NFPA® 150

Fire and Life Safety in Animal Housing Facilities Code

2025 Edition

NFPA, 1 Batterymarch Park, Quincy, MA 02169-7471
An International Codes and Standards Organization

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NFPA® 150

Fire and Life Safety in Animal Housing Facilities Code

2025 Edition

This edition of NFPA 150, *Fire and Life Safety in Animal Housing Facilities Code*, was prepared by the Technical Committee on Animal Housing Facilities and acted on by the NFPA membership during the 2024 NFPA Technical Meeting held June 20, 2024. It was issued by the Standards Council on August 29, 2024, with an effective date of September 18, 2024, and supersedes all previous editions.

This edition of NFPA 150 was approved as an American National Standard on September 18, 2024.

Origin and Development of NFPA 150

After a series of disastrous fires in racetrack stables in 1975, NFPA established the Committee on Firesafety in Racetrack Stables. This committee began its work in 1976 with the establishment of three working subcommittees covering construction, occupancy requirements, and fire protection. NFPA 150, *Standard on Firesafety in Racetrack Stables*, was first published in 1979. In the 1985 edition, minor changes were made to the standard that included the printing of Table 3 from NFPA 220, *Standard on Types of Building Construction*, in Appendix A. Changes to both the 1991 and 1995 editions consisted of editorial improvements and clarifications of the existing text.

The 2000 edition added a section on equivalency and revised other portions of the text to reflect the *Manual of Style for NFPA Technical Committee Documents* for use of mandatory language.

In 2004, the scope of NFPA 150 expanded to include life and safety requirements for both humans and animals in all types of animal housing facilities. In July 2004, the Standards Council approved the expansion and changed the name of the document to *Standard on Fire and Life Safety in Animal Housing Facilities*. The expanded NFPA 150 provided better guidance to authorities having jurisdiction by addressing all types of animal housing facilities and made possible the consistent treatment of such facilities from jurisdiction to jurisdiction.

The 2009 edition included several updates to referenced codes and standards and to some of the extracted text. A new provision allowing the use of the room-corner test from NFPA 286, *Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth*, was introduced to allow an alternative test protocol to evaluate interior finish materials. These refinements continued and a new chapter on performance-based design approaches was added for the 2013 edition. Other changes for that edition included supplemental provisions for the built-in fire protection systems that are mandated by the standard.

Changes for the 2016 edition included several clarifications and additions, including scoping criteria with regard to how the standard should be applied to existing buildings, classification of all agricultural animals in the Category B scheme for protection purposes, and a provision that extends automatic sprinkler and smoke control systems into all facilities that board or house horses.

For the 2019 edition, the entire document was rewritten and changed from a standard to a code, the format reflecting the layout of NFPA *101*®, *Life Safety Code*®, with core and occupancy chapters. Also included were seven new animal categories, some of which were broken down into subcategories, each with specific requirements tailored to the facilities' specific hazards and safety needs. In addition, a new annex was developed that featured a table summarizing fire protection requirements for each animal category.

The 2022 edition included new requirements for risk management in research facilities. New options for emergency forces notification and requirements for annual inspections were added to the agricultural chapter. Updates were also made to the references and extracted text.

The 2025 edition includes a new chapter and related definitions for medical gas systems and a new fire safety checklist annex. Multiple changes to Chapter 17 include new requirements for

emergency access openings and automatic fire sprinklers and revisions to requirements for automatic detection. Updates have been made to the references and extracted text.

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This list represents the membership at the time the Committee was balloted on the final text of this edition. Since that time, changes in the membership may have occurred. A key to classifications is found at the back of the document.

NOTE: Membership on a committee shall not in and of itself constitute an endorsement of the Association or any document developed by the committee on which the member serves.

Committee Scope: This Committee shall have primary responsibility for documents on the loss of animal and human life and property from fire in animal housing facilities, including, but not limited to the following: barns; stables; kennels; animal shelters; animal hospitals; veterinary facilities; zoos, special amusement parks; agricultural facilities; laboratories; and racetrack stable and kennel areas including those stable and kennel areas, barns, and associated buildings at state, county, and local fairgrounds. This Committee does not cover building code or life safety code requirements that are handled by other committees.

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Fire and Life Safety in Animal Housing Facilities Code

2025 Edition

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

A reference in brackets [ ] following a section or paragraph indicates material that has been extracted from another NFPA document. 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 shall be sent to the technical committee responsible for the source document.

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

Chapter 1 Administration

1.1 Scope.

1.1.1* This *Code* shall provide the minimum requirements for the design, construction, fire protection, and classification of animal housing facilities.

1.1.2* Animal housing facilities shall be designed, constructed, and maintained in accordance with the adopted building, fire, and life safety codes and the requirements herein.

1.1.3 Where requirements of this *Code* differ from the adopted fire prevention, life safety, and building codes, the requirements of this *Code* shall govern the protection of the animal occupants and animal handlers.

1.2 Purpose. The purpose of this *Code* shall be to prevent the loss of animal life, human life, and property from fire or other emergencies by providing the minimum requirements for the design, construction, operation, and maintenance of facilities where animals are housed, including, but not limited to, rest, feed, work, exercise, and production areas.

1.3 Application.

Δ **1.3.1*** This *Code* shall apply to animal housing facilities that are subject to local, state, or federal licensing or permitting requirements, including, but not limited to, the following:

(1) Animal hospitals and veterinary facilities
(2) Barns and stables
(3) Laboratories
(4)* Animal shelters and adoption centers
(5) Zoos, special amusement parks, and traveling exhibitions
(6)* General board and care facilities
(7) Agricultural facilities
(8) Emergency facilities

1.3.2 This *Code* shall apply to new animal housing facilities.

1.3.3* This *Code* shall also apply to existing facilities where any one of the following conditions applies:

(1) A change of use or occupancy classification occurs where animals are introduced.
(2) A change is made in the category or quantity of the animals housed.
(3) A facility undergoes rehabilitation that is classified by Chapter 43 of NFPA *101* as a modification, reconstruction, addition, or change of use or occupancy classification.
(4) A building or structure with an animal housing facility is relocated.
(5) A building with an animal housing facility is considered damaged, unsafe, or a fire hazard.
(6) A property line that affects compliance with any provision of this *Code* is created or relocated.

1.3.4* This *Code* shall apply to temporary structures housing animals solely for the purposes of developing a disaster/emergency management program in accordance with 4.3.4.

1.4 Retroactivity. The provisions of this *Code* provide an acceptable degree of protection from the hazards addressed in this *Code* at the time the *Code* was issued.

1.4.1 Unless otherwise specified, the provisions of this *Code* shall not apply to facilities, equipment, structures, or installations that existed or were approved for construction or installation prior to the effective date of the *Code*. Where specified, the provisions of this *Code* shall be retroactive.

1.4.2 This *Code* shall apply to existing installations that are determined by the authority having jurisdiction (AHJ) to constitute imminent danger to animal occupant or animal handler safety.

1.4.3 The retroactive requirements of this *Code* shall be permitted to be modified if their application would be impractical in the judgment of the AHJ and only where it is evident that a reasonable degree of safety is provided.

1.5 Equivalency. Nothing in this *Code* is intended to prevent the use of systems, methods, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety over those prescribed by this *Code*.

1.5.1 Technical documentation shall be submitted to the AHJ to demonstrate equivalency.

1.5.2 The system, method, or device shall be approved for the intended purpose by the AHJ.

1.5.3 Alternative systems, methods, or devices approved as equivalent by the AHJ shall be recognized as being in compliance with this *Code*.

1.6 Units.

1.6.1 SI Units. Metric units in this *Code* are in accordance with the modernized metric system known as the International System of Units (SI).

1.6.2 Primary and Equivalent Values. If a value for a measurement as given in this *Code* is followed by an equivalent value in other units, the first stated value shall be regarded as the requirement. A given equivalent value might be approximate.

1.7 Enforcement. This *Code* shall be administered and enforced by the AHJ designated by the governing authority. *(See Annex B for sample wording for enabling legislation.)*

Chapter 2 Referenced Publications

Δ **2.1 General.** The documents or portions thereof listed in this chapter are referenced within this *Code* and shall be considered part of the requirements of this document.

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

NFPA 1, *Fire Code,* 2024 edition.

NFPA 10, *Standard for Portable Fire Extinguishers,* 2022 edition.

NFPA 13, *Standard for the Installation of Sprinkler Systems,* 2025 edition.

NFPA 13D, *Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes,* 2025 edition.

NFPA 13R, *Standard for the Installation of Sprinkler Systems in Low-Rise Residential Occupancies,* 2025 edition.

NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems,* 2023 edition.

NFPA 31, *Standard for the Installation of Oil-Burning Equipment,* 2024 edition.

NFPA 54/ANSI Z223.1, *National Fuel Gas Code,* 2024 edition.

NFPA 58, *Liquefied Petroleum Gas Code,* 2024 edition.

NFPA 70®, National Electrical Code®, 2023 edition.

NFPA 72®, National Fire Alarm and Signaling Code®, 2025 edition.

NFPA 80, *Standard for Fire Doors and Other Opening Protectives,* 2025 edition.

NFPA 90A, *Standard for the Installation of Air-Conditioning and Ventilating Systems,* 2024 edition.

NFPA 90B, *Standard for the Installation of Warm Air Heating and Air-Conditioning Systems,* 2024 edition.

NFPA 92, *Standard for Smoke Control Systems,* 2024 edition.

NFPA 99, *Health Care Facilities Code,* 2024 edition.

NFPA *101®, Life Safety Code®,* 2024 edition.

NFPA 105, *Standard for Smoke Door Assemblies and Other Opening Protectives,* 2025 edition.

NFPA 204, *Standard for Smoke and Heat Venting,* 2024 edition.

NFPA 211, *Standard for Chimneys, Fireplaces, Vents, and Solid Fuel–Burning Appliances,* 2024 edition.

NFPA 220, *Standard on Types of Building Construction,* 2024 edition.

NFPA 221, *Standard for High Challenge Fire Walls, Fire Walls, and Fire Barrier Walls,* 2024 edition.

NFPA 252, *Standard Methods of Fire Tests of Door Assemblies,* 2022 edition.

NFPA 257, *Standard on Fire Test for Window and Glass Block Assemblies,* 2022 edition.

NFPA 286, *Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth,* 2024 edition.

NFPA 288, *Standard Methods of Fire Tests of Horizontal Fire Door Assemblies Installed in Horizontal Fire Resistance–Rated Assemblies,* 2022 edition.

NFPA 780, *Standard for the Installation of Lightning Protection Systems,* 2023 edition.

NFPA 1140, *Standard for Wildland Fire Protection,* 2022 edition.

NFPA 1660, *Standard for Emergency, Continuity, and Crisis Management: Preparedness, Response and Recovery,* 2024 edition.

NFPA 5000®, Building Construction and Safety Code®, 2024 edition.

2.3 Other Publications.

2.3.1 ANSI Publications. American National Standards Institute, Inc., 25 West 43rd Street, 4th Floor, New York, NY 10036.

ICC/ANSI A117.1, *American National Standard for Accessible and Usable Buildings and Facilities*, 2019.

2.3.2 ASCE Publications. American Society of Civil Engineers, 1801 Alexander Bell Drive, Reston, VA 20191-4400.

ASCE/SEI 7, *Minimum Design Loads for Buildings and Other Structures*, 2022 edition.

N **2.3.3 ASSE Publications.** American Society of Sanitary Engineering, 18927 Hickory Creek Drive, Suite 220, Mokena, IL 60448.

ASSE 6010, *Professional Qualifications Standard for Medical Gas Systems Installers*, 2021.

ASSE 6030, *Professional Qualifications Standard for Medical Gas Systems Verifiers*, 2021.

2.3.4 ASTM Publications. ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959.

ASTM A269/A269M, *Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service*, 2022.

ASTM A312, *Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes*, 2022a.

ASTM B88, *Standard Specification for Seamless Copper Water Tube*, 2022.

ASTM B280, *Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service*, 2020.

ASTM B819, *Standard Specification for Seamless Copper Tube for Medical Gas Systems*, 2019.

ASTM D396, *Standard Specification for Fuel Oils*, 2021.

ASTM D3699, *Standard Specification for Kerosene*, 2019.

ASTM D6448, *Industrial Burner Fuels from Used Lube Oils*, 2016, reapproved 2022.

ASTM D6751, *Standard Specification for Biodiesel Fuel Blend Stock (B100) for Middle Distillate Fuel*, 2023a.

ASTM D6823, *Standard Specification for Commercial Boiler Fuels with Used Lubricating Oils*, 2008, reapproved 2021.

ASTM D7666, *Standard Specification for Triglyceride Burner Fuel*, 2012, reapproved 2019.

ASTM E84, *Standard Test Method of Surface Burning Characteristics of Building Materials*, 2023b.

ASTM E119, *Standard Test Methods for Fire Tests of Building Construction and Materials*, 2022.

ASTM E814, *Standard Test Method for Fire Tests of Penetration Fire Stop Systems*, 2023a.

ASTM E1354, *Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter*, 2023.

ASTM E1591, *Standard Guide for Obtaining Data for Fire Growth Models*, 2020.

ASTM E1966, *Standard Test Method for Fire-Resistive Joint Systems*, 2015, reapproved 2019.

ASTM E2307, *Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-Story Apparatus*, 2023a.

N **2.3.5 CGA Publications.** Compressed Gas Association, 14501 George Carter Way, Suite 103, Chantilly, VA 20151-2923.

CGA G-4.1, *Cleaning Equipment for Oxygen Service*, 2018.

CGA G-8.1, *Standard for Nitrous Oxide Systems at Customer Sites*, 2013.

N **2.3.6 MSS Publications.** Manufacturer's Standardization Society (MSS) of the Valve and Fittings Industry, 127 Park Street NE, Vienna, VA 22180-4602.

MSS SP-58, *Pipe Hangers and Supports — Materials, Design, Manufacture, Selection, Application, and Installation*, 2018.

2.3.7 UL Publications. Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096.

UL 9, *Fire Tests of Window Assemblies*, 2009, revised 2020.

UL 10B, *Fire Tests of Door Assemblies*, 2008, revised 2020.

UL 10C, *Positive Pressure Fire Tests of Door Assemblies*, 2016, revised 2021.

UL 217, *Smoke Alarms*, 8th edition, 2020, revised 2022.

UL 263, *Fire Tests of Building Construction and Materials*, 2011, revised 2022.

UL 268, *Smoke Detectors for Smoke Alarm Systems*, 2023.

UL 296A, *Waste Oil-Burning Air-Heating Appliances*, 2018.

UL 555, *Fire Dampers*, 2006, revised 2020.

UL 555S, *Smoke Dampers*, 2014, revised 2020.

UL 647, *Unvented Kerosene-Fired Room Heaters and Portable Heaters*, 1993, revised 2010.

UL 723, *Test for Surface Burning Characteristics of Building Materials*, 2018, revised 2023.

UL 1037, *Antitheft Alarms and Devices*, 2016, revised 2023.

UL 1479, *Fire Tests of Penetration Firestops*, 2015, revised 2023.

UL 2079, *Tests for Fire Resistance of Building Joint Systems*, 2015, revised 2020.

2.3.8 Other Publications.

ASME A17.1/CSA B44, *Safety Code for Elevators and Escalators*, 2019.

ASME A17.3, *Safety Code for Existing Elevators and Escalators*, 2020.

Merriam-Webster's Collegiate Dictionary, 11th edition, Merriam-Webster, Inc., Springfield, MA, 2020.

2.4 References for Extracts in Mandatory Sections.

NFPA 1, *Fire Code*, 2024 edition.

NFPA 72®, National Fire Alarm and Signaling Code®, 2022 edition.

NFPA 80, *Standard for Fire Doors and Other Opening Protectives*, 2022 edition.

NFPA 96, *Standard for Ventilation and Control and Fire Protection of Commercial Cooking Operations*, 2024 edition.

NFPA 99, *Health Care Facilities Code*, 2024 edition.

NFPA *101®, Life Safety Code®*, 2024 edition.

NFPA 5000®, Building Construction and Safety Code®, 2024 edition.

Chapter 3 Definitions

Δ 3.1 General.

N **3.1.1** The definitions contained in this chapter shall apply to the terms used in this *Code*.

N **3.1.2** Where terms are not defined in this chapter or within another chapter, they shall be defined using their ordinarily accepted meanings within the context in which they are used.

N **3.1.3** *Merriam-Webster's Collegiate Dictionary*, 11th edition, shall be 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* Code. A standard that is an extensive compilation of provisions covering broad subject matter or that is suitable for adoption into law independently of other codes and standards.

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.

3.3.1 Addition. An increase in the building area, aggregate floor area, building height, or number of stories of a structure. [**5000,** 2024]

3.3.2 Animal. For the purposes of this *Code*, an air-breathing vertebrate.

N **3.3.2.1** ***Animal Patient.*** Any animal that is present in any animal care category that is being treated for any medical, wellness, injury, or behavioral condition.

3.3.2.2* ***Confined Animals.*** Animals housed such that human intervention is required for their release and evacuation in case of emergency.

3.3.3* Animal Handler. A person responsible for the handling, grooming, and care of confined animals, or reasonably expected to assist in their handling and evacuation in case of emergency.

3.3.4* Animal Housing Facility. Area of a building or structure, including interior and adjacent exterior spaces, where animals are fed, rested, worked, exercised, treated, exhibited, or used for production.

3.3.5 Animal Housing Facility Categories.

3.3.5.1* ***Category 1 — Animal Health Care.*** Animal housing facilities used for short-term care, maintenance, or medical attention of animals.

3.3.5.2 ***Category 1 Class A.*** Facilities where animals are observed overnight, not constantly attended, for short-term care, maintenance, or medical attention.

3.3.5.3 ***Category 1 Class B.*** Facilities where animals are housed temporarily and constantly attended for short-term care, maintenance, or medical attention.

3.3.5.4 ***Category 2 — Horse Facilities.*** Facilities used for temporary or permanent housing for horses.

3.3.5.5 ***Category 2 Class A.*** Facilities where horses are housed for general board and care in a commercial or professional facility greater than 5000 ft^2 (465 m^2).

3.3.5.6 ***Category 2 Class B.*** Facilities where horses are housed for general board and care in a small commercial or professional facility less than 5000 ft^2 (465 m^2).

3.3.5.7 ***Category 2 Class C.*** Facilities where horses are housed in small family stables.

3.3.5.8 ***Category 3 — Research.*** Facilities used for experimentation, education, or scientific experimentation or production research on animals in a controlled environment.

3.3.5.9* ***Category 5 — Exhibition/Public Viewing.*** Facilities that allow public access for the purpose of exhibition or public viewing of animals.

3.3.5.10 ***Category 5 Class A.*** Facilities where public attraction animals are permanently housed.

3.3.5.11 ***Category 5 Class B.*** Facilities where public attraction animals are temporarily housed.

3.3.5.12* ***Category 6 — General Board and Care.*** Facilities used for temporary or permanent housing of animals used for providing a service or participating in a sport or for the purposes of providing general board and care.

3.3.5.13 ***Category 6 Class A.*** Facilities where animals are housed without constant supervision.

3.3.5.14 ***Category 6 Class B.*** Facilities where animals are housed with constant supervision.

3.3.5.15 ***Category 7 — Agriculture.*** Animal housing facilities used for housing agricultural animals used for food or commodity production.

3.3.5.16 ***Category 7 Class A.*** Facilities where agricultural animals are housed for commercial use.

3.3.5.17 ***Category 7 Class B.*** Facilities where agricultural animals are housed in private residential-type animal housing.

3.3.5.18 ***Category 7 Class C.*** Facilities where agricultural animals are housed outdoors.

3.3.5.19 ***Category 8 — Emergency.*** Facilities used for the shelter or care of animals during an emergency event that are either temporary or not typically used for animal occupancy.

N **3.3.6 Animal Patient.** See 3.3.2.1

3.3.7 Building Height. The vertical distance from the grade plane to the average elevation of the highest roof surface. [**5000,** 2024]

3.3.8 Cage. A box or enclosure from which an animal or animals cannot normally escape without human intervention.

3.3.9 Confined Animals. See 3.3.2.2.

3.3.10 Feed Room. See 3.3.24.

3.3.11 Fire Resistance Rating. The time, in minutes or hours, that materials or assemblies have withstood a fire exposure as determined by the tests, or methods based on tests, prescribed by this *Code*. [**5000,** 2024]

3.3.12 General Public. People who do not have an intimate knowledge of the layout of the building or structure, or the general behavior of the animals at the facility, and are not intended personnel.

3.3.13 Intended Personnel. People working in the animal housing facility with an intimate knowledge of the layout of the building or structure and the general behavior of the animals at the facility, such as employees or students, who are not considered the general public.

3.3.14 Mechanical Utility Room. A room that primarily contains mechanical, electrical, plumbing, ventilation, or other utility equipment.

N **3.3.15 Medical Gas 1 Space.** Space in which failure of equipment or a system is likely to cause major injury or death of patients, staff, or visitors.

N **3.3.16 Medical Gas 2 Space.** Space in which failure of equipment or a system is likely to cause minor injury to patients, staff, or visitors.

3.3.17 Modification. The reconfiguration of any space, the addition or elimination of any door or window, the addition or elimination of load-bearing elements, the reconfiguration or extension of any system, or the installation of any additional equipment. [**5000,** 2024]

Δ **3.3.18 Occupancy.** See NFPA *101*.

N **3.3.19 Patient Care Space.** Any space within a veterinary, shelter medicine, animal health, animal transport, animal laboratory, animal research, or other animal care facility wherein animals are intended to be examined, treated or studied, or have procedures performed on them.

3.3.20* Protection. A device, material, or system that provides a specified level of safety to achieve a desired outcome.

3.3.21 Qualified. A competent and capable person who has met the requirements and training for a given field acceptable to the AHJ. [**96,** 2024]

3.3.22 Reconstruction. The reconfiguration of a space that affects an exit, or a corridor shared by more than a single tenant; or reconfiguration of space such that the rehabilitation work area is not permitted to be occupied because existing means of egress and fire protection systems, or their equivalent, are not in place or continuously maintained. [**5000,** 2024]

3.3.23 Renovation. The replacement in kind, strengthening, or upgrading of building elements, materials, equipment, or fixtures that does not result in a reconfiguration of the building or spaces within. [**5000,** 2024]

3.3.24 Stall. A room or compartment that normally houses one or more animals.

3.3.25 Tack. Stable gear; also harnesses, bridles, saddles, and other accessories used in riding or driving horses.

N **3.3.26 Waste Anesthetic Gas Disposal (WAGD).** Exhaust systems specifically designed to remove exhalation and waste anesthetic gases to the outdoors, which are also known as veterinary scavenger systems.

Chapter 4 General Requirements

4.1* Goals and Objectives.

4.1.1* Goals. The primary goals of this *Code* shall be safety and facility usability for both human and animal occupants, including property protection as it relates to the primary goals.

4.1.2* Objectives. To achieve the goals stated in 4.1.1, the goals and objectives of 4.1.3 and 4.1.4 shall be satisfied.

4.1.3 Safety. The intent of the safety goal of this *Code* shall be to reduce the probability of injury or death to both animal and human occupants from fire, similar emergencies, and facility use.

4.1.3.1 Safety from Fire.

4.1.3.1.1* Safety-from-Fire Goals. The fire safety goals of this *Code* shall be as follows:

(1) To provide a safe environment for human occupants inside an animal housing facility
(2) To provide a safe environment for animal occupants inside or adjacent to a structure
(3) To provide a level of safety for firefighters and emergency responders during search-and-rescue operations for animal and human occupants
(4) To minimize loss of property and interruption of facility operations from fire and similar emergencies to a level that is as low as reasonably practical

4.1.3.1.2 Safety-from-Fire Objectives.

4.1.3.1.2.1 Facilities shall be designed and constructed to protect human and animal occupants not intimate with the initial fire development for the time needed to evacuate, relocate, or defend in place.

4.1.3.1.2.2* Facilities shall be designed and constructed to allow firefighters and emergency responders the ability to conduct search-and-rescue operations for animal and human occupants without sustaining permanent disabilities if conducted.

4.1.3.1.2.3 Facilities shall be designed and constructed to provide access to the structure for emergency responders.

4.1.3.2 Safety During Facility Use.

4.1.3.2.1* Safety-During-Facility-Use Goal. The safety-during-facility-use goal of this *Code* shall be to provide an environment for both the human and animal occupants of the facility that minimizes hazards and provides an approved means of egress at all times.

4.1.3.2.2 Safety-During-Facility-Use Objectives.

4.1.3.2.2.1 Facilities shall be designed and constructed to allow occupants to evacuate or defend in place during emergency or nonemergency operations without sustaining a permanent disability.

4.1.3.2.2.2 Facilities shall be designed and constructed to allow occupants to recognize the development of an unwanted fire at its incipient stage.

4.1.3.2.2.3* Facilities shall be designed and constructed to allow human occupants to evacuate animal occupants or provide defend-in-place measures depending on the animal category.

4.1.4 Usability Goal. The intent of the usability goal of this *Code* shall be to ensure that the facility is capable of functioning at the level for which it was designed.

4.1.4.1 Function.

4.1.4.1.1* Function Goal. The intent of the function goal of this *Code* shall be to ensure that a facility and its systems, features, and construction, throughout its life, provide capability of operation to satisfy the other goals of this *Code*.

4.1.4.1.2* Function Objective. Facilities shall be designed and constructed to provide assurance that its systems, features, and construction are capable of performing their intended use to satisfy the objectives of this *Code*.

4.2 Fundamental Fire and Life Safety Requirements.

4.2.1 Multiple Safeguards.

4.2.1.1 The design of every facility intended for animal and human occupancy shall be such that reliance for property protection and safety to life does not depend solely on any single safeguard.

4.2.1.2 Additional safeguard(s) shall be provided for property protection and life safety in case any single safeguard is ineffective due to inappropriate animal or human actions, building failure, or system failure.

4.2.2 Appropriateness of Safeguards. Every facility shall be provided with means of egress and other fire and life safety safeguards of the kinds, numbers, locations, and capacities appropriate to the individual facility, with due regard to the following:

(1) Character of the occupancy, including fire load
(2) Characteristics and capabilities of both human and animal occupants and their responses to fire protection safeguards
(3) Number of animals and persons exposed
(4) Fire protection available
(5) Height, size, and type of construction of the facility
(6) Other factors necessary to provide animal and human occupants with a reasonable degree of safety
(7) Other factors necessary to protect the facility and contents from unacceptable damage
(8) Available water supplies
(9) Alternate noncombustible and limited-combustible construction techniques or materials

4.2.3 Means of Egress. The minimum number of means of egress for human and animal occupants shall be in accordance with Chapter 8.

4.2.4* Occupant Notification. In every facility of such size, arrangement, or occupancy that a fire itself might not provide adequate occupant warning, fire alarm systems shall be provided where required to warn human occupants of the existence of fire.

4.2.5 System Design and Installation. Any fire protection system, building service equipment, feature of protection, or safeguard provided for fire and life safety shall be designed, installed, and approved in accordance with applicable NFPA codes and standards.

4.2.6 Limiting Fire Spread.

4.2.6.1 The interior surfaces of the facility shall not contribute to an unacceptable rate and magnitude of fire spread and generation of heat and smoke.

4.2.6.2 Where required by other chapters of this *Code*, every building shall be divided into compartments to limit the spread of fire and restrict the movement of smoke.

4.2.7 Structural Integrity. The facility's structural members and assemblies shall be provided with the required degree of fire resistance to limit structural damage, damage to the building and its contents, and damage to adjacent buildings and property.

4.3 General Requirements.

4.3.1 Authority Having Jurisdiction (AHJ).

4.3.1.1 The AHJ shall determine whether the provisions of this *Code* are met.

4.3.1.2 Where it is evident that a reasonable degree of safety is provided, any requirement shall be permitted to be modified if, in the judgment of the AHJ, its application would be hazardous under normal occupancy conditions.

4.3.1.3* Any requirements that are essential for the safety of building occupants and that are not specifically provided for by this *Code* shall be determined by the AHJ.

4.3.2 Provisions in Excess of *Code* Requirements. Nothing in this *Code* shall be construed to prohibit a superior type of building construction, an additional means of egress, or an otherwise safer condition than that specified by the minimum requirements of this *Code*.

4.3.3 Maintenance and Testing.

4.3.3.1 Whenever or wherever any device, equipment, system, condition, arrangement, level of protection, fire-resistive construction, or any other feature is required for compliance with the provisions of this *Code*, such device, equipment, system, condition, arrangement, level of protection, fire-resistive construction, or other feature shall thereafter be continuously maintained.

4.3.3.2 Maintenance shall be provided in accordance with applicable NFPA requirements or requirements developed as part of a performance-based design, or as directed by the AHJ.

4.3.3.3 No existing life safety feature shall be removed or reduced where such feature is a requirement in this *Code*.

4.3.3.4 Existing life safety features obvious to the public, if not required by the code, shall be either maintained or removed.

4.3.3.5 Any device, equipment, system, condition, arrangement, level of protection, fire-resistive construction, or any other feature requiring periodic testing, inspection, or operation to ensure its maintenance shall be tested, inspected, or operated as specified elsewhere in this *Code* or as directed by the AHJ.

4.3.3.6 Maintenance, inspection, and testing shall be performed under the supervision of a responsible person who shall ensure that testing, inspection, and maintenance are made at specified intervals in accordance with applicable NFPA standards or as directed by the AHJ.

4.3.4 Disaster/Emergency Management Program.

4.3.4.1* General. Disaster/emergency management programs shall be required in all animal housing facilities to protect and ensure the safety of the animal and human occupants during fire or other similar emergencies.

4.3.4.2 Program Requirements.

4.3.4.2.1* Disaster/emergency management programs shall be developed in accordance with NFPA 1660 and shall include the procedures for reporting emergencies; the occupant and staff response to emergencies; the design and conduct of disaster/emergency drills; the type and coverage of building fire protection systems; a hazard assessment identifying hazards to

human and animal life; plans to monitor and reduce known hazards; and other items required by the AHJ.

4.3.4.2.2 Required disaster/emergency management programs shall be submitted to the AHJ for review and approval if required.

4.3.4.2.3 Disaster/emergency management programs shall be reviewed and updated annually.

4.3.4.2.4 Revised plans shall be submitted for review and updates shall be provided whenever changes are made in the occupancy or physical arrangement of the building or fire protection systems or features.

4.3.4.2.5 Floor plans shall be provided to the AHJ, if required.

4.3.4.2.6 In accordance with the disaster/emergency management program, equipment designated as necessary for the evacuation or relocation of animals shall be accessible at all times.

4.3.4.2.7 Information regarding the disaster/emergency management program shall be posted for reference.

4.3.4.2.8 Where animals pose a danger to first responder health or safety, the disaster/emergency management program shall be shared with the AHJ and instructional signage indicating hazards and special procedures shall be posted.

4.3.5* Disaster/Emergency Drills.

4.3.5.1 General. Disaster/emergency drills conforming to the provisions of this *Code* shall be conducted in cooperation with the local authorities and as specified by this *Code* or by the AHJ.

4.3.5.2 Drill Frequency.

4.3.5.2.1 Where required by this *Code* or the AHJ, disaster/emergency drills shall be held to familiarize occupants with the drill procedure and to establish conduct of the drill as a matter of routine.

4.3.5.2.2* Disaster/emergency drills shall include procedures to ensure that all persons subject to the drill participate.

Δ Chapter 5 Medical Gas Systems

N 5.1* Applicability.

N 5.1.1 Chapter 5 shall apply to veterinary, shelter medicine, animal health, animal transport, animal laboratory, animal research, or other animal care facilities that require Medical Gas 1 and Medical Gas 2 systems.

N 5.1.2 Medical Gas 1 and Medical Gas 2 piped gas or piped vacuum system requirements shall be applied where any of the following criteria is met:

(1) General anesthesia or deep sedation is performed
(2) The loss of the piped gas or piped vacuum systems is likely to cause major injury or death of patients, staff, or visitors
(3) The facility piped gas or piped vacuum systems are intended for Medical Gas 1 and Medical Gas 2 patient care space

N 5.1.3* Where the terms medical gas or medical support gas occur, the provisions shall apply to all piped systems for oxygen, nitrous oxide, medical air, instrument air, and mixtures thereof as well as vacuum and waste anesthetic gas disposal (WAGD) systems.

N 5.1.4 Wherever the name of a specific gas service occurs, the provision shall apply only to that gas.

N 5.1.5 Continued use of an existing system that is not in strict compliance with the provisions of this chapter shall be permitted if the authority having jurisdiction has determined that such use does not constitute a distinct hazard to life.

N 5.2 Medical Gas 1 and Medical Gas 2 Sources.

N 5.2.1 Central Supply System Operations.

N 5.2.1.1 The use of adapters or conversion fittings to adapt one gas-specific fitting to another shall be prohibited.

N 5.2.1.2 No flammable materials, cylinders containing flammable gases, or containers containing flammable liquids shall be stored in rooms with gas cylinders.

N 5.2.1.3 Cylinders without correct markings or whose markings and gas-specific fittings do not match shall not be used.

N 5.2.1.4 Cryogenic liquid storage units intended to supply gas to the facility shall not be used to trans fill other liquid storage vessels.

N 5.2.1.5 Care shall be exercised when handling cylinders that have been exposed to freezing temperatures or containers that contain cryogenic liquids to prevent injury to the skin.

N 5.2.1.6 Cylinders containing compressed gases and containers for volatile liquids shall be kept away from radiators, steam piping, and like sources of heat.

N 5.2.1.7 When cylinder valve protection caps are supplied, they shall be secured tightly in place unless the cylinder is connected for use.

N 5.2.1.8 Cylinders in use and in storage shall be prevented from reaching temperatures in excess of 125°F (52°C).

N 5.2.2* Central Supply System Locations.

N 5.2.2.1 General. Central supply systems shall be located to meet the criteria in 5.2.2.1.1 through 5.2.2.1.5.

N 5.2.2.1.1 Any of the following systems shall be permitted to be located together in the same outdoor enclosure:

(1) Manifolds for gas cylinders
(2) Manifolds for cryogenic liquid containers
(3) Bulk cryogenic liquid systems

N 5.2.2.1.2 Any of the following systems shall be permitted to be located together in the same indoor enclosure:

(1) Manifolds for gas cylinders
(2) Manifolds for cryogenic liquid containers
(3) In-building emergency reserves

N 5.2.2.1.3 Any of the following systems shall be permitted to be located together in the same room:

(1) Medical air compressor supply sources
(2) Medical-surgical vacuum sources
(3) Waste anesthetic gas disposal (WAGD) sources
(4) Any other compressor, vacuum pump, or electrically powered machinery
(5) Veterinary anesthesia cart bottled isoflurane or other cart-mounted anesthetic
(6) Veterinary anesthesia cart bottled oxygen

N **5.2.2.1.4** Indoor storage locations for oxygen and other gases shall not communicate with the following:

(1) Areas involved in critical patient care
(2) Anesthetizing locations where moderate sedation, deep sedation, or general anesthesia is administered
(3) Locations storing flammables
(4) Rooms containing open electrical contacts or transformers
(5) Storage tanks for ignitible (flammable or combustible) liquids
(6) Engines
(7) Kitchens
(8) Areas with open flames

N **5.2.2.1.5** Central supply systems for oxygen with a total capacity connected and in storage of 20,000 ft^3 (566,335 L) or more outside of the facility at standard temperature and pressure (STP) shall comply with NFPA 55.

N **5.2.2.2* Design and Construction.** Locations for central supply systems and the storage of positive-pressure gases shall meet all of the following requirements:

(1) They are constructed with access to move cylinders, equipment, and so forth, in and out of the location on hand trucks.
(2) They have lockable doors or gates or are otherwise able to be secured.
(3) If outdoors, they are provided with an enclosure (wall or fencing) constructed of noncombustible materials with a minimum of two entries/exits.
(4) If outdoors, bulk cryogenic liquid systems are provided with a minimum of two entries/exits.
(5) If indoors, they have interior finishes of noncombustible or limited-combustible materials.
(6) If indoors, the room is separated from the rest of the building by walls and floors having a 1-hour fire resistance rating with doors and other opening protectives having a ¾-hour fire protection rating.
(7) They are provided with racks, chains, or other fastenings to secure all cylinders from falling, whether connected, unconnected, full, or empty.
(8) They are supplied with electrical power from an emergency generator or enough uninterruptable power supply (UPS) to carry the load until the generator power is fully functioning or orderly transfer to anesthesia cart-mounted medical gas is completed.
(9) They have racks, shelves, and supports, where provided, constructed of noncombustible materials or limited-combustible materials.
(10) Electrical devices are protected from physical damage.
(11) They allow access by delivery vehicles and management of cylinders (e.g., proximity to loading docks, access to elevators, and passage of cylinders through public areas).
(12) They are designed to meet the operational requirements of 5.2.2 regarding room temperature.

N **5.2.2.3 Ventilation.**

N **5.2.2.3.1 Ventilation for Indoor Locations.** Medical gas storage and transfilling rooms shall be provided with adequate ventilation based on the stored gases in accordance with 5.2.2.3.

N **5.2.2.3.2 Natural Ventilation.**

N **5.2.2.3.2.1** Natural ventilation shall consist of two nonclosable louvered openings, each having an aggregate free opening area of at least 24 in^2 per 1000 ft^3 (155 cm^2 per 35 L) of the fluid designed to be stored in the space and not less than 72 in^2 (465 cm^2).

N **5.2.2.3.2.2** One opening shall be located within 1 ft (300 mm) of the floor, and one shall be located within 1 ft (300 mm) of the ceiling.

N **5.2.2.3.3 Mechanical Ventilation.**

N **5.2.2.3.3.1** Mechanical exhaust to maintain a negative pressure in the space shall be provided continuously, unless an alternative design is approved by the authority having jurisdiction.

N **5.2.2.3.3.2** Mechanical exhaust shall be at a rate of 1 cfm of airflow for each 5 ft^3 (1 L/sec per 300 L of fluid) designed to be stored in the space and not less than 50 cfm (24 L/sec) nor more than 500 cfm (235 L/sec).

N **5.2.2.3.3.3** Mechanical exhaust inlets shall be unobstructed and shall draw air from within 1 ft (300 mm) of the floor and adjacent to the cylinder or containers.

N **5.2.2.3.3.4** Dedicated exhaust systems shall not be required, provided that the system does not connect to spaces that contain ignitible (flammable or combustible) materials.

N **5.2.2.3.3.5** The exhaust duct material shall be noncombustible.

N **5.2.2.3.3.6** A means of make-up air shall be provided according to one of the following:

(1) Air provided via noncombustible ductwork to be transferred from adjacent spaces, from outside the building, or from spaces that do not contain combustible or flammable materials.
(2) Air transferred from a corridor under the door up to 50 cfm (24 L/sec) or 15 percent of the room exhaust, whichever is greater.
(3) Supply air provided from any building ventilation system that does not contain flammable or combustible vapors.

N **5.2.2.3.4 Venting of Relief Valves.** Indoor supply systems shall have all relief valves vented.

N **5.2.2.3.5 Ventilation for Motor-Driven Equipment.** The following source locations shall be adequately ventilated to prevent accumulation of heat:

(1) Medical air sources
(2) Medical–surgical vacuum sources
(3) Waste anesthetic gas disposal (WAGD) sources

N **5.2.2.3.6 Ventilation for Outdoor Locations.** Ventilation for outdoor locations shall comply with all the following:

(1) Outdoor locations surrounded by impermeable walls, except fire barrier walls, have protected ventilation openings located at the base of each wall to allow free circulation of air within the enclosure.
(2) Walls that are shared with other enclosures or with buildings are permitted to not have openings.
(3) The fire barrier wall has no openings or penetrations, except conduit or piping, provided that the penetration is

protected with a firestop system in accordance with the building code.

N 5.2.2.4 Storage of Unconnected Gas Cylinders.

N 5.2.2.4.1 Full or empty medical gas cylinders, when not connected, shall be stored in accordance with 5.2.2.4.

N 5.2.2.4.2 Unconnected gas cylinders shall be permitted to be in the same rooms or enclosures as their respective central supply systems.

N 5.2.2.4.3 Storage of volumes between 300 ft^3 (8495 L) and 3000 ft^3 (84,950 L) shall be stored in locations that are outdoors or in an interior enclosure of noncombustible or limited-combustible construction.

N 5.2.2.4.4 Indoor locations shall include all of the following:

(1) Restriction of oxidizing gases from being stored with any flammable gas, liquid, or vapor.
(2) Separation of oxidizing gases from combustibles or flammables by a minimum distance of 20 ft (6.1 m) or a distance of 5 ft (1.5 m) where the entire storage location is sprinklered or a gas cabinet.
(3) Regulation of temperatures.
(4) Appropriate restraints and cylinder valve protection caps.
(5) Smoking, open flames, electric heating elements, prohibited from location and within 20 ft (6.1 m) outside location.

N 5.2.3 Central Supply Systems.

N 5.2.3.1 General. Central supply systems shall be obtained from a supplier or manufacturer familiar with their proper construction and use and installed in accordance with the manufacturer's instructions.

N 5.2.3.2 Permitted Locations for Medical Gases. Central supply systems and medical gas outlets for oxygen, medical air, nitrous oxide, carbon dioxide, and all other patient medical gases shall be piped only into areas where the gases will be used under the direction of licensed veterinary medical professionals.

N 5.2.3.3* Materials. Materials used in central supply systems shall meet all of the following requirements:

(1) In those portions of systems intended to handle oxygen at gauge pressures greater than 350 psi (2413 kPa), interconnecting hose contains no polymeric materials.
(2) In those portions of systems intended to handle oxygen or nitrous oxide material, construction is compatible with oxygen under the temperatures and pressures to which the components can be exposed in the containment and use of oxygen, nitrous oxide, mixtures of these gases, or mixtures containing more than 23.5 percent oxygen.
(3) If potentially exposed to cryogenic temperatures, materials are designed for low temperature service.
(4) If intended for outdoor installation, materials are installed as per the manufacturer's requirements.

N 5.2.3.4 Final Line Pressure Regulators.

N 5.2.3.4.1 All positive pressure supply systems shall be provided with duplex line pressure regulators piped in parallel with all of the following characteristics:

(1) They are provided with isolation valves on the source side of each regulator.
(2) They are provided with isolation or check valves on the patient side of each regulator.
(3) A pressure indicator(s) is located downstream (patient or use side) of each regulator or immediately downstream of the isolating valves for the regulators.
(4) They are piped to allow either regulator to be serviced without interrupting supply.
(5) Each regulator is be sized for 100 percent of the peak calculated demand.
(6) They are constructed of materials deemed suitable by the manufacturer.

N 5.2.3.4.2 Central supply systems for positive pressure gases shall include one or more relief valves, all meeting the following requirements:

(1) They are located between each final line regulator and the source valve.
(2) They have a relief setting that is 50 percent above the normal system operating pressure.

N 5.2.4 Emergency Plan. The facility staff shall develop their emergency plan to address the loss of piped medical gas and the loss of medical–surgical vacuum.

N 5.3 Valves.

N 5.3.1 General.

N 5.3.1.1 Gas and Vacuum Shutoff Valves. Shutoff valves shall be provided to isolate sections or portions of the piped distribution system for maintenance, repair, or planned future expansion need and to facilitate periodic testing.

N 5.3.1.2 Labeling. All valves shall be labeled as to the gas supplied and the area(s) controlled.

N 5.4* Station Outlets/Inlets.

N 5.4.1 Each station outlet/inlet for medical gases or vacuums shall be gas-specific, whether the outlet/inlet is threaded or is a noninterchangeable quick coupler.

N 5.4.2 Each outlet/inlet shall be legibly identified.

N 5.4.3 Station outlets/inlets shall be permitted to be recessed or otherwise protected from damage.

N 5.4.4 When multiple wall outlets/inlets are installed, they shall be spaced to allow the simultaneous use of adjacent outlets/inlets with any of the various types of therapy equipment.

N 5.4.5 Station outlets in systems having nonstandard operating pressures shall meet all of the following additional requirements:

(1) They are gas-specific.
(2) They are pressure-specific where a single gas is piped at more than one operating pressure [e.g., a station outlet for oxygen at 80 psi (550 kPa) does not accept an adapter for oxygen at 50 psi (345 kPa)].
(3) If operated at a pressure in excess of 80 psi (550 kPa), they are either DISS connectors or comply with 5.4.5(4).
(4) If operated at a gauge pressure between 200 psi and 300 psi (1380 kPa and 2070 kPa), the station outlet is designed to prevent the removal of the adapter until the pressure has been relieved to prevent the adapter from injuring the user or others when removed from the outlet.

N **5.4.6** WAGD networks shall provide a WAGD inlet in all locations where halogenated anesthetic gas is intended to be administered.

N **5.4.6.1** Station inlets for WAGD service shall have the following additional characteristics:

(1) They are not interchangeable with any other systems, including medical–surgical vacuum.
(2) Components necessary for the maintenance of WAGD specificity are legibly marked to identify them as components of a WAGD inlet.
(3) They are of a type appropriate for the flow and vacuum level required by the facility's gas anesthetic machines.
(4) They are be located to avoid physical damage to the inlet.

N **5.5 Medical Gas 1 and Medical Gas 2 Warning Systems.**

N **5.5.1 General.** All master, area, and local alarm systems used for medical gas and vacuum systems shall include all of the following:

(1) Separate visual indicators for each condition monitored, except as permitted for local alarms that are displayed on master alarm panels
(2) Means to indicate a lamp or LED failure and audible failure
(3) Visual and audible indication that the communication with an alarm-initiating device is disconnected
(4) Labeling of each indicator, indicating the condition monitored
(5) Labeling of each alarm panel for its area of surveillance
(6) Reinitiation of the audible signal if another alarm condition occurs while the audible alarm is silenced
(7) Power for master, area alarms, sensors, and switches from the emergency power system
(8) Communication devices that do not use electrical wiring for signal transmission are supervised such that failure of communication shall initiate an alarm

N **5.5.2 Master Alarms.** A master alarm system shall be provided to monitor the operation and condition of the source of supply and the pressure in the main lines of each medical gas and vacuum piping system.

N **5.5.2.1** Master alarm panels for medical gas and vacuum systems shall each include the following signals:

(1) Alarm indication when the pressure in the main line of each separate medical gas system increases 20 percent or decreases 20 percent from the normal operating pressure
(2) Alarm indication when the medical–surgical vacuum pressure in the main line of each vacuum system drops to or below 12 in. (300 mm) gauge HgV
(3) WAGD low alarm when the WAGD vacuum level or flow is below effective operating limits

N **5.6 Medical Gas 1 and Medical Gas 2 Distribution.**

N **5.6.1 Piping Materials for Field Installed Positive Pressure Medical Gas Systems.**

N **5.6.1.1** Tubes, valves, fittings, station outlets, and other piping components in medical gas systems shall have been cleaned for oxygen service by the manufacturer prior to installation in accordance with the mandatory requirements of CGA G-4.1, *Cleaning Equipment for Oxygen Service*, except that fittings shall be permitted to be cleaned by a supplier or agency other than the manufacturer.

N **5.6.1.2** Each length of tube shall be delivered plugged or capped by the manufacturer and kept sealed until prepared for installation.

N **5.6.1.3** Fittings, valves, and other components shall be delivered sealed and labeled and kept sealed until prepared for installation.

N **5.6.1.4*** Tubes shall be hard-drawn seamless copper in accordance with ASTM B819, *Standard Specification for Seamless Copper Tube for Medical Gas Systems*; medical gas tube; or Type L, except Type K, which shall be used where operating pressures are above a gauge pressure of 185 psi (1275 kPa) and the pipe sizes are larger than NPS 3 [3⅛ in. OD (DN80)].

N **5.6.1.5** ASTM B819, *Standard Specification for Seamless Copper Tube for Medical Gas Systems,* medical gas tube shall be identified by the manufacturer's markings "OXY," "MED," "OXY/MED," "OXY/ACR," or "ACR/MED" in blue (Type L) or green (Type K).

N **5.6.1.6** The installer shall furnish documentation certifying that all installed piping materials comply with the requirements of 5.6.1.1.

N **5.6.2 Piping Materials for Field Installed Medical–Surgical Vacuum and WAGD Systems.**

N **5.6.2.1 Tubes for Vacuum.**

(1) Hard-drawn seamless copper tube in accordance with the following:
   (a) ASTM B88, *Standard Specification for Seamless Copper Water Tube*, copper tube (Type K, Type L, or Type M)
   (b) ASTM B280, *Standard Specification for Seamless Copper Tubing for Air Conditioning and Refrigeration Field Service*, copper ACR tube
   (c) ASTM B819, *Standard Specification for Seamless Copper Tube for Medical Gas Systems*, copper medical gas tubing (Type K or Type L)
(2) Stainless steel tube in accordance with the following:
   (a) ASTM A269, *Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service*, TP304L or 316L
   (b) ASTM A312, *Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes*, TP304L or 316L
   (c) ASTM A312, *Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes*, TP 304L/316L, Sch. 5S pipe, and A403WP304L/316L, Sch. 5S fittings

N **5.6.3 Prohibited Joints.** The following joints shall be prohibited throughout medical gas and vacuum distribution pipe-line systems:

(1) Flared and compression-type connections, including connections to station outlets and inlets, alarm devices, and other components
(2) Other straight-threaded connections, including unions
(3) Pipe-crimping tools used to permanently stop the flow of medical gas and vacuum piping
(4) Removable and nonremovable push-fit fittings that employ a quick assembly push-fit connector

N 5.6.4 Installation of Piping and Equipment.

N 5.6.4.1 Pipe Sizing.

N 5.6.4.1.1 Piping systems shall be designed and sized to deliver the required flow rates at the utilization pressures.

N 5.6.4.1.2 Mains and branches in medical gas piping systems shall be not less than NPS ½ [⅝ in. OD (DN15)] size.

N 5.6.4.1.3 Mains and branches in medical–surgical vacuum systems shall be not less than NPS ¾ [⅞ in. OD (DN20)] size.

N 5.6.4.1.4 Drops to individual station outlets and inlets shall be not less than NPS ½ [⅝ in. OD (DN15)] size.

N 5.6.4.1.5 Runouts to alarm panels and connecting tubing for gauges and alarm devices shall be permitted to be NPS ¼ [⅜ in. OD (DN8)] size.

N 5.6.4.2 Protection of Piping. Piping shall be protected against freezing, corrosion, and physical damage.

N 5.6.4.2.1 Piping exposed in corridors and other areas where subject to physical damage from the movement of carts, stretchers, portable equipment, or vehicles shall be protected.

N 5.6.4.2.2 Piping underground within buildings or embedded in concrete floors or walls shall be installed in a continuous conduit.

N 5.6.4.3 Location of Piping.

N 5.6.4.3.1 Piping risers shall be permitted to be installed in pipe shafts if protected from physical damage, effects of excessive heat, corrosion, or contact with oil.

N 5.6.4.3.2 Piping shall not be installed in kitchens, elevator shafts, elevator machine rooms, areas with open flames, and areas prohibited under *NFPA 70*.

N 5.6.4.4 Pipe Support.

N 5.6.4.4.1 Piping shall be supported from the building structure.

N 5.6.4.4.2 Hangers and supports shall comply with and be installed in accordance with MSS SP-58, *Pipe Hangers and Supports Materials, Design, Manufacture, Selection, Application, and Installation*.

N 5.6.4.4.3 Supports for copper tube shall be sized for copper tube.

N 5.6.4.4.4 In potentially damp locations, copper tube hangers or supports that are in contact with the tube shall be plastic-coated or otherwise be electrically insulated from the tube by a material that will not absorb moisture.

N 5.6.4.4.5 Maximum support spacing shall be in accordance with Table 5.6.4.4.5.

N 5.6.4.4.6 Where required, medical gas and vacuum piping shall be seismically restrained against earthquakes in accordance with the applicable building code.

N 5.6.4.5 Prohibited System Interconnections.

N 5.6.4.5.1 Two or more medical gas or vacuum piping systems shall not be interconnected for installation, testing, or any other reason, except as permitted by 5.6.4.5.2.

N Table 5.6.4.4.5 Maximum Pipe Support Spacing

Pipe Size	Hanger Spacing	
	mm	ft
DN8 (NPS ¼) (⅜ in. O.D.)	1520	5
DN10 (NPS ⅜) (½ in. O.D.)	1830	6
DN15 (NPS ½) (⅝ in. O.D.)	1830	6
DN 20 (NPS ¾) (⅞ in. O.D.)	2130	7
DN25 (NPS 1) (1 ⅛ in. O.D.)	2440	8
DN32 (NPS 1 ¼) (1 ⅜ in. O.D.)	2740	9
DN40 (NPS 1 ½) (1 ⅝ in. O.D.) and larger	3050	10
Vertical risers, all sizes, every floor, but not to exceed	4570	15

N 5.6.4.5.2 Medical gas and vacuum systems with the same contents shall be permitted to be interconnected with an in-line valve installed between the systems.

N 5.6.4.5.3 Leak testing shall be accomplished by separately charging and testing each individual piping system.

N 5.6.4.6 Manufacturer's Instructions.

N 5.6.4.6.1 The installation of individual components shall be made in accordance with the instructions of the manufacturer.

N 5.6.4.6.2 Manufacturer's instructions shall include directions and information deemed by the manufacturer to be adequate for attaining proper operation, testing, and maintenance of the medical gas and vacuum systems.

N 5.6.4.6.3 Copies of the manufacturer's instructions shall be left with the system owner.

N 5.6.4.7 Qualification of Installers.

N 5.6.4.7.1 The installation of medical gas and vacuum systems shall be completed by qualified, competent technicians who are experienced in performing such installations, including all personnel who actually install the piping system.

N 5.6.4.7.2 Installers of medical gas and vacuum piped distribution systems, all appurtenant piping supporting pump and compressor source systems, and appurtenant piping supporting source gas manifold systems, not including permanently installed bulk source systems, shall be certified in accordance with ASSE 6010, *Professional Qualification Standard for Medical Gas Systems Installers*.

N 5.7* Labeling, Identification, and Operating Pressure. Color and pressure requirements shall be in accordance with Table 5.7.

N 5.7.1 Pipe Labeling.

N 5.7.1.1 Piping shall be labeled by stenciling or adhesive markers that identify the medical gas, WAGD piping, or the vacuum system and include the following:

(1) Name of the gas or vacuum system or the chemical symbol per Table 5.7
(2) Gas or vacuum system color code per Table 5.7

N 5.7.1.2 Pipe labels shall be located as follows:

(1) At intervals of not more than 20 ft (6.1 m)
(2) At least once in or above every room
(3) On both sides of walls or partitions penetrated by the piping
(4) At least once in every story height traversed by risers

N 5.7.1.3 Medical gas piping shall not be painted.

N 5.7.2 Shutoff Valves.

N 5.7.2.1 Shutoff valves shall be identified with all of the following:

(1) Name or chemical symbol for the specific medical gas or vacuum system
(2) Room or areas served
(3) Caution to not close or open the valve except in emergency

N 5.7.3 Station Outlets and Inlets.

N 5.7.3.1 Station outlets and inlets shall be identified as to the name or chemical symbol for the specific medical gas or vacuum provided.

N 5.7.3.2 Where medical gas systems operate at pressures other than the standard gauge pressure of 50 psi to 55 psi (345 kPa to 380 kPa) or a gauge pressure of 160 psi to 185 psi (1100 kPa to 1275 kPa) for nitrogen, the station outlet identification shall include the nonstandard operating pressure in addition to the name of the gas.

N 5.7.4 Alarm Panels.

N 5.7.4.1 Labeling of alarm panels for each indicator shall indicate the condition monitored and its area of surveillance.

N Table 5.7 Standard Designation Colors and Operation Pressures for Gas and Vacuum Systems

Gas Service	Abbreviated Name	Colors (Background/Text)	Standard Gauge	
			kPa	psi
Medical air	Med air	Yellow/black	345-380	50-55
Carbon dioxide	CO_2	Gray/black of gray/white	345-380	50-55
Helium	He	Brown/white	345-380	50-55
Nitrogen	N_2	Black/white	1100-1275	160-185
Nitrous oxide	N_2O	Blue/white	345-380	50-55
Oxygen	O_2	Green/white or white/green	345-380	50-55
Oxygen/carbon dioxide mixtures	O_2/CO_{2n} % (n = % of CO_2)	Green/white	345-380	50-55
Medical-surgical vacuum	Med vac	White/black	380 mm to 760 mm (15.in. to 30 in.) HgV	
Waste anesthetic gas disposal	WAGD	Violet/white	Varies with system type	
Other mixtures	Gas A%/Gas B%	Colors as above Major gas for background/minor gas for text	None	
Nonmedical air (Category 3 gas-powered device)		Yellow and white diagonal stripe/black	None	
Nonmedical and Category 3 vacuum		White and black diagonal stripe/black boxed	None	
Laboratory air		Yellow and white checkerboard/black	None	
Laboratory vacuum		White and black checkerboard/black boxed	None	
Instrument air		Red/white	110-1275	160-185

[**99:**Table 5.1.11]

N 5.8* Performance Criteria and Testing — Medical Gas 1 and Medical Gas 2 (Gases, Medical–Surgical Vacuum, and WAGD).

N 5.8.1 General.

N 5.8.1.1 Inspection and testing shall be performed on all new piped gas systems, additions, renovations, temporary installations, or repaired systems to ensure, by a documented procedure, that all applicable provisions of this document have been adhered to and system integrity has been achieved or maintained.

N 5.8.1.2 Inspection and testing shall include all components of the system, or portions thereof, including, but not limited to, gas bulk source(s); manifolds; compressed air source systems (e.g., compressors, dryers, filters, regulators); source alarms and monitoring safeguards; master alarms; pipelines; isolation valves; area alarms; zone valves; and station inlets (vacuum) and outlets (pressure gases).

N 5.8.1.3 All systems that are breached and components that are subject to additions, renovations, or replacement (e.g., new gas sources, bulk, manifolds, compressors, dryers, alarms) shall be inspected and tested.

N 5.8.1.4 Systems shall be deemed breached at the point of pipeline intrusion by physical separation or by system component removal, replacement, or addition.

N 5.8.1.5 Breached portions of the systems subject to inspection and testing shall be confined to only the specific altered zone and components in the immediate zone or area that is located upstream for vacuum systems and downstream for pressure gases at the point or area of intrusion.

N 5.8.1.6 The inspection and testing reports shall be submitted directly to the party that contracted for the testing, who submits the report through channels to the responsible facility authority and any others that are required.

N 5.8.1.7 Reports shall contain detailed listings of all findings and results.

N 5.8.2 Installer-Performed Tests.

N 5.8.2.1 General.

N 5.8.2.1.1 The tests required by 5.8.2 shall be performed and documented by the installer prior to the tests listed in 5.8.3.

N 5.8.2.1.2 The test gas shall be oil-free, dry nitrogen National Formulary (NF).

N 5.8.2.1.3 Where manufactured assemblies are to be installed, the tests required by 5.8.2 shall be performed as follows:

(1) After completion of the distribution piping, but before the standing pressure test
(2) Prior to installation of manufactured assemblies supplied through flexible hose or flexible tubing
(3) At all station outlets/inlets on installed manufactured assemblies supplied through copper tubing

N 5.8.2.2 Initial Piping Blowdown. Piping in medical gas and vacuum distribution systems shall be blown clear by means of oil-free, dry nitrogen NF after installation of the distribution piping but before installation of station outlet/inlet rough-in assemblies and other system components (e.g., pressure/vacuum alarm devices, pressure/vacuum indicators, pressure relief valves, manifolds, source equipment).

N 5.8.2.3 Initial Pressure Test.

N 5.8.2.3.1 Each section of the piping in medical gas and vacuum systems shall be pressure tested.

N 5.8.2.3.2 Initial pressure tests shall be conducted as follows:

(1) After blowdown of the distribution piping
(2) After installation of station outlet/inlet rough-in assemblies
(3) Prior to the installation of components of the distribution piping system that would be damaged by the test pressure (e.g., pressure/vacuum alarm devices, pressure/vacuum indicators, line pressure relief valves)

N 5.8.2.3.3 The source shutoff valve shall remain closed during the tests.

N 5.8.2.3.4 The test pressure for pressure gases and vacuum systems shall be 1.5 times the system operating pressure but not less than a gauge pressure of 150 psi (1035 kPa).

N 5.8.2.3.5 Leaks, if any, shall be located, repaired (if permitted) or replaced (if required), and retested.

N 5.8.2.4 Initial Cross-Connection Test. It shall be determined that no cross-connections exist between the various medical gas and vacuum piping systems.

N 5.8.2.4.1 All piping systems shall be reduced to atmospheric pressure.

N 5.8.2.4.2 Sources of test gas shall be disconnected from all piping systems, except for the one system being tested.

N 5.8.2.4.3 The system under test shall be charged with oil-free, dry nitrogen NF to a gauge pressure of 345 kPa (50 psi).

N 5.8.2.4.4 After the installation of the individual faceplates with appropriate adapters matching outlet/inlet labels, each individual outlet/inlet in each installed medical gas and vacuum piping system shall be checked to determine that the test gas is being dispensed only from the piping system being tested.

N 5.8.2.5 Initial Piping Purge Test. The outlets in each medical gas piping system shall be purged to remove any particulate matter from the distribution piping.

N 5.8.2.5.1 Using appropriate adapters, each outlet shall be purged with an intermittent high-volume flow of test gas until the purge produces no discoloration in a clean white cloth.

N 5.8.2.5.2 The purging shall be started at the closest outlet/inlet to the zone valve and continue to the furthest outlet/inlet within the zone.

N 5.8.2.6 Standing Pressure Test for Positive Pressure Medical Gas Piping. After successful completion of the initial pressure tests, medical gas distribution piping shall be subject to a standing pressure test.

N 5.8.2.6.1* Tests shall be conducted after the final installation of station outlet valve bodies, faceplates, and other distribution system components.

N 5.8.2.6.2 The source valve shall be closed during this test.

N 5.8.2.6.3 The piping systems shall be subjected to a 24-hour standing pressure test using oil-free, dry nitrogen NF.

N 5.8.2.6.4 Test pressures shall be 20 percent above the normal system operating line pressure.

N **5.8.2.6.5*** At the conclusion of the tests, there shall be no change in the test pressure except that attributed to specific changes in ambient temperature.

N **5.8.2.6.6** Leaks, if any, shall be located, repaired (if permitted) or replaced (if required), and retested.

N **5.8.2.7 Standing Vacuum Test for Vacuum Piping.** After successful completion of the initial pressure tests, vacuum distribution piping shall be subjected to a standing vacuum test.

N **5.8.2.7.1** Tests shall be conducted after installation of all components of the vacuum system.

N **5.8.2.7.2** The piping systems shall be subjected to a 24-hour standing vacuum test.

N **5.8.2.7.3** Test pressure shall be between 12 in. (300 mm) HgV and full vacuum.

N **5.8.2.7.4** During the test, the source of test vacuum shall be disconnected from the piping system.

N **5.8.2.7.5*** At the conclusion of the test, there shall be no change in the vacuum other than that attributed to changes of ambient temperature.

N **5.8.2.7.6** Leaks, if any, shall be located, repaired (if permitted) or replaced (if required), and retested.

N **5.8.3 System Verification.**

N **5.8.3.1 General.**

N **5.8.3.1.1** Verification tests shall be performed only after all tests required in 5.8.2 have been completed.

N **5.8.3.1.2** The test gas shall be oil-free, dry nitrogen NF or the system gas where permitted.

N **5.8.3.1.3** Testing shall be conducted by a party technically competent and experienced in the field of medical gas and vacuum pipeline testing and meeting the requirements of ASSE 6030, *Professional Qualifications Standard for Medical Gas Systems Verifiers.*

N **5.8.3.1.4** Testing shall be performed by a party other than the installing contractor.

N **5.8.3.2 Alarm Test.**

N **5.8.3.2.1 General.**

N **5.8.3.2.1.1** All warning systems for each medical gas and vacuum system(s) shall be tested to ensure that all components function properly prior to placing the system in service.

N **5.8.3.2.1.2** Permanent records of these tests shall be maintained.

N **5.8.3.2.1.3** Warning systems that are part of an addition to an existing piping system shall be tested prior to the connection of the new piping to the existing system.

N **5.8.3.2.2 Master Alarms.**

N **5.8.3.2.2.1** The master alarm system tests shall be performed for each of the medical gas and vacuum piping systems.

N **5.8.3.2.2.2** Permanent records of these tests shall be maintained.

N **5.8.3.2.2.3** The audible and noncancelable visual signals shall indicate if the pressure in the main line increases or decreases 20 percent from the normal operating pressure.

N **5.8.3.2.2.4** The operation of all master alarm signals referenced in 5.5.2.1 shall be verified.

N **5.8.3.3 Piping Purge Test.** In order to remove any traces of particulate matter deposited in the pipelines as a result of construction, a heavy, intermittent purging of the pipeline shall be done.

N **5.8.3.3.1** The appropriate adapter shall be obtained from the facility or manufacturer and high purge rates of at least 8 SCFM (225 Nl/min) put on each outlet.

N **5.8.3.3.2** After the purge is started, it shall be rapidly interrupted several times until the purge produces no discoloration in a white cloth loosely held over the adapter during the purge.

N **5.8.3.3.3** In order to avoid possible damage to the outlet and its components, this test shall not be conducted using any implement other than the proper adapter.

N **5.8.3.4 Medical Air Compressor Systems.**

N **5.8.3.4.1** Tests of the medical air compressor system shall include the purity test for air quality and the test of the alarm sensors after calibration and setup per the manufacturer's instructions, as well as lead-lag controls.

N **5.8.3.4.2** Tests shall be conducted at the sample port of the medical air system.

N **5.8.3.4.3** The operation of the system control sensors, such as dewpoint, air temperature, and all other air quality monitoring sensors and controls, shall be checked for proper operation and function before the system is put into service.

N **5.8.3.4.4** The quality of medical air as delivered by the compressor air supply shall be verified after installation of new components prior to use by veterinary patients.

N **5.8.3.4.5** The air quality tests shall be conducted after the medical air source system has been operating normally but with the source valve closed under a simulated load for an elapsed time of at least 12 hours.

N **5.8.3.5 Medical–Surgical Vacuum Systems.** The proper functioning of the medical–surgical vacuum source system(s) shall be tested before it is put into service.

N **5.9* Medical Gas 1 and Medical Gas 2 Operation and Management.**

N **5.9.1 Special Precautions—Patient Gas, Vacuum, WAGD, and Medical Support Gas Systems.**

N **5.9.1.1*** Piping systems shall not be used for the distribution of flammable anesthetic gases.

N **5.9.1.2** Piping systems shall not be used as a grounding electrode.

N **5.9.1.3*** Liquid or debris shall not be introduced into the medical–surgical vacuum or WAGD systems for disposal.

N **5.9.1.4*** The medical–surgical vacuum and WAGD systems shall not be used for nonmedical applications.

N 5.9.2 Maintenance of Medical Gas, Vacuum, WAGD, and Medical Support Gas Systems.

N 5.9.2.1* General. Animal care facilities with installed medical gas, vacuum, WAGD, or medical support gas systems, or combinations thereof, shall develop and document periodic maintenance programs for these systems and their subcomponents as appropriate to the equipment installed.

N 5.9.3 Medical Gas and Vacuum Systems Information and Warning Signs.

N 5.9.3.1 The gas content of medical gas and vacuum piping systems shall be labeled in accordance with 5.7.1.

N 5.9.3.2 Labels for shutoff valves shall be in accordance with 5.7.2 and updated when modifications are made changing the areas served.

N 5.9.3.3 Station inlets and outlets shall be identified in accordance with 5.7.3.

N 5.9.4 Medical Gas and Vacuum Systems Maintenance and Record Keeping.

N 5.9.4.1 Permanent records of all tests required shall be maintained in the organization's files.

N 5.9.4.2 Central supply systems for nonflammable medical gases shall conform to all of the following:

(1) They are inspected annually.
(2) They are maintained by a qualified representative of the equipment owner.
(3) A record of the annual inspection is available for review by the authority having jurisdiction.

N 5.9.4.3 Whenever modifications are made that breach the pipeline, the installer and verification tests specified in this *Code* shall be conducted on the downstream portions of the medical gas piping system.

N 5.9.4.4 Audible and visual alarm indicators shall meet all of the following requirements:

(1) They are periodically tested to determine that they are functioning properly.
(2) Records of the test are maintained until the next test is performed.

Chapter 6 Animal Housing Categories

6.1 General.

6.1.1* Occupancy Classification.

6.1.1.1 The general occupancy classification of a facility housing animals shall be determined in accordance with Chapter 6 of *NFPA 5000* or Chapter 6 of NFPA *101*.

6.1.1.2 Animal housing facility categories shall be subject to the ruling of the AHJ where there is a question of classification.

6.1.2 Occupancy Separations. The separations required between different occupancies shall be in accordance with Chapter 6 of *NFPA 5000* or Chapter 6 of NFPA *101*.

6.2 Animal Housing Facility Categories. The occupancy of a facility housing animals shall be subclassified in accordance with this section.

6.2.1 Category 1 — Animal Health Care.

6.2.1.1* Definition. Animal housing facilities used for short-term care, maintenance, or medical attention of animals.

6.2.1.2* Category 1 Class A. Facilities where animals are observed overnight, not constantly attended for short-term care, maintenance, or medical attention.

6.2.1.3* Category 1 Class B. Facilities where animals are housed temporarily and constantly attended for short-term care, maintenance, or medical attention.

6.2.2 Category 2 — Horse Facilities.

6.2.2.1* Definition. Facilities used for temporary or permanent housing for horses.

6.2.2.2* Category 2 Class A. Facilities where horses are housed for general board and care in a commercial or professional facility greater than 5000 ft^2 (465 m^2).

6.2.2.3* Category 2 Class B. Facilities where horses are housed for general board and care in a small commercial or professional facility less than 5000 ft^2 (465 m^2).

6.2.2.4* Category 2 Class C. Facilities where horses are housed in small family stables.

6.2.3 Category 3 — Research.

6.2.3.1* Definition. Facilities used for experimentation, education, or scientific experimentation or production research on animals in a controlled environment.

6.2.4 Category 4. (Reserved)

6.2.5 Category 5 — Exhibition/Public Viewing.

6.2.5.1* Definition. Facilities that allow public access for the purpose of exhibition or public viewing of animals.

6.2.5.2* Category 5 Class A. Facilities where public attraction animals are permanently housed.

6.2.5.3* Category 5 Class B. Facilities where public attraction animals are temporarily housed.

6.2.6 Category 6 — General Board and Care.

6.2.6.1* Definition. Facilities used for temporary or permanent housing of animals used for providing a service, participating in a sport, or the purposes of providing general board and care.

6.2.6.2* Category 6 Class A. Facilities where animals are housed without constant supervision.

6.2.6.3* Category 6 Class B. Facilities where animals are housed with constant supervision.

6.2.7 Category 7 — Agriculture.

6.2.7.1 Definition. Animal housing facilities used for housing agricultural animals used for food or commodity production animals.

6.2.7.2* Category 7 Class A. Facilities where agricultural animals are housed for commercial use.

6.2.7.3* Category 7 Class B. Facilities where agricultural animals are housed in private residential-type animal housing.

6.2.7.4* Category 7 Class C. Facilities where agricultural animals are housed outdoors.

6.2.8 Category 8 — Emergency.

6.2.8.1* Definition. Facilities used for the shelter or care of animals during an emergency event that are either temporary or not typically used for animal occupancy.

6.3 Multiple Categories.

6.3.1* Multiple categories shall comply with the requirements of one of the following:

(1) Mixed categories *(see 6.3.3)*
(2) Separated categories *(see 6.3.4)*

6.3.2 Definitions.

6.3.2.1 Mixed Categories. A facility in which multiple categories are intermingled.

6.3.2.2 Multiple Categories. A facility in which two or more categories of animal housing facilities exist.

6.3.2.3 Separated Categories. A facility in which multiple categories are separated by fire-resistance-rated assemblies.

6.3.3 Mixed Categories.

6.3.3.1 Each portion of the facility shall be categorized as to its use in accordance with Section 6.2.

6.3.3.2 The building shall comply with the most restrictive requirements of the categories involved, unless separate safeguards are approved.

6.3.3.3* Where incidental to another occupancy, mercantile, business, industrial, or storage usage shall be subject to the predominant occupancy.

6.3.4 Separated Categories.

6.3.4.1 Where separated categories are provided, each part of the structure comprising a distinct category, as described in this chapter, shall be completely separated from other categories by fire-resistive assemblies in accordance with NFPA *101* or *NFPA 5000*, as specified in 6.3.4 and Table 6.3.4.1, unless separation is provided by approved existing separations.

6.3.4.2 Category separations shall be classified as 1-hour fire-resistance-rated and shall meet the requirements of Chapter 8 of *NFPA 5000* or Chapter 8 of NFPA *101*.

6.3.4.3 Category separations shall be vertical, horizontal, or both, or, where necessary, of such other form as required to provide complete separation between category divisions in the structure.

6.3.4.4 Where the category separation is horizontal, structural members supporting the separation shall be protected by an equivalent fire-resistive construction.

6.3.5 Change in Category. If there is a change in category, the facility shall meet the requirements for the new category.

6.4 Hazard of Contents.

6.4.1 General.

6.4.1.1 For the purpose of this *Code*, the hazard of contents shall be the relative danger of the start and spread of fire, the danger of smoke or gases generated, and the danger of explosion or other occurrence potentially endangering the lives and safety of the occupants of the building or structure.

6.4.1.2 Hazard of contents shall be classified by the registered design professional (RDP) or owner and submitted to the AHJ for review and approval on the basis of the character of the contents and the processes or operations conducted in the building or structure.

Δ **6.4.1.3** For the purpose of the *Code*, where different degrees of hazard of contents exist in different parts of a building or structure, the most hazardous shall govern the classification, unless hazardous areas are separated or protected.

6.4.2 Classification of Hazard of Contents.

6.4.2.1 General. The hazard of contents of any building or structure shall be classified as low, ordinary, or high in accordance with 6.4.2.2, 6.4.2.3, and 6.4.2.4.

6.4.2.2 Low Hazard Contents. Low hazard contents shall be classified as those of such low combustibility that no self-propagating fire therein can occur.

Table 6.3.4.1 Category Separation Fire Rating (hr)

	1A	1B	2A	2B	2C	3	4	5A	5B	6A	6B	7A	7B	7C	8
1A	X	1	1	NR	NR	1	–	NR	1	NR	NR	NR	NR	NR	NR
1B	1	X	1	1	1	1	–	1	1	1	1	1	1	NR	NR
2A	1	1	X	1	NR	1	–	1	1	1	1	1	1	NR	NR
2B	NR	1	1	X	1	1	–	1	1	NR	1	1	1	NR	NR
2C	NR	1	NR	1	X	1	–	1	NR	NR	NR	NR	NR	NR	NR
3	1	1	1	1	1	X	–	1	1	1	1	1	1	NR	NR
4	–	–	–	–	–	–	X	–	–	–	–	–	–	–	–
5A	1	1	1	1	1	1	–	X	NR	1	NR	1	1	NR	NR
5B	1	1	1	1	1	1	–	NR	X	NR	1	NR	NR	NR	NR
6A	NR	1	1	1	NR	1	–	1	1	X	1	NR	NR	NR	NR
6B	NR	1	NR	1	NR	1	–	NR	1	1	X	NR	NR	NR	NR
7A	NR	1	1	1	NR	1	–	1	NR	NR	NR	X	NR	NR	NR
7B	NR	1	1	1	NR	1	–	1	NR	NR	NR	NR	X	NR	NR
7C	NR	NR	NR	NR	NR	NR	–	NR	NR	NR	NR	NR	NR	X	NR
8	NR	NR	NR	NR	NR	NR	–	NR	NR	NR	NR	NR	NR	NR	X

NR: Not required.

6.4.2.3 Ordinary Hazard Contents. Ordinary hazard contents shall be classified as those that are likely to burn with moderate rapidity or to give off a considerable volume of smoke.

6.4.2.4 High Hazard Contents. High hazard contents shall be classified as those that are likely to burn with extreme rapidity or from which explosions are likely.

Chapter 7 Construction and Separation Requirements

7.1* Types of Construction. The types of construction for animal housing facilities shall be in accordance with NFPA 220 or Section 7.2 of *NFPA 5000*.

7.2 Height and Area Requirements.

7.2.1 General. The height and area requirements for the category of the animal housing facility shall be in accordance with Section 7.4 of *NFPA 5000*.

7.2.1.1 Exterior areas such as corrals, paddocks, or other fenced holding areas attached to animal housing facilities shall not be included in the calculated allowable area per story.

7.2.1.2 If such exterior areas are partially or totally covered by extended roof structures integral with the building, the line of primary structure supporting such roofed areas shall be considered exterior wall lines when determining location on property.

7.2.2* Additional Requirements. In addition to the requirements of 7.2.1, the allowable number of stories above grade where the animal housing facilities are permitted and the allowable area per story of animal housing facilities shall not exceed the limits set forth in Table 7.2.2. The values in Table 7.2.2 for sprinklered facilities shall apply to facilities protected throughout with an approved, electrically supervised automatic sprinkler system in accordance with Section 9.2.

7.2.2.1 In Table 7.2.2, a one-story building of Type II construction for Categories 3, 5, 7, and 8 shall not be limited in area where the building is surrounded and adjoined by public ways or yards not less than 60 ft (18 m) in width.

7.2.3 Maximum Facility Area. The maximum area of the animal housing facilities within a building or structure shall be determined by multiplying the allowable area per story, as determined by Table 7.2.2, by the facility's number of stories up to a maximum of three stories.

7.2.4 Multiple Categories. Where an animal housing facility is occupied by animals of two or more categories, the animal housing facility shall comply with 7.2.4.

7.2.4.1 Mixed Categories. Animal housing facilities with mixed categories complying with 6.3.3 shall have their required type of construction determined by applying the most restrictive type of construction to the entire animal housing facility.

7.2.4.2 Separated Categories. Animal housing facilities with separated occupancies complying with 6.3.4 shall have their required type of construction determined in accordance with 7.2.4.2.1 and 7.2.4.2.2.

7.2.4.2.1 The location of each separated category in the animal housing facility shall comply with the story requirements of 7.2.2.

7.2.4.2.2 For each story in the animal housing facility, the sum of the ratios of the per story area of each separated category divided by the allowable area per story as determined by Table 7.2.2 shall not exceed 1.0.

7.3 Stall, Cage, and Enclosure Requirements.

7.3.1 Stalls, cages, and enclosure requirements shall be based on established standards for the specific animal and facility type.

7.3.2* Animal enclosures shall not interfere with egress or extrication from the enclosure.

7.3.3* Modifications to 7.3.1 and 7.3.2 shall be permitted for temporary holding areas with the approval of the AHJ.

7.4 Exposure Protection. Adjacent buildings shall be separated in accordance with Chapter 7 of *NFPA 5000*.

7.5 Structural Design.

7.5.1 Structural design shall be subject to the requirements of Chapter 35 of *NFPA 5000* and this section.

7.5.2* Structural design criteria for walls and fence assemblies providing animal containment shall be designed to withstand the horizontal forces exerted by the animal occupants.

7.6 Fire-Rated Separations Between Animal Housing Facilities and Hazardous Areas.

7.6.1 Where required by the occupancy chapters, animal housing facilities shall be separated with a 2-hour fire-resistance-rated enclosure from hazardous areas, including, but not limited to, the following:

(1) Feed rooms over 100 ft^2 (9.3 m^2)
(2) Tack rooms over 100 ft^2 (9.3 m^2)
(3) Vehicle or equipment storage rooms over 100 ft^2 (9.3 m^2)
(4) Blacksmith shops using open flames
(5) Kitchens with commercial cooking equipment
(6) Mechanical equipment rooms with fuel-fired equipment
(7) Laundry rooms
(8) Hot water power washer rooms
(9) Electrical rooms
(10) Generator rooms
(11) Similar areas

7.6.2 In buildings protected throughout with an approved, supervised automatic sprinkler system in accordance with NFPA 13, animal housing facilities shall be permitted to be separated with a 1-hour fire-resistance-rated enclosure from the hazardous areas identified in 7.6.1.

7.7 Wildland/Urban Interface or Wildland/Urban Intermix. Animal housing facilities located in a wildland/urban interface or wildland/urban intermix shall comply with this *Code* and the construction requirements of NFPA 1140.

7.8 Additions.

7.8.1 Additions to existing buildings shall conform to the building rehabilitation requirements.

7.8.2 Existing parts of the structure shall not be required to be modified, provided that the new construction has not diminished the fire safety features of the facility.

Table 7.2.2 Allowable Area Factor in ft² per Story

Occupancy Classification	See Footnotes	Type of Construction								
		Type 1		Type II*		Type III		Type IV	Type V	
		A	B	A	B	A	B	A	A	B
Category 1-A	NS	UL	UL	15,000	11,000	12,000	NP	12,000	9,500	NP
	S1	UL	UL	60,000	44,000	48,000	NP	48,000	38,000	NP
	SM	UL	UL	45,000	33,000	36,000	NP	36,000	28,500	NP
Category 1-B	NS	UL	55,000	19,000	10,000	16,500	10,000	18,000	10,500	4,500
	S1	UL	220,000	76,000	40,000	66,000	40,000	72,000	42,000	18,000
	SM	UL	165,000	57,000	30,000	49,500	30,000	54,000	31,500	13,500
Category 2-A	NS	UL	UL	24,400	16,000	24,000	16,000	20,500	12,000	7,000
	S1	UL	UL	96,000	64,000	96,000	64,000	82,000	48,000	28,000
	SM	UL	UL	72,000	48,000	72,000	48,000	61,500	36,000	21,000
Category 2-B	NS	UL	UL	24,400	16,000	24,000	16,000	20,500	12,000	7,000
	S1	UL	UL	96,000	64,000	96,000	64,000	82,000	48,000	28,000
	SM	UL	UL	72,000	48,000	72,000	48,000	61,500	36,000	21,000
Category 2-C	NS	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
	S1	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
	SM	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Category 3	NS	UL	UL	24,400	16,000	24,000	16,000	20,500	12,000	7,000
	S1	UL	UL	96,000	64,000	96,000	64,000	82,000	48,000	28,000
	SM	UL	UL	72,000	48,000	72,000	48,000	61,500	36,000	21,000
Category 4	(Reserved)									
Category 5-A R-2 (A-3)	NS	UL	UL	24,400 (15,000)	16,000 (9,500)	24,000 (14,000)	16,000 (9,500)	20,500 (15,000)	12,000 (11,500)	7,000 (6,000)
	S1	UL	UL	96,000 (62,000)	64,000 (38,000)	96,000 (56,000)	64,000 (38,000)	82,000 (60,000)	48,000 (46,000)	28,000 (24,000)
	SM	UL	UL	72,000 (46,500)	48,000 (28,500)	72,000 (42,000)	48,000 (28,500)	61,500 (45,000)	36,000 (34,500)	21,000 (18,000)
Category 5-B	NS	UL	UL	24,400 (15,000)	16,000 (9,500)	24,000 (14,000)	16,000 (9,500)	20,500 (15,000)	12,000 (11,500)	7,000 (6,000)
	S1	UL	UL	96,000 (62,000)	64,000 (38,000)	96,000 (56,000)	64,000 (38,000)	82,000 (60,000)	48,000 (46,000)	28,000 (24,000)
	SM	UL	UL	72,000 (46,500)	48,000 (28,500)	72,000 (42,000)	48,000 (28,500)	61,500 (45,000)	36,000 (34,500)	21,000 (18,000)
Category 6-A	NS	UL	UL	24,400	16,000	24,000	16,000	20,500	12,000	7,000
	S1	UL	UL	96,000	64,000	96,000	64,000	82,000	48,000	28,000
	SM	UL	UL	72,000	48,000	72,000	48,000	61,500	36,000	21,000
Category 6-B	NS	UL	UL	24,400	16,000	24,000	16,000	20,500	12,000	7,000
	S1	UL	UL	96,000	64,000	96,000	64,000	82,000	48,000	28,000
	SM	UL	UL	72,000	48,000	72,000	48,000	61,500	36,000	21,000
Category 7-A	NS	UL	UL	UL	UL	UL	UL	UL	UL	UL
	S1	UL	UL	UL	UL	UL	UL	UL	UL	UL
	SM	UL	UL	UL	UL	UL	UL	UL	UL	UL

(continues)

Table 7.2.2 *Continued*

Occupancy Classification	See Footnotes	Type of Construction								
		Type 1		Type II*		Type III		Type IV	Type V	
		A	B	A	B	A	B	A	A	B
Category 7-B	NS	UL	UL	UL	UL	UL	UL	UL	UL	UL
	S1	UL	UL	UL	UL	UL	UL	UL	UL	UL
	SM	UL	UL	UL	UL	UL	UL	UL	UL	UL
Category 7-C	NS	UL	UL	UL	UL	UL	UL	UL	UL	UL
	S1	UL	UL	UL	UL	UL	UL	UL	UL	UL
	SM	UL								
Category 8	NS	UL	UL	24,400	16,000	24,000	16,000	20,500	12,000	7,000
	S1	UL	UL	96,000	64,000	96,000	64,000	82,000	48,000	28,000
	SM	UL	UL	72,000	48,000	72,000	48,000	61,500	36,000	21,000

For SI units, 1 ft = 0.3048 m, 1 ft^2 = 0.093 m^2.
UL: Unlimited. NP: Not permitted.
S1: Sprinklered one-story. Allowable facility height in feet and allowable number of stories above grade in facilities protected with an automatic sprinkler system as specified in 7.2.2.
SM: Sprinklered multistory. Allowable facility height in feet and allowable number of stories above grade in facilities protected with an automatic sprinkler system as specified in 7.2.2.
NS: Nonsprinklered. Allowable facility height in feet and allowable number of stories above grade in facilities not protected with an automatic sprinkler system as specified in 7.2.2.
Note: Within each category, "Stories" refers to the allowable number of stories above grade where the animal housing facilities are permitted to be located; "Area" refers to the allowable area per story.
*See 7.2.2.1.

Chapter 8 Means of Egress Requirements

8.1 General. The means of egress shall be in accordance with the applicable chapters of NFPA *101*, *NFPA 5000*, and this chapter, unless modified by the applicable animal category chapter.

8.2 Means of Egress Components.

8.2.1 Doors.

8.2.1.1 Minimum Width of Doors. The clear width of any door opening in a means of egress shall not be less than the following:

(1) 32 in. (815 mm)
(2)* One-and-one-half times the largest average width of the following:
  (a) Largest animal using the door
  (b) Any associated equipment necessary for egress

8.2.1.2 Door Headroom. The minimum door headroom in a means of egress shall accommodate the animal, a human, and any associated equipment.

8.3 Number of Means of Egress.

8.3.1 The number of means of egress from any story or portion thereof shall be two.

8.3.1.1 One exit shall be acceptable if the travel distance to the exit is less than 100 ft (30 m) in a sprinklered building and 75 ft (23 m) in an unsprinklered building.

8.3.2 Where two means of egress are required, they shall be remote.

8.4 Illumination and Emergency Lighting. (Reserved)

8.5 Marking of Means of Egress. (Reserved)

8.6 Special Means of Egress Features. (Reserved)

8.7* Travel Distance. Travel distance shall comply with this section unless modified by the animal occupancy chapters *(see Chapters 11 through 18)*.

8.7.1 In animal housing facilities sprinklered in accordance with Section 9.2, travel distance to an exit shall not exceed 100 ft (30 m).

8.7.2 In animal housing facilities, other than those complying with 8.7.1, travel distance shall not exceed 75 ft (23 m).

Chapter 9 Fire Protection

9.1 General.

9.1.1 Requirements for protection from fire and special hazards shall be in accordance with NFPA 1, NFPA *101*, or *NFPA 5000*, and this chapter, unless modified by the animal category chapter.

9.1.2 Where a change in category occurs and the installed fire protection systems are no longer necessary or no longer required, the facility owner shall either maintain the systems in full operation or completely remove them.

9.2 Sprinkler Protection.

9.2.1 Where automatic sprinklers are required by this *Code* throughout the animal housing facility, the system shall be installed in accordance with the requirements of Section 9.2.

9.2.2 Required automatic sprinkler systems shall be in accordance with NFPA 13.

9.2.3 Quick-response sprinklers shall be utilized in animal housing facilities.

9.2.4 Sprinkler systems shall be supervised.

9.2.4.1 Alarms shall be transmitted to an approved, proprietary alarm-receiving facility, a remote station, a central station, or the fire department.

9.2.4.2 Where a fire alarm system is not required by another section of this *Code*, a single manual pull station shall be provided in accordance with *NFPA 72* at a location approved by the AHJ.

9.2.5 Sprinklers shall be inspected, tested, and maintained in accordance with NFPA 25.

9.2.6 A sprinkler system impairment program shall be implemented in accordance with NFPA 25.

9.2.7 In areas protected by automatic sprinklers, automatic heat-detection devices required by other sections of this *Code* shall not be required.

9.2.8 Automatic sprinkler systems installed to make use of an alternative permitted by this *Code* shall be considered required systems and shall meet the provisions of this *Code* that apply to required systems. [***101*:**9.7.1.5]

9.2.9 Sprinkler piping serving not more than six sprinklers for any hazardous area shall be permitted to be connected directly to a domestic water supply system having a capacity sufficient to provide 0.15 gpm/ft^2 (6.1 mm/min) throughout the entire enclosed area. [***101*:**9.7.1.2]

9.2.10 Sprinkler piping serving hazardous areas as described in 9.2.9 shall be provided with an indicating shutoff valve, supervised in accordance with NFPA 13 or 9.7.2 of NFPA *101*, and installed in an accessible, visible location between the sprinklers and the connection to the domestic water supply. [***101*:**9.7.1.3]

9.3 Fire Detection, Alarm, and Communication Systems.

9.3.1 General.

9.3.1.1 The provisions of Section 9.3 shall apply only where specifically required by another section of this *Code*.

9.3.1.2 Fire detection, alarm, and communications systems installed to make use of an alternative permitted by this *Code* shall be considered required systems and shall meet the provisions of this *Code* applicable to required systems. [***101*:**9.6.1.2]

Δ **9.3.1.3** Fire alarm systems required by this *Code* shall be installed, tested, and maintained in accordance with the applicable requirements of *NFPA 70* and *NFPA 72* unless otherwise permitted by 9.3.1.4. [***101*:**9.6.1.3]

9.3.1.4 An approved existing installation shall be permitted to be continued in use and shall comply with 9.3.1.5.[***101*:**9.6.1.4]

9.3.1.5 To ensure operational integrity, the fire alarm system shall have an approved maintenance and testing program complying with the applicable requirements of *NFPA 70* and *NFPA 72*. [***101*:**9.6.1.5]

9.3.1.6 Fire alarm system impairment procedures shall comply with *NFPA 72*. [***101*:**9.6.1.6]

9.3.1.7* Modifications to Section 9.3 shall be permitted to accommodate the needs of the animal occupants with approval of the AHJ.

9.3.2 Signal Initiation.

9.3.2.1 Where required by other sections of this *Code*, actuation of the fire alarm system shall occur by any or all of the following means of initiation but shall not be limited to such means:

(1) Manual fire alarm initiation
(2) Automatic detection
(3) Extinguishing system operation

[***101*:**9.6.2.1]

9.3.2.2 Manual fire alarm boxes shall be used only for fire-protective signaling purposes.

9.3.2.3 A manual fire alarm box shall be located within 60 in. (1525 mm) of exit doorways.

9.3.2.4 Manual fire alarm boxes shall be mounted on both sides of grouped openings over 40 ft (12.2 m) in width, and within 60 in. (1525 mm) of each side of the opening. [***101*:**9.6.2.4]

9.3.2.5 Additional manual fire alarm boxes shall be located so that, on any given floor in any part of the building, no horizontal distance on that floor exceeding 200 ft (61 m) shall need to be traversed to reach a manual fire alarm box. [***101*:**9.6.2.5]

9.3.2.6 Manual fire alarm boxes shall be accessible, unobstructed, and visible. [***101*:**9.6.2.7]

9.3.2.7 Where a sprinkler system provides automatic detection and alarm system initiation, it shall be provided with an approved alarm initiation device that operates when the flow of water is equal to or greater than that from a single automatic sprinkler. [***101*:**9.6.2.8]

9.3.2.8 Where a total (complete) coverage smoke detection system is required by another section of this *Code*, automatic detection of smoke in accordance with *NFPA 72* shall be provided in all occupiable areas in environments that are suitable for proper smoke detector operation. [***101*:**9.6.2.9]

9.3.3 Smoke Alarms.

9.3.3.1 Where required by another section of this *Code*, single-station and multiple-station smoke alarms shall be in accordance with *NFPA 72*.

9.3.3.2 Where automatic smoke detection is required, smoke alarms shall not be used as a substitute.

Δ **9.3.3.3** Smoke alarms and smoke detectors shall not be installed between 10 ft (3.0 m) and 20 ft (6.1 m) along a horizontal flow path from a stationary or fixed cooking appliance unless the devices comply with the following:

(1) Prior to May 1, 2022, smoke alarms and smoke detectors shall be equipped with an alarm-silencing means, use photoelectric detection, or be listed for resistance to common nuisance sources from cooking in accordance with the 8th edition of UL 217, *Smoke Alarms*, the 7th edition of UL 268, *Smoke Detectors for Fire Alarm Systems*, or subsequent editions.
(2) Effective May 1, 2022, smoke alarms and smoke detectors shall be listed for resistance to common nuisance sources from cooking in accordance with the 8th edition of UL 217, the 7th edition of UL 268, or subsequent editions.

[**72:**29.11.3.4(4)]

Δ **9.3.3.4** Smoke alarms and smoke detectors shall not be installed within an area of exclusion determined by a 10 ft (3.0 m) radial distance along a horizontal flow path from a stationary or fixed cooking appliance. When the 10 ft (3.0 m) area of exclusion would prohibit the placement of a smoke alarm or smoke detector required by other sections of this *Code*, and when the kitchen or cooking area and adjacent spaces have no clear interior partitions or headers, smoke alarms or smoke detectors shall be permitted for installation at a radial distance between 6 ft (1.8 m) and 10 ft (3.0 m) from any stationary or fixed cooking appliance unless the devices comply with the following:

(1) Prior to May 1, 2022, the devices shall use photoelectric detection or be listed for resistance to common nuisance sources from cooking in accordance with the 8th edition of UL 217, the 7th edition of UL 268, or subsequent editions.
(2) Effective May 1, 2022, the devices shall be listed for resistance to common nuisance sources from cooking nuisance alarms in accordance with the 8th edition of UL 217, the 7th edition of UL 268, or subsequent editions.

[**72:**29.11.3.4(5)]

9.3.3.5 The installation of smoke alarms and smoke detectors near a bathroom containing a shower or tub shall be in accordance with *NFPA 72*. [***101*:**9.6.2.10.5]

9.3.3.6 System smoke detectors in accordance with *NFPA 72* and arranged to function in the same manner as single-station or multiple-station smoke alarms shall be permitted in lieu of smoke alarms. [***101*:**9.6.2.10.8]

9.3.3.7 Smoke alarms, other than battery-operated smoke alarms as permitted by other sections of this *Code*, shall be powered in accordance with the requirements of *NFPA 72*. [***101*:**9.6.2.10.6]

9.3.3.8 Where two or more smoke alarms are required within a suite of rooms, or similar area, they shall be arranged so that operation of any smoke alarm shall cause the alarm in all smoke alarms within the suite of rooms, or similar area to sound, unless otherwise permitted by 9.3.3.8.1 or 9.3.3.8.2.

9.3.3.8.1 The requirement of 9.3.3.8 shall not apply to configurations that provide equivalent distribution of the alarm signal.

9.3.3.8.2 The alarms described in 9.3.3.8 shall sound only within a suite of rooms, or similar area, and shall not actuate the building fire alarm system, unless otherwise permitted by the AHJ.

9.3.3.9 Smoke alarms shall be permitted to be connected to the building fire alarm system for the purpose of annunciation in accordance with *NFPA 72*. [***101*:**9.6.2.10.10]

9.3.4 Carbon Monoxide Detection. For animal housing facilities with fuel-burning appliances or equipment, carbon monoxide detection shall be installed in accordance with *NFPA 72*.

9.4 Occupant Notification.

9.4.1 Occupant notification shall be provided to alert occupants of a fire or other emergency where required by other sections of this *Code*. [***101*:**9.6.3.1]

9.4.2 Occupant notification shall be in accordance with 9.4.3 through 9.4.6.8, unless otherwise provided in 9.4.2.1 through 9.4.2.3.

9.4.2.1 Elevator lobby, hoistway, and associated machine room smoke detectors used solely for elevator recall, and heat detectors used solely for elevator power shutdown, shall not be required to activate the building evacuation alarm if the power supply and installation wiring to such detectors are monitored by the building fire alarm system, and if the activation of such detectors initiates a supervisory signal at a constantly attended location. [***101*:**9.6.3.2.1]

9.4.2.2 Smoke detectors used solely for closing dampers or heating, ventilating, and air-conditioning system shutdown shall not be required to activate the building evacuation alarm, provided that the power supply and installation wiring to the detectors are monitored by the building fire alarm system, and the activation of the detectors initiates a supervisory signal at a constantly attended location. [***101*:**9.6.3.2.2]

9.4.2.3 Smoke detectors located at doors for the exclusive operation of automatic door release shall not be required to activate the building evacuation alarm, provided that the power supply and installation wiring to the detectors are monitored by the building fire alarm system, and the activation of the detectors initiates a supervisory signal at a constantly attended location. [***101*:**9.6.3.2.3]

9.4.3 Where permitted by Chapters 11 through 18, a presignal system shall be permitted where the initial fire alarm signal is automatically transmitted without delay to a municipal fire department, to a fire brigade (if provided), and to an on-site staff person trained to respond to a fire emergency. [***101*:**9.6.3.4]

9.4.4 A positive alarm sequence shall be permitted, provided that it is in accordance with *NFPA 72*.

9.4.5 Unless otherwise provided in 9.4.5.1 through 9.4.5.5, notification signals for occupants to evacuate shall be by audible and visible signals in accordance with *NFPA 72* and ICC A117.1, *Accessible and Usable Buildings and Facilities*, or other

means of notification acceptable to the authority having jurisdiction. [***101***:9.6.3.6]

9.4.5.1 Areas not subject to occupancy by persons who are deaf or hard of hearing shall not be required to comply with the provisions for visible signals. [***101***:9.6.3.6.1]

9.4.5.2 Visible-only signals shall be provided to accommodate the needs of the animals and occupants with the approval of the AHJ.

9.4.5.3 Visible signals shall not be required in exit stair enclosures. [***101***:9.6.3.6.5]

9.4.5.4 Visible signals shall not be required in elevator cars. [***101***:9.6.3.6.6]

9.4.5.5 Where visible signals are not required, as permitted by 9.4.5.3 or 9.4.5.4, documentation of such omission shall be maintained.

9.4.6 The general evacuation alarm signal shall operate in accordance with one of the methods prescribed by 9.4.6.1 through 9.4.6.2. [***101***:9.6.3.7]

9.4.6.1 The general evacuation alarm signal shall operate throughout the entire building other than the locations described in 9.4.6.3 and 9.4.6.4. [***101***:9.6.3.7.1]

9.4.6.2 Where the evacuation of animals is not practical, all of the following shall apply:

(1) The private operating mode, as described in *NFPA 72* shall be permitted to be used.
(2) Only the attendants and other personnel required to evacuate animals from a zone, area, floor, or building shall be required to be notified.
(3) Notification of personnel as specified in 9.4.6.2(2) shall include means to readily identify the zone, area, floor, or building in need of evacuation.

9.4.6.3 The general evacuation signal shall not be required in exit stair enclosures. [***101***:9.6.3.7.4]

9.4.6.4 The general evacuation signal shall not be required in elevator cars. [***101***:9.6.3.7.5]

9.4.6.5 Audible alarm notification appliances shall be of such character and so distributed as to be effectively heard above the average ambient sound level that exists under normal conditions of occupancy. [***101***:9.6.3.8]

9.4.6.6 Audible alarm notification appliances shall produce signals that are distinctive from audible signals used for other purposes in a given building. [***101***:9.6.3.9]

9.4.6.7 Automatically transmitted or live voice evacuation or relocation instructions shall be permitted to be used to notify occupants and shall comply with either 9.4.6.7.1 or 9.4.6.7.2. [***101***:9.6.3.10]

9.4.6.7.1 Automatically transmitted or live voice evacuation or relocation instructions shall be in accordance with *NFPA 72*. [***101***:9.6.3.10.1]

9.4.6.7.2 Where permitted by Chapters 11 through 18, automatically transmitted or live voice announcements shall be permitted to be made via a voice communication or public address system that complies with all of the following:

(1) Occupant notification, either live or recorded, shall be initiated at a constantly attended receiving station by personnel trained to respond to an emergency.
(2) An approved secondary power supply shall be provided for other than existing, previously approved systems.
(3) The system shall be audible above the expected ambient noise level.
(4) Emergency announcements shall take precedence over any other use.

[***101***:9.6.3.10.2]

9.4.6.8 Unless otherwise permitted by another section of this *Code*, audible and visible fire alarm notification appliances shall comply with either 9.4.6.8.1 or 9.4.6.8.2. [***101***:9.6.3.11]

9.4.6.8.1 Audible and visible fire alarm notification appliances shall be used only for fire alarm system or other emergency purposes. [***101***:9.6.3.11.1]

9.4.6.8.2 Emergency voice/alarm communication systems shall be permitted to be used for other purposes in accordance with *NFPA 72*. [***101***:9.6.3.11.2]

9.5 Emergency Forces Notification.

9.5.1 Where required by another section of this *Code*, emergency forces notification shall be provided to alert the municipal fire department and fire brigade (if provided) of fire or other emergency. [***101***:9.6.4.1]

9.5.2 Where emergency forces notification is required by another section of this *Code*, the fire alarm system shall be arranged to transmit the alarm automatically via any of the following means acceptable to the authority having jurisdiction and shall be in accordance with *NFPA 72*:

(1) Auxiliary fire alarm system
(2) Central station fire alarm system
(3) Proprietary supervision station fire alarm system
(4) Remote supervising station fire alarm system

[***101***:9.6.4.2]

9.5.3 Where fire alarm systems are required to provide emergency forces notification, supervisory signals and trouble signals shall sound and be visibly displayed either at an approved, remotely located receiving facility or at a location within the protected building that is constantly attended by qualified personnel.

9.6 Fire Safety Functions.

9.6.1 Emergency control functions shall be installed in accordance with the requirements of *NFPA 72*. [***101***:9.6.6.1]

9.6.2 Where required by another section of this *Code*, the following functions shall be actuated:

(1) Release of hold-open devices for doors or other opening protectives
(2) Stairwell or elevator shaft pressurization
(3) Smoke management or smoke control systems
(4) Unlocking of doors
(5) Elevator recall and shutdown
(6) HVAC shutdown

[***101***:9.6.6.2]

9.6.3 Location of Controls. Operator controls, alarm indicators, and manual communications capability shall be installed at a convenient location acceptable to the authority having jurisdiction. [***101***:9.6.7]

9.7 Annunciation.

9.7.1 Where alarm annunciation is required by another section of this *Code*, it shall comply with 9.7.1.1 through 9.7.7. [***101*:**9.6.8.1]

9.7.1.1 Alarm annunciation at the control center shall be by means of audible and visible indicators. [***101*:**9.6.8.2]

9.7.1.2 For the purposes of alarm annunciation, each floor of the building, other than floors of existing buildings, shall be considered as not less than one zone, unless otherwise permitted by 9.7.1.3.3, or another section of this *Code*. [***101*:**9.6.8.3]

9.7.1.3 Where a floor area exceeds 22,500 ft^2 (2090 m^2), additional fire alarm zoning shall be provided, and the length of any single fire alarm zone shall not exceed 300 ft (91 m) in any direction, except as provided in 9.7.1.3.1 through 9.7.1.3.3, or as otherwise modified by another section of this *Code*. [***101*:**9.6.8.4]

9.7.1.3.1 Where permitted by another section of this *Code*, fire alarm zones shall be permitted to exceed 22,500 ft^2 (2090 m^2), and the length of a zone shall be permitted to exceed 300 ft (91 m) in any direction. [***101*:**9.6.8.4.1]

9.7.1.3.2 Where the building is protected by an automatic sprinkler system, the area of the fire alarm zone shall be permitted to coincide with the allowable area of the sprinkler system.

9.7.1.3.3 Where a building not exceeding four stories in height is protected by an automatic sprinkler, the sprinkler system shall be permitted to be annunciated on the fire alarm system as a single zone.

9.7.2 A system trouble signal shall be annunciated by means of audible and visible indicators in accordance with *NFPA 72*. [***101*:**9.6.8.5]

9.7.3 A system supervisory signal shall be annunciated by means of audible and visible indicators in accordance with *NFPA 72*. [***101*:**9.6.8.6]

9.7.4 Where the system serves more than one building, each building shall be annunciated separately. [***101*:**9.6.8.7]

9.7.5 Where permitted by another section of this *Code*, the alarm zone shall be permitted to coincide with the permitted area for smoke compartments. [***101*:**9.6.8.8]

9.7.6 Where a graphic annunciation panel is required by another section of this *Code*, the graphic annunciation panel shall identify animal housing areas within the building.

9.7.7 Where the locations of animal facilities are sensitive, the specific locations of animal housing shall be provided to the fire department but shall not be subject to the graphic annunciator panel requirement in 9.7.6.

9.8 Fire Barriers.

9.8.1 General.

9.8.1.1 Fire barriers used to provide enclosure, subdivision, or protection under this *Code* shall be classified in accordance with one of the following fire resistance ratings:

(1) 3-hour fire resistance rating
(2) 2-hour fire resistance rating
(3) 1-hour fire resistance rating
(4) ½-hour fire resistance rating

[***101*:**8.3.1.1]

9.8.1.2 Fire barriers shall comply with one of the following:

(1) The fire barriers are continuous from outside wall to outside wall or from one fire barrier to another, or a combination thereof, including continuity through all concealed spaces, such as those found above a ceiling, including interstitial spaces.
(2) The fire barriers are continuous from outside wall to outside wall or from one fire barrier to another, and from the floor to the bottom of the interstitial space, provided that the construction assembly forming the bottom of the interstitial space has a fire resistance rating not less than that of the fire barrier.

[***101*:**8.3.1.2]

9.8.1.3 Walls used as fire barriers shall comply with the requirements of NFPA 221 applicable to fire barrier walls. [***101*:**8.3.1.3]

9.8.1.4 The NFPA 221 limitation on percentage width of openings shall not apply.

9.8.2 Walls.

9.8.2.1 The fire-resistive materials, assemblies, and systems used shall be limited to those permitted in this *Code* and this chapter. [***101*:**8.3.2.1]

9.8.2.1.1 Fire resistance glazing tested in accordance with ASTM E119, *Standard Test Methods for Fire Tests of Building Construction and Materials*, or UL 263, *Fire Tests of Building Construction and Materials*, shall be permitted. [***101*:**8.3.2.1.1]

9.8.2.1.2 Fire resistance glazing shall bear the identifier "W-XXX" where "XXX" is the fire resistance rating in minutes. Such identification shall be permanently affixed.

9.8.2.2 The construction materials and details for fire-resistive assemblies and systems for walls described shall comply with all other provisions of this *Code*, except as modified herein. [***101*:**8.3.2.2]

9.8.2.3 Interior walls and partitions of nonsymmetrical construction shall be evaluated from both directions and assigned a fire resistance rating based on the shorter duration obtained in accordance with ASTM E119, *Standard Test Methods for Fire Tests of Building Construction and Materials*, or UL 263, *Fire Tests of Building Construction and Materials*. When the wall is tested with the least fire-resistive side exposed to the furnace, the wall shall not be required to be subjected to tests from the opposite side. [***101*:**8.3.2.3]

9.8.3 Fire Doors and Windows.

9.8.3.1 Openings required to have a fire protection rating by Table 9.8.4.2 shall be protected by approved, listed, and labeled fire door assemblies and fire window assemblies and their accompanying hardware, including all frames, closing devices, anchorage, and sills in accordance with the requirements of NFPA 80 except as otherwise specified in this *Code*. [***101*:**8.3.3.2.6]

Δ **9.8.3.1.1** Fire resistance glazing tested in accordance with ASTM E119, *Standard Test Methods for Fire Tests of Building Construction and Materials*, or UL 263, *Fire Tests of Building Construction and Materials*, shall be permitted in fire doors and

fire window assemblies in accordance with their listings. [***101***:8.3.3.6.8]

9.8.3.1.2 Fire resistance glazing shall be marked in accordance with 9.8.3.12 and Table 9.8.4.2. Such marking shall be permanently affixed.

9.8.3.2 Fire protection ratings for products required to comply with 9.8.3 shall be as determined and reported by a nationally recognized testing agency in accordance with NFPA 252; NFPA 257; UL 10B, *Fire Tests of Door Assemblies*; UL 10C, *Positive Pressure Fire Tests of Door Assemblies*; or UL 9, *Fire Tests of Window Assemblies*. [***101***:8.3.3.2.1]

9.8.3.2.1 Fire protection glazing shall be evaluated under positive pressure in accordance with NFPA 257.

9.8.3.2.2 All products required to comply with 9.8.3.2 shall bear an approved label.

9.8.3.2.3 Labels. Labels on fire door assemblies shall be maintained in a legible condition. [***101***:8.3.3.3.3]

9.8.3.3 Unless otherwise specified, fire doors shall be self-closing or automatic-closing. [***101***:8.3.3.3.5]

9.8.3.4 Floor fire door assemblies shall be tested in accordance with NFPA 288 and shall achieve a fire resistance rating not less than the assembly being penetrated. Floor fire door assemblies shall be listed and labeled.

9.8.3.5 Fire protection glazing shall be permitted in fire barriers having a required fire resistance rating of 1 hour or less and shall be of an approved type with the appropriate fire protection rating for the location in which the barriers are installed. [***101***:8.3.3.6.5]

9.8.3.6 Glazing in fire window assemblies, other than in existing fire window installations of wired glass and other fire-rated glazing material, shall be of a design that has been tested to meet the conditions of acceptance of NFPA 257 or UL 9, *Fire Tests of Window Assemblies*. [***101***:8.3.3.6.6]

9.8.3.7 Fire protection glazing in fire door assemblies, other than in existing fire-rated door assemblies, shall be of a design that has been tested to meet the conditions of acceptance of NFPA 252, UL 10B, *Fire Tests of Door Assemblies*, or UL 10C, *Positive Pressure Fire Tests of Door Assemblies*. [***101***:8.3.3.6.7]

9.8.3.8 Fire resistance glazing complying with 9.8.2.1.1 shall be permitted in fire doors and fire window assemblies in accordance with their listings.

9.8.3.9 Glazing materials that have been listed and labeled to indicate the type of opening to be protected for fire protection purposes shall be permitted to be used in approved opening protectives in accordance with Table 9.8.4.2 and NFPA 80. [***101***:8.3.3.6.1]

9.8.3.10 Nonsymmetrical fire protection glazing systems shall be tested with each face exposed to the furnace, and the assigned fire protection rating shall be the shortest duration obtained from the two tests conducted in compliance with NFPA 257 or UL 9, *Fire Tests of Window Assemblies*. [***101***:8.3.3.6.9]

9.8.3.11 The total combined area of fire protection glazing in fire window assemblies and fire door assemblies used in fire barriers shall not exceed 25 percent of the area of the fire barrier that is common with any room, unless the installation is an existing fire window of wired glass or other fire protection glazing in approved frames. [***101***:8.3.3.6.10]

9.8.3.12 New fire protection glazing shall be marked in accordance with Table 9.8.3.12 and Table 9.8.4.2, and such marking shall be permanently affixed. [***101***:8.3.3.6.3]

9.8.3.13 Fire-rated door assemblies shall be inspected and tested in accordance with NFPA 80.

9.8.4 Opening Protectives.

9.8.4.1 Every opening in a fire barrier shall be protected to limit the spread of fire and restrict the movement of smoke from one side of the fire barrier to the other.

9.8.4.2 The minimum fire rating for opening protectives in fire barriers, fire-rated smoke barriers, and fire-rated smoke partitions shall be in accordance with Table 9.8.4.2. [***101***:8.3.3.2.2]

9.8.4.2.1 Fire-rated glazing assemblies marked as complying with hose stream requirements (H) shall be permitted in applications that do not require compliance with hose stream requirements. Fire-rated glazing assemblies marked as complying with temperature rise requirements (T) shall be permitted in applications that do not require compliance with temperature rise requirements. Fire-rated glazing assemblies marked with ratings that exceed the ratings required by this *Code* shall be permitted.

Table 9.8.3.12 Marking Fire-Rated Glazing Assemblies

Fire Test Standard	Marking	Definition of Marking
ASTM E119 or UL 263	W	Meets wall assembly criteria
NFPA 257 or UL 9	OH	Meets fire window assembly criteria, including the hose stream test
NFPA 252, UL 10B, or UL 10C	D	Meets fire door assembly criteria
	H	Meets fire door assembly hose stream test
	T	Meets 450°F (232°C) temperature rise criteria for 30 minutes
	XXX	The time, in minutes, of fire resistance or fire protection rating of the glazing assembly

[***101***:8.3.3.6.3]

Δ Table 9.8.4.2 Minimum Fire Ratings for Opening Protectives in Fire-Resistance-Rated Assemblies and Fire-Rated Glazing Markings

Component	Walls and Partitions (hr)	Fire Door Assemblies (hr)	Door Vision Panel Maximum Size (in.^{2})	Fire-Rated Glazing Marking Door Vision Panel	Minimum Side Light/ Transom Assembly Rating (hr)		Fire-Rated Glazing Marking Side Light/ Transom Panel		Minimum Fire-Rated Windows Rating[a,b] (hr)		Fire-Rated Window Marking	
					Fire Protection	Fire Resistance	Fire Protection	Fire Resistance	Fire Protection	Fire Resistance	Fire Protection	Fire Resistance
Elevator hoistways	2	1½	155 in.^{2}[c]	D-H-90 or D-H-W-90	NP	2	NP	D-H-W-120	NP	2	NP	W-120
	1	1	155 in.^{2}[c]	D-H-60 or D-H-W-60	NP	1	NP	D-H-W-60	NP	1	NP	W-60
	½	⅓	85 in.^{2}[d]	D-20 or D-W-20	⅓	⅓	D-H-20	D-W-20	⅓	⅓	OH-20	W-30
Elevator lobby	1	1	100 in.^{2}[a]	≤100 in.^{2}, D-H-T-60 or D-H-W-60 >100 in.^{2}, D-H-W-60	NP	1	NP	D-H-W-60	NP	1	NP	W-60
Vertical shafts (including stairways, exits, and refuse chutes)	2	1½	Maximum size tested	D-H-90 or D-H-W-90	NP	2	NP	D-H-W-120	NP	2	NP	W-120
	1	1	Maximum size tested	D-H-60 or D-H-W-60	NP	1	NP	D-H-W-60	NP	1	NP	W-60
Replacement panels in existing vertical shafts	½	⅓	Maximum size tested	D-20 or D-W-20	⅓	⅓	D-H-20	D-W-20	⅓	⅓	OH-20	W-30
Horizontal exits	2	1½	Maximum size tested	D-H-90 or D-H-W-90	NP	2	NP	D-H-W-120	NP	2	NP	W-120
Horizontal exits served by bridges between buildings	2	¾	Maximum size tested[e]	D-H-45 or D-H-W-45	¾[e]	¾[e]	D-H-45	D-H-W-45	¾	¾	OH-45	W-120
Exit access corridors[f]	1	⅓	Maximum size tested	D-20 or D-W-20	¾	¾	D-H-45	D-H-W-45	¾	¾	OH-45	W-60
	½	⅓	Maximum size tested	D-20 or D-W-20	⅓	⅓	D-H-20	D-H-W-20	⅓	⅓	OH-20	W-30
Other fire barriers	3	3	100 in.^{2}[a]	≤100 in.^{2}, D-H-180 or D-H-W-180 >100 in.^{2}, D-H-W-180	NP	3	NP	D-H-W-180	NP	3	NP	W-180
	2	1½	Maximum size tested	D-H-90 or D-H-W-90	NP	2	NP	D-H-W-120	NP	2	NP	W-120
	1	¾	Maximum size tested[e]	D-H-45 or D-H-W-45	¾[e]	¾[e]	D-H-45	D-H-W-45	¾	¾	OH-45	W-60
	½	⅓	Maximum size tested	D-20 or D-W-20	⅓	⅓	D-H-20	D-H-W-20	⅓	⅓	OH-20	W-30
Smoke barriers[f]	1	⅓	Maximum size tested	D-20 or D-W-20	¾	¾	D-H-45	D-H-W-45	¾	¾	OH-45	W-60
	½	⅓	Maximum size tested	D-20 or D-W-20	⅓	⅓	D-H-20	D-H-W-20	⅓	⅓	OH-20	W-30
Smoke partitions[f,g]	1	⅓	Maximum size tested	D-20 or D-W-20	¾	¾	D-H-45	D-H-W-45	¾	¾	OH-45	W-60
	½	⅓	Maximum size tested	D-20 or D-W-20	⅓	⅓	D-H-20	D-H-W-20	⅓	⅓	OH-20	W-30

For SI units, 1 in.^{2} = 0.00064516 m^2.

NP: Not permitted.

[a]Fire resistance glazing tested to ASTM E119, *Standard Test Methods for Fire Tests of Building Construction and Materials*, or UL 263, *Fire Tests of Building Construction and Materials*, shall be permitted in the maximum size tested *(see 9.8.3.1.1)*.

[b]Fire-rated glazing in exterior windows shall be marked in accordance with Table 9.8.3.12.

[c]See ASME A17.1/CSA B44, *Safety Code for Elevators and Escalators*, for additional information.

[d]See ASME A17.3, *Safety Code for Existing Elevators and Escalators*, for additional information.

[e]Maximum area of individual exposed lights shall be 1296 in.^{2} (0.84 m^2), with no dimension exceeding 54 in. (1.37 m) unless otherwise tested. [**80:**Table 4.4.5 Note b and **80:**4.4.5.1]

[f]Fire doors are not required to have a hose stream test per UL 10B, *Fire Tests of Door Assemblies*, or UL 10C, *Positive Pressure Fire Tests of Door Assemblies*.

[g]For residential board and care, see NFPA *101*, Chapters 32 and 33.

[***101*:**8.3.3.2.2]

9.8.5 Penetrations.

9.8.5.1 General.

9.8.5.1.1 The provisions of 9.8.5 shall govern the materials and methods of construction used to protect through-penetrations and membrane penetrations in fire walls, fire barrier walls, and fire-resistance-rated horizontal assemblies. [***101***:8.3.4.1.1]

9.8.5.1.2 The provisions of 9.8.5 shall not apply to approved existing materials and methods of construction used to protect existing through-penetrations and existing membrane penetrations in fire walls, fire barrier walls, or fire-resistance-rated horizontal assemblies, unless otherwise required by this *Code*. [***101***:8.3.4.1.2]

9.8.5.2 Firestop Systems and Devices Required.

9.8.5.2.1 Penetrations for cables, cable trays, conduits, pipes, tubes, combustion vents and exhaust vents, wires, and similar items to accommodate electrical, mechanical, plumbing, and communications systems that pass through a wall, floor, or floor/ceiling assembly constructed as a fire barrier shall be protected by a firestop system or device. [***101***:8.3.4.2.1]

9.8.5.2.2 The firestop system or device shall be tested in accordance with ASTM E814, *Standard Test Method for Fire Tests of Penetration Firestop Systems*, or UL 1479, *Fire Tests of Penetration Firestops*, at a minimum positive pressure differential of 0.01 in. water column (2.5 Pa) between the exposed and the unexposed surface of the test assembly. [***101***:8.3.4.2.2]

9.8.5.2.3 The requirements of 9.8.5.2 shall not apply where otherwise permitted by any one of the following:

(1) Where penetrations are tested and installed as part of an assembly tested and rated in accordance with ASTM E119, *Standard Test Methods for Fire Tests of Building Construction and Materials*, or UL 263, *Fire Tests of Building Construction and Materials*
(2) Where penetrations through floors are enclosed in a shaft enclosure designed as a fire barrier
(3) Where concrete, grout, or mortar has been used to fill the annular spaces around cast-iron, copper, or steel piping, conduit, or tubing that penetrates one or more concrete or masonry fire-resistance-rated assemblies and all of the following applies:
    (a) The nominal diameter of each penetrating item does not exceed 6 in. (150 mm).
    (b) The opening size does not exceed 1 ft^2 (0.09 m^2).
    (c) The thickness of the concrete, grout, or mortar is the full thickness of the assembly.
(4) Where penetration is limited to one floor, the firestopping material is capable of preventing the passage of flame and hot gases sufficient to ignite cotton waste when subjected to the time–temperature fire conditions of ASTM E119, *Standard Test Methods for Fire Tests of Building Construction and Materials*, or UL 263, *Fire Tests of Building Construction and Materials*, under a minimum positive pressure differential of 0.01 in. water column (2.5 Pa) at the location of the penetration for the time period equivalent to the required fire resistance rating of the assembly penetrated, and the firestopping materials are used with the following penetrating items:
    (a) Steel, ferrous, or copper cables
    (b) Cable or wire with steel jackets
    (c) Cast-iron, steel, or copper pipes
    (d) Steel conduit or tubing

[***101***:8.3.4.2.5.1]

9.8.5.2.4 The maximum nominal diameter of the penetrating item, as indicated in 9.8.5.2.3(4)(a) through 9.8.5.2.3(4)(d), shall not be greater than 4 in. (100 mm) and shall not exceed an aggregate 100 $in.^2$ (64,520 mm^2) opening in any 100 ft^2 (9.3 m^2) of floor or wall area. [***101***:8.3.4.2.5.2]

9.8.5.2.5 Firestop systems and devices shall have a minimum 1-hour F rating but not less than the required fire resistance rating of the fire barrier penetrated.

9.8.5.2.6 T Ratings.

9.8.5.2.6.1 Penetrations in fire-resistance-rated horizontal assemblies shall have a T rating of not less than 1 hour, and not less than the fire resistance rating of the horizontal assembly. [***101***:8.3.4.2.4.1]

9.8.5.2.6.2 A T rating shall not be required for either of the following:

(1) Floor penetrations contained within the cavity of a wall assembly
(2) Penetrations through floors or floor assemblies where the penetration is not in direct contact with combustible material

[***101***:8.3.4.2.4.2]

9.8.5.3 Sleeves. Where the penetrating item uses a sleeve to penetrate the wall or floor, the sleeve shall be securely set in the wall or floor, and the space between the item and the sleeve shall be filled with a material that complies with 9.8.5.1. [***101***:8.3.4.3]

9.8.5.4 Insulation and coverings for penetrating items shall not pass through the wall or floor unless the insulation or covering has been tested as part of the firestop system or device. [***101***:8.3.4.4]

9.8.5.5 Where designs take transmission of vibrations into consideration, any vibration isolation shall meet one of the following conditions:

(1) It shall be provided on either side of the wall or floor.
(2) It shall be designed for the specific purpose.

9.8.5.6 Transitions.

9.8.5.6.1 Where piping penetrates a fire-resistance-rated wall or floor assembly, combustible piping shall not connect to noncombustible piping unless it can be demonstrated that the transition will not reduce the fire resistance rating, except in the case of previously approved installations. [***101***:8.3.4.6.1]

9.8.5.6.2 Unshielded couplings shall not be used to connect noncombustible piping to combustible piping unless it can be demonstrated that the transition complies with the fire-resistive requirements of 9.8.5.1. [***101***:8.3.4.6.2]

9.8.5.7 Membrane Penetrations.

9.8.5.7.1 Membrane penetrations for cables, cable trays, conduits, pipes, tubes, combustion vents, exhaust vents, wires, and similar items to accommodate electrical, mechanical, plumbing, and communications systems that pass through a membrane of a wall, floor, or floor/ceiling assembly constructed as a fire barrier shall be protected by a firestop system or

device and shall comply with 9.8.5.1 through 9.8.5.2. [***101*:**8.3.4.7.1]

9.8.5.7.2 The firestop system or device shall be tested in accordance with ASTM E814, *Standard Test Method for Fire Tests of Penetration Firestop Systems*, or UL 1479, *Fire Tests of Penetration Firestops*, at a minimum positive pressure differential of 0.01 in. water column (2.5 Pa) between the exposed and the unexposed surface of the test assembly, unless one of the following applies:

(1) Membrane penetrations of ceilings that are not an integral part of a fire-resistance-rated floor/ceiling or roof/ceiling assembly
(2) Membrane penetrations of steel, ferrous, or copper conduit, piping, or tubing, and steel electrical outlet boxes and wires, or combustion vents or exhaust vents where the annular space is protected with an approved material and the aggregate area of the openings does not exceed 100 in.^{2} (64.520 mm^2) in any 100 ft^2 (9.3 m^2) of ceiling area
(3) Electrical outlet boxes and fittings provided that such devices are listed for use in fire-resistance-rated assemblies and are installed in accordance with their listing
(4) The annular space created by the membrane penetration of a fire sprinkler shall be permitted, provided that the space is covered by a metal escutcheon plate

[***101*:**8.3.4.7.2]

9.8.5.7.3 Where walls or partitions are required to have a minimum 1-hour fire resistance rating, recessed fixtures shall be installed in the wall or partition in such a manner that the required fire resistance is not reduced, unless one of the following criteria is met:

(1) Any steel electrical box not exceeding 16 in.^{2} (10,300 mm^2) in area shall be permitted where the aggregate area of the openings provided for the boxes does not exceed 100 in.^{2} (64,520 mm^2) in any 100 ft^2 (9.3 m^2) of wall area, and, where outlet boxes are installed on opposite sides of the wall, the boxes shall be separated by one of the following means:
    (a) Horizontal distance of not less than 24 in. (610 mm)
    (b) Horizontal distance of not less than the depth of the wall cavity, where the wall cavity is filled with cellulose loose-fill, rock wool, or slag wool insulation
    (c) Solid fireblocking
    (d) Other listed materials and methods
(2) Membrane penetrations for any listed electrical outlet box made of any material shall be permitted, provided that such boxes have been tested for use in fire-resistance-rated assemblies and are installed in accordance with the instructions included in the listing.
(3) The annular space created by the membrane penetration of a fire sprinkler shall be permitted, provided that the space is covered by a metal escutcheon plate.
(4) Membrane penetrations by electrical boxes of any size or type, which have been listed as part of a wall opening protective material system for use in fire-resistance-rated assemblies and are installed in accordance with the instructions included in the listing, shall be permitted.

[***101*:**8.3.4.7.3]

9.8.6 Joints.

9.8.6.1 The provisions of 9.8.6 shall govern the materials and methods of construction used to protect joints in fire barriers, in between fire barriers, and at the perimeter of fire barriers where fire barriers meet other fire barriers, the floor or roof deck above, or the outside walls. [***101*:**8.3.5.1.1]

9.8.6.2 Joints made within, between, or at the perimeter of fire barriers shall be protected with a joint system that is capable of limiting the transfer of smoke.

9.8.6.3 Testing of the joint system in a fire barrier shall be representative of the actual installation suitable for the required engineering demand without compromising the fire resistance rating of the assembly or the structural integrity of the assembly. [***101*:**8.3.5.2.4]

9.8.6.4 Joints made within or at the perimeter of fire barriers, between fire-resistance-rated assemblies, or where fire barriers meet other fire barriers, the floor or roof deck above, or the outside walls shall be protected with a joint system that is designed and tested to prevent the spread of fire for a time period equal to that of the assembly in which the joint is located. [***101*:**8.3.5.2.1]

9.8.6.5 Such materials, systems, or devices shall be tested as part of the assembly in accordance with the requirements of ASTM E1966, *Standard Test Method for Fire-Resistive Joint Systems*, or UL 2079, *Tests for Fire Resistance of Building Joint Systems*. [***101*:**8.3.5.2.5]

9.8.6.6 All joint systems shall be tested at their maximum joint width in accordance with the requirements of ASTM E1966, *Standard Test Method for Fire-Resistive Joint Systems*, or UL 2079, *Tests for Fire Resistance of Building Joint Systems*, under a minimum positive pressure differential of 0.01 in. water column (2.5 N/m^2) for a time period equal to that of the assembly. [***101*:**8.3.5.2.6]

9.8.6.7 All test specimens shall comply with the minimum height or length required by the standard. [***101*:**8.3.5.2.7]

9.8.6.8 Wall assemblies shall be subjected to a hose stream test in accordance with ASTM E119, *Standard Test Methods for Fire Tests of Building Construction and Materials*, or UL 263, *Fire Tests of Building Construction and Materials*. [***101*:**8.3.5.2.8]

9.8.6.9 Exterior Curtain Walls and Perimeter Joints.

9.8.6.9.1 Voids created between the fire resistance–rated floor assembly and the exterior curtain wall shall be protected with a perimeter joint system that is designed and tested in accordance with ASTM E2307, *Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multistory Apparatus*. [***101*:**8.3.5.4.1]

9.8.6.9.2 The perimeter joint system shall have an F rating equal to the fire resistance rating of the floor assembly. [***101*:**8.3.5.4.2]

9.9 Smoke Barriers.

9.9.1 General. Where required, smoke barriers shall be provided to subdivide building spaces for the purpose of restricting the movement of smoke.

9.9.2 Continuity.

9.9.2.1 Smoke barriers required by this *Code* shall be continuous from an outside wall to an outside wall, from a floor to a floor, or from a smoke barrier to a smoke barrier, or by use of a combination thereof. [***101*:**8.5.2.1]

9.9.2.2 Smoke barriers required by this *Code* shall be continuous through all concealed spaces, such as those found above a ceiling, including interstitial spaces. [***101*:**8.5.2.2]

9.9.2.3 A smoke barrier required for an occupied space below an interstitial space shall not be required to extend through the interstitial space, provided that the construction assembly forming the bottom of the interstitial space provides resistance to the passage of smoke equal to that provided by the smoke barrier. [***101*:**8.5.2.3]

9.9.3 Fire Barrier Used as Smoke Barrier. A fire barrier shall be permitted to be used as a smoke barrier, provided that it meets the requirements of Section 9.9. [***101*:**8.5.3]

9.9.4 Opening Protectives.

9.9.4.1 Doors in smoke barriers shall close the opening, leaving only the minimum clearance necessary for proper operation, and shall be without louvers or grilles. For other than previously approved existing doors, the clearance under the bottom of the doors shall be a maximum of ¾ in. (19 mm). [***101*:**8.5.4.1]

9.9.4.2 Latching hardware shall be required on doors in smoke barriers, unless specifically exempted by Chapters 11 through 18. [***101*:**8.5.4.3]

9.9.4.3 Doors in smoke barriers shall be self-closing or automatic-closing.

9.9.4.4 Fire window assemblies shall comply with NFPA 80.

9.9.5 Ducts and Air-Transfer Openings.

9.9.5.1 General. The provisions of 9.9.5 shall govern the materials and methods of construction used to protect ducts and air-transfer openings in smoke barriers. [***101*:**8.5.5.1]

9.9.5.2 Smoke Dampers.

9.9.5.2.1 Where a smoke barrier is penetrated by a duct or air-transfer opening, a smoke damper designed and tested in accordance with the requirements of UL 555S, *Smoke Dampers*, shall be installed. [***101*:**8.5.5.2.1]

9.9.5.2.2 Where a smoke barrier is also constructed as a fire barrier, a combination fire-smoke damper designed and tested in accordance with the requirements of UL 555, *Fire Dampers*, and UL 555S, *Smoke Dampers*, shall be installed. [***101*:**8.5.5.2.2]

9.9.5.3 Smoke Damper Exemptions. Smoke dampers shall not be required under any of the following conditions:

(1) Where ducts or air-transfer openings are part of an engineered smoke control system and the smoke damper will interfere with the operation of a smoke control system
(2) Where the air in ducts continues to move and the air handling system installed is arranged to prevent recirculation of exhaust or return air under fire emergency conditions
(3) Where the air inlet or outlet openings in ducts are limited to a single smoke compartment
(4) Where ducts penetrate floors that serve as smoke barriers
(5) Where ducts penetrate communicating spaces that do not connect more than three contiguous floors, the lowest or next-to-lowest story within the communicating space is a street floor, the entire floor area of the communicating space is open and unobstructed, such that a fire in any part of the space will be readily obvious to the occupants of the space prior to the time it becomes an occupant hazard, and the building is fully sprinkler protected

9.9.5.4 Installation, Testing, and Maintenance.

9.9.5.4.1 Air-conditioning, heating, ventilating ductwork, and related equipment, including smoke dampers and combination fire and smoke dampers, shall be installed in accordance with NFPA 90A, NFPA 90B, NFPA 105, or NFPA 80, as applicable. [***101*:**8.5.5.4.1]

9.9.5.4.2 Smoke dampers and combination fire and smoke dampers required by this *Code* shall be inspected, tested, and maintained in accordance with NFPA 105. [***101*:**8.5.5.4.2]

9.9.5.4.3 The equipment specified in 9.9.5.4.1 shall be installed in accordance with the requirements of 9.9.5, the manufacturer's installation instructions, and the equipment listing. [***101*:**8.5.5.4.3]

9.9.5.5 Access and Identification.

9.9.5.5.1 Access to the dampers shall be provided for inspection, testing, and maintenance. [***101*:**8.5.5.5.1]

9.9.5.5.2 Smoke and combination fire and smoke dampers in new construction shall be provided with an approved means of access, as follows:

(1) The means of access shall be large enough to allow inspection and maintenance of the damper and its operating parts.
(2) The access shall not affect the integrity of fire-resistance-rated assemblies or smoke barrier continuity.
(3) The access openings shall not reduce the fire resistance rating of the assembly.
(4) Access doors in ducts shall be tight-fitting and suitable for the required duct construction.
(5) Access and maintenance shall comply with the requirements of the mechanical code.

[***101*:**8.5.5.5.2]

9.9.5.5.3 Identification. Access points to fire and smoke dampers shall be permanently identified by one of the following:

(1) A label having letters not less than ½ in. (13 mm) in height and reading as one of the following:
    (a) FIRE/SMOKE DAMPER
    (b) SMOKE DAMPER
    (c) FIRE DAMPER
(2) Symbols as approved by the authority having jurisdiction

9.9.5.6 Smoke Damper Ratings. Smoke damper leakage ratings shall be not less than Class II. Elevated temperature ratings shall be not less than 250°F (140°C). [***101*:**8.5.5.6]

9.9.5.7 Smoke Detectors.

9.9.5.7.1 Required smoke dampers in ducts penetrating smoke barriers shall close upon detection of smoke by approved smoke detectors in accordance with *NFPA 72* unless one of the following conditions exists:

(1) The ducts penetrate smoke barriers above the smoke barrier doors, and the door release detector actuates the damper.
(2) Approved smoke detector installations are located within the ducts in existing installations.

[***101*:**8.5.5.7.1]

9.9.5.7.2 Where a duct is provided on one side of the smoke barrier, the smoke detectors on the duct side shall be in accordance with 9.9.5.7.1. [***101*:**8.5.5.7.2]

9.9.5.7.3 Required smoke dampers in air-transfer openings shall close upon detection of smoke by approved smoke detectors in accordance with *NFPA 72*. [***101*:**8.5.5.7.3]

9.9.6 Penetrations.

9.9.6.1 The provisions of 9.9.6 shall govern the materials and methods of construction used to protect through-penetrations and membrane penetrations of smoke barriers. [***101*:**8.5.6.1]

9.9.6.2 Penetrations for cables, cable trays, conduits, pipes, tubes, vents, wires, and similar items to accommodate electrical, mechanical, plumbing, and communications systems that pass through a wall, floor, or floor/ceiling assembly constructed as a smoke barrier, or through the ceiling membrane of the roof/ceiling of a smoke barrier assembly, shall be protected by a system or material capable of restricting the transfer of smoke. [***101*:**8.5.6.2]

9.9.6.3 Where a smoke barrier is also constructed as a fire barrier, the penetrations shall be protected in accordance with the requirements of fire barriers.

9.9.6.4 Where sprinklers penetrate a single membrane of a fire-resistance-rated assembly in buildings equipped throughout with an approved automatic fire sprinkler system, noncombustible escutcheon plates shall be permitted, provided that the space around each sprinkler penetration does not exceed ½ in. (13 mm), measured between the edge of the membrane and the sprinkler. [***101*:**8.5.6.4]

9.9.6.5 Where the penetrating item uses a sleeve to penetrate the smoke barrier, the sleeve shall be securely set in the smoke barrier, and the space between the item and the sleeve shall be filled with a listed system or a material capable of restricting the transfer of smoke. [***101*:**8.5.6.6]

9.9.6.6 Where designs take transmission of vibrations into consideration, any vibration isolation shall meet one of the following conditions:

(1) It shall be provided on either side of the smoke barrier.
(2) It shall be designed for the specific purpose.

9.9.7 Joints.

9.9.7.1 The provisions of 9.9.7 shall govern the materials and methods of construction used to protect joints in between and at the perimeter of smoke barriers or, where smoke barriers meet other smoke barriers, the floor or roof deck above, or the outside walls. The provisions of 9.9.7.1 shall not apply to approved existing materials and methods of construction used to protect existing joints in smoke barriers, unless otherwise required by this *Code*. [***101*:**8.5.7.1]

9.9.7.2 Joints made within, between, or at the perimeter of smoke barriers shall be protected with a joint system that is capable of limiting the transfer of smoke.

9.9.7.3 Smoke barriers that are also constructed as fire barriers shall be protected with a joint system that is designed and tested to resist the spread of fire for a time period equal to the required fire resistance rating of the assembly and restrict the transfer of smoke in accordance with 9.9.7.2. [***101*:**8.5.7.3]

9.9.7.4 Testing of the joint system in a smoke barrier that also serves as fire barrier shall be representative of the actual installation. [***101*:**8.5.7.4]

9.10 Fire Extinguishers.

9.10.1 Where required by another section of this *Code*, portable fire extinguishers shall be selected, installed, inspected, and maintained in accordance with NFPA 10. [***101*:**9.9]

9.10.2 Fire extinguishers in accordance with 9.10.1 shall have a minimum 2-A:10-B:C rating.

9.10.3 Fire extinguishers shall be located so that the minimum travel distance does not exceed 50 ft (15.2 m), unless permitted by 9.10.5.

9.10.4 Livestock areas not typically occupied by humans shall have a minimum 2-A:10:B:C rated fire extinguisher located at each entrance.

9.10.5* Alternative placement or physical protection of fire extinguishers shall be permitted with the approval of the AHJ in areas where necessary to prevent injury to the animal occupants or damage to the fire extinguishers.

9.11 Lightning Protection. Where lightning protection is required by the local building code, lightning protection shall be in accordance with NFPA 780.

9.12 Special Hazards.

9.12.1 Open Flame, Candles, Open Fires, Portable Cooking, and Incinerators.

9.12.1.1* Open flame, candles, open fires, and incinerators shall not be permitted except as provided in 9.12.1.2.

9.12.1.2 Open flame heating devices that comply with the following shall be permitted:

(1) NFPA 31
(2) NFPA 54/ANSI Z223.1
(3) NFPA 58
(4) *NFPA 70*
(5) NFPA 90A
(6) NFPA 90B
(7) NFPA 211

9.12.1.3 Portable cooking equipment shall be used only in spaces designated for such use and separated from the animal housing facility.

9.12.2 Smoking.

9.12.2.1 Smoking shall be prohibited in animal housing facilities.

9.12.2.2 "No Smoking" signs shall be posted in conspicuous, designated locations where smoking is prohibited.

9.12.3 Waste Removal and Housekeeping.

9.12.3.1 Approved containers for rubbish and other trash materials shall be provided.

9.12.3.2 Rubbish, trash, and other waste material shall be disposed of at regular intervals.

9.12.3.3 Combustible waste or refuse shall be properly stored or disposed of to prevent unsafe conditions.

9.12.3.4 Persons owning or having control of any property shall not allow any combustible waste material to accumulate in any area or in any manner that creates a fire hazard to life or property.

9.12.4 Rubbish Containers.

9.12.4.1 General. Rubbish containers kept outside of rooms or vaults shall not exceed 40.5 ft^3 (1.15 m^3) capacity.

9.12.4.1.1 Containers exceeding a capacity of 5⅓ ft^3 [40 gal (0.15 m^3)] shall be provided with lids.

9.12.4.1.2 Rubbish containers and lids shall be constructed of noncombustible materials or nonmetallic materials complying with 9.12.4.2.

9.12.4.2 Nonmetallic Containers.

9.12.4.2.1 Nonmetallic rubbish containers exceeding a capacity of 5⅓ ft^3 [40 gal (0.15 m^3)] shall be manufactured of materials having a peak rate of heat release not exceeding 300 kW/m^2 at a flux of 50 kW/m^2 when tested in the horizontal orientation, at a thickness as used in the container but not less than 0.25 in. (6 mm), in accordance with ASTM E1354, *Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter*.

9.12.4.2.2 Such containers shall be permanently labeled indicating capacity and peak rate of heat release.

9.12.4.3 Removal. Combustible rubbish stored in containers outside of noncombustible vaults or rooms shall be removed from buildings at least once each working day.

9.12.4.4 Rubbish Within Dumpsters.

9.12.4.4.1 Dumpsters and containers with an individual capacity of 1.5 yd^3 [40.5 ft^3 (1.15 m^3)] or more shall not be stored in buildings or placed within 10 ft (3 m) of combustible walls, openings, or combustible roof eave lines.

9.12.4.4.2 Areas containing dumpsters or containers shall be protected by an approved automatic sprinkler system and enclosed with a fire resistance rating of 1 hour.

9.12.4.5 Approved metal receptacles with self-closing covers shall be provided for the storage or disposal of oil-soaked waste or cloths.

9.12.5 Storage. Aisles, hallways, or other types of corridors of animal housing facilities shall not be used in any form for permanent storage.

9.12.6 Electrical Fire Safety.

9.12.6.1 General. Subsection 9.12.6 shall apply to permanent and temporary electrical appliances, equipment, fixtures, and wiring. [**1:**11.1.1]

9.12.6.2 Permanent Wiring, Fixtures, and Equipment.

9.12.6.2.1* All new electrical wiring, fixtures, appliances and equipment shall be installed in accordance with *NFPA 70*. [**1:**11.1.2.1]

9.12.6.3 Multiplug Adapters.

9.12.6.3.1 Multiplug adapters, such as multiplug extension cords, cube adapters, strip plugs, and other devices, shall be listed and used in accordance with their listing. [**1:**11.1.3.1]

9.12.6.3.2 Multiplug adapters shall not be used as a substitute for permanent wiring or receptacles. [**1:**11.1.3.2]

9.12.6.4 Relocatable Power Taps.

9.12.6.4.1 Relocatable power taps shall be listed to UL 1363A, *Outline of Investigation for Special Purpose Relocatable Power Taps*, where applicable, excepted as permitted by 9.12.6.4.2. [**1:**11.1.4.1]

N **9.12.6.4.2** Relocatable power taps incorporated into furniture shall be listed and labeled in accordance with UL 962A, *Furniture Power Distribution Units*. [**1:**11.1.4.2]

9.12.6.4.3 The relocatable power taps shall be directly connected to a permanently installed receptacle. [**1:**11.1.4.4]

9.12.6.4.4 Relocatable power tap cords shall not extend through walls, ceilings, or floors; under doors or floor coverings; or be subject to environmental or physical damage. [**1:**11.1.4.5]

9.12.6.5 Extension Cords.

9.12.6.5.1 Extension cords shall be plugged directly into an approved receptacle, power tap, or multiplug adapter and shall, except for approved multiplug extension cords, serve only one portable appliance. [**1:**11.1.5.1]

9.12.6.5.2 The ampacity of the extension cords shall not be less than the rated capacity of the portable appliance supplied by the cord. [**1:**11.1.5.2]

9.12.6.5.3 The extension cords shall be maintained in good condition without splices, deterioration, or damage. [**1:**11.1.5.3]

9.12.6.5.4 Extension cords shall be grounded when servicing grounded portable appliances. [**1:**11.1.5.4]

9.12.6.5.5 Extension cords and flexible cords shall not be affixed to structures; extend through walls, ceilings, or floors, or under doors or floor coverings; or be subject to environmental or physical damage. [**1:**11.1.5.5]

9.12.6.5.6 Extension cords shall be permitted to be used on portable appliances to the nearest receptacle where receptacle spacing is in accordance with *NFPA 70*. [**1:**11.1.5.6]

9.12.7 Utilities.

9.12.7.1 General.

9.12.7.1.1 The installation of stationary liquid fuel–burning appliances, including but not limited to industrial-, commercial-, and residential-type steam, hot water, or warm air heating appliances; domestic-type range burners; space heaters; and portable liquid fuel–burning equipment shall comply with 9.12.7 and NFPA 31. [**1:**11.5.1.1]

Δ **9.12.7.1.2** Subsection 9.12.7 shall also apply to all accessories and control systems, whether electric, thermostatic, or mechanical, and all electrical wiring connected to liquid fuel–burning appliances. [**1:**11.5.1.2]

Δ **9.12.7.1.3** Subsection 9.12.7 shall also apply to the installation of liquid fuel storage and supply systems connected to liquid fuel–burning appliances. [**1:**11.5.1.3]

9.12.7.1.4 Subsection 9.12.7 shall also apply to those multifueled appliances in which a liquid fuel is one of the standard or optional fuels. [**1:**11.5.1.4]

9.12.7.1.5 Subsection 9.12.7 shall not apply to internal combustion engines, oil lamps, or portable devices not specifically covered in NFPA 31. *(See Chapter 11 of NFPA 31 for portable devices that are covered in NFPA 31.)* [**1:**11.5.1.5]

9.12.7.1.6 The installation of gas-fired heating appliances shall comply with 9.12.7 and NFPA 54. *(See Chapter 69 of NFPA 1 for LP-Gas fuel supply and storage installations.)* [**1:**11.5.1.6]

9.12.7.1.7 All heating appliances shall be approved or listed. [**1:**11.5.1.7]

9.12.7.1.8 Electrical wiring and utilization equipment used in connection with oil-burning appliances or equipment shall be installed in accordance with *NFPA 70*.

9.12.7.1.9 Acceptable Liquid Fuels.

9.12.7.1.9.1 The type and grade of liquid fuel used in a liquid fuel–burning appliance shall be that type and grade for which the appliance is listed and approved or is stipulated by the manufacturer. Liquid fuels shall meet one of the following specifications and shall not contain gasoline or any other flammable liquid:

(1) ASTM D396, *Standard Specification for Fuel Oils*
(2) ASTM D3699, *Standard Specification for Kerosine*
(3) ASTM D6448, *Industrial Burner Fuels from Used Lube Oils*
(4) ASTM D6751, *Standard Specification for Biodiesel Fuel Blend Stock (B100) for Middle Distillate Fuel*
(5) ASTM D6823, *Standard Specification for Commercial Boiler Fuels with Used Lubricating Oils*
(6) ASTM D7666, *Standard Specification for Triglyceride Burner Fuel*

[**1:**11.5.1.10.1]

9.12.7.1.9.2 Appliances that burn crankcase oil or used oil shall not be used in a residential occupancy. Such appliances shall only be used if all of the following conditions are met:

(1) The installation is in a commercial or industrial occupancy.
(2) The oil-burning appliance is designed to burn crankcase oil or used oil and is listed for such use.
(3) The appliance is installed in accordance with the manufacturer's instructions and with the terms of its listing.
(4) The installation meets the applicable requirements of Section 4.6 of NFPA 31 and Chapter 12 of NFPA 31.

[**1:**11.5.1.10.2]

9.12.7.1.9.3 Where heavy oils are used, the following shall be required:

(1) The oil-burning appliance shall be designed to burn such fuels.
(2) Means shall be provided to maintain the oil at its proper atomizing temperature.
(3) Automatically operated burners that require preheating of oil shall be arranged so that no oil can be delivered for combustion until the oil is at the proper atomizing temperature.
(4) Use of an oil-fired appliance that is listed in accordance with UL 296A, *Waste Oil-Burning Air-Heating Appliances*, shall be deemed as meeting the intent of 9.12.7.1.9.3(1) through 9.12.7.1.9.3(3).

[**1:**11.5.1.10.3]

9.12.7.1.9.4 A properly sized and rated oil filter or strainer shall be installed in the oil supply line to an oil burner. [**1:**11.5.1.10.4]

9.12.8 Clothes Dryers.

9.12.8.1 Clothes dryers shall be cleaned to maintain the lint trap and keep the mechanical and heating components free from excessive accumulations of lint. [**1:**11.5.1.11.1]

9.12.9 Kerosene Burners and Oil Stoves.

9.12.9.1 Kerosene burners and oil stoves shall be equipped with a primary safety control furnished as an integral part of the appliance by the manufacturer to stop the flow of oil in the event of flame failure. Barometric oil feed shall not be considered a primary safety control. [**1:**11.5.2.1]

9.12.9.2 A conversion range oil burner shall be equipped with a thermal (heat-actuated) valve in the oil supply line, located in the burner compartment of the stove. [**1:**11.5.2.2]

9.12.9.3 Kerosene heaters shall be listed and labeled in accordance with UL 647, *Unvented Kerosene-Fired Room Heaters and Portable Heaters*, and their use shall meet all of the following:

(1) Adequate ventilation shall be provided.
(2) Kerosene heaters shall not be placed on carpeting.
(3) Kerosene heaters shall be located not less than 3 ft (0.9 m) from combustible furnishings and drapes.
(4) Only approved Type 1-K water clear kerosene shall be used.
(5) Kerosene heaters shall be allowed to cool before refueling.

[**1:**11.5.2.3]

9.12.10 Portable Electric Heater.

9.12.10.1 Portable heating appliances shall be used only in spaces designated for such use and separated from the animal housing facility.

9.12.10.2 Portable electric heaters shall be designed and located so that they cannot be easily overturned. [**1:**11.5.3.2]

9.12.10.3 All portable electric heaters shall be listed. [**1:**11.5.3.3]

9.12.11 All chimneys, smokestacks, or similar devices for conveying smoke or hot gases to the outer air and the stoves, furnaces, incinerators, boilers, or any other heat-producing devices or appliances shall be installed and maintained in accordance with NFPA 54 and NFPA 211. [**1:**11.5.4]

9.12.12 Lighting. Permanently installed lighting shall be provided throughout the animal housing facility.

9.12.13 Flammable and Combustible Liquids.

9.12.13.1 Flammable and combustible liquids shall be stored in hazardous materials storage cabinets.

9.12.13.2 Hazardous Materials Storage Cabinets. When storage cabinets are used to increase maximum allowable quantities per control area or to otherwise comply with a specific provision in Section 60.5 of NFPA 1, such cabinets shall be in accordance with the following:

(1) Cabinets shall be constructed of metal.
(2) The interior of cabinets shall be treated, coated, or constructed of materials that are nonreactive with the hazardous material stored, and such treatment, coating, or construction shall include the entire interior of the cabinet.
(3) Cabinets shall be either listed as suitable for the intended storage or constructed in accordance with the following:
    (a) Cabinets shall be of steel having a thickness of not less than 0.044 in. (1.12 mm) (18 gauge).
    (b) The cabinet, including the door, shall be double-walled with 1½ in. (38.1 mm) airspace between the walls.
    (c) Joints shall be riveted or welded and shall be tight-fitting.
    (d) Doors shall be well fitted, self-closing, and equipped with a self-latching device.
    (e) The bottoms of cabinets utilized for the storage of liquids shall be liquidtight to a minimum height of 2 in. (51 mm).
    (f) For requirements regarding electrical equipment and devices within cabinets used for the storage of hazardous liquids, compressed gases, or cryogenic fluids, see *NFPA 70*.
(4) Cabinets shall be marked in conspicuous lettering that reads as follows: HAZARDOUS — KEEP FIRE AWAY

[**1:**60.5.1.18]

9.13 Fire Department Access.

9.13.1 General. Fire department access and fire department access roads shall be provided and maintained in accordance with Section 9.13. [**1:**18.2.1]

9.13.2 Access to Structures or Areas.

9.13.2.1 The AHJ shall have the authority to require an access box(es) to be installed in an accessible location where access to or within a structure or area is difficult because of security. The access box(es) shall be of an approved type listed in accordance with UL 1037, *Antitheft Alarms and Devices*. [**1:**18.2.2.1]

9.13.2.2 The AHJ shall have the authority to require fire department access be provided to gated subdivisions or developments through the use of an approved device or system. [**1:**18.2.2.2]

9.13.2.3 The owner or occupant of a structure or area, with required fire department access as specified in 9.13.2.1 or 9.13.2.2, shall notify the AHJ when the access is modified in a manner that could prevent fire department access. [**1:**18.2.2.3]

9.13.3 Fire Department Access Roads.

9.13.3.1 Required Access.

9.13.3.1.1 Approved fire apparatus access roads shall be provided for every facility, building, or portion of a building hereafter constructed or relocated. [**1:**18.2.3.1.1]

9.13.3.1.2 Fire apparatus access roads shall consist of roadways, fire lanes, parking lot lanes, or a combination thereof. [**1:**18.2.3.1.2]

9.13.3.1.3 The provisions of 9.13.3.1 through 9.13.4.2.1 shall be permitted to be modified by the AHJ where any of the following conditions exists:

(1) Agricultural buildings having an area not exceeding 400 ft^2 (37.2 m^2)
(2) Sheds and other detached buildings having an area not exceeding 400 ft^2 (37.2 m^2)

9.13.3.1.4 When fire apparatus access roads cannot be installed due to location on property, topography, waterways, nonnegotiable grades, or other similar conditions, the AHJ shall be authorized to require additional fire protection features. [**1:**18.2.3.1.4]

9.13.4 Access to Building.

9.13.4.1 A fire apparatus access road shall extend to within 50 ft (15 m) of at least one exterior door that can be opened from the outside and that provides access to the interior of the building. [**1:**18.2.3.2.1]

9.13.4.2 Fire Department Access Roads. Fire apparatus access roads shall be provided such that any portion of the facility or any portion of an exterior wall of the first story of the building is located not more than 150 ft (46 m) from fire apparatus access roads as measured by an approved route around the exterior of the building or facility. [**1:**18.2.3.2.2]

9.13.4.2.1 When buildings are protected throughout with an approved automatic sprinkler system that is installed in accordance with NFPA 13, NFPA 13R, or NFPA 13D, the distance in 9.13.4.2 shall be permitted to be increased to 450 ft (137 m). [**1:**18.2.3.2.2.1]

9.13.4.3 Multiple Access Roads. More than one fire apparatus access road shall be provided when it is determined by the AHJ that access by a single road could be impaired by vehicle congestion, condition of terrain, climate conditions, or other factors that could limit access. [**1:**18.2.3.3]

9.14 Utilities. Equipment using fuel gas and related gas piping shall be in accordance with NFPA 54 or NFPA 58. *(See Chapter 69 of NFPA 1 for LP-Gas fuel supply and storage installations.)* [**1:**11.4]

9.15 Protection from Vehicle Damage. Aboveground gas meters, regulators, and piping exposed to vehicular damage shall be protected.

9.16* Additional Safeguards. In animal housing facilities with animals that are difficult to move, the AHJ shall be permitted to require additional safeguards necessary to protect animal occupants that cannot be safely evacuated.

9.17 Smoke Control. Where required by another section of this *Code*, smoke control systems shall be designed, installed, inspected, tested, and maintained in accordance with NFPA 92, NFPA 204, or recommended best practices, as approved by the AHJ.

Chapter 10 Interior Finishes, Contents, Furnishings, and Storage

10.1* General. Interior finishes, contents, furnishings, and storage shall be in accordance with Section 10.2 of NFPA *101* or Sections 10.2 and 10.3 of *NFPA 5000*, and this chapter.

10.1.1 Interior wall and ceiling finish materials shall be Class A or Class B in accordance with ASTM E84, *Standard Test Method of Surface Burning Characteristics of Building Materials*, or UL 723, *Test for Surface Burning Characteristics of Building Materials*, in exits and in exit access corridors.

10.1.2 Interior wall and ceiling finish materials shall be Class A, Class B, or Class C in accordance with ASTM E84, *Standard Test Method of Surface Burning Characteristics of Building Materials*, or UL 723, *Test for Surface Burning Characteristics of Building Materials*, in all other areas.

10.1.3 Interior wall and ceiling finish materials tested in accordance with NFPA 286 and complying with the requirements in Section 10.2 of NFPA *101* or Sections 10.2 and 10.3 of *NFPA 5000* shall be permitted to be used in all areas where a Class A, Class B, or Class C finish material is used in accordance with ASTM E84, *Standard Test Method of Surface Burning Characteristics of Building Materials*, or UL 723, *Test for Surface Burning Characteristics of Building Materials*.

10.2* Storage of Combustibles.

10.2.1 Protection Plan. A risk management assessment shall be performed to determine the appropriate protection plan for combustible storage, where required by the AHJ.

10.2.2 Storage of Hay, Straw, and Other Similar Agricultural Products.

10.2.2.1 Hay, straw, and other similar agricultural products shall not be stored adjacent to buildings or combustible material unless a cleared horizontal distance equal to the height of the pile is maintained between such storage and combustible material and buildings. [**1:**45.7.1]

10.2.2.2 Storage shall be limited to stacks of 100 tons (90,720 kg) each. [**1:**45.7.2]

10.2.2.3 Either an approved 1-hour fire wall installed in accordance with NFPA 221 or a clear space of 20 ft (6.1 m) shall be maintained between such stacks. [**1:**45.7.3]

Chapter 11 Category 1 — Animal Health Care

11.1 General.

11.1.1 Application.

11.1.1.1 The requirements of this chapter shall apply to new Category 1 animal housing facilities or portions thereof.

11.1.1.2 Category 1 animal housing facilities shall be in accordance with Chapter 38 of NFPA *101* Chapter 28 of *NFPA 5000*, or the business occupancy requirements in the locally adopted building codes, at a minimum, and this chapter.

11.1.2 General. The requirements in Chapter 1 and Chapters 4 through 10 shall apply.

11.1.3 Special Definitions.

11.1.3.1 Category 1 — Animal Health Care. Animal housing facilities used for short-term care, maintenance, or medical attention of animals.

11.1.3.2* Category 1 Class A. Facilities where animals are observed overnight, not constantly attended, for short-term care, maintenance, or medical attention.

11.1.3.3* Category 1 Class B. Facilities where animals are housed temporarily and constantly attended for short-term care, maintenance, or medical attention.

11.1.4 Minimum Construction Requirements. Category 1 animal housing facilities shall be constructed in accordance with Chapter 7.

11.1.5 Multiple Occupancies.

11.1.5.1 All multiple occupancies shall be in accordance with Section 6.3.

11.1.5.2 Where there are differences in the specific requirements of this chapter and the requirements for mixed or separated occupancies, the requirements of this chapter shall apply.

11.1.6 Hazard of Contents. The contents of Category 1 facilities shall be classified as ordinary hazard in accordance with Section 6.4.

11.1.7 Occupant Load. In Category 1 facilities, the occupant load, in number of persons for whom means of egress and other provisions are required, shall be determined in accordance with Chapter 38 of NFPA *101*, Chapter 28 of *NFPA 5000*, or the business occupancy requirements in the locally adopted building codes, at a minimum.

11.2 Means of Egress Requirements. Each required means of egress shall be in accordance with Chapter 8.

11.3 Fire Protection.

11.3.1 Vertical Openings. Vertical openings shall be in accordance with Chapter 38 of NFPA *101*, Chapter 28 of *NFPA 5000*, or business occupancy requirements in the locally adopted building codes, at a minimum.

11.3.2 Special Hazards.

11.3.2.1 General. Facilities shall be protected from special hazards in accordance with Section 7.6.

11.3.2.2 Hyperbaric Chambers.

11.3.2.2.1 Hyperbaric chambers used in Category 1 facilities shall meet the requirements for Class A or Class B chambers in accordance with NFPA 99.

11.3.2.2.2 Hyperbaric chambers classified by the manufacturer for animal use, not capable of accommodating a human, shall meet the requirements for Class C chambers in NFPA 99.

11.3.3 Interior Finishes, Contents, and Furnishings. Interior finishes, contents, and furnishings shall be in accordance with Chapter 10.

11.3.4 Detection, Alarm, and Communication Systems.

11.3.4.1 Fire Alarm. A supervised fire alarm system in accordance with Section 9.3 shall be provided.

11.3.4.2 Initiation. The required fire alarm system shall be initiated by any of the following where provided:

(1) Manual means in accordance with 9.3.2
(2) Required automatic sprinkler system
(3) Required detection system

11.3.4.3 Occupant Notification. The required fire alarm shall activate a general alarm in accordance with Section 9.4.

11.3.4.4 Emergency Forces Notification. Emergency forces notification shall be provided in accordance with Section 9.5.

11.3.4.5* Detection. An automatic detection system shall be installed throughout in accordance with 9.3.3.

11.3.4.6 Carbon Monoxide Detection Systems. For animal housing facilities with fuel-burning appliances or equipment, carbon monoxide detection shall be installed in accordance with 9.3.4.

11.3.4.7 Fire Safety Functions. Fire safety functions shall be provided in accordance with Section 9.6.

11.3.4.8 Annunciation. Annunciation shall be provided in accordance with Section 9.7.

11.3.5 Extinguishment.

11.3.5.1 Automatic Fire Sprinklers.

11.3.5.1.1 In Category 1 Class A facilities, automatic fire sprinklers shall be installed in accordance with Section 9.2.

11.3.5.1.2 In Category 1 Class B facilities, which are greater than 10,000 ft^2 (930 m^2), an automatic fire sprinkler system shall be installed in accordance with Section 9.2.

11.3.5.2 Fire Extinguishers. Fire extinguishers shall be provided in accordance with Section 9.10.

11.3.6 Fuel-Burning Utilities. Utilities shall be provided in accordance with Section 9.14.

11.3.7 Lightning Protection. (Reserved)

11.4 Operating Features.

11.4.1 Disaster/Emergency Management Program. A disaster/emergency management program complying with 4.3.4 shall be provided.

11.4.2 Drills. Animal handlers, designated employees, designated volunteers, and supervisory personnel shall be trained and hold disaster/emergency drills once annually in accordance with 4.3.5.

11.4.3 Extinguisher Training. All designated employees shall be annually instructed in the use of portable fire extinguishers.

11.5 Fire Barriers. Where fire barriers are required, they shall be installed in accordance with Section 9.8.

11.6 Fire Department Access. Fire department access shall be provided in accordance with Section 9.13.

Chapter 12 Category 2 — Horse Facilities

12.1 General.

12.1.1 Application.

12.1.1.1 The requirements of this chapter shall apply to new Category 2 animal housing facilities or portions thereof.

12.1.1.2 Category 2 animal housing facilities shall be in accordance with Chapter 42 of NFPA *101*, Chapter 30 of *NFPA 5000*, or the storage occupancy requirements in the locally adopted building code, at a minimum, and this chapter.

12.1.2 General. The requirements in Chapter 1 and Chapters 4 through 10 shall apply.

12.1.3 Special Definitions.

12.1.3.1* Category 2 — Horse Facilities. Facilities used for temporary or permanent housing for horses.

12.1.3.2 Category 2 Class A. Facilities where horses are housed for general board and care in a commercial or professional facility greater than 5000 ft^2 (465 m^2).

12.1.3.3 Category 2 Class B. Facilities where horses are housed for general board and care in a small commercial or professional facility less than 5000 ft^2 (465 m^2).

12.1.3.4* Category 2 Class C. Facilities where horses are housed in small family stables.

12.1.4 Minimum Construction Requirements. Category 2 animal housing facilities shall be constructed in accordance with Chapter 7.

12.1.4.1 A 2-hour fire/smoke separation shall be provided between human living quarters and stable areas.

12.1.4.2 A 30 ft (9 m) separation distance shall be provided between any buildings.

12.1.5 Multiple Occupancies.

12.1.5.1 All multiple occupancies shall be in accordance with Section 6.3.

12.1.5.2 Where there are differences in the specific requirements of this chapter and the requirements for mixed or separated occupancies, the requirements of this chapter shall apply.

12.1.6 Hazard of Contents. The contents of Category 2 facilities shall be classified as ordinary hazard in accordance with Section 6.4.

12.1.7 Occupant Load. In Category 2 facilities, the occupant load, in number of persons for whom means of egress and other provisions are required, shall be determined in accordance with Chapter 42 of NFPA *101* or Chapter 30 of *NFPA 5000*, or the storage occupancy requirements in the locally adopted building code, at a minimum.

12.2 Means of Egress Requirements.

12.2.1 General. Each required means of egress shall be in accordance with Section 12.2 and Chapter 8.

12.2.2 Means of Egress Components. Each means of egress intended for animal relocation shall have a minimum clear width of two-and-a-half times the width of the largest animal.

12.2.3 Arrangement.

12.2.3.1 The travel distance limits in all Category 2 facilities shall be determined by using the high-hazard storage occupancy limits from Table 42.2.5 of NFPA *101*.

12.2.3.2 Each stall that is located on an exterior wall shall have a means of escape directly to an outside area that is one-and-half times the width of the animal.

12.3 Fire Protection.

12.3.1 Vertical Openings. Vertical openings shall be in accordance with Chapter 42 of NFPA *101* or Chapter 30 of *NFPA 5000*, or storage occupancy requirements in the locally adopted building code, at a minimum.

12.3.2 Special Hazards. Facilities shall be protected from special hazards in accordance with Section 7.6.

12.3.3 Interior Finishes, Contents, and Furnishings. Interior finishes, contents, and furnishings shall be in accordance with Chapter 10.

12.3.4 Detection, Alarm, and Communication Systems.

12.3.4.1 Fire Alarm. A supervised fire alarm system in accordance with Section 9.3 shall be installed in accordance with the following:

(1) In all Class A facilities
(2) In Class B facilities with sleeping quarters

12.3.4.2 Initiation. Where required, the fire alarm system shall be initiated by any of the following where provided:

(1) Manual means in accordance with 9.3.2
(2) Required automatic sprinkler system
(3) Required detection system

12.3.4.3 Occupant Notification. Where a fire alarm is required, the fire alarm shall activate a general alarm in accordance with Section 9.4.

12.3.4.4 Emergency Forces Notification. Where a fire alarm is required, emergency forces shall be provided in accordance with Section 9.5.

12.3.4.5* Detection. An automatic detection system shall be installed throughout in accordance with 9.3.3 in the following locations:

(1) Human sleeping areas
(2) Storage areas greater than 100 ft^2 (9.3 m^2) in area
(3) Areas with conditioned air

12.3.4.6 Carbon Monoxide Detection Systems. For animal housing facilities with fuel-burning appliances or equipment, carbon monoxide detection shall be installed in accordance with 9.3.4.

12.3.4.7 Fire Safety Functions. Fire safety functions shall be provided in accordance with Section 9.6.

12.3.4.8 Annunciation. Annunciation shall be provided in accordance with Section 9.7.

12.3.5 Extinguishment.

12.3.5.1 Automatic Fire Sprinklers. Automatic fire sprinklers shall be installed in accordance with Section 9.2 in any of the following Category 2 facilities:

(1) All Class A facilities
(2) Class B facilities with sleeping quarters

12.3.5.2 Fire Extinguishers. Fire extinguishers shall be provided in accordance with Section 9.10.

12.3.6 Fuel-Burning Utilities. Utilities shall be provided in accordance with Section 9.14.

12.3.7 Lightning Protection. (Reserved)

12.4 Operating Features.

12.4.1 Disaster/Emergency Management Program.

12.4.1.1 A disaster/emergency management program complying with 4.3.4 shall be provided.

12.4.1.2 Animal handlers, designated employees, and supervisory personnel shall be trained and hold disaster/emergency drills once annually in accordance with 4.3.5.

12.4.2* Extinguisher Training. All designated employees shall be annually instructed in the use of portable fire extinguishers.

12.5 Fire Barriers. Where fire barriers are required, they shall be installed in accordance with Section 9.8.

12.6 Fire Department Access. Fire department access shall be provided in accordance with Section 9.13.

Chapter 13 Category 3 — Research

13.1 General.

13.1.1 Application.

13.1.1.1 The requirements of this chapter shall apply to new Category 3 animal housing facilities or portions thereof.

13.1.1.2 Category 3 animal housing facilities shall be in accordance with Chapter 38 of NFPA *101*, Chapter 28 of *NFPA 5000*, or the business occupancy requirements in the locally adopted building code, at a minimum, and this chapter.

13.1.2 General. The requirements in Chapter 1 and Chapters 4 through 10 shall apply.

13.1.3 Special Definitions.

13.1.3.1* Category 3 — Research. Facilities used for experimentation, education, or scientific experimentation or production research on animals in a controlled environment.

13.1.4 Minimum Construction Requirements. Category 3 animal housing facilities shall be constructed in accordance with Chapter 7.

13.1.5 Multiple Occupancies.

13.1.5.1 All multiple occupancies shall be in accordance with Section 6.3.

13.1.5.2 Where there are differences in the specific requirements of this chapter and the requirements for mixed or separated occupancies, the requirements of this chapter shall apply.

13.1.6 Hazard of Contents. The contents of Category 3 facilities shall be classified as ordinary hazard in accordance with Section 6.4.

13.1.7 Occupant Load. In Category 3 facilities, the occupant load, in number of persons for whom means of egress and other provisions are required, shall be determined in accordance with Chapter 38 of NFPA *101*, Chapter 28 of *NFPA 5000*, or the business occupancy requirements in the locally adopted building code, at a minimum.

13.2 Means of Egress Requirements. Each required means of egress shall be in accordance with the applicable sections of Chapter 8.

13.3 Fire Protection.

13.3.1 Vertical Openings. Vertical openings shall be in accordance with Chapter 38 of NFPA *101*, Chapter 28 of *NFPA 5000*, or business occupancy requirements in the locally adopted building codes, at a minimum.

13.3.2 Special Hazards. Facilities shall be protected from special hazards in accordance with Section 7.6.

13.3.3 Interior Finishes, Contents, and Furnishings. Interior finishes, contents, and furnishings shall be in accordance with Chapter 10.

13.3.4 Detection, Alarm, and Communication Systems.

13.3.4.1 Fire Alarm.

13.3.4.1.1 A supervised fire alarm system in accordance with Section 9.3 shall be required in Category 3 facilities 3000 ft^2 (280 m^2) or greater.

13.3.4.1.2 Where a fire alarm system is not required, residential-type smoke alarms shall be installed.

13.3.4.2 Initiation. The required fire alarm system shall be initiated by any of the following where provided:

(1) Manual means in accordance with 9.3.2
(2) Required automatic sprinkler system
(3) Required detection system

13.3.4.3 Occupant Notification.

13.3.4.3.1 The required fire alarm shall activate a general alarm in accordance with Section 9.4.

13.3.4.3.2* Where fire alarm system notification devices could impact the animal's well-being, alternative notification methods approved by the AHJ shall be used in the animal areas.

13.3.4.4 Emergency Forces Notification. Emergency forces notification shall be provided in accordance with Section 9.5.

13.3.4.5* Detection. An automatic detection system shall be installed in accordance with Section 9.3 in facilities 3000 ft^2 (280 m^2) or greater.

13.3.4.6 Carbon Monoxide Detection Systems. For animal housing facilities with fuel-burning appliances or equipment, carbon monoxide detection shall be installed in accordance with 9.3.4.

13.3.4.7 Fire Safety Functions. Fire safety functions shall be provided in accordance with Section 9.6.

13.3.4.8 Annunciation. Annunciation shall be provided in accordance with Section 9.7.

13.3.5 Extinguishment.

13.3.5.1 Automatic Fire Sprinklers. In Category 3 buildings of Type III, IV, or V construction exceeding 3000 ft^2 (280 m^2) per story, automatic fire sprinkler protection in accordance with Section 9.2 shall be required.

13.3.5.2 Fire Extinguishers. Fire extinguishers shall be provided in accordance with Section 9.10.

13.3.6 Fuel-Burning Utilities. Utilities shall be provided in accordance with Section 9.14.

13.3.7 Lightning Protection. Lightning protection shall be required in accordance with Section 9.11.

13.3.8 Smoke Control System. An approved smoke control system shall be installed in accordance with Section 9.17 where required by the risk management assessment in Section 13.4.

13.4 Risk Management. A risk management assessment shall be conducted to determine if additional fire protection features are needed based on the animals' needs.

13.5 Operating Features.

13.5.1 Disaster/Emergency Management Program. A disaster/emergency management program complying with 4.3.4 shall be provided.

13.5.2 Drills.

13.5.2.1 Animal handlers, designated employees, and supervisory personnel shall hold disaster/emergency drills once annually in accordance with 4.3.5.

13.5.3 Training. All designated employees shall be annually instructed in the emergency management program and special procedures, including the use of portable fire extinguishers.

Chapter 14 Reserved

Chapter 15 Category 5 — Exhibition/Public Viewing

15.1 General.

15.1.1 Application.

15.1.1.1 The requirements of this chapter shall apply to new Category 5 animal housing facilities or portions thereof.

15.1.1.2 Category 5 animal housing facilities shall be in accordance with this chapter and the following, at a minimum:

(1) Assembly use areas shall be in accordance with Chapter 12 of NFPA *101*, or Chapter 16 of *NFPA 5000*, or the assembly occupancy requirements in the locally adopted building code.
(2) Business use areas shall be in accordance with Chapter 38 of NFPA *101*, or Chapter 28 of *NFPA 5000*, or the business occupancy requirements in the locally adopted building code.

15.1.2 General. The requirements in Chapter 1 and Chapters 4 through 10 shall apply.

15.1.3 Special Definitions.

15.1.3.1 Category 5 — Exhibition/Public Viewing. Facilities that allow public access for the purpose of exhibition or public viewing of animals.

15.1.3.2* Category 5 Class A. Facilities where public attraction animals are permanently housed.

15.1.3.3* Category 5 Class B. Facilities where public attraction animals are temporarily housed.

15.1.4 Minimum Construction Requirements. Category 5 animal housing facilities shall be constructed in accordance with Chapter 7.

15.1.5 Multiple Occupancies.

15.1.5.1 All multiple occupancies shall be in accordance with Section 6.3.

15.1.5.2 Where there are differences in the specific requirements of this chapter and the requirements for mixed or separated occupancies, the requirements of this chapter shall apply.

15.1.6 Hazard of Contents. The contents of Category 5 facilities shall be classified as ordinary hazard in accordance with Section 6.4.

15.1.7 Occupant Load. In Category 5 facilities, the occupant load, in number of persons for whom means of egress and other provisions are required, shall be determined in accordance with the following:

(1) Assembly use areas shall be in accordance with Chapter 12 of NFPA *101*, or Chapter 16 of *NFPA 5000*, or the assembly occupancy requirements in the locally adopted building code.
(2) Business use areas shall be in accordance with Chapter 38 of NFPA *101*, or Chapter 28 of *NFPA 5000*, or the business occupancy requirements in the locally adopted building code.

15.2 Means of Egress Requirements.

15.2.1 General. Each required means of egress shall be in accordance with Section 15.2 and the applicable sections of Chapter 8.

15.2.2* Illumination of Means of Egress. Illumination shall be designed to accommodate animal needs.

15.3 Fire Protection.

15.3.1 Vertical Openings. Where required by the AHJ, vertical openings shall be in accordance with Section 9.8 for applicable business or assembly occupancies.

15.3.2 Special Hazards. Facilities shall be protected from special hazards in accordance with Section 7.6.

15.3.3 Interior Finishes, Contents, and Furnishings. Interior finishes, contents, and furnishings shall be in accordance with Chapter 10.

15.3.4 Detection, Alarm, and Communication Systems.

15.3.4.1* Fire Alarm. A monitored fire alarm system in accordance with Section 9.3 shall be provided in Class A facilities.

N **15.3.4.1.1** The AHJ shall be permitted to exclude temporary structures, as defined in the local building or fire code, from complying with 15.3.4.1.

15.3.4.1.2 A fire alarm system notification shall be designed based on animal program requirements.

15.3.4.1.3* A 24-hour fire watch shall be provided in all animal areas of Class B facilities.

15.3.4.2 Initiation. The required fire alarm system shall be initiated by any of the following where provided:

(1) Manual means in accordance with 9.3.2
(2) Required automatic sprinkler system
(3) Required detection system

15.3.4.3 Occupant Notification.

15.3.4.3.1 The required fire alarm shall activate a general alarm in accordance with Section 9.4.

15.3.4.3.2* Where fire alarm notification devices could impact the animal's well-being, alternative notification methods approved by the AHJ shall be used in the animal areas.

15.3.4.4 Emergency Forces Notification. Emergency forces notification shall be provided in Class A facilities in accordance with Section 9.5.

15.3.4.5* Detection. An automatic detection system shall be installed throughout in accordance with 9.3.3 where required by the risk management assessment in Section 15.4.

15.3.4.6 Carbon Monoxide Detection Systems. For animal housing facilities with fuel-burning appliances or equipment, carbon monoxide detection shall be installed in accordance with 9.3.4.

15.3.4.7 Fire Safety Functions. Fire safety functions shall be provided in accordance with Section 9.6.

15.3.4.8 Annunciation. Annunciation shall be provided in accordance with Section 9.7.

15.3.5 Extinguishment.

15.3.5.1 In all Class A facilities, automatic fire sprinklers shall be installed in accordance with Section 9.2.

15.3.5.2 Systems shall be designed based on animal program needs.

15.3.5.3 Fire Extinguishers. Fire extinguishers shall be provided in accordance with Section 9.10.

15.3.6 Fuel-Burning Utilities. Utilities shall be provided in accordance with Section 9.14.

15.3.7 Lightning Protection. (Reserved)

15.3.8* Smoke Control System. An approved smoke control system shall be installed in accordance with Section 9.17 where required by the risk management assessment in Section 15.4.

15.3.9 Operating Features.

15.3.9.1 Disaster/Emergency Management Program.

15.3.9.1.1 A disaster/emergency management program complying with 4.3.4 shall be provided.

15.3.9.2 Drills. Animal handlers, designated employees, designated volunteers, and supervisory personnel shall hold disaster/emergency drills once annually in accordance with 4.3.5.

15.3.9.3 Extinguisher Training. All designated employees shall be annually instructed in the use of portable fire extinguishers.

15.3.10 Fire Barriers. Where fire barriers are required, they shall be installed in accordance with Section 9.8.

15.3.11 Fire Department Access. Fire department access shall be provided in accordance with Section 9.13.

15.4 Risk Management. A risk management assessment shall be conducted to determine if additional fire protection features are needed based on the animals' needs.

Chapter 16 Category 6 — General Board and Care

16.1 General.

16.1.1 Application.

16.1.1.1 The requirements of this chapter shall apply to new Category 6 animal housing facilities or portions thereof.

16.1.1.2 Category 6 animal housing facilities shall be in accordance with Chapter 38 of NFPA *101*, or Chapter 28 of *NFPA 5000*, or the business occupancy requirements in the locally adopted building code, at a minimum, and this chapter.

16.1.2 General. The requirements in Chapter 1 and Chapters 4 through 10 shall apply.

16.1.3 Special Definitions.

16.1.3.1* Category 6 — General Board and Care. Facilities used for the temporary or permanent housing of animals used for providing a service or participating in a sport or for the purposes of providing general board and care.

16.1.3.2* Category 6 Class A. Facilities where animals are housed without constant supervision.

16.1.3.3* Category 6 Class B. Facilities where animals are housed with constant supervision.

16.1.4 Minimum Construction Requirements. Category 6 animal housing facilities shall be constructed in accordance with Chapter 7.

16.1.5 Multiple Occupancies.

16.1.5.1 All multiple occupancies shall be in accordance with Section 6.3.

16.1.5.2 Where there are differences in the specific requirements of this chapter and the requirements for mixed or separated occupancies, the requirements of this chapter shall apply.

16.1.6 Hazard of Contents. The contents of Category 6 facilities shall be classified as ordinary hazard in accordance with Section 6.4.

16.1.7 Occupant Load. In Category 6 facilities, the occupant load, in number of persons for whom means of egress and other provisions are required, shall be determined in accordance with one of the following, at a minimum:

(1) Where the facility is arranged for training of animals and their handlers and trainers, Chapter 38 of NFPA *101* or Chapter 28 of *NFPA 5000*, or the business occupancy requirements in the locally adopted building codes shall apply.
(2) Where the facility is arranged for 50 or more people to gather to watch animals perform, Chapter 12 of NFPA *101* or Chapter 16 of *NFPA 5000*, or the assembly occupancy requirements in the locally adopted building codes shall apply.
(3) Where the facility is arranged for board and care of animals with limited public access, Chapter 42 of NFPA *101* or Chapter 30 of *NFPA 5000*, or the storage occupancy requirements in the locally adopted building codes shall apply.
(4) Where more than one of 16.1.7(1) through 16.1.7(3) apply, the most restrictive shall apply.

16.2 Means of Egress Requirements. Each required means of egress shall be in accordance with the applicable sections of Chapter 8.

16.3 Fire Protection.

16.3.1 Vertical Openings. Vertical openings shall be in accordance with Chapter 38 of NFPA *101*, Chapter 28 of *NFPA 5000*, or the business occupancy requirements in the locally adopted building codes, at a minimum.

16.3.2 Special Hazards. Facilities shall be protected from special hazards in accordance with Section 7.6.

16.3.3 Interior Finishes, Contents, and Furnishings. Interior finishes, contents, and furnishings shall be in accordance with Chapter 10.

16.3.4 Detection, Alarm, and Communication Systems.

16.3.4.1 Fire Alarm. A supervised fire alarm system in accordance with Section 9.3 shall be required in all Category 6 facilities.

16.3.4.2 Initiation. The required fire alarm system shall be initiated by any of the following where provided:

(1) Manual means in accordance with 9.3.2
(2) Required automatic sprinkler system
(3) Required detection system

16.3.4.3 Occupant Notification. The required fire alarm shall activate a general alarm in accordance with Section 9.4.

16.3.4.4 Emergency Forces Notification. Emergency forces notification shall be provided in accordance with Section 9.5.

16.3.4.5* Detection. An automatic detection system shall be installed throughout in accordance with 9.3.3 in the following facilities:

(1) Class A facilities
(2) Class B facilities with overnight animal accommodations

16.3.4.6 Carbon Monoxide Detection Systems. For animal housing facilities with fuel-burning appliances or equipment, carbon monoxide detection shall be installed in accordance with 9.3.4.

16.3.4.7 Fire Safety Functions. Fire safety functions shall be provided in accordance with Section 9.6.

16.3.4.8 Annunciation. Annunciation shall be provided in accordance with Section 9.7.

16.3.5 Extinguishment.

16.3.5.1 Automatic Fire Sprinklers.

16.3.5.1.1 An automatic sprinkler system in accordance with Section 9.2 shall be installed throughout all buildings containing a Class A facility.

16.3.5.1.2 Where the Class A facility is separated from the remainder of the building by a 2-hour rated smoke barrier in accordance with Section 9.9, the requirements of 16.3.5.1 shall only apply to the Class A facility.

16.3.5.1.3 Where the dedicated animal sleeping area is separated from the remainder of the building by a 2-hour rated smoke barrier in accordance with Section 9.9, the requirements of 16.3.5.1 shall only apply to the dedicated animal sleeping area.

16.3.5.2 Fire Extinguishers. Fire extinguishers shall be provided in accordance with Section 9.10.

16.3.6 Fuel-Burning Utilities. Utilities shall be provided in accordance with Section 9.14.

16.3.7 Lightning Protection. (Reserved)

16.4 Operating Features.

16.4.1 Disaster/Emergency Management Program. A disaster/emergency management program complying with 4.3.4 shall be provided.

16.4.2 Drills. Animal handlers, designated employees, and supervisory personnel shall hold disaster/emergency drills once annually in accordance with 4.3.5.

16.4.3 Extinguisher Training. All designated employees shall be annually instructed in the use of portable fire extinguishers.

16.5 Fire Barriers. Where fire barriers are required, they shall be installed in accordance with Section 9.8.

16.6 Fire Department Access. Fire department access shall be provided in accordance with Section 9.13.

Chapter 17 Category 7 — Agriculture

17.1 General.

17.1.1 Application.

17.1.1.1 The requirements of this chapter shall apply to new Category 7 animal housing facilities and portions thereof.

17.1.1.2 Category 7 animal housing facilities shall be in accordance with Chapter 42 of NFPA *101* or Chapter 30 of *NFPA 5000*, or the utility occupancy requirements in the locally adopted building code, at a minimum, and this chapter.

17.1.1.3* Category 7 Class B and Class C facilities shall be exempt from the requirements of this *Code*.

17.1.2 General. The requirements in Chapter 1 and Chapters 4 through 10 shall apply.

17.1.3 Special Definitions.

17.1.3.1 Category 7 — Agriculture. Animal housing facilities used for housing agricultural animals used for food or commodity production.

17.1.3.2* Category 7 Class A. Facilities where agricultural animals are housed for commercial use.

17.1.3.3* Category 7 Class B. Facilities where agricultural animals are housed in private residential-type animal housing.

17.1.3.4* Category 7 Class C. Facilities where agricultural animals are housed outdoors.

17.1.4 Minimum Construction Requirements. Category 7 animal housing facilities shall be constructed in accordance with Chapter 7.

17.1.4.1* Fire Resistance Rating of Exterior Walls. Where two or more buildings are located on the same lot, the facing exterior walls of Class A buildings to the facing exterior walls of the adjacent building shall be separated by a minimum distance of 60 ft (18.3 m).

17.1.4.2 Nonanimal housing accessory structures shall be separated per Table 17.1.4.2.

17.1.5 Multiple Occupancies.

17.1.5.1 All multiple occupancies shall be in accordance with Section 6.3.

17.1.5.2 Where there are differences in the specific requirements of this chapter and the requirements for mixed or separated occupancies, the requirements of this chapter shall apply.

17.1.6 Hazard of Contents. The contents of Category 7 facilities shall be classified as ordinary hazard in accordance with Section 6.4.

Table 17.1.4.2 Fire Resistance Rating of Exterior Walls

Horizontal Separation		Fire Resistance Rating
ft	m	(hr)
0–20	0–6.1	2 hours
>20–<60	>6.1–<18.3	1 hour
>60	>18.3	0

17.1.7 Occupant Load. In Category 7 facilities, the occupant load, in number of persons for whom means of egress and other provisions are required, shall be determined in accordance with Chapter 42 of NFPA *101*, Chapter 30 of *NFPA 5000*, or the utility occupancy requirements in the locally adopted building code, at a minimum.

17.2 Means of Egress Requirements.

Δ **17.2.1 General.**

N **17.2.1.1** Each required means of egress shall be in accordance with Section 17.2 and the applicable sections of Chapter 8.

N **17.2.1.2** Where compliance with 17.2 and applicable sections of Chapter 8 cannot be met in limited access structures or portions of a structure, emergency access openings shall be permitted in accordance with 17.2.2.5 and 17.2.2.6.

17.2.2* Arrangement of Means of Egress.

17.2.2.1 The maximum travel distance to an exit shall not exceed 300 ft (91 m).

17.2.2.2 Where the calculated human occupant load is less than 30, the common path of travel shall not exceed 100 ft (30 m).

17.2.2.3 Dead-end corridors shall not exceed 50 ft (15 m).

17.2.2.4 The common path of travel shall not exceed 75 ft (22.8 m).

N **17.2.2.5** In addition to the number of means of egress required by Chapter 8 and 17.2.2, one-story structures shall have finished ground-level doors or emergency access openings in accordance with 17.2.2.6 on at least two sides of the structure.

N **17.2.2.6*** Emergency access openings shall consist of a window, panel, or similar opening that complies with the following:

(1) The opening has dimensions not less than 32 in. (81 cm) in width and 32 in. (81 cm) in height and is unobstructed to allow for ventilation and rescue from the exterior
(2) The bottom of the opening is not more than 44 in. (1120 mm) above the floor
(3) The opening is readily identifiable from both the exterior and the interior
(4) Signage on the occupied side clearly indicates "Emergency Exit Only"
(5) Glazing with a minimum size of 9 in. × 9 in. is centered on the door leaf
(6) A single latch releasing mechanism is located on the occupied side not more than 60 in. above floor elevation
(7) The opening is openable from the exterior and interior

17.3 Fire Protection.

17.3.1 Vertical Openings. Vertical openings shall be in accordance with Chapter 42 of NFPA *101*, Chapter 30 of *NFPA 5000*, or the utility occupancy requirements in the locally adopted building codes, at a minimum.

17.3.2 Special Hazards. Facilities shall be protected from special hazards in accordance with Section 7.6.

17.3.3 Interior Finishes, Contents, and Furnishings. Interior finishes, contents, and furnishings shall be in accordance with Chapter 10.

17.3.4 Detection, Alarm, and Communication Systems.

17.3.4.1 Fire Alarm. A fire alarm system in accordance with Section 9.3 shall be required in Class A facilities.

17.3.4.2* Initiation. The required fire alarm system shall be initiated by any of the following where provided:

(1) Manual means in accordance with 9.3.2
(2) Required automatic sprinkler system
(3) Required detection system

17.3.4.3 Occupant Notification. The required fire alarm shall activate a general alarm in accordance with Section 9.4.

17.3.4.4* Emergency Forces Notification. Where communications infrastructure exists, emergency forces notification shall be provided in accordance with 9.5 or the fire alarm signal shall be received at a location approved by the AHJ.

Δ **17.3.4.5* Detection.** An automatic detection system shall be installed in accordance with Section 9.3 in areas where animals are housed and hazardous areas including, the following:

(1) Laundry areas
(2) Electrical rooms
(3) Kitchens
(4) Utility rooms
(5) Power washing rooms
(6) Storage areas greater than 50 ft^2 (4.7 m^2) or containing ignitible (flammable or combustible) liquids or combustible materials

17.3.4.6* Carbon Monoxide Detection Systems. For animal housing facilities with fuel-burning appliances or equipment, carbon monoxide detection shall be installed in accordance with 9.3.4.

17.3.4.7 Fire Safety Functions. Fire safety functions shall be provided in accordance with Section 9.6.

17.3.4.8 Annunciation. Annunciation shall be provided in accordance with Section 9.7.

17.3.5 Extinguishment.

Δ **17.3.5.1 Automatic Fire Sprinklers.**

N **17.3.5.1.1** Class A Facilities meeting or exceeding the US Environmental Protection Agency animal size threshold of a Medium Concentrated Animal Feeding Operation shall be provided with automatic fire sprinklers in accordance with Section 9.2, unless otherwise permitted by 17.3.5.1.2.

N **17.3.5.1.2** Where approved by the AHJ, sprinkler protection required by 17.3.5.1 shall not be required where equivalent alternative active or passive protection, or a combination thereof is provided.

17.3.5.2 Fire Extinguishers. Fire extinguishers shall be provided in accordance with Section 9.10.

17.3.6 Fuel-Burning Utilities. Utilities shall be provided in accordance with Section 9.14.

17.3.7 Lightning Protection. (Reserved)

17.4 Operating Features.

17.4.1 Disaster/Emergency Management Program. A disaster/emergency management program complying with 4.3.4 shall be provided.

17.4.2 Drills. Animal handlers, designated employees, and supervisory personnel shall hold disaster/emergency drills once annually in accordance with 4.3.5.

17.4.3 Extinguisher Training.

17.4.3.1 All designated employees shall be annually instructed in the use of portable fire extinguishers, emergency egress methods, and other site safety issues.

17.4.3.2 In addition to annual training, new employees shall receive initial training within 30 days of hire.

17.4.4* In accordance with industry standards, adequate ventilation shall run continuously at all times.

17.5 Fire Barriers. Where fire barriers are required, they shall be installed in accordance with Section 9.8.

17.6 Fire Department Access. Fire department access shall be provided in accordance with Section 9.13.

17.7 Risk Management.

17.7.1 In all Class A facilities, a risk management assessment shall be completed when requested by the AHJ.

17.7.1.1 Where requested, the risk management assessment shall be submitted to the AHJ.

17.7.1.2 Hazards to be identified shall include storage of flammable and combustible materials, electrical systems and wiring, buildup of flammable and combustible gases, and hazardous materials.

17.7.1.3 Appropriate protection methods shall include one or more of the following:

(1) Fire-rated separation
(2) Air circulation plans
(3) Electrical inspection plans
(4)* Fire suppression systems

17.8 Annual Inspection.

17.8.1 All Category 7 facilities shall be inspected annually to identify electrical, structural, and housekeeping hazards.

17.8.2 Inspections shall be performed by qualified personnel.

17.8.3 Inspection documentation shall be made available to the AHJ upon request.

Chapter 18 Category 8 — Emergency

18.1 General.

18.1.1 Application.

18.1.1.1 The requirements of this chapter shall apply to new Category 8 animal housing facilities or portions thereof.

18.1.1.2 Category 8 animal housing facilities shall be in accordance with the occupancy requirements for the current use of the building in NFPA *101*, *NFPA 5000*, or the locally adopted building codes.

18.1.1.3 Selection of emergency facilities shall be approved by the AHJ.

18.1.2 General. The requirements in Chapter 1 and Chapters 4 through 10 shall apply.

18.1.3 Special Definitions.

18.1.3.1* Category 8 — Emergency. Facilities used for the shelter or care of animals during an emergency event that are either temporary or not typically used for animal occupancy.

18.1.4 Minimum Construction Requirements. Category 8 facilities shall be constructed in accordance with the current use of the building.

18.1.5 Multiple Occupancies.

18.1.5.1 All multiple occupancies shall be in accordance with Section 6.3.

18.1.5.2 Where there are differences in the specific requirements of this chapter and the requirements for mixed or separated occupancies, the requirements of this chapter shall apply.

18.1.6 Hazard of Contents. The contents of Category 8 facilities shall be classified in accordance with the current use of the building.

18.1.7 Occupant Load. In Category 8 facilities, the occupant load, in number of persons for whom means of egress and other provisions are required, shall be based on the approved occupant load for the building in its current use.

18.2 Means of Egress Requirements.

18.2.1 General. Each required means of egress shall be in accordance with Section 18.2 and the applicable sections of Chapter 8.

18.2.2 Means of Egress Components. Aisles created as part of the emergency use of the building shall comply with Chapter 8.

18.2.3 Number of Means of Egress. The number and arrangement of means of egress shall be in accordance with the current use of the building and the applicable portions of Chapter 8.

18.3 Fire Protection.

18.3.1 Vertical Openings. (Reserved)

18.3.2 Special Hazards. Facilities shall be protected from special hazards in accordance with Section 7.6.

18.3.3 Interior Finishes, Contents, and Furnishings. Interior finishes, contents, and furnishings shall be in accordance with Chapter 10.

18.3.4 Detection, Alarm, and Communication Systems.

18.3.4.1 Fire Alarm. Existing buildings with fire alarms or smoke detection systems shall be the preferred locations for emergency facilities.

18.3.4.2 Initiation. (Reserved)

18.3.4.3 Occupant Notification. (Reserved)

18.3.4.4 Emergency Forces Notification. (Reserved)

18.3.4.5 Detection. Existing buildings with fire alarms or smoke detectors shall be the preferred locations for emergency facilities.

18.3.4.6* Carbon Monoxide Detection Systems. For animal housing facilities with fuel-burning appliances or equipment, carbon monoxide detection shall be installed in accordance with 9.3.4.

18.3.4.7 Fire Safety Functions. Fire safety functions shall be provided in accordance with Section 9.6.

18.3.4.8 Annunciation. Annunciation shall be provided in accordance with Section 9.7.

18.3.5 Extinguishment. Fire extinguishers shall be provided in accordance with Section 9.10.

18.3.6 Fuel Burning Utilities. Utilities shall be provided in accordance with Section 9.14.

18.3.7 Lightning Protection. (Reserved)

18.4 Operating Features.

18.4.1 Disaster/Emergency Management Program. A disaster/emergency management program shall be required in accordance with 4.3.4.

18.4.2* Drills. Animal handlers, designated employees, and supervisory personnel shall hold disaster/emergency drills once annually in accordance with 4.3.5.

18.4.3 Extinguisher Training. All designated employees shall be annually instructed in the use of portable fire extinguishers.

18.5 Fire Barriers. (Reserved)

18.6 Fire Department Access. Fire department access shall be provided in accordance with Section 9.13.

Chapter 19 Reserved

Chapter 20 Performance-Based Design Option

20.1* General.

20.1.1 Application. The requirements of this chapter shall apply to buildings or structures, portions of buildings or structures, or building systems designed in accordance with the performance-based option permitted by Section 4.3.

20.1.2 Goals and Objectives. The performance-based design shall meet the goals and objectives of Section 4.1.

20.1.3* Independent Review. The AHJ shall be permitted to require an approved, independent third party to review the proposed design and provide an evaluation of the design to the AHJ at the expense of the owner.

20.1.4* Sources of Data. Data sources shall be identified and documented for each input data requirement that must be met using a source other than a design scenario, an assumption, or a building design specification.

20.1.4.1 The degree of conservatism reflected in such data resources shall be specified.

20.1.4.2 A justification for the source of the data shall be provided.

20.1.5* Final Determination. The AHJ shall make the final determination as to whether the performance objectives have been met.

20.1.6* Maintenance of Design Features.

20.1.6.1 The design features required for the building to continue to meet the performance goals and objectives of this *Code* shall be maintained for the life of the building.

20.1.6.1.1 Performance goals and objectives shall include complying with all documented assumptions and design specifications.

20.1.6.1.2 Any variations in the performance goals and objectives shall require the approval of the AHJ prior to the actual change.

20.1.6.2 Whenever or wherever any device, equipment, system, condition, arrangement, level of protection, or other feature is required to meet the goals, objectives, or performance criteria of this *Code*, approved procedures for the operation and maintenance of such device, equipment, system, condition, arrangement, level of protection, or other feature shall be prepared, and an approved system of inspection, maintenance, and testing shall be included in an operations and maintenance manual developed as part of the performance-based design.

20.1.7 Special Definitions. See Section 3.3.

20.2 Safety-from-Fire Goals.

20.2.1 The fire safety goals of this *Code* shall be as follows:

(1) To provide a safe environment for human occupants inside an animal housing facility
(2) To provide a safe environment for animal occupants inside or adjacent to a structure
(3) To provide a level of safety for firefighters and emergency responders during search-and-rescue operations for animal and human occupants
(4) To minimize loss of property and interruption of facility operations from fire and similar emergencies to a level that is as low as reasonably practical

20.2.2 Safety-from-Fire Objectives.

20.2.2.1 Facilities shall be designed and constructed to protect human and animal occupants not intimate with the initial fire development for the time needed to evacuate, relocate, or defend in place.

20.2.2.2* Facilities shall be designed and constructed to provide reasonable safety for firefighters and emergency responders during search and rescue operations for animal and human occupants.

20.2.2.3 Facilities shall be designed and constructed to provide reasonable access to the structure for emergency responders.

20.2.2.4 Facilities shall be designed and constructed to reasonably protect adjacent persons, animals, and structures from injury, death, or substantial damage as a result of a fire.

20.2.3 Safety During Facility Use.

20.2.3.1* Safety-During-Facility-Use Goal. The safety-during-facility-use goal of this *Code* shall be to provide an environment for both the human and animal occupants of the facility that is reasonably safe during the normal use of the facility.

20.2.3.2 Safety-During-Facility-Use Objectives.

20.2.3.2.1 Facilities shall be designed and constructed to provide for reasonably safe animal and crowd movement during emergency and nonemergency conditions.

20.2.3.2.2 Facilities shall be designed and constructed to provide reasonable safety for animal and human occupants and workers during construction and demolition.

20.2.3.2.3* Facilities shall be designed and constructed to provide reasonable and appropriate notification to occupants during emergency situations.

20.2.3.2.4 Facilities shall be designed and constructed to provide reasonable signage to identify hazards, means of egress, and other building safety features.

20.2.3.3 Glass. Glass or other similar frangible construction material shall be installed in such a manner that, if occupants come into contact with such material, one of the following occurs:

(1) The material resists impact without breaking.
(2) The material breaks in such a manner that it does not cause injury.
(3) The material is protected from occupant impact.

20.2.4 Uncontrolled Moisture.

20.2.4.1 Where critical to the operation and use of the animal housing facility, uncontrolled moisture shall be controlled in accordance with 20.2.4.1.1 through 20.2.4.1.3.

20.2.4.1.1 The exterior envelope of the building shall be designed to control the entry of precipitation into the building.

20.2.4.1.2 The exterior walls, attics, crawl spaces, and other concealed or enclosed building elements that constitute the building envelope shall be designed to control the accumulation of water vapor or its condensation in such quantities and physical state that contact of water vapor or its condensation with the building insulation or building materials will not result in conditions that adversely affect the health of the building occupants.

20.2.4.1.3 Building materials located in areas within the building that are subject to exposure from water discharges or leaks in quantities and durations that cause exterior moisture to accumulate for extended periods of time, thus resulting in conditions that adversely affect the health of the building occupants, shall be designed to control penetration of, or direct contact with, water or shall be protected from such exposure.

20.3 Retained Prescriptive Requirements. The design shall comply with the requirements of Section 20.3 in addition to the performance criteria of Section 20.2 and the methods of Sections 20.4 through 20.8.

20.3.1 Systems and Features. All fire protection systems and features of the building shall comply with applicable NFPA standards for those systems and features.

20.3.2 Means of Egress. Means of egress shall comply with Chapter 8.

20.4* Performance-Based Design Characteristics and Assumptions.

20.4.1 General.

20.4.1.1 Design characteristics and assumptions used in the performance-based design shall be clearly stated and shown to be realistic and sustainable.

20.4.1.2 Each design characteristic and assumption used in the design shall be accurately translated into input data specifications, as appropriate for the calculation method or model to be used.

20.4.1.3 Design characteristics and assumptions that the design analyses do not explicitly address or incorporate and that are, therefore, omitted from input data specifications shall be identified, and a sensitivity analysis of the consequences of that omission shall be performed.

20.4.1.4 Design characteristics and assumptions modified in input data specifications, due to limitations in test methods or other data-generation procedures, shall be identified, and a sensitivity analysis of the consequences of the modification shall be performed.

20.4.1.5* The design shall not include mutually inconsistent characteristics, assumptions, or statements of conditions.

20.4.2 Building Characteristics and Assumptions.

20.4.2.1* Characteristics of the building or its contents, equipment, layout, or operations that are not inherent in the design specifications, but that affect occupant or building behavior or the rate of hazard development, shall be explicitly identified.

20.4.2.2* The performance of building systems and features shall reflect the documented performance and reliability of the components of those systems or features, unless design specifications are incorporated to modify the expected performance.

20.4.3 Occupant Characteristics and Assumptions.

20.4.3.1* General. The selection of occupant characteristics to be used in the design calculations shall be approved by the AHJ and shall provide an accurate reflection of the expected population of building users.

20.4.3.2 Occupant Profile. Occupant characteristics shall represent the normal occupant profile, unless design specifications are used to modify the expected occupant features.

20.4.3.3 Response Characteristics. The basic response characteristics of sensibility, reactivity, mobility, and susceptibility shall be considered.

20.4.3.3.1 Consideration for the characteristics listed in 20.4.3.3 shall include the expected distribution of characteristics of a population appropriate to the use of the building.

20.4.3.3.2 The source of data for the characteristics listed in 20.4.3.3 shall be documented.

20.4.3.4 Location. It shall be assumed that, in every normally occupied room or area, at least one occupant shall be located at the most remote point from the exits.

20.4.3.5 Number of Occupants.

20.4.3.5.1 The design shall be based on the maximum number of occupants that every occupied room or area is expected to contain.

20.4.3.5.2 Where success or failure of the design is contingent on a specified maximum number of occupants, operational controls shall be used to ensure that a greater number of occupants could not be expected to be present.

20.4.3.6* Staff Assistance.

20.4.3.6.1 In those occupancies where staff assistance is required to ensure the safety of other occupants, such trained assistance shall be provided.

20.4.3.6.2 The ability of trained employees to be included as part of the building safety system shall be identified and documented.

20.4.4 Emergency Response Personnel Characteristics and Assumptions.

20.4.4.1 Nongovernmental emergency response personnel shall not be relied upon in the performance design, unless they are under the continuous and direct control of the building owner or occupant.

20.4.4.2 Emergency response personnel of the governmental agency legally responsible for providing emergency responders to the local jurisdiction shall be permitted to be relied upon in the performance design when approved by the governmental agency.

20.4.4.3 Design characteristics and assumptions related to the availability, speed of response, effectiveness, roles, and other characteristics of emergency response personnel shall be specified, estimated, or characterized sufficiently for evaluation of the design.

20.5* Design Scenarios.

20.5.1 General.

20.5.1.1 The proposed design shall be considered to meet the goals and objectives if it achieves the performance criteria for each required design scenario.

20.5.1.2 The AHJ shall approve the parameters involved with design scenarios.

20.5.1.3 Design scenarios shall be evaluated for each required scenario using a method acceptable to the AHJ and appropriate for the conditions.

20.5.1.4 Each scenario shall be as challenging and realistic as any that could realistically occur in the building.

20.6 Evaluation of Proposed Designs.

20.6.1 General.

20.6.1.1 A proposed design's performance shall be assessed relative to each performance objective in Section 4.1 and each applicable scenario in Section 20.5, with the assessment conducted through the use of appropriate calculation methods.

20.6.1.2 The AHJ shall approve the choice of assessment methods.

20.6.2 Use. The design professional shall use the assessment methods to demonstrate that the proposed design will achieve the goals and objectives for each scenario, as measured by the performance criteria in light of the safety margins and uncertainty analysis, given the assumptions.

20.6.3 Input Data.

20.6.3.1 Data.

20.6.3.1.1 Input data for computer fire models shall be obtained in accordance with ASTM E1591, *Standard Guide for Obtaining Data for Fire Growth Models*.

20.6.3.1.2 Data for use in analytical models that are not computer-based fire models shall be obtained using appropriate measurement, recording, and storage techniques to ensure the applicability of the data to the analytical method being used.

20.6.3.2 Data Requirements. A complete listing of input data requirements for all models, engineering methods, and other calculation or verification methods required or proposed as part of the performance-based design shall be provided.

20.6.3.3 Uncertainty and Conservatism of Data. Uncertainty in input data shall be analyzed and, as determined appropriate by the AHJ, addressed through the use of conservative values.

20.6.4 Output Data. The assessment methods used shall accurately and appropriately produce the required output data from input data based on the design specifications, assumptions, and scenarios.

20.6.5 Validity. Evidence shall be provided confirming that the assessment methods are valid and appropriate for the proposed building, use, and conditions.

20.7 Safety Factors. Approved safety factors shall be included in the design methods and calculations to reflect uncertainty in the assumptions, data, and other factors associated with the performance-based design.

20.8 Documentation Requirements.

20.8.1* General.

20.8.1.1 All aspects of the design, including those described in 20.8.2 through 20.8.14, shall be documented.

20.8.1.2 The format and content of the documentation shall be acceptable to the AHJ.

20.8.2 Technical References and Resources.

20.8.2.1 The AHJ shall be provided with sufficient documentation to support the validity, accuracy, relevance, and precision of the proposed methods.

20.8.2.2 The engineering standards, calculation methods, and other forms of scientific information provided shall be appropriate for the particular application and methodologies used.

20.8.3 Building Design Specifications. All details of the proposed building design that affect the ability of the building to meet the stated goals and objectives shall be documented.

20.8.4 Performance Criteria. Performance criteria, with sources, shall be documented.

20.8.5 Occupant Characteristics. Assumptions about occupant characteristics shall be documented.

20.8.6 Design Scenarios. Descriptions of design hazard scenarios shall be documented.

20.8.7 Input Data. Input data to models and assessment methods, including sensitivity analysis, shall be documented.

20.8.8 Output Data. Output data from models and assessment methods, including sensitivity analysis, shall be documented.

20.8.9 Safety Factors. The safety factors utilized shall be documented.

20.8.10 Prescriptive Requirements. Retained prescriptive requirements shall be documented.

20.8.11* Modeling Feature.

20.8.11.1 Assumptions made by the model user and the description of the models and methods used, including known limitations, shall be documented.

20.8.11.2 Documentation shall be provided verifying that the assessment methods have been used validly and appropriately to address the design specifications, assumptions, and scenarios.

20.8.12 Evidence of Modeler Capability. The design team's relevant experience with the models, test methods, databases, and other assessment methods used in the performance-based design proposal shall be documented.

20.8.13 Performance Evaluation. The performance evaluation summary shall be documented.

20.8.14 Use of Performance-Based Design Option. Design proposals shall include documentation that provides anyone involved in ownership or management of the building with notification of the following:

(1) The building was approved as a performance-based design with certain specified design criteria and assumptions.
(2) Any remodeling, modification, renovation, change in use, or change in the established assumptions is to be reevaluated and reapproved.

Annex A Explanatory Material

Annex A is not a part of the requirements of this NFPA document but is included for informational purposes only. This annex contains explanatory material, numbered to correspond with the applicable text paragraphs.

A.1.1.1 The requirements of NFPA 150 are firmly rooted in the following fundamental principles:

(1) Animals are sentient beings. As such, their protection has a humane component to it that does not exist in the protection requirements for inanimate storage or commodities.
(2) Animals, both domesticated and feral, lack the ability of self-preservation when housed in buildings and other structures.
(3) Current building, fire, and life safety codes do not address the life safety of the animal occupants. The requirements found in NFPA 150 are written with the intention that animal housing facilities will continue to be designed, constructed, and maintained in accordance with the applicable building, fire, and life safety codes. The requirements herein are not intended to replace or rewrite the basic requirements for the human occupants. Instead, NFPA 150 provides additional minimum requirements for the protection of the animal occupants and the human occupants who interact with those animals in these facilities. NFPA 150 is divided into three major sections. The first section, Chapters 1 through 3, contains only administrative requirements, while the second section, Chapters 4 through 10, provides general requirements for all facilities housing animals (i.e., facility subclassification, animal category, construction, means of egress, fire protection, and interior finish requirements). The third section, Chapters 11 through 18, includes specific requirements focused on the class of the facility.

A.1.1.2 NFPA 150 is referenced in Chapter 11 of NFPA *101*.

A.1.3.1 While it would be appropriate for NFPA 150 to clearly establish a minimum number of animals above which the requirements of NFPA 150 apply, the necessary technical information to make these decisions is not available at this time. Instead, 1.3.1 states that facilities requiring a permit or license from the local, state, or federal authorities to function must comply with this *Code*. With this approach, adopting jurisdictions can further modify this *Code* to fit its local requirements.

N **A.1.3.1(4)** Animal shelters and adoption centers should include intake facilities, animal control, animal sanctuaries, long-term animal rehabilitation facilities, animal transportation, and transportation holding facilities.

N **A.1.3.1(6)** General board and care facilities should include day care, training, breeding, and grooming.

A.1.3.3 An extensive modification includes modification of an entire building or an entire occupancy within a building and should be considered reconstruction. Modification work that is exclusively electrical, mechanical, or structural, or that exclusively involves plumbing or equipment used in the care or treatment of animals or the fire protection system should not be considered a reconstruction, regardless of its extent. See Chapter 43 of NFPA *101* for the specific rehabilitation requirements and thresholds.

A.1.3.4 In this particular situation, the definition of temporary is left to the applicable building, life safety, and fire codes enforced in the jurisdiction.

Δ **A.3.2.1 Approved.** The National Fire Protection Association does not approve, inspect, or certify any installations, procedures, equipment, or materials nor does it approve or evaluate testing laboratories. In determining the acceptability of installations or procedures, equipment, or materials, the "authority having jurisdiction" may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure, or use. The "authority having jurisdiction" may also refer to the listings or labeling practices of an organization that is concerned with product evaluations and is thus in a position to determine compliance with appropriate standards for the current production of listed items.

A.3.2.2 Authority Having Jurisdiction (AHJ). The phrase "authority having jurisdiction," or its acronym AHJ, is used in NFPA standards in a broad manner because jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local, or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designated agent assumes the role of the authority having jurisdiction; at government installations, the commanding officer or departmental official may be the authority having jurisdiction.

A.3.2.3 Code. The decision to designate a standard as a "code" is based on such factors as the size and scope of the NFPA standard, its intended use and form of adoption, and

whether it contains substantial enforcement and administrative provisions.

A.3.2.5 Listed. The means for identifying listed equipment may vary for each organization concerned with product evaluation; some organizations do not recognize equipment as listed unless it is also labeled. The authority having jurisdiction should utilize the system employed by the listing organization to identify a listed product.

A.3.3.2.2 Confined Animals. This includes animals in pens near or adjacent to a structure where they would be endangered by smoke, heat, fire spread, or structural failure.

A.3.3.3 Animal Handler. This includes but is not limited to attendants, exhibitors, hands, keepers, groomers, technicians, trainers, veterinarians, wranglers, or their assistants.

A.3.3.4 Animal Housing Facility. This includes but is not limited to barns, kennels, coops, stables, sheds, pens, corrals, runs, vivaria, terraria, laboratories, zoos, including accessory areas and incidental use areas. Adjacent exterior spaces include areas near or adjacent to a structure where confined animals would be endangered by smoke, heat, fire spread, or structural failure.

N **A.3.3.5.1 Category 1 — Animal Health Care.** Examples of Category 1 animal housing facilities include veterinary hospitals, veterinary clinics, portions of zoos and animal shelters that include clinics and veterinary services.

N **A.3.3.5.9 Category 5 — Exhibition/Public Viewing.** Examples of Category 5 animal housing facilities include circuses, traveling animal exhibits, associated animal transportation, and public portions of zoos.

N **A.3.3.5.12 Category 6 — General Board and Care.** Examples include animal shelters and adoption centers, companion animal intake and animal control facilities, animal kennels and boarding facilities, breeding facilities, animal day care and training facilities, companion animal grooming facilities, animal sanctuaries and rehabilitation facilities, animal transportation holding facilities, and associated animal transportation.

A.3.3.20 Protection. For the purposes of this *Code*, *protection* takes various distinct forms. The specific provision of the *Code* will address what the *Code* intends as an acceptable minimum device, material, or system. With regard to structural fire protection, *protection* or *protected* usually means an assembly of materials that has achieved a specified level of fire resistance. For fire suppression systems, *protected* usually means being provided with an approved automatic sprinkler system or similar automatic fire suppression system. The type of *protection* desired must be clearly understood within the context of the item under consideration.

A.4.1 The overall goals of this *Code* are presented in 4.1.1. These overall goals are treated in greater depth in 4.1.3 and 4.1.4. In each of these subsections, an overall goal for the subsection is defined, specific goals relating to the overall goal are presented, and the objectives that relate to the specific goal follow. This format is intended to enhance the usability of the *Code*.

A.4.1.1 These highest level goals are intentionally general in nature. Each includes a broad spectrum of topics as shown in 4.1.3 and 4.1.4. Property protection is not included as a highest level goal as it is contained in most of the other goals. Safety is intended to indicate a need for protection against immediate or short-duration hazards, such as a fire or similar emergency.

A.4.1.2 The objectives are stated in more specific terms and define how the goal is to be achieved. Objectives are quantitative. Goals are qualitative.

A.4.1.3.1.1 The phrase "reasonably safe from fire" is defined by subsequent language in this *Code*, primarily in the objectives.

A.4.1.3.1.2.2 In many cases, the other provisions of the *Code* that provide safety for occupants will satisfy this goal for protection of emergency responders.

A.4.1.3.2.1 Certain requirements are provided to ensure that the occupants are safe during nonemergency use of the buildings. Failure to address these features could result in injuries to occupants in their normal daily activities in the building.

A.4.1.3.2.2.3 Appropriate consideration should be given to the type of audible device selected. Certain signals can cause a stress response in some animals (e.g., a bell would be inappropriate as a fire alarm in a racetrack stable).

A.4.1.4.1.1 The long-term function of a building, in total, is not within the scope of this goal. This goal relates, however, to the long-term, continued operation and effectiveness of the building to satisfy the goals of safety and usability.

A.4.1.4.1.2 This objective is intended to apply to systems, features, and construction that are provided in the building for the purpose of meeting the other objectives and is not intended to apply to nonrequired systems, features, and construction.

A.4.2.4 Fire alarm systems and devices alert occupants to initiate emergency procedures, facilitate orderly conduct of fire drills, and initiate response by emergency services.

A.4.3.1.3 This *Code* is not intended to address every conceivable arrangement of construction or use of animal housing facilities. These structures are unique in that the life safety of two important, but dramatically different, forms of life are addressed — humans and animals. These structures often involve the interaction of animals and people that are unfamiliar with one another's reaction to fire or other emergency conditions. For instance, for mobility impaired or other disabled individuals, the ability of the humans to egress can be impaired, hindered, or jeopardized by the movement of the animals. These facilities can also be located within or close to a process or other occupancy that elevates the risk to animals, but perhaps not to humans, beyond that contemplated by the *Code*. These facilities can be housed in a historic building. If these or other special circumstances clearly exist, the AHJ can require alternative or additional fire protection features. These can include, but are not limited to, a performance-based analysis of the special condition, building fire evacuation plans, management policies on staff response to emergencies, a higher staff-to-client ratio, increased fire resistance ratings, or modification of fire suppression or fire alarm requirements.

A.4.3.4.1 Disaster/emergency management programs should include the following items based on the type of occupancy and hazards involved:

(1) Procedures for reporting of emergencies requiring relocation and/or evacuation of occupants
(2) Occupants or staff member duties during emergencies

(3) Floor plans identifying the locations of portable fire extinguishers, other manual fire-extinguishing equipment, other automatic or manual fire suppression systems, first aid equipment, hazardous material spill equipment, and equipment designated as necessary for the evacuation of animals
(4) Manual fire alarm pull stations and fire alarm control panel locations
(5) Floor plans identifying the primary and secondary routes of evacuation for each room or portion of the occupancy
(6) Floor plans indicating the locations of interior areas of refuge and animal occupied areas
(7) Site maps identifying the designated exterior assembly area for each evacuation route
(8) Assessments of both building systems and management features
(9) Use of alarms
(10) Transmission of alarm to fire department
(11) Response to alarms
(12) Procedures for isolation and/or extinguishment of fire
(13) Properties and location of hazardous storage or operations
(14) Special procedures for staff members who perform or shut down critical plant operations and/or attend to animals
(15) A system to account for animal and human occupants and staff members after evacuation
(16) Designation of an emergency response coordinator and a back-up coordinator
(17) An alternate means of communications other than the fire alarm
(18) Emergency contact information
(19) Special procedures for animal handlers to address such items as animal bites and animal escapes

A.4.3.4.2.1 The disaster/emergency management plan should include considerations for conducting a comprehensive hazards analysis and risk assessment prior to facility construction/renovation to identify and then take action to mitigate the hazards that are operable on the site. Examples of hazards include flood zones, wildfire exposures, WUI interfaces, high wind events, hurricanes, tornadoes, power loss, barn fires, manure sludge hazards, snow loading, and so forth.

The plan should consider the following:

(1) Maintaining ventilation for animals during and after a disaster
(2) Maintaining a program for feed and fresh, clean water for animals during and after a disaster
(3) Ensuring secondary sources of power
(4) Moving animals from flood prone areas (including basements) or other exposed areas to the safety of dry land
(5) Maintaining waste lagoons to avoid overflowing or breaching
(6) Implementing provisions for protection against mosquito infestation
(7) Following provisions for the administration of first aid and periodic inspection for illnesses
(8) Maintaining a program for debris/trash removal
(9) Provisioning for proper disposal of carcasses
(10) Provisioning for the care of orphaned young
(11) Planning in the face of catastrophic disaster where it is not possible to provide appropriate shelter, care, and provisioning for confined animals

Employees should have awareness of the specific types of evacuations that the facility might be subject to where confined animals would be endangered by smoke, heat, fire spread, structural failure, rising water levels from floods, debris, or electrical hazards.

Training in Animal Technical Rescue reflected in NFPA 2500 and NFPA 1006 is available for first responders.

A.4.3.5 The purpose of disaster/emergency drills is to educate the participants in the fire safety features of the building, the egress facilities available, safe handling of the animal occupants, and the procedures to be followed. Speed in evacuating buildings or relocating occupants, while desirable, is not the only objective. Prior to an evaluation of the performance of a disaster/emergency drill, an opportunity for instruction and practice should be provided. This educational opportunity should be presented in a nonthreatening manner with consideration to the prior knowledge, age, and ability of the audience.

A.4.3.5.2.2 If a disaster/emergency drill is considered merely as a routine exercise from which some persons are allowed to be excused, there is a grave danger that, in an actual emergency, the evacuation and relocation will not be successful. However, there could be circumstances under which all occupants do not participate in a disaster/emergency drill.

N **A.5.1** Chapter 5 is intended to provide medical gas guidance for facilities providing animal housing and care including, but not limited to, veterinary clinics, laboratories, shelters, etc. This chapter is intended to be used in lieu of NFPA 99, which is only applicable to human health care occupants. NFPA 99 excludes veterinary care except for hyperbaric chambers. This exclusion creates a lack of guidance for medical gas use in veterinary settings. Chapter 5 of this *Code* addresses that void.

N **A.5.1.3** Veterinary systems typically utilize cart-mounted isofluorane anesthesia and have only a limited number of gas services. These requirements do not restrict the distribution of other inert gases through piping systems.

N **A.5.2.2** The bulk supply system should be installed on a site that has been prepared to meet the requirements of NFPA 55 or CGA G-8.1, *Standard for Nitrous Oxide Systems at Customer Sites*. A storage unit(s), a reserve, pressure regulation, and a signal actuating switch(es) are components of the supply system. Shutoff valves, piping from the site, and electric wiring from a signal switch(es) to the master signal panels are components of the piping system.

The bulk supply system is normally installed on the site by the owner of this equipment. The owner or the organization responsible for the operation and maintenance of the bulk supply system is responsible for ensuring that all components of the supply system — main supply, reserve supply, supply system signal-actuating switch(es), and delivery pressure regulation equipment — function properly before the system is put in service.

In the locating of central supply systems, consideration should be given to ensuring the resilience of the facility under reasonably anticipated adverse conditions. Examples have included the following:

(1) Flooding of systems located in basements from extraordinary weather, water main breaks, and sprinkler head failures

(2) Seismic events that rendered the supply system inoperative
(3) Degradation of the quality of air at the intake due to a nearby fire and chemical release
(4) Electrical problems, including failure of motor control centers and failure of switchgear to properly connect

Many of these risks can be ameliorated by care when siting the central supply systems and their utility connections.

N **A.5.2.2.2** Electric wiring and equipment are not required to be explosion proof.

N **A.5.2.3.3** Components include, but are not limited to, containers, valves, valve seats, lubricants, fittings, gaskets, and interconnecting equipment, including hose. Easily ignitible materials should be avoided.

Compatibility involves both combustibility and ease of ignition. Materials that burn in air will burn violently in pure oxygen at normal pressure and explosively in pressurized oxygen. Also, many materials that do not burn in air will do so in pure oxygen, particularly under pressure. Metals for containers and piping have to be carefully selected, depending on service conditions. The various steels are acceptable for many applications, but some service conditions can call for other materials (usually copper or its alloys) because of their greater resistance to ignition and lower rate of combustion.

Similarly, materials that can be ignited in air have lower ignition energies in oxygen. Many such materials can be ignited by friction at a valve seat or stem packing or by adiabatic compression produced when oxygen at high pressure is rapidly introduced into a system initially at low pressure.

N **A.5.4** Station outlets and inlets should be located at an appropriate height above the floor to prevent physical damage to equipment attached to the outlet. The minimum number of outlets and inlets for each system should be based on the applicable FGI guidelines.

N **A.5.6.1.4** Operation of piped medical gas systems at gauge pressures in excess of 185 psi (1275 kPA) involves certain restrictions because of the limitations in materials.

N **A.5.7** It is recommended that the facility's normal operating pressure of nitrous oxide be initially set and continually maintained at least 5 psig (34.5 kPag) below the normal operating pressures of the oxygen and medical air.

N **A.5.8** All testing should be completed before putting a new piping system, or an addition to an existing system, into service. Test procedures and the results of all tests should be made part of the permanent records of the facility of which the piping system forms a part. They should show the room and area designations, dates of the tests, and names(s) of the person(s) conducting the tests.

N **A.5.8.2.6.1** Examples of other distribution system components include pressure alarm devices, pressure indicators, line pressure relief valves, manufactured assemblies, and hose.

N **A.5.8.2.6.5** See A.5.8.2.7.5.

N **A.5.8.2.7.5** The effect of temperature changes on the vacuum of a confined gas is based on the Ideal Gas Law. The final absolute vacuum (V2a) equals the initial absolute vacuum (V1a) times the final absolute temperature (T2a), divided by the initial absolute temperature (T1a).

Absolute vacuum is the absolute zero pressure 101 kPa (30 inHg) less the vacuum reading below atmospheric. See Table A.5.8.2.7.5 for the absolute atmospheric pressures for elevations at and above sea level.

Absolute temperature K (°R) is the temperature gauge reading °C (°F) plus the absolute zero temperature 273°C (460°F).

Examples of vacuum test data at sea level in SI and IP units follow.

The initial test vacuum is 54 kPa or 16 inHg at 18°C (65°F). A temperature increase to 27°C (80°F) will cause the test vacuum to decrease to 52.5 kPa (15.6 inHg).

For SI units:

V1g = 54 kPa, T1g = 18°C, T2g = 27°C

V1a = 101 – 54 = +47 kPaV

T1a = 18 + 273 = 291K

T2a = 27 + 273 = 300K

V2a = 47 x 300/291 = 52.5 kPa

V2g = 101 – 48.5 = 52.5 kPa

For IP units:

V1g = 16 inHg, T1g = 65°F, T2g = 80°F

V1a = 30 – 16 = +14 inHgV

T1a = 65 + 460 = 525°R

T2a = 80 + 460 = 540°R

V2a = 14 x 540/525 – +14.4 inHgV

V2g = 30 – 14.4 = 15.6 inHg

N **A.5.9** All cylinders containing compressed gases, such as anesthetic gases, oxygen, or other gases used for medicinal purposes, whether these gases are flammable or not, should comply with the specifications and be maintained in accordance with regulations of the US Department of Transportation.

Cylinder and container temperatures greater than 125°F (52°C) can result in excessive pressure increase. Pressure relief devices are sensitive to temperature and pressure. When relief devices actuate, contents are discharged.

N **Table A.5.8.2.7.5 Pressure Corrections for Elevation**

Elevation	Absolute Atmospheric Pressure			
(ft)	kPa	psia	mmHg	inHg
0	101.33	14.7	760	29.92
500	99.49	14.43	746.3	29.38
1000	97.63	14.16	733	28.86
1500	95.91	13.91	719.6	28.33
2000	94.19	13.66	706.6	27.82
2500	92.46	13.41	693.9	27.32
3000	90.81	13.17	681.2	26.82
3500	89.15	12.93	668.8	26.33
4000	87.49	12.69	656.3	25.84
4500	85.91	12.46	644.4	25.37
5000	84.33	12.23	632.5	24.9

[**99:**Table A.5.1.12.2.6.5]

N **A.5.9.1.1** Piping systems for the distribution of flammable gases (e.g., hydrogen, acetylene, natural gas) are outside the scope of this chapter.

N **A.5.9.1.3** Vacuum systems from station inlets to the exhaust discharge should be considered contaminated unless proven otherwise. Methods exist to disinfect the system or portions thereof.

Clogging of regulators, for example, with lint, debris, or dried body fluids, reduces vacuum system performance.

N **A.5.9.1.4** Other examples of prohibited use of medical surgical vacuum would be scope cleaning, decontamination, and laser plume.

N **A.5.9.2.1** The facility should retain a written or an electronic copy of all findings and any corrections performed.

A.6.1.1 The user should reference *NFPA 5000*, NFPA *101*, Chapter 11, or the locally adopted building code to obtain the general human occupancy classification of an animal housing facility whether it is storage, business, assembly, or other occupancy. If there are multiple occupancies within the facility, they should be in accordance with the mixed or separated occupancy requirements in Chapter 6 of *NFPA 5000* or Chapter 6 of NFPA *101*. NFPA 150 and its subclassification, defined in Section 6.2, are intended to apply only to those portions of the facility housing animals.

N **A.6.2.1.1** See A.3.3.5.1.

A.6.2.1.2 Examples include animal hospitals (e.g., surgery, post-op housing) and inpatient veterinary hospital sites.

A.6.2.1.3 Examples include grooming, training, and outpatient veterinary wellness clinics.

A.6.2.2.1 Examples include stables, and facilities for horse racing and horse breeding. Facilities where horses are brought temporarily, like veterinary clinics, are not included in this category.

A.6.2.2.2 Category 2 Class A facilities are typically larger than 5,000 ft^2 (465 m^2).

A.6.2.2.3 Category 2 Class B facilities are typically less than 5,000 ft^2 (465 m^2).

A.6.2.2.4 Examples include stables for less than five horses owned by the same owner.

A.6.2.3.1 Examples include laboratories, schools, and universities. The intent of the research category is to provide protection for animals with contagious diseases or high value due to research projects.

N **A.6.2.5.1** See A.3.3.5.9.

A.6.2.5.2 Examples include zoos, petting zoos, nature centers, aquariums, amusement parks, and wildlife sanctuaries.

A.6.2.5.3 Examples include circuses and carnivals.

A.6.2.6.1 Examples include facilities used for boarding, training, therapy, service animals, or law enforcement animals. This category excludes horse facilities, which are covered under Category 2. See also A.3.3.5.12.

A.6.2.6.2 Examples include facilities where animals are unattended indoors, such as boarding facilities, without staff supervision.

A.6.2.6.3 Examples include facilities that are staffed 24/7.

A.6.2.7.2 Examples include production swine farrowing and nurseries, poultry housing, milking facilities, and dairy loafing sheds.

A.6.2.7.3 Examples include small backyard chicken coups and small fenced-in pens for private dairy animals. The required zoning or permitting would be classified as residential or private.

A.6.2.7.4 Examples include pastures, feed lots, and hutches.

A.6.2.8.1 Examples include emergency/disaster relief centers. Buildings that are not designed as an emergency/disaster relief center that will be used for emergency animal housing facilities should be existing buildings that are approved for assembly and educational occupancies; or other occupancies provided with automatic sprinkler protection and fire alarm system, adequate means of egress, lighting, and ventilation.

A.6.3.1 See Figure A.6.3.1(a) and Figure A.6.3.1(b) for illustrations of the multiple subclassifications.

A.6.3.3.3 A small storage room, gift shop, or minor office space might be considered incidental use. Assembly occupancies or spaces used for overnight sleeping (humans) are never considered incidental.

A.7.1 Table A.7.1 is a reprint of Table 7.2.1.1 from *NFPA 5000*.

A.7.2.2 Descriptions of the construction types found in Table 7.2.2 can be found in NFPA 220 and *NFPA 5000*.

A.7.3.2 Animals should be able to lie down with their limbs extended in a normal manner without obstruction from enclosure sides or having to extend their feet through feed doors or bars.

A.7.3.3 An example of a temporary holding area, as used in 7.3.3, might be less than 12 hours.

A.7.5.2 Table A.7.5.2 lists the recommended animal enclosure horizontal design forces for a sampling of animals.

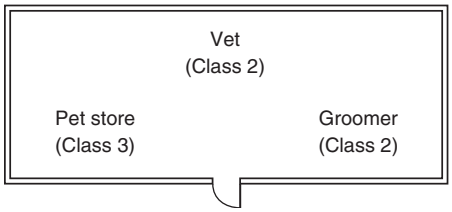

FIGURE A.6.3.1(a) Multiple Mixed Subclass.

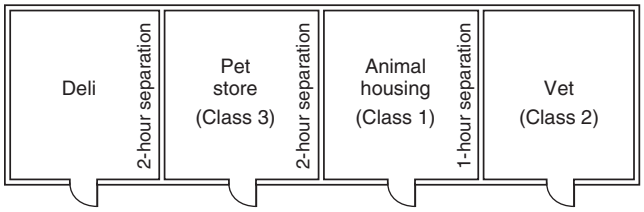

FIGURE A.6.3.1(b) Multiple Separated Subclass.

Table A.7.1 Fire Resistance Ratings for Type I Through Type V Construction (hr)

	Type I		Type II			Type III		Type IV	Type V	
Construction Element	**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 text for requirements).*
[a]See *NFPA 5000*, 7.3.2.1.
[b]See *NFPA 5000*, Section 7.3.
[c]See *NFPA 5000*, 7.2.3.2.12, 7.2.4.2.3, and 7.2.5.6.8.
[**5000:** Table 7.2.1.1]

Table A.7.5.2 Animal Enclosure Design Forces

	Horizontal Force		Height Above Grade of Load Application	
Animal	**lb**	**N**	**ft**	**m**
Bull elephant	10,000	44,480	7	2.13
Female elephant	8,000	35,584	7	2.13
Hippopotamus	4,000	17,792	4	1.22
Rhinoceros	4,000	17,792	4	1.22
Lion	500	2,224	5	1.53
Cheetah	100	445	4	1.22
Giraffe	1,600	7,117	8	2.46
All other animals	500	2,224	4	1.22

Source: EPCOT Building Code, 1998.

A.8.2.1.1(2) The width of the animal should be the widest part of the animal, including horns, antlers, and other appendages. Average widths are summarized by the American Zoo and Aquarium Association's *Minimum Husbandry Guidelines for Mammals.* Additional guidelines can be found in the Institute for Laboratory Animal Research's *Guide for the Care and Use of Laboratory Animals.*

A.8.7 Exit distances are more stringent than those specified in NFPA *101* because of the difficulty of evacuating panicked animals from the facility in an emergency situation.

A.9.3.1.7 Fire alarm systems operating in private mode could be provided to accommodate the needs of animals with the approval of the AHJ. Only the attendants and other personnel required to evacuate the occupants from a zone, area, floor, or building should be notified. Visible only signals can be used where animals might be sensitive to noise. Consideration should be given to animal reactions and undue stress caused by audible sounds or flashing strobes. For example, in zoos, an acknowledge station where the keeper can disengage the notification appliances only in the animal areas could be incorporated into the design where acceptable to the AHJ. After the notification appliances are deactivated, another means, such as a red beacon, could be used as an alternative notification method. Other means acceptable to the AHJ might be more suitable for other animal housing occupancies.

A.9.10.5 Placing a fire extinguisher within an animal enclosure might create a hazard to the animal occupants, create a hazard to the human trying to reach the extinguisher, or might damage the extinguisher. For example, during a fire event, it is a hazard for humans to enter a dog enclosure to retrieve an extinguisher.