

**REVISION RECORD
FOR THE STATE OF CALIFORNIA
ERRATA**

January 1, 2011

2010 Title 24, Part 4, California Mechanical Code

PLEASE NOTE: The date of this supplement is for identification purposes only. See the History Note Appendix.

It is suggested that the section number, as well as the page number be checked when inserting this material and removing the superseded material. In case of doubt, rely on the section numbers rather than the page numbers because the section numbers must run consecutively.

It is further suggested that the superseded material be retained with this revision record sheet so that the prior wording of any section can be easily ascertained. Please keep the removed pages with this revision page for future reference.

NOTE

Due to the fact that the application date for a building permit establishes the California Building Standards Code provisions that are effective at the local level, which apply to the plans, specifications, and construction for that permit, it is strongly recommended that the removed pages be retained for historical reference.

Part 4

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California Code of Regulations, Title 24

California Agency Information Contact List

California Energy Commission

Energy Hotline(800) 772-3300
or (916) 654-5106
Building Efficiency Standards
Appliance Efficiency Standards
Compliance Manual/Forms

California State Lands Commission

Marine Oil Terminals(562) 499-6317

California State Library

Resources and Information(916) 654-0261
Government Publication Section.....(916) 654-0069

Corrections Standards Authority

Local Adult Jail Standards.....(916) 324-1914
Local Juvenile Facility Standards(916) 324-1914

Department of Consumer Affairs – Acupuncture Board

Office Standards.....(916) 445-3021

Department of Consumer Affairs – Board of Pharmacy

Pharmacy Standards(916) 574-7900

Department of Consumer Affairs – Bureau of Barbering And Cosmetology

Barber and Beauty Shop and
College Standards.....(916) 574-7570
(800) 952-5210

Department of Consumer Affairs – Bureau of Home Furnishings and Thermal Insulation

Insulation Testing Standards.....(916) 574-2041

Department of Consumer Affairs – Structural Pest Control Board

Structural Standards.....(800) 737-8188
(916) 561-8708

Department of Consumer Affairs – Veterinary Medical Board

Veterinary Hospital Standards.....(916) 263-2610

Department of Food and Agriculture

Meat & Poultry Packing Plant
Standards(916) 654-1447
Dairy Standards(916) 654-1447

Department of Public Health

Organized Camps Standards(916) 449-5661
Public Swimming Pools Standards(916) 449-5693
Asbestos Standards(510) 620-2874

Department of Housing and Community Development

Residential – Hotels, Motels, Apartments,
Single-Family Dwellings(916) 445-9471
Permanent Structures in Mobilehome
and Special Occupancy Parks(916) 445-9471
Factory-Built Housing, Manufactured
Housing and Commercial Modular(916) 445-3338
Mobile Homes – Permits & Inspections
Northern Region(916) 255-2501
Southern Region(951) 782-4420
Employee Housing Standards(916) 445-9471

Department of Water Resources

Gray Water Installations Standards(916) 651-9667

Division of the State Architect – Access Compliance

Access Compliance Standards(916) 445-8100

Division of the State Architect – Structural Safety

Public Schools Standards.....(916) 445-8100
Essential Services Building Standards.....(916) 445-8100
Community College Standards(916) 445-8100

Division of the State Architect - State Historical Building Safety Board

Alternative Building Standards(916) 445-8100

Office of Statewide Health Planning and Development

Hospital Standards(916) 440-8356
Skilled Nursing Facility Standards(916) 440-8356
Clinic Standards.....(916) 440-8356
Permits(916) 440-8356

Office of The State Fire Marshal

Code Development and Analysis.....(916) 445-8200
Fire Safety Standards.....(916) 445-8200
Fireplace Standards(916) 445-8200
Day Care Centers Standards(916) 445-8200
Exit Standards(916) 445-8200

Revised: February 24, 2010

UMC FOREWORD

Not Adopted by The State of California

The *Uniform Mechanical Code*® (UMC®) provides complete requirements for the installation and maintenance of heating, ventilating, cooling, and refrigeration systems, while at the same time allowing latitude for innovation and new technologies.

This code was first published in 1967. With the publication of the 2003 edition of the *Uniform Mechanical Code*®, another significant milestone was reached. For the first time in the history of the United States, a mechanical code was developed through a true consensus process. The 2009 edition represents the most current approaches in the mechanical field and is the second edition developed under the ANSI Consensus process. Contributions to the content of this code were made by every segment of the built industry, including such diverse interests as consumers, enforcing authorities, installers/maintainers, insurance, labor, manufacturers, research/standards/testing laboratories, special experts, and users.

The public at large is encouraged and invited to participate in IAPMO's open consensus code development process. This code is updated every three years. A code development timeline and other relevant information is available at IAPMO's website at www.iapmo.org.

The *Uniform Mechanical Code*® is dedicated to all those who, in working to achieve "the ultimate mechanical code," have unselfishly devoted their time, effort, and personal funds to create and maintain this, the finest mechanical code in existence today.

The 2009 *Uniform Mechanical Code*® is supported by the American Society of Sanitary Engineering (ASSE), Mechanical Contractors Association of America (MCAA), Plumbing-Heating-Cooling Contractors National Association (PHCC-NA), the United Association (UA), and the World Plumbing Council (WPC). The presence of these logos, while reflecting support, does not imply any ownership of the copyright to the UMC which is held exclusively by IAPMO. Further, the logos of these associations indicates the support of IAPMO's open, consensus process being used to develop IAPMO's codes and standards.

The addresses of the organizations are as follows:

ASSE – 901 Canterbury Road, Suite A • Westlake, Ohio 44145-7201 • (440) 835-3040

MCAA – 1385 Piccard Drive • Rockville, Maryland 20850 • (301) 869-5800

PHCC-NA – PO Box 6808 • Falls Church, Virginia 22046 • (800) 533-7694

UA – 901 Massachusetts Avenue NW • Washington, DC 20001 • (202) 628-5823

WPC – WPC Secretary • c/o Mechanical Contractors Association of Alberta

#204 2725-12 St. NE Calgary • Alberta T2E 7J2 Canada • +1-40-325-072-37

P.O. Box 2005 • Marmion, Western Australia 6020 • +61-8-9448-0430

Code changes made to the original amalgamated code are marked in the margins as follows.

← An arrow denotes a deletion | A vertical line denotes a change

HOW TO DISTINGUISH MODEL CODE LANGUAGE FROM CALIFORNIA AMENDMENTS

To distinguish between model code language and incorporated California amendments, including exclusive California standards, California amendments will appear in italics. Symbols indicate the status of code changes as follows:

- [SFM]** This symbol following a section leader identifies which state agency(s) have amended a section of model code. For a complete listing of state agencies, refer to the Application Sections within Chapter 1, Division I.
- | This symbol indicates that a change has been made to IAPMO model language.
- || This symbol indicates that a change has been made to a California amendment.
- > This symbol indicates deletion of California language.
- This symbol indicates IAPMO deletion of IAPMO language.

To learn more about the use of this code refer to pages xxiv and xxv. Training materials on the application and use of this code are available at the website of the California Building Standards Commission <http://www.bsc.ca.gov/default.htm>



RELATED PUBLICATIONS AND SERVICES

The Documents Listed are Not by this Reference Adopted by The State of California.

IAPMO provides a variety of other products which are useful for inspectors, building officials, architects, engineers, manufacturers, contractors, plumbers, and apprentices.

IAPMO Headquarters Directory

5001 East Philadelphia Street, Ontario, California 91761-2816
Publication Order Desk Phone: 800-85-IAPMO
Publication Toll Free Fax: 877-85-CODES
E-mail: iapmo@iapmo.org
Website: www.iapmo.org
Free Code Question Answers & Analysis: 800-201-0335

Uniform Mechanical Code – 2009 Edition:

The Uniform Mechanical Code contains complete requirements for the installation and maintenance of heating, ventilating, cooking and refrigeration systems.

Uniform Mechanical Code Illustrated Training Manual:

Contains technical diagrams and illustrations that demonstrate the intent and use of the UMC. A great reference for everyone involved in Mechanical HVACR design and installation.

Uniform Mechanical Code Study Guide:

The Study Guide is a complete self-study course for learning the UMC. A big help in getting ready for a certification exam! This book is the perfect complement to the UMC Illustrated Training Manual.

Uniform Mechanical Code Answer & Analysis Manual:

This increasing popular manual is the result of ongoing work by IAPMO's Answers & Analysis Committee. It contains hundreds of questions and answers that encompass three editions of the UMC. Many of these questions arise in the daily administration of the code.

Cumulative Analysis of Uniform Mechanical Code Changes:

The UMC Cumulative Analysis is a very useful tool in targeting the latest changes between editions of the code. It is an excellent guide for anyone proposing a UMC change.

Uniform Plumbing Code – 2009 Edition:

The Uniform Plumbing Code is the most widely adopted plumbing code in the world. The 2009 edition contains complete "turnkey" requirements for the installation and maintenance of plumbing systems, all in one easy to use book.

Uniform Plumbing Code Illustrated Training Manual:

The UPC Illustrated Training Manual is an excellent reference for anyone involved in the plumbing industry. It contains an extensive definitions section and several hundred comprehensive technical diagrams and illustrations. It serves as a textbook, and it also is useful as a valuable tool for explaining the intent and use of the Code.

Uniform Plumbing Code Study Guide:

This book is the perfect complement to the UPC Illustrated Training Manual. Alone, it constitutes a complete self-study course for learning the UPC. It has hundreds of questions, general practice exams, and plumbing math, pipe sizing exercises and fitting identification. A big help in getting you ready for a certification exam!

CALIFORNIA MATRIX ADOPTION TABLES

Format of the Matrix Adoption Tables

The matrix adoption tables, which follow, show the user which state agencies have adopted and/or amended given sections of model code for applications within their respective authorities. See Chapter 1, Division I, Sections 1.2.0 through 1.14.0, for building application and enforcement responsibilities.

The side headings identify the scope of the state agencies’ adoption as follows:

Adopt the entire chapter without state amendments

If there is an “X” under a particular state agency’s acronym in this row, it means that particular state agency has adopted the entire model code chapter without any state amendments.

Example:

CHAPTER 1 - GENERAL CODE PROVISIONS

Adopting Agency	BSC	SFM	HCD			DSA			OSHDP				CA	DPH
			1	2	1/AC	AC	SS	SS/CC	1	2	3	4		
Adopt Entire Chapter	X													
Adopt Entire Chapter as amended (amended sections listed below)														
Adopt only those sections that are listed below														
Article/Section														

SAMPLE

Adopt the entire chapter as amended (amendments listed below)

If there is an “X” under a particular state agency’s acronym in this row, it means that a particular state agency has adopted the entire model code chapter, with state amendments.

Each state-amended section that the agency has added to that particular chapter is listed. There will be an “X” in the column, by that particular section, under the agency’s acronym, as well as an “X” by each section that the agency has adopted.

Example:

CHAPTER 1 - GENERAL CODE PROVISIONS

Adopting Agency	BSC	SFM	HCD			DSA			OSHDP				CA	DPH
			1	2	1/AC	AC	SS	SS/CC	1	2	3	4		
Adopt Entire Chapter	X													
Adopt Entire Chapter as amended (amended sections listed below)														
Adopt only those sections that are listed below														
Article/Section														
101	X													
102	X													

SAMPLE

Adopt only those sections which are listed below:

If there is an “X” under a particular state agency’s acronym in this row, it means that particular state agency is adoption only specific model code or state-amended sections within this chapter. There will be an “X” in the column under the agency’s acronym, as well as an “X” by each section that the agency has adopted.

Example:

CHAPTER 1 - GENERAL CODE PROVISIONS

Adopting Agency	BSC	SFM	HCD			DSA			OSHPD				CA	DPH
			1	2	1/AC	AC	SS	SS/CC	1	2	3	4		
Adopt Entire Chapter	X													
Adopt Entire Chapter as amended (amended sections listed below)														
Adopt only those sections that are listed below														
Article/Section														
101	X													
102	X													

Legend of Abbreviations of Adopting State Agencies

- BSC California Building Standards Commission (see Section 1.2)
- SFM Office of the State Fire Marshal (see Section 1.11)
- HCD 1 Department of Housing and Community Development (see Section 1.8.2.1.1)
- HCD 2 Department of Housing and Community Development (see Section 1.8.2.1.3)
- HCD 1/AC Department of Housing and Community Development (see Section 1.8.2.1.2)
- DSA-AC Division of the State Architect-Access Compliance (see Section 1.9.1)
- DSA-SS Division of the State Architect-Structural Safety (see Section 1.9.2)
- DSA-SS/CC Division of the State Architect-Structural Safety/Community Colleges (see Section 1.9.2.2)
- OSHPD 1 Office of Statewide Health Planning and Development (see Section 1.10.1)
- OSHPD 2 Office of Statewide Health Planning and Development (see Section 1.10.2)
- OSHPD 3 Office of Statewide Health Planning and Development (see Section 1.10.3)
- OSHPD 4 Office of Statewide Health Planning and Development (see Section 1.10.4)
- CSA Corrections Standards Authority (see Section 1.3)
- DPH Department of Public Health (see Section 1.7)
- AGR Department of Food and Agriculture (see Section 1.6)
- CEC California Energy Commission (see Section 100 in Part 2, the California Energy Code)
- CA Department of Consumer Affairs (see Section 1.4):
 - Board of Barbering and Cosmetology
 - Board of Examiners in Veterinary Medicine
 - Board of Pharmacy
 - Acupuncture Board
 - Bureau of Home Furnishings
 - Structural Pest Control Board
- SL State Library (see Section 1.12)
- SLC State Lands Commission (see Section 1.14)
- DWR Department of Water Resources (see Section 1.12 of Chapter 1 of the California Plumbing Code in Part 2 of Title 24)

The state agencies are available to answer questions about their adoptions. Contact information is provided on page v of this code.

complying with Section 1.1.8.1. The effective date of amendments, additions, or deletions to this code by a city, county, or city and county filed pursuant to Section 1.1.8.1 shall be the date filed. However, in no case shall the amendments, additions, or deletions to this code be effective any sooner than the effective date of this code.

Local modifications shall comply with Health and Safety Code Section 18941.5 for Building Standards Law, Health and Safety Code Section 17958 for State Housing Law or Health and Safety Code Section 13869.7 for Fire Protection Districts.

1.1.8.1 Findings and Filings.

- (1) The city, county, or city and county shall make express findings for each amendment, addition, or deletion based upon climatic, topographical, or geological conditions.

Exception: Hazardous building ordinances and programs mitigating unreinforced masonry buildings.

- (2) The city, county, or city and county shall file the amendments, additions, or deletions expressly marked and identified as to the applicable findings. Cities, counties, cities and counties, and fire departments shall file the amendments, additions, or deletions, and the findings with the California Building Standards Commission at 2525 Natomas Park Drive, Suite 130, Sacramento, CA 95833.
- (3) Findings prepared by fire protection districts shall be ratified by the local city, county, or city and county and filed with the California Department of Housing and Community Development, Division of Codes and Standards, P.O. Box 1407, Sacramento, CA 95812-1407 or 1800 3rd Street, Room 260, Sacramento, CA 95811.

1.1.9 Effective Date of This Code. Only those standards approved by the California Building Standards Commission that are effective at the time an application for building permit is submitted shall apply to the plans and specifications for, and to the construction performed under, that permit. For the effective dates of the provisions contained in this code, see the History Note page of this code.

1.1.10 Availability of Codes. At least one complete copy each of Titles 8, 19, 20, 24, and 25 with all revisions shall be maintained in the office of the building official responsible for the administration and enforcement of this code. Each state department concerned and each city, county, or city and county shall have an up-to-date copy of the code available for public inspection. See Health and Safety Code Sections 18942(d)(1) and (2).

1.1.11 Format. This part fundamentally adopts the Uniform Mechanical Code by reference on a chapter-by-chapter basis. Such adoption is reflected in the Matrix Adoption Table of each chapter of this part. When the Matrix Adoption Tables make no reference to a specific chapter of the Uniform Mechanical Code, such chapter of the Uniform Mechanical Code is not adopted as a portion of this code.

1.1.12 Validity. If any chapter, section, subsection, sentence, clause, or phrase of this code is for any reason held to be unconstitutional, contrary to statute, exceeding the authority of the state as stipulated by statutes or otherwise inoperative, such decision shall not affect the validity of the remaining portion of this code.

1.2.0 Building Standards Commission.

1.2.1 Specific scope of application of the agency responsible for enforcement, the enforcement agency, and the specific authority to adopt and enforce such provisions of this code, unless otherwise stated.

(1) State Buildings for all Occupancies.

Application – State buildings (all occupancies), including buildings constructed by the Trustees of the California State University and the Regents of the University of California where no state agency has the authority to adopt building standards applicable to such buildings.

Enforcing Agency – State or local agency specified by the applicable provisions of law.

Authority Cited – Health and Safety Code Section 18934.5.

Reference – Health and Safety Code, Division 13, Part 2.5, commencing with Section 18901.

(2) University of California, California State Universities, and California Community Colleges.

Application – Standards for lighting for parking lots and primary campus walkways at the University of California, California State Universities, and California Community Colleges.

Enforcing Agency – State or local agency specified by the applicable provisions of law.

Authority Cited – Government Code Section 14617.

Reference – Government Code Section 14617.

(3) Existing State-Owned Buildings, including those owned by the University of California and by the California State University – Building seismic retrofit standards including abating falling hazards of structural and nonstructural components and strengthening of building structures. See also Division of the State Architect.

Enforcing Agency – State or local agency specified by the applicable provisions of law.

Authority Cited – Government Code Section 16600.

References – Government Code Sections 16600 through 16604.

(4) Unreinforced Masonry Bearing Wall Buildings.

Application – Minimum seismic strengthening standards for buildings specified in Appendix Chapter 1 of the California Code for Building Conservation, except for buildings subject to building standards adopted pursuant to Part 1.5 (commencing with Section 17910).

Enforcing Agency – State or local agency specified by the applicable provisions of law.

Authority Cited – Health and Safety Code Section 18934.6.

References – Health and Safety Code Sections 18901 through 18949.

1.2.2 Alternative Materials, Design, and Methods Of Construction And Equipment.

The provisions of this code are not intended to prevent the installation of any material or to prohibit any design or method of construction not specifically prescribed by this code, provided that any such alternative has been approved. An alternative material, design, or method of construction shall be approved where the building official finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code in quality, strength, effectiveness, fire resistance, durability and safety.

1.2.2.1 Research Reports. Supporting data, where necessary to assist in the approval of materials or assemblies not specifically provided for in this code, shall consist of valid research reports from approved sources.

1.2.2.2 Tests. Whenever there is insufficient evidence of compliance with the provisions of this code, or evidence that a material or method does not conform to the requirements of this code, or in order to substantiate claims for alternative materials or methods, the building official shall have the authority to require tests as evidence of compliance to be made at no expense to the jurisdiction. Test methods shall be as specified in this code or by other recognized test standards. In the absence of recognized and accepted test methods, the building official shall approve the testing procedures. Tests shall be performed by an approved agency. Reports of such tests shall be retained by the building official for the period required for retention of public records.

1.2.3 Adopting Agency Identification.

The provisions of this code applicable to buildings identified in this section will be identified in the Matrix Adoption Tables under the acronym BSC.

1.3.0 Reserved for Corrections Standards Authority.

1.4.0 Department of Consumer Affairs.

1.4.1 Specific scope of application of the agency responsible for enforcement, the enforcement agency, and the specific authority to adopt and enforce such provisions of this code, unless otherwise stated.

Board of Pharmacy.

Application – Pharmacies.

Enforcing Agency – State or local agency specified by applicable provisions of law.

Authority Cited – Business and Professions Code Section 4005.

References – Business and Professions Code Sections 4005, 4127.7, and 4201.

1.4.2 Adopting Agency Identification.

The provisions of this code applicable to buildings identified in this section will be identified in the Matrix Adoption Tables under the acronym CA.

1.5.0 Reserved for California Energy Commission.

1.6.0 Reserved for Department of Food and Agriculture.

1.7.0 California Department of Public Health.

1.7.1 Specific scope of application of the agency responsible for enforcement, the enforcement agency, and the specific authority to adopt and enforce such provisions of this code, unless otherwise stated.

Department of Public Health.

Application – Food establishments.

Enforcing Agency – Department of Health Services and the local health agency.

Authority Cited – Health and Safety Code Sections 110065, 113710, and 131200.

References – Health and Safety Code Sections 110065, 113705, 114140, and 131200.

1.7.2 Adopting Agency Identification.

The provisions of this code applicable to buildings identified in this section will be identified in the Matrix Adoption Tables under the acronym DPH.

1.8.0 Department of Housing and Community Development (HCD).

1.8.1 Purpose. The purpose of this code is to establish the minimum requirements necessary to protect the health, safety, and general welfare of the occupants and the public by governing the erection, construction, reconstruction, enlargement, conversion, alteration, repair, moving, removal, demolition, ventilation, and maintenance or use of heating, ventilating, cooling, refrigeration systems, incinerators, and other miscellaneous heat-producing appliances.

1.8.2 Authority and Abbreviations.

1.8.2.1 General. The Department of Housing and Community Development is authorized by law to promulgate and adopt building standards and regulations for several types of building applications. These applications are grouped and identified by abbreviation in the Matrix Adoption Tables to show which model code sections and amendments are applicable to each application. The applications under the authority of the Department of Housing and Community Development are listed in Sections 1.8.2.1.1 through 1.8.2.1.3.

1.8.2.1.1 Housing Construction. Application - Hotels, motels, lodging houses, apartment houses, dwellings, dormitories, condominiums, shelters for homeless persons, congregate residences, employee housing, factory-built housing, and other types of dwellings containing sleeping accommodations with or without common toilet or cooking facilities including acces-

sory buildings, facilities, and uses thereto. Sections of this code which pertain to applications listed in this section are identified in the Matrix Adoption Table using the abbreviation “HCD 1”.

Enforcing Agency – Local building department or the Department of Housing and Community Development.

Authority Cited – Health and Safety Code Sections 17040, 17050, 17920.9, 17921, 17921.3, 17921.6, 17921.10, 17922, 17922.6, 17922.12, 17927, 17928, 17959.6, 18300, 18552, 18554, 18620, 18630, 18640, 18670, 18690, 18691, 18865, 18871.3, 18871.4, 18873, 18873.1, 18873.2, 18873.3, 18873.4, 18873.5, 18938.3, 18944.11, and 19990; and Government Code Section 12955.1.

References – Health and Safety Code Sections 17000 through 17062.5, 17910 through 17995.5, 18200 through 18700, 18860 through 18874, and 19960 through 19997; and Government Code Sections 12955.1 and 12955.1.1.

1.8.2.1.2 Housing Accessibility. Application - Covered multifamily dwellings as defined in Chapter 11A of the California Code of Regulations, Title 24, Part 2, also known as the California Building Code (CBC) including, but not limited to, lodging houses, dormitories, timeshares, condominiums, shelters for homeless persons, congregate residences, apartment houses, dwellings, employee housing, factory-built housing, and other types of dwellings containing sleeping accommodations with or without common toilet or cooking facilities.

Sections of this code identified in the Matrix Adoption Table by the abbreviation “HCD 1-AC” require specific accommodations for “PERSONS WITH DISABILITIES” as defined in Chapter 11A of the CBC. The application of such provisions shall be in conjunction with other requirements of this code and apply only to newly-constructed “COVERED MULTIFAMILY DWELLINGS” as defined in Chapter 11A of the CBC. “HCD 1-AC” applications include, but are not limited to, the following:

- (1) All newly-constructed “COVERED MULTIFAMILY DWELLINGS” as defined in Chapter 11A of the CBC.
- (2) New “COMMON USE AREAS” as defined in Chapter 11A of the CBC serving existing covered multifamily dwellings.
- (3) Additions to existing buildings, where the addition alone meets the definition of “COVERED MULTIFAMILY DWELLINGS” as defined in Chapter 11A of the CBC.
- (4) Common use areas serving covered multifamily dwellings.
- (5) Where any portion of a building’s exterior is preserved, but the interior of the building is removed, including all structural portions of floors and ceilings, the building is considered a new building for determining the application of CBC, Chapter 11A.

“HCD 1-AC” building standards generally do not apply to public use areas or public accommodations such as hotels and motels. Public use areas, public accommodations, and housing which is publicly funded as defined in Chapter 2 of the CBC are subject to the Division of the State Architect (DSA-AC) and are referenced in Section 1.9.1.

Enforcing Agency – Local building department or the Department of Housing and Community Development.

Authority Cited – Health and Safety Code Sections 17040, 17050, 17920.9, 17921, 17921.3, 17921.6, 17921.10, 17922, 17922.6, 17922.12, 17927, 17928, 17959.6, 18300, 18552, 18554, 18620, 18630, 18640, 18670, 18690, 18691, 18865, 18871.3, 18871.4, 18873, 18873.1, 18873.2, 18873.3, 18873.4, 18873.5, 18938.3, 18944.11, and 19990; and Government Code Section 12955.1.

References – Health and Safety Code Sections 17000 through 17062.5, 17910 through 17995.5, 18200 through 18700, 18860 through 18874, and 19960 through 19997; and Government Code Sections 12955.1 and 12955.1.1.

1.8.2.1.3 Permanent Buildings in Mobilehome Parks and Special Occupancy Parks. Application - Permanent buildings, and permanent accessory buildings or structures, constructed within mobile-home parks and special occupancy parks that are under the control and ownership of the park operator. Sections of this code which pertain to applications listed in this section are identified in the Matrix Adoption Table using the abbreviation “HCD 2”.

Enforcing Agency – Local building department or other local agency responsible for the enforcement of Health and Safety Code, Division 13, Part 2.1, commencing with Section 18200 for mobilehome parks and Health and Safety Code, Division 13, Part 2.3, commencing with Section 18860 for special occupancy parks; or the Department of Housing and Community Development.

Authority Cited – Health and Safety Code Sections 17040, 17050, 17920.9, 17921, 17921.3, 17921.6, 17921.10, 17922, 17922.6, 17922.12, 17927, 17928, 17959.6, 18300, 18552, 18554, 18620, 18630, 18640, 18670, 18690, 18691, 18865, 18871.3, 18871.4, 18873, 18873.1, 18873.2, 18873.3, 18873.4, 18873.5, 18938.3, 18944.11, and 19990; and Government Code Section 12955.1.

References – Health and Safety Code Sections 17000 through 17062.5, 17910 through 17995.5, 18200 through 18700, 18860 through 18874, and 19960 through 19997; and Government Code Sections 12955.1 and 12955.1.1.

1.8.3 Local Enforcing Agency.

1.8.3.1 Duties and Powers. The building department of every city, county, or city and county shall enforce all the provisions of law, this code, and the other rules and regulations promulgated by the Department of Housing and Community Development pertaining to the installation, erection, construction,

reconstruction, movement, enlargement, conversion, alteration, repair, removal, demolition, or arrangement of apartment houses, hotels, motels, lodging houses, and dwellings, including accessory buildings, facilities, and uses thereto.

The provisions regulating the erection and construction of dwellings and appurtenant structures shall not apply to existing structures as to which construction is commenced or approved prior to the effective date of these regulations. Requirements relating to use, maintenance, and occupancy shall apply to all dwellings and appurtenant structures approved for construction or constructed before or after the effective date of this code.

For additional information regarding the use and occupancy of existing buildings and appurtenant structures, see California Code of Regulations, Title 25, Division 1, Chapter 1, Subchapter 1, commencing with Section 1.

1.8.3.2 Laws, Rules, and Regulations. Other than the building standards contained in this code, and notwithstanding other provisions of law, the statutory authority and location of the laws, rules, and regulations to be enforced by local enforcing agencies are listed by statute in Sections 1.8.3.2.1 through 1.8.3.2.5 below:

1.8.3.2.1 State Housing Law. Refer to the State Housing Law, California Health and Safety Code, Division 13, Part 1.5, commencing with Section 17910, and California Code of Regulations, Title 25, Division 1, Chapter 1, Subchapter 1, commencing with Section 1, for the erection, construction, reconstruction, movement, enlargement, conversion, alteration, repair, removal, demolition, or arrangement of apartment houses, hotels, motels, lodging houses, and dwellings, including accessory buildings, facilities, and uses thereto.

1.8.3.2.2 Mobilehome Parks Act. Refer to the Mobilehome Parks Act, California Health and Safety Code, Division 13, Part 2.1, commencing with Section 18200 and California Code of Regulations, Title 25, Division 1, Chapter 2, commencing with Section 1000 for mobilehome park administrative and enforcement authority, permits, plans, fees, violations, inspections, and penalties both within and outside mobilehome parks.

Exception: Mobilehome parks where the Department of Housing and Community Development is the enforcing agency.

1.8.3.2.3 Special Occupancy Parks Act. Refer to the Special Occupancy Parks Act, California Health and Safety Code, Division 13, Part 2.3, commencing with Section 18860 and California Code of Regulations, Title 25, Division 1, Chapter 2.2, commencing with Section 2000 for special occupancy park administrative and enforcement authority, permits, fees, violations, inspections, and penalties both within and outside of special occupancy parks.

Exception: Special occupancy parks where the Department of Housing and Community Development is the enforcing agency.

1.8.3.2.4 Employee Housing Act. Refer to the Employee Housing Act, California Health and Safety Code, Division 13, Part 1, commencing with Section 17000 and California Code of Regulations, Title 25, Division 1, Chapter 1, Subchapter 3, commencing with Section 600 for employee housing administrative and enforcement authority, permits, fees, violations, inspections, and penalties.

1.8.3.2.5 Factory-Built Housing Law. Refer to the Factory-Built Housing Law, California Health and Safety Code, Division 13, Part 6, commencing with Section 19960 and California Code of Regulations, Title 25, Division 1, Chapter 3, Subchapter 1, commencing with Section 3000 for factory-built housing administrative and enforcement authority, permits, fees, violations, inspections, and penalties.

1.8.4 Permits, Fees, Applications, and Inspections.

1.8.4.1 Permits. A written construction permit shall be obtained from the enforcing agency prior to the erection, construction, reconstruction, installation, relocation, or alteration of any mechanical system.

Exceptions:

- (1) Work exempt from permits as specified in Chapter 1, Administration, Division II, Sections 112.2 through 112.2.5 of this code.
- (2) Changes, alterations, or repairs of a minor nature not affecting structural features, egress, sanitation, safety, or accessibility as determined by the enforcing agency.

Exemptions from permit requirements shall not be deemed to grant authorization for any work to be done in any manner in violation of other provisions of law or this code.

1.8.4.2 Fees. Subject to other provisions of law, the governing body of any city, county, or city and county may prescribe fees to defray the cost of enforcement of rules and regulations promulgated by the Department of Housing and Community Development. The amount of the fees shall not exceed the amount reasonably necessary to administer or process permits, certificates, forms, or other documents, or to defray the costs of enforcement. For additional information, see State Housing Law, Health and Safety Code, Division 13, Part 1.5, Section 17951 and California Code of Regulations, Title 25, Division 1, Chapter 1, Subchapter 1, Article 3, commencing with Section 6.

1.8.4.3 Plan Review and Time Limitations. Subject to other provisions of law, provisions related to plan checking, prohibition of excessive delays, and contracting with or employment of private parties to perform plan checking are set forth in the State Housing Law, Health and Safety Code Section 17960.1, and for employee housing, in Health and Safety Code Section 17021.

1.8.4.3.1 Retention of Plans. The building department of every city, county, or city and county shall maintain an official copy, microfilm, or electronic or other type of photographic copy of the plans of every building, during the life of the building, for which the department issued a building permit.

Exceptions:

- (1) Single or multiple dwellings not more than two stories and basement in height.
- (2) Garages and other structures appurtenant to buildings listed in Exception 1.
- (3) Farm or ranch buildings appurtenant to buildings listed in Exception 1.
- (4) Any one-story building where the span between bearing walls does not exceed 25 feet (7620 mm), except a steel frame or concrete building.

All plans for common interest developments as defined in Section 1351 of the California Civil Code shall be retained. For additional information regarding plan retention and reproduction of plans by an enforcing agency, see Health and Safety Code Sections 19850 through 19852.

1.8.4.4 Inspections. Construction or work for which a permit is required shall be subject to inspection by the building official and such construction or work shall remain accessible and exposed for inspection purposes until approved. Approval as a result of an inspection shall not be construed to be an approval of a violation of the provisions of this code or other regulations of the Department of Housing and Community Development.

1.8.5 Right of Entry for Enforcement.

1.8.5.1 General. Subject to other provisions of law, officers, and agents of the enforcing agency may enter and inspect public and private properties to secure compliance with the rules and regulations promulgated by the Department of Housing and Community Development. For limitations and additional information regarding enforcement, see the following:

- (1) For applications subject to State Housing Law as referenced in Section 1.8.3.2.1 of this code, refer to Health and Safety Code, Division 13, Part 1.5, commencing with Section 17910 and California Code of Regulations, Title 25, Division 1, Chapter 1, Subchapter 1, commencing with Section 1.
- (2) For applications subject to the Mobilehome Parks Act as referenced in Section 1.8.3.2.2 of this code, refer to Health and Safety Code, Division 13, Part 2.1, commencing with Section 18200, and California Code of Regulations, Title 25, Division 1, Chapter 2, commencing with Section 1000.
- (3) For applications subject to the Special Occupancy Parks Act as referenced in Section 1.8.3.2.3 of this code, refer to Health and Safety Code, Division 13, Part 2.3, commencing with Section 18860, and California Code of Regulations, Title 25, Division 1, Chapter 2.2, commencing with Section 2000.
- (4) For applications subject to the Employee Housing Act as referenced in Section 1.8.3.2.4 of this code, refer to Health and Safety Code, Division 13, Part 1, commencing with Section 17000 and California Code of Regulations, Title 25, Division 1, Chapter 1, Subchapter 3, commencing with Section 600.

- (5) For applications subject to the Factory-Built Housing Law as referenced in Section 1.8.3.2.5 of this code, refer to Health and Safety Code, Division 13, Part 6, commencing with Section 19960 and California Code of Regulations, Title 25, Division 1, Chapter 3, Subchapter 1, commencing with Section 3000.

1.8.6 Local Modification by Ordinance or Regulation.

1.8.6.1 General. Subject to other provisions of law, a city, county, or city and county may make changes to the provisions adopted by the Department of Housing and Community Development. If any city, county, or city and county does not amend, add, or repeal by local ordinances or regulations the provisions published in this code or other regulations promulgated by the Department of Housing and Community Development, those provisions shall be applicable and shall become effective 180 days after publication by the California Building Standards Commission. Amendments, additions, and deletions to this code adopted by a city, county, or city and county pursuant to California Health and Safety Code Sections 17958.5, 17958.7 and 18941.5, together with all applicable portions of this code, shall also become effective 180 days after publication of the California Building Standards Code by the California Building Standards Commission.

1.8.6.2 Findings, Filings, and Rejections of Local Modifications. Prior to making any modifications or establishing more restrictive building standards, the governing body shall make express findings and filings, as required by California Health and Safety Code Section 17958.7, showing that such modifications are reasonably necessary due to local climatic, geological, or topographical conditions. No modification shall become effective or operative unless the following requirements are met:

- (1) The express findings shall be made available as a public record.
- (2) A copy of the modification and express finding, each document marked to cross-reference the other, shall be filed with the California Building Standards Commission for a city, county, or city and county, and with the Department of Housing and Community Development for fire protection districts.
- (3) The California Building Standards Commission has not rejected the modification or change.

Nothing in this section shall limit the authority of fire protection districts pursuant to California Health and Safety Code Section 13869.7(a).

1.8.7 Alternate Materials, Designs, Tests, and Methods of Construction.

1.8.7.1 General. The provisions of this code as adopted by the Department of Housing and Community Development are not intended to prevent the use of any alternate material, appliance, installation, device, arrangement, design, or method of construction not specifically prescribed by this code. Consideration and approval of

alternates shall comply with Section 1.8.7.2 for local building departments and Section 1.8.7.3 for the Department of Housing and Community Development.

1.8.7.2 Local Building Departments. The building department of any city, county, or city and county may approve alternates for use in the erection, construction, reconstruction, movement, enlargement, conversion, alteration, repair, removal, demolition, or arrangement of an apartment house, hotel, motel, lodging house, dwelling, or an accessory structure, except for the following:

- (1) Structures located in mobilehome parks as defined in California Health and Safety Code Section 18214.
- (2) Structures located in special occupancy parks as defined in California Health and Safety Code Section 18862.43.
- (3) Factory-built housing as defined in California Health and Safety Code Section 19971.

1.8.7.2.1 Approval of Alternates. The consideration and approval of alternates by a local building department shall comply with the following procedures and limitations:

- (1) The approval shall be granted on a case-by-case basis.
- (2) Evidence shall be submitted to substantiate claims that the proposed alternate, in performance, safety, and protection of life and health, conforms to, or is at least equivalent to, the standards contained in this code and other rules and regulations promulgated by the Department of Housing and Community Development.
- (3) The local building department may require tests performed by an approved testing agency at the expense of the owner or owner's agent as proof of compliance.
- (4) If the proposed alternate is related to accessibility in covered multifamily dwellings or facilities serving "COVERED MULTIFAMILY DWELLINGS" as defined in Chapter 11A of the CBC, the proposed alternate must also meet the threshold set for "EQUIVALENT FACILITATION" as defined in Chapter 11A of the CBC.

For additional information regarding approval of alternates by a local building department pursuant to the State Housing Law, see California Health and Safety Code Section 17951(e) and California Code of Regulations, Title 25, Division 1, Chapter 1, Subchapter 1.

1.8.7.3 Department of Housing and Community Development. The Department of Housing and Community Development may approve alternates for use in the erection, construction, reconstruction, movement, enlargement, conversion, alteration, repair, removal, or demolition of an apartment house, hotel, motel, lodging house, dwelling, or an accessory thereto. The consideration and approval of alternates shall comply with the following:

- (1) The department may require tests at the expense of the owner or owner's agent to substantiate compliance with the California Building Standards Code.
- (2) The approved alternate shall, for its intended purpose, be at least equivalent in performance and safety to the materials, designs, tests, or methods of construction prescribed by this code.

1.8.8 Appeals Board.

1.8.8.1 General. Every city, county, or city and county, shall establish a local appeals board and a housing appeals board. The local appeals board and housing appeals board shall each be comprised of at least five voting members who shall serve at the pleasure of the city, county, or city and county. Appointees shall not be employees of the jurisdiction and shall be qualified and specifically knowledgeable in the California Building Standards Codes and applicable local ordinances.

1.8.8.2 Definitions. The following terms shall for the purposes of this section have the meaning shown.

Housing Appeals Board. The board or agency of a city, county, or city and county which is authorized by the governing body of the city, county, or city and county to hear appeals regarding the requirements of the city, county, or city and county relating to the use, maintenance, and change of occupancy of buildings and structures, including requirements governing alteration, additions, repair, demolition, and moving. In any area in which there is no such board or agency, "Housing Appeals Board" means the local appeals board having jurisdiction over the area.

Local Appeals Board. The board or agency of a city, county, or city and county which is authorized by the governing body of the city, county, or city and county to hear appeals regarding the building requirements of the city, county, or city and county. In any area in which there is no such board or agency, "Local Appeals Board" means the governing body of the city, county, or city and county having jurisdiction over the area.

1.8.8.3 Appeals. Except as otherwise provided by law, any person, firm, or corporation adversely affected by a decision, order, or determination by a city, county, or city and county relating to the application of building standards published in the California Building Standards Code, or any other applicable rule or regulation adopted by the Department of Housing and Community Development, or any lawfully enacted ordinance by a city, county, or city and county, may appeal the issue for resolution to the local appeals board or housing appeals board as appropriate.

The local appeals board shall hear appeals relating to new building construction and the housing appeals board shall hear appeals relating to existing buildings.

1.8.9 Unsafe Buildings or Structures.

1.8.9.1 Authority to Enforce. Subject to other provisions of law, the administration, enforcement, actions, proceedings, abatement, violations, and penalties for unsafe buildings and structures are contained in the following statutes and regulations:

- (1) For applications subject to State Housing Law as referenced in Section 1.8.3.2.1 of this code, refer to Health and Safety Code, Division 13, Part 1.5, commencing with Section 17910 and California Code of Regulations, Title 25, Division 1, Chapter 1, Subchapter 1, commencing with Section 1.
- (2) For applications subject to the Mobilehome Parks Act as referenced in Section 1.8.3.2.2 of this code, refer to Health and Safety Code, Division 13, Part 2.1, commencing with Section 18200 and California Code of Regulations, Title 25, Division 1, Chapter 2, commencing with Section 1000.
- (3) For applications subject to the Special Occupancy Parks Act as referenced in Section 1.8.3.2.3 of this code, refer to Health and Safety Code, Division 13, Part 2.3, commencing with Section 18860 and California Code of Regulations, Title 25, Division 1, Chapter 2.2, commencing with Section 2000.
- (4) For applications subject to the Employee Housing Act as referenced in Section 1.8.3.2.4 of this code, refer to Health and Safety Code, Division 13, Part 1, commencing with Section 17000 and California Code of Regulations, Title 25, Division 1, Chapter 1, Subchapter 3, commencing with Section 600.
- (5) For applications subject to the Factory-Built Housing Law as referenced in Section 1.8.3.2.5 of this code, refer to Health and Safety Code, Division 13, Part 6, commencing with Section 19960 and California Code of Regulations, Title 25, Division 1, Chapter 3, Subchapter 1, commencing with Section 3000.

1.8.9.2 Actions and Proceedings. Subject to other provisions of law, punishments, penalties, and fines for violations of building standards are contained in the following statutes and regulations:

- (1) For applications subject to the State Housing Law as referenced in Section 1.8.3.2.1 of this code, refer to Health and Safety Code, Division 13, Part 1.5, commencing with Section 17910 and California Code of Regulations, Title 25, Division 1, Chapter 1, Subchapter 1, commencing with Section 1.
- (2) For applications subject to the Mobilehome Parks Act as referenced in Section 1.8.3.2.2 of this code, refer to Health and Safety Code, Division 13, Part 2.1, commencing with Section 18200 and California Code of Regulations, Title 25, Division 1, Chapter 2, commencing with Section 1000.
- (3) For applications subject to the Special Occupancy Parks Act as referenced in Section 1.8.3.2.3 of this code, refer to Health and Safety Code, Division 13, Part 2.3, commencing with Section 18860 and California Code of Regulations, Title 25, Division 1, Chapter 2.2, commencing with Section 2000.
- (4) For applications subject to the Employee Housing Act as referenced in Section 1.8.3.2.4 of this code, refer to Health and Safety Code, Division 13, Part 1, commencing with Section 17000 and California Code of Regulations, Title 25, Division 1, Chapter 1, Subchapter 3, commencing with Section 600.

- (5) For applications subject to the Factory-Built Housing Law as referenced in Section 1.8.3.2.5 of this code, refer to Health and Safety Code, Division 13, Part 6, commencing with Section 19960 and California Code of Regulations, Title 25, Division 1, Chapter 3, Subchapter 1, commencing with Section 3000.

1.8.10 Other Building Regulations.

1.8.10.1 Existing Structures. Notwithstanding other provisions of law, the replacement, retention, and extension of original materials and the use of original methods of construction for any existing building or accessory structure, or portions thereof, shall be permitted. For additional information, see California Health and Safety Code, Sections 17912 and 17958.8.

1.8.10.2 Moved Structures. Subject to the requirements of California Health and Safety Code Sections 17922.3 and 17958.9, local ordinances or regulations relating to a moved residential building or accessory structure thereto, shall, after July 1, 1978, permit the retention of existing materials and methods of construction so long as the structure does not become or continue to be a substandard building.

1.9.0 Division of the State Architect.

1.9.1 Reserved for the Division of the State Architect – Access Compliance.

1.9.2 Division of the State Architect - Structural Safety.

1.9.2.1 Adopting Agency Identification.

The provisions of this code applicable to buildings identified in this Subsection 1.9.2 will be identified in the Matrix Adoption Tables under the acronym DSA SS.

1.9.2.2 DSA-SS Division of the State Architect – Structural Safety.

Application – Public elementary and secondary schools, community college buildings, and state-owned or state-leased essential services buildings.

Enforcing Agency – Division of the State Architect – Structural Safety (DSA-SS).

The Division of the State Architect has been delegated the responsibility and authority by the Department of General Services to review and approve the design and oversee the construction of public elementary and secondary schools, community colleges, and state-owned or state-leased essential services buildings.

Authority Cited – Education Code Section 17310 and 81142, and Health & Safety Code Section 16022.

References – Education Code Sections 17280 through 17317 and 81130 through 81147, and Health & Safety Code Sections 16000 through 16023.

1.9.2.3 Adopting Agency Identification.

The provisions of this code applicable to buildings identified in this Subsection 1.9.2.2 will be identified in the Matrix Adoption Tables under the acronym DSA SS/CC.

1.9.2.4 DSA-SS/CC Division of the State Architect – Structural Safety/Community Colleges.

Application – Community Colleges.

The Division of the State Architect has been delegated the authority by the Department of General Services to promulgate alternate building standards for application to community colleges, which a community college may elect to use in lieu of standards promulgated by DSA-SS in accordance with Section 1.9.2.1. Refer to Title 24, Part 2, Section 1.9.2.2.

Enforcing Agency – Division of the State Architect – Structural Safety/Community Colleges (DSA-SS/CC).

The Division of the State Architect has been delegated the authority by the Department of General Services to review and approve the design and oversee construction of community colleges electing to use the alternative building standards as provided in this section.

Authority Cited – Education Code Section 81053.

References – Education Code Sections 81052, 81053, and 81130 through 81147.

1.10.0 Office of Statewide Health Planning and Development.

1.10.1 OSHPD 1. Specific scope of application of the agency responsible for enforcement, enforcement agency, specific authority to adopt and enforce such provisions of this code, unless otherwise stated.

OSHPD 1

Application – General acute-care hospitals and acute psychiatric hospitals, excluding distinct part units or distinct part freestanding buildings providing skilled nursing or intermediate-care services. For Structural Regulations: Skilled nursing facilities and/or intermediate-care facilities except those skilled nursing facilities and intermediate care facilities of single story, Type V, wood or light steel-frame construction.

Enforcing Agency – Office of Statewide Health Planning and Development (OSHPD). The office shall enforce the Division of the State Architect access compliance regulations and the regulations of the Office of the State Fire Marshal for the above stated facility types.

1.10.1.1 Applicable Administrative Standards.

- (1) Title 24, Part 1, California Code of Regulations: Chapters 6 and 7.
- (2) Title 24, Part 2, California Code of Regulations: Sections 1.1.0 and 1.10.0, Chapter 1, Division I, and Sections 101-117, Chapter 1, Division II.

1.10.1.2 Applicable Building Standards. California Building Standards Code, Title 24, Parts 2, 3, 4, 5, 9, 10 and 11.

Authority Cited – Health and Safety Code Sections 127010, 127015, 1275, and 129850.

References – Health and Safety Code Sections 19958, 127010, 127015, 129680, 1275, and 129675 through 130070.

1.10.1.3 Adopting Agency Identification.

The provisions of this code applicable to buildings identified in this Subsection 1.10.1 will be identified in the Matrix Adoption Tables under the acronym OSHPD 1.

1.10.2 OSHPD 2. Specific scope of application of the agency responsible for enforcement, enforcement agency, specific authority to adopt and enforce such provisions of this code, unless otherwise stated.

OSHPD 2

Application – Skilled nursing facilities and intermediate-care facilities, including distinct part skilled nursing and intermediate-care services on a general acute-care or acute psychiatric hospital license, provided either in a separate unit or a freestanding building. For Structural Regulations: Single-story, Type V skilled nursing facility and/or intermediate-care facilities utilizing wood or light steel-frame construction.

Enforcing Agency – Office of Statewide Health Planning and Development (OSHPD). The office shall also enforce the Division of the State Architect access compliance regulations and the regulations of the Office of the State Fire Marshal for the above stated facility type.

1.10.2.1 Applicable Administrative Standards:

- (1) Title 24, Part 1, California Code of Regulations: Chapter 7.
- (2) Title 24, Part 2, California Code of Regulations: Sections 1.1.0 and 1.10.0, Chapter 1, Division I, and Sections 101-117, Chapter 1, Division II.

1.10.2.2 Applicable Building Standards. California Building Standards Code, Title 24, Parts 2, 3, 4, 5, 9, 10, and 11.

Authority Cited – Health and Safety Code Sections 127010, 127015, 1275, and 129850.

References – Health and Safety Code Sections 127010, 127015, 1275, and 129680.

1.10.2.3 Adopting Agency Identification.

The provisions of this code applicable to buildings identified in this Subsection 1.10.2 will be identified in the Matrix Adoption Tables under the acronym OSHPD 2.

1.10.3 OSHPD 3. Specific scope of application of the agency responsible for enforcement, enforcement agency, specific authority to adopt and enforce such provisions of this code, unless otherwise stated.

OSHPD 3

Application – Licensed clinics and any freestanding building under a hospital license where outpatient clinical services are provided.

Enforcing Agency – Local building department.

1.10.3.1 Applicable Administrative Standards.

- (1) Title 24, Part 1, California Code of Regulations: Chapter 7.
- (2) Title 24, Part 2, California Code of Regulations: Sections 1.1.0 and 1.10.0, Chapter 1, Division I, and Sections 101-117, Chapter 1, Division II.

1.10.3.2 Applicable Building Standards. California Building Standards Code, Title 24, Parts 2, 3, 4, 5, 9, 10, and 11.

Authority Cited – Health and Safety Code Sections 127010, 127015, and 1226.

References – Health and Safety Code Sections 127010, 127015, 129885, and 1226, Government Code Section 54350, and State Constitution Article 11 Section 7.

1.10.3.3 Adopting Agency Identification.

The provisions of this code applicable to buildings identified in this Subsection 1.10.3 will be identified in the Matrix Adoption Tables under the acronym OSHPD 3.

1.10.4 OSHPD 4. Specific scope of application of the agency responsible for enforcement, enforcement agency, specific authority to adopt and enforce such provisions of this code, unless otherwise stated.

OSHPD 4

Application – Correctional Treatment Centers.

Enforcing Agency – Office of Statewide Health Planning and Development (OSHPD). The Office shall also enforce the Division of the State Architect access compliance regulations and the regulations of the Office of the State Fire Marshal for the above stated facility types.

1.10.4.1 Applicable Administrative Standards.

- (1) Title 24, Part 1, California Code of Regulations: Chapter 7.
- (2) Title 24, Part 2, California Code of Regulations: Sections 1.1.0 and 1.10.0, Chapter 1, Division I, and Sections 101-117, Chapter 1, Division II.

1.10.4.2 Applicable Building Standards. California Building Standards Code, Title 24, Parts 2, 3, 4, 5, 9, 10, and 11.

Authority Cited – Health and Safety Code Sections 127010, 127015, and 129790.

References – Health and Safety Code Sections 127010, 127015, 1275, and 129675 through 130070.

1.10.4.3 Adopting Agency Identification.

The provisions of this code applicable to buildings identified in this Subsection 1.10.4 will be identified in the Matrix Adoption Tables under the acronym OSHPD 4.

1.11.0 Office of the State Fire Marshal.

1.11.1 SFM – Office of the State Fire Marshal. Specific scope of application of the agency responsible for enforcement, the enforcement agency and the specific authority to adopt and enforce such provisions of this code, unless otherwise stated.

Application:

Institutional, Educational, or any Similar Occupancy. Any building or structure used or intended for use as an asylum, jail, mental hospital, hospital, sanitarium, home for the aged, children's nursery, children's home, school, or any similar occupancy of any capacity.

Authority Cited – Health and Safety Code Section 13143.

Reference – Health and Safety Code Section 13143.

Assembly or Similar Place of Assemblage. Any theater, dancehall, skating rink, auditorium, assembly hall, meeting hall, nightclub, fair building or similar place of assemblage where 50 or more persons may gather together in a building, room or structure for the purpose of amusement, entertainment, instruction, deliberation, worship, drinking or dining, awaiting transportation, or education.

Authority Cited – Health and Safety Code Section 13143.

Reference – Health and Safety Code Section 13143.

Small Family Day Care Homes.

Authority Cited – Health and Safety Code Sections 1597.45, 1597.54, 13143, and 17921.

Reference – Health and Safety Code Section 13143.

Large Family Day Care Homes.

Authority Cited – Health and Safety Code Sections 1597.46, 1597.54, and 17921.

Reference – Health and Safety Code Section 13143.

Residential Facilities and Residential Facilities for the Elderly.

Authority Cited – Health and Safety Code Section 13133.

Reference – Health and Safety Code Section 13143.

Any State Institution, Other State-Owned or State-Occupied Building.

Authority Cited – Health and Safety Code Section 13108.

Reference – Health and Safety Code Section 13143.

High-Rise Structures.

Authority Cited – Health and Safety Code Section 13211.

Reference – Health and Safety Code Section 13143.

Motion Picture Production Studios.

Authority cited – Health and Safety Code Section 13143.1.

Reference – Health and Safety Code Section 13143.

Organized Camps.

Authority Cited – Health and Safety Code Section 18897.3.

Reference – Health and Safety Code Section 13143.

Residential. All hotels, motels, lodging houses, apartment houses, and dwellings, including congregate residences and buildings and structures accessory thereto. Multiple-story structures existing on January 1, 1975, let for human habitation, including and limited to, hotels, motels and apartment houses, less than 75 feet (22 860 mm) above the lowest floor

level having building access, wherein rooms used for sleeping are let above the ground floor.

Authority Cited – Health and Safety Code Sections 13143.2 and 17921.

Reference – Health and Safety Code Section 13143.

Residential Care Facilities. Certified family care homes, out-of-home placement facilities, halfway houses, drug and/or alcohol rehabilitation facilities and any building or structure used or intended for use as a home or institution for the housing of any person of any age when such person is referred to or placed within such home or institution for protective social care and supervision services by any governmental agency.

Authority Cited – Health and Safety Code Section 13143.6.

Reference – Health and Safety Code Section 13143.

Tents, Awnings, or other Fabric Enclosures Used in Connection with any Occupancy.

Authority Cited – Health and Safety Code Section 13116.

Reference – Health and Safety Code Section 13143.

Fire Alarm Devices, Equipment, and Systems in Connection with any Occupancy.

Authority Cited – Health and Safety Code Section 13114.

Reference – Health and Safety Code Section 13143.

Hazardous Materials.

Authority Cited – Health and Safety Code Section 13143.9.

Reference – Health and Safety Code Section 13143.

Flammable and Combustible Liquids.

Authority Cited – Health and Safety Code Section 13143.6.

Reference – Health and Safety Code Section 13143.

Public School Automatic Fire Detection, Alarm, and Sprinkler Systems.

Authority Cited – Health and Safety Code Section 13143 and California Education Code Article 7.5, Sections 17074.50, 17074.52, and 17074.54.

References – Government Code Section 11152.5, Health and Safety Code Section 13143 and California Education Code Chapter 12.5, Leroy F. Greene School Facilities Act of 1998, Article 1.

Wildland-Urban Interface Fire Area.

Authority Cited – Health and Safety Code Sections 13143, 13108.5(a), 18949.2(b), (c) and Government Code Section 51189.

References – Health and Safety Code Sections 13143, Government Code Sections 51176, 51177, 51178, and 51179 and Public Resources Code Sections 4201 through 4204.

1.11.2 Duties and Powers of the Enforcing Agency.

1.11.2.1 Enforcement.

1.11.2.1.1 The responsibility for enforcement of building standards adopted by the State Fire Marshal and published in the California Building Standards Code relating to fire and panic safety and other regulations of the State Fire Marshal shall except as provided in Section 1.11.2.1.2 be as follows:

(1) The city, county, or city and county with jurisdiction in the area affected by the standard or regulation shall delegate the enforcement of the building standards relating to fire and panic safety and other regulations of the State Fire Marshal as they relate to Group R-3 occupancies, as described in Section 310.1 of Part 2 of the California Building Standards Code, to either of the following:

1.1. The chief of the fire authority of the city, county, or city and county, or an authorized representative.

1.2. The chief building official of the city, county, or city and county, or an authorized representative.

(2) The chief of any city or county fire department or of any fire protection district, and authorized representatives, shall enforce within the jurisdiction the building standards and other regulations of the State Fire Marshal, except those described in Item 1 or 4.

(3) The State Fire Marshal shall have authority to enforce the building standards and other regulations of the State Fire Marshal in areas outside of corporate cities and districts providing fire protection services.

(4) The State Fire Marshal shall have authority to enforce the building standards and other regulations of the State Fire Marshal in corporate cities and districts providing fire protection services on request of the chief fire official or the governing body.

(5) Any fee charged pursuant to the enforcement authority of this section shall not exceed the estimated reasonable cost of providing the service for which the fee is charged pursuant to Section 66014 of the Government Code.

1.11.2.1.2 Pursuant to Health and Safety Code Section 13108, and except as otherwise provided in this section, building standards adopted by the State Fire Marshal published in the California Building Standards Code relating to fire and panic safety shall be enforced by the State Fire Marshal in all state-owned buildings, state-occupied buildings, and state institutions throughout the state. Upon the written request of the chief fire official of any city, county or fire protection district, the State Fire Marshal may authorize such chief fire official and his or her authorized representatives, in their geographical area of responsibility, to make fire

prevention inspections of state-owned or state-occupied buildings, other than state institutions, for the purpose of enforcing the regulations relating to fire and panic safety adopted by the State Fire Marshal pursuant to this section and building standards relating to fire and panic safety published in the California Building Standards Code. Authorization from the State Fire Marshal shall be limited to those fire departments or fire districts which maintain a fire prevention bureau staffed by paid personnel.

Pursuant to Health and Safety Code Section 13108, any requirement or order made by any chief fire official who is authorized by the State Fire Marshal to make fire prevention inspections of state-owned or state-occupied buildings, other than state institutions, may be appealed to the State Fire Marshal. The State Fire Marshal shall, upon receiving an appeal and subject to the provisions of Chapter 5 (commencing with Section 18945) of Part 2.5 of Division 13 of the Health and Safety Code, determine if the requirement or order made is reasonably consistent with the fire and panic safety regulations adopted by the State Fire Marshal and building standards relating to fire and panic safety published in the California Building Code.

Any person may request a code interpretation from the State Fire Marshal relative to the intent of any regulation or provision adopted by the State Fire Marshal. When the request relates to a specific project, occupancy or building, the State Fire Marshal shall review the issue with the appropriate local enforcing agency prior to rendering such code interpretation.

1.11.2.1.3 Pursuant to Health and Safety Code Section 13112, any person who violates any order, rule or regulation of the State Fire Marshal is guilty of a misdemeanor punishable by a fine of not less than \$100.00 or more than \$500.00, or by imprisonment for not less than six months, or by both. A person is guilty of a separate offense each day during which he or she commits, continues or permits a violation of any provision of, or any order, rule or regulation of, the State Fire Marshal as contained in this code.

Any inspection authority who, in the exercise of his or her authority as a deputy State Fire Marshal, causes any legal complaints to be filed or any arrest to be made shall notify the State Fire Marshal immediately following such action.

1.11.2.2 Right of Entry. The fire chief of any city, county, or fire protection district, or such person's authorized representative, may enter any state institution or any other state-owned or state-occupied building for the purpose of preparing a fire suppression preplanning program or for the purpose of investigating any fire in a state-occupied building.

The State Fire Marshal, his or her deputies or salaried assistants, the chief of any city or county fire department or fire protection district and his or her authorized representatives may enter any building or premises not used for dwelling purposes at any reason-

able hour for the purpose of enforcing this chapter. The owner, lessee, manager or operator of any such building or premises shall permit the State Fire Marshal, his or her deputies or salaried assistants and the chief of any city or county fire department or fire protection district and his or her authorized representatives to enter and inspect them at the time and for the purpose stated in this section.

1.11.2.3 More Restrictive Fire and Panic Safety Building Standards.

1.11.2.3.1 Any fire protection district organized pursuant to Health and Safety Code Part 2.7 (commencing with Section 13800) of Division 12 may adopt building standards relating to fire and panic safety that are more stringent than those building standards adopted by the State Fire Marshal and contained in the California Building Standards Code. For these purposes, the district board shall be deemed a legislative body and the district shall be deemed a local agency. Any changes or modifications that are more stringent than the requirements published in the California Building Standards Code relating to fire and panic safety shall be subject to Section 1.1.8.1.

1.11.2.3.2 Any fire protection district that proposes to adopt an ordinance pursuant to this section shall, not less than 30 days prior to noticing a proposed ordinance for public hearing, provide a copy of that ordinance, together with the adopted findings made pursuant to Section 1.11.2.3.1, to the city, county, or city and county where the ordinance will apply. The city, county, or city and county may provide the district with written comments, which shall become part of the fire protection district's public hearing record.

1.11.2.3.3 The fire protection district shall transmit the adopted ordinance to the city, county, or city and county where the ordinance will apply. The legislative body of the city, county, or city and county may ratify, modify or deny an adopted ordinance and transmit its determination to the district within 15 days of the determination. Any modification or denial of an adopted ordinance shall include a written statement describing the reasons for any modifications or denial. No ordinance adopted by the district shall be effective until ratification by the city, county, or city and county where the ordinance will apply. Upon ratification of an adopted ordinance, the city, county, or city and county shall file a copy of the findings of the district, and any findings of the city, county, or city and county, together with the adopted ordinance expressly marked and identified to which each finding refers, in accordance with Section 1.1.8.1, Item 3.

1.11.2.4 Request for Alternate Means of Protection. Requests for approval to use an alternative material, assembly or materials, equipment, method of construction, method of installation of equipment or means of protection shall be made in writing to the enforcing agency by the owner or the owner's authorized representative and shall be accompanied by a full statement of

the conditions. Sufficient evidence or proof shall be submitted to substantiate any claim that may be made regarding its conformance. The enforcing agency may require tests and the submission of a test report from an approved testing organization as set forth in Title 19, California Code of Regulation, to substantiate the equivalency of the proposed alternative means of protection.

When a request for alternate means of protection involves hazardous materials, the authority having jurisdiction may consider implementation of the findings and recommendations identified in a Risk Management Plan (RMP) developed in accordance with Title 19, Division 2, Chapter 4.5, Article 3.

Approval of a request for use of an alternative material, assembly of materials, equipment, method of construction, method of installation of equipment, or means of protection made pursuant to these provisions shall be limited to the particular case covered by request and shall not be construed as establishing any precedent for any future request.

1.11.2.5 Appeals. When a request for an alternate means of protection has been denied by the enforcing agency, the applicant may file a written appeal to the State Fire Marshal for consideration of the applicant's proposal. In considering such appeal, the State Fire Marshal may seek the advice of the State Board of Fire Services. The State Fire Marshal shall, after considering all of the facts presented, including any recommendations of the State Board of Fire Services, determine if the proposal is for the purposes intended, at least equivalent to that specified in these regulations in quality, strength, effectiveness, fire resistance, durability and safety, and shall transmit such findings and any recommendations to the applicant and to the enforcing agency.

1.11.3 Construction Documents.

1.11.3.1 Public Schools. Plans and specifications for the construction, alteration, or addition to any building owned, leased, or rented by any public school district shall be submitted to the Division of the State Architect.

1.11.3.2 Movable Walls and Partitions. Plans or diagrams shall be submitted to the enforcing agency for approval before the installation of, or rearrangement of, any movable wall or partition in any occupancy. Approval shall be granted only if there is no increase in the fire hazard.

1.11.3.3 New Construction High-Rise Buildings.

- (1) Complete plans or specifications, or both, shall be prepared covering all work required to comply with new construction high-rise buildings. Such plans and specifications shall be submitted to the enforcing agency having jurisdiction.
- (2) All plans and specifications shall be prepared under the responsible charge of an architect or a civil or structural engineer authorized by law to develop construction plans and specifications, or by both such architect and engineer. Plans and specifications shall be prepared by an engineer duly qualified in that branch of engineering necessary to

perform such services. Administration of the work of construction shall be under the charge of the responsible architect or engineer except that where plans and specifications involve alterations or repairs, such work of construction may be administered by an engineer duly qualified to perform such services and holding a valid certificate under Chapter 7 (commencing with Section 65700) of Division 3 of the Business and Professions Code for performance of services in that branch of engineering in which said plans, specifications and estimates and work of construction are applicable.

This section shall not be construed as preventing the design of fire-extinguishing systems by persons holding a C-16 license issued pursuant to Division 3, Chapter 9, Business and Professions Code. In such instances, however, the responsibility charge of this section shall prevail.

1.11.3.4 Existing High-Rise Buildings.

- (1) Complete plans or specifications, or both, shall be prepared covering all work required by Section 3412 for existing high-rise buildings. Such plans or specifications shall be submitted to the enforcing agency having jurisdiction.
- (2) When new construction is required to conform with the provisions of these regulations, complete plans or specifications, or both, shall be prepared in accordance with the provisions of this subsection. As used in this section, "new construction" is not intended to include repairs, replacements or minor alterations which do not disrupt or appreciably add to or affect the structural aspects of the building.

1.11.3.5 Retention of Plans. Refer to Building Standards Law, Health and Safety Code Sections 19850 and 19851 for permanent retention of plans.

1.11.4 Fees.

1.11.4.1 Other Fees. Pursuant to Health and Safety Code Section 13146.2, a city, county, or district which inspects a hotel, motel, lodging house, or apartment house may charge and collect a fee for the inspection from the owner of the structure in an amount, as determined by the city, county or district, sufficient to pay its costs of that inspection.

1.11.4.2 Large Family Day Care. Pursuant to Health and Safety Code Section 1597.46, Large Family Day Care Homes, the local government shall process any required permit as economically as possible, and fees charged for review shall not exceed the costs of the review and permit process.

1.11.4.3 High-Rise. Pursuant to Health and Safety Code Section 13217, High-rise Structure Inspection: Fees and costs, a local agency which inspects a high-rise structure pursuant to Health and Safety Code Section 13217 may charge and collect a fee for the inspection from the owner of the high-rise structure in an amount, as determined by the local agency, sufficient to pay its costs of that inspection.

1.11.4.4 Fire Clearance Preinspection. Pursuant to Health and Safety Code Section 13235, Fire Clearance Preinspection, fee, upon receipt of a request from a prospective licensee of a community care facility, as defined in Section 1502, of a residential care facility for the elderly, as defined in Section 1569.2, or of a child day care facility, as defined in Section 1596.750, the local fire enforcing agency, as defined in Section 13244, or State Fire Marshal, whichever has primary jurisdiction, shall conduct a preinspection of the facility prior to the final fire clearance approval. At the time of the preinspection, the primary fire enforcing agency shall price consultation and interpretation of the fire safety regulations and shall notify the prospective licensee of the facility in writing of the specific fire safety regulations which shall be enforced in order to obtain fire clearance approval. A fee of not more than \$50.00 may be charged for the preinspection of a facility with a capacity to serve 25 or fewer persons. A fee of not more than \$100.00 may be charged for a preinspection of a facility with a capacity to serve 26 or more persons.

1.11.4.5 Care Facilities. The primary fire enforcing agency shall complete the final fire clearance inspection for a community care facility, residential care facility for the elderly, or child day care facility within 30 days of receipt of the request for the final inspection, or as of the date the prospective facility requests the final preclearance inspection by the State Department of Social Services, whichever is later.

Pursuant to Health and Safety Code Section 13235, a preinspection fee of not more than \$50.00 may be charged for a facility with a capacity to serve 25 or less clients. A fee of not more than \$100.00 may be charged for a preinspection of a facility with a capacity to serve 26 or more clients.

Pursuant to Health and Safety Code Section 13131.5, a reasonable final inspection fee, not to exceed the actual cost of inspection services necessary to complete a final inspection may be charged for occupancies classified as Residential Care Facilities for the Elderly (RCFE).

Pursuant to Health and Safety Code Section 1569.84, neither the State Fire Marshal nor any local public entity shall charge any fee for enforcing fire inspection regulations pursuant to state law or regulation or local ordinance, with respect to Residential Care Facilities for the Elderly (RCFE) which service six or fewer persons.

1.11.4.6 Requests of the Office of the State Fire Marshal. Whenever a local authority having jurisdiction requests that the State Fire Marshal perform plan review and/or inspection services related to a building permit, the applicable fees for such shall be payable to the Office of the State Fire Marshal.

1.11.5 Inspections. Work performed subject to the provisions of this code shall comply with the inspection requirements of Title 24, Part 2, California Building Standards Code, Sections 109.1, 109.3, 109.3.4, 109.3.5, 109.3.6, 109.3.8, 109.3.9, 109.3.10, 109.5, and 109.6 as adopted by the Office of the State Fire Marshal.

1.11.5.1 Existing Group I-1 or R Occupancies. Licensed 24-hour care in a Group I-1 or R occupancy in existence and originally classified under previously adopted state codes shall be reinspected under the appropriate previous code, provided there is no change in the use or character which would place the facility in a different occupancy group.

1.11.6 Certificate of Occupancy. A Certificate of Occupancy shall be issued as specified in Title 24, Part 2, California Building Code, Section 111.

Exception: Group R, Division 3 and Group U occupancies.

1.11.7 Temporary Structures and Uses. See Title 24, Part 2, California Building Code, Section 107.

1.11.8 Service Utilities. See Title 24, Part 2, California Building Code, Section 112.

1.11.9 Stop Work Order. See Title 24, Part 2, California Building Code, Section 115.

1.11.10 Unsafe Buildings, Structures, and Equipment. See Title 24, Part 2, California Building Code, Section 116.

1.11.11 Adopting Agency Identification.

The provisions of this code applicable to buildings identified in this Section 1.11.0 will be identified in the Matrix Adoption Tables under the acronym SFM.

1.12.0 Reserved for the State Librarian.

1.13.0 Reserved for the Department of Water Resources.

1.14.0 Reserved for the State Lands Commission.

**CALIFORNIA MECHANICAL CODE – MATRIX ADOPTION TABLE
CHAPTER 3 – GENERAL REQUIREMENTS**

Adopting Agency	BSC	SFM	HCD			DSA			OSHPD				CA	DPH
			1	2	1/AC	AC	SS	SS/CC	1	2	3	4		
Adopt Entire Chapter	X						X	X						
Adopt Entire Chapter as amended (amended sections listed below)		X	X	X					X	X	X	X		
Adopt only those sections that are listed below														
Article/Section														
303.2, Exception 2									X	X	X	X		
303.7		X	X	X										
303.7.1			X	X										
312.0									X	X	X	X		
313.0									X	X		X		
314.1									X			X		
314.2										X		X		
314.3											X			
315.1									X			X		
316.0									X	X	X	X		
Table 315									X	X	X	X		

- (1) *Wet chemical extinguishing system (NFPA 17A, Standard for Wet Chemical Extinguishing Systems), complying with UL 300, Fire Testing of Fire Extinguishing Systems for Protection of Restaurant Cooking Equipment. All existing dry chemical and wet chemical extinguishing systems shall comply with UL 300, Fire Testing of Fire Extinguishing Systems for Protection of Restaurant Cooking Equipment.*
- (2) *Carbon dioxide extinguishing systems (NFPA 12, Standard on Carbon Dioxide Extinguishing Systems).*
- (3) *Automatic fire sprinkler systems (NFPA 13, Standard for the Installation of Sprinkler Systems).*

All existing dry chemical and wet chemical extinguishing systems shall comply with UL 300, no later than the second required servicing of the system following the effective date of this section.

Exceptions:

- (1) Automatic fire-extinguishing equipment provided as part of listed recirculating systems complying with standard UL 710B, *Outline of Investigation for Recirculating Exhaust System.*
- (2) *Public schools kitchens, without deep-fat fryers, shall be upgraded to a UL 300, Fire Testing of Fire Extinguishing Systems for Protection of Restaurant Cooking Equipment, compliant system during state funded modernization projects that are under the jurisdiction of the Division of the State Architect*

513.2.3 In existing systems, when changes in the cooking media, positioning, or replacement of cooking equipment occur, the fire-extinguishing system shall be made to comply with Section 513.2.2. [NFPA 96:10.2.3.1]

513.2.4 Modification of Existing Hood Systems.

513.2.4.1 Any abandoned pipe or conduit from a previous installation shall be removed from within the hood, plenum, and exhaust duct. [NFPA 96:10.2.7.1]

513.2.4.2 Penetrations and holes resulting from the removal of conduit or piping shall be sealed with listed or equivalent liquid tight sealing devices. [NFPA 96:10.2.7.2]

513.2.4.3 The addition of obstructions to spray patterns from the cooking appliance nozzle(s) such as baffle plates, shelves, or any modification shall not be permitted. [NFPA 96:10.2.7.3]

513.2.4.4 Changes or modifications to the hazard after installation of the fire extinguishing systems shall result in reevaluation of the system design by a properly trained, qualified, and certified person(s). [NFPA 96:10.2.7.4]

513.2.5 Fixed Baffle Hoods with Water Wash. Grease removal devices, hood exhaust plenums, and exhaust ducts requiring protection in accordance with Section 513.1.1 shall be permitted to be protected by a listed fixed baffle hood containing a constant or fire-actuated water wash system that is listed and in compliance with UL 300, *Fire Testing of Fire Extinguishing Systems for Protection of Restaurant Cooking Equipment*, or other equivalent standards and shall be installed in accordance with the requirements of their listing. [NFPA 96:10.2.8.1]

513.2.5.1 The water for listed, fixed baffle hood assemblies shall be permitted to be supplied from

the domestic water supply when the minimum water pressure and flow are provided in accordance with the terms of the listing. [NFPA 96:10.2.8.3]

513.2.5.2 The water supply shall be controlled by a supervised water supply control valve. [NFPA 96:10.2.8.4]

513.2.5.3 The water wash in the fixed baffle hood shall be activated by the cooking equipment extinguishing system. [NFPA 96:10.2.8.5]

513.2.5.4 A water-wash system approved to be used for protection of the grease removal device(s), hood exhaust plenum(s), exhaust duct(s), or combination thereof shall include instruction and appropriate electrical interface for simultaneous activation of the water-wash system from an automatic fire-extinguishing system, where the automatic fire-extinguishing system is used for cooking equipment protection only. [NFPA 96:10.2.8.6]

513.2.5.5 Where the fire-extinguishing system provides protection for the cooking equipment, hood, and duct, activation of the water wash shall not be required. [NFPA 96:10.2.8.7]

513.2.5.6 The water required for listed automatic fire-extinguishing systems shall be permitted to be supplied from the domestic water supply where the minimum water pressure and flow are provided in accordance with the terms of the listing. The water supply shall be controlled by a supervised water supply control valve. [NFPA 96:10.2.9]

513.2.6 Water Valve Supervision. Valves controlling the water supply to listed fixed baffle hood assemblies, automatic fire-extinguishing systems, or both shall be listed indicating type of valve and shall be supervised open by one of the following methods:

- (1) Central station, proprietary, or remote station alarm service.
- (2) Local alarm service that will cause the sounding of an audible signal at a constantly attended point.
- (3) Locking valves open.
- (4) Sealing of valves and approved weekly recorded inspection. [NFPA 96:10.2.10]

513.3 Simultaneous Operation. Fixed-pipe extinguishing systems in a single hazard area shall be arranged for simultaneous automatic operation upon actuation of anyone of the systems. [NFPA 96:10.3.1]

513.3.1 Simultaneous operation shall not be required where the fixed pipe extinguishing system is an automatic sprinkler system. [NFPA 96:10.3.2]

513.3.2 Simultaneous operation shall not be required where dry or wet chemical system be permitted to be used to protect common exhaust ductwork by the methods specified in NFPA 17A, *Wet Chemical Extinguishing Systems*.

513.4 Fuel Shutoff.

513.4.1 Upon activation of any fire-extinguishing system for a cooking operation, all sources of fuel and electric power that produce heat to all equipment requiring protection by that system shall automatically shut off. [NFPA 96:10.4.1]

Exception: Solid-fuel cooking operations.

513.4.2 Steam supplied from an external source shall not be required to automatically shut off. [NFPA 96:10.4.2]

513.4.3 Any gas appliance not requiring protection, but located under the same ventilating equipment, shall also automatically shut off upon activation of any extinguishing system. [NFPA 96:10.4.3]

513.4.4 Shutoff devices shall require manual reset. [NFPA 96:10.4.4]

513.5 Manual Activation.

513.5.1 A readily accessible means for manual activation shall be located between forty-two (42) inches and forty-eight (48) inches (1,067 mm and 1,219 mm) above the floor, located in a path of exit or egress, and clearly identify the hazard protected. A manual actuation device shall be located a minimum of ten (10) feet (3 m) when possible and a maximum of twenty (20) feet (6 m) from the protected kitchen appliance(s) within the path of egress. Manual actuation using a cable-operated pull station shall not require more than forty (40) pounds (178 N) of force, with a pull movement not to exceed fourteen (14) inches (356 mm) to actuate the fire suppression system. The automatic and manual means of system activation external to the control head or releasing device shall be separate and independent of each other so that failure of one will not impair the operation of the other. [NFPA 96:10.5.1 – 10.5.2]

513.5.2 The manual means of system activation shall be permitted to be common with the automatic means if the manual activation device is located between the control head or releasing device and the first fusible link. [NFPA 96:10.5.3]

513.5.3 An automatic sprinkler system shall not require a manual means of system activation. [NFPA 96:10.5.4]

513.5.4 The means for manual actuator(s) shall be mechanical or rely on electrical power for actuation. [NFPA 96:10.5.5]

513.5.5 Electrical power shall be permitted to be used for manual activation if a standby power supply is provided or if supervision is provided in accordance with Section 513.7. [NFPA 96:10.5.6]

513.6 System Annunciation.

513.6.1 Upon activation of an automatic fire extinguishing system, an audible alarm or visual indicator shall be provided to show that the system has activated. [NFPA 96:10.6.1]

513.6.2 Where a fire alarm signaling system is serving the occupancy where the extinguishing system is located, the activation of the automatic fire-extinguishing system shall activate the fire alarm signaling system. [NFPA 96:10.6.2]

513.7 System Supervision.

513.7.1 Where electrical power is required to operate the automatic fire-extinguishing system, it shall be monitored by a supervisory alarm, with a standby power supply provided. [NFPA 96:10.7.1]

513.7.2 System supervision shall not be required where an automatic fire-extinguishing system(s) includes automatic mechanical detection and actuation as a backup detection system. [NFPA 96:10.7.2]

513.7.3 System supervision shall not be required where a fire-extinguishing system(s) is interconnected or interlocked with the cooking equipment power source(s) so that if the fire extinguishing system becomes inoperable due to power failure, all sources of fuel or electric power that produce heat to all cooking equipment serviced by that hood shall automatically shut off. [NFPA 96:10.7.3]

513.7.4 System supervision shall not be required where an automatic fire-extinguishing system, including automatic mechanical detection and actuation, is electrically connected to a listed fire-actuated water-wash system for simultaneous operation of both systems. [NFPA 96:10.7.4]

513.8 Special Design and Application.

513.8.1 Hoods containing automatic fire extinguishing systems are protected areas; therefore, these hoods are not considered obstructions to overhead sprinkler systems and shall not require floor coverage underneath. [NFPA 96:10.8.1]

513.8.2 A single listed detection device, listed with the extinguishing system, shall be permitted for more than one (1) appliance when installed in accordance with the terms of the listing. [NFPA 96:10.8.2]

513.9 Review and Certification.

513.9.1 Where required, complete drawings of the system installation, including the hood(s), exhaust duct(s), and appliances, along with the interface of the fire-extinguishing system detectors, piping, nozzles, fuel shutoff devices, agent storage container(s), and manual actuation device(s), shall be submitted to the Authority Having Jurisdiction. [NFPA 96:10.9.1]

513.10 Installation Requirements.

513.10.1 Installation of systems shall be performed only by persons properly trained and qualified to install the specific system being provided. The installer shall provide certification that the installation is in agreement with the terms of the listing and the manufacturer's instructions and/or approved design. [NFPA 96:10.9.2]

513.11 Portable Fire Extinguishers.

513.11.1 Portable fire extinguishers shall be installed in kitchen cooking areas in accordance with *Chapter 3, Title 19 California Code of Regulations*. Such extinguishers shall use agents that saponify upon contact with hot grease, such as sodium bicarbonate and potassium bicarbonate dry chemical and potassium carbonate solutions. Class B gas-type portables such as CO₂ and halon shall not be permitted in kitchen cooking areas. Manufacturer's recommendations shall be followed.

513.11.1.1 Portable fire extinguishers listed specifically for use in the kitchen cooking areas shall also be permitted.

517.5 Grease Removal Devices for Solid-Fuel Cooking.

Grease removal devices shall be constructed of steel or stainless steel or be approved for solid-fuel cooking.

517.5.1 If airborne sparks and embers can be generated by the solid-fuel cooking operation, spark arrester devices shall be used prior to the grease removal device to minimize the entrance of these sparks and embers into the grease removal device and into the hood and duct system.

517.5.2 Filters shall be a minimum of four (4) feet (1.2 m) above the appliance cooking surface.

517.6 Air Movement for Solid-Fuel Cooking. Exhaust system requirements shall comply with the provisions of the code for hooded operation or shall be installed in accordance with the manufacturer's recommendation for unhooded applications.

517.6.1 A replacement or makeup-air system shall be provided to ensure a positive supply of replacement air at all times during cooking operations.

517.6.2 Makeup-air systems serving solid-fuel cooking operations shall be interlocked with the exhaust-air system and powered, if necessary, to prevent the space from attaining a negative pressure while the solid-fuel appliance is in operation.

517.7 Fire-Extinguishing Equipment for Solid-Fuel Cooking.

517.7.1 Approved fire-extinguishing equipment shall be provided to protect all solid-fuel-burning cooking appliances that might be a source of ignition of grease in the hood, grease removal device, or duct.

Exception: If acceptable to the Authority Having Jurisdiction, solid-fuel-burning cooking appliances constructed of solid masonry or reinforced portland or refractory cement concrete and vented in accordance with NFPA 211, *Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances*, Chapters 3 and 4, shall not require fixed automatic fire-extinguishing equipment.

517.7.2 Approved fire-extinguishing equipment shall be provided for the protection of grease removal devices, hoods, and duct systems.

Exception: If acceptable to the Authority Having Jurisdiction, solid-fuel-burning cooking appliances constructed of solid masonry or reinforced portland or refractory cement concrete and vented in accordance with NFPA 211, *Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances*, Chapters 3 and 4, shall not require automatic fire-extinguishing equipment.

517.7.3 Approved fire-extinguishing equipment for solid-fuel-burning cooking appliances, where required, shall comply with NFPA 211, *Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances*, and shall be comprised of water-based agents.

517.7.4 Fire-extinguishing equipment shall be rated and designed to extinguish solid-fuel cooking fires, in accordance with the manufacturer's recommendations. The fire-extinguishing equipment shall be of sufficient size to totally extinguish fire in the entire hazard area and prevent reignition of the fuel.

517.7.5 All solid-fuel appliances (whether or not under a hood) with fireboxes of five (5) ft.³ (0.14 m³) volume or less shall at least have a listed 2-A rated water-type fire extinguisher or a 1.6 gal (6 L) wet chemical fire extinguisher listed for Class K fires in accordance with NFPA 10, *Portable Fire Extinguishers*, in the immediate vicinity of the appliance. [NFPA 96:14.7.8]

517.7.6 Solid-fuel appliances with fireboxes exceeding five (5) ft.³ (0.14 m³) shall be provided with a fixed-water-pipe system with a hose in the immediate vicinity of the appliance. The hose shall be equipped with an adjustable nozzle capable of producing a fine to medium spray or mist. The nozzle shall be of the type that cannot produce a straight stream. The system shall have a minimum operating pressure of forty (40) psi (275.8 kPa) and shall provide a minimum of five (5) gpm. [NFPA 96:14.7.9.1 – 14.7.9.2]

517.7.7 Fire suppression for fuel storage areas shall comply with Section 513.2.2(3).

517.7.8 In addition to the requirements of Section 517.7.5 or 517.7.6, where any solid-fuel cooking appliance is also provided with auxiliary electric, gas, oil, or other fuel for ignition or supplemental heat and the appliance is also served by any portion of a fire-extinguishing system complying with Section 513.0, such auxiliary fuel shall be shut off upon actuation of the fire-extinguishing system.

517.8 Other Safety Requirements.

517.8.1 Metal-fabricated solid-fuel cooking appliances shall be listed for the application where produced in practical quantities or shall be approved by the Authority Having Jurisdiction. When listed, they shall be installed in accordance with the terms of their listings and with the applicable requirements of this standard.

517.8.2 Site-built solid-fuel cooking appliances shall be submitted for approval to the Authority Having Jurisdiction before being considered for installation. All units shall be installed, operated, and maintained in accordance with the approved terms of the manufacturer's instructions and any additional requirements set forth by the Authority Having Jurisdiction.

517.8.3 Except for the spark arrester required in Section 517.1.6, there shall be no additional devices of any type in any portion of the appliance, flue pipe, and chimney of a natural draft solid-fuel operation.

517.8.4 No solid-fuel cooking device of any type shall be permitted for deep-fat frying involving more than one (1) quart of liquid shortening, nor shall any solid-fuel cooking device be permitted within three (3) feet (0.92 m) of any deep-fat frying unit.

**TABLE 5-5
MINIMUM SHEET METAL THICKNESS FOR ROUND DUCTS FOR PRODUCT-CONVEYING SYSTEM DUCTS**

NEGATIVE PRESSURE	REINF. SPACING (Inches)	CLASS 1									
		Up to 7"	8" to 11"	12" to 15"	16" to 19"	20" to 23"	24" to 35"	36" to 47"	48" to 59"	60"	
To 7"	0	.021 (24 ga.)	.021 (24 ga.)	.033 (20 ga.)	.044 (18 ga.)	.055 (16 ga.)	.068 (14 ga.)	.127 (10 ga.)			
	96	.021 (24 ga.)	.021 (24 ga.)	.021 (24 ga.)	.027 (22 ga.)	.033 (20 ga.)	.044 (18 ga.)	.055 (16 ga.)	.068 (14 ga.)	.068 (14 ga.)	
	48	.021 (24 ga.)	.021 (24 ga.)	.021 (24 ga.)	.021 (24 ga.)	.021 (24 ga.)	.027 (22 ga.)	.033 (20 ga.)	.044 (18 ga.)	.055 (16 ga.)	
	24	.021 (24 ga.)	.021 (24 ga.)	.021 (24 ga.)	.021 (24 ga.)	.021 (24 ga.)	.021 (24 ga.)	.027 (22 ga.)	.033 (20 ga.)	.044 (18 ga.)	
8" to 11"	0	.021 (24 ga.)	.027 (22 ga.)	.044 (18 ga.)	.055 (16 ga.)	.068 (14 ga.)	.097 (12 ga.)				
	96	.021 (24 ga.)	.027 (22 ga.)	.027 (22 ga.)	.044 (18 ga.)	.044 (18 ga.)	.044 (18 ga.)	.068 (14 ga.)	.097 (12 ga.)	.097 (12 ga.)	
	48	.021 (24 ga.)	.021 (24 ga.)	.021 (24 ga.)	.027 (22 ga.)	.033 (20 ga.)	.033 (20 ga.)	.055 (16 ga.)	.068 (14 ga.)	.068 (14 ga.)	
	24	.021 (24 ga.)	.021 (24 ga.)	.021 (24 ga.)	.021 (24 ga.)	.027 (22 ga.)	.027 (22 ga.)	.044 (18 ga.)	.055 (16 ga.)	.055 (16 ga.)	
12" to 15"	0	.021 (24 ga.)	.033 (20 ga.)	.055 (16 ga.)	.068 (14 ga.)	.097 (12 ga.)	.097 (12 ga.)				
	96	.021 (24 ga.)	.027 (22 ga.)	.044 (18 ga.)	.044 (18 ga.)	.055 (16 ga.)	.055 (16 ga.)	.097 (12 ga.)	.112 (11 ga.)	.112 (11 ga.)	
	48	.021 (24 ga.)	.027 (22 ga.)	.027 (22 ga.)	.033 (20 ga.)	.044 (18 ga.)	.044 (18 ga.)	.068 (14 ga.)	.068 (14 ga.)	.097 (12 ga.)	
	24	.021 (24 ga.)	.021 (24 ga.)	.021 (24 ga.)	.027 (22 ga.)	.027 (22 ga.)	.027 (22 ga.)	.055 (16 ga.)	.055 (16 ga.)	.055 (16 ga.)	
16" to 20"	0	.021 (24 ga.)	.044 (18 ga.)	.068 (14 ga.)	.097 (12 ga.)	.112 (11 ga.)					
	96	.021 (24 ga.)	.033 (20 ga.)	.055 (16 ga.)	.055 (16 ga.)	.068 (14 ga.)	.068 (14 ga.)	.112 (11 ga.)	.112 (11 ga.)	.112 (11 ga.)	
	48	.021 (24 ga.)	.027 (22 ga.)	.033 (20 ga.)	.044 (18 ga.)	.055 (16 ga.)	.055 (16 ga.)	.068 (14 ga.)	.097 (12 ga.)	.112 (11 ga.)	
	24	.021 (24 ga.)	.021 (24 ga.)	.027 (22 ga.)	.033 (20 ga.)	.044 (18 ga.)	.044 (18 ga.)	.055 (16 ga.)	.068 (14 ga.)	.097 (12 ga.)	
To 7"	0	CLASS 2									
		.027 (22 ga.)	.027 (22 ga.)	.033 (20 ga.)	.044 (18 ga.)	.055 (16 ga.)	.068 (14 ga.)	.127 (10 ga.)			
		96	.027 (22 ga.)	.027 (22 ga.)	.033 (20 ga.)	.033 (20 ga.)	.044 (18 ga.)	.044 (18 ga.)	.055 (16 ga.)	.068 (14 ga.)	.068 (14 ga.)
		48	.027 (22 ga.)	.027 (22 ga.)	.033 (20 ga.)	.033 (20 ga.)	.044 (18 ga.)	.044 (18 ga.)	.055 (16 ga.)	.055 (16 ga.)	.055 (16 ga.)
8" to 11"	24	.027 (22 ga.)	.027 (22 ga.)	.033 (20 ga.)	.033 (20 ga.)	.044 (18 ga.)	.044 (18 ga.)	.055 (16 ga.)	.055 (16 ga.)	.055 (16 ga.)	
		0	.027 (22 ga.)	.027 (22 ga.)	.044 (18 ga.)	.055 (16 ga.)	.068 (14 ga.)	.097 (12 ga.)			
		96	.027 (22 ga.)	.027 (22 ga.)	.033 (20 ga.)	.044 (18 ga.)	.044 (18 ga.)	.044 (18 ga.)	.068 (14 ga.)	.097 (12 ga.)	.097 (12 ga.)
		48	.027 (22 ga.)	.027 (22 ga.)	.033 (20 ga.)	.033 (20 ga.)	.044 (18 ga.)	.044 (18 ga.)	.055 (16 ga.)	.068 (14 ga.)	.068 (14 ga.)
12" to 15"	24	.027 (22 ga.)	.027 (22 ga.)	.033 (20 ga.)	.033 (20 ga.)	.044 (18 ga.)	.044 (18 ga.)	.055 (16 ga.)	.055 (16 ga.)	.055 (16 ga.)	
		0	.027 (22 ga.)	.033 (20 ga.)	.055 (16 ga.)	.068 (14 ga.)	.097 (12 ga.)	.097 (12 ga.)			
		96	.027 (22 ga.)	.033 (20 ga.)	.044 (18 ga.)	.044 (18 ga.)	.055 (16 ga.)	.055 (16 ga.)	.097 (12 ga.)	.112 (11 ga.)	.112 (11 ga.)
		48	.027 (22 ga.)	.027 (22 ga.)	.033 (20 ga.)	.033 (20 ga.)	.044 (18 ga.)	.044 (18 ga.)	.068 (14 ga.)	.068 (14 ga.)	.097 (12 ga.)
16" to 20"	24	.027 (22 ga.)	.027 (22 ga.)	.033 (20 ga.)	.033 (20 ga.)	.044 (18 ga.)	.044 (18 ga.)	.055 (16 ga.)	.055 (16 ga.)	.055 (16 ga.)	
		0	.027 (22 ga.)	.033 (20 ga.)	.055 (16 ga.)	.068 (14 ga.)	.097 (12 ga.)	.097 (12 ga.)			
		96	.027 (22 ga.)	.033 (20 ga.)	.055 (16 ga.)	.055 (16 ga.)	.068 (14 ga.)	.068 (14 ga.)	.112 (11 ga.)	.112 (11 ga.)	.112 (11 ga.)
		48	.027 (22 ga.)	.033 (20 ga.)	.033 (20 ga.)	.044 (18 ga.)	.055 (16 ga.)	.055 (16 ga.)	.068 (14 ga.)	.068 (14 ga.)	.097 (12 ga.)
To 7"	0	CLASS 3									
		.033 (20 ga.)	.033 (20 ga.)	.044 (18 ga.)	.044 (18 ga.)	.055 (16 ga.)	.068 (14 ga.)	.127 (10 ga.)			
		96	.033 (20 ga.)	.033 (20 ga.)	.044 (18 ga.)	.044 (18 ga.)	.055 (16 ga.)	.055 (16 ga.)	.068 (14 ga.)	.068 (14 ga.)	.068 (14 ga.)
		48	.033 (20 ga.)	.033 (20 ga.)	.044 (18 ga.)	.044 (18 ga.)	.055 (16 ga.)	.055 (16 ga.)	.068 (14 ga.)	.068 (14 ga.)	.068 (14 ga.)
8" to 11"	24	.033 (20 ga.)	.033 (20 ga.)	.044 (18 ga.)	.044 (18 ga.)	.055 (16 ga.)	.055 (16 ga.)	.068 (14 ga.)	.068 (14 ga.)	.068 (14 ga.)	
		0	.033 (20 ga.)	.033 (20 ga.)	.044 (18 ga.)	.055 (16 ga.)	.068 (14 ga.)	.097 (12 ga.)			
		96	.033 (20 ga.)	.033 (20 ga.)	.044 (18 ga.)	.044 (18 ga.)	.055 (16 ga.)	.055 (16 ga.)	.068 (14 ga.)	.097 (12 ga.)	.097 (12 ga.)
		48	.033 (20 ga.)	.033 (20 ga.)	.044 (18 ga.)	.044 (18 ga.)	.055 (16 ga.)	.055 (16 ga.)	.068 (14 ga.)	.068 (14 ga.)	.068 (14 ga.)
To 7"	24	.033 (20 ga.)	.033 (20 ga.)	.044 (18 ga.)	.044 (18 ga.)	.055 (16 ga.)	.055 (16 ga.)	.068 (14 ga.)	.068 (14 ga.)	.068 (14 ga.)	

TABLE 5-5 (continued)
MINIMUM SHEET METAL THICKNESS FOR ROUND DUCTS FOR PRODUCT-CONVEYING SYSTEM DUCTS

NEGATIVE PRESSURE	REINF. SPACING (Inches)	CLASS 3								
		Up to 7"	8" to 11"	12" to 15"	16" to 19"	20" to 23"	24" to 35"	36" to 47"	48" to 59"	60"
12" to 15"	0	.033 (20 ga.)	.033 (20 ga.)	.055 (16 ga.)	.068 (14 ga.)	.097 (12 ga.)	.097 (12 ga.)			
	96	.033 (20 ga.)	.033 (20 ga.)	.044 (18 ga.)	.044 (18 ga.)	.055 (16 ga.)	.055 (16 ga.)	.097 (12 ga.)	.112 (11 ga.)	.112 (11 ga.)
	48	.033 (20 ga.)	.033 (20 ga.)	.044 (18 ga.)	.044 (18 ga.)	.055 (16 ga.)	.055 (16 ga.)	.068 (14 ga.)	.068 (14 ga.)	.068 (14 ga.)
	24	.033 (20 ga.)	.033 (20 ga.)	.044 (18 ga.)	.044 (18 ga.)	.055 (16 ga.)	.055 (16 ga.)	.068 (14 ga.)	.068 (14 ga.)	.068 (14 ga.)
16" to 20"	0	.033 (20 ga.)	.044 (18 ga.)	.068 (14 ga.)	.097 (12 ga.)	.112 (11 ga.)				
	96	.033 (20 ga.)	.033 (20 ga.)	.055 (16 ga.)	.055 (16 ga.)	.068 (14 ga.)	.068 (14 ga.)	.112 (11 ga.)	.112 (11 ga.)	.112 (11 ga.)
	48	.033 (20 ga.)	.033 (20 ga.)	.044 (18 ga.)	.044 (18 ga.)	.055 (16 ga.)	.055 (16 ga.)	.068 (14 ga.)	.068 (14 ga.)	.097 (12 ga.)
	24	.033 (20 ga.)	.033 (20 ga.)	.044 (18 ga.)	.044 (18 ga.)	.055 (16 ga.)	.055 (16 ga.)	.068 (14 ga.)	.068 (14 ga.)	.068 (14 ga.)
To 7"		CLASS 4								
	0	.055 (16 ga.)	.055 (16 ga.)	.055 (16 ga.)	.055 (16 ga.)	.068 (14 ga.)	.068 (14 ga.)	.127 (10 ga.)		
	96	.055 (16 ga.)	.055 (16 ga.)	.055 (16 ga.)	.055 (16 ga.)	.068 (14 ga.)	.068 (14 ga.)	.097 (12 ga.)	.097 (12 ga.)	.097 (12 ga.)
	48	.055 (16 ga.)	.055 (16 ga.)	.055 (16 ga.)	.055 (16 ga.)	.068 (14 ga.)	.068 (14 ga.)	.097 (12 ga.)	.097 (12 ga.)	.097 (12 ga.)
8" to 11"	0	.055 (16 ga.)	.055 (16 ga.)	.055 (16 ga.)	.055 (16 ga.)	.068 (14 ga.)	.097 (12 ga.)			
	96	.055 (16 ga.)	.055 (16 ga.)	.055 (16 ga.)	.055 (16 ga.)	.068 (14 ga.)	.068 (14 ga.)	.097 (12 ga.)	.097 (12 ga.)	.097 (12 ga.)
	48	.055 (16 ga.)	.055 (16 ga.)	.055 (16 ga.)	.055 (16 ga.)	.068 (14 ga.)	.068 (14 ga.)	.097 (12 ga.)	.097 (12 ga.)	.097 (12 ga.)
	24	.055 (16 ga.)	.055 (16 ga.)	.055 (16 ga.)	.055 (16 ga.)	.068 (14 ga.)	.068 (14 ga.)	.097 (12 ga.)	.097 (12 ga.)	.097 (12 ga.)
12" to 15"	0	.055 (16 ga.)	.055 (16 ga.)	.055 (16 ga.)	.068 (14 ga.)	.097 (12 ga.)	.097 (12 ga.)			
	96	.055 (16 ga.)	.055 (16 ga.)	.055 (16 ga.)	.055 (16 ga.)	.068 (14 ga.)	.068 (14 ga.)	.097 (12 ga.)	.112 (11 ga.)	.112 (11 ga.)
	48	.055 (16 ga.)	.055 (16 ga.)	.055 (16 ga.)	.055 (16 ga.)	.068 (14 ga.)	.068 (14 ga.)	.097 (12 ga.)	.097 (12 ga.)	.097 (12 ga.)
	24	.055 (16 ga.)	.055 (16 ga.)	.055 (16 ga.)	.055 (16 ga.)	.068 (14 ga.)	.068 (14 ga.)	.097 (12 ga.)	.097 (12 ga.)	.097 (12 ga.)
16" to 20"	0	.055 (16 ga.)	.055 (16 ga.)	.068 (14 ga.)	.097 (12 ga.)	.112 (11 ga.)				
	96	.055 (16 ga.)	.055 (16 ga.)	.055 (16 ga.)	.055 (16 ga.)	.068 (14 ga.)	.068 (14 ga.)	.112 (11 ga.)	.112 (11 ga.)	.112 (11 ga.)
	48	.055 (16 ga.)	.055 (16 ga.)	.055 (16 ga.)	.055 (16 ga.)	.068 (14 ga.)	.068 (14 ga.)	.097 (12 ga.)	.097 (12 ga.)	.097 (12 ga.)
	24	.055 (16 ga.)	.055 (16 ga.)	.055 (16 ga.)	.055 (16 ga.)	.068 (14 ga.)	.068 (14 ga.)	.097 (12 ga.)	.097 (12 ga.)	.097 (12 ga.)

Note: 1 in. = 25.4 mm

**TABLE 5-6
MINIMUM SHEET METAL THICKNESS FOR RECTANGULAR DUCTS**

NEGATIVE PRESSURE	REINF. SPACING	LONGEST SIDE OF DUCT									
		CLASS 1					CLASS 2				
		Up to 12"	13" to 24"	25" to 36"	37" to 48"	49" to 60"	Up to 12"	13" to 24"	25" to 36"	37" to 48"	49" to 60"
To 7"	48	.021 (24 ga.)	.033 (20 ga.)	.055 (16 ga.)	.068 (14 ga.)		.033 (20 ga.)	.044 (18 ga.)	.055 (16 ga.)	.068 (14 ga.)	
To 7"	24	.021 (24 ga.)	.027 (22 ga.)	.033 (20 ga.)	.033 (20 ga.)	.033 (20 ga.)	.033 (20 ga.)	.044 (18 ga.)	.055 (16 ga.)	.055 (16 ga.)	.055 (16 ga.)
To 7"	12	.021 (24 ga.)	.021 (24 ga.)	.021 (24 ga.)	.021 (24 ga.)	.021 (24 ga.)	.033 (20 ga.)	.044 (18 ga.)	.055 (16 ga.)	.055 (16 ga.)	.055 (16 ga.)
8" to 11"	48	.027 (22 ga.)	.068 (14 ga.)	.097 (12 ga.)	.097 (12 ga.)		.033 (20 ga.)	.068 (14 ga.)	.097 (12 ga.)	.097 (12 ga.)	
8" to 11"	24	.027 (22 ga.)	.055 (16 ga.)	.055 (16 ga.)	.068 (14 ga.)	.068 (14 ga.)	.033 (20 ga.)	.055 (16 ga.)	.055 (16 ga.)	.068 (14 ga.)	.068 (14 ga.)
8" to 11"	12	.021 (24 ga.)	.027 (22 ga.)	.027 (22 ga.)	.027 (22 ga.)	.027 (22 ga.)	.033 (20 ga.)	.044 (18 ga.)	.055 (16 ga.)	.055 (16 ga.)	.055 (16 ga.)
12" to 15"	48	.044 (18 ga.)	.097 (12 ga.)				.044 (18 ga.)	.044 (18 ga.)			
12" to 15"	24	.044 (18 ga.)	.055 (16 ga.)	.097 (12 ga.)	.097 (12 ga.)	.097 (12 ga.)	.044 (18 ga.)	.044 (18 ga.)	.097 (12 ga.)	.097 (12 ga.)	.097 (12 ga.)
12" to 15"	12	.027 (22 ga.)	.044 (18 ga.)	.044 (18 ga.)	.044 (18 ga.)	.044 (18 ga.)	.033 (20 ga.)	.044 (18 ga.)	.055 (16 ga.)	.055 (16 ga.)	.055 (16 ga.)
16" to 20"	48	.068 (14 ga.)	.112 (11 ga.)				.068 (14 ga.)	.112 (11 ga.)			
16" to 20"	24	.068 (14 ga.)	.068 (14 ga.)	.112 (11 ga.)	.112 (11 ga.)	.112 (11 ga.)	.068 (14 ga.)	.068 (14 ga.)	.112 (11 ga.)	.112 (11 ga.)	.112 (11 ga.)
16" to 20"	12	.033 (20 ga.)	.068 (14 ga.)	.068 (14 ga.)	.068 (14 ga.)	.068 (14 ga.)	.033 (20 ga.)	.044 (18 ga.)	.068 (14 ga.)	.068 (14 ga.)	.068 (14 ga.)
			CLASS 3					CLASS 4			
To 7"	48	.044 (18 ga.)	.055 (16 ga.)	.068 (14 ga.)	.068 (14 ga.)		.055 (16 ga.)	.068 (14 ga.)	.097 (12 ga.)	.097 (12 ga.)	
To 7"	24	.044 (18 ga.)	.055 (16 ga.)	.068 (14 ga.)	.068 (14 ga.)	.068 (14 ga.)	.055 (16 ga.)	.068 (14 ga.)	.097 (12 ga.)	.097 (12 ga.)	.097 (12 ga.)
To 7"	12	.044 (18 ga.)	.055 (16 ga.)	.068 (14 ga.)	.068 (14 ga.)	.068 (14 ga.)	.055 (16 ga.)	.068 (14 ga.)	.097 (12 ga.)	.097 (12 ga.)	.097 (12 ga.)
8" to 11"	48	.044 (18 ga.)	.068 (14 ga.)	.097 (12 ga.)	.097 (12 ga.)		.055 (16 ga.)	.068 (14 ga.)	.097 (12 ga.)	.097 (12 ga.)	
8" to 11"	24	.044 (18 ga.)	.055 (16 ga.)	.068 (14 ga.)	.068 (14 ga.)	.068 (14 ga.)	.055 (16 ga.)	.068 (14 ga.)	.097 (12 ga.)	.097 (12 ga.)	.097 (12 ga.)
8" to 11"	12	.044 (18 ga.)	.055 (16 ga.)	.068 (14 ga.)	.068 (14 ga.)	.068 (14 ga.)	.055 (16 ga.)	.068 (14 ga.)	.097 (12 ga.)	.097 (12 ga.)	.097 (12 ga.)
12" to 15"	48	.044 (18 ga.)	.097 (12 ga.)				.055 (16 ga.)	.097 (12 ga.)			
12" to 15"	24	.044 (18 ga.)	.055 (16 ga.)	.097 (12 ga.)	.097 (12 ga.)	.097 (12 ga.)	.055 (16 ga.)	.068 (14 ga.)	.097 (12 ga.)	.097 (12 ga.)	.097 (12 ga.)
12" to 15"	12	.044 (18 ga.)	.055 (16 ga.)	.068 (14 ga.)	.068 (14 ga.)	.068 (14 ga.)	.055 (16 ga.)	.068 (14 ga.)	.097 (12 ga.)	.097 (12 ga.)	.097 (12 ga.)
16" to 20"	48	.068 (14 ga.)	.112 (11 ga.)				.055 (16 ga.)	.112 (11 ga.)			
16" to 20"	24	.068 (14 ga.)	.068 (14 ga.)	.112 (11 ga.)	.112 (11 ga.)	.112 (11 ga.)	.055 (16 ga.)	.068 (14 ga.)	.112 (11 ga.)	.112 (11 ga.)	.112 (11 ga.)
16" to 20"	12	.044 (18 ga.)	.068 (14 ga.)	.068 (14 ga.)	.068 (14 ga.)	.068 (14 ga.)	.055 (16 ga.)	.068 (14 ga.)	.097 (12 ga.)	.097 (12 ga.)	.097 (12 ga.)

Note: 1 in. = 25.4 mm

802.5.2 Termination.

802.5.2.1 A chimney for residential-type or low-heat appliances shall extend at least three (3) feet (914 mm) above the highest point where it passes through a roof of a building and at least two (2) feet (610 mm) higher than any portion of a building within a horizontal distance of ten (10) feet (3,048 mm) (See Figure 8-1). [NFPA 54:12.6.2.1]

802.5.2.2 A chimney for medium-heat appliances shall extend at least ten (10) feet (3,048 mm) higher than any portion of any building within twenty-five (25) feet (7,620 mm). [NFPA 54:12.6.2.2]

802.5.2.3 A chimney shall extend at least five (5) feet (1,524 mm) above the highest connected appliance draft hood outlet or flue collar. [NFPA 54:12.6.2.3]

802.5.2.4 Decorative shrouds shall not be installed at the termination of factory-built chimneys except where such shrouds are listed and labeled for use with the specific factory-built chimney system and are installed in accordance with manufacturer’s installation instructions. [NFPA 54:12.6.2.4]

802.5.3 Size of Chimneys. The effective area of a chimney venting system serving listed gas appliances with draft hoods, Category I appliances, and other appliances listed for use with Type B vents shall be in accordance with one of the following methods [NFPA 54:12.6.3.1]:

- (1) Section 803.0. [NFPA 54:12.6.3.1(1)]
- (2) For sizing an individual chimney venting system for a single appliance with a draft hood, the effective areas of the vent connector and chimney flue shall be not less than the area of the appliance flue collar or draft hood outlet or greater than seven times the draft hood outlet area. [NFPA 54:12.6.3.1(2)]
- (3) For sizing a chimney venting system connected to two (2) appliances with draft hoods, the effective area of the chimney flue shall be not less than the area of the larger draft hood outlet plus 50 percent of the area of the smaller draft hood outlet, or greater than seven (7) times the smallest draft hood outlet area. [NFPA 54:12.6.3.1(3)]
- (4) Other approved engineering methods. [NFPA 54:12.6.3.1(5)]
- (5) Chimney venting systems using mechanical draft shall be sized in accordance with approved engineering methods. [NFPA 54:12.6.3.1(4)]

802.5.4 Inspection of Chimneys.

802.5.4.1 Before replacing an existing appliance or connecting a vent connector to a chimney, the chimney passageway shall be examined to ascertain that it is clear and free of obstructions and shall be cleaned if previously used for venting solid or liquid fuel-burning appliances or fireplaces. [NFPA 54:12.6.4.1]

**TABLE 8-1
TYPE OF VENTING SYSTEM TO BE USED
[NFPA 54: TABLE 12.5.1]**

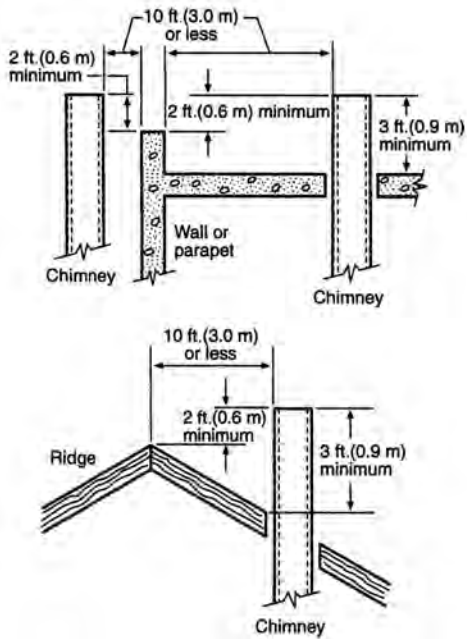
APPLIANCE	TYPE OF VENTING SYSTEM
Listed Category I appliance Listed appliance equipped with draft hood	Type B gas vent (802.6) Chimney (802.5)
Appliance listed for use with Type B gas vent	Single-wall metal pipe (802.7) Listed chimney lining system for gas venting (802.5.1.3) Special gas vent listed for this appliance (802.4.4)
Listed vented wall furnaces	Type B-W gas vent (802.6, 928.0)
Category II appliance Category III appliance Category IV appliance	As specified or furnished by manufacturers of listed appliance (802.4.2, 802.4.4)
Incinerators, outdoors	Single-wall metal pipe (802.7, 802.7.3.3)
Incinerators, indoors Appliance that can be converted to use of solid fuel Unlisted combination gas- and oil-burning appliance Combination gas- and solid-fuel-burning appliance Appliance listed for use with chimneys only Unlisted appliance	Chimney (802.5)
Listed combination gas- and oil-burning appliance	Type L vent (802.6) or chimney (802.5)
Decorative appliance in vented fireplace	Chimney [907.2]
Gas-fired toilets	Single-wall metal pipe (802.7, 926.3)
Direct-vent appliance	See 802.2.5
Appliance with integral vent	See 802.2.6

802.5.4.2 Chimneys shall be lined in accordance with NFPA 211, *Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances*. [NFPA 54:12.6.4.2]

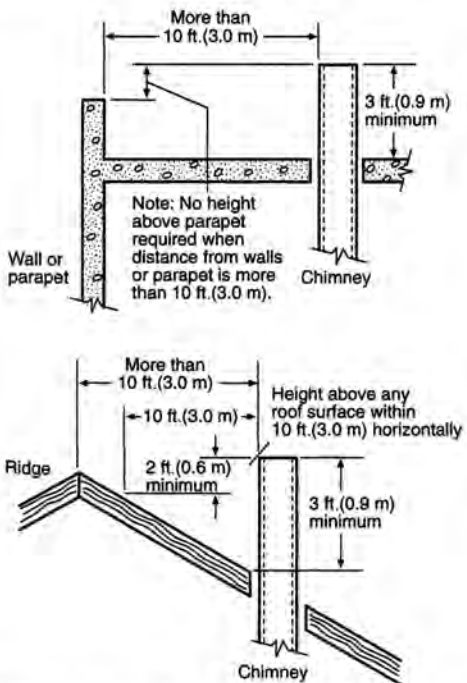
Exception: Existing chimneys shall be permitted to have their use continued when an appliance is replaced by an appliance or similar type, input rating, and efficiency, where the chimney complies with Section 802.5.4, and the sizing of the chimney is in accordance with Section 802.5.3.

802.5.4.3 Cleanouts shall be examined to determine that they will remain tightly closed when not in use. [NFPA 54:12.6.4.3]

802.5.4.4 When inspection reveals that an existing chimney is not safe for the intended application, it shall be repaired, rebuilt, lined, relined, or replaced with a vent or chimney to conform to NFPA 211,



(a) Termination 10 ft.(3.0 m) or Less from Ridge, Wall, or Parapet



(b) Termination More Than 10 ft.(3.0 m) from Ridge, Wall, or Parapet

FIGURE 8-1
TYPICAL TERMINATION LOCATIONS FOR CHIMNEYS
AND SINGLE-WALL METAL PIPES SERVING
RESIDENTIAL-TYPE AND LOW-HEAT APPLIANCE.
[NFPA 54: FIGURE 12.6.2.1]

Standard for Chimneys, Fireplaces, Vents, and Solid-Fuel-Burning Appliances, and shall be suitable for the appliance to be attached. [NFPA 54:12.6.4.4]

802.5.5 Chimney Serving Appliances Burning Other Fuels.

802.5.5.1 Appliances shall not be connected to a chimney flue serving a separate appliance designed to burn solid fuel. [NFPA 54:12.6.5.1]

802.5.5.2 Where one (1) chimney serves gas appliances and an appliance burning liquid fuel, the appliances shall be connected through separate openings or shall be connected through a single opening where joined by a suitable fitting located as close as practical to the chimney. Where two (2) or more openings are provided into one (1) chimney flue, they shall be at different levels. Where the appliance is automatically controlled, it shall be equipped with a safety shutoff device. [NFPA 54:12.6.5.2]

802.5.5.3 A listed combination gas and solid fuel-burning appliance connected to a single chimney flue shall be equipped with a manual reset device to shut off gas to the main burner in the event of sustained backdraft or flue gas spillage. The chimney flue shall be sized to properly vent the appliance. [NFPA 54:12.6.5.3]

802.5.5.4 A single chimney flue serving a listed combination gas- and oil-burning appliance shall be sized to properly vent the appliance. [NFPA 54:12.6.5.4]

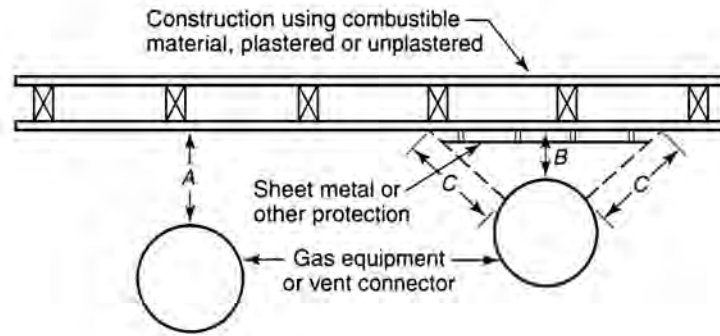
802.5.6 Support of Chimneys. All portions of chimneys shall be supported for the design and weight of the materials employed. Listed factory-built chimneys shall be supported and spaced in accordance with their listings and the manufacturers' instructions. [NFPA 54:12.6.6]

802.5.7 Cleanouts. Where a chimney that formerly carried flue products from liquid or solid fuel-burning appliances is used with an appliance using fuel gas, an accessible cleanout shall be provided. The cleanout shall have a tight-fitting cover and be installed so its upper edge is at least six (6) inches (150 mm) below the lower edge of the lowest chimney inlet opening. [NFPA 54:12.6.7]

802.5.8 Space Surrounding Lining or Vent. The remaining space surrounding a chimney liner, gas vent, special gas vent, or plastic piping installed within a masonry chimney flue shall not be used to vent another appliance. [NFPA 54:12.6.8.1]

Exception: The insertion of another liner or vent within the chimney as provided in this code and the liner or vent manufacturer's instructions.

The remaining space surrounding a chimney liner, gas vent, special gas vent, or plastic piping installed within a masonry, metal or factory-built chimney flue shall not be used to supply combustion air. [NFPA 54:12.6.8.2]



Notes:

A equals the clearance with no protection.

B equals the reduced clearance permitted. The protection applied to the construction using combustible material shall extend far enough in each direction to make C equal to A.

FIGURE 9-1(a)
EXTENT OF PROTECTION NECESSARY TO REDUCE CLEARANCE FROM GAS EQUIPMENT OR VENT CONNECTORS.
[NFPA 54-09: FIGURE 10.3.2.2(A)]

six (6) inches (150 mm) for the next three (3) feet (914 mm) and one (1) inch (25 mm) beyond six (6) feet (1,829 mm). [NFPA 54:10.3.2.10]

904.3 Assembly and Installation. A central-heating boiler or furnace shall be installed in accordance with the manufacturer's instructions and shall be installed on a floor of noncombustible construction with noncombustible flooring and surface finish and with no combustible material against the underside thereof, or on fire-resistive slabs or arches having no combustible material against the underside thereof.

Exceptions:

- (1) Appliances listed for installation on a combustible floor.
- (2) Installation on a floor protected in an approved manner. [NFPA 54:10.3.3]

904.3.1 Under-floor Installation. Furnaces installed in an under-floor area of the building shall comply with the Sections 904.3.1.1 through 904.3.1.3.

904.3.1.1 Supported by Ground. Where a furnace is supported by the ground, it shall be installed on a concrete slab not less than three (3) inches (76 mm) above the adjoining ground level.

904.3.1.2 Supported from Above. Where a furnace is supported from above, a minimum clearance of six (6) inches (152 mm) shall be provided from finished grade.

904.3.1.3 Excavation. Where excavation is necessary to install a furnace, it shall extend to a depth of six (6) inches (152 mm) below and twelve (12) inches (300 mm) on all sides of the furnace, except on the service side, which shall have thirty (30) inches (762 mm). If the depth of the excavation for either the furnace or passageway exceeds twelve (12) inches (300 mm), walls shall be lined with concrete or masonry four (4) inches (102 mm) above the adjoining ground level.

904.4 Temperature- or Pressure-Limiting Devices. Steam and hot water boilers, respectively, shall be provided with approved automatic limiting devices for shutting down the burner(s) to prevent boiler steam pressure or boiler water temperature from exceeding the maximum allowable working pressure or temperature. Safety limit controls shall not be used as operating controls. [NFPA 54:10.3.4]

904.5 Low-Water Cutoff. Hot water boilers installed above the radiation level and all steam boilers shall be provided with an automatic means to shut off the fuel supply to the burner(s) if the boiler water level drops to the lowest safe water line. [NFPA 54:10.3.5]

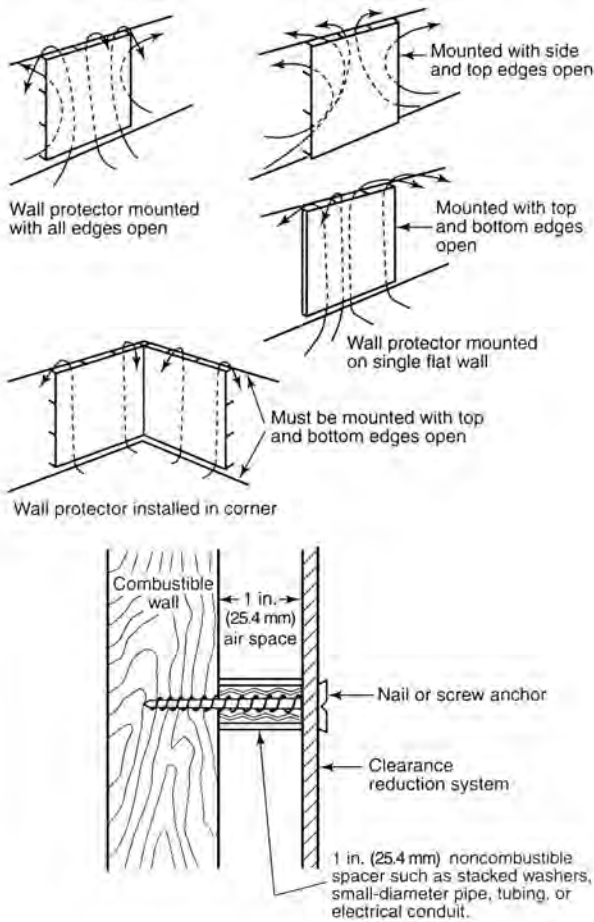
904.6 Steam Safety and Pressure-Relief Valves. Steam and hot water boilers shall be equipped, respectively, with listed or approved steam safety or pressure-relief valves of appropriate discharge capacity and conforming with ASME requirements. A shutoff valve shall not be placed between the relief valve and the boiler or on discharge pipes between such valves and the atmosphere.

- (1) Relief valves shall be piped to discharge near the floor.
- (2) The entire discharge piping shall be at least the same size as the relief valve discharge piping.
- (3) Discharge piping shall not contain a threaded end connection at its termination point. [NFPA 54:10.3.6]

904.7 Furnace Plenums and Air Ducts.

- (A) Furnace plenums and air ducts shall be installed in accordance with NFPA 90A, *Standard for the Installation of Air-Conditioning and Ventilating Systems*, or NFPA 90B, *Standard for the Installation of Warm-Air Heating and Air-Conditioning Systems*. [NFPA 54:10.3.7.1]
- (B) A furnace plenum supplied as a part of a furnace shall be installed in accordance with the manufacturer's instructions. [NFPA 54:10.3.7.2]
- (C) Where a furnace plenum is not supplied with the furnace, any fabrication and installation instructions provided by

INSTALLATION OF SPECIFIC APPLIANCES



Masonry walls can be attached to combustable walls using wall ties. Spacers should not be used directly behind appliance or connector.

FIGURE 9-1(b)
WALL PROTECTOR CLEARANCE REDUCTION SYSTEM.
[NFPA 54-09: FIGURE 10.3.2.2(b)]

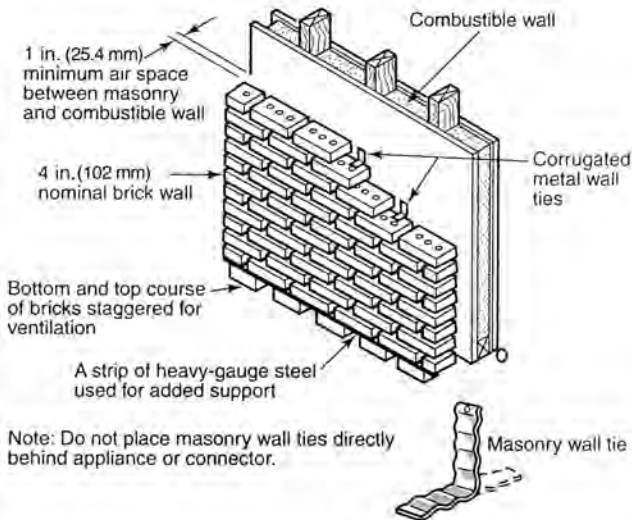


FIGURE 9-1(c)
MASONRY CLEARANCE REDUCTION SYSTEM.
[NFPA 54-09: FIGURE 10.3.2.2(c)]

the manufacturer shall be followed. The method of connecting supply and return ducts shall facilitate proper circulation of air. [NFPA 54:10.3.7.3]

- (D) Where a furnace is installed so supply ducts carry air circulated by the furnace to areas outside the space containing the furnace, the return air shall also be handled by a duct(s) sealed to the furnace casing and terminating outside the space containing the furnace. [NFPA 54:10.3.7.4]

904.8 Refrigeration Coils. The installation of refrigeration coils shall comply with the following requirements: [NFPA 54:10.3.8]

- (A) A refrigeration coil shall not be installed in conjunction with a forced-air furnace where circulation of cooled air is provided by the furnace blower, unless the blower has sufficient capacity to overcome the external static resistance imposed by the duct system and cooling coil and the air throughput necessary for heating or cooling, whichever is greater. [NFPA 54:10.3.8(1)]
- (B) Furnaces shall not be located upstream from cooling units, unless the cooling unit is designed or equipped so as not to develop excessive temperature or pressure. [NFPA 54:10.3.8(2)]
- (C) Refrigeration coils shall be installed in parallel with or on the downstream side of central furnaces to avoid condensation in the heating element, unless the furnace has been specifically listed for downstream installation. With a parallel flow arrangement, the dampers or other means used to control flow of air shall be sufficiently tight to prevent any circulation of cooled air through the furnace. [NFPA 54:10.3.8(3)]
- (D) Means shall be provided for disposal of condensate and to prevent dripping of condensate on the heating element. [NFPA 54:10.3.8(4)]

904.9 Cooling Units Used with Heating Boilers.

- (A) Boilers, where used in conjunction with refrigeration systems, shall be installed so that the chilled medium is piped in parallel with the heating boiler with appropriate valves to prevent the chilled medium from entering the heating boiler. [NFPA 54:10.3.9.1]
- (B) Where hot-water-heating boilers are connected to heating coils located in air-handling units where they can be exposed to refrigerated air circulation, such boiler piping systems shall be equipped with flow control valves or other automatic means to prevent gravity circulation of the boiler water during the cooling cycle. [NFPA 54:10.3.9.2]

904.10 Access to Appliances on Roofs.

904.10.1 Appliances located on roofs or other elevated locations shall be accessible. [NFPA 54-09:9.4.3.1]

904.10.2 Buildings of more than fifteen (15) feet (4,572 mm) in height shall have an inside means of access to the roof, unless other means acceptable to the Authority Having Jurisdiction are used. [NFPA 54-09:9.4.3.2]

904.10.3 The inside means of access shall be a permanent or foldaway inside stairway or ladder, terminating in an enclosure, scuttle, or trapdoor. Such scuttles or trapdoors shall be at least twenty-two (22)

1308.0 Temporary Use of Gas.

Where temporary use of gas is desired and the Authority Having Jurisdiction deems the use necessary, a permit may be issued for such use for a period of time not to exceed that designated by the Authority Having Jurisdiction, provided that such gas piping system otherwise conforms to the requirements of this code regarding material, sizing, and safety.

1309.0 Gas Piping System Design, Materials, and Components.

1309.1 Piping Plan.

1309.1.1 Installation of Piping System. Where required by the Authority Having Jurisdiction, a piping sketch or plan shall be prepared before proceeding with the installation. This plan shall show the proposed location of piping, the size of different branches, the various load demands, and the location of the point of delivery.

1309.1.2 Addition to Existing System. When additional appliances are being connected to a gas piping system, the existing piping shall be checked to determine whether it has adequate capacity (See Section 1309.4.3). If inadequate, the existing system shall be enlarged as required, or separate gas piping of adequate capacity shall be provided. [NFPA 54:5.1.2]

1309.2 Provision for Location of Point of Delivery. The location of the point of delivery shall be acceptable to the serving gas supplier. [NFPA 54:5.2]

1309.3 Interconnections Between Gas Piping Systems. [NFPA 54:5.3]

1309.3.1 Interconnections Supplying Separate Users. Where two (2) or more meters, or two (2) or more service regulators where meters are not provided, are located on the same premises and supply separate users, the gas piping systems shall not be interconnected on the outlet side of the meters or service regulators. [NFPA 54:5.3.1]

1309.3.2 Interconnections for Standby Fuels. Where a supplementary gas for standby use is connected downstream from a meter or a service regulator where a meter is not provided, a device to prevent backflow shall be installed. A three-way valve installed to admit the standby supply and at the same time shut off the regular supply shall be permitted to be used for this purpose. [NFPA 54:5.3.2]

1309.4 Sizing of Gas Piping Systems.

1309.4.1 General Considerations. Gas piping systems shall be of such size and so installed as to provide a supply of gas sufficient to meet the maximum demand and supply gas to each appliance inlet at not less than the minimum supply pressure required by the appliance. [NFPA 54-09:5.4.1]

1309.4.2 Maximum Gas Demand. The volume of gas to be provided (in cubic feet per hour) shall be determined directly from the manufacturer's input ratings of the appliance served. Where the input rating is not indicated, the gas supplier, the appliance manufacturer, or a qualified agency shall be contacted, or the rating from Table 13-1

shall be used for estimating the volume of gas to be supplied. The total connected hourly load shall be used as the basis for pipe sizing, assuming all appliances are operating at full capacity simultaneously. [NFPA 54:5.4.2]

Exception: Sizing shall be permitted to be based upon established load diversity factors.

**TABLE 13-1
APPROXIMATE GAS INPUT FOR TYPICAL APPLIANCES
[NFPA 54: TABLE 5.4.2.1]**

APPLIANCE	INPUT Btu/h (approx.)
SPACE HEATING UNITS	
Warm air furnace	
Single family	100,000
Multifamily, per unit	60,000
Hydronic boiler	
Single family	100,000
Multifamily, per unit	60,000
SPACE AND WATER HEATING UNITS	
Hydronic boiler	
Single family	120,000
Multifamily, per unit	75,000
WATER HEATING APPLIANCES	
Water heater, automatic storage	
30 to 40 gal tank	35,000
Water heater, automatic storage	
50 gal tank	50,000
Water heater, automatic instantaneous	
Capacity at 2 gal/minute	142,800
Capacity at 4 gal/minute	285,000
Capacity at 6 gal/minute	428,400
Water heater, domestic,	
Circulating or side-arm	35,000
COOKING APPLIANCES	
Range, free standing, domestic	65,000
Built-in oven or broiler unit, domestic	25,000
Built-in top unit, domestic	40,000
OTHER APPLIANCES	
Refrigerator	3,000
Clothes dryer, Type 1 (domestic)	35,000
Gas fireplace, direct vent	40,000
Gas log	80,000
Barbecue	40,000
Gas light	2,500

Note: 1 Btu/hr = 0.293 W

1309.4.3 Sizing Methods. Gas piping shall be sized in accordance with one of the following:

- (1) Pipe sizing tables or sizing equations in this chapter.
- (2) Other approved engineering methods acceptable to the Authority Having Jurisdiction.

- (3) Sizing tables included in a listed piping system manufacturer's installation instructions. [NFPA 54:5.4.3]

1309.4.4 Allowable Pressure Drop. The design pressure loss in any piping system under maximum probable flow conditions, from the point of delivery to the inlet connection of the appliance, shall be such that the supply pressure at the appliance is greater than or equal to the minimum pressure required by the appliance. [NFPA 54-09:5.4.4]

1309.5 Acceptable Piping Materials and Joining Methods.

1309.5.1 General.

1309.5.1.1 Materials. Materials used for piping systems shall comply with the requirements of this chapter or shall be acceptable to the Authority Having Jurisdiction. [NFPA 54:5.6.1.1]

1309.5.1.2 Used Materials. Pipe, fittings, valves, or other materials shall not be used again unless they are free of foreign materials and have been ascertained to be adequate for the service intended. [NFPA 54:5.6.1.2]

1309.5.1.3 Other Materials. Material not covered by the standard specifications listed herein shall be investigated and tested to determine that it is safe and suitable for the proposed service and, in addition, shall be recommended for that service by the manufacturer and shall be acceptable to the Authority Having Jurisdiction. [NFPA 54:5.6.1.3]

1309.5.2 Metallic Pipe.

1309.5.2.1 Cast-iron pipe shall not be used. [NFPA 54:5.6.2.1]

1309.5.2.2 Steel and wrought-iron pipe shall be at least of standard weight (Schedule 40) and shall comply with one of the following standards:

- (1) ASME B36.10, *Welded and Seamless Wrought-Steel Pipe*.
- (2) ASTM A 53, *Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless*.
- (3) ASTM A 106, *Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service*. [NFPA 54:5.6.2.2]

1309.5.2.3 Copper and brass pipe shall not be used if the gas contains more than an average of 0.3 grains of hydrogen sulfide per one-hundred (100) scf of gas (0.7 mg/100 L). [NFPA 54:5.6.2.3]

Threaded copper, brass, or aluminum alloy pipe shall not be used with gases corrosive to such material. [NFPA 54:5.6.2.4]

1309.5.2.4 Aluminum alloy pipe shall comply with ASTM B 241, *Standard Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube* (except that the use of alloy 5456 is prohibited) and shall be marked at each end of each length indicating compliance. Aluminum alloy pipe shall be coated to protect against external corrosion where it is in contact with masonry, plaster, insula-

tion, or is subject to repeated wettings by such liquids as water, detergents, or sewage. [NFPA 54:5.6.2.5]

Aluminum alloy pipe shall not be used in exterior locations or underground. [NFPA 54:5.6.2.6]

1309.5.3 Metallic Tubing. Seamless copper, aluminum alloy, or steel tubing shall not be used with gases corrosive to such material. [NFPA 54:5.6.3]

1309.5.3.1 Steel tubing shall comply with ASTM A 254, *Standard Specification for Copper-Brazed Steel Tubing*. [NFPA 54-09:5.6.3.1]

1309.5.3.2 Copper and brass tubing shall not be used if the gas contains more than an average of 0.3 grains of hydrogen sulfide per one-hundred (100) scf of gas (0.7 mg/100 L). Copper tubing shall comply with standard Type K or L of ASTM B 88, *Standard Specification for Seamless Copper Water Tube*, or ASTM B 280, *Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service*. [NFPA 54:5.6.3.2]

1309.5.3.3 Aluminum alloy tubing shall comply with ASTM B 210, *Standard Specification for Aluminum and Aluminum-Alloy Drawn Seamless Tubes*, or ASTM B 241, *Standard Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube*. Aluminum alloy tubing shall be coated to protect against external corrosion where it is in contact with masonry, plaster, insulation, or is subject to repeated wettings by such liquids as water, detergent, or sewage. Aluminum alloy tubing shall not be used in exterior locations or underground. [NFPA 54:5.6.3.3]

1309.5.3.4 Corrugated stainless steel tubing shall be tested and listed in compliance with the construction, installation, and performance requirements of CSA LC-1, *Standard for Fuel Gas Piping Systems Using Corrugated Stainless Steel Tubing*. [NFPA 54:5.6.3.4]

1309.5.4 Plastic Pipe, Tubing, and Fittings. Plastic pipe, tubing, and fittings used to supply fuel gas shall conform with ASTM D 2513, *Standard Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings*. Pipe to be used shall be marked "gas" and "ASTM D 2513, Thermoplastic Gas Pressure Pipe, Tubing and Fittings." [NFPA 54:5.6.4.1]

Anodeless risers shall comply with the following: [NFPA 54:5.6.4.3]

1309.5.4.1 Factory-assembled anodeless risers shall be recommended by the manufacturer for the gas used and shall be leak-tested by the manufacturer in accordance with written procedures. [NFPA 54:5.6.4.3(1)]

1309.5.4.2 Service head adapters and field-assembled anodeless risers incorporating service head adapters shall be recommended by the manufacturer for the gas used by the manufacturer and shall be design-certified to meet the requirements of Category I of ASTM F1973, *Factory Assembled Anodeless Riser and Transition Fitting in Polyethylene (PE) Fuel Gas Distribution Systems*, and the Code

(3) ASTM F 2509, *Standard Specification for Field-assembled Anodeless Riser Kits for Use on Outside Diameter Controlled Polyethylene Gas Distribution Pipe and Tubing*. [NFPA 54-09:7.1.7.2]

(C) An electrically continuous corrosion-resistant tracer wire (minimum AWG 14) or tape shall be buried with the plastic pipe to facilitate locating. One (1) end shall be brought above ground at a building wall or riser. [NFPA 54:7.1.7.3]

1312.2 Installation of Piping.

1312.2.1 Piping installed above ground shall be securely supported and located where it will be protected from physical damage (Also See Section 1312.1.4). Where passing through an outside wall, the piping shall also be protected against corrosion by coating or wrapping with an inert material approved for such applications. Where piping is encased in a protective pipe sleeve, the annular space between the gas piping and the sleeve shall be sealed at the wall to prevent the entry of water, insects, or rodents. [NFPA 54:7.2.1]

1312.2.2 Building Structure.

- (1) The installation of gas piping shall not cause structural stresses within building components to exceed allowable design limits. [NFPA 54:7.2.2.1]
- (2) Approval shall be obtained before any beams or joists are cut or notched. [NFPA 54:7.2.2.2]

1312.2.3 Other Than Dry Gas. Drips, sloping, protection from freezing, and branch pipe connections, as provided for in Sections 1312.1.4, 1312.6.1, and 1312.8, shall be provided when other than dry gas is distributed and climactic conditions make such provisions necessary. [NFPA 54:7.2.3]

1312.2.4 Gas Piping to be Sloped. Piping for other than dry gas conditions shall be sloped not less than one-fourth (1/4) inch in fifteen (15) feet (7 mm in 4.6 m) to prevent traps. [NFPA 54:7.2.4]

1312.2.4.1 Ceiling Locations. Gas piping shall be permitted to be installed in accessible spaces between a fixed ceiling and a dropped ceiling, whether or not such spaces are used as a plenum. Valves shall not be located in such spaces.

Exception: Equipment shutoff valves required by this code shall be permitted to be installed in accessible spaces containing vented appliances.

1312.2.5 Prohibited Locations. Gas piping inside any building shall not be installed in or through a circulating air duct, clothes chute, chimney or gas vent, ventilating duct, dumbwaiter, or elevator shaft. [NFPA 54:7.2.5] This provision shall not apply to ducts used to provide combustion and ventilation air in accordance with Section 701.0 or to above-ceiling spaces as covered in Section 1312.2.4.1.

1312.2.6 Hangers, Supports, and Anchors.

(A) Piping shall be supported with metal pipe hooks, metal pipe straps, metal bands, metal brackets, metal hangers, or building structural components;

suitable for the size of piping, of adequate strength and quality, and located at intervals so as to prevent or damp out excessive vibration. Piping shall be anchored to prevent undue strains on connected appliances and shall not be supported by other piping. Pipe hangers and supports shall conform to the requirements of MSS SP-58, *Pipe Hangers and Supports - Materials, Design and Manufacture*. [NFPA 54:7.2.6.1]

- (B) Spacings of supports in gas piping installations shall not be greater than shown in Table 13-3. Spacing of supports for CSST shall be in accordance with the CSST manufacturer's instruction. [NFPA 54:7.2.6.2]
- (C) Supports, hangers, and anchors shall be installed so as not to interfere with the free expansion and contraction of the piping between anchors. All parts of the supporting appliances shall be designed and installed so they will not be disengaged by movement of the supported piping. [NFPA 54:7.2.6.3]

**TABLE 13-3
SUPPORT OF PIPING
[NFPA 54: TABLE 7.2.6.2]**

STEEL PIPE, NOMINAL SIZE OF PIPE (in.)	SPACING OF SUPPORTS (ft.)	NOMINAL SIZE OF TUBING SMOOTH-WALL (in. O.D.)	SPACING OF SUPPORTS (ft.)
1/2	6	1/2	4
3/4 or 1	8	5/8 or 3/4	6
1 1/4 or larger (horizontal)	10	7/8 or 1 (horizontal)	8
1 1/4 or larger (vertical)	Every floor level	1 or larger (vertical)	Every floor level

Note: 1 ft. = 0.305 m

1312.2.7 Removal of Pipe. Where piping containing gas is to be removed, the line shall be first disconnected from all sources of gas and then thoroughly purged with air, water, or inert gas before any cutting or welding is done (See Section 1316.6). [NFPA 54:7.2.7]

1312.3 Concealed Piping Building.

1312.3.1 General. Gas piping in concealed locations shall be installed in accordance with this section. [NFPA 54:7.3.1]

1312.3.2 Connections. Where gas piping is to be concealed, unions, tubing fittings, right and left couplings, bushings, swing joints, and compression couplings made by combinations of fittings shall not be used. Connections shall be of the following type:

- (1) Pipe fittings, such as elbows, tees, and couplings.
- (2) Joining tubing by brazing (See Section 1309.5.8.2).
- (3) Fittings listed for use in concealed spaces that have been demonstrated to sustain, without leakage, any forces due to temperature expansion or contraction,

vibration, or fatigue based on their geographic location, application, or operation.

- (4) Where necessary to insert fittings in gas pipe that has been installed in a concealed location, the pipe shall be reconnected by welding, flanges, or the use of a ground joint union with the nut center-punched to prevent loosening by vibration. [NFPA 54:7.3.2]

1312.3.3 Piping in Partitions. Concealed gas piping shall not be located in solid partitions. [NFPA 54:7.3.3]

1312.3.4 Tubing in Partitions. This provision shall not apply to tubing that pierces walls, floors, or partitions. Tubing installed vertically and horizontally inside hollow walls or partitions without protection along its entire concealed length shall meet the following requirements [NFPA 54:7.3.4]:

1312.3.4.1 Tubing shall only be installed horizontally or vertically.

1312.3.4.2 A steel striker barrier not less than 0.0508 in. (1.3 mm) thick, or equivalent, shall be installed between the tubing and the finished wall and shall extend at least four (4) inches (100 mm) beyond concealed penetrations of plates, fire stops, wall studs, and similar construction features. [NFPA 54:7.3.4(1)]

1312.3.4.3 The tubing shall be installed in single runs and shall not be rigidly secured. [NFPA 54:7.3.4(2)]

1312.3.4.4 Where the wall or partition contains batt-type insulation the insulation shall not restrict the movement of the tubing.

1312.3.5 Piping in Floors. In industrial occupancies, gas piping in solid floors such as concrete shall be laid in channels in the floor and covered to permit access to the piping with a minimum of damage to the building. Where piping in floor channels could be exposed to excessive moisture or corrosive substances, the piping shall be protected in an approved manner. [NFPA 54:7.3.5.1]

Exception: In other than industrial occupancies and where approved by the Authority Having Jurisdiction, gas piping embedded in concrete floor slabs constructed with portland cement shall be surrounded with a minimum of 1½ inch (38 mm) of concrete and shall not be in physical contact with other metallic structures, such as reinforcing rods or electrically neutral conductors. All piping, fittings, and risers shall be protected against corrosion in accordance with Section 1309.5.6. Piping shall not be embedded in concrete slabs containing quickset additives or cinder aggregate. [NFPA 54:7.3.5.2]

1312.4 Piping in Vertical Chases (See Section 1302.0). Where gas piping exceeding five (5) psi (34 kPa) is located within vertical chases in accordance with NFPA 54, *National Fuel Gas Code*, Section 5.5.1(2), the requirements of Sections 1312.4.1 through 1312.4.3 shall apply. [NFPA 54:7.4]

The following references were extracted from NFPA 54, National Fuel Gas Code:

5.5.1 Maximum Design Operating Pressure. The maximum design operating pressure for piping systems located inside buildings shall not exceed 5 psi (34 kPa) unless one or more of the following conditions are met:

- (1) *The piping system is welded.*
- (2) *The piping is located in a ventilated chase or otherwise enclosed for protection against accidental gas accumulation.*
- (3) *The piping is located inside buildings or separate areas of buildings used exclusively for one of the following:*
 - (a) *Industrial processing or heating*
 - (b) *Research*
 - (c) *Warehousing*
 - (d) *Boiler or mechanical equipment rooms*
- (4) *The piping is a temporary installation for building under construction.*
- (5) *The piping serves appliances or equipment used for agricultural purposes.*
- (6) *The piping system is an LP-Gas piping system with a design operating pressure greater than 20 psi and complies with NFPA 58, Liquefied Petroleum Gas Code, Section 5.5.2. LP-Gas systems designed to operate below -5°F (-21°C) or with butane or a propane-butane mix shall be designed to either accommodate liquid LP-Gas or to prevent LP-Gas vapor from condensing back into liquid.*

5.5.2 Liquefied Petroleum Gas Systems. LP-Gas systems designed to operate below -5 F (-21C) or with butane or a propane-butane mix shall be designed to either accommodate liquid LP-Gas or to prevent LP-Gas vapor from condensing back into a liquid.

1312.4.1 Pressure Reduction (See Section 1302). Where pressure reduction is required in branch connections for compliance with NFPA 54, *National Fuel Gas Code*, Section 5.5.1, such reduction shall take place either inside the chase or immediately adjacent to the outside wall of the chase. Regulator venting and downstream overpressure protection shall comply with Section 1309.7.5. The regulator shall be accessible for service and repair and vented in accordance with one (1) of the following:

- (1) Where the fuel gas is lighter than air, regulators equipped with a vent-limiting means shall be permitted to be vented into the chase. Regulators not equipped with a vent-limiting means shall be permitted to be vented either directly to the outdoors or to a point within the top one (1) foot (305 mm) of the chase.
- (2) Where the fuel gas is heavier than air, the regulator vent shall be vented only directly to the outdoors. [NFPA 54:7.4.1]

1312.4.2 Construction. Chase construction shall comply with local building codes with respect to fire resistance and protection of horizontal and vertical openings. [NFPA 54:7.4.2]

1312.4.3 Ventilation. A chase shall be ventilated to the outdoors and only at the top. The opening(s) shall have a minimum free area (in square inches) equal to the

product of one-half (½) of the maximum pressure in the piping (in psi) times the largest nominal diameter of that piping (in inches), or the cross-sectional area of the chase, whichever is smaller. Where more than one (1) fuel gas piping system is present, the free area for each system shall be calculated and the largest area used. [NFPA 54:7.4.3]

1312.5 Gas Pipe Turns. Changes in direction of gas pipe shall be made by the use of fittings or factory bends. [NFPA 54:7.5]

1312.5.1 Metallic Pipe. Metallic pipe bends shall comply with the following:

- (1) Bends shall be made only with bending equipment and procedures intended for that purpose.
- (2) All bends shall be smooth and free from buckling, cracks, or other evidence of mechanical damage.
- (3) The longitudinal weld of the pipe shall be near the neutral axis of the bend.
- (4) Pipe shall not be bent through an arc of more than 90 degrees.
- (5) The inside radius of a bend shall be not less than six (6) times the outside diameter of the pipe. [NFPA 54:7.5.1]

1312.5.2 Plastic Pipe. Plastic pipe bends shall comply with the following:

- (1) The pipe shall not be damaged, and the internal diameter of the pipe shall not be effectively reduced.
- (2) Joints shall not be located in pipe bends.
- (3) The radius of the inner curve of such bends shall not be less than 25 times the inside diameter of the pipe.
- (4) Where the piping manufacturer specifies the use of special bending equipment or procedures, such equipment or procedures shall be used. [NFPA 54:7.5.2]

1312.5.3 Elbows. Factory-made welding elbows or transverse segments cut therefrom shall have an arc length measured along the crotch of at least one (1) inch (25 mm) for pipe sizes two (2) inches (50 mm) and larger. [NFPA 54:7.5.3]

1312.6 Drips and Sediment Traps.

1312.6.1 Provide Drips Where Necessary. For other than dry gas conditions, a drip shall be provided at any point in the line of pipe where condensate could collect. Where required by the Authority Having Jurisdiction or the serving gas supplier, a drip shall also be provided at the outlet of the meter. This drip shall be so installed as to constitute a trap wherein an accumulation of condensate will shut off the flow of gas before it will run back into the meter. [NFPA 54:7.6.1]

1312.6.2 Location of Drips. All drips shall be installed only in such locations that they will be readily accessible to permit cleaning or emptying. A drip shall not be located where the condensate is likely to freeze. [NFPA 54:7.6.2]

1312.6.3 Sediment Traps (See Section 1313.7).

1312.7 Outlets.

1312.7.1 Location and Installation.

- (1) The outlet fittings or piping shall be securely fastened in place. [NFPA 54:7.7.1.1]
- (2) Outlets shall not be located behind doors. [NFPA 54:7.7.1.2]
- (3) Outlets shall be located far enough from floors, walls, patios, slabs, and ceilings to permit the use of wrenches without straining, bending, or damaging the piping. [NFPA 54:7.7.1.3]
- (4) The unthreaded portion of gas piping outlets shall extend not less than (1) inch (25 mm) through finished ceilings or indoor or outdoor walls. [NFPA 54:7.7.1.4]
- (5) The unthreaded portion of gas piping outlets shall extend not less than two (2) inches (50 mm) above the surface off floors or outdoor patios or slabs. [NFPA 54:7.7.1.5]
- (6) The provisions of Section 1312.7.1(4) and (5) shall not apply to listed quick disconnect devices of the flush-mounted type or listed gas convenience outlets. Such devices shall be installed in accordance with the manufacturer's installation instructions. [NFPA 54:7.7.1.6]

1312.7.2 Cap All Outlets.

- (A)** Each outlet, including a valve, shall be closed gastight with a threaded plug or cap immediately after installation and shall be left closed until the appliance is connected thereto. When an appliance is disconnected from an outlet and the outlet is not to be used again immediately, it shall be closed gastight. [NFPA 54:7.7.2.1]

Exceptions:

- (1) Laboratory equipment installed in accordance with Section 1313.2(A) shall be permitted.
 - (2) The use of a listed quick-disconnect device with integral shutoff or listed gas convenience outlet shall be permitted.
- (B)** Equipment shutoff valves installed in fireplaces shall be removed and the piping capped gastight where the fireplace is used for solid-fuel burning. [NFPA 54:7.7.2.2]

1312.8 Branch Pipe Connection. When a branch outlet is placed on a main supply line before it is known what size pipe will be connected to it, the outlet shall be of the same size as the line that supplies it. [NFPA 54:7.8]

1312.9 Manual Gas Shutoff Valves (See Section 1313.4).

1312.9.1 Valves at Regulators. An accessible gas shutoff valve shall be provided upstream of each gas pressure regulator. Where two (2) gas pressure regulators are installed in series in a single gas line, a manual valve shall not be required at the second regulator. [NFPA 54:7.9.1]

1312.9.2 Valves Controlling Multiple Systems.

(A) Accessibility of Gas Valves. Main gas shutoff valves controlling several gas piping systems shall be readily accessible for operation and installed so as to be protected from physical damage. They shall be marked with a metal tag or other permanent means attached by the installing agency so that the gas piping systems supplied through them can be readily identified. [NFPA 54:7.9.2.1]

(B) Shutoff Valves for Multiple House Lines. In multiple tenant buildings supplied through a master meter, or through one (1) service regulator where a meter is not provided, or where meters or service regulators are not readily accessible from the appliance location, an individual shutoff valve for each apartment or tenant line shall be provided at a convenient point of general accessibility.

In a common system serving a number of individual buildings, shutoff valves shall be installed at each building. [NFPA 54:7.9.2.2]

1312.9.3 Emergency Shutoff Valves. An exterior shutoff valve to permit turning off the gas supply to each building in an emergency shall be provided. The emergency shutoff valves shall be plainly marked as such and their locations posted as required by the Authority Having Jurisdiction. [NFPA 54:7.9.2.3]

1312.9.4 Shutoff Valve for Laboratories. Each laboratory space containing two (2) or more gas outlets installed on tables, benches, or in hoods in educational, research, commercial and industrial occupancies shall have a single shutoff valve through which all such gas outlets are supplied. The shutoff valve shall be accessible and shall be located within the laboratory or located adjacent to the laboratory's egress door and shall be identified. [NFPA 54-09:7.9.2.4]

1312.10 Prohibited Devices. No device shall be placed inside the gas piping or fittings that will reduce the cross-sectional area or otherwise obstruct the free flow of gas, except where proper allowance in the piping system design has been made for such a device and where approved by the Authority Having Jurisdiction. [NFPA 54:7.10]

1312.11 Systems Containing Gas-Air Mixtures Outside the Flammable Range. Where gas-air mixing machines are employed to produce mixtures above or below the flammable range, they shall be provided with stops to prevent adjustment of the mixture to within or approaching the flammable range. [NFPA 54:7.11]

1312.12 Systems Containing Flammable Gas-Air Mixtures.

1312.12.1 Required Components. A central premix system with a flammable mixture in the blower or compressor shall consist of the following components:

- (1) Gas-mixing machine in the form of an automatic gas-air proportioning device combined with a downstream blower or compressor.
- (2) Flammable mixture piping, minimum Schedule 40 NPS.

- (3) Automatic firecheck(s).
- (4) Safety blowout(s) or backfire preventers for systems utilizing flammable mixture lines above 2½ inch nominal pipe size or the equivalent. [NFPA 54:7.12.1]

1312.12.2 Optional Components. The following components shall also be permitted to be utilized in any type of central premix system [NFPA 54:7.12.2]:

- (1) Flowmeter(s)
- (2) Flame arrester(s)

1312.12.3 Additional Requirements. Gas-mixing machines shall have nonsparking blowers and shall be so constructed that a flashback will not rupture machine casings. [NFPA 54:7.12.3]

1312.12.4 Special Requirements for Mixing Blowers. A mixing blower system shall be limited to applications with minimum practical lengths of mixture piping, limited to a maximum mixture pressure of ten (10) inches water column (25 Pa) and limited to gases containing no more than 10 percent hydrogen.

The blower shall be equipped with a gas-control valve at its air entrance so arranged that gas is admitted to the airstream, entering the blower in proper proportions for correct combustion by the type of burners employed, the said gas-control valve being of either the zero governor or mechanical ratio valve type that controls the gas and air adjustment simultaneously. No valves or other obstructions shall be installed between the blower discharge and the burner or burners. [NFPA 54:7.12.4]

1312.12.5 Installation of Gas-Mixing Machines.

(A) The machine shall be located in a large, well-ventilated area or in a small detached building or cutoff room provided with room construction and explosion vents in accordance with sound engineering principles.

Such rooms or below finished grade installations shall have adequate positive ventilation. [NFPA 54:7.12.5.1]

(B) Where gas-mixing machines are installed in well-ventilated areas, the type of electrical equipment shall be in accordance with NFPA 70, *National Electrical Code*, for general service conditions unless other hazards in the area prevail. Where gas-mixing machines are installed in small detached buildings or cutoff rooms, the electrical equipment and wiring shall be installed in accordance with NFPA 70, *National Electrical Code*, for hazardous locations (Articles 500 and 501, Class I, Division 2). [NFPA 54:7.12.5.2]

(C) Air intakes for gas-mixing machines using compressors or blowers shall be taken from outdoors whenever practical. [NFPA 54:7.12.5.3]

(D) Controls for gas-mixing machines shall include interlocks and a safety shutoff valve of the manual

reset type in the gas supply connection to each machine arranged to automatically shut off the gas supply in the event of high or low gas pressure. Except for open-burner installations only, the controls shall be interlocked so that the blower or compressor will stop operating following a gas supply failure. Where a system employs pressurized air, means shall be provided to shut off the gas supply in the event of air failure. [NFPA 54:7.12.5.4]

- (E) Centrifugal gas-mixing machines in parallel shall be reviewed by the user and equipment manufacturer before installation, and means or plans for minimizing these effects of downstream pulsation and equipment overload shall be prepared and utilized as needed. [NFPA 54:7.12.5.5]

1312.12.6 Use of Automatic Firechecks, Safety Blowouts, or Backfire Preventers. Automatic firechecks and safety blowouts or backfire preventers shall be provided in piping systems distributing flammable air-gas mixtures from gas-mixing machines to protect the piping and the machines in the event of flashback, in accordance with the following [NFPA 54:7.12.6]:

- (A) Approved automatic firechecks shall be installed upstream as close as practicable to the burner inlets following the firecheck manufacturer's instructions. [NFPA 54:7.12.6(1)]
- (B) A separate manually operated gas valve shall be provided at each automatic firecheck for shutting off the flow of gas-air mixture through the firecheck after a flashback has occurred. The valve shall be located up stream as close as practical to the inlet of the automatic firecheck.

Caution:

These valves shall not be reopened after a flashback has occurred until the firecheck has cooled sufficiently to prevent reignition of the flammable mixture and has been reset properly. [NFPA 54:7.12.6(2)]

- (C) A safety blowout or backfiring preventer shall be provided in the mixture line near the outlet of each gas-mixing machine where the size of the piping is larger than two and one-half (2½) inches NPS, or equivalent, to protect the mixing equipment in the event of an explosion passing through an automatic firecheck. The manufacturer's instructions shall be followed when installing these devices, particularly after a disc has burst. The discharge from the safety blowout or backfire preventer shall be located or shielded so that particles from the ruptured disc cannot be directed toward personnel. Wherever there are interconnected installations of gas-mixing machines with safety blowouts or backfire preventers, provision shall be made to keep the mixture from other machines from reaching any ruptured disc opening. Check valves shall not be used for this purpose. [NFPA 54:7.12.6(3)]

- (D) Large-capacity premix systems provided with explosion heads (rupture discs) to relieve excessive pressure in pipelines shall be located at and vented to a safe outdoor location. Provisions shall be provided for automatically shutting off the supply of gas-air mixture in the event of rupture. [NFPA 54:7.12.6(4)]

1312.13 Electrical Bonding and Grounding.

- (A) **Pipe and Tubing other than CSST.** Each aboveground portion of a gas piping system other than CSST that is likely to become energized shall be electrically continuous and bonded to an effective ground-fault current path. Gas piping, other than CSST shall be considered to be bonded when it is connected to appliances that are connected to the appliance grounding conductor of the circuit supplying that appliance. [NFPA 54-09:7.13.1]
- (B) CSST gas piping systems shall be bonded to the electrical service grounding electrode system at the point where the gas service enters the building. The bonding jumper shall not be smaller than 6 AWG copper wire. [NFPA 54-09: 7.13.2]
- (C) Gas piping shall not be used as a grounding conductor or electrode. This does not preclude the bonding of metallic piping to a grounding system. [NFPA 54-09:7.13.3]

1312.14 Lightning Protection System. Where a lightning system is installed, the bonding of the gas piping shall be in accordance with NFPA 780, *Standard for Installation of Lightning Protection Systems*. [NFPA 54-09:7.13.4]

1312.15 Electrical Circuits. Electrical circuits shall not utilize gas piping or components as conductors.

Exception: Low-voltage (50V or less) control circuits, ignition circuits, and electronic flame detection device circuits shall be permitted to make use of piping or components as a part of an electric circuit. [NFPA 54:7.14]

1312.16 Electrical Connections.

- (A) All electrical connections between wiring and electrically operated control devices in a piping system shall conform to the requirements of NFPA 70, *National Electrical Code* (See Section 1312.13). [NFPA 54:7.15.1]
- (B) Any essential safety control depending on electric current as the operating medium shall be of a type that will shut off (fail safe) the flow of gas in the event of current failure. [NFPA 54:7.15.2]

1313.0 Appliance Connections to Building Piping.

1313.1 Connecting Gas Appliances. Gas utilization appliances shall be connected to the building piping in compliance with Sections 1313.4 through 1313.6 by one of the following [NFPA 54:9.6.1]:

- (1) Rigid metallic pipe and fittings. [NFPA 54:9.6.1(1)]
- (2) Semirigid metallic tubing and metallic fittings. Aluminum alloy tubing shall not be used in exterior locations. [NFPA 54:9.6.1(2)]

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- (3) Listed flexible gas connectors in compliance with CSA Z21.24, *Standard for Connectors for Gas Appliances*. The connectors shall be used in accordance with the terms of their listing that are completely in the same room as the appliance. [NFPA 54:9.6.1(3)]
- (4) CSST, where installed in accordance with the manufacturer's instructions. [NFPA 54:9.6.1(5)]
- (5) Listed nonmetallic gas hose connectors in accordance with Section 1313.2. [NFPA 54:9.6.1(6)]
- (6) Gas-fired food service (commercial cooking) appliances listed for use with casters or otherwise subject to movement for cleaning, and other large and heavy appliances that can be moved, shall be connected in accordance with the connector manufacturer's installation instructions using a listed appliance connector complying with CSA Z21.69, *Standard for Connectors for Movable Gas Appliances*. The commercial cooking appliance connector installation shall be configured in accordance with the manufacturer's installation instructions. [NFPA 54-09:9.6.1.1]
- (7) Movement of appliances with casters shall be limited by a restraining device installed in accordance with the connector and appliance manufacturer's installation instructions. [NFPA 54-09:9.6.1.2]

The building gas supply manifold branch connection for commercial cooking appliances shall be oriented as follows:

- (1) The building gas supply manifold branch connection shall be oriented vertically down (toward the floor).
 - (2) The bottom of the building gas supply manifold branch connection shall be located not less than 36 in. (914 mm) and not more than 42 in. (1,067 mm) above the floor.
 - (3) The building gas supply manifold branch connection shall be directly behind the appliance it serves and not obstructed by any appliance, equipment or anything else.
- (8) In Section 1313.1(2), (3), and (5), the connector or tubing shall be installed so as to be protected against physical and thermal damage. Aluminum alloy tubing and connectors shall be coated to protect against external corrosion where they are in contact with masonry, plaster, insulation, or are subject to repeated wettings by such liquids as water (except rainwater), detergents, or sewage. [NFPA 54:9.6.1(7)]

1313.2 Use of Nonmetallic Gas Hose Connectors. Listed nonmetallic gas hose connectors shall be used in accordance with the terms of their listing and as follows [NFPA 54:9.6.2]:

- (A) **Indoor.** Indoor gas hose connectors shall be used only to connect laboratory, shop, and ironing equipment requiring mobility during operation. An equipment shutoff valve shall be installed where the connector is attached to the building piping. The connector shall be of minimum length and shall not exceed six (6) feet (1,829 mm). The connector shall not be concealed and shall not extend from one (1) room to another or pass through wall partitions, ceilings, or floors. [NFPA 54:9.6.2(1)]

- (B) **Outdoor.** Outdoor gas hose connectors are permitted to connect portable outdoor gas-fired appliances. An equipment shutoff valve, a listed quick-disconnect device, or a listed gas convenience outlet shall be installed where the connector is attached to the supply piping and in such a manner to prevent the accumulation of water or foreign matter. This connection shall only be made in the outdoor area where the appliance is to be used. [NFPA 54:9.6.2(2)]. The connector length shall not exceed fifteen (15) feet (4,572 mm).

1313.3 Connection of Portable and Mobile Industrial Appliances.

- (A) Where portable industrial gas utilization appliances or appliances requiring mobility or subject to vibration is connected to the building gas piping system by the use of a flexible hose, the hose shall be suitable and safe for the conditions under which it can be used. [NFPA 54:9.6.3.1]
- (B) Where industrial gas utilization appliances requiring mobility is connected to the rigid piping by the use of swivel joints or couplings, the swivel joints or couplings shall be suitable for the service required, and only the minimum number required shall be installed. [NFPA 54:9.6.3.2]
- (C) Where industrial gas utilization appliances subject to vibration is connected to the building piping system by the use of all metal flexible connectors, the connectors shall be suitable for the service required. [NFPA 54:9.6.3.3]
- (D) Where flexible connections are used, they shall be of the minimum practical length and shall not extend from one (1) room to another or pass through any walls, partitions, ceilings, or floors. Flexible connections shall not be used in any concealed location. They shall be protected against physical or thermal damage and shall be provided with gas shutoff valves in readily accessible locations in rigid piping upstream from the flexible connections. [NFPA 54:9.6.3.4]

1313.4 Appliance Shutoff Valves and Connections. Appliances connected to a piping system shall have an accessible, approved manual shutoff valve with a nondisplaceable valve member or a listed gas convenience outlet installed within six (6) feet (1,829 mm) of the appliance it serves. Where a connector is used, the valve shall be installed up-stream of the connector. A union or flanged connection shall be provided downstream from this valve to permit removal of controls. Shutoff valves serving decorative gas appliances shall be permitted to be installed in fireplaces if listed for such use. [NFPA 54:9.6.4]

Exceptions:

- (1) Shutoff valves shall be permitted to be accessibly located inside or under an appliance when such appliance can be removed without removal of the shutoff valve.
- (2) Shutoff valves shall be permitted to be accessibly located inside wall heaters and wall furnaces listed for recessed installation where necessary maintenance can be performed without removal of the shutoff valve.

STANDARD NUMBER	STANDARD TITLE	APPLICATION	REFERENCED SECTION
UL 565-1998	Liquid-Level Gauges and Indicators for Anhydrous Ammonia and LP-Gas	Gauges, LP Gas	516.2.1, 1309.5.4.3, 1309.5.9(D), 1313.0
UL 569-1995*	Pigtails and Flexible Hose Connectors for LP-Gas	Gas Connectors, Connectors	516.2.2, 1309.5.4.3, 1309.5.9(D), 1313.0
UL 641-1995	Type L Low-Temperature Venting Systems	Product	302.3
UL 710-1995	Exhaust Hoods for Commercial Cooking Equipment	Exhaust Hoods, Hoods	508.6, 513.2.2
UL 723-2008*	Test for Surface Burning Characteristics of Building Materials	Surface Burning Testing	508.2.8, 508.3, 1201.2.1.8
UL 726-1995	Oil-Fired Boiler Assemblies	Boiler, Oil Fired	302.3, 1320.0
UL 727-2006	Oil-Fired Central Furnaces	Furnaces, Central, Oil Fired	302.3, 1320.0
UL 729-2003	Oil-Fired Floor Furnaces	Furnaces, Floor, Oil Fired Furnaces	302.3, 912.0
UL 730-2003	Oil-Fired Wall Furnaces	Furnaces, Wall, Oil Fired	302.3, 928.0
UL 731-1995	Oil-Fired Heater Units	Heaters, Oil Fired	302.3, 927.0
UL 732-1995*	Oil-Fired Storage Tank Water Heaters	Water Heaters, Oil Fired	302.3, 1320.0
UL 733-1993	Oil-Fired Air Heaters and Direct-Fired Heaters	Water Heaters, Direct Fired, Oil Fired	302.3, 1320.0
UL 737-2007	Fireplace Stoves	Fireplace Stoves	208.0
UL 791-2006	Residential Incinerators	Incinerators	Table 8-2
UL 795-2006	Commercial-Industrial Gas Heating Equipment	Heating Equipment, Gas Fired	Ch.10
UL 834-2004*	Heating Water Supply, and Power Boilers-Electric	Boilers, Electric Ranges Boilers	Ch.10
UL 842-1997	Valves for Flammable Fluids	Valves	Ch.13
UL 858-2005*	Household Electric Ranges	Electric Ranges, Ranges	Ch.9
UL 867-2000	Electrostatic Air Cleaners	Filters	311.2
UL 896-1993	Oil-Burning Stoves	Stoves, Oil Fired	1320.0
UL 900-2004*	Air Filter Units	Air Filters, Filters	311.2
UL 907-1994	Fireplace Accessories	Fireplace Accessories	Ch.9
UL 921-2006*	Commercial Electric Dishwashers	Dishwashers	Ch.5, Part II
UL 959-2001*	Medium Heat Appliance Factory-Built Chimneys	Chimneys	802.5
UL 984-1996	Hermetic Refrigerant Motor-Compressors	Compressors, Refrigeration	Ch.11
UL 1026-2007*	Electric Household Cooking and Food Serving Appliances	Cooking Appliances, Electric Appliances	916.0
UL 1046-2000	Grease Filters for Exhaust Ducts	Filters-Grease	509.1
UL 1206-2003*	Electric Commercial Clothes-Washing Equipment	Clothes Washers, Commercial Clothes Washers	Ch.5
UL 1240-2005*	Electric Commercial Clothes-Drying Equipment	Clothes Dryers, Commercial	905.0
UL 1453-2004*	Electric Booster and Commercial Storage	Electric Water Heaters, Water Heaters	302.3, 303.8.1.6, 308.0
UL 1479-2003	Fire Tests of Through-Penetration Firestops	Firestops	Ch.12
UL 1482-1996	Solid-Fuel Type Room Heaters	Room Heaters, Solid Fuel Heaters	924.0

STANDARDS

STANDARD NUMBER	STANDARD TITLE	APPLICATION	REFERENCED SECTION
UL 1738-1993	Venting Systems for Gas-Burning Appliances, Categories II, III, and IV	Gas Vent Systems, Vent Systems	802.0
UL 1746-2007*	External Corrosion Protection Systems for Steel Underground Storage Tanks	Tanks	204.0, Ch.10
UL 1777- 2007*	Chimney Liners	Chimneys, Liners	803.1.6, 803.2.19
UL 1812-1995	Ducted Heat Recovery Ventilators	Heat Recovery Ventilators	Ch.6
UL 1815-2001	Nonducted Heat Recovery Ventilators	Heat Recovery Ventilators	Ch.6
UL 1820-2004*	Fire Test of Pneumatic Tubing for Flame and Smoke Characteristics	Surface Burning Test, Pneumatic Tubing	602.2(7)
UL 1887-2004*	Fire Test of Plastic Sprinkler Pipe for Visible Flame and Smoke Characteristics	Surface Burning Test, Fire Sprinkler Pipe	602.2(6)
UL 1963-2005*	Refrigerant Recovery/ Recycling Equipment	Refrigerant Equipment	Ch.11
UL 1978-2005*	Grease Ducts	Ducts, Grease	508.2.11
UL 1995-2005*	Heating and Cooling Equipment	HVAC, Electric	307.0
UL 2021-1997	Fixed and Location-Dedicated Electric Room Heaters	Product, Heating, Electric	Ch.9
UL 2043-1996	Fire Test for Heat and Visible Smoke Release For Discrete Products and Their Accessories Installed in Air-Handling Spaces	Surface Burning Test, Discrete Products	602.2(8)
UL 2157-1997	Electric Clothes Washing Machines and Extractors	Clothes Washers, Extractors	Ch.5
UL 2158-1997	Electric Clothes Dryers	Clothes Dryers, Electric	905.0
UL 2200,1998	Stationary Engine Generator Assemblies	Assemblies	1602.0
UL 2221-2001	Tests of Fire Resistive Grease Duct Enclosure Assemblies	Duct Wrap, Grease Duct Enclosure	507.2.5

Although these standards are referenced in Chapter 17, some of the materials and equipment in the standards may not be acceptable for use under the provisions of this code.

* ANSI Approved Standards

HISTORY NOTE APPENDIX

CALIFORNIA MECHANICAL CODE (TITLE 24, PART 4, CALIFORNIA CODE OF REGULATIONS)

For prior history, see the History Note Appendix to the California Mechanical Code (CMC), 2007 Triennial Edition effective January 1, 2008.

1. (BSC 04/09, DSA-AC 02/09, DSA-SS 03/09, HCD 02/09, OSHPD 03/09, SFM 01/09, DWR 01/09) Adoption by reference of the 2009 Uniform Mechanical Code (UMC) with necessary state amendments into the 2010 CMC and repeal of the 2006 edition of the UMC. Effective on January 1, 2011.

|| *2. Erratum to correct errors and omissions.*

