self-closing mechanisms or release mechanisms actuated by smoke detectors. In the case of doors separating living units from each other or from common spaces, self-closing doors shall be permitted whether or not they are equipped with devices that can be used to hold them in the open position, provided the normal routine of the living unit is to keep the door closed, particularly after the occupants have retired for the night. Note that this parameter category does not cover the charges for dead-end conditions, travel distance, interior finish in the egress routes (exit or exit access), or enclosure of stairways or other egress routes that pass from floor to floor. These elements are covered separately in 7.6.4.8, 7.6.4.9, and 7.6.4.10.

7.6.4.6.9 A separation is considered standard (i.e., rated as equivalent to walls greater than 1 hour, doors greater than 20 minutes) if the fire resistance of the doors and walls is equivalent to that specified by Chapters 30 and 31 (NFPA *101*) for the protection level involved.

7.6.4.7 Exit System. This parameter applies to the entirety of the exit routes serving the group residence. Exit routes are the paths of travel from the living unit to the outside, using any of the types and arrangements described in Chapter 7 (NFPA *101*).

7.6.4.7.1 Multiple Routes. Multiple routes exist where the occupants of any living unit have a choice of two separate exit routes to the outside, using those types permitted by Section 30.2 or 31.2, as appropriate (NFPA *101*). Occupants have a choice of routes either from the living unit or through access in a corridor adjacent to the living unit. Single exit routes complying with 30.2.4.4, 31.2.4.3, or 31.2.4.4 (NFPA *101*) qualify as multiple routes. *[See 7.6.4.7.6 for facilities complying with the single exit route provisions of 30.2.4.2 or 31.2.4.2 (NFPA 101).]*

7.6.4.7.2 Deficient. An exit route is deficient if it fails to meet any of the applicable criteria covered by Chapter 7 (NFPA *101*). The exit system also is classed as deficient if a smoke barrier, as required by 30.3.7 or 31.3.7 (NFPA *101*), is not provided.

7.6.4.7.3 Without Horizontal Exit (W/O Horiz. Exit). An egress system is based on this charge if there are multiple routes that are not deficient but the arrangement does not include a horizontal exit as defined in 7.6.4.7.4 or have an acceptable direct exit from each living unit as defined in 7.6.4.7.6.

7.6.4.7.4 With Horizontal Exit (W/ Horiz. Exit). A single horizontal exit on each floor containing living units shall be considered a horizontal exit if the space created is of sufficient size to provide at least 3 ft^2 (0.28 m^2) of accessible space for all of the potential occupants, including those already present in and those evacuating to such space. The details of horizontal exits also shall meet the requirements of 7.2.4 (NFPA *101*). A horizontal exit acts as a smoke barrier, and, where provided, is credited as both a smoke barrier in 7.6.4.11 and a horizontal exit in 7.6.4.7.

7.6.4.7.5 Smokeproof Enclosure. Credit for a smokeproof enclosure shall be permitted to be given if either the stairway so designated meets the requirements for a smokeproof enclosure specified in 7.2.3 (NFPA *101*) or the stairway has an acceptably designed smoke pressurization system maintaining a positive pressure in the stairwell sufficient to prevent intolerable contamination of the stairwell by smoke or other fire effects. To receive the credit for smokeproof enclosures, all exit stairs credited in 7.6.4.7 and 7.6.4.8 must meet the smokeproof enclosure requirement.

7.6.4.7.6 Direct Exit.

7.6.4.7.6.1 To be credited for direct exits, each living unit shall have within that unit a door that opens to the exterior at grade or onto an unenclosed exterior balcony with direct access to an unenclosed exterior exit or smokeproof enclosure. The credit for direct exit is applicable even if there are no other exit routes from the involved living unit and if the following apply:

(1) The opening is directly onto a grade.
(2) The exit is located so that any person egressing can move directly away from the building without further exposure.

7.6.4.7.6.2 Single exit routes complying with 30.2.4.2 or 31.2.4.2 (NFPA *101*) qualify as direct exits. *[See 7.6.4.7.1 for facilities complying with the single exit route provisions of 30.2.4.4, 31.2.4.3, or 31.2.4.4 (*NFPA *101).]* Existing buildings more than six stories in height with exterior exit access in accordance with 31.3.5.12.2 (NFPA *101*) qualify as having a direct exit.

7.6.4.8 Exit Access. This parameter applies only to the exit access route from the board and care home.

7.6.4.8.1 Exit access is a measurement of travel distance from the living unit to the outside or to an enclosed interior stairway or other exit (e.g., horizontal exit) or to a smoke barrier meeting the requirements in 7.6.4.11, whichever is shorter.

7.6.4.8.2 The charge for dead ends shall be made where any corridor affords access in only one direction to a required exit from the corridor. The calculation of the distance to determine the level of charge is the measurement from the centerline of the doorway exiting the living unit to the nearest point where a person has a choice of two directions or routes of egress.

7.6.4.9 Interior Finish (Egress Routes).

7.6.4.9.1 The interior finish within the living units is evaluated separately from the interior finish in the corridor and egress routes and other public space. Classification of interior finish is based on the flame-spread rating of the interior finish in accordance with NFPA 255, *Standard Method of Test of Surface Burning Characteristics of Building Materials*. The requirements apply to wall and ceiling finish materials as described in Section 10.2 (NFPA *101*). Choose the safety parameter value in Worksheet 7.7.2 based on the interior finish material provided. For example, if the interior wall finish material has a flame-spread rating of between 25 and 75, do not take the parameter value associated with a flame-spread rating of less than 25 regardless of the presence of automatic sprinkler protection. The mandatory values have been calibrated to take into consideration any sprinkler protection provided. Exposed portions of structural members complying with the requirements of Type IV(2HH) construction shall be permitted.

7.6.4.9.2 Interior wall and ceiling finish materials tested in accordance with NFPA 265, *Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile Coverings on Full Height Panels and Walls*, or NFPA 286, *Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth*, as permitted by Section 10.2 (NFPA *101*), and meeting the criteria established in Section 10.2 (NFPA *101*) for those test standards, shall be scored as Class A interior finish materials (flame spread ≤25).

7.6.4.9.3 Only floor coverings in the exit and exit access system are considered. For purposes of assigning the parameter values in Worksheet 7.7.2, such floor coverings are considered as having a flame spread ≤25 if they meet the requirements for Class I or II and as otherwise having a flame spread >75. Previously installed floor coverings shall be permitted, subject to the approval of the authority having jurisdiction.

7.6.4.9.4 No consideration is included in the safety parameter value for any finish with a flame-spread rating greater than 200 or for any material not rationally measured by NFPA 255, *Standard Method of Test of Surface Burning Characteristics of Building Materials*. Materials not rationally measured include foam plastics, asphalt-impregnated paper, or other materials capable of inducing extreme rates of fire growth and rapid flashover. In any case involving these materials, the resultant risk is considered beyond the capacity of this evaluation system and requires individual appraisal. Note that plywood of ¼ in. (6 mm) or greater thickness should be considered as having a flame-spread rating of ≤200.

7.6.4.10 Vertical Openings. This parameter applies to those portions of vertical openings exposing the floor containing the group residence or the exit routes from an apartment.

7.6.4.10.1 These values apply to vertical openings and penetrations including exit stairways, ramps, and any other vertical exits, pipe shafts, ventilation shafts, duct penetrations, and laundry and incinerator chutes. The charge for vertical openings shall be based on the presence or lack of enclosure and the fire resistance rating of the enclosure, if provided.

7.6.4.10.2 A vertical opening or penetration shall be classified as open or incomplete provided any of the following conditions apply:

(1) It is unenclosed.
(2) It is enclosed but does not have doors.
(3) It is enclosed but has openings other than doorways.
(4) It is enclosed with cloth, paper, or similar materials without any sustained firestopping capabilities.

7.6.4.10.3 If a shaft other than a credited exit route (i.e., credited as one of the multiple routes required in 7.6.4.7.1 or in determining travel distance in 7.6.4.8.1) is enclosed on all floors but one, and this results in an unprotected opening between that shaft and one, and only one, floor, the parameter value assigned to that shaft shall be 0. If a required egress route is contained in that shaft, the parameter value shall be (–2).

7.6.4.11 Smoke Control. This parameter applies to the floor containing the board and care home. Smoke control definitions are provided in 7.6.4.11.1 through 7.6.4.11.5.

7.6.4.11.1 None. There are no smoke barriers (or horizontal exits) on the floor, the floor is not served by a smokeproof enclosure, and there are no mechanically assisted smoke control systems serving the floor.

7.6.4.11.2 Smoke Barriers. Smoke barriers are partitions extending across the entire width of the building or so arranged as to combine a partition in the corridor with existing building elements and subdividing partitions and walls to partition the building into two completely separate units. The smoke barrier must be equipped with doors in the corridor that are self-closing, closed upon detection by smoke detectors located at the door arches, or closed by smoke detector systems that have been credited with a six-point parameter value in 7.6.4.4. Smoke barriers also shall conform to the requirements of Section 8.5 (NFPA *101*). A horizontal exit acts as a smoke barrier and is credited as both a smoke barrier in 7.6.4.11 and a horizontal exit in 7.6.4.7.

7.6.4.11.3 Mechanically Assisted Automatic Systems — by Zone. Mechanically assisted smoke control systems protected on a zone basis shall include a smoke barrier (or a horizontal exit) supported by a mechanism of automatic control fans, smoke vent shafts, or a combination thereof to provide a pressure differential that assists in confining smoke to the compartment of origin. Fans shall be permitted to be special smoke control fans, or special adjustments of the normal building air movement fans shall be permitted to be made.

7.6.4.11.4 Mechanically Assisted Automatic Systems — by Unit. Mechanically assisted smoke control systems protected on a living unit basis are systems so designed as to provide a mechanism of automatically controlled fans, smoke vent shafts, or a combination thereof to ensure a positive pressure differential that prevents intrusion of smoke into any living unit not involved in fire. Therefore, the living unit has a pressure differential higher than that of the corridor and higher than that of any living unit where fire has been detected. Such systems shall be so arranged that the detection mechanism in each living unit prevents a fire-involved living unit from becoming positively pressurized.

7.6.4.11.5 Mechanically Assisted Automatic Systems — by Corridor. A mechanically assisted smoke control system protected on a corridor basis is a system initiated by a method of smoke detection that ensures operation of the smoke control system before significant smoke has entered into the corridor involved.

7.6.4.11.5.1 The mechanism must be capable of pressurizing the corridor sufficiently to prevent smoke from the living unit or space of origin from entering the corridor during the entire course of the fire. Such a system must be able to hold back the smoke through the expected maximum severity of the fire. It also must be capable of exhausting smoke from the corridor based on the assumption that the emergency evacuation procedures and other activities involving the opening and closing of doors will cause occasional brief periods during which the smoke control system is overpowered.

7.6.4.11.5.2 This results in the movement of the smoke from the fire area into the corridor. (The exhausting of the smoke normally would be accomplished by having an exhaust fan of lower capacity than that of the fan supplying air for pressurization exhaust from the corridor. The net pressurization force would occur from the effect of the pressurizing fan minus the effect of the removal or purging fan.)

7.6.4.11.5.3 The corridor's pressurizing system could involve early warning smoke detection, automatic closing of all living unit doors, sprinkler protection, or all three. Where these additional protection devices are provided to effect such a smoke control system, the individual credits for each of the involved protection devices are in addition to the credits for the smoke control system.

7.7 Worksheets for Evaluating Fire Safety in an Apartment Building with Board and Care Occupancies. For each apartment house containing one or more apartment units with a board and care occupancy, the seven-step process in Figure 7.7 should be followed when evaluating fire safety in an apartment building with board and care occupancies.

7.7.1 Step 1 — Complete Cover Sheet Using Worksheet 7.7.1. See Figure 7.7.

WORKSHEET 7.7.1 COVER SHEET

Fire Safety Evaluation Worksheet for an Apartment Building with Board and Care Occupancies

Building Identification _____

Evaluator _____ Date _____

WORKSHEET 7.7.2 SAFETY PARAMETER VALUES — APARTMENT BUILDING

Safety Parameters	Parameter Values							
1. Construction	Combustible					Noncombustible		
Stories in Height	Type V (000)	Type V (111)	Type III (200)	Type III (211)	Type IV (2HH)	Type II (000)	Type II (111)	Type II(222) & Type I
1 Story	−2( )[a]	0	−2( )[a]	0	0	0	2	2
2 Stories	−6( )[a]	0	−6( )[a]	0	0	−5( )[a]	2	2
3–4 Stories	−8( )[a]	−2(0)[k]	−8( )[a]	0	−2(0)[k]	−6( )[a]	2	2
5–6 Stories	−8	−2(0)[k]	−8( )[a]	0	−2(0)[k]	−6( )[a]	2	2
Over 6 Stories	−10	−4	−10	−2(0)[k]	−4(0)[k]	−8	0	2

2. Hazardous Areas (outside board & care home units)	Double Deficiency	Single Deficiency	None or No Deficiency
	−4(−7)[b,g]	0(−4)[g]	0

3. Manual Fire Alarm	None or Incomplete	Manual Alarm	
		W/O F.D. Notification	W/ F.D. Notification
	0(2)[i] (3)[m]	2	3

4. Smoke Detection and Alarm (outside board & care home units)	None or Incomplete	Interconnected System		Total Building
		Corrs. & Common	Corrs., Common Spaces, & Each Level of Living Units	
	0	3(0)[e] (3)[j]	4	6

5. Automatic Sprinklers (outside board & care home units)	None or Incomplete	Corrs., Public Spaces	Living Units Only	Corrs., Hab., & Public Spaces	Total Building
	0	2(0)[c]	4(0)[c]	6	8

6. Separation of Board & Care Home Unit and Its Exit Route from Other Spaces	None or Incomplete	Walls <30 min		Walls ≥30 min to <1 hr		Walls ≥1 hr	
		Doors <20 min W/O Closer	Doors ≥20 min W/O Closer	Doors <20 min W/Closer	Doors ≥20 min W/Closer	Doors <20 min W/Closer	Doors ≥20 min W/Closer
	−6	−2	0(−2)[b]	1(−2)[b]	2(−2)[b]	1(−2)[b]	4(−2)[b]

7. Exit System (serving board & care home units)	<2 Standard Routes	Multiple Routes				Direct Exit
		Deficient	W/O Horiz. Exit	W/ Horiz. Exit	Smokeproof Enclosure	
	−6	−2	0	2	2	4

8. Exit Access (serving board & care home units)	Max. Dead End Is		No Dead End > 50 ft and Travel Is				
	>100 ft	>50 ft or corridor common path >35 ft	>200 ft	>150 ft to ≤200 ft	>100 ft to ≤150 ft	>50 ft to ≤100 ft	≤50 ft
	−6(0)[d]	−4(0)[d]	−2	−1	0	1	2

9. Interior Finish (egress routes serving board & care home units)	Flame-Spread Ratings		
	>75 to ≤200	>25 to ≤75	≤25
	−3	−1	0

(Worksheet 7.7.2 continues)

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FIGURE 7.7 Worksheets for Evaluating Fire Safety in an Apartment Building with Board and Care Occupancies.

Worksheet 7.7.2 *Continued*

10. Vertical Openings	Open or Incomplete Enclosure				Enclosed [h]	
	Thru 5 or More Floors		3–4 Floors	2 Floors	<1 hour [f]	≥1 hour [f]
	−10		−7	−2	0	1(0)[b]
11. Smoke Control (serving floors having board & care home units)	None	Smoke Barriers	Mechanically Assisted Systems			
			By Zone	By Unit	By Corridor	
	0(2)[l]	2	3	3	4	

[a] Use (−1 × stories in height) if building is fully sheathed with plaster, gypsum board, or similar materials but not <−2 if Parameter 5 is 8.
[b] Use ( ) if Parameter 1 is based on Type V(000), Type III(200), or Type II(000), if Note [a] does not apply, and if Parameter 5 is ≤4.
[c] Use ( ) if Parameter 1 is based on Type V(000), Type III(200), or Type II(000).
[d] Use ( ) if Parameter 7 is −6.
[e] Use ( ) if Parameter 6 is based on "None or Incomplete," or "Walls or Doors" are ½-hr walls/20-min doors and Parameter 5 is ≤4.
[f] ≥30 min in existing building.
[g] Use ( ) if hazardous area is on exit route or in refuge area serving group home unit.
[h] Use 0 in 1-story building.
[i] Use (2) in 1–3 story buildings with <12 living units.
[j] Use (3) if corridors and common spaces are protected by quick response sprinklers.
[k] Use (0) if Parameter 5 is 8.
[l] Use ( ) where exemptions of 31.3.7.1 through 31.3.7.5 (NFPA *101*) apply.
[m] Use (3) if in compliance with 30.3.4.2.2 and 30.3.4.3.5 (NFPA *101*).

For SI units, 1 ft = 0.3048 m; 1 ft² = 0.092 m².

WORKSHEET 7.7.3 INDIVIDUAL SAFETY EVALUATIONS — APARTMENT BUILDINGS

Safety Parameters	Fire Control (S_1)	Egress Provided (S_2)	Refuge Provided (S_3)	General Fire Safety Provided (S_4)
1. Construction				
2. Hazardous Areas		÷ 2 =		
3. Manual Fire Alarm	÷ 2 =			
4. Smoke Detection and Alarm	÷ 2 =			
5. Automatic Sprinklers		÷ 2 =	÷ 2 = *(See note.)*	
6. Separation of Living Units		÷ 2 =		
7. Exit System			÷ 2 =	
8. Exit Access				
9. Interior Finish				
10. Vertical Openings	÷ 2 =			
11. Smoke Control				
Total	S_1 =	S_2 =	S_3 =	S_4 =

NOTE: Use full value if Safety Parameter 1 is based on Type V(000), Type III(200), or Type II(000) construction. Divide by 2 (÷2) in all other cases.

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FIGURE 7.7 *Continued*

WORKSHEET 7.7.4A MANDATORY SAFETY REQUIREMENTS — EXISTING APARTMENT BUILDINGS HOUSING EXISTING BOARD AND CARE FACILITIES

Stories in Height	Evacuation Capability	Control Requirement (S_a)	Egress Requirement (S_b)	Refuge Requirement (S_c)	General Fire Safety Requirement (S_d)
1 Story	Prompt/Slow	2	5	3	5
	Impractical	5	5	6	8
2–6 Stories	Prompt/Slow	3	6	5	7
	Impractical	5	6	7	9
>6 Stories	Prompt/Slow	10.5	3.5	6	8
	Impractical	13.5	5.5	8	12

WORKSHEET 7.7.4B MANDATORY SAFETY REQUIREMENTS — NEW APARTMENT BUILDINGS

Stories in Height	Control Requirement (S_a)	Egress Requirement (S_b)	Refuge Requirement (S_c)	General Fire Safety Requirement (S_d)
1 Story	9	3	4	6
2 Stories	11.5	4	7	9
≥3 Stories	13.5	4	9	11

WORKSHEET 7.7.4C MANDATORY SAFETY REQUIREMENTS — NONSPRINKLERED APARTMENT BUILDINGS MEETING 30.3.5.2 (NFPA *101*)

Stories in Height	Control Requirement (S_a)	Egress Requirement (S_b)	Refuge Requirement (S_c)	General Fire Safety Requirement (S_d)
1 Story	3	10	4	10
2 Stories	5.5	11	7	13
≥3 Stories	7.5	11	9	15

WORKSHEET 7.7.4D MANDATORY SAFETY REQUIREMENTS — NEW BOARD AND CARE FACILITIES LOCATED IN EXISTING APARTMENT BUILDINGS

Stories in Height	Control Requirement (S_a)	Egress Requirement (S_b)	Refuge Requirement (S_c)	General Fire Safety Requirement (S_d)
1 Story	9	7.5	6	11
2 Stories	10.5	7.5	7	12
≥3 Stories	12.5	7.5	9	14

(For use with NFPA 101A-2010/NFPA *101*-2009, B & C Apts.) (p. 3 of 4)

FIGURE 7.7 ***Continued***

WORKSHEET 7.7.5 EQUIVALENCY EVALUATION

						Yes	No
Control Provided (S_1)	minus	Required Control (S_a)	≥	0	S_1 ☐ – S_a ☐ = ☐		
Egress Provided (S_2)	minus	Required Egress (S_b)	≥	0	S_2 ☐ – S_b ☐ = ☐		
Refuge Provided (S_3)	minus	Required Refuge (S_c)	≥	0	S_3 ☐ – S_c ☐ = ☐		
General Fire Safety (S_4)	minus	Required Gen. Fire Safety (S_d)	≥	0	S_4 ☐ – S_d ☐ = ☐		

WORKSHEET 7.7.6 FACILITY FIRE SAFETY REQUIREMENTS WORKSHEET

	Considerations	Met	Not Met	Not Applic.
A.	Utilities comply with the provisions of 32.3.6.1 and 33.3.6.1.			☒
B.	Heating, ventilating, and air conditioning equipment comply with the provisions of 32.3.6.2 and 33.3.6.2, except for enclosure of vertical openings, which have been considered in Safety Parameter 10 of Worksheet 7.7.2.			☒
C.	Elevators, dumbwaiters, and vertical conveyors comply with the provisions of 32.3.6.3 and 33.3.6.3.			
D.	Rubbish chutes, incinerators, and laundry chutes comply with the provisions of 32.3.6.4 and 33.3.6.4.			☒
E.	Complies with the applicable requirements of Sections 32.7 and 33.7.			

All references are to NFPA *101*, *Life Safety Code.*

WORKSHEET 7.7.7 CONCLUSIONS

1. ☐ All of the checks in Worksheet 7.7.5 are in the "Yes" column. The level of fire safety is at least equivalent to that prescribed by NFPA *101, Life Safety Code*, for apartments to house a board and care occupancy.*
2. ☐ One or more of the checks in Worksheet 7.7.5 are in the "No" column. The level of fire safety is not shown by this system to be equivalent to that prescribed by NFPA *101* for apartments to house board and care occupancy.

* The equivalency covered by this worksheet includes the majority of considerations covered by NFPA *101, Life Safety Code*. There are some considerations that are not evaluated by this method. These must be considered separately. These additional considerations are covered in Worksheet 7.7.6, Facility Fire Safety Requirements Worksheet. One copy of this worksheet is to be completed for each facility.

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FIGURE 7.7 ***Continued***

7.7.2 Step 2 — Determine Safety Parameter Values Using Worksheet 7.7.2. First, select and circle the safety value for each safety parameter in Worksheet 7.7.2 that best describes the conditions in the facility. Then, choose only one value for each of the parameters. If two or more values appear to apply, choose the one with the lowest point value.

7.7.3 Step 3 — Complete Individual Safety Evaluations Using Worksheet 7.7.3. The following steps should be taken:

(1) Transfer each of the 11 circled safety parameter values from Worksheet 7.7.2 to every available block in the line with the corresponding safety parameter in Worksheet 7.7.3. Where the block is marked "÷ 2 =," enter one-half the value shown in Worksheet 7.7.2.
(2) Add each of the four columns, keeping in mind that any negative numbers need to be deducted.
(3) Transfer the resulting values for S_1, S_2, S_3, and S_4 to the corresponding blocks in Worksheet 7.7.5.

7.7.4 Step 4 — Determine Mandatory Requirements Using Worksheets 7.7.4A through 7.7.4D. The following steps should be taken:

(1) Using the classifications of the building (i.e., "new" or "existing"), the building height, and the level of requirements established for small dwelling units, circle the appropriate value in each of the four columns in Worksheet 7.7.4A, 7.7.4B, 7.7.4C, or 7.7.4D as appropriate.
(2) Transfer the circled values from Worksheet 7.7.4A, 7.7.4B, 7.7.4C, or 7.7.4D to the corresponding blocks for S_a, S_b, S_c, and S_d in Worksheet 7.7.5.

7.7.5 Step 5 — Evaluate Fire Safety Equivalency. The following steps should be taken:

(1) Perform the subtractions indicated in Worksheet 7.7.5. Enter the differences in the appropriate answer blocks.
(2) For each row, check "yes" if the value in the answer block is zero (0) or greater. Check "no" if the value in the answer block is a negative number.

7.7.6 Step 6 — Evaluate Other Considerations Not Previously Addressed Using Worksheet 7.7.6. The equivalency covered by Worksheets 7.7.2 through 7.7.5 includes the majority of the considerations covered by the *Life Safety Code*. Some considerations are not evaluated by this method and must be considered separately. These additional considerations are covered in Worksheet 7.7.6, the Facility Fire Safety Requirements Worksheet. Complete one copy of this separate worksheet for each facility.

7.7.7 Step 7 — Determine Equivalency Conclusions. Conclude whether the level of life safety is at least equivalent to that prescribed by the *Life Safety Code*, using Worksheet 7.7.7, Conclusions. This worksheet combines the zone fire safety equivalency evaluation of Worksheet 7.7.5 and the additional considerations of Worksheet 7.7.6.

Chapter 8 Fire Safety Evaluation System for Business Occupancies

8.1 Introduction.

8.1.1 This chapter is part of an NFPA guide and, therefore, is not mandatory. The term *shall* in this chapter is used to indicate that if the provisions of the chapter are applied, the procedures mandated are to be followed to ensure the effectiveness of the evaluation system.

8.1.2 The Fire Safety Evaluation System (FSES) is a measuring system. It compares the level of safety provided by an arrangement of safeguards that differ from those specified in NFPA *101*, *Life Safety Code*, to the level of safety provided in a building that conforms exactly with the details of the *Code*.

8.1.3 This chapter is provided to assist in completion of Figure 8.6, Worksheets for Evaluating Fire Safety in Business Occupancies. The step-by-step instructions for completion appear in the text of Section 8.6. This chapter provides expanded discussion and definition of the various items in the worksheet to assist the user when questions of definitions or interpretation arise. The chapter is organized to follow the format of the worksheet progressively.

8.2 Procedure for Determining Equivalency.

8.2.1 Evaluate the factors affecting either every fire zone or the building as a whole using Figure 8.6, Worksheets for Evaluating Fire Safety in Business Occupancies.

8.2.1.1 Zoning must divide the building into units that consist of one or more complete fire/smoke zones. A fire/smoke zone is a portion of a building that is separated from all other portions of the building by vertical or horizontal fire barriers having at least a 1-hour fire resistance rating or vertical smoke barriers conforming to the requirements of Section 8.5 (NFPA *101*), or a combination of both. Any vertical openings (shafts, stairs) involved also must provide 1-hour separation. In facilities completely protected by automatic sprinkler protection, these fire resistance requirements do not apply. The elements separating one zone from another, however, must be of sound- and smoke-resisting construction. Doors in zone separations must be either self-closing or equipped with automatic closers operated by smoke detectors.

8.2.1.2 Zones shall be permitted to be either adjacent to each other (e.g., separate wings or building sections) or above each other (e.g., floors or groups of floors).

8.2.1.3 Each zone containing spaces used for business occupancy can be evaluated using this system.

8.2.1.4 Each of the safety parameters is to be analyzed, and the safety value for each parameter that best describes the condition in the building is to be identified.

8.2.2 Using the Facility Fire Safety Requirements Worksheet (Worksheet 8.6.6), determine the acceptability of the general building systems (utilities, HVAC, elevator installations, standpipes and fire extinguishers, and rubbish chutes, incinerators, and laundry chute installations).

8.2.3 Equivalency is achieved if the building or fire/smoke zone evaluations show equivalency or better in each and every zone and the requirements of the Facility Fire Safety Requirements Worksheet (Worksheet 8.6.6) are met.

8.3 Glossary for Fire Safety Evaluation Worksheet for Business Occupancies.

8.3.1 Introduction. This glossary is provided to assist in completing the Worksheets for Evaluating Fire Safety in Business Occupancies. This glossary provides expanded discussion and definitions for the various items in the worksheets to assist the user where questions of definition or interpretation arise. To the maximum extent possible, the glossary does not repeat the definitions already existing in NFPA *101*, *Life Safety Code*, but rather references the appropriate paragraphs in NFPA *101*.

8.3.2 Areas of Application.

8.3.2.1 The entire building can be evaluated on a single set of worksheets. The building might, however, be zoned by considering each zone separately or by using any convenient grouping of zones.

8.3.2.1.1 Charges for Safety Parameter 2, "Segregation of Hazards," in Worksheet 8.6.2, apply to any hazardous area in the zone being evaluated and to any hazardous area in zones adjacent to or below the zone being evaluated.

8.3.2.1.2 Where zones are located above each other, the value assigned to Parameter 1, "Construction," in Worksheet 8.6.2, in each zone is based on the highest story used for regular human occupancy in that "stack of zones" and the type of construction for that stack of zones.

8.3.2.1.3 The assignment of values for Safety Parameter 5, "Fire Alarm"; Parameter 9, "Exit Access"; and Parameter 10, "Egress Route," in Worksheet 8.6.2, does not consider conditions in unoccupied spaces in other zones where such are not involved in any egress paths.

8.3.2.1.4 The evaluation of Safety Parameter 10, "Egress Route," in Worksheet 8.6.2, includes those portions of any egress route that serve the zone being evaluated. Any exposures or deficiencies pertaining to any part of the egress route must be taken into account in the evaluation of the zone.

8.3.2.2 Zones that do not involve regular human occupancy are evaluated the same as those with regular human occupancy, with the following variations:

(1) Any such zone shall be permitted to be omitted from the numerical evaluation if both of the following conditions are met:
   (a) The zone is not involved in the egress route from any space with regular human occupancy.
   (b) The zone conforms to NFPA *101, Life Safety Code*, requirements applicable to its use.
(2) Alternatively, such zones shall be permitted to be evaluated using this system, on the condition that any additional egress capabilities and arrangements appropriate to the specific use of the space are provided.

8.4 Maintenance. All protection systems, requirements, arrangements, and procedures shall be maintained in a dependable operating condition and a sufficient state of readiness and shall be used in such a manner that the intended safety function or hazard constraint is not impaired. Otherwise, they shall receive no credit in the evaluation.

8.5 Safety Parameters (Worksheet 8.6.2). The safety parameters are a measure of those building factors that bear on or contribute to the safety of those persons who might be in the building at the time of a fire. The safety parameters in Worksheet 8.6.2 are described in the following subsections.

8.5.1 Construction. Construction types are classified in accordance with the definitions of NFPA 220, *Standard on Types of Building Construction*. Where the facility includes additions or connected structures of different construction, the rating and classification of the structure is based on one of the following:

(1) Separate buildings where the separation between the portions of the building is a fire barrier having at least a 1-hour fire resistance rating and any opening protectives have at least a 45-minute fire protection rating
(2) The lower safety parameter point score involved where such a separation does not exist

8.5.2 Segregation of Hazards. The assignment of charges for unsegregated hazardous areas is a four-step process.

8.5.2.1 Step 1 — Identify Hazardous Areas. A hazardous area is any space or compartment in which a storage or other activity exists that is not a part of normal office space arrangements and that possesses the potential for producing a fully involved fire.

8.5.2.2 Step 2 — Determine the Level of Hazard.

8.5.2.2.1 There are two levels of hazard: structurally endangering and not structurally endangering.

8.5.2.2.1.1 Structurally Endangering. A hazardous area with a potential fire severity that might exceed the tested resistance of the enclosure and defeat the basic structural integrity of the building framing as defined in Safety Parameter 1, "Construction," of Worksheet 8.6.2. *[See Figure 8.5.2.2.1.1 for determining approximate potential fire severity.]*

8.5.2.2.1.2 Not Structurally Endangering. A hazardous area with sufficient fire potential to build to full involvement (flashover) and present a danger of propagating through openings or wall partitions but not possessing sufficient total potential to endanger the structural framing or floor decking as defined in Safety Parameter 1 of Worksheet 8.6.2. *[See Figure 8.5.2.2.1.2 for assistance in estimating the fire size needed to flash over the area containing various combustible contents.]*

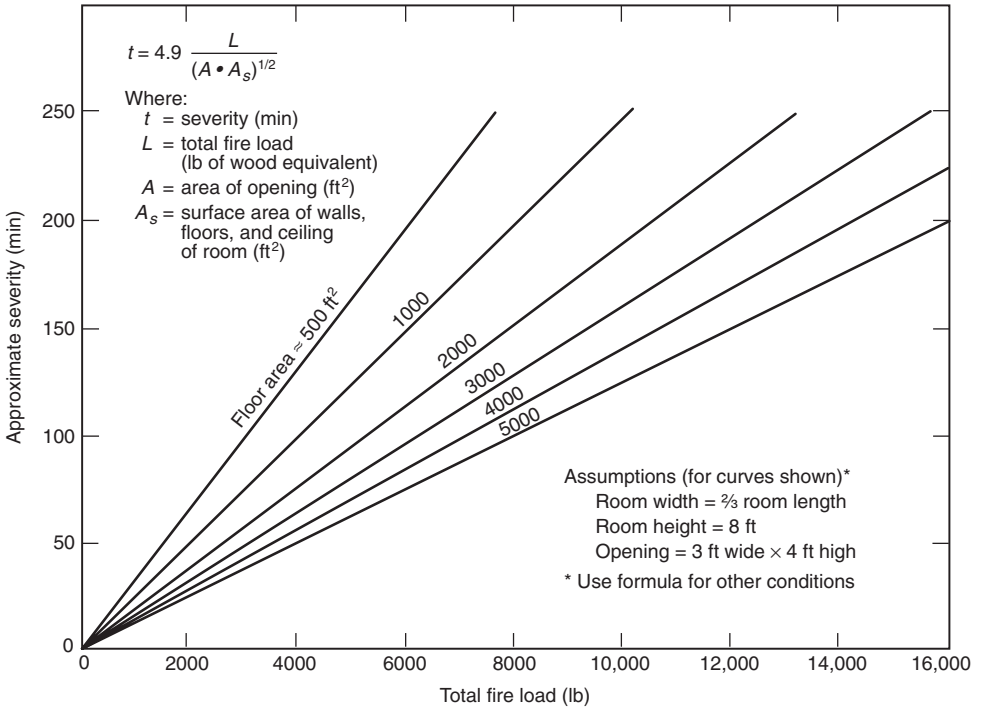
8.5.2.2.2 Example of Structurally Endangering. For a room 20 ft × 30 ft × 8 ft high (6.1 m × 9.1 m × 2.4 m high) with a (window) opening 3 ft wide × 4 ft high (0.9 m wide × 1.4 m high), 3000 lb (1361 kg) of ordinary fuel can produce a fire severity of approximately 95 minutes. If the fire resistance of the hazardous area enclosure is less than 95 minutes and the fire is likely to continue to its estimated duration, the hazardous area shall be permitted to be classed as structurally endangering.

8.5.2.3 Step 3 — Determine the Fire Protection Provided.

8.5.2.3.1 The parameter value for hazardous areas is based on the presence or absence of the fire protection necessary to control or confine the hazard. Two different types of fire protection are considered. The first consists of automatic sprinklers or other appropriate extinguishing systems covering the entire hazard. The credit for sprinklers shall not be given unless the hazardous area is separated from the rest of human occupancy or the egress route by reasonably smoke-resistant partitions and doors. The second is a complete fire enclosure having a sufficient fire resistance rating to contain the potential fire severity of the hazardous area. This includes the following:

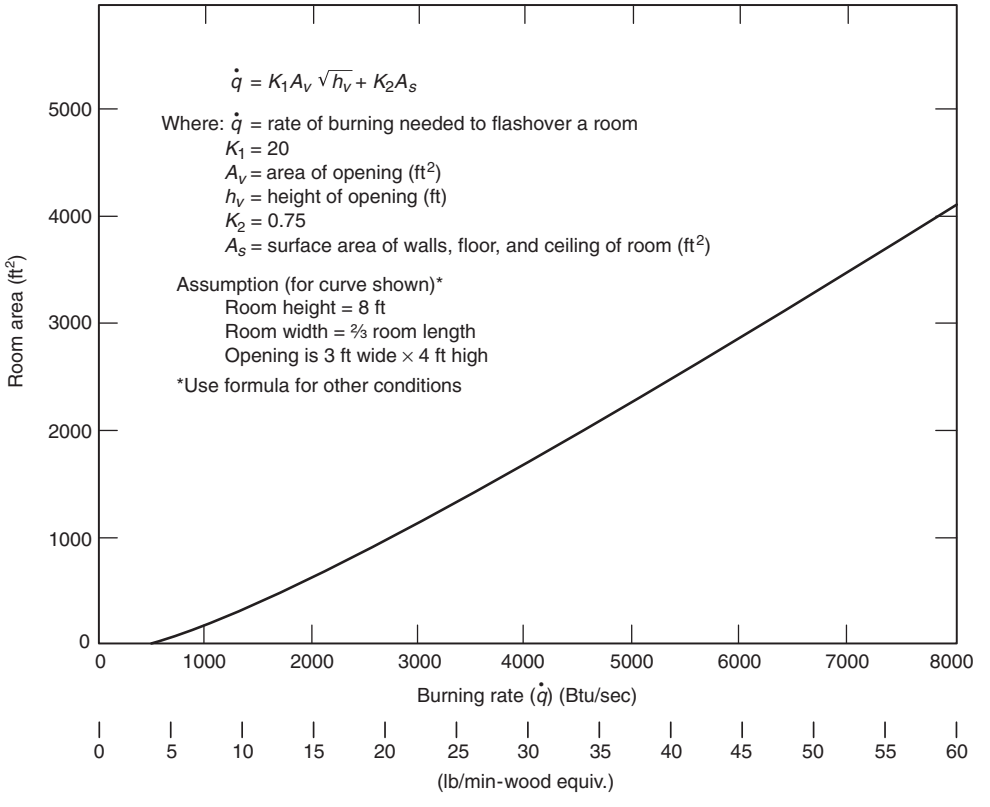
(1) The separation of the hazardous area from any structural framing members
(2) Partitions separating the hazardous area from all other spaces
(3) Fire protection–rated doors sufficient to exceed the potential of the fire load involved

8.5.2.3.2 Any hazardous space that has any of these protection systems is classified as having single protection.



For SI units, 1 lb = 0.4536 kg; 1 ft = 0.3048 m; 1 ft² = 0.0929 m².

FIGURE 8.5.2.2.1.1 Approximate Fire Severity.



For SI units, 1 lb = 0.4536 kg; 1 ft = 0.3048 m; 1 ft² = 0.0929 m²; 1 Btu/sec = 1.055 kW.

FIGURE 8.5.2.2.1.2 Approximate Flashover Energy.

8.5.2.4 Step 4 — Determine Degree of Deficiency and Assign Parameter Values.

8.5.2.4.1 The parameter value ultimately is determined by the degree of the deficiency of the hazardous area based on the level of protection needed. Table 8.5.2.4.1 provides a matrix to be used for determining the degree of deficiency to be assessed.

8.5.2.4.2 In some situations, more than one hazardous area with the same or differing levels of deficiency exists. The overall charge is based on the single most serious deficiency for the hazardous area.

8.5.2.4.3 Open-Plan Office Space.

8.5.2.4.3.1 A sprinkler-protected open-plan office space is not considered a hazardous space.

8.5.2.4.3.2 An unsprinklered open-plan office space is not considered a hazardous space unless it involves such a collection of fuel that flashover is likely to occur. This can be estimated in the following manner:

(1) Appraise the largest fuel concentrations. A fuel concentration is a collection of combustible materials (desks, files, or other material or items) that is separated from other fuel concentrations by a clear space that is 24 in. (610 mm) wide or one-half the height of the collection, whichever is greater. Floor covering is not considered in this estimate.
(2) The burning rate is based on the best available data. If test data are available, use those data; otherwise use Table 8.5.2.4.3.2. If data are not available and Table 8.5.2.4.3.2 is not sufficient, the burning rate is based on 125 Btu/sec · ft^2 of actual fuel-covered floor space for typical wooden desk modules. Ignore space occupied by metal desks or metal file cabinets. For open-shelf storage or similar piled or stacked concentrations of combustible materials, estimate 100 Btu/sec · ft^2 of covered floor space for each foot of height of combustible material. Double these figures for the portion of the fuel assembly that is foamed plastic.
(3) Based on the estimated burning rate, appraise the flashover potential. Use Figure 8.5.2.2.1.1.
(4) If flashover is shown as a potential, use Figure 8.5.2.2.1.2 to appraise severity, classify the space as a hazardous area, and assign charges, as appropriate.

8.5.3 Vertical Openings. These values apply to vertical openings and penetrations including exit stairways, ramps, and any other vertical exits, pipe shafts, ventilation shafts, duct penetrations, and laundry and incinerator chutes. The charge for vertical openings is based on the fire resistance of the enclosure, if provided. Where the protection of vertical openings (other than exits) meets the requirements of 38.3.1 and 39.3.1 (NFPA *101*), the parameter is assessed on the basis of "Enclosed, >1 hr" for new buildings >75 ft in height, and "Enclosed, 30 min to 1 hr" for all other buildings.

8.5.3.1 A vertical opening or penetration is classified as open if it has any of the following characteristics:

(1) Unenclosed
(2) Enclosed but has doorways (or similar portals) that are without doors
(3) Enclosed but has unprotected openings other than doorways
(4) Enclosed with cloth, paper, or similar materials without any sustained firestopping capabilities

8.5.3.2 The credit for vertical opening protection varies depending on the number of stories connected by the vertical opening and the degree of enclosure.

8.5.4 Sprinklers.

8.5.4.1 Where an automatic sprinkler is installed for either total or partial building coverage, the system shall be in accordance with the requirements of NFPA 13, *Standard for the Installation of Sprinkler Systems*.

8.5.4.2 To receive credit for protection, the sprinkler system must be equipped with an automatic alarm initiating device that activates the building manual fire alarm system or otherwise sounds an alarm sufficiently audible to be heard in all occupied areas.

8.5.4.3 To receive credit for "total building" sprinkler protection, the entire building must be provided with sprinkler coverage and that coverage must cover all zones of the building.

8.5.5 Fire Alarm. Fire alarms are defined in 8.5.5.1 through 8.5.5.4.

8.5.5.1 None. There is no fire alarm system, or the system is incomplete and does not meet the requirements for a higher-scored category.

8.5.5.2 Without Fire Department Notification (W/O F.D. Notification). There is a fire alarm system that meets the requirements of Section 9.6 (NFPA *101*).

8.5.5.3 With Fire Department Notification (W/ F.D. Notification). There is a fire alarm system that complies with the requirements of 8.5.5.2 and, in addition, automatically transmits a signal to the fire department that is committed to serve the area in which the building is located through a direct connection, an approved central station, or other acceptable means.

Table 8.5.2.4.1 Segregation of Hazards — Degree of Deficiency

	No protection	Sprinkler protection	Fire resistance–rated enclosure*	Sprinklered and fire resistance–rated enclosure*
Not structurally endangering	Single deficiency	No deficiency		
Structurally endangering	Double deficiency	Single deficiency	No deficiency	

*Complete enclosure having sufficient fire resistance to contain the potential of the hazardous contents area.

Table 8.5.2.4.3.2 Some Typical Peak Rates of Heat Release

Btu/sec · ft^2	Growth Rate[b]	Potential Fuel
1.5	S	Fire retardant–treated mattress (including normal bedding)
15[a]	M	Lightweight Type C upholstered furniture[c]
35[a]	S	Moderate weight Type C upholstered furniture[c]
35	F	Mail bags (full) stored 5 ft high
50[a]	M	Cotton/polyester innerspring mattress (including bedding)
60[a]	M	Lightweight Type B upholstered furniture[c]
60[a]	S	Medium weight Type C upholstered furniture[c]
65[a]	VF	Methyl alcohol pool fire
70[a]	S	Heavy weight Type C upholstered furniture[c]
80[a]	F	Polyurethane innerspring mattress (including bedding)
90[a]	M	Moderate weight Type B upholstered furniture[c]
125	M	Wooden pallets 1½ ft high
145[a]	M	Medium weight Type B upholstered furniture[c]
150[a]	F	Lightweight Type A upholstered furniture[c]
150	F	Empty cartons 15 ft high
175[a]	M	Heavy weight Type B upholstered furniture[c]
175	F	Diesel oil pool fire (> about 3 ft diameter)
175	VF	Cartons containing polyethylene bottles 15 ft high
220[a]	F	Moderate weight Type A upholstered furniture[c]
225[a]	F	Particleboard wardrobe/chest of drawers
290	VF	Gasoline pool fire (> about 3 ft diameter)
340[a]	VF	Thin plywood wardrobe with fire-retardant paint on all surfaces (50 in. × 24 in. × 72 in. high)
350	F	Wooden pallets 5 ft high
360[a]	F	Medium weight Type A upholstered furniture[c]
450[a]	F	Heavy weight Type A upholstered furniture[c]
600[a]	VF	Thin plywood wardrobe (50 in. × 24 in. × 72 in. high)

For SI units, (Btu/sec)/ft^2 = 11.35 kW/m^2; 1 in. = 25.4 mm; 1 Btu/sec = 1.055 kW; 1 ft = 0.3048 m; 1 lb = 0.4536 kg; 1 ft^2 = 0.0929 m^2.

[a]Peak rates of heat release were of short duration. These fuels typically showed a rapid rise to the peak and a corresponding rapid decline. In each case, the fuel package tested consisted of a single item.

[b]Growth Rates:

S — Slow: Burning rate in the range of a *t*-squared fire that reaches 1000 Btu/sec in 600 seconds.

M — Moderate: Burning rate in the range of a *t*-squared fire that reaches 1000 Btu/sec in 300 seconds.

F — Fast: Burning rate in the range of a *t*-squared fire that reaches 1000 Btu/sec in 150 seconds.

VF — Very Fast: Burning rate in the range of a *t*-squared fire that reaches 1000 Btu/sec in 75 seconds.

[c]The classification system used to describe upholstered furniture is as follows:

Lightweight — Less than about 5 lb/ft^2 of floor area. A typical 6 ft long couch weighs under 75 lb.

Moderate weight — About 5 lb/ft^2 to 10 lb/ft^2 of floor area. A typical 6 ft long couch weighs between 75 lb and 150 lb.

Medium weight — About 10 lb/ft^2 to 15 lb/ft^2 of floor area. A typical 6 ft long couch weighs between 150 lb and 300 lb.

Heavy weight — More than about 15 lb/ft^2 of floor area. A typical 6 ft long couch weighs over 300 lb.

Type A — Furniture with untreated or lightly treated foam plastic padding and nylon or other melting fabric.

Type B — Furniture with untreated or lightly treated foam plastic padding or with nylon or other melting fabric, but not both.

Type C — Furniture with cotton or heavily treated foam plastic padding and having cotton or other fabric that resists melting.

The estimated heat release rates are based on furniture having simple lines. For ornate or convoluted shapes, increase the indicated rates by up to 50 percent based on elaborateness.

Additional potential fuel heat release information can be found in *NFPA 72, National Fire Alarm and Signaling Code*; NFPA 204, *Standard for Smoke and Heat Venting*; the *SFPE Handbook of Fire Protection Engineering*; and other references.

8.5.5.4 With Voice Communication. There is a fire alarm system with voice alarm in accordance with 11.8.4 (NFPA *101*).

8.5.6 Smoke Detection.

8.5.6.1 All references to detectors herein refer to smoke detectors. No credit is given for heat detectors in habitable space except as specifically noted in 8.5.6.2 through 8.5.6.5. Heat detectors can be credited in uninhabitable spaces where ambient temperatures can be expected to reach 120°F (50°C) or fall below 0°F (–18°C), provided separation from inhabited spaces is at least ½-hour fire resistance–rated.

8.5.6.2 To meet the requirements for smoke detector coverage, the spaces must be provided with smoke detectors installed in accordance with *NFPA 72, National Fire Alarm and Signaling Code*.

8.5.6.3 Only those detectors whose activation will sound the alarm throughout the zone of origin are to be credited in this parameter.

8.5.6.4 If the building is evaluated by zones as defined in 8.3.2, the evaluation is based solely on detection within the zone.

8.5.6.5 To receive credit for smoke detection in corridors only, all corridors in the building or zone must have smoke detectors.

8.5.7 Interior Finish.

8.5.7.1 Classification of interior finish is based on the flame-spread rating of the interior finish tested in accordance with NFPA 255, *Standard Method of Test of Surface Burning Characteristics of Building Materials*. The requirements apply to wall and ceiling finish materials as described in Section 10.2 (NFPA *101*).

8.5.7.2 No consideration is included in the safety parameter value for any finish with a flame-spread rating of more than 200 or for any finish not rationally measured by NFPA 255, *Standard Method of Test of Surface Burning Characteristics of Building Materials*. Thus, this FSES should not be used where such conditions exist. Such materials include foamed plastics; asphalt-impregnated paper; materials that melt, drip, or delaminate; or those capable of inducing extreme rates of fire growth and rapid flashover. In any case involving these materials, the resultant risk is considered beyond the capacity of this evaluation system and requires individual appraisal.

8.5.7.3 Interior wall and ceiling finish materials tested in accordance with NFPA 265, *Standard Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile Coverings on Full Height Panels and Walls*, or NFPA 286, *Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth*, as permitted by Section 10.2 (NFPA *101*), and meeting the criteria established in Section 10.2 (NFPA *101*) for those test standards, shall be scored as Class A interior finish materials (flame spread ≤25).

8.5.7.4 Any interior finish having a flame spread of 75 or less that is protected by automatic sprinklers is evaluated as having a flame spread not exceeding 25. Any interior finish having a flame spread of more than 75 but not more than 200 that is protected by automatic sprinklers is evaluated as having a flame spread not exceeding 75.

8.5.8 Smoke Control. Smoke control definitions are provided in 8.5.8.1 through 8.5.8.2.2.

8.5.8.1 No Control. There are no smoke barriers or horizontal exits to a separated fire/smoke zone on the floor and no mechanically assisted smoke control systems serve the floor.

8.5.8.2 Smoke Barriers. Smoke barriers consist of installations conforming to the requirements of Section 8.5 (NFPA *101*).

8.5.8.2.1 Passive. The smoke control system is passive if it consists of continuous vertical membranes designed to restrict the movement of smoke. Passive smoke barriers might or might not have a fire resistance rating and might have protected openings.

8.5.8.2.2 Active. The smoke control system is active if it has a tested and accepted smoke control system that obstructs the leakage of smoke between compartments or zones. One method of judging acceptance of smoke control systems is contained in NFPA 92A, *Standard for Smoke-Control Systems Utilizing Barriers and Pressure Differences*.

8.5.9 Exit Access.

8.5.9.1 The charge for dead-end access is made where any corridor affords access in only one direction to a required exit.

8.5.9.2 If dead-end distances exceed 100 ft (30 m), a separate analysis must be made to evaluate the potential of flashover of any spaces that could block egress from the dead end and to determine the potential rate of smoke-filling of the egress system involved. If the safe time is shorter than the expected egress time, the evaluation should be discontinued unless a corrective action is specified.

8.5.9.3 The 50 ft (15 m) dead-end limit is applicable to existing buildings or new fully sprinklered buildings. A value of 20 ft (6.1 m) should be used for other new buildings.

8.5.9.4 Any system with common path of travel in excess of that permitted by NFPA *101* should be considered deficient under Safety Parameter 10, "Egress Route."

8.5.10 Egress Route.

8.5.10.1 Egress routes are the paths of travel from any point within a room to the public way using any types and arrangements described in Sections 38.2 or 39.2 (NFPA *101*).

8.5.10.2 Egress routes are defined in 8.5.10.2.1 through 8.5.10.2.5.

8.5.10.2.1 Single Egress Route. A single egress route exists where the occupants on any floor do not have either a direct exit to the public way or multiple egress routes as defined in 8.5.10.2.2.

8.5.10.2.2 Multiple Egress Routes. Multiple egress routes exist where the occupants on a floor have a choice of at least two separate means of egress routes to the public way using the permitted types in Sections 38.2 or 39.2 (NFPA *101*).

8.5.10.2.3 Deficient — Multiple Routes. An egress route is deficient if it fails to meet any of the applicable criteria of NFPA *101*, *Life Safety Code*, including capacity. Any system with a common path of travel in excess of that permitted by NFPA *101* should be considered deficient under Parameter 10, "Egress Route."

8.5.10.2.4 Smokeproof Enclosure. Credit for a smokeproof enclosure shall be permitted to be given for a stairway designed and tested in accordance with the requirements of 7.2.3 (NFPA *101*) for a smokeproof enclosure. To receive credit for a smokeproof enclosure, all exit stairs credited in Safety Parameter 10, "Egress Route," shall meet the smokeproof enclosure requirements.

8.5.10.2.5 Direct Exit. To be credited for direct exits, each room shall have within that unit a door that opens to the exterior at grade level or onto an exterior balcony with direct access to an

exterior exit. Where such openings are directly onto grade in a location where any person egressing can move directly away from the building without further exposure, the credit for direct exit shall be given even if there are no other exit routes from the space.

8.5.11 Corridor/Room Separation. The values assigned in Safety Parameter 11, "Corridor/Room Separation," are based on the quality of separation between the room and the corridor. For purposes of this evaluation, corridor separation in new buildings is considered as complete (i.e., 1 hour with door closer) if it meets the requirements of 38.3.6 (NFPA *101*).

8.5.11.1 Corridor/room separation is defined in 8.5.11.1.1 through 8.5.11.1.3.

8.5.11.1.1 Incomplete.

8.5.11.1.1.1 The separation is judged as "incomplete" if the wall to the corridor has unprotected openings (no door, or there are louvers, gaps, or transfer grilles) between the floor and ceiling. If openings exist above the ceiling level, the separation is considered complete if the ceiling in the room is a completed membrane. In this case, the separation rating is based on the level of resistance involved in the wall/ceiling system.

8.5.11.1.1.2 The score for incomplete separation is based on the potential time that at least the lower 5 ft (1.5 m) of the corridor could be expected to remain free of smoke if a fully involved fire were to occur in an exposing room. This is dependent on the amount of leakage from the exposing room with the greatest leakage and the size of the corridor *(see Figure 8.5.11.1.1.2)*. The scores are shown in Table 8.5.11.1.1.2.

8.5.11.1.2 Complete Separation. The separation, if not judged to be "incomplete" based on the criteria in Table 8.5.11.1.1.2, is considered "complete."

Table 8.5.11.1.1.2 Incomplete Separation Scores

Safe Time (min)	Score
<2	–6
≥2 but <4	–4
≥4 but <8	–2
≥8 but <16	0
≥16	Complete separation

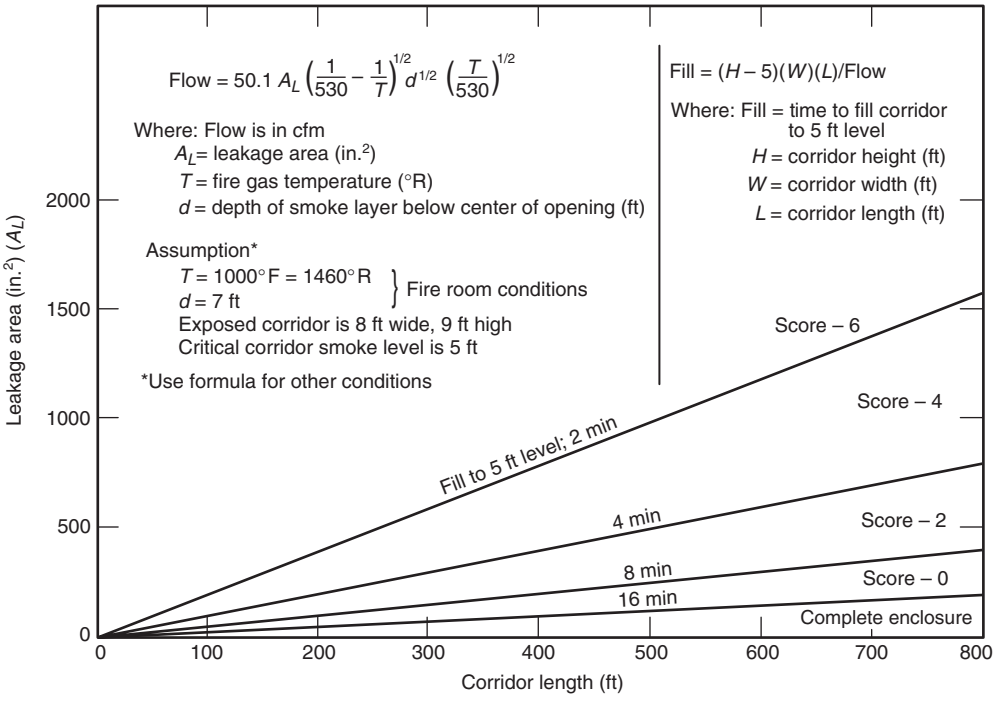
8.5.11.1.3 No Separation. There is "no separation" if the floor or the smoke zone is not subdivided (i.e., there is no corridor leading to an exit). *[See 38.3.6.1(1) through 38.3.6.1(3) (NFPA 101).]*

8.5.11.2 For information on credit for door closers, "smoke resistive" versus "≥½ hr" or "1 hr," see Note e to Worksheet 8.6.2.

8.5.12 Occupant Emergency Program.

8.5.12.1 The value of this parameter is determined by the number of fire exit drills conducted in the building each year. If no fire exit drills are conducted, the parameter is assessed a value of –2. If drills are conducted once or twice a year, the value is zero (0). If drills are conducted more than twice a year, this parameter is given a value of 1. If the building occupant load is fewer than 500 persons with fewer than 100 persons above or below the street level, this parameter should be given, as a minimum, a value of 1.

8.5.12.2 To qualify for credit, a majority of the building or zone occupants must take part in scenario-oriented fire exit drills. The scenarios should be based on the hazardous conditions that could develop during a fire in the facility.



For SI units, 1 in.² = 6.452 cm²; 1 ft = 0.3048 m; ⅝ (°F – 32) = °C.

FIGURE 8.5.11.1.1.2 Approximate Time to Smoke Impact.

8.5.12.3 The fire exit drills should be conducted in accordance with the appropriate provisions of NFPA *101*, *Life Safety Code*.

8.6 Worksheets for Evaluating Fire Safety in Business Occupancies. The worksheets for evaluating fire safety use a five-step process found in Figure 8.6.

8.6.1 Step 1 — Complete the Cover Sheet Using Worksheet 8.6.1. See Figure 8.6.

8.6.2 Step 2 — Determine Individual Safety Evaluations Using Worksheet 8.6.2. The following steps should be taken:

(1) Select and circle the safety value for each parameter in Worksheet 8.6.2 that best describes the conditions in the facility. Only one value for each of the parameters is to be chosen. If two or more values appear to apply, the one with the lowest point value governs.
(2) Transfer each of the 12 circled safety parameter values from Worksheet 8.6.2 to the available blocks corresponding to each safety parameter in Worksheet 8.6.3. Where the blocks indicate "÷ 2 =," enter one-half the value from Worksheet 8.6.2.
(3) Add each of the three columns, keeping in mind that any negative numbers need to be deducted.
(4) Transfer the resulting values for S_1, S_2, and S_3 to Worksheet 8.6.5.

8.6.3 Step 3 — Determine Mandatory Requirements Using Worksheet 8.6.4. The following steps should be taken:

(1) Circle the mandatory values in Worksheet 8.6.4 for the building being evaluated.
(2) Transfer the circled values from Worksheet 8.6.4 to the boxes marked S_a, S_b, and S_c in Worksheet 8.6.5.

8.6.4 Step 4 — Evaluate Fire Safety Equivalency Using Worksheet 8.6.5. The following steps should be taken:

(1) Perform the subtractions indicated in Worksheet 8.6.5. Enter the differences in the appropriate boxes.
(2) For each row, check "yes" if the value in the answer box is zero (0) or greater. Check "no" if the value in the answer box is negative.

8.6.5 Step 5 — Conclude Whether the Level of Life Safety Is at Least Equivalent to that Prescribed by the *Life Safety Code*, Using Worksheet 8.6.7, Conclusions. Worksheet 8.6.7 combines the fire safety equivalency evaluation of Worksheet 8.6.5 and the additional considerations of Worksheet 8.6.6.