

Ohio Board of Building Standards



AMENDMENTS GROUP LXXXIX (89)

PUBLIC HEARING DRAFT

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&
PARTS A, B, C, & D
(PROPOSED OBC, OMC, OPC, & BOILER RULE CHANGES)**

September 19, 2014

**PUBLIC HEARING DRAFT
AMENDMENTS GROUP LXXXIX (89)**

Public Hearing
Friday, September 19, 2014
10:00 AM
6606 Tussing Road
Reynoldsburg, Ohio 43068

Notice is hereby given that the Ohio Board of Building Standards will convene for a public hearing at 10:00 A.M., Friday, September 19, 2014, in Hearing Room #1, at 6606 Tussing Road, Reynoldsburg, Ohio. The purpose of the hearing is to solicit testimony on proposed actions taken on select rules of the Administrative Code, identified as Amendments Group LXXXIX (89), pursuant to Chapters 119., 3781., 3791., and 4104. of the Revised Code.

Synopsis of the proposed rule changes:

PART A – OHIO BUILDING CODE RULES

Consider the following amended rules of the Administrative Code: **4101:1-3-01** to clarify the appropriate NFPA 70 (National Electrical Code) edition to be used for R-3 occupancies using the Residential Code of Ohio requirements; **4101:1-35-01** to update the NFPA 70 standard in the Ohio Building Code to the 2014 edition for non-residential buildings as a result of approved Petition #13-004, to add “residential” to the title of ASHRAE 90.1, and to list TIA 10-4 and TIA 10-5 with the NFPA 72 standard to clarify the intent of the low frequency alarm requirements for fire alarm and emergency alarm systems and smoke alarms.

PART B – OHIO MECHANICAL CODE RULE

Consider the following amended rules of the Administrative Code: **4101:2-15-01** to update the NFPA 70 standard in the Ohio Mechanical Code to the 2014 edition for non-residential buildings as a result of approved Petition #13-004 and to list TIA 10-4 and TIA 10-5 with the NFPA 72 standard to clarify the intent of the low frequency alarm requirements for fire alarm and emergency alarm systems and smoke alarms.

PART C – OHIO PLUMBING CODE RULE

Consider the following amended rules of the Administrative Code: **4101:3-13-01** to update the NFPA 70 standard in the Ohio Plumbing Code to the 2014 edition for non-residential buildings as a result of approved Petition #13-004.

PART D – OHIO BOILER AND PRESSURE VESSEL RULES

Consider the following amended, rescinded, and new rules of the Administrative Code: **4101:4-1-01** to add a quotation mark in paragraph (T), to add the word “controls” to paragraph (U), to add the definition of “Qualified Individual”; **4101:4-3-01** to add the ASME CSD-1 and NFPA 85 standards to the list of approved standards ; **4101:4-4-03** to add the word “controls” for clarification of paragraphs (A), (B), and (F) and to add a pointer to rule 4101:4-10-01 for clarification in paragraph (G); **4101:4-9-01** to add the word “controls” for clarification and to add a pointer to rule 4101:4-10-01 for clarification in paragraph (I); and **4101:4-10-01**(rescind and adopt new) to revise paragraph (A) to be consistent with Section 4104.05 of the Revised Code, to revise paragraph (B)(1) for clarification and consistency with other paragraph construction, to revise paragraph (B)(2) for clarification, to delete old paragraph (C) (definition of horsepower) consistent with changes made to Section 4104.05 of the Revised Code, to reword and renumber old paragraph (D) for clarification, and to add new provisions in paragraphs (B)(4) and (B)(5)

permitting certain automatically operated boilers that conform to ASME CSD-1 and NFPA 85 to be operated without the presence of a licensed operator.

The full text of this public hearing draft containing the proposed rules can be viewed on the Board’s website at (<http://www.com.ohio.gov/dico/bbs.aspx>). Electronic copies of the public hearing draft on compact disc will be mailed upon written request to the Ohio Board of Building Standards at P.O. Box 4009, 6606 Tussing Rd., Reynoldsburg, Ohio 43068.

The full text of the proposed rules were filed electronically with the Legislative Service Commission, the Joint Committee on Agency Rule Review, and the Secretary of State as required in section 119.03 of the Revised Code. Prior to electronic filing of the rules, stakeholder meetings were held and electronic notification was provided to all stakeholders. The proposed rules and a Business Impact Analysis were posted and submitted to the Common Sense Initiative Office. Additionally, the Clerks of the 88 County Commissioners were notified of the filings as required by statute.

The rule filing can be viewed on the Register of Ohio (<http://www.registerofohio.state.oh.us>).

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PART A – Ohio Building Code Rules			
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4101:4-10-01	Rescind	Licensure and attendance requirements of operators.	D-12
4101:4-10-01	New	Licensure and attendance requirements of operators.	D-13

On the date and at the time and place of this hearing, any person affected by these rules may appear and be heard in person, by his attorney, or both. Any person may present their positions, arguments and contentions orally, or in writing. Any person may offer and examine witnesses and present evidence.

All new rules are shown underlined.

New wording in an amended rule is indicated by underlining and deleted wording is shown as stricken text as follows: ~~deleted~~.

PART A

4101:1-3-01 Use and occupancy classification.

[Comment: When a reference is made within this rule to a federal statutory provision, an industry consensus standard, or any other technical publication, the specific date and title of the publication as well as the name and address of the promulgating agency are listed in rule 4101:1-35-01 of the Administrative Code. The application of the referenced standards shall be limited and as prescribed in section 102.5 of rule 4101:1-1-01 of the Administrative Code.]

**SECTION 301
GENERAL**

301.1 Scope. The provisions of this chapter shall control the classification of all buildings and structures as to use and occupancy.

**SECTION 302
CLASSIFICATION**

302.1 General. Structures or portions of structures shall be classified with respect to occupancy in one or more of the groups listed below. A room or space that is intended to be occupied at different times for different purposes shall comply with all of the requirements that are applicable to each of the purposes for which the room or space will be occupied. Structures with multiple occupancies or uses shall comply with Section 508. Where a structure is proposed for a purpose that is not specifically provided for in this code, such structure shall be classified in the group that the occupancy most nearly resembles, according to the fire safety and relative hazard involved.

1. Assembly (see Section 303): Groups A-1, A-2, A-3, A-4 and A-5
2. Business (see Section 304): Group B
3. Educational (see Section 305): Group E
4. Factory and Industrial (see Section 306): Groups F-1 and F-2
5. High Hazard (see Section 307): Groups H-1, H-2, H-3, H-4 and H-5
6. Institutional (see Section 308): Groups I-1, I-2, I-3 and I-4
7. Mercantile (see Section 309): Group M
8. Residential (see Section 310): Groups R-1, R-2, R-3 and R-4
9. Storage (see Section 311): Groups S-1 and S-2
10. Utility and Miscellaneous (see Section 312): Group U

SECTION 303

ASSEMBLY GROUP A

303.1 Assembly Group A. Assembly Group A occupancy includes, among others, the use of a building or structure, or a portion thereof, for the gathering of persons for purposes such as civic, social or religious functions; recreation, food or drink consumption or awaiting transportation.

Exceptions:

1. A building or tenant space used for assembly purposes with an occupant load of less than 50 persons shall be classified as a Group B occupancy.
2. A room or space used for assembly purposes with an occupant load of less than 50 persons and accessory to another occupancy shall be classified as a Group B occupancy or as part of that occupancy.
3. A room or space used for assembly purposes that is less than 750 square feet (70 m²) in area and accessory to another occupancy shall be classified as a Group B occupancy or as part of that occupancy.
4. Assembly areas that are accessory to Group E occupancies are not considered separate occupancies except when applying the assembly occupancy requirements of Chapter 11.
5. Accessory religious educational rooms and religious auditoriums with occupant loads of less than 100 are not considered separate occupancies.

Assembly occupancies shall include the following:

A-1 Assembly uses, usually with fixed seating, intended for the production and viewing of the performing arts or motion pictures including, but not limited to:

Motion picture theaters

Symphony and concert halls

Television and radio studios admitting an audience

Theaters

A-2 Assembly uses intended for food and/or drink consumption including, but not limited to:

Banquet halls

Night clubs

Restaurants

Taverns and bars

A-3 Assembly uses intended for worship, recreation or amusement and other assembly uses not classified elsewhere in Group A including, but not limited to:

Amusement arcades

Art galleries

Bowling alleys

Community halls

Courtrooms

Dance halls (not including food or drink consumption)

Exhibition halls
Funeral parlors
Gymnasiums (without spectator seating)
Indoor swimming pools (without spectator seating)
Indoor tennis courts (without spectator seating)
Lecture halls
Libraries
Museums
Places of religious worship
Pool and billiard parlors
Waiting areas in transportation terminals

A-4 Assembly uses intended for viewing of indoor sporting events and activities with spectator seating including, but not limited to:

Arenas
Skating rinks
Swimming pools
Tennis courts

A-5 Assembly uses intended for participation in or viewing outdoor activities including, but not limited to:

Amusement park structures
Bleachers
Grandstands
Stadiums

SECTION 304 BUSINESS GROUP B

304.1 Business Group B. Business Group B occupancy includes, among others, the use of a building or structure, or a portion thereof, for office, professional or service-type transactions, including storage of records and accounts. Business occupancies shall include, but not be limited to, the following:

Airport traffic control towers
Ambulatory health care facilities
Animal hospitals, kennels and pounds
Banks
Barber and beauty shops
Car wash
Civic administration
Clinic—outpatient
Dry cleaning and laundries: pick-up and delivery stations and self-service
Educational occupancies for students above the 12th grade

Electronic data processing
Laboratories: testing and research
Motor vehicle showrooms
Post offices
Print shops
Professional services (architects, attorneys, dentists, physicians, engineers, etc.)
Radio and television stations
Telephone exchanges
Training and skill development not within a school or academic program

304.1.1 Definitions. The following words and terms shall, for the purposes of this section and as used elsewhere in this code, have the meanings shown herein.

AMBULATORY HEALTH CARE FACILITY. In accordance with Section 422, buildings or portions thereof used to provide medical, surgical, psychiatric, nursing or similar care on a less than 24-hour basis to individuals who are rendered incapable of self-preservation.

CLINIC, OUTPATIENT. Buildings or portions thereof used to provide medical care on less than a 24-hour basis to individuals who are not rendered incapable of self-preservation by the services provided.

SECTION 305 EDUCATIONAL GROUP E

305.1 Educational Group E. Educational Group E occupancy includes, among others, the use of a building or structure, or a portion thereof, by six or more persons at any one time for educational purposes through the 12th grade. Religious educational rooms and religious auditoriums, which are accessory to places of religious worship in accordance with Section 303.1 and have occupant loads of less than 100, shall be classified as A-3 occupancies.

305.2 Day care. The use of a building or structure, or portion thereof, for educational, supervision or personal care services for more than five children older than 2 ½ years of age, shall be classified as a Group E occupancy.

A child day care facility that provides care for more than five but no more than 100 children 2 ½ years or less of age, where the rooms in which the children are cared for are located on a level of exit discharge serving such rooms and each of these child care rooms has an exit door directly to the exterior, shall be classified as Group E.

SECTION 306 FACTORY GROUP F

306.1 Factory Industrial Group F. Factory Industrial Group F occupancy includes, among others, the use of a building or structure, or a portion thereof, for assembling, disassembling, fabricating, finishing, manufacturing, packaging, repair or processing operations that are not

classified as a Group H hazardous or Group S storage occupancy.

306.2 Factory Industrial F-1 Moderate-hazard Occupancy.

Factory industrial uses which are not classified as Factory Industrial F-2 Low Hazard shall be classified as F-1 Moderate Hazard and shall include, but not be limited to, the following:

Aircraft (manufacturing, not to include repair) Appliances

Athletic equipment

Automobiles and other motor vehicles

Bakeries

Beverages: over 16-percent alcohol content

Bicycles

Boats

Brooms or brushes

Business machines

Cameras and photo equipment

Canvas or similar fabric

Carpets and rugs (includes cleaning)

Clothing

Construction and agricultural machinery

Disinfectants

Dry cleaning and dyeing

Electric generation plants

Electronics

Engines (including rebuilding)

Food processing

Furniture

Hemp products

Jute products

Laundries

Leather products

Machinery

Metals

Millwork (sash and door)

Motion pictures and television filming (without spectators)

Musical instruments

Optical goods

Paper mills or products

Photographic film

Plastic products

Printing or publishing

Recreational vehicles

Refuse incineration

Shoes

Soaps and detergents

Textiles
Tobacco
Trailers
Upholstering
Wood; distillation
Woodworking (cabinet)

306.3 Factory Industrial F-2 Low-hazard Occupancy. Factory industrial uses that involve the fabrication or manufacturing of noncombustible materials which during finishing, packing or processing do not involve a significant fire hazard shall be classified as F-2 occupancies and shall include, but not be limited to, the following:

Beverages; up to and including 16-percent alcohol content
Brick and masonry
Ceramic products
Foundries
Glass products
Gypsum
Ice
Metal products (fabrication and assembly)

SECTION 307 HIGH-HAZARD GROUP H

307.1 High-hazard Group H. High-hazard Group H occupancy includes, among others, the use of a building or structure, or a portion thereof, that involves the manufacturing, processing, generation or storage of materials that constitute a physical or health hazard in quantities in excess of those allowed in control areas complying with Section 414, based on the maximum allowable quantity limits for control areas set forth in Tables 307.1(1) and 307.1(2). Hazardous occupancies are classified in Groups H-1, H-2, H-3, H-4 and H-5 and shall be in accordance with this section, the requirements of Section 415 and the *fire code*. Hazardous materials stored, or used on top of roofs or canopies shall be classified as outdoor storage or use and shall comply with the *fire code*.

Exceptions: The following shall not be classified as Group H, but shall be classified as the occupancy that they most nearly resemble.

1. Buildings and structures occupied for the application of flammable finishes, provided that such buildings or areas conform to the requirements of Section 416 and the *fire code*.
2. Wholesale and retail sales and storage of flammable and combustible liquids in mercantile occupancies conforming to the *fire code*.
3. Closed piping system containing flammable or combustible liquids or gases utilized for the operation of machinery or equipment.
4. Cleaning establishments that utilize combustible liquid solvents having a flash point of 140°F (60°C) or higher in closed systems employing equipment listed by an approved testing agency, provided that this occupancy is separated from all other areas of the

- building by 1-hour fire barriers constructed in accordance with Section 707 or 1-hour horizontal assemblies constructed in accordance with Section 712, or both.
5. Cleaning establishments that utilize a liquid solvent having a flash point at or above 200°F (93°C).
 6. Liquor stores and distributors without bulk storage.
 7. Refrigeration systems.
 8. The storage or utilization of materials for agricultural purposes on the premises.
 9. Stationary batteries utilized for facility emergency power, uninterrupted power supply or telecommunication facilities, provided that the batteries are provided with safety venting caps and ventilation is provided in accordance with the *mechanical code*.
 10. Corrosives shall not include personal or household products in their original packaging used in retail display or commonly used building materials.
 11. Buildings and structures occupied for aerosol storage shall be classified as Group S-1, provided that such buildings conform to the requirements of the *fire code*.
 12. Display and storage of nonflammable solid and nonflammable or noncombustible liquid hazardous materials in quantities not exceeding the maximum allowable quantity per control area in Group M or S occupancies complying with Section 414.2.5.
 13. The storage of black powder, smokeless propellant and small arms primers in Groups M and R-3 and special industrial explosive devices in Groups B, F, M and S, provided such storage conforms to the quantity limits and requirements prescribed in the *fire code*.

TABLE 307.1(1)
MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS
MATERIALS POSING A PHYSICAL HAZARD^{a, j, m, n, p}

MATERIAL	CLASS	GROUP WHEN THE MAXIMUM ALLOWABLE QUANTITY IS EXCEEDED	STORAGE ^b			USE-CLOSED SYSTEMS ^b			USE-OPEN SYSTEMS ^b	
			Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)	Solid pounds (cubic feet)	Liquid gallons (pounds)	Gas (cubic feet at NTP)	Solid pounds (cubic feet)	Liquid gallons (pounds)
Combustible liquid ^{c,i}	II IIIA IIIB	H-2 or H-3 H-2 or H-3 N/A	N/A	120 ^{d,e} 330 ^{d,e} 13,200 ^{e,f}	N/A	N/A	120 ^d 330 ^d 13,200 ^f	N/A	N/A	30 ^d 80 ^d 3,300 ^f
Combustible fiber	Loose Baled ^o	H-3	(100) (1,000)	N/A	N/A	(100) (1,000)	N/A	N/A	(20) (200)	N/A
Consumer fireworks(Class C, Common)	1.4G	H-3	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Cryogenics, flammable	N/A	H-2	N/A	45 ^d	N/A	N/A	45 ^d	N/A	N/A	10 ^d
Cryogenics, inert	N/A	N/A	N/A	N/A	NL	N/A	N/A	NL	N/A	N/A
Cryogenics, oxidizing	N/A	H-3	N/A	45 ^d	N/A	N/A	45 ^d	N/A	N/A	10 ^d

Explosives	Division 1.1	H-1	1 ^{e, g}	(1) ^{e, g}	N/A	0.25 ^g	(0.25) ^g	N/A	0.25 ^g	(0.25) ^g
	Division 1.2	H-1	1 ^{e, g}	(1) ^{e, g}	N/A	0.25 ^g	(0.25) ^g	N/A	0.25 ^g	(0.25) ^g
	Division 1.3	H-1 or H-2	5 ^{e, g}	(5) ^{e, g}	N/A	1 ^g	(1) ^g	N/A	1 ^g	(1) ^g
	Division 1.4	H-3	50 ^{e, g}	(50) ^{e, g}	N/A	50 ^g	(50) ^g	N/A	N/A	N/A
	Division 1.4G	H-3	125 ^{d, e, l}	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Division 1.5	H-1	1 ^{e, g}	(1) ^{e, g}	N/A	0.25 ^g	(0.25) ^g	N/A	0.25 ^g	(0.25) ^g
Division 1.6	H-1		1 ^{d, e, g}	N/A	N/A	N/A	N/A	N/A	N/A	
Flammable gas	Gaseous	H-2	N/A	N/A	1,000 ^{d, e}	N/A	N/A	1,000 ^{d, e}	N/A	N/A
	Liquefied									
Flammable liquid ^c	1A	H-2 or H-3	N/A	30 ^{d, e}	N/A	N/A	30 ^d	N/A	N/A	10 ^d
	1B and 1C									
Flammable liquid, combination (1A, 1B, 1C)	N/A	H-2 or H-3	N/A	120 ^{d, e, h}	N/A	N/A	120 ^{d, h}	N/A	N/A	30 ^{d, h}
Flammable solid	N/A	H-3	125 ^{d, e}	N/A	N/A	125 ^d	N/A	N/A	25 ^d	N/A
Inert gas	Gaseous	N/A	N/A	N/A	NL	N/A	N/A	NL	N/A	N/A
	Liquefied	N/A	N/A	N/A	NL	N/A	N/A	NL	N/A	N/A
Organic peroxide	UD	H-1	1 ^{e, g}	(1) ^{e, g}	N/A	0.25 ^g	(0.25) ^g	N/A	0.25 ^g	(0.25) ^g
	I	H-2	5 ^{d, e}	(5) ^{d, e}	N/A	1 ^d	(1) ^d	N/A	1 ^d	(1) ^d
	II	H-3	50 ^{d, e}	(50) ^{d, e}	N/A	50 ^d	(50) ^d	N/A	10 ^d	(10) ^d
	III	H-3	125 ^{d, e}	(125) ^{d, e}	N/A	125 ^d	(125) ^d	N/A	25 ^d	(25) ^d
	IV	N/A	NL	NL	N/A	NL	NL	N/A	NL	NL
V	N/A	NL	NL	N/A	NL	NL	N/A	NL	NL	
Oxidizer	4	H-1	1 ^{e, g}	(1) ^{e, g}	N/A	0.25 ^g	(0.25) ^g	N/A	0.25 ^g	(0.25) ^g
	3 ^k	H-2 or H-3	10 ^{d, e}	(10) ^{d, e}	N/A	2 ^d	(2) ^d	N/A	2 ^d	(2) ^d
	2	H-3	250 ^{d, e}	(250) ^{d, e}	N/A	250 ^d	(250) ^d	N/A	50 ^d	(50) ^d
	1	N/A	4,000 ^{e, f}	(4,000) ^{e, f}	N/A	4,000 ^f	(4,000) ^f	N/A	1,000 ^f	(1,000) ^f
Oxidizing gas	Gaseous	H-3	N/A	N/A	1,500 ^{d, e}	N/A	N/A	1,500 ^{d, e}	N/A	N/A
	Liquefied									
Pyrophoric material	N/A	H-2	4 ^{e, g}	(4) ^{e, g}	50 ^{e, g}	1 ^g	(1) ^g	10 ^g	0	0
Unstable (reactive)	4	H-1	1 ^{e, g}	(1) ^{e, g}	10 ^g	0.25 ^g	(0.25) ^g	2 ^{e, g}	0.25 ^g	(0.25) ^g
	3	H-1 or H-2	5 ^{d, e}	(5) ^{d, e}	50 ^{d, e}	1 ^d	(1) ^d	10 ^{d, e}	1 ^d	(1) ^d
	2	H-3	50 ^{d, e}	(50) ^{d, e}	250 ^{d, e}	50 ^d	(50) ^d	250 ^{d, e}	10 ^d	(10) ^d
	1	N/A	NL	NL	NL	NL	NL	NL	NL	NL
Water reactive	3	H-2	5 ^{d, e}	(5) ^{d, e}	N/A	5 ^d	(5) ^d	N/A	1 ^d	(1) ^d
	2	H-3	50 ^{d, e}	(50) ^{d, e}	N/A	50 ^d	(50) ^d	N/A	10 ^d	(10) ^d
	1	N/A	NL	NL	N/A	NL	NL	N/A	NL	NL

For SI: 1 cubic foot = 0.028 m³, 1 pound = 0.454 kg, 1 gallon = 3.785 L. NL = Not Limited; N/A = Not Applicable; UD = Unclassified Detonable

a. For use of control areas, see Section 414.2.

b. The aggregate quantity in use and storage shall not exceed the quantity listed for storage.

c. The quantities of alcoholic beverages in retail and wholesale sales occupancies shall not be limited providing the liquids are packaged in individual containers not exceeding 1.3 gallons. In retail and wholesale sales occupancies, the quantities of medicines, foodstuffs, consumer or industrial products, and cosmetics containing not more than 50 percent by volume of water-miscible liquids with the remainder of the solutions not being flammable, shall not be limited, provided that such materials are packaged in individual containers not exceeding 1.3 gallons.

d. Maximum allowable quantities shall be increased 100 percent in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1. Where Note e also applies, the increase for both notes shall be applied accumulatively.

e. Maximum allowable quantities shall be increased 100 percent when stored in approved storage cabinets, day

- boxes, gas cabinets or exhausted enclosures or in listed safety cans in accordance with Section 2703.9.10 of the *fire code*. Where Note d also applies, the increase for both notes shall be applied accumulatively.
- f. The permitted quantities shall not be limited in a building equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.
 - g. Permitted only in buildings equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1.
 - h. Containing not more than the maximum allowable quantity per control area of Class IA, IB or IC flammable liquids.
 - i. The maximum allowable quantity shall not apply to fuel oil storage complying with Section 603.3.2 of the *fire code*.
 - j. Quantities in parenthesis indicate quantity units in parenthesis at the head of each column.
 - k. A maximum quantity of 200 pounds of solid or 20 gallons of liquid Class 3 oxidizers is allowed when such materials are necessary for maintenance purposes, operation or sanitation of equipment. Storage containers and the manner of storage shall be approved.
 - l. Net weight of the pyrotechnic composition of the fireworks. Where the net weight of the pyrotechnic composition of the fireworks is not known, 25 percent of the gross weight of the fireworks, including packaging, shall be used.
 - m. For gallons of liquids, divide the amount in pounds by 10 in accordance with Section 2703.1.2 of the *fire code*.
 - n. For storage and display quantities in Group M and storage quantities in Group S occupancies complying with Section 414.2.5, see Tables 414.2.5(1) and 414.2.5(2).
 - o. Densely packed baled cotton that complies with the packing requirements of ISO 8115 shall not be included in this material class.
 - p. The following shall not be included in determining the maximum allowable quantities:
 - 1. Liquid or gaseous fuel in fuel tanks on vehicles.
 - 2. Liquid or gaseous fuel in fuel tanks on motorized equipment operated in accordance with this code.
 - 3. Gaseous fuels in piping systems and fixed appliances regulated by the *fuel gas code*.
 - 4. Liquid fuels in piping systems and fixed appliances regulated by the *mechanical code*.

TABLE 307.1(2)

MAXIMUM ALLOWABLE QUANTITY PER CONTROL AREA OF HAZARDOUS MATERIAL POSING A HEALTH HAZARD^{a, b, c, i}

MATERIAL	STORAGE ^d			USE-CLOSED SYSTEMS ^d			USE-OPEN SYSTEMS ^d	
	Solid pounds (cubic feet)	Liquid gallons (pounds) ^{e, f}	Gas (cubic feet at NTP) ^e	Solid pounds ^e	Liquid gallons (pounds) ^e	Gas (cubic feet at NTP) ^e	Solid pounds ^e	Liquid gallons (pounds) ^e
Corrosive	5,000	500	Gaseous 810 ^f Liquefied (150) ^h	5,000	500	Gaseous 810 ^f Liquefied (150) ^h	1,000	100
Highly toxic	10	(10) ^h	Gaseous 20 ^g Liquefied (4) ^{g, h}	10	(10) ⁱ	Gaseous 20 ^g Liquefied (4) ^{g, h}	3	(3) ⁱ
Toxic	500	(500) ^h	Gaseous 810 ^f Liquefied (150) ^{f, h}	500	(500) ⁱ	Gaseous 810 ^f Liquefied (150) ^{f, h}	125	(125)

For SI: 1 cubic foot = 0.028 m³, 1 pound = 0.454 kg, 1 gallon = 3.785 L.

a. For use of control areas, see Section 414.2.

b. In retail and wholesale sales occupancies, the quantities of medicines, foodstuffs, consumer or industrial products, and cosmetics, containing not more than 50 percent by volume of water-miscible liquids and with the remainder of the solutions not being flammable, shall not be limited, provided that such materials are packaged in individual containers not exceeding 1.3 gallons.

c. For storage and display quantities in Group M and storage quantities in Group S occupancies complying with Section 414.2.5,

see Tables 414.2.5(1) and 414.2.5(2).

- d. The aggregate quantity in use and storage shall not exceed the quantity listed for storage.
- e. Maximum allowable quantities shall be increased 100 percent in buildings equipped throughout with an approved automatic sprinkler system in accordance with Section 903.3.1.1. Where Note f also applies, the increase for both notes shall be applied accumulatively.
- f. Maximum allowable quantities shall be increased 100 percent when stored in approved storage cabinets, gas cabinets or exhausted enclosures as specified in the *fire code*. Where Note e also applies, the increase for both notes shall be applied accumulatively.
- g. Allowed only when stored in approved exhausted gas cabinets or exhausted enclosures as specified in the *fire code*.
- h. Quantities in parenthesis indicate quantity units in parenthesis at the head of each column.
- i. For gallons of liquids, divide the amount in pounds by 10 in accordance with Section 2703.1.2 of the *fire code*.

307.1.1 Hazardous materials. Hazardous materials in any quantity shall conform to the requirements of this code, including Section 414, and the *fire code*.

307.2 Definitions. The following words and terms shall, for the purposes of this section and as used elsewhere in this code, have the meanings shown herein.

AEROSOL. A product that is dispensed from an aerosol container by a propellant.

Aerosol products shall be classified by means of the calculation of their chemical heats of combustion and shall be designated Level 1, 2 or 3.

Level 1 aerosol products. Those with a total chemical heat of combustion that is less than or equal to 8,600 British thermal units per pound (Btu/lb) (20 kJ/g).

Level 2 aerosol products. Those with a total chemical heat of combustion that is greater than 8,600 Btu/lb (20 kJ/g), but less than or equal to 13,000 Btu/lb (30 kJ/g).

Level 3 aerosol products. Those with a total chemical heat combustion that is greater than 13,000 Btu/lb (30 kJ/g).

AEROSOL CONTAINER. A metal can or a glass or plastic bottle designed to dispense an aerosol. Metal cans shall be limited to a maximum size of 33.8 fluid ounces (1000 ml). Glass or plastic bottles shall be limited to a maximum size of 4 fluid ounces (118 ml).

BALED COTTON. A natural seed fiber wrapped in and secured with industry accepted materials, usually consisting of burlap, woven polypropylene, polyethylene or cotton or sheet polyethylene, and secured with steel, synthetic or wire bands or wire; also includes linters (lint removed from the cottonseed) and motes (residual materials from the ginning process).

BALED COTTON, DENSELY PACKED. Cotton made into banded bales with a packing density of at least 22 pounds per cubic foot (360 kg/m^3), and dimensions complying with the following: a length of 55 inches ($1397 \pm 20 \text{ mm}$), a width of 21 inches ($533.4 \pm 20 \text{ mm}$) and a height of 27.6 to 35.4 inches (701 to 899 mm).

BARRICADE. A structure that consists of a combination of walls, floor and roof, which is designed to withstand the rapid release of energy in an explosion and which is fully confined, partially vented or fully vented; or other effective method of shielding from explosive materials by a natural or artificial barrier.

Artificial barricade. An artificial mound or revetment a minimum thickness of 3 feet

(914 mm).

Natural barricade. Natural features of the ground, such as hills, or timber of sufficient density that the surrounding exposures that require protection cannot be seen from the magazine or building containing explosives when the trees are bare of leaves.

BOILING POINT. The temperature at which the vapor pressure of a liquid equals the atmospheric pressure of 14.7 pounds per square inch (psi) (101 kPa) gage or 760 mm of mercury. Where an accurate boiling point is unavailable for the material in question, or for mixtures which do not have a constant boiling point, for the purposes of this classification, the 20-percent evaporated point of a distillation performed in accordance with ASTM D 86 shall be used as the boiling point of the liquid.

CLOSED SYSTEM. The use of a solid or liquid hazardous material involving a closed vessel or system that remains closed during normal operations where vapors emitted by the product are not liberated outside of the vessel or system and the product is not exposed to the atmosphere during normal operations; and all uses of compressed gases. Examples of closed systems for solids and liquids include product conveyed through a piping system into a closed vessel, system or piece of equipment.

COMBUSTIBLE DUST. Finely divided solid material that is 420 microns or less in diameter and which, when dispersed in air in the proper proportions, could be ignited by a flame, spark or other source of ignition. Combustible dust will pass through a U.S. No. 40 standard sieve.

COMBUSTIBLE FIBERS. Readily ignitable and free-burning materials in a fibrous or shredded form, such as cocoa fiber, cloth, cotton, excelsior, hay, hemp, henequen, istle, jute, kapok, oakum, rags, sisal, Spanish moss, straw, tow, wastepaper, certain synthetic fibers or other like materials. This definition does not include densely packed baled cotton.

COMBUSTIBLE LIQUID. A liquid having a closed cup flash point at or above 100°F (38°C). Combustible liquids shall be subdivided as follows:

Class II. Liquids having a closed cup flash point at or above 100°F (38°C) and below 140°F (60°C).

Class IIIA. Liquids having a closed cup flash point at or above 140°F (60°C) and below 200°F (93°C).

Class IIIB. Liquids having a closed cup flash point at or above 200°F (93°C).

The category of combustible liquids does not include compressed gases or cryogenic fluids.

COMPRESSED GAS. A material, or mixture of materials, that:

- 1 Is a gas at 68°F (20°C) or less at 14.7 pounds per square inch atmosphere (psia) (101 kPa) of pressure; and
- 2 Has a boiling point of 68°F (20°C) or less at 14.7 psia (101 kPa) which is either

liquefied, nonliquefied or in solution, except those gases which have no other health-or physical-hazard properties are not considered to be compressed until the pressure in the packaging exceeds 41 psia (282 kPa) at 68°F (20°C).

The states of a compressed gas are categorized as follows:

- 1 Nonliquefied compressed gases are gases, other than those in solution, which are in a packaging under the charged pressure and are entirely gaseous at a temperature of 68°F (20°C).
- 2 Liquefied compressed gases are gases that, in a packaging under the charged pressure, are partially liquid at a temperature of 68°F (20°C).
- 3 Compressed gases in solution are nonliquefied gases that are dissolved in a solvent.
- 4 Compressed gas mixtures consist of a mixture of two or more compressed gases contained in a packaging, the hazard properties of which are represented by the properties of the mixture as a whole.

CONTROL AREA. Spaces within a building where quantities of hazardous materials not exceeding the maximum allowable quantities per control area are stored, dispensed, used or handled. See also the definition of “Outdoor control area” in the *fire code*.

CORROSIVE. A chemical that causes visible destruction of, or irreversible alterations in, living tissue by chemical action at the point of contact. A chemical shall be considered corrosive if, when tested on the intact skin of albino rabbits by the method described in DOTn 49 CFR, Part 173.137, such a chemical destroys or changes irreversibly the structure of the tissue at the point of contact following an exposure period of 4 hours. This term does not refer to action on inanimate surfaces.

CRYOGENIC FLUID. A liquid having a boiling point lower than -150°F (-101°C) at 14.7 pounds per square inch atmosphere (psia) (an absolute pressure of 101 kPa).

DAY BOX. A portable magazine designed to hold explosive materials constructed in accordance with the requirements for a Type 3 magazine as defined and classified in Chapter 33 of the *fire code*.

DEFLAGRATION. An exothermic reaction, such as the extremely rapid oxidation of a flammable dust or vapor in air, in which the reaction progresses through the unburned material at a rate less than the velocity of sound. A deflagration can have an explosive effect.

DETONATION. An exothermic reaction characterized by the presence of a shock wave in the material which establishes and maintains the reaction. The reaction zone progresses through the material at a rate greater than the velocity of sound. The principal heating mechanism is one of shock compression. Detonations have an explosive effect.

DISPENSING. The pouring or transferring of any material from a container, tank or similar vessel, whereby vapors, dusts, fumes, mists or gases are liberated to the atmosphere.

EXPLOSION. An effect produced by the sudden violent expansion of gases, which may be

accompanied by a shock wave or disruption, or both, of enclosing materials or structures. An explosion could result from any of the following:

- 1 Chemical changes such as rapid oxidation, deflagration or detonation, decomposition of molecules and runaway polymerization (usually detonations).
- 2 Physical changes such as pressure tank ruptures.
- 3 Atomic changes (nuclear fission or fusion).

EXPLOSIVE. A chemical compound, mixture or device, the primary or common purpose of which is to function by explosion. The term includes, but is not limited to, dynamite, black powder, pellet powder, initiating explosives, detonators, safety fuses, squibs, detonating cord, igniter cord, igniters and display fireworks, 1.3G (Class B, Special).

The term “explosive” includes any material determined to be within the scope of USC Title 18: Chapter 40 and also includes any material classified as an explosive other than consumer fireworks, 1.4G (Class C, Common) by the hazardous materials regulations of DOTn 49 CFR Parts 100-185.

High explosive. Explosive material, such as dynamite, which can be caused to detonate by means of a No. 8 test blasting cap when unconfined.

Low explosive. Explosive material that will burn or deflagrate when ignited. It is characterized by a rate of reaction that is less than the speed of sound. Examples of low explosives include, but are not limited to, black powder; safety fuse; igniters; igniter cord; fuse lighters; fireworks, 1.3G (Class B, Special) and propellants, 1.3C.

Mass-detonating explosives. Division 1.1, 1.2 and 1.5 explosives alone or in combination, or loaded into various types of ammunition or containers, most of which can be expected to explode virtually instantaneously when a small portion is subjected to fire, severe concussion, impact, the impulse of an initiating agent or the effect of a considerable discharge of energy from without. Materials that react in this manner represent a mass explosion hazard. Such an explosive will normally cause severe structural damage to adjacent objects. Explosive propagation could occur immediately to other items of ammunition and explosives stored sufficiently close to and not adequately protected from the initially exploding pile with a time interval short enough so that two or more quantities must be considered as one for quantity-distance purposes.

UN/DOTn Class 1 explosives. The former classification system used by DOTn included the terms “high” and “low” explosives as defined herein. The following terms further define explosives under the current system applied by DOTn for all explosive materials defined as hazard Class 1 materials. Compatibility group letters are used in concert with the division to specify further limitations on each division noted (i.e., the letter G identifies the material as a pyrotechnic substance or article containing a pyrotechnic substance and similar materials).

Division 1.1. Explosives that have a mass explosion hazard. A mass explosion is one which affects almost the entire load instantaneously.

Division 1.2. Explosives that have a projection hazard but not a mass explosion hazard.

Division 1.3. Explosives that have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard.

Division 1.4. Explosives that pose a minor explosion hazard. The explosive effects are largely confined to the package and no projection of fragments of appreciable size or range is to be expected. An external fire must not cause virtually instantaneous explosion of almost the entire contents of the package.

Division 1.5. Very insensitive explosives. This division is comprised of substances that have a mass explosion hazard, but that are so insensitive there is very little probability of initiation or of transition from burning to detonation under normal conditions of transport.

Division 1.6. Extremely insensitive articles which do not have a mass explosion hazard. This division is comprised of articles that contain only extremely insensitive detonating substances and which demonstrate a negligible probability of accidental initiation or propagation.

FIREWORKS. Any composition or device for the purpose of producing a visible or audible effect for entertainment purposes by combustion, deflagration or detonation that meets the definition of 1.4G fireworks or 1.3G fireworks as set forth herein.

Fireworks, 1.3G. (Formerly Class B, Special Fireworks.) Large fireworks devices, which are explosive materials, intended for use in fireworks displays and designed to produce audible or visible effects by combustion, deflagration or detonation. Such 1.3G fireworks include, but are not limited to, firecrackers containing more than 130 milligrams (2 grains) of explosive composition, aerial shells containing more than 40 grams of pyrotechnic composition, and other display pieces which exceed the limits for classification as 1.4G fireworks. Such 1.3G fireworks are also described as fireworks, UN0335 by the DOTn.

Fireworks, 1.4G. (Formerly Class C, Common Fireworks.) Small fireworks devices containing restricted amounts of pyrotechnic composition designed primarily to produce visible or audible effects by combustion. Such 1.4G fireworks which comply with the construction, chemical composition and labeling regulations of the DOTn for fireworks, UN0336, and the U.S. Consumer Product Safety Commission (CPSC) as set forth in CPSC 16 CFR: Parts 1500 and 1507, are not explosive materials for the purpose of this code.

FLAMMABLE GAS. A material that is a gas at 68°F (20°C) or less at 14.7 pounds per square inch atmosphere (psia) (101 kPa) of pressure [a material that has a boiling point of 68°F (20°C) or less at 14.7 psia (101 kPa)] which:

- 1 Is ignitable at 14.7 psia (101 kPa) when in a mixture of 13 percent or less by volume with air; or
- 2 Has a flammable range at 14.7 psia (101 kPa) with air of at least 12 percent, regardless of the lower limit.

The limits specified shall be determined at 14.7 psi (101 kPa) of pressure and a temperature of 68°F (20°C) in accordance with ASTM E 681.

FLAMMABLE LIQUEFIED GAS. A liquefied compressed gas which, under a charged pressure, is partially liquid at a temperature of 68°F (20°C) and which is flammable.

FLAMMABLE LIQUID. A liquid having a closed cup flash point below 100°F (38°C). Flammable liquids are further categorized into a group known as Class I liquids. The Class I category is subdivided as follows:

Class IA. Liquids having a flash point below 73°F (23°C) and a boiling point below 100°F (38°C).

Class IB. Liquids having a flash point below 73°F (23°C) and a boiling point at or above 100°F (38°C).

Class IC. Liquids having a flash point at or above 73°F (23°C) and below 100°F (38°C).

The category of flammable liquids does not include compressed gases or cryogenic fluids.

FLAMMABLE MATERIAL. A material capable of being readily ignited from common sources of heat or at a temperature of 600°F (316°C) or less.

FLAMMABLE SOLID. A solid, other than a blasting agent or explosive, that is capable of causing fire through friction, absorption or moisture, spontaneous chemical change, or retained heat from manufacturing or processing, or which has an ignition temperature below 212°F (100°C) or which burns so vigorously and persistently when ignited as to create a serious hazard. A chemical shall be considered a flammable solid as determined in accordance with the test method of CPSC 16 CFR; Part 1500.44, if it ignites and burns with a self-sustained flame at a rate greater than 0.1 inch (2.5 mm) per second along its major axis.

FLASH POINT. The minimum temperature in degrees Fahrenheit at which a liquid will give off sufficient vapors to form an ignitable mixture with air near the surface or in the container, but will not sustain combustion. The flash point of a liquid shall be determined by appropriate test procedure and apparatus as specified in ASTM D 56, ASTM D 93 or ASTM D 3278.

HANDLING. The deliberate transport by any means to a point of storage or use.

HAZARDOUS MATERIALS. Those chemicals or substances that are physical hazards or health hazards as defined and classified in this section and the *fire code*, whether the materials are in usable or waste condition.

HEALTH HAZARD. A classification of a chemical for which there is statistically significant evidence that acute or chronic health effects are capable of occurring in exposed persons. The term "health hazard" includes chemicals that are toxic or highly toxic, and corrosive.

HIGHLY TOXIC. A material which produces a lethal dose or lethal concentration that falls within any of the following categories:

- 1 A chemical that has a median lethal dose (LD₅₀) of 50 milligrams or less per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.

2 A chemical that has a median lethal dose (LD₅₀) of 200 milligrams or less per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between 2 and 3 kilograms each.

3 A chemical that has a median lethal concentration (LC₅₀) in air of 200 parts per million by volume or less of gas or vapor, or 2 milligrams per liter or less of mist, fume or dust, when administered by continuous inhalation for 1 hour (or less if death occurs within 1 hour) to albino rats weighing between 200 and 300 grams each.

Mixtures of these materials with ordinary materials, such as water, might not warrant classification as highly toxic. While this system is basically simple in application, any hazard evaluation that is required for the precise categorization of this type of material shall be performed by experienced, technically competent persons.

INCOMPATIBLE MATERIALS. Materials that, when mixed, have the potential to react in a manner that generates heat, fumes, gases or byproducts which are hazardous to life or property.

INERT GAS. A gas that is capable of reacting with other materials only under abnormal conditions such as high temperatures, pressures and similar extrinsic physical forces. Within the context of the code, inert gases do not exhibit either physical or health properties as defined (other than acting as a simple asphyxiant) or hazard properties other than those of a compressed gas. Some of the more common inert gases include argon, helium, krypton, neon, nitrogen and xenon.

OPEN SYSTEM. The use of a solid or liquid hazardous material involving a vessel or system that is continuously open to the atmosphere during normal operations and where vapors are liberated, or the product is exposed to the atmosphere during normal operations. Examples of open systems for solids and liquids include dispensing from or into open beakers or containers, dip tank and plating tank operations.

OPERATING BUILDING. A building occupied in conjunction with the manufacture, transportation or use of explosive materials. Operating buildings are separated from one another with the use of intraplant or intraline distances.

ORGANIC PEROXIDE. An organic compound that contains the bivalent -O-O-structure and which may be considered to be a structural derivative of hydrogen peroxide where one or both of the hydrogen atoms have been replaced by an organic radical. Organic peroxides can pose an explosion hazard (detonation or deflagration) or they can be shock sensitive. They can also decompose into various unstable compounds over an extended period of time.

Class I. Those formulations that are capable of deflagration but not detonation.

Class II. Those formulations that burn very rapidly and that pose a moderate reactivity hazard.

Class III. Those formulations that burn rapidly and that pose a moderate reactivity hazard.

Class IV. Those formulations that burn in the same manner as ordinary combustibles and that pose a minimal reactivity hazard.

Class V. Those formulations that burn with less intensity than ordinary combustibles or do not sustain combustion and that pose no reactivity hazard.

Unclassified detonable. Organic peroxides that are capable of detonation. These peroxides pose an extremely high explosion hazard through rapid explosive decomposition.

OXIDIZER. A material that readily yields oxygen or other oxidizing gas, or that readily reacts to promote or initiate combustion of combustible materials and, if heated or contaminated, can result in vigorous self-sustained decomposition.

Class 4. An oxidizer that can undergo an explosive reaction due to contamination or exposure to thermal or physical shock and that causes a severe increase in the burning rate of combustible materials with which it comes into contact. Additionally, the oxidizer causes a severe increase in the burning rate and can cause spontaneous ignition of combustibles.

Class 3. An oxidizer that causes a severe increase in the burning rate of combustible materials with which it comes in contact.

Class 2. An oxidizer that will cause a moderate increase in the burning rate of combustible materials with which it comes in contact.

Class 1. An oxidizer that does not moderately increase the burning rate of combustible materials.

OXIDIZING GAS. A gas that can support and accelerate combustion of other materials.

PHYSICAL HAZARD. A chemical for which there is evidence that it is a combustible liquid, cryogenic fluid, explosive, flammable (solid, liquid or gas), organic peroxide (solid or liquid), oxidizer (solid or liquid), oxidizing gas, pyrophoric (solid, liquid or gas), unstable (reactive) material (solid, liquid or gas) or water-reactive material (solid or liquid).

PYROPHORIC. A chemical with an autoignition temperature in air, at or below a temperature of 130°F (54.4°C).

PYROTECHNIC COMPOSITION. A chemical mixture that produces visible light displays or sounds through a self-propagating, heat-releasing chemical reaction which is initiated by ignition.

TOXIC. A chemical falling within any of the following categories:

1 A chemical that has a median lethal dose (LD₅₀) of more than 50 milligrams per kilogram, but not more than 500 milligrams per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.

2 A chemical that has a median lethal dose (LD₅₀) of more than 200 milligrams per kilogram, but not more than 1,000 milligrams per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between 2 and 3 kilograms each.

3 A chemical that has a median lethal concentration (LC₅₀) in air of more than 200 parts per million, but not more than 2,000 parts per million by volume of gas or vapor, or

more than 2 milligrams per liter but not more than 20 milligrams per liter of mist, fume or dust, when administered by continuous inhalation for 1 hour (or less if death occurs within 1 hour) to albino rats weighing between 200 and 300 grams each.

UNSTABLE (REACTIVE) MATERIAL. A material, other than an explosive, which in the pure state or as commercially produced, will vigorously polymerize, decompose, condense or become self-reactive and undergo other violent chemical changes, including explosion, when exposed to heat, friction or shock, or in the absence of an inhibitor, or in the presence of contaminants, or in contact with incompatible materials. Unstable (reactive) materials are subdivided as follows:

Class 4. Materials that in themselves are readily capable of detonation or explosive decomposition or explosive reaction at normal temperatures and pressures. This class includes materials that are sensitive to mechanical or localized thermal shock at normal temperatures and pressures.

Class 3. Materials that in themselves are capable of detonation or of explosive decomposition or explosive reaction but which require a strong initiating source or which must be heated under confinement before initiation. This class includes materials that are sensitive to thermal or mechanical shock at elevated temperatures and pressures.

Class 2. Materials that in themselves are normally unstable and readily undergo violent chemical change but do not detonate. This class includes materials that can undergo chemical change with rapid release of energy at normal temperatures and pressures, and that can undergo violent chemical change at elevated temperatures and pressures.

Class 1. Materials that in themselves are normally stable but which can become unstable at elevated temperatures and pressure.

WATER-REACTIVE MATERIAL. A material that explodes; violently reacts; produces flammable, *toxic* or other hazardous gases; or evolves enough heat to cause autoignition or ignition of combustibles upon exposure to water or moisture. Water-reactive materials are subdivided as follows:

Class 3. Materials that react explosively with water without requiring heat or confinement.

Class 2. Materials that react violently with water or have the ability to boil water. Materials that produce flammable, toxic or other hazardous gases or evolve enough heat to cause autoignition or ignition of combustibles upon exposure to water or moisture.

Class 1. Materials that react with water with some release of energy, but not violently.

307.3 High-hazard Group H-1. Buildings and structures containing materials that pose a detonation hazard shall be classified as Group H-1. Such materials shall include, but not be limited to, the following:

Detonable pyrophoric materials

Explosives:

Division 1.1

Division 1.2

Division 1.3

Exception: Materials that are used and maintained in a form where either confinement or configuration will not elevate the hazard from a mass fire to mass explosion hazard shall be allowed in H-2 occupancies.

Division 1.4

Exception: Articles, including articles packaged for shipment, that are not regulated as an explosive under Bureau of Alcohol, Tobacco and Firearms regulations, or unpackaged articles used in process operations that do not propagate a detonation or deflagration between articles shall be allowed in H-3 occupancies.

Division 1.5

Division 1.6

Organic peroxides, unclassified detonable

Oxidizers, Class 4

Unstable (reactive) materials, Class 3 detonable and Class 4

307.4 High-hazard Group H-2. Buildings and structures containing materials that pose a deflagration hazard or a hazard from accelerated burning shall be classified as Group H-2. Such materials shall include, but not be limited to, the following:

Class I, II or IIIA flammable or combustible liquids which are used or stored in normally open containers or systems, or in closed containers or systems pressurized at more than 15 psi (103.4 kPa) gage.

Combustible dusts

Cryogenic fluids, flammable

Flammable gases

Organic peroxides, Class I

Oxidizers, Class 3, that are used or stored in normally open containers or systems, or in closed containers or systems pressurized at more than 15 psi (103 kPa) gage

Pyrophoric liquids, solids and gases, nondetonable

Unstable (reactive) materials, Class 3, nondetonable

Water-reactive materials, Class 3

307.5 High-hazard Group H-3. Buildings and structures containing materials that readily support combustion or that pose a physical hazard shall be classified as Group H-3. Such materials shall include, but not be limited to, the following:

Class I, II or IIIA flammable or combustible liquids that are used or stored in normally closed containers or systems pressurized at 15 pounds per square inch gauge (103.4 kPa) or less

Combustible fibers, other than densely packed baled cotton

Consumer fireworks, 1.4G (Class C, Common)

Cryogenic fluids, oxidizing

Flammable solids

Organic peroxides, Class II and III
Oxidizers, Class 2 Oxidizers, Class 3, that are used or stored in normally closed containers or systems pressurized at 15 pounds per square inch gauge (103 kPa) or less
Oxidizing gases
Unstable (reactive) materials, Class 2
Water-reactive materials, Class 2

307.6 High-hazard Group H-4. Buildings and structures which contain materials that are health hazards shall be classified as Group H-4. Such materials shall include, but not be limited to, the following:

Corrosives
Highly toxic materials
Toxic materials

307.7 High-hazard Group H-5 structures. Semiconductor fabrication facilities and comparable research and development areas in which hazardous production materials (HPM) are used and the aggregate quantity of materials is in excess of those listed in Tables 307.1(1) and 307.1(2) shall be classified as Group H-5. Such facilities and areas shall be designed and constructed in accordance with Section 415.8.

307.8 Multiple hazards. Buildings and structures containing a material or materials representing hazards that are classified in one or more of Groups H-1, H-2, H-3 and H-4 shall conform to the code requirements for each of the occupancies so classified.

SECTION 308 INSTITUTIONAL GROUP I

308.1 Institutional Group I. Institutional Group I occupancy includes, among others, the use of a building or structure, or a portion thereof, in which people are cared for or live in a supervised environment, having physical limitations because of health or age are harbored for medical treatment or other care or treatment, or in which people are detained for penal or correctional purposes or in which the liberty of the occupants is restricted. Institutional occupancies shall be classified as Group I-1, I-2, I-3 or I-4.

308.2 Group I-1. This occupancy shall include buildings, structures or parts thereof housing more than 16 persons, on a 24-hour basis, who because of age, mental disability or other reasons, live in a supervised residential environment that provides personal care services. The occupants are capable of responding to an emergency situation without physical assistance from staff. This group shall include, but not be limited to, the following:

Alcohol and drug centers
Assisted living facilities
Congregate care facilities
Convalescent facilities
Group homes

Halfway houses
Residential board and care facilities
Social rehabilitation facilities

A facility such as the above with five or fewer persons shall be classified as a Group R-3 or shall comply with the *Residential Code of Ohio*. A facility such as above, housing at least six and not more than 16 persons, shall be classified as Group R-4.

This group shall also include residential care facilities (see section 310.2 Definitions) where more than sixteen individuals reside and supervision and personal care services are provided for three or more individuals and when no more than five need physical assistance in response to an emergency.

308.3 Group I-2. This occupancy shall include buildings and structures used for medical, surgical, psychiatric, nursing or custodial care for persons who are not capable of self-preservation. This group shall include, but not be limited to, the following:

Child care facilities
Detoxification facilities
Hospitals
Mental hospitals
Nursing homes

This occupancy shall also include nursing homes where personal care services and skilled nursing care are provided for three or more individuals.

This group shall also include residential care facilities (see section 310.2 Definitions) where more than sixteen individuals reside and supervision and personal care services are provided for three or more individuals when more than five are not capable of responding to an emergency without physical assistance.

308.3.1 Definitions. The following words and terms shall, for the purposes of this section and as used elsewhere in this code, have the meanings shown herein.

CHILD CARE FACILITIES. Facilities that provide care on a 24-hour basis to more than five children, 2 ½ years of age or less.

CUSTODIAL CARE. *See Section 202.*

DETOXIFICATION FACILITIES. Facilities that serve patients who are provided treatment for substance abuse on a 24-hour basis and who are incapable of self-preservation or who are harmful to themselves or others.

HOSPITALS AND MENTAL HOSPITALS.

Buildings or portions thereof used on a 24-hour basis for the medical, psychiatric, obstetrical or

surgical treatment of inpatients who are incapable of self-preservation.

NURSING HOMES. *A home used for the reception and care of individuals who by reason of illness or physical or mental impairment require skilled nursing care and of individuals who require personal care services but not skilled nursing care. A nursing home is required to be licensed by the Ohio Department of Health to provide personal care services and skilled nursing care.*

308.4 Group I-3. This occupancy shall include buildings and structures that are inhabited by more than five persons who are under restraint or security. An I-3 facility is occupied by persons who are generally incapable of self-preservation due to security measures not under the occupants' control. This group shall include, but not be limited to, the following:

- Correctional centers
- Detention centers
- Jails
- Prerelease centers
- Prisons
- Reformatories

Buildings of Group I-3 shall be classified as one of the occupancy conditions indicated in Sections 308.4.1 through 308.4.5 (see Section 408.1).

308.4.1 Condition 1. This occupancy condition shall include buildings in which free movement is allowed from sleeping areas, and other spaces where access or occupancy is permitted, to the exterior via means of egress without restraint. A Condition 1 facility is permitted to be constructed as Group R.

308.4.2 Condition 2. This occupancy condition shall include buildings in which free movement is allowed from sleeping areas and any other occupied smoke compartment to one or more other smoke compartments. Egress to the exterior is impeded by locked exits.

308.4.3 Condition 3. This occupancy condition shall include buildings in which free movement is allowed within individual smoke compartments, such as within a residential unit comprised of individual sleeping units and group activity spaces, where egress is impeded by remote-controlled release of means of egress from such a smoke compartment to another smoke compartment.

308.4.4 Condition 4. This occupancy condition shall include buildings in which free movement is restricted from an occupied space. Remote-controlled release is provided to permit movement from sleeping units, activity spaces and other occupied areas within the smoke compartment to other smoke compartments.

308.4.5 Condition 5. This occupancy condition shall include buildings in which free movement is restricted from an occupied space. Staff-controlled manual release is provided to permit movement from sleeping units, activity spaces and other occupied areas within the smoke compartment to other smoke compartments.

308.5 Group I-4, day care facilities. This group shall include buildings and structures occupied by persons of any age who receive custodial care for less than 24 hours by individuals other than parents or guardians, relatives by blood, marriage or adoption, and in a place other than the home of the person cared for. A facility such as the above with five or fewer persons shall be classified as a Group R-3 or shall comply with the *Residential Code of Ohio*. Places of worship during religious functions are not included.

308.5.1 Adult care facility. A facility that provides accommodations for less than 24 hours for more than five unrelated adults and provides supervision and personal care services shall be classified as Group I-4.

Exception: A facility where occupants are capable of responding to an emergency situation without physical assistance from the staff shall be classified as Group R-3.

308.5.2 Child day care facility. A facility that provides supervision and personal care on less than a 24-hour basis for more than five children 2¹/₂ years of age or less shall be classified as Group I-4.

Exception: A child day care facility that provides care for more than five but no more than 100 children 2 ½ years or less of age, where the rooms in which the children are cared for are located on a level of exit discharge serving such rooms and each of these child care rooms has an exit door directly to the exterior, shall be classified as Group E.

SECTION 309 MERCANTILE GROUP M

309.1 Mercantile Group M. Mercantile Group M occupancy includes, among others, the use of a building or structure or a portion thereof, for the display and sale of merchandise and involves stocks of goods, wares or merchandise incidental to such purposes and accessible to the public. Mercantile occupancies shall include, but not be limited to, the following:

- Department stores
- Drug stores
- Markets
- Motor fuel-dispensing facilities
- Retail or wholesale stores
- Sales rooms

309.2 Quantity of hazardous materials. The aggregate quantity of nonflammable solid and nonflammable or noncombustible liquid hazardous materials stored or displayed in a single control area of a Group M occupancy shall not exceed the quantities in Table 414.2.5(1).

SECTION 310 RESIDENTIAL GROUP R

310.1 Residential Group R. Residential Group R includes, among others, the use of a building or structure, or a portion thereof, for sleeping purposes when not classified as an Institutional Group I or when not a detached one-, two-, or three- family dwelling regulated by the *Residential Code of Ohio*.

***Detached One-, Two-, or Three- Family Dwellings.** The “Residential Code of Ohio for One-, Two-, or Three- Family Dwellings” shall apply to structures comprised exclusively of one-, two-, or three-family dwellings (having independent exits) and their accessory structures in jurisdictions where a residential department is certified by the board. If no residential department is certified in a jurisdiction, construction documents for structures comprised exclusively of one-, two-, or three-family dwellings are not required to be submitted for approval.*

Residential occupancies shall include the following:

R-1 Residential occupancies containing sleeping units where the occupants are primarily transient in nature, including:

- Boarding houses (transient)
- Hotels (transient)
- Motels (transient)

R-1 occupancies typically will include sleeping units but may also include dwelling units when those units are not used primarily as permanent residences.

SRO facilities are not an occupancy within the R-1 occupancy group but in order to qualify for Fire Marshal issued licensure, an SRO facility must be designed and constructed to meet the R-1 criteria in this code.

Congregate living facilities (transient) with 10 or fewer occupants are permitted to comply with the construction requirements *found in Chapters 4-34 of this code* for Group R-3.

R-2 Residential occupancies containing sleeping units or more than *three* dwelling units where the occupants are primarily permanent in nature *in structures with shared exits*, including:

- Apartment houses
- Boarding houses (nontransient)
- Convents
- Dormitories
- Fraternities and sororities
- Hotels (nontransient)
- Live/work units
- Monasteries
- Motels (nontransient)
- SRO (Single room occupancy) facility (also see R-1)*

Vacation timeshare properties

Congregate living facilities with 16 or fewer occupants are permitted to comply with the construction requirements *found in Chapters 4-34 of this code* for Group R-3.

Residential occupancies in buildings or structures of mixed use containing one or more dwelling units where the occupants are primarily permanent in nature in structures with shared exits.

This group includes buildings or structures containing two or three dwelling units when the units share an exit.

R-3 Residential occupancies *having more than three dwelling units* where the occupants are primarily permanent in nature and not classified as Group R-1, R-2, R-4 or I, and where each unit has independent *exit* including:

Adult care facilities that provide accommodations for five or fewer persons of any age for less than 24 hours.

Child care facilities that provide accommodations for five or fewer persons of any age for less than 24 hours.

Congregate living facilities with 16 or fewer persons.

This group includes residential occupancies in buildings or structures of mixed use, three stories or less, where the occupants are primarily permanent in nature and where each dwelling unit has an independent exit.

The “Residential Code of Ohio for One-, Two-, and Three-Family Dwellings” (RCO) is permitted to be used in place of the requirements of this code for R-3 occupancies in buildings three stories or less, comprised exclusively of dwelling units where each unit has an independent exit with the following conditions:

- 1. No more than one dwelling unit is allowed to be located above another unit. Fire separation between units within a grouping of two units including a unit located partially or totally above another unit shall be in accordance with the RCO section 302.2. Fire separation between any grouping of two units and other adjacent units shall be in accordance with RCO sections 302.2 through 302.6.*
- 2. Chapter 1 of the OBC shall be applicable for code administration purposes.*
- 3. The edition of NFPA 70 listed in Chapter 35 of the OBC shall be applicable for electrical components, equipment, and system requirements.*

Adult care and child care facilities that are within a single-family home are permitted to comply with the *Residential Code of Ohio*.

R-4 Residential occupancies shall include buildings arranged for occupancy as residential care/assisted living facilities including more than five but not more than 16 occupants, excluding staff.

Group R-4 occupancies shall meet the requirements for construction as defined for Group R-3, except as otherwise provided for in this code or shall comply with the *Residential Code of Ohio* provided the building is protected by an automatic sprinkler system installed in accordance with Section 903.2.8.

310.2 Definitions. The following words and terms shall, for the purposes of this section and as used elsewhere in this code, have the meanings shown herein.

BOARDING HOUSE. A building arranged or used for lodging for compensation, with or without meals, and not occupied as a single-family unit.

CONGREGATE LIVING FACILITIES. A building or part thereof that contains sleeping units where residents share bathroom and/or kitchen facilities.

CUSTODIAL CARE. *See Section 202.*

DWELLING. *Any building that exclusively contains one, two, or three dwelling units, each of which may be occupied by a family and no more than five lodgers or boarders, intended, or designed to be built, used, rented, leased, let or hired out to be occupied, or that is occupied for living purposes, physically separated from adjacent structures, and with an independent exit from each dwelling unit.*

DWELLING, ONE-, TWO-, OR THREE-FAMILY. *See Dwelling.*

DWELLING UNIT. *A single unit providing complete, independent living facilities for one or more persons, that includes permanent provisions for living, sleeping, eating, cooking and sanitation. The dwelling unit may include any accessory space intended for the exclusive use of the occupants of an individual dwelling unit such as a private garage, greenhouse, etc.*

DORMITORY. A space in a building where group sleeping accommodations are provided in one room, or in a series of closely associated rooms, for persons not members of the same family group, under joint occupancy and single management, as in college dormitories or fraternity houses.

PERSONAL CARE SERVICE. *Assistance to residents with the activities of daily living to include assistance with the self-administration of medications and preparation of special diets as may be prescribed by physician or licensed dietitian. For purposes of this code, personal care service shall extend to assurance of physical safety of the resident.*

PRIMARILY TRANSIENT. *Use of a space for sleeping that has facilities for sanitation, with or without other spaces used for living purposes, offered or otherwise intended to be used for*

short periods of time but not intended to be used as a permanent residence or an institutional-use group facility where care or supervision is provided.

RESIDENTIAL CARE/ASSISTED LIVING FACILITIES. *Any building or part thereof, regardless of by which name held out publicly, housing residents on a 24-hour basis, who, because of age, mental illness, severe mental disability, infirmity, or other reason, live in a supervised residential environment which provides personal care service as a condition of licensing, and the occupants of which are capable of responding to an emergency situation without physical assistance from staff. This classification shall include, but not be limited to, residential care facilities holding themselves out as: board and care facilities, assisted living facilities, halfway houses, adult care or mental health group homes, congregate care facilities, social rehabilitation facilities, alcohol and drug abuse centers, and convalescent facilities with a maximum of 16 persons as residents.*

SRO (Single room occupancy) FACILITY. *A facility with more than five sleeping rooms that is kept, used, maintained, advertised or held out to the public as a place where each individual is provided with separate sleeping accommodations which is intended to be the permanent residence of a single occupant. SRO facilities are required to be licensed by the Ohio Fire Marshal and do not include agricultural labor camps, apartment houses, lodging houses, rooming houses or college dormitories.*

TRANSIENT. *See PRIMARILY TRANSIENT above.*

SECTION 311 STORAGE GROUP S

311.1 Storage Group S. Storage Group S occupancy includes, among others, the use of a building or structure, or a portion thereof, for storage that is not classified as a hazardous occupancy.

311.2 Moderate-hazard storage, Group S-1. Buildings occupied for storage uses that are not classified as Group S-2, including, but not limited to, storage of the following:

- Aerosols, Levels 2 and 3
- Aircraft hangar (storage and repair)
- Bags: cloth, burlap and paper
- Bamboos and rattan
- Baskets
- Belting: canvas and leather
- Books and paper in rolls or packs
- Boots and shoes
- Buttons, including cloth covered, pearl or bone
- Cardboard and cardboard boxes
- Clothing, woolen wearing apparel

Cordage
Dry boat storage (indoor)
Furniture Furs
Glues, mucilage, pastes and size
Grains
Horns and combs, other than celluloid
Leather
Linoleum
Lumber
Motor vehicle repair garages complying with the maximum
allowable quantities of hazardous materials listed in
Table 307.1(1) (see Section 406.6)
Photo engravings
Resilient flooring
Silks
Soaps
Sugar
Tires, bulk storage of
Tobacco, cigars, cigarettes and snuff
Upholstery and mattresses
Wax candles

311.3 Low-hazard storage, Group S-2. Includes, among others, buildings used for the storage of noncombustible materials such as products on wood pallets or in paper cartons with or without single thickness divisions; or in paper wrappings. Such products are permitted to have a negligible amount of plastic *trim*, such as knobs, handles or film wrapping. Group S-2 storage uses shall include, but not be limited to, storage of the following:

Asbestos
Beverages up to and including 16-percent alcohol in metal,
glass or ceramic containers
Cement in bags
Chalk and crayons
Dairy products in nonwaxed coated paper containers
Dry cell batteries
Electrical coils
Electrical motors
Empty cans
Food products
Foods in noncombustible containers
Fresh fruits and vegetables in nonplastic trays or containers
Frozen foods
Glass
Glass bottles, empty or filled with noncombustible liquids
Gypsum board

Inert pigments
Ivory
Meats
Metal cabinets
Metal desks with plastic tops and *trim*
Metal parts
Metals
Mirrors
Oil-filled and other types of distribution transformers
Parking garages, open or enclosed
Porcelain and pottery
Stoves
Talc and soapstones
Washers and dryers

SECTION 312
UTILITY AND MISCELLANEOUS GROUP U

312.1 General. Buildings and structures of an accessory character and miscellaneous structures not classified in any specific occupancy *and not used for agricultural purposes as defined in section 3781.06 of the Revised Code*, shall be constructed, equipped and maintained to conform to the requirements of this code commensurate with the fire and life hazard incidental to their occupancy. Group U shall include, but not be limited to, the following:

Agricultural buildings not used for agricultural purposes as defined in section 3781.06 of the Revised Code
Aircraft hangars, *residential* (see Section 412.5)
Barns
Carports
Fences more than 6 feet (1829 mm) high
Grain silos, accessory to a residential occupancy
Greenhouses
Livestock shelters *not used for agricultural purposes as defined in section 3781.06 of the Revised Code*
Private garages
Retaining walls
Sheds
Stables
Tanks
Towers

4101:1-35-01 Referenced standards.

3501.1 General. *This chapter lists the standards that are referenced in various sections of the building code. The standards are listed herein by the promulgating agency of the standard, the standard identification, the effective date and title. The application of the referenced standards shall be as specified in Section 102.5.*

3501.2 Referenced codes. *When indicated in this code, the following codes refer to provisions in the listed chapters of the administrative code:*

<i>Referenced Code</i>	<i>Ohio Administrative Code Chapters</i>
<i>Building Code</i>	<i>4101:1-1 to 4101:1-35</i>
<i>Energy Code</i>	<i>4101:1-13</i>
<i>Fire Code</i>	<i>1301:7-1 to 1301:7-7</i>
<i>Mechanical Code</i>	<i>4101:2-1 to 4101:2-15</i>
<i>Ohio Boiler and Pressure Vessel Rules</i>	<i>4101:4-1 to 4101:4-10</i>
<i>Ohio Elevator Code</i>	<i>4101:5-1 to 4101:5-3</i>
<i>Residential Code of Ohio for One, Two and Three Family Dwellings</i>	<i>4101:8-1 to 4101:8-44</i>
<i>Plumbing Code</i>	<i>4101:3-1 to 4101:3-13</i>

3501.3 Building Code Referenced Standards.

Aluminum Association
 1525 Wilson Boulevard, Suite 600
 Arlington, VA 22209

AA

Standard reference number

Title

- | | |
|-----------|--|
| ADM1—10 | Aluminum Design Manual: Part 1-A Specification for Aluminum Structures, Allowable Stress Design; and Part 1-B—Aluminum Structures, Load and Resistance Factor Design |
| ASM 35—00 | Aluminum Sheet Metal Work in Building Construction (Fourth Edition) |

American Architectural Manufacturers Association
 1827 Waldon Office Square, Suite 550
 Schaumburg, IL 60173

**AAMA
Standard
reference
number**

1402—09
AAMA/WDMA/CSA
101/I.S.2/A440—08

Title

Standard Specifications for Aluminum Siding, Soffit and Fascia
North American Fenestration Standard/Specifications for
Windows, Doors and Skylights

American Concrete Institute
38800 Country Club Drive
Farmington Hills, MI 48331

**ACI
Standard
reference
number**

216.1—07
318—08
530—08
530.1—08

Title

Standard Method for Determining Fire Resistance of Concrete and
Masonry Construction Assemblies
Building Code Requirements for Structural Concrete
Building Code Requirements for Masonry Structures
Specifications for Masonry Structures

American Forest & Paper Association
1111 19th St, NW Suite 800
Washington, DC 20036

**AF&PA
Standard
reference
number**

WCD No. 4—03
NDS—05

Title

Wood Construction Data—Plank and Beam Framing for
Residential
National Design Specification (NDS) for Wood
Construction with 2005 Supplement
Span Tables for Joists and Rafters
Permanent Wood Foundation Design Specification
Special Design Provisions for Wind and Seismic

AF&PA—93
ANSI/AF&PA PWF—07
ANSI/AF&PA SDPWS—08

American Institute of Steel Construction
One East Wacker Drive, Suite 3100
Chicago, IL 60601-2001

AISC

**Standard
reference
number**

Title

341—05	Seismic Provisions for Structural Steel Buildings, including Supplement No. 1 dated 2005
360—05	Specification for Structural Steel Buildings

American Iron and Steel Institute
1140 Connecticut Avenue
Suite 705
Washington, DC 20036

AISI

**Standard
reference
number**

Title

S100—07	North American Specification for the Design of Cold-formed Steel Structural Members
S200—08	North American Standard for Cold-formed Steel Framing—General
S210—08	North American Standard for Cold-formed Steel Framing—Floor and Roof System Design
S211—08	North American Standard for Cold-formed Steel Framing—Wall Stud
S212—08	North American Standard for Cold-formed Steel Framing—Header Design
S213—08	North American Standard for Cold-formed Steel Framing—Lateral Design
S214—08	North American Standard for Cold-formed Steel Framing—Truss Design, with Supplement 2, dated 2008

American Institute of Timber Construction
Suite 140
7012 S. Revere Parkway
Englewood, CO 80112

AITC

**Standard
reference
number**

Title

AITC Technical Note 7—96	Calculation of Fire Resistance of Glued Laminated Timbers
AITC 104—03	Typical Construction Details
AITC 110—01	Standard Appearance Grades for Structural Glued Laminated
AITC 113—01	Standard for Dimensions of Structural Glued Laminated Timber

AITC 117—04	Standard Specifications for Structural Glued Laminated Timber of Softwood Species
AITC 119—96	Standard Specifications for Structural Glued Laminated Timber of Hardwood
AITC200—09	Manufacturing Quality Control Systems Manual for Structural Glued Laminated Timber
ANSI/AITCA 190.1—07	Structural Glued Laminated Timber

Automotive Lift Institute
P.O. Box 85
Courtland, NY 13045

**ALI
Standard
reference
number**

Title

ALI ALCTV—2007	Standard for Automobile Lifts—Safety Requirements for Construction, Testing and Validation (ANSI)
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American National Standards Institute
25 West 43rd Street, Fourth Floor
New York, NY 10036

**ANSI
Standard
reference
number**

Title

A13.1—07	Scheme for the Identification of Piping Systems
A108.1A—09	Installation of Ceramic Tile in the Wet-set Method, with Portland Cement Mortar Setting Bed with Dry-set or Latex-
A108.1B—09	Installation of Ceramic Tile, quarry Tile on a Cured Portland Cement Mortar Setting Bed with Dry-set or Latex-
A108.4—09	Installation of Ceramic Tile with Organic Adhesives or Water-cleanable Tile-setting Epoxy Adhesive
A108.5—09	Installation of Ceramic Tile with Dry-set Portland Cement Mortar or Latex-portland Cement Mortar
A108.6—09	Installation of Ceramic Tile with Chemical-resistant, Water Cleanable Tile-setting and -grouting Epoxy
A108.8—09	Installation of Ceramic Tile with Chemical-resistant Furan Resin Mortar and Grout
A108.9—09	Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout
A108.10—09	Installation of Grout in Tilework
A118.1—10.1	American National Standard Specifications for Dry-set Portland Cement

A118.3—10.1	American National Standard Specifications for Chemical-resistant, Water-cleanable Tile-setting and -grouting Epoxy and Water Cleanable Tile-setting Epoxy
A118.4—10.1	American National Standard Specifications for Latex-portland Cement
A118.5—10.1	American National Standard Specifications for Chemical Resistant Furan Mortar and Grouts for Tile
A118.8—10.1	American National Standard Specifications for Modified Epoxy Emulsion Mortar/Grout
A136.1—10.1	American National Standard Specifications for Organic Adhesives for Installation of Ceramic
137.1—08	American National Standard Specifications for Ceramic Tile
A208.1—09	Particleboard
Z 97.1—09	Safety Glazing Materials Used in Buildings—Safety Performance Specifications and Methods of Test

APA - Engineered Wood Association
7011 South 19th
Tacoma, WA 98466

**APA
Standard
reference
number**

Title

APA PDS—08	Panel Design Specification
APA PDS Supplement 1—90	Design and Fabrication of Plywood Curved Panels (revised 1995)
APA PDS Supplement 2—92	Design and Fabrication of Plywood-lumber Beams (revised 1998)
APA PDS Supplement 3—96	Design and Fabrication of Plywood Stressed-skin Panels (revised 1996)
APA PDS Supplement 4—93	Design and Fabrication of Plywood Sandwich Panels (revised 1993)
APA PDS Supplement 5—95	Design and Fabrication of All-plywood Beams (revised 1995)
EWS R540—07	Builders Tips: Proper Storage and Handling of Glulam Beams
EWS S475—07	Glued Laminated Beam Design Tables
EWS S560—10	Field Notching and Drilling of Glued Laminated Timber Beams
EWS T300—07	Glulam Connection
EWS X440—08	Product Guide— Glulam
EWS X450—01	Glulam in Residential Construction—Western Edition

The Association of Pool & Spa Professionals
2111 Eisenhower Avenue
Alexandria, VA 22314

**APSP
Standard
reference
number**

Title

ANSI/APSP 7—06 Standard for Suction Entrapment Avoidance in Swimming Pools, Wading Pools, Spas, Hot Tubs and Catch Basins

American Society of Agricultural and Biological Engineers
2950 Niles Road
St. Joseph, MI 49085

**ASABE
Standard
reference
number**

Title

EP 484.2 -98 Diaphragm Design of Metal-clad, Post-frame Rectangular Buildings
EP 486.1 -99 Shallow-post Foundation Design
EP 559 -03 Design Requirements and Bending Properties for Mechanically Laminated Columns

American Society of Civil Engineers
Structural Engineering Institute
1801 Alexander Bell Drive
Reston, VA 20191-4400

**ASCE/SEI
Standard
reference
number**

Title

3—91 Structural Design of Composite Slabs
5—08 Building Code Requirements for Masonry
6—08 Specification for Masonry Structures
7—05 Minimum Design Loads for Buildings and Other Structures including Supplements No. 1 and 2, excluding Chapter 14 and Appendix 11A
8—02 Standard Specification for the Design of Cold-formed Stainless Steel Structural Members
19—10 Structural Applications of Steel Cables for Buildings
24—05 Flood Resistant Design and Construction
29—05 Standard Calculation Methods for Structural Fire Protection
32—01 Design and Construction of Frost Protected Shallow Foundations

American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.

1791 Tullie Circle, NE
Atlanta, GA 30329-2305

ASHRAE

Standard

Reference

Number

Title

ASHRAE 90.1-2007 *Energy Standard for Buildings Except Low-Rise Residential Buildings*

American Society of Mechanical Engineers
Three Park Avenue
New York, NY 10016-5990

ASME

Standard

reference

number

Title

A17.1/CSA B44—2010

Safety Code for Elevators and Escalators

A18.1—2008

Safety Standard for Platform Lifts and Stairway Chairlifts

A90.1—2009

Safety Standard for Belt Manlifts

B16.18—2001

(Reaffirmed 2005)

Cast Copper Alloy Solder Joint Pressure Fittings

B16.22—2001

(Reaffirmed 2005)

Wrought Copper and Copper Alloy Solder Joint Pressure Fittings

B20.1—2009

Safety Standard for Conveyors and Related Equipment

B31.3—2008

Process Piping

ASTM International
100 Barr Harbor Drive
West Conshohocken, PA 19428-2959

ASTM

Standard

reference

number

Title

A 36/A 36M—08

Specification for Carbon Structural Steel

A 153/A 153M—09

Specification for Zinc Coating (Hot-dip) on Iron and Steel Hardware

A 240/A 240M—10a

Standard Specification for Chromium and Chromium-nickel Stainless Steel Plate,

Sheet and Strip for Pressure Vessels and for General Applications

A 252—10

Specification for Welded and Seamless Steel Pipe Piles

A 283/A 283M—03(2007)	Specification for Low and Intermediate Tensile Strength Carbon Steel Plates
A 307—07b	Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
A 416/A 416M—10	Specification for Steel Strand, Uncoated Seven-wire for Prestressed Concrete
A 463/A 463M—09a	Standard Specification for Steel Sheet, Aluminum-coated, by the Hot-dip Process
A 572/A 572M—07	Specification for High-strength Low-alloy Columbium-vanadium Structural Steel
A 588/A 588M—10	Specification for High-strength Low-alloy Structural Steel with 50 ksi (345 MPa) Minimum Yield Point to 4 inches (100 mm) Thick
A 615/A 615M—09b	Specification for Deformed and Plain Billet-steel Bars for Concrete Reinforcement
A 653/A 653M—09a	Specification for Steel Sheet, Zinc-coated Galvanized or Zinc-iron Alloy-coated Galvannealed by the Hot-dip Process
A 690/A 690M—07	Standard Specification for High-strength Low-alloy Nickel, Copper, Phosphorus Steel H-piles and Sheet Piling with Atmospheric Corrosion Resistance for Use in Marine Environments
A 706/A 706M—09b	Specification for Low-alloy Steel Deformed and Plain Bars for Concrete Reinforcement
A 722/A 722M—07	Specification for Uncoated High-strength Steel Bar for Prestressing
A 755/A 755M—03(2008)	Specification for Steel Sheet, Metallic-coated by the Hot-dip Process and Prepainted by the Coil-coating Process for Exterior Exposed Building Products
A 792/A 792M—09a	Specification for Steel Sheet, 55% Aluminum-zinc Alloy-coated by the Hot-dip Process
A 875/A 875M—09a	Standard Specification for Steel Sheet Zinc-5 percent, Aluminum Alloy-coated by the Hot-dip Process
A 913/A 913M—07	Specification for High-strength Low-alloy Steel Shapes of Structural Quality, Produced by Quenching and Self-tempering Process (QST)
A 924/A 924M—10	Standard Specification for General Requirements for Steel Sheet, Metallic-coated by the Hot-dip Process
A 992/A 992M—06a	Standard Specification for Structural Shapes
B 42—10	Specification for Seamless Copper Pipe, Standard
B 43—09	Specification for Seamless Red Brass Pipe, Standard Sizes
B 68—02	Specification for Seamless Copper Tube, Bright Annealed (Metric
B 88—09	Specification for Seamless Copper Water Tube

B 101—07	Specification for Lead-coated Copper Sheet and Strip for Building Construction
B 209—07	Specification for Aluminum and Aluminum Alloy Steel and Plate
B 251—10	Specification for General Requirements for Wrought Seamless Copper and Copper-alloy Tube
B 280—08	Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service
B 370—09	Specification for Cold-rolled Copper Sheet and Strip for Building Construction
B 695—04(2009)	Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel
C 5—10	Specification for Quicklime for Structural
C 22/C 22M—00 (2005)e01	Specification for Gypsum
C 27—98 (2008)	Specification for Standard Classification of Fireclay and High-alumina Refractory Brick
C 28/C 28M—10	Specification for Gypsum
C 31/C 31M—10	Practice for Making and Curing Concrete Test Specimens in the Field
C 33—08	Specification for Concrete Aggregates
C 34—10	Specification for Structural Clay Load-bearing Wall Tile
C 35—01(2009)	Specification for Inorganic Aggregates for Use in Gypsum Plaster
C 36/C 36M—03	Specification for Gypsum Wallboard
C 37/C 37M—01	Specification for Gypsum Lath
C 55—09	Specification for Concrete Building Brick
C 56—10	Specification for Structural Clay Nonload-bearing Tile
C 59/C 59M—00 (2006)	Specification for Gypsum Casting and Molding Plaster
C 61/C 61M—00 (2006)	Specification for Gypsum Keene's
C 62—10	Specification for Building Brick (Solid Masonry Units Made from Clay or Shale)
C 67—09	Test Methods of Sampling and Testing Brick and Structural Clay
C 73—05	Specification for Calcium Silicate Face Brick (Sand-lime Brick)
C 79—04a	Specification for Treated Core and Nontreated Core Gypsum Sheathing Board
C 90—09	Specification for Loadbearing Concrete Masonry Units
C 91—05	Specification for Masonry Cement
C 94/C 94M—10	Specification for Ready-mixed
C 126—10	Specification for Ceramic Glazed Structural Clay Facing Tile, Facing Brick and Solid Masonry Units
C 140—10	Test Method Sampling and Testing Concrete Masonry Units and Related Units
C 150—09	Specification for Portland Cement
C 172—10	Practice for Sampling Freshly Mixed
C 199—84 (2005)	Test Method for Pier Test for Refractory Mortars
C 206—03 (2009)	Specification for Finishing Hydrated Lime

C 208—08a	Specification for Cellulosic Fiber Insulating Board
C 212—10	Specification for Structural Clay Facing Tile
C 216—10	Specification for Facing Brick (Solid Masonry Units Made from Clay or Shale)
C 270—10	Specification for Mortar for Unit Masonry
C 315—07	Specification for Clay Flue Liners and Chimney Pots
C 317/C 317M—00 (2005)	Specification for Gypsum Concrete
C 330—09	Specification for Lightweight Aggregates for Structural Concrete
C 331—05	Specification for Lightweight Aggregates for Concrete Masonry Units
C 406—10	Specification for Roofing Slate
C 442/C 442M—04	Specification for Gypsum Backing Board and Coreboard and Gypsum Shaftliner Board
C 472—99 (2009)	Specification for Standard Test Methods for Physical Testing of Gypsum, Gypsum Plasters and Gypsum Concrete
C 473—10	Test Method for Physical Testing of Gypsum Panel Products
C 474—05	Test Methods for Joint Treatment Materials for Gypsum Board Construction
C 475—02 (2007)	Specification for Joint Compound and Joint Tape for Finishing Gypsum Wallboard
C 503—10	Specification for Marble Dimension Stone (Exterior)
C 514—04 (2009)e1	Specification for Nails for the Application of Gypsum
C 516—08	Specifications for Vermiculite Loose Fill Thermal
C 547—07e1	Specification for Mineral Fiber Pipe Insulation
C 549—06	Specification for Perlite Loose Fill
C 552—07	Standard Specification for Cellular Glass Thermal Insulation
C 557—03(2009)e01	Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing
C 568—10	Specification for Limestone Dimension Stone
C 578—10	Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
C 587—04 (2009)	Specification for Gypsum Veneer Plaster
C 588/C 588M—01	Specification for Gypsum Base for Veneer Plasters
C 595—10	Specification for Blended Hydraulic Cements
C 615—10	Specification for Granite Dimension
C 616—10	Specification for Quartz Dimension Stone
C 629—10	Specification for Slate Dimension
C 630/C 630M—03	Specification for Water-resistant Gypsum Backing Board
C 631—09	Specification for Bonding Compounds for Interior Gypsum Plastering
C 635/C 635M-07	Specification for the Manufacture, Performance and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel
C 636/C 636M—08	Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels

C 645—09a	Specification for Nonstructural Steel Framing Members
C 652—10	Specification for Hollow Brick (Hollow Masonry Units Made from Clay or Shale)
C 728—05 (2010)	Standard Specification for Perlite Thermal Insulation Board
C 744—10	Specification for Prefaced Concrete and Calcium Silicate Masonry
C 754—09a	Specification for Installation of Steel Framing Members to Receive Screw-attached Gypsum Panel Products
C 836/C 836M-10	Specification for High-solids Content, Cold Liquid-applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course
C 840—08	Specification for Application and Finishing of Gypsum Board
C 841—03 (2008)e1	Specification for Installation of Interior Lathing and Furring
C 842—05	Specification for Application of Interior Gypsum Plaster
C 843—99 (2006)	Specification for Application of Gypsum Veneer Plaster
C 844—10	Specification for Application of Gypsum Base to Receive Gypsum Veneer Plaster
C 847—10a	Specification for Metal Lath
C 887—05 (2010)	Specification for Packaged, Dry Combined Materials for Surface Bonding Mortar
C 897—05 (2009)	Specification for Aggregate for Job-mixed Portland Cement-based Plaster
C 920—10	Standard for Specification for Elastomeric Joint Sealants
C 926—06	Specification for Application of Portland Cement-based Plaster
C 931/C 931M—04	Specification for Exterior Gypsum Soffit Board
C 932—06	Specification for Surface-applied Bonding Compounds Agents for Exterior Plastering
C 933—09	Specification for Welded Wire Lath
C 946—10	Specification for Practice for Construction of Dry-stacked, Surface-bonded Walls
C 954—10	Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 inch (0.84 mm) to 0.112 inch (2.84 mm) in Thickness
C 955—09a	Standard Specification for Load-bearing Transverse and Axial Steel Studs, Runners Tracks, and Bracing or Bridging, for Screw Application of Gypsum Panel Products and Metal Plaster Bases
C 956—04 (2010)	Specification for Installation of Cast-in-place Reinforced Gypsum
C 957—10	Specification for High-solids Content, Cold Liquid-applied Elastomeric Waterproofing Membrane with Integral Wearing Surface
C 960—04	Specification for Predecorated Gypsum Board
C 1002—07	Specification for Steel Self-piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs

C 1007—08a	Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories
C 1019—09	Test Method of Sampling and Testing Grout
C 1029—10	Specification for Spray-applied Rigid Cellular Polyurethane Thermal Insulation
C 1032—06	Specification for Woven Wire Plaster Base
C 1047—10a	Specification for Accessories for Gypsum Wallboard and Gypsum Veneer
C 1063—08	Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-based Plaster
C 1088—10	Specification for Thin Veneer Brick Units Made from Clay or Shale
C 1167—03 (2009)	Specification for Clay Roof Tiles
C 1177/C 1177M—08	Specification for Glass Mat Gypsum Substrate for Use as Sheathing
C 1178/C 1178M—08	Specification for Coated Glass Mat Water-resistant Gypsum Backing Panel
C 1186—08	Specification for Flat-Fiber Cement Sheets
C 1261—10	Specification for Firebox Brick for Residential Fireplaces
C 1278/C 1278M—07a	Specification for Fiber-reinforced Gypsum Panels
C 1280—09	Specification for Application of Gypsum Sheathing
C 1283—07a	Practice for Installing Clay Flue Lining.
C 1288—99 (2010)	Standard Specification for Discrete Nonasbestos Fiber-cement Interior Substrate Sheets
C 1289—10	Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board
C 1314—10	Test Method for Compressive Strength of Masonry Prisms
C 1325—08b	Standard Specification for Nonasbestos Fiber-mat Reinforced Cement Interior Substrate Sheets
C 1328—05	Specification for Plastic (Stucco Cement
C 1386—07	Specification for Precast Autoclaved Aerated Concrete (AAC) Wall Construction
C 1395/C 1395M—06a	Specification for Gypsum Ceiling Board
C 1396M—09a	Specification for Gypsum Board
C 1405—10	Standard Specification for Glazed Brick (Single Fired, Solid Brick Units
C 1492—03 (2009)	Standard Specification for Concrete Roof
C 1629/C 1629M—06	Standard Classification for Abuse-resistant Nondecorated Interior Gypsum Panel Products and Fiber-reinforced Cement Panels
C 1658/C 1658M—06	Standard Specification for Glass Mat Gypsum Panels
D 25—99 (2005)	Specification for Round Timber Piles
D 41—05 (2010)	Specification for Asphalt Primer Used in Roofing, Dampproofing and Waterproofing

D 43—00 (2006)	Specification for Coal Tar Primer Used in Roofing, Dampproofing and Waterproofing
D 56—05	Test Method for Flash Point By Tag Closed Tester
D 86—10a	Test Method for Distillation of Petroleum Products at Atmospheric Pressure
D 93—10	Test Method for Flash Point By Pensky-Martens Closed Cup Tester
D 225—07	Specification for Asphalt Shingles (Organic Felt) Surfaced with Mineral Granules
D 226/D 226M-09	Specification for Asphalt-saturated Organic Felt Used in Roofing and Waterproofing
D 227—03	Specification for Coal-tar-saturated Organic Felt Used in Roofing and Waterproofing
D 312—00 (2006)	Specification for Asphalt Used in
D 422—63 (2007)	Test Method for Particle-size Analysis of Soils
D 448—08	Standard Classification for Sizes of Aggregate for Road and Bridge
D 450—07	Specification for Coal-tar Pitch Used in Roofing, Dampproofing and Waterproofing
D 635—10	Test Method for Rate of Burning and/or Extent and Time of Burning of Self-supporting Plastics in a Horizontal Position
D 1143/D 1143M—07e1	Test Method for Piles Under Static Axial Compressive Load
D 1227—95 (2007)	Specification for Emulsified Asphalt Used as a Protective Coating for Roofing
D 1557—09	Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort [56,000 ft-lb/ft ³ (2,700 KN m/m ³)]
D 1586—08a	Specification for Penetration Test and Split-barrel Sampling of Soils
D 1761—06	Test Method for Mechanical Fasteners in Wood
D 1863—05	Specification for Mineral Aggregate Used on Built-up Roofs
D 1929—96 (2001)e01	Test Method for Determining Ignition Properties of Plastics
D 1970—09	Specification for Self-adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roof Underlayment for Ice Dam Protection
D 2166—06	Test Method for Unconfined Compressive Strength of Cohesive Soil
D 2178—04	Specification for Asphalt Glass Felt Used in Roofing and Waterproofing
D 2216—10	Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
D 2487—10	Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
D 2626—04	Specification for Asphalt Saturated and Coated Organic Felt Base Sheet Used in Roofing
D 2822—05	Specification for Asphalt Roof Cement

D 2823—05	Specification for Asphalt Roof Coatings
D 2843—10	Test for Density of Smoke from the Burning or Decomposition of Plastics
D 2850—03a (2007)	Test Method for Unconsolidated, Undrained Triaxial Compression Test on Cohesive Soils
D 2898—10	Test Methods for Accelerated Weathering of Fire-retardant-treated Wood for Fire Testing
D 3019—08	Specification for Lap Cement Used with Asphalt Roll Roofing, Nonfibered, Asbestos Fibered and NonasbestosFibered
D 3161—09	Test Method for a Wind Resistance of Asphalt Shingles (Fan Induced Method)
D 3200—74 (2005)	Standard Specification and Test Method for Establishing Recommended Design Stresses for Round Timber Construction Poles
D 3201—08ae1	Test Method for Hygroscopic Properties of Fire-retardant-treated Wood and Wood-based Products
D 3278—96(2004)e01	Test Methods for Flash Point of Liquids by Small Scale Closed-cup Apparatus
D 3462/ D3462M-10a	Specification for Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules
D 3468—99 (2006)e1	Specification for Liquid-applied Neoprene and Chlorosulfonated Polyethylene Used in Roofing and Waterproofing
D 3679—09a	Specification for Rigid Poly [Vinyl Chloride (PVC) Siding]
D 3689—07	Method for Testing Individual Piles Under Static Axial Tensile Load
D 3737—09	Practice for Establishing Allowable Properties for Structural Glued Laminated Timber (Glulam)
D 3746—85 (2008)	Test Method for Impact Resistance of Bituminous Roofing Systems
D 3747—79 (2007)	Specification for Emulsified Asphalt Adhesive for Adhering Roof Insulation
D 3909—97b (2004)e01	Specification for Asphalt Roll Roofing (Glass Felt) Surfaced with Mineral Granules
D 3957—09	Standard Practices for Establishing Stress Grades for Structural Members Used in Log Buildings
D 4022—07	Specification for Coal Tar Roof Cement, Asbestos Containing
D 4272—09	Test Method for Total Energy Impact of Plastic Films by Dart Drop
D 4318—10	Test Methods for Liquid Limit, Plastic Limit and Plasticity Index of Soils
D 4434/D 4434M-09	Specification for Poly (Vinyl Chloride) Sheet Roofing
D 4479—07	Specification for Asphalt Roof Coatings—Asbestos-free
D 4586—07	Specification for Asphalt Roof Cement—Asbestos-free

D 4601—04	Specification for Asphalt-coated Glass Fiber Base Sheet Used in Roofing
D 4637/D 4637M-10	Specification for EPDM Sheet Used in Single-ply Roof Membrane
D 4829—08a	Test Method for Expansion Index of Soils
D 4869—05e01	Specification for Asphalt-saturated (Organic Felt) Underlayment Used in Steep Slope Roofing
D 4897/D 4897M-01(2009)	Specification for Asphalt-coated Glass Fiber Venting Base Sheet Used in Roofing
D 4945—08	Test Method for High-strain Dynamic Testing of Piles
D 4990—97a (2005)e1	Specification for Coal Tar Glass Felt Used in Roofing and Waterproofing.
D 5019—07a	Specification for Reinforced Nonvulcanized Polymeric Sheet Used in Roofing Membrane
D 5055—10	Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-joists
D 5456—10	Specification for Evaluation of Structural Composite Lumber Products
D 5516—09	Test Method of Evaluating the Flexural Properties of Fire-retardant-treated Softwood Plywood Exposed to the Elevated Temperatures
D 5643—06	Specification for Coal Tar Roof Cement, Asbestos-free
D 5664—10	Test Methods for Evaluating the Effects of Fire-retardant Treatment and Elevated Temperatures on Strength Properties of Fire-retardant-treated Lumber
D 5665—99a (2006)	Specification for Thermoplastic Fabrics Used in Cold-applied Roofing and Waterproofing
D 5726—98 (2005)	Specification for Thermoplastic Fabrics Used in Hot-applied Roofing and Waterproofing .
D 6083—05e01	Specification for Liquid Applied Acrylic Coating Used in Roofing
D 6162—00a (2008)	Specification for Styrene-butadiene-styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements
D 6163—00 (2008)	Specification for Styrene-butadiene-styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements
D 6164—05 e1	Specification for Styrene-butadiene-styrene (SBS) Modified Bituminous Sheet Metal Materials Using Polyester Reinforcements
D 6222—08	Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using Polyester Reinforcements
D 6223/D6223M-02(2009)e1	Specification for Atactic Polypropylene (APP) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements
D 6298—05e1	Specification for Fiberglass Reinforced Styrene-butadiene-styrene (SBS) Modified Bituminous Sheets with a Factory Applied Metal Surface

D 6305—08	Practice for Calculating Bending Strength Design Adjustment Factors for Fire-retardant-treated Plywood Roof Sheathing
D 6380—03 (2009)	Standard Specification for Asphalt Roll Roofing (Organic) Felt
D 6509/D6509M-09	Standard Specification for Atactic Polypropylene (APP) Modified Bituminous base Sheet Materials Using Glass Fiber Reinforcements
D 6694—08	Standard Specification for Liquid-applied Silicone Coating Used in Spray Polyurethane Foam Roofing
D 6754/D6754M-10	Standard Specification for Ketone Ethylene Ester Based Sheet Roofing
D 6757—07	Standard Specification for Inorganic Underlayment for Use with Steep Slope Roofing Products
D 6841—08	Standard Practice for Calculating Design Value Treatment Adjustment Factors for Fire-retardant-treated Lumber
D 6878—08e1	Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing
D 6947—07	Standard Specification for Liquid Applied Moisture Cured Polyurethane Coating Used in Spray Polyurethane Foam Roofing System
D 7158—08d	Standard Test Method for Wind Resistance of Sealed Asphalt Shingles (Uplift Force/Uplift Resistance Method)
E 84—10b	Test Methods for Surface Burning Characteristics of Building Materials
E 90—09	Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
E 96/E 96M—05	Test Method for Water Vapor Transmission of Materials
E 108—10a	Test Methods for Fire Tests of Roof Coverings
E 119—10b	Test Methods for Fire Tests of Building Construction and Materials
E 136—09b	Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C
E 330—02 (2010)	Test Method for Structural Performance of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference
E 331—00 (2009)	Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain Walls by Uniform Static Air Pressure Difference
E 492—09	Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-ceiling Assemblies Using the Tapping Machine
E 605—93 (2006)	Test Method for Thickness and Density of Sprayed Fire-resistive Material (SFRM) Applied to Structural Members.
E 681—09	Test Methods for Concentration Limits of Flammability of Chemical Vapors and Gases

E 736—00 (2006)	Test Method for Cohesion/Adhesion of Sprayed Fire-resistant Materials Applied to Structural Members
E 814—10	Test Method of Fire Tests of Through-penetration Firestops
E 970—10	Test Method for Critical Radiant Flux of Exposed Attic Floor Insulation Using a Radiant Heat Energy Source
E 1300—09a	Practice for Determining Load Resistance of Glass in Buildings.
E 1354—10a	Standard Test Method for Heat and Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter
E 1592—05	Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference
E 1602—03 (2010)e1	Guide for Construction of Solid Fuel-burning Masonry Heaters
E 1886—05	Test Method for Performance of Exterior Windows, Curtain Walls, Doors and Storm Shutters Impacted by Missiles and Exposed to Cyclic Pressure Differentials
E 1966—07	Test Method for Fire-resistant Joint Systems.
E 1996—09	Specification for Performance of Exterior Windows, Glazed Curtain Walls, Doors and Impact Protective Systems Impacted by Windborne Debris in Hurricanes
E 2072—10	Standard Specification for Photoluminescent (Phosphorescent) Safety Markings
E 2273—03	Standard Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish Systems (EIFS) Clad Wall Assemblies
E 2307—10	Standard Test Method for Determining Fire Resistance of Perimeter Fire Barrier Systems Using Intermediate-scale, Multistory Test Apparatus
E 2404—10	Standard Practice for Specimen Preparation and Mounting of Textile, Paper or Vinyl Wall or Ceiling Coverings to Assess Surface Burning Characteristics
E 2568—09e1	Standard Specification for PB Exterior Insulation and Finish Systems (EIFS)
E 2570—07	Standard Test Method for Evaluating Water-resistant Barrier (WRB) Coatings Used Under Exterior Insulation and Finish Systems (EIFS) for EIFS with Drainage
E 2573—07a	Standard Practice for Specimen Preparation and Mounting of Site-fabricated Stretch Systems to Assess Surface Burning Characteristics
F 547—06	Terminology of Nails for Use with Wood and Wood-based Materials
F 1346—91 (2003)	Performance Specification for Safety Covers and Labeling Requirements for All Covers for Swimming Pools, Spas and Hot Tubs
F 1667—10	Specification for Driven Fasteners: Nails, Spikes and Staples

F 2006—10	Standard/Safety Specification for Window Fall Prevention Devices for Nonemergency Escape (Egress) and Rescue (Ingress) Windows
F 2090—10	Specification for Window Fall Prevention Devices with Emergency Escape (Egress) Release Mechanisms
F 2200—05	Standard Specification for Automated Vehicular Gate Construction
G 152—06	Practice for Operating Open Flame Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials
G 154—06	Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials
G 155—05a	Practice for Operating Xenon Arc Light Apparatus for Exposure of Nonmetallic Materials

The Association of the Wall and Ceiling Industries International
513 West Broad Street, Suite 210
Falls Church, VA 22046

AWCI

**Standard
reference
number**

Title

12-B—05	Technical Manual 12-B Standard Practice for the Testing and Inspection of Field Applied Thin Film Intumescent Fire-resistive Materials; an Annotated Guide, <i>Second Edition</i>
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American Wood Protection Association
P.O. Box 361784
Birmingham, AL 35236-1784

AWPA

**Standard
reference
number**

Title

C1—03	All Timber Products—Preservative Treatment by Pressure Processes
M4—06	Standard for the Care of Preservative-treated Wood Products
U1—10	USE CATEGORY SYSTEM: User Specification for Treated Wood Except Section 6, Commodity Specification H

American Welding Society
550 N.W. LeJeune Road
Miami, FL 33126

AWS

**Standard
reference**

number	Title
D1.1—10	Structural Welding Code—Steel
D1.3—08	Structural Welding Code—Sheet Steel
D1.4—05	Structural Welding Code—Reinforcing Steel

Builders Hardware Manufacturers' Association
355 Lexington Avenue, 17th Floor
New York, NY 10017-6603

BHMA
Standard
reference

number	Title
A 156.10—05	Power Operated Pedestrian Doors
A 156.19—07	Standard for Power Assist and Low Energy Operated Doors

Canadian General Standards Board
Place du Portage 111, 6B1
11 Laurier Street
Gatineau, Quebec, Canada KIA 1G6

CGSB
Standard
Reference

Number	Title
37-GP-52M (1984)	Roofing and Waterproofing Membrane, Sheet Applied, Elastomeric
37-GP-56M (1985)	Membrane, Modified, Bituminous, Prefabricated and Reinforced for Roofing—with December 1985 Amendment
CAN/CGSB 37.54—95	Polyvinyl Chloride Roofing and Waterproofing Membrane

Composite Panel Association
19465 Deerfield Avenue, Suite 306
Leesburg, VA 20176

CPA
Standard
reference

number	Title
ANSI A135.4—2004	Basic Hardboard
ANSI A135.5—2004	Prefinished Hardboard Paneling
ANSI A135.6—2006	Hardboard Siding

Consumer Product Safety Commission

4330 East West Highway
Bethesda, MD 20814-4408

CPSC

**Standard
reference
number**

Title

16 CFR Part 1201(1977)	Safety Standard for Architectural Glazing Material
16 CFR Part 1209 (1979)	Interim Safety Standard for Cellulose Insulation
<i>16 CFR Part 1301(1977)</i>	<i>Ban of Unstable Refuse Bins</i>
16 CFR Part 1404 (1979)	Cellulose Insulation
16 CFR Part 1500 (1991)	Hazardous Substances and Articles; Administration and Enforcement Regulations
16 CFR Part 1500.44 (2001)	Method for Determining Extremely Flammable and Flammable Solids
16 CFR Part 1507 (2001)	Fireworks Devices
16 CFR Part 1630 (2000)	Standard for the Surface Flammability of Carpets and Rugs

Canadian Standards Association
5060 Spectrum Way, Suite 100
Mississauga, Ontario, L4W 5N6 Canada

CSA

**Standard
reference
number**

Title

101/I.S.2/A440—08	Specifications for Windows, Doors and Unit Skylights
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Cedar Shake and Shingle Bureau
P.O. Box 1178
Sumas, WA 98295-1178

CSSB

**Standard
reference
number**

Title

CSSB—97	Grading and Packing Rules for Western Red Cedar Shakes and Western Red Shingles of the Cedar Shake and Shingle Bureau
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Door and Access Systems Manufacturers Association International
1300 Summer Avenue
Cleveland, OH 44115-2851

DASMA

**Standard
reference
number**

Title

ANSI/DASMA 107—1997
(R2004)

Room Fire Test Standard for Garage Doors Using Foam Plastic
Insulation

108—05

Standard Method for Testing Sectional Garage Doors and Rolling
Doors: Determination of Structural Performance Under Uniform
Static Air Pressure Difference

115—05

Standard Method for Testing Sectional Garage Doors and Rolling
Doors: Determination of Structural Performance Under Missile
Impact and Cyclic Wind Pressure

U.S. Department of Commerce
National Institute of Standards and Technology
1401 Constitution Avenue, NW
Washington, DC 20230

DOC

**Standard
reference
number**

Title

PS-1—07

Structural Plywood

PS-2—04

Performance Standard for Wood-based Structural-use Panels

PS 20—05

American Softwood Lumber Standard

U.S. Department of Labor
c/o Superintendent of Documents
U.S. Government Printing Office
Washington, DC 20402-9325

DOL

**Standard
reference
number**

Title

29 CFR Part 1910.1000
(1974)

Air Contaminants

U.S. Department of Transportation
c/o Superintendent of Documents
1200 New Jersey Avenue, SE
Washington, DC 20402-9325

**DOTn
Standard
reference
number**

49CFR Parts 100-185-2005
49 CFR Parts 173.137
(2005)

49 CFR—1998

Title

Hazardous Materials Regulations

Shippers—General Requirements for Shipments and Packaging—
Class 8—Assignment of Packing Group
Specification of Transportation of Explosive and Other Dangerous
Articles,
UN 0335, UN 0336 Shipping Containers

European Committee for Standardization (EN)
Central Secretariat
Rue de Stassart 36
B-10 50 Brussels

**EN
Standard
reference
number**

EN 1081-98

Title

Resilient Floor Coverings—Determination of the Electrical Resistance

Federal Emergency Management Agency
Federal Center Plaza
500 C Street S.W.
Washington, DC 20472

**FEMA
Standard
reference
number**

FIA-TB11—01

Title

Crawlspace Construction for Buildings Located in Special Flood
Hazard Areas

Factory Mutual Global Research
Standards Laboratories Department
1301 Atwood Avenue, P.O. Box 7500
Johnson, RI 02919

**FM
Standard
reference**

number	Title
4450 (1989)	Approval Standard for Class 1 Insulated Steel Deck Roofs—with Supplements through July 1992
4470 (2010)	Approval Standard for Class 1 Roof Covers
4474 (04)	Evaluating the Simulated Wind Uplift Resistance of Roof Assemblies Using Static Positive and/or Negative Differential Pressures
4880 (2010)	American National Standard for Evaluating Insulated Wall or Wall and Roof/ Ceiling Assemblies, Plastic Interior Finish Materials, Plastic Exterior Building Panels, Wall/Ceiling Coating Systems, Interior and Exterior Finish Systems

Gypsum Association
810 First Street N.E. #510
Washington, DC 20002-4268

**GA
Standard
reference**

number	Title
GA 216—10	Application and Finishing of Gypsum Panel Products
GA 600—09	Fire-resistance Design Manual, 18th Edition

Hardwood Plywood Veneer Association
1825 Michael Faraday Drive
Reston, VA 20190-5350

**HPVA
Standard
reference**

number	Title
HP-1—2009	Standard for Hardwood and Decorative Plywood

U.S. Department of Housing and Urban Development
451 7th Street, SW,
Washington, DC 20410

**HUD
Standard
reference**

number	Title
HUD 24 CFR Part 3280 (1994)	Manufactured Home Construction and Safety Standards

International Code Council, Inc.
500 New Jersey Ave, NW 6th Floor

Washington, DC 20001

ICC

Standard

reference

number

Title

ICC/ANSI A117.1—09

Accessible and Usable Buildings and Facilities

ICC 300—07

ICC Standard on Bleachers, Folding and Telescopic Seating and

ICC 400—07

Standard on Design and Construction of Log Structures

ICC 500—08

ICC/NSSA Standard on the Design and Construction of Storm

ICC 600—08

Standard for Residential Construction in High Wind Regions

IEBC – 09

International Existing Buildings Code

IECC—09

International Energy Conservation Code (*adoption includes only section 101 of chapter 1 and chapters 2 through 6*)

IFGC—09

International Fuel Gas Code (*including ICC Emergency Amendment changing IFGC Sections 406.7*)

SBCCI SSTD 11—99

Test Standard for Determining Wind Resistance of Concrete or Clay Roof Tiles

International Organization for Standardization

ISO Central Secretariat,

1 ch, de la Voie-Creuse,

Case Postale 56

CH-1211 Geneva 20, Switzerland

ISO

Standard

reference

number

Title

ISO 8115—86

Cotton Bales—Dimensions and Density

National Association of Architectural Metal Manufacturers,

800 Roosevelt Road,

Bldg. C, Suite 312

Glen Ellyn, IL 60137

NAAMM

Standard

reference

number

Title

FP 1001—07

Guide Specifications for Design of Metal Flag Poles

National Concrete Masonry Association,

13750 Sunrise Valley,

Herndon, VA 22071-4662

**NCMA
Standard
reference
number**

TEK5-08

Title

Details for Concrete Masonry Fire Walls

National Fire Protection Association
1 Batterymarch Park
Quincy, MA 02269-9101

**NFPA
Standard
reference
number**

10—10

Title

Portable Fire Extinguishers

11—10

Low Expansion Foam

12—08

Carbon Dioxide Extinguishing Systems

12A—04

Halon 1301 Fire Extinguishing Systems

13—10

Installation of Sprinkler Systems (*including TIA 10-2*)

13D—10

Installation of Sprinkler Systems in One- and Two-family Dwellings and Manufactured Homes (*including TIA 10-2*)

13R—10

Installation of Sprinkler Systems in Residential Occupancies Up to and Including Four Stories in Height (*including TIA 10-2*)

14—10

Installation of Standpipe and Hose System

16—07

Installation of Foam-water Sprinkler and Foam-water Spray Systems

17—09

Dry Chemical Extinguishing Systems

17A—09

Wet Chemical Extinguishing

20—10

Installation of Stationary Pumps for Fire Protection

30—08

Flammable and Combustible Liquids Code

31—06

Installation of Oil-burning Equipment

32—07

Dry Cleaning Plants

40—11

Storage and Handling of Cellulose Nitrate Film

58—11

Liquefied Petroleum Gas Code

61—08

Prevention of Fires and Dust Explosions in Agricultural and Food Product Facilities

~~70—11~~ 14

National Electrical Code (*including TIA 11-1*)

72—10

National Fire Alarm and Signaling Code (*including TIA 10-4 and TIA 10-5*)

80—10

Fire Doors and Other Opening Protectives

85—07

Boiler and Combustion System Hazards Code

(Note: NFPA 8503 has been incorporated into NFPA 85)

92B—09	Smoke Management Systems in Malls, Atria and Large Spaces
99—05	Standard for Health Care Facilities
105—10	Standard for the Installation of Smoke Door Assemblies
110—10	Emergency and Standby Power Systems
111—10	Stored Electrical Energy Emergency and Standby Power Systems
120—10	Coal Preparation Plants
170—09	Standard for Fire Safety and Emergency Symbols
211—10	Chimneys, Fireplaces, Vents and Solid Fuel-burning
252—08	Standard Methods of Fire Tests of Door Assemblies
253—06	Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source
257—07	Standard for Fire Test for Window and Glass Block Assemblies
259—08	Test Method for Potential Heat of Building Materials
265—07	Method of Fire Tests for Evaluating Room Fire Growth Contribution of Textile Wall Coverings on Full Height Panels and Walls
268—07	Standard Test Method for Determining Ignitibility of Exterior Wall Assemblies Using a Radiant Heat Energy Source
285—06	Standard Method of Test for the Evaluation of Flammability Characteristics of Exterior Nonload-bearing Wall Assemblies Containing Combustible Components
286—06	Standard Method of Fire Test for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth
288—07	Standard Method of Fire Tests of Floor Fire Door Assemblies Installed Horizontally in Fire-resistance-rated Floor Systems
409—11	Aircraft Hangars
418—06	Standard for Heliports
484—09	Combustible Metals
654—06	Prevention of Fire & Dust Explosions from the Manufacturing, Processing and Handling of Combustible Particulate Solids
655—07	Prevention of Sulfur Fires and Explosions
664—07	Prevention of Fires and Explosions in Wood Processing and Woodworking Facilities
701—10	Standard Methods of Fire Tests for Flame-propagation of Textiles and Films
704—07	Standard System for the Identification of the Hazards of Materials for Emergency Response
1124—06	Manufacture, Transportation and Storage of Fireworks and Pyrotechnic Articles
2001—08	Clean Agent Fire Extinguishing Systems

PCI

**Standard
reference
number**

MNL 124—89
MNL 128—01

Title

Design for Fire Resistance of Precast Prestressed Concrete
Recommended Practice for Glass Fiber Reinforced Concrete
Panels

Post-Tensioning Institute
8601 North Black Canyon Highway, Suite 103
Phoenix, AZ 85021

PTI

**Standard
reference
number**

PTI—2008

PTI—2008

Title

Standard Requirements for Analysis of Shallow Concrete Foundations on
Expansive Soils, Third Edition

Standard Requirements for Design of Shallow Post-tensioned Concrete
Foundation on Expansive Soils, Second Edition

Rack Manufacturers Institute
8720 Red Oak Boulevard, Suite 201
Charlotte, NC 28217

RMI

**Standard
reference
number**

ANSI/MH16.1—08

Title

Specification for Design, Testing and Utilization of Industrial Steel
Storage Racks

Steel Deck Institute,
P. O. Box 25
Fox River Grove, IL 60021

SDI

**Standard
reference
number**

ANSI/NC1.0—06
ANSI/RD1.0—06

Title

Standard for Noncomposite Steel Floor Deck
Standard for Steel Roof Deck

Steel Joist Institute,
1173B London Links Drive
Forest, VA 24551

SJI

**Standard
reference
number**

Title

CJ-1.0—06	Standard Specification for Composite Steel Joists, CJ-series
JG-1.1—05	Standard Specification for Joist Girders
K-1.1—05	Standard Specification for Open Web Steel Joists, K- series
LH/DLH-1.1—05	Standard Specification for Longspan Steel Joists, LH-series and Deep Longspan Steel Joists, DLH-series

Single-Ply Roofing Institute,
411 Waverly Oaks Road, Suite 331B,
Waltham, MA 02452

SPRI

**Standard
reference
number**

Title

SPRI/ANSI/ES-1—03	Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems
RP-4—02	Wind Design Guide for Ballasted Single-ply Roofing Systems

Telecommunications Industry Association
2500 Wilson Boulevard
Arlington, VA 22201-3834

TIA

**Standard
reference
number**

Title

TIA-222-G—09	Structural Standards for Steel Antenna Towers and Antenna Supporting Structures including-Addendum 1, 222-G-1, Dated 2007
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The Masonry Society,
3970 Broadway, Unit 201-D,
Boulder, CO 80304-1135

TMS

**Standard
reference**

number	Title
0216—07	Standard Method for Determining Fire Resistance of Concrete and Masonry Construction Assemblies
0302—07	Standard Method for Determining the Sound Transmission Class Rating for Masonry Walls
402—08	Building Code Requirements for Masonry Structures
602—08	Specification for Masonry Structures

Truss Plate Institute,
218 N. Lee Street, Suite 312
Alexandria, VA 22314

TPI Standard reference number	Title
TPI 1—2007	National Design Standards for Metal-plate-connected Wood Truss Construction

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

UL Standard reference number	Title
9—09	Fire Tests of Window Assemblies
10A—09	Tin Clad Fire Doors
10B—08	Fire Tests of Door Assemblies
10C—09	Positive Pressure Fire Tests of Door Assemblies
14B—08	Sliding Hardware for Standard Horizontally-mounted Tin Clad Fire Doors
14C—06	Swinging Hardware for Standard Tin Clad Fire Doors Mounted Singly and in Pairs
103—10	Factory-built Chimneys, for Residential Type and Building Heating Appliances
127—08	Factory-built Fireplaces
199E—04	Outline of Investigation for Fire Testing of Sprinklers and Water Spray Nozzles for Protection of Deep Fat Fryers.
217—06	Single and Multiple Station Smoke Alarms
263—03	Standard for Fire Test of Building Construction and Materials
268—09	Smoke Detectors for Fire Protective Signaling Systems
300—05	Fire Testing of Fire Extinguishing Systems for Protection of Restaurant Cooking Areas

305—97	Panic Hardware
325—02	Door, Drapery, Gate, Louver and Window Operations and Systems—with Revisions through February 2006
555—2006	Fire Dampers
555C—2006	Ceiling Dampers
555S—99	Smoke Dampers—with Revisions through July 2006
580—2006	Test for Uplift Resistance of Roof Assemblies
641—95	Type L Low-temperature Venting Systems
710B—04	Recirculating Systems—with Revisions through April 2006
723—08	Standard for Test for Surface Burning Characteristics of Building Materials
790—04	Standard Test Methods for Fire Tests of Roof Coverings
793—08	Standards for Automatically Operated Roof Vents for Smoke and Heat
864—03	Standards for Control Units and Accessories for Fire Alarm Systems—with Revisions through March 2006
924—06	Standard for Safety Emergency Lighting and Power Equipment
1040—96	Fire Test of Insulated Wall Construction—with Revisions through June 2001
1256—02	Fire Test of Roof Deck Construction—with Revisions through January 2007
1479—03	Fire Tests of Through-penetration Firestops—with Revisions through April 2007
1482—10	Solid-fuel-type Room Heater
1715—97	Fire Test of Interior Finish Material—with Revisions through March 2004
1777—07	Chimney Liners
1784—01	Air Leakage Tests of Door Assemblies—with Revisions through December 2004
1897—04	Uplift Tests for Roof Covering Systems
1975—06	Fire Test of Foamed Plastics Used for Decorative Purposes
1994—04	Standard for Luminous Egress Path Marking Systems—with Revisions through February 2005
2017—08	Standards for General-purpose Signaling Devices and Systems
2079—04	Tests for Fire Resistance of Building Joint Systems—with Revisions through March 2006
2200—98	Stationary Engine Generator Assemblies

Underwriters Laboratories of Canada,
7 Underwriters Road,
Toronto, Ontario, Canada M1R3B4

ULC
Standard
reference
number

Title

CAN/ULC S102.2—2010 Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Coverings and Miscellaneous Materials and Assemblies—with 2000 Revisions

United States Code,
c/o Superintendent of Documents
U.S. Government Printing Office,
Washington, DC 20402-9325

USC

**Standard
reference
number**

Title

10 U.S.C. Sections 18233(A)(1) and 18237-1994

18 USC Part 1, Ch.40 Importation, Manufacture, Distribution and Storage of Explosive Materials

Window and Door Manufacturers Association
1400 East Touhy Avenue #470
Des Plaines, IL 60018

WDMA

**Standard
reference
number**

Title

AAMA/WDMA/CSA

101/I.S.2/A440—08 Specifications for Windows, Doors and Unit Skylights

Wire Reinforcement Institute, Inc.
942 Main Street, Suite 300
Hartford, CT 06103

WRI

**Standard
reference
number**

Title

WRI/CRSI—81 Design of Slab-on-ground Foundations—with 1996 Update

PART B

4101:2-15-01 Referenced standards.

1501.1 General. This chapter lists the *codes and standards* that are referenced in various sections of this document. The standards are listed herein by the promulgating agency of the standard, the standard identification, the effective date and *the* title. The application of the referenced standards shall be as specified in Section 102.5 of the building code.

1501.2 Referenced codes: When indicated in the OMC, the following codes refer to provisions in the listed chapters of the Administrative Code:

<i>Referenced code</i>	<i>Ohio Administrative Code chapters</i>
<i>Building Code</i>	<i>4101:1-1 to 4101:1-35</i>
<i>Fire Code</i>	<i>1301:7-1 to 1301:7-7</i>
<i>Ohio Boiler and Pressure Vessel Rules</i>	<i>4101:4-1 to 4101:4-10</i>
<i>Plumbing Code</i>	<i>4101:3-1 to 4101:3-13</i>

1501.3 Referenced Standards.

ACCA Air Conditioning Contractors of America
 2800 Shirlington Road, Suite 300
 Arlington, VA 22206

Standard reference number	Title
Manual D—95 183—2007	Residential Duct Systems Peak Cooling and Heating Load Calculations in Buildings Except Low-Rise Residential Buildings

AHRI Air-Conditioning, Heating and Refrigeration Institute
 4100 North Fairfax Drive, Suite 200
 Arlington, VA 22203

Standard reference number	Title
700—06	Purity Specifications for Fluorocarbon and Other Refrigerants

ANSI American National Standards Institute

11 West 42nd Street
New York, NY 10036

**Standard
reference
number**

Title

Z21.8—1994 (R2002) Installation of Domestic Gas Conversion Burners

ASHRAE American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.

1791 Tullie Circle, NE
Atlanta, GA 30329

**Standard
reference
number**

Title

Handbook—2009 ASHRAE Fundamentals Handbook—
15—2010 Safety Standard for Refrigeration Systems
34—2010 Designation and Safety Classification of Refrigerants
62.1—2010 Ventilation for Acceptable Indoor Air Quality
62.2. -2010 *Ventilation for Acceptable Indoor Air Quality in Low-Rise Residential Buildings*
170-2008 *Ventilation of Health Care Facilities (with addendums a through h-2011)*

ASME American Society of Mechanical Engineers

Three Park Avenue
New York, NY 10016-5990

**Standard
reference
number**

Title

B1.20.1—1983 (R2006) Pipe Threads, General Purpose (Inch
B16.3—2006 Malleable Iron Threaded Fittings, Classes 150 & 300
B16.5—2009 Pipe Flanges and Flanged Fittings NPS 1/2 through NPS 24—
B16.9—2007 Factory Made Wrought Steel Buttwelding Fittings
B16.11—2009 Forged Fittings, Socket-welding and Threaded
B16.15—2006 Cast Bronze Threaded Fittings
B16.18—2001
(Reaffirmed 2005) Cast Copper Alloy Solder Joint Pressure Fittings
B16.22—2001
(Reaffirmed 2005) Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
B16.23—2002
(Reaffirmed 2006) Cast Copper Alloy Solder Joint Drainage Fittings DWV

B16.24—2006	Cast Copper Alloy Pipe Flanges and Flanged Fittings: Class 150, 300, 400, 600, 900, 1500 and
B16.26—2006	Cast Copper Alloy Fittings for Flared Copper Tubes
B16.28—1994	Wrought Steel Butt welding Short Radius Elbows and Returns
B16.29—2007	Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings-
B31.9—2010	Building Services Piping
BPVC—2010	Boiler & Pressure Vessel Code
BPVC Section IX-2010	Welding and Brazing Qualifications
CSD-1—2009	Controls and Safety Devices for Automatically Fired Boilers

ASSE

American Society of Sanitary Engineering

901 Canterbury, Suite A
Westlake, OH 44145

Standard reference number

Title

1017—09 Temperature Actuated Mixing Valves for Hot Water Distribution Systems

ASTM

ASTM International

100 Barr Harbor Drive
West Conshohocken, PA 19428

Standard reference number

Title

A 53/A 53M—10	Specification for Pipe, Steel, Black and Hot-dipped, Zinc-coated Welded and Seamless
A 106/A106M—10	Specification for Seamless Carbon Steel Pipe for High-Temperature Service
A 126—04 (2009)	Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings
A 254—97 (2007)	Specification for Copper Brazed Steel Tubing
A 420/A 420M—10	Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Low-Temperature Service
A 539—99	Specification for Electric-Resistance-Welded Coiled Steel Tubing for Gas and Fuel Oil Lines
B 32—08	Specification for Solder Metal
B 42—10	Specification for Seamless Copper Pipe, Standard Sizes
B 43—09	Specification for Seamless Red Brass Pipe, Standard
B 68—02	Specification for Seamless Copper Tube, Bright Annealed
B 75—02	Specification for Seamless Copper
B 88—09	Specification for Seamless Copper Water
B 135—10	Specification for Seamless Brass Tube
B 251—10	Specification for General Requirements for Wrought Seamless Copper and Copper-alloy Tube
B 280—08	Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service
B 302—07	Specification for Threadless Copper Pipe, Standard
B 813—10	Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube

C 315—07	Specification for Clay Flue Liners and Chimney Pots
C 411—05	Test Method for Hot-surface Performance of High-temperature Thermal Insulation
D 56—05 (2010)	Test Method for Flash Point by Tag Closed Tester
D 93—10a	Test Method for Flash Point of Pensky-Martens Closed Cup Tester
D 1527—99(2005)	Specification for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe, Schedules 40 and 80
D 1693—08	Test Method for Environmental Stress-Cracking of Ethylene Plastics
D 1785—06	Specification for Poly (Vinyl Chloride)(PVC) Plastic Pipe, Schedules 40, 80 and 120
D 2235—04	Specifications for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings
D 2241—09	Specification for Poly (Vinyl Chloride)(PVC) Pressure-rated Pipe (SDR-Series
D 2282—99(2005)	Specification for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe (SDR-PR)
D 2412—10	Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-plate Loading
D 2447—03	Specification for Polyethylene (PE) Plastic Pipe, Schedules 40 and 80, Based on Outside Diameter
D 2466—06	Specification for Poly (Vinyl Chloride)(PVC) Plastic Pipe Fittings, Schedule 40
D 2467—06	Specification for Poly (Vinyl Chloride)(PVC) Plastic Pipe Fittings, Schedule 80
D 2468—96a	Specification for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe Fittings, Schedule 40
D 2513—09a	Specification for Thermoplastic Gas Pressure Pipe, Tubing, and
D 2564—04(2009)e01	Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems
D 2657—07	Standard Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings
D 2683—10	Specification for Socket-type Polyethylene Fittings for Outside Diameter-controlled Polyethylene Pipe and Tubing
D 2837—08	Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products
D 2846/D 2846M—09b	Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Hot and Cold Water Distribution Systems
D 2996—01(2007)e01	Specification for Filament-wound Fiberglass (Glass Fiber Reinforced Thermosetting Resin) Pipe
D 3035—08	Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter
D 3278—96(2004)e01	Test Methods for Flash Point of Liquids by Small Scale Closed-cup Apparatus
D 3261—10a	Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and
D 3309—96a(2002)	Specification for Polybutylene (PB) Plastic Hot and Cold Water Distribution Systems
D 3350—10	Specification for Polyethylene Plastics Pipe and Fittings Materials
E 84—10b	Test Method for Surface Burning Characteristics of Building Materials
E 119—10b	Test Method for Fire Tests of Building Construction and
E 136—09b	Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 Degrees C
E 814—10	Test Method for Fire Tests of Through-penetration Fire
E 1509—04	Specification for Room Heaters, Pellet Fuel-burning
E 2231—09	Standard Practice For Specimen Preparation and Mounting of Pipe and Duct Insulation Materials to Assess Surface Burning Characteristics
E 2336-04 (2009)	Standard Test Methods for Fire Resistive Grease Duct Enclosure Systems
F 438—09	Specification for Socket Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40
F 439—09	Specification for Socket Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80
F 441/F 441M—09	Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and

F 442/F 442M—09	Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe (SDR-PR).
F 493—10	Specification for Solvent Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings
F 876—10	Specification for Crosslinked Polyethylene (PEX) Tubing
F 877—07	Specification for Crosslinked Polyethylene (PEX) Plastic Hot and Cold Water Distribution Systems.
F 1055—98(2006)	Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene Pipe and
F 1281—07	Specification for Crosslinked Polyethylene/Aluminum/Crosslinked Polyethylene (PEX-AL-PEX) Pressure Pipe
F 1282—10	Standard Specification for Polyethylene/Aluminum/Polyethylene (PE-AL-PE) Composite Pressure Pipe
F 1476-07	Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications
F 1924—05	Standard Specification for Plastic Mechanical Fittings for Use on Outside Diameter Controlled Polyethylene Gas Distribution Pipe and Tubing
F 1974—09	Standard Specification for Metal Insert Fittings for Polyethylene/Aluminum/Polyethylene and Crosslinked Polyethylene/Aluminum/Crosslinked Polyethylene Composite Pressure Pipe
F 2389—10	Specification for Pressure-Rated Polypropylene Piping Systems
F 2623—08	Standard Specification for Polyethylene of Raised Temperature (PE-RT) SDR 9 Tubing

AWS American Welding Society
550 N.W. LeJeune Road P.O. Box 351040
Miami, FL 33135

**Standard
reference
number**

Title

A5.8—2004 Specifications for Filler Metals for Brazing and Braze Welding.

AWWA American Water Work Association
6666 West Quincy Avenue
Denver, CO 80235

**Standard
reference
number**

Title

C110/A21.10—08 Standard for Ductile Iron & Gray Iron Fittings, 2 inches Through 48 inches for Water
C115/A21.15—05 Standard for Flanged Ductile-iron Pipe with Ductile Iron or Grey-iron Threaded Flanges
C151/A21.51—09 Standard for Ductile-Iron Pipe, Centrifugally Cast for Water
C153/A21.53—06 Standard for Ductile-Iron Compact Fittings for Water Service

CSA Canadian Standards Association

5060 Spectrum Way Mississauga,
Ontario, Canada L4W 5N6

**Standard
reference
number**

Title

B137.9-M91 CAN/CSA B137.10—05	Polyethylene/Aluminum/Polyethylene (PE-AL-PE) Composite Pressure-Pipe Systems Cross-linked Polyethylene/Aluminum/Cross-linked Polyethylene Composite Pressure- Pipe Systems
ANSI CSA America FC1-04	Stationary Fuel Cell Power Systems

DOL Department of Labor Occupational Safety and Health Administration

c/o Superintendent of Documents
US Government Printing Office
Washington, DC 20402-9325

**Standard
reference
number**

Title

29CFRPart 1910.1000 (1974)	Air Contaminants
29CFRPart 1910. 1025	Toxic and Hazardous Substances

FS Federal Specifications*

General Services Administration
7th & D Streets Specification Section, Room 6039
Washington, DC 20407

**Standard
reference
number**

Title

WW-P-325B (1976)	Pipe, Bends, Traps, Caps and Plugs; Lead (for Industrial Pressure and Soil and Waste Applications)
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*Standards are available from the Supt. of Documents, U.S. Government Printing Office, Washington, DC 20402-9325.

ICC International Code Council, Inc.

500 New Jersey Ave, NW
6th FloorICC
Washington, DC 20001

**Standard
reference**

number	Title
IFGC—09	International Fuel Gas Code (<i>including ICC Emergency Amendment changing IFGC Sections 406.7</i>)

IIAR International Institute of Ammonia Refrigeration
1110 North Glebe Road
Arlington, VA 22201

Standard reference number	Title
2—99 (with Addendum A-2005)	Equipment, Design, and Installation of Ammonia Mechanical Refrigerating Systems

MSS Manufacturers Standardization Society of the Valve & Fittings Industry, Inc. 1
27 Park Street, N.E.
Vienna, VA 22180

Standard reference number	Title
SP-69—2003	Pipe Hangers and Supports—Selection and Application

NAIMA North American Insulation Manufacturers Association
44 Canal Center Plaza, Suite 310 Alexandria, VA 22314

Standard reference number	Title
AH116—02	Fibrous Glass Duct Construction Standards

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

Standard reference number	Title
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30A—08	Code for Motor Fuel-dispensing Facilities and Repair Garages
31—06	Installation of Oil-burning Equipment
37—10	Stationary Combustion Engines and Gas Turbines
58—11	Liquefied Petroleum Gas Code
69—08	Explosion Prevention Systems
70— 11 14	National Electrical Code
72—10	National Fire Alarm <i>and Signaling Code</i> (<i>including TIA 10-4 and TIA 10-5</i>)
75-09	<i>Protection of Information Technology Equipment</i>
82—09	Incinerators and Waste and Linen Handling Systems and Equipment
85-07	<i>Boiler and Combustion Systems Hazards Code</i>
91—10	Exhaust Systems for Air Conveying of Vapors, Gases, and Noncombustible Particulate Solids
92B—09	Smoke Management Systems in Malls, Atria and Large Spaces
211—10	Chimneys, Fireplaces, Vents and Solid Fuel-burning Appliances
262—07	Standard Method of Test for Flame Travel and Smoke of Wires and Cables for Use in Air-handling Spaces
704—07	Identification of the Hazards of Materials for Emergency Response
853—10	Installation of Stationary Fuel Power Plants

SMACNA Sheet Metal & Air Conditioning Contractors National Assoc., Inc.
4201 Lafayette Center Drive
Chantilly, VA 20151-1209

**Standard
reference
number**

Title

SMACNA/ANSI—2005	HVAC Duct Construction Standards—Metal and Flexible (2005)
SMACNA—03	Fibrous Glass Duct Construction Standards

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

**Standard
reference
number**

Title

17—08	Vent or Chimney Connector Dampers for Oil-fired Appliances
103—10	Factory-built Chimneys, Residential Type and Building Heating Appliance
127—08	Factory-built Fireplaces
174—04	Household Electric Storage Tank Water Heaters—with Revisions through May 2006
181—05	Factory-made Air Ducts and Air Connectors—with Revisions through December 1998
181A—05	Closure Systems for Use with Rigid Air Ducts and Air Connectors—with Revisions through December 1998
181B—05	Closure Systems for Use with Flexible Air Ducts and Air Connectors—with Revisions through December 1998
207—01	Refrigerant-containing Components and Accessories, Nonelectrical—with Revisions through November 2004
263—03	Standard for Fire Test of Building Construction and Materials

268—09	Smoke Detectors for Fire Prevention Signaling Systems
268A—08	Smoke Detectors for Duct Applications
343—08	Pumps for Oil-Burning Appliances
391—10	Solid-fuel and Combination-fuel Central and Supplementary Furnaces
412—04	Refrigeration Unit Coolers—with Revisions through February 2007 .
471—10	Commercial Refrigerators and Freezers
508—99	Industrial Control Equipment—with Revisions through July 2005
536—97	Flexible Metallic Hose—with Revisions through June 2003
555—06	Fire Dampers—with Revisions through January 2002.
555C—06	Ceiling Dampers
555S—99	Smoke Dampers—with Revisions through July 2006
586—09	High-efficiency, Particulate, Air Filter Units
641—95	Type L Low-temperature Venting Systems—with Revisions through August 2005
710—95	Exhaust Hoods for Commercial Cooking Equipment—with Revisions through February 2007.
710B—04	Recirculating Systems
723—08	Standard for Test for Surface Burning Characteristics of Building Materials
726—95	Oil-fired Boiler Assemblies—with Revisions through March 2006
727—06	Oil-fired Central Furnaces
729—03	Oil-fired Floor Furnaces—with Revisions through January 1999
730—03	Oil-fired Wall Furnaces—with Revisions through January 1999
731—95	Oil-fired Unit Heaters—with Revisions through February 2006
732—95	Oil-fired Storage Tank Water Heaters—with Revisions through February 2005
737—07	Fireplace Stoves
762—03	Outline of Investigation for Power Ventilators for Restaurant Exhaust Appliances
791—06	Residential Incinerators.
834—04	Heating, Water Supply and Power Boilers Electric—with Revisions through March 2006
858—05	Household Electric Ranges—with Revisions through April 2006
867—00	Electrostatic Air Cleaners—with Revisions through May 2004
875—09	Electric Dry Bath Heater
896—93	Oil-burning Stoves—with Revisions through May 2004
900—04	Air Filter Units
923—08	Microwave Cooking Appliances
959—01	Medium Heat Appliance Factory-built Chimneys—with Revisions through September 2006
1240—05	Electric Commercial Clothes
1261—01	Electric Water Heaters for Pools and Tubs—with Revisions through June 2004
1453—04	Electric Booster and Commercial Storage Tank Water Heaters—with Revisions through May 2006
1482—10	Solid-fuel Type Room Heaters
1777—07	Chimney Liners .
1812—09	Standard for Ducted Heat Recovery Ventilators
1815—09	Standard for Nonducted Heat Recovery Ventilators
1820—04	Fire Test of Pneumatic Tubing for Flame and Smoke Characteristics
1887—04	Fire Tests of Plastic Sprinkler Pipe for Visible Flame and Smoke Characteristics
1978—05	Grease Ducts
1995—05	Heating and Cooling Equipment .
2158—97	Electric Clothes Dryers—with Revisions through May 2004
2162—01	Outline of Investigation for Commercial Wood-fired Baking Ovens—Refractory Type
2200—98	Stationery Engine Generator Assemblies
2221—10	Tests of Fire Resistive Grease Duct Enclosure Assemblies

PART C

4101:3-13-01 Referenced standards.

1301.1 General. This chapter lists the *codes and standards* that are referenced in various sections of this document. The standards are listed herein by the promulgating agency of the standard, the standard identification, the effective date, and *the title*. The application of the referenced standards shall be as specified in Section 102.5 of the building code.

1301.2 Referenced codes. When indicated in the “*OPC*”, the following codes refer to provisions in the listed chapters of the Administrative Code:

<i>Referenced code</i>	<i>Ohio Administrative Code chapters</i>
<i>Building Code</i>	<i>4101:1-1 to 4101:1-35</i>
<i>Fire Code</i>	<i>1301:7-1 to 1301:7-7</i>
<i>Mechanical Code</i>	<i>4101:2-1 to 4101:2-15</i>
<i>Ohio Boiler and Pressure Vessel Rules</i>	<i>4101:4-1 to 4101:4-10</i>

1301.3 Referenced Standards.

ANSI American National Standards Institute
 25 West 43rd Street, Fourth Floor
 New York, NY 10036

Standard Referenced	Title
A118.10-10	Specifications for Load Bearing, Bonded, Waterproof Membranes for Thin Set Ceramic Tile and Dimension Stone Installation
Z4.3—95 (R2005)	Minimum Requirements for Nonsewered Waste-Disposal Systems (<i>Standard is developed by the Portable Sanitation Association International-PSAI</i>)
Z21.22—99 (R2003)	Relief Valves for Hot Water Supply Systems with Addenda Z21.22a-2000 (R2003) and Z21.22b-2001 (R2003) (<i>Standard is developed by the Canadian Standards Association-CSA and is the same as CSA 4.4-M99</i>)
Z124.1.2—05	Plastic Bathtub and Shower Units (<i>Standard is developed by IAPMO</i>)
Z124.3—05	Plastic Lavatories (<i>Standard is developed by IAPMO</i>)
Z124.4—06	Plastic Water Closet Bowls and Tanks (<i>Standard is developed by IAPMO</i>)
Z124.6—07	Plastic Sinks (<i>Standard is developed by IAPMO</i>)
Z124.9—04	Plastic Urinal Fixtures. (<i>Standard is developed by IAPMO</i>)

AHRI Air-Conditioning, Heating, & Refrigeration Institute
 4100 North Fairfax Drive, Suite 200
 Arlington, VA 22203

Standard

Referenced	Title
1010—02	Self-contained, Mechanically Refrigerated Drinking-Water Coolers

ASME American Society of Mechanical Engineers Three

Park Avenue
 New York, NY 10016-5990

Standard

Referenced	Title
A112.1.2—2004	Air Gaps in Plumbing Systems
A112.1.3—2000 (R 2005)	Air Gap Fittings for Use with Plumbing Fixtures, Appliances and Appurtenances
A112.3.1—2007	Stainless Steel Drainage Systems for Sanitary, DWV, Storm and Vacuum Applications Above and Below Ground
A112.3.4—2000 (R 2004)	Macerating Toilet Systems and Related Components
A112.4.1—2009	Water Heater Relief Valve Drain Tubes
A112.4.3—1999 (R 2004)	Plastic Fittings for Connecting Water Closets to the Sanitary Drainage System
A112.6.1M—1997 (R2002)	Floor-affixed Supports for Off-the-floor Plumbing Fixtures for Public Use
A112.6.2—2000 (R2004)	Framing-affixed Supports for Off-the-floor Water Closets with Concealed Tanks
A112.6.3—2001 (R 2007)	2001 Floor and Trench Drains
A112.6.7—2001 (R 2007)	Enameled and Epoxy-coated Cast-iron and PVC Plastic Sanitary Floor Sinks
A112.14.1—2003	Backwater Valves
A112.14.3—2000	Grease Interceptors
A112.14.4—2001(R2007)	Grease Removal Devices
A112.18.1-2005	Plumbing Supply Fittings
CSA B125.1-2005/A112.18.2-2005	Plumbing Waste Fittings
CSA B125.2-2005/A112.18.3-2002	Performance Requirements for Backflow Protection Devices and Systems in Plumbing Fixture Fittings
A112.18.6—2009	Flexible Water Connectors.
A112.18.7—1999 (R2004)	Deck mounted Bath/Shower Transfer Valves with Integral Backflow Protection
A112.19.1M—2008	Enameled Cast Iron Plumbing Fixtures
A112.19.2—2008	Vitreous China Plumbing Fixtures and Hydraulic Requirements for Water Closets and Urinals .
A112.19.3M—2008	Stainless Steel Plumbing Fixtures (Designed for Residential Use
A112.19.4M—1994 (R 2004)	Porcelain Enameled Formed Steel Plumbing Fixtures.
A112.19.5—2005	Trim for Water-closet Bowls, Tanks and Urinals
A112.19.6—1995	Hydraulic Performance Requirements for Water Closets and Urinals
A112.19.7M—2006	HydromassageBathtub Appliances
A112.19.8M—2007	Suction Fittings for Use in Swimming Pools, Wading Pools, Spas, Hot Tubs
A112.19.9M—1991(R2002)	Nonvitreous Ceramic Plumbing Fixtures with 2002 Supplement
A112.19.12—2006	Wall Mounted and Pedestal Mounted, Adjustable, Elevating, Tilting and Pivoting Lavatory, Sink and Shampoo Bowl Carrier Systems and Drain Systems
A112.19.13—2001 (R2007)	ElectrohydraulicWater Closets
A112.19.15— 2005	Bathtub/Whirlpool Bathtubs with Pressure Sealed Doors
A112.19.19—2006	Vitreous ChinaNonwaterUrinals
A112.21.2M—1983	Roof Drains
A112.36.2M—1991(R2002)	Cleanouts
B1.20.1—1983(R2006)	Pipe Threads, General Purpose (inch
B16.3—2006	Malleable Iron Threaded Fittings Classes 150 and 300
B16.4—2006	Gray Iron Threaded Fittings Classes 125 and 250
B16.9—2007	Factory-made Wrought Steel Buttwelding Fittings.
B16.11—2009	Forged Fittings, Socket-welding and Threaded.

B16.12—2009	Cast-iron Threaded Drainage Fittings
B16.15—2006	Cast Bronze Threaded Fittings
B16.18—2001(R 2005)	Cast Copper Alloy Solder Joint Pressure Fittings
B16.22—2001 (R2005)	Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
B16.23—2002 (R 2006)	Cast Copper Alloy Solder Joint Drainage Fittings DWV
B16.26—2006	Cast Copper Alloy Fittings for Flared Copper Tubes .
B16.28—1994	Wrought Steel Butt welding Short Radius Elbows and Returns
B16.29—2007	Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings (DWV)
<i>BPVC Section IX-2010</i>	<i>Welding and Brazing Qualifications.</i>

ASSE American Society of Sanitary Engineering
 901 Canterbury Road, Suite A
 Westlake, OH 44145

Standard Referenced	Title
1001—08	Performance Requirements for Atmospheric Type Vacuum Breakers
1002—08	Performance Requirements for Antisiphon Fill Valves (Ballcocks) for Gravity Water Closet Flush Tanks
1003—09	Performance Requirements for Water Pressure Reducing Valves .
1004—08	Performance Requirements for Backflow Prevention Requirements for Commercial Dishwashing Machines .
1005—99	Performance Requirements for Water Heater Drain Valves.
1006—86	Performance Requirements for Residential Use Dishwashers.
1007—86	Performance Requirements for Home Laundry Equipment
1008—06	Performance Requirements for Household Food Waste Disposer Units
1009—90	Performance Requirements for Commercial Food Waste Grinder Units
1010—04	Performance Requirements for Water Hammer Arresters
1011—04	Performance Requirements for Hose Connection Vacuum Breakers
1012—09	Performance Requirements for Backflow Preventers with Intermediate Atmospheric Vent .
1013—09	Performance Requirements for Reduced Pressure Principle Backflow Preventers and Reduced Pressure Fire Protection Principle Backflow Preventers
1015—09	Performance Requirements for Double Check Backflow Prevention Assemblies and Double Check Fire Protection Backflow Prevention Assemblies
1016—05	Performance Requirements for Individual Thermostatic, Pressure Balancing and Combination Control Valves for Individual Fixture Fittings
1017—09	Performance Requirements for Temperature Actuated Mixing Valves for Hot Water Distribution Systems.
1018—01	Performance Requirements for Trap Seal Primer Valves; Potable Water Supplied
1019—04	Performance Requirements for Vacuum Breaker Wall Hydrants, Freeze Resistant, Automatic Draining Type
1020—04	Performance Requirements for Pressure Vacuum Breaker Assembly
1022—03	Performance Requirements for Backflow Preventer for Beverage Dispensing Equipment
1024—04	Performance Requirements for Dual Check Valve Type Backflow Preventers (for Residential Supply Service or Individual Outlets
1035—08	Performance Requirements for Laboratory Faucet Backflow Preventers

1037—90	Performance Requirements for Pressurized Flushing Devices for Plumbing Fixtures
1044—01	Performance Requirements for Trap Seal Primer Devices Drainage Types and Electronic Design Types
1047—09	Performance Requirements for Reduced Pressure Detector Fire Protection BackflowPrevention Assemblies
1048—09	Performance Requirements for Double Check Detector Fire Protection BackflowPrevention Assemblies
1050—09	Performance Requirements for Stack Air Admittance Valves for Sanitary Drainage Systems .
1051—09	Performance Requirements for Individual and Branch Type Air Admittance Valves for Sanitary Drainage Systems-fixture and Branch Devices
1052—04	Performance Requirements for Hose Connection Backflow Preventers
1055—09	Performance Requirements for Chemical Dispensing Systems
1056—01	Performance Requirements for Spill Resistant Vacuum Breaker
1060—06	Performance Requirements for Outdoor Enclosures for Backflow Prevention Assemblies
1061—06	Performance Requirements for Removable and Nonremovable Push Fit Fittings
1062—06	Performance Requirements for Temperature Actuated, Flow Reduction Valves to Individual Fixture Fittings
1066—97	Performance Requirements for Individual Pressure Balancing In-line Valves for Individual Fixture Fittings
1069—05	Performance Requirements for Automatic Temperature Control Mixing Valves
1070—04	Performance Requirements for Water-temperature Limiting Devices
1072—07	Performance Requirements for Barrier Type Floor Drain Trap Seal Protection Devices
1079—05	Dielectric Pipe Unions.
5013—09	Performance Requirements for Testing Reduced Pressure Principle Backflow Prevention Assembly (RPA) and Reduced Pressure Fire Protection PrincipleBackflow Preventers(RFP)
5015—09	Performance Requirements for Testing Double Check Valve Backflow Prevention Assembly (DCVA)
5020—09	Performance Requirements for Testing Pressure Vacuum Breaker Assembly (PVBA)
5047—09	Performance Requirements for Testing Reduced Pressure Detector Fire Protection BackflowPrevention Assemblies (RPDA) .
5048—09	Performance Requirements for Testing Double Check Valve Detector Assembly (DCDA).
5052—09	Performance Requirements for Testing Hose Connection Backflow Preventers
5056—09	Performance Requirements for Testing Spill Resistant Vacuum Breaker.

ASTM ASTM International

100 Barr Harbor Drive
 West Conshohocken, PA 19428-2959

Standard Referenced	Title
A 53/A 53M—10	Specification for Pipe, Steel, Black and Hot-dipped, Zinc-coated Welded and Seamless
A 74—09	Specification for Cast-iron Soil Pipe and Fittings
A 312/A 312M—09	Specification for Seamless and Welded Austenitic Stainless Steel Pipes

A 733—03 (2009)e1	Specification for Welded and Seamless Carbon Steel and Austenitic Stainless Steel Pipe Nipples
A 778—01(2009)e1	Specification for Welded Unannealed Austenitic Stainless Steel Tubular Products
A 888—09	Specification for Hubless Cast-iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Application
B 32—08	Specification for Solder Metal
B 42—10	Specification for Seamless Copper Pipe, Standard Sizes
B 43—09	Specification for Seamless Red Brass Pipe, Standard Sizes
B 75—02	Specification for Seamless Copper Tube
B 88—09	Specification for Seamless Copper Water Tube
B 152/B 152M—09	Specification for Copper Sheet, Strip Plate and Rolled Bar
B 251—10	Specification for General Requirements for Wrought Seamless Copper and Copper-alloy Tube
B 302—07	Specification for Threadless Copper Pipe, Standard Sizes
B 306—09	Specification for Copper Drainage Tube (DWV)
B 447—07	Specification for Welded Copper Tube
B 687—99(2005)e1	Specification for Brass, Copper and Chromium-plated Pipe Nipples
B 813—10	Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube
B 828—02	Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings.
C 4—04 (2009)	Specification for Clay Drain Tile and Perforated Clay Drain Tile
C 14—07	Specification for Nonreinforced Concrete Sewer, Storm Drain and Culvert Pipe.
C 76—10a	Specification for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe
C 296-00 (2009)e1	Specification for Asbestos-cement Pressure Pipe
C 425—04 (2009)	Specification for Compression Joints for Vitrified Clay Pipe and Fittings
C 428—05 (2006)	Specification for Asbestos-cement Nonpressure Sewer Pipe
C 443—05ae1	Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
C 508- 00 (2009)e1	Specification for Asbestos-cement Underdrain Pipe
C 564—09a	Specification for Rubber Gaskets for Cast-iron Soil Pipe and Fittings
C 700—09	Specification for Vitrified Clay Pipe, Extra Strength, Standard Strength, and Perforated .
C 1053—00(2010)	Specification for Borosilicate Glass Pipe and Fittings for Drain, Waste, and Vent (DWV) Applications
C 1173—08	Specification for Flexible Transition Couplings for Underground Piping System.
C 1277—09a	Specification for Shielded Coupling Joining Hubless Cast-iron Soil Pipe and Fittings
C 1440—08	Specification for Thermoplastic Elastomeric (TPE) Gasket Materials for Drain, Waste, and Vent (DWV), Sewer, Sanitary and Storm Plumbing Systems
C 1460—08	Specification for Shielded Transition Couplings for Use with Dissimilar DWV Pipe and Fittings Above Ground
C 1461—08	Specification for Mechanical Couplings Using Thermoplastic Elastomeric (TPE) Gaskets for Joining Drain, Waste and Vent (DWV) Sewer, Sanitary and Storm Plumbing Systems for Above and Below Ground Use
C 1540—09a	Specification for Heavy Duty Shielded Couplings Joining Hubless Cast-iron Soil Pipe and Fittings
C 1563—08	Standard Test Method for Gaskets for Use in Connection with Hub and Spigot Cast Iron Soil Pipe and Fittings for Sanitary Drain, Waste, Vent and Storm Piping Applications
D 1527—99(2005)	Specification for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe, Schedules 40 and 80
D 1785—06	Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80 and 120
D 1869—95(2005)e1	Specification for Rubber Rings for Asbestos-cement Pipe

D 2235—04	Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings
D 2239—03	Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter
D 2241—09	Specification for Poly (Vinyl Chloride) (PVC) Pressure-rated Pipe (SDR-Series)
D 2282—(2005)99e01	Specification for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe (SDR-PR)
D 2464—06	Specification for Threaded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
D 2466—06	Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
D 2467—06	Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
D 2468—96a	Specification for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe Fittings, Schedule 40
D 2564—04 (2009) e01	Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems
D 2609—02 (2008)	Specification for Plastic Insert Fittings for Polyethylene (PE) Plastic Pipe.
D 2657—07	Practice for Heat Fusion-joining of Polyolefin Pipe and Fitting
D 2661—08	Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings
D 2665—09	Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings
D 2672—96a(2009)	Specification for Joints for IPS PVC Pipe Using Solvent Cement .
D 2683—10	Standard Specification for Socket-type Polyethylene fittings for Outside Diameter-controlled Polyethylene Pipe and Tubing
D 2729—03	Specification for Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
D 2737—03	Specification for Polyethylene (PE) Plastic Tubing
D 2751—05	Specification for Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings
D 2846/D 2846M—09b	Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Hot and Cold Water Distribution Systems
D 2855—96(2010)	Standard Practice for Making Solvent-cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings D 2949—01ae01 Specification for 3.25-in Outside Diameter Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings
D 3034—08	Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
D 3035-08	Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter
D 3139—98(2005)	Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals
D 3212—07	Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
D 3261—10a	Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic fittings for Polyethylene (PE) Plastic Pipe and Tubing
D 3311—06a09a	Specification for Drain, Waste and Vent (DWV) Plastic Fittings Patterns
D 4068—09	Specification for Chlorinated Polyethylene (CPE) Sheeting for Concealed Water-containment Membrane
D 4551—96(2008) e1	Specification for Poly (Vinyl Chloride) (PVC) Plastic Flexible Concealed Water-containment Membrane
F 405—05	Specification for Corrugated Polyethylene (PE) Tubing and Fittings
F 409—02(2008)	Specification for Thermoplastic Accessible and Replaceable Plastic Tube and Tubular Fittings .
F 437—09	Specification for Threaded Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80
F 438—09	Specification for Socket-type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40

F 439—09	Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80
F 441/F 441M—09	Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80
F 442/F 442M—09	Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe (SDR-PR)
F 477—10	Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
F 493—10	Specification for Solvent Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe and Fittings
F 628—08	Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe with a Cellular Core
F 656—10	Specification for Primers for Use in Solvent Cement Joints of Poly (Vinyl Chloride) (PVC) Plastic Pipe and Fittings
F 714—08	Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter
F 876—10	Specification for Cross-linked Polyethylene (PEX) Tubing
F 877—07	Specification for Cross-linked Polyethylene (PEX) Plastic Hot and Cold Water Distribution Systems
F 891—10	Specification for Coextruded Poly (Vinyl Chloride) (PVC) Plastic Pipe with a Cellular Core .
F 1055—98(2006)	Standard Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene Pipe and Tubing
F 1281—07	Specification for Cross-linked Polyethylene/Aluminum/ Cross-linked Polyethylene (PEX-AL-PEX) Pressure Pipe
F 1282—10	Specification for Polyethylene/Aluminum/Polyethylene (PE-AL-PE) Composite Pressure Pipe
F 1412—09	Specification for Polyolefin Pipe and Fittings for Corrosive Waste Drainage
F 1488—09	Specification for Coextruded Composite Pipe
F 1673—10	PolyvinylideneFluoride (PVDF) Corrosive Waste Drainage Systems
F 1807—07	Specification for Metal Insert Fittings Utilizing a Copper Crimp Ring for SDR9 Cross-linked Polyethylene (PEX) Tubing
F 1866—07	Specification for Poly (Vinyl Chloride) (PVC) Plastic Schedule 40 Drainage and DWV Fabricated Fittings .
F 1960—10	Specification for Cold Expansion Fittings with PEX Reinforcing Rings for use with Cross-linked Polyethylene (PEX) Tubing.
F 1974—09	Specification for Metal Insert Fittings for Polyethylene/Aluminum/Polyethylene and Cross-linked Polyethylene/Aluminum/Cross-linked Polyethylene Composite Pressure Pipe
F 1986—01(2006)	Specification for Multilayer Pipe, Type 2, Compression Fittings and Compression Joints for Hot and Cold Drinking Water Systems.
F 2080—09	Specifications for Cold-expansion Fittings with Metal Compression-sleeves for Cross-linked Polyethylene (PEX) Pipe
F 2098—08	Standard specification for Stainless Steel Clamps for Securing SDR9 Cross-linked Polyethylene (PEX) Tubing to Metal Insert Fittings
F 2159—10	Specification for Plastic Insert Fittings Utilizing a Copper Crimp Ring for SDR9 Cross-linked Polyethylene (PEX) Tubing
F 2262—09	Specification for Cross-linked Polyethylene/Aluminum/Cross-linked Polyethylene Tubing OD Controlled SDR9
F 2306/F 2306M-08	12" to 60" Annular Corrugated Profile-wall Polyethylene (PE) Pipe and Fittings for Gravity Flow Storm Sewer and Subsurface Drainage Applications
F 2389—10	Specification for Pressure-rated Polypropylene (PP) Piping Systems
F 2434—09	Standard Specification for Metal Insert Fittings Utilizing a Copper Crimp Ring for SDR9 Cross-linked Polyethylene (PEX) Tubing and SDR9 Cross-linked Polyethylene/Aluminum/Cross-linked Polyethylene (PEXAL-PEX) Tubing.

AWS American Welding Society

550 N.W. LeJeune Road
Miami, FL 33126

Standard

Referenced

Title

A5.8—04

Specifications for Filler Metals for Brazing and Braze Welding

AWWA American Water Works Association

6666 West Quincy Avenue
Denver, CO 80235

Standard

Referenced

Title

C104/A21.4-08

Standard for Cement-mortar Lining for Ductile-iron Pipe and Fittings for Water

C110/A21.10—08

Standard for Ductile-iron and Gray-iron Fittings, 3 Inches through 48 Inches, for Water

C111/A21.11-06

Standard for Rubber-gasket Joints for Ductile-iron Pressure Pipe and Fittings

C115/A21.15—05

Standard for Flanged Ductile-iron Pipe with Ductile-iron or Gray-iron Threaded Flanges

C151/A21.51—09

Standard for Ductile-iron Pipe, Centrifugally Cast for Water

C153/A21.53—06

Standard for Ductile-iron Compact Fittings for Water Service

C510—07

Double Check Valve Backflow Prevention Assembly

C511—07

Reduced-pressure Principle Backflow Prevention Assembly

C651—05

Disinfecting Water Mains

C652—02

Disinfection of Water-storage Facilities

CISPI Cast Iron Soil Pipe Institute

5959 Shallowford Road, Suite 419
Chattanooga, TN 37421

Standard

Referenced

Title

301—09

Specification for Hubless Cast-iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications

310—09

Specification for Coupling for Use in Connection with Hubless Cast-iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications

CSA Canadian Standards Association

5060 Spectrum Way.
Mississauga, Ontario, Canada L4W 5N6

Standard

Referenced	Title
B45.1—02 (R2008)	Ceramic Plumbing Fixtures.
B45.2—02 (R2008)	Enameled Cast-iron Plumbing Fixtures
B45.3—02 (R2008)	Porcelain Enameled Steel Plumbing Fixtures
B45.4—02 (R2008)	Stainless-steel Plumbing Fixtures
B45.5—02 (R2008)	Plastic Plumbing Fixtures
B45.9—99 (R2008)	Macerating Systems and Related Components
B64.1.2—07	Vacuum Breakers, Pressure Type (PVB)
B64.2.1—07	Vacuum Breakers, Hose Connection Type (HCVB) with Manual Draining Feature
B64.2.1.1—07	Vacuum Breakers, Hose Connection Dual Check Type (HCDVB)
B64.4.1—07	Backflow Preventers, Reduced Pressure Principle Type for Fire Sprinklers (RPF)
B64.5—07	Backflow Preventers, Double Check Type (DCVA)
B64.5.1—07	Backflow Preventers, Double Check Type for Fire Systems (DCVAF)
B64.6—07	Backflow Preventers, Dual Check Valve Type (DuC)
B64.7—07	Vacuum Breakers, Laboratory Faucet Type (LFVB)
B64.10/B64.10.1—07	Manual for the Selection and Installation of Backflow Prevention Devices/Manual for the Maintenance and Field Testing of Backflow Prevention Devices
B79—08	Floor, Area and Shower Drains, and Cleanouts for Residential Construction
B125—01	Plumbing Fittings
B125.3—2005	Plumbing Fittings
B137.1-09	Polyethylene Pipe, Tubing and Fittings for Cold Water Pressure Services
B137.2-09	PVC Injection-moulded Gasketed Fittings for Pressure Applications
B137.3-09	Rigid Poly (Vinyl Chloride) (PVC) Pipe for Pressure Applications
B137.5-09	Cross-linked Polyethylene (PEX) Tubing Systems for Pressure Applications— with Revisions through September 1992
B137.6-09	CPVC Pipe, Tubing and Fittings for Hot and Cold Water Distribution Systems— with Revisions through May 1986B137.11—02 Polypropylene (PP-R) Pipe and Fittings for Pressure Applications
B181.1—06	ABS Drain, Waste and Vent Pipe and Pipe Fittings
B181.2—06	PVC Drain, Waste, and Vent Pipe and Pipe Fittings— with Revisions through December 1993
B182.1—06	Plastic Drain and Sewer Pipe and Pipe Fittings
B182.2—06	PVC Sewer Pipe and Fittings (PSM Type)
B182.4—06	Profile PVC Sewer Pipe and Fittings
B182.6—06	Profile Polyethylene Sewer Pipe and Fittings for Leak-proof Sewer Applications
B182.8—06	Profile Polyethylene Storm Sewer and Drainage Pipe and Fittings
CAN/CSA-A257.1M—09	Circular Concrete Culvert, Storm Drain, Sewer Pipe and Fittings
CAN/CSA-A257.2M—09	Reinforced Circular Concrete Culvert, Storm Drain, Sewer Pipe and Fittings
CAN/CSA-A257.3M—09	Joints for Circular Concrete Sewer and Culvert Pipe, Manhole Sections and Fittings Using Rubber Gaskets
CAN/CSA-B64.1.1—07	Vacuum Breakers, Atmospheric Type (AVB)
CAN/CSA-B64.2—07	Vacuum Breakers, Hose Connection Type (HCVB).
CAN/CSA-B64.2.2—07	Vacuum Breakers, Hose Connection Type (HCVB) with Automatic Draining Feature
CAN/CSA-B64.3—07	Backflow Preventers, Dual Check Valve Type with Atmospheric Port (DCAP)
CAN/CSA-B64.4—07	Backflow Preventers, Reduced Pressure Principle Type (RP)
CAN/CSA-B64.10—07	Manual for the Selection, Installation, Maintenance and Field Testing of Backflow Prevention Devices
CAN/CSA-B137.9—09	Polyethylene/Aluminum/Polyethylene Composite Pressure Pipe Systems
CAN/CSA-B137.10M—09	Cross-linked Polyethylene/Aluminum/Polyethylene Composite Pressure Pipe Systems
CAN/CSA-B181.3—06	Polyolefin Laboratory Drainage Systems

CAN/CSA-B182.4—06
CAN/CSA-B602—10

Profile PVC Sewer Pipe and Fittings
Mechanical Couplings for Drain, Waste and Vent Pipe and Sewer Pipe

ICC International Code Council, Inc.

500 New Jersey Ave, NW 6th Floor
Washington, DC 20001

Standard

Referenced

Title

IFGC—09

International Fuel Gas Code (*including ICC Emergency Amendment changing IFGC Sections 406.7*)

ISEA International Safety Equipment Association

1901 N. Moore Street, Suite 808
Arlington, VA 22209

Standard

Referenced

Title

Z358.1—09

Emergency Eyewash and Shower Equipment

NFPA National Fire Protection Association

1 Batterymarch Park
Quincy, MA 02169-7471

Standard

Referenced

Title

70—~~H 14~~
99C—05

National Electrical Code
Gas and Vacuum Systems

NSF NSF International

789 Dixboro Road
Ann Arbor, MI 48105

Standard

Referenced

Title

3—2009

Commercial Warewashing Equipment

14—2010

Plastic Piping System Components and Related Materials

18—2009

Manual Food and Beverage Dispensing Equipment

42—2009

Drinking Water Treatment Units—Aesthetic Effects

44—2009

Residential Cation Exchange Water Softeners

53—2009e

Drinking Water Treatment Units—Health Effects.

58—2009

Reverse Osmosis Drinking Water Treatment Systems

61—2010a

Drinking Water System Components—Health Effects

62—2009
372-2010

Drinking Water Distillation Systems
Drinking Water System Components – Lead Content

PDI Plumbing and Drainage Institute

800 Turnpike Street, Suite 300
North Andover, MA 01845

Standard
Referenced

Title

G101(2010)

Testing and Rating Procedure for Grease Interceptors with Appendix of Sizing
and Installation Data

UL Underwriters Laboratories, Inc.

333 Pfingsten Road
Northbrook, IL 60062-2096

Standard
Referenced

Title

UL 508—99

Industrial Control Equipment with Revision through July 2005

PART D

4101:4-1-01 Definitions and abbreviations.

As used in Chapters 4101:4-1 to 4101:4-10 of the Administrative Code,

- (A) "Alteration" means any change in the item described on the original manufacturer's data report which affects the pressure containing capability of the boiler or pressure vessel. Non physical changes such as an increase in the maximum allowable working pressure (internal or external) or design temperature of a boiler or pressure vessel shall be considered an alteration. A reduction in minimum temperature such that additional mechanical tests are required shall also be considered an alteration.
- (B) "ASME" means the "American Society of Mechanical Engineers". Referenced standards, codes, and related technical information developed by this organization can be purchased by logging on to <http://www.asme.org> or by calling 1-800-the-asme.
- (C) "Authorized Inspection Agency" means an entity, accepted by the "National Board," that provides third party inspection services in which boilers and pressure vessels are inspected during construction, repairs, and alterations to verify their conformity with the code of construction adopted by the board of building standards. Authorized inspection agencies employ authorized inspectors.
- (D) "Authorized Inspector" means an individual holding a "National Board" commission with the appropriate endorsement and designated as such by an "Authorized Inspection Agency".
- (E) "Board" means the board of building standards established by section 3781.07 of the Revised Code and authorized by section 4104.02 of the Revised Code to formulate rules and regulations for the construction, installation, repair, conservation of energy, and operation of boilers and for the construction and repair of pressure vessels.
- (F) "Boiler" means a closed vessel in which water is heated, steam is generated, steam is superheated, or any combination thereof, under pressure or vacuum for use externally to itself by the direct application of heat from the combustion of fuels, or from electricity or nuclear energy. The term boiler shall include fired units for heating or vaporizing liquids other than water where these units are separate from processing systems and are complete within themselves.
- (G) "Boiler, high pressure, high temperature water" means a water heating boiler operating at pressures exceeding one hundred sixty psig or temperatures exceeding two hundred fifty degrees Fahrenheit.
- (H) "Boiler, low pressure" means a steam boiler operating at pressures not exceeding fifteen psig, or a hot water heating boiler operating at pressures not exceeding one hundred

sixty psig or temperatures not exceeding two hundred fifty degrees Fahrenheit.

- (I) "Boiler, portable" means a boiler which is primarily intended for temporary use and the construction and usage of which is obviously portable.
- (J) "Boiler, potable water heater" means a boiler used for supplying potable hot water for commercial purposes at pressures not exceeding one hundred sixty psig and temperatures not exceeding two hundred ten degrees Fahrenheit, except that water heaters are exempted when none of the following limitations are exceeded:
 - (1) Heat input of two hundred thousand Btu per hour;
 - (2) Water temperature of two hundred ten degrees Fahrenheit;
 - (3) Nominal water-containing capacity of one hundred twenty gallons.
- (K) "Boiler, power" means a boiler in which steam or other vapor, to be used externally to itself, is generated at a pressure of more than fifteen psig.
- (L) "Boiler, process" means a boiler to which all of the following apply:
 - (1) The steam in the boiler is either generated or superheated, or both, under pressure or vacuum for use external to itself.
 - (2) The source of heat for the boiler is, in part or in whole, from a process other than the boiler itself.
 - (3) The boiler is part of a continuous processing unit, such as used in chemical manufacture or petroleum refining, other than a steam-generated process unit.
- (M) "Btu" means "British Thermal Unit".
- (N) "Certificate of competency" means the document issued by the superintendent to a person who has passed the examination prescribed by the board of building standards.
- (O) "Certificate of inspection" means a report of the inspection of a boiler as required by sections 4104.11, 4104.12, and 4104.13 of the Revised Code and the rules of the board of building standards. The written report, completed by a general or special inspector, when filed in the office of the superintendent, shall be the basis on which a certificate of operation may be granted or denied. The certificate of inspection would then be replaced with a certificate of operation, if granted.
- (P) "Certificate of operation" means the certificate issued by the superintendent to the owner or user following the general or special inspector's inspection of a boiler in accordance with section 4104.12 of the Revised Code.
- (Q) "Code stamp" means the permanent "ASME" identifying stamping applied to boilers and pressure vessels which indicates that the vessel has been constructed in accordance with the rules of the board and the applicable section of the "ASME Boiler and Pressure Vessel Code" and has been approved by an authorized inspector.

- (R) "Commission, National Board" means a certificate and renewable commission card issued by the "National Board" to an individual who has satisfied the requirements and the rules of the "National Board."
- (S) "Commission, Ohio" means a document issued by the superintendent pursuant to section 4104.08 of the Revised Code, which authorizes a general or special inspector to inspect boilers and pressure vessels for use in the state of Ohio.
- (T) "Contractor" means any person, firm, partnership, company, or corporation that engages in the practice of installing or making major repairs or modifications to any boiler that is subject to the provisions of Chapters 4101:4-1 to 4101:4-10 and 1301:3-5 of the Administrative Code.
- (U) "Inspection, external" means the inspection of the exterior parts of a boiler and the fittings, appurtenances, controls, and safety appliances attached thereto while the boiler is under operating conditions.
- (V) "Inspection, internal" means a complete visual and physical inspection of the interior of a boiler.
- (W) "Inspector, general" means a state of Ohio employee holding a certificate of competency and a valid Ohio commission to inspect boilers and pressure vessels to be used in the state of Ohio.
- (X) "Inspector, special" means an individual who holds a valid "National Board" commission and a valid Ohio commission to inspect boilers and pressure vessels to be used in the state of Ohio. Special inspectors are typically employed by an insurance company authorized to write boiler and pressure vessel insurance in the state of Ohio but can also be employed as an inspector by the owner-user of the boiler or pressure vessel which is proposed for use or is operating within the state of Ohio. The owner-user must maintain an established inspection program meeting the requirements of the "National Board" publication "NB-371, Accreditation of Owner-User Inspection Organizations (OUIO)" referenced in rule 4101:4-3-01 of the Administrative Code. In their capacity as a special inspector, they are a representative of the state boiler inspection department, acting independently of their relationship with their employer.
- (Y) "Installation, existing" means any boiler or pressure vessel within the scope of these rules that has been previously approved and issued a certificate of operation.
- (Z) "Installation, new" means any boiler or pressure vessel that has not yet been placed in service or issued a certificate of operation.
- (AA) "National Board" or "NB" means the "National Board of Boiler and Pressure Vessel Inspectors." Referenced standards, codes, publications, and other technical information developed by this organization can be purchased and obtained by logging on to <http://www.nationalboard.org> or by calling (614)888-8320.
- (BB) "NBIC" means the "National Board Inspection Code" as published by the "National

Board of Boiler and Pressure Vessel Inspectors" and referenced in rule 4101:4-3-01 of the Administrative Code.

- (CC) "NFPA" means the "National Fire Protection Association." Referenced standards published by this organization can be purchased by logging on to <http://www.nfpa.org> or by calling (800)344-3555.
- (DD) "Non-standard" means an existing power boiler or pressure vessel which was installed prior to July 1, 1913 and was not constructed and stamped in accordance with the rules adopted by the industrial commission of Ohio or the Ohio board of building standards.
- (EE) "Ohio special" means a boiler or pressure vessel which does not fully comply with "ASME" code requirements, but has been approved for use in Ohio by special action of the board of building standards under section 4104.02 of the Revised Code or permitted for use by the board of building appeals under section 3781.19 of the Revised Code.
- (FF) "Ohio-standard" means an existing boiler or pressure vessel constructed to meet the rules of the Ohio industrial commission code requirements but not stamped with the applicable "ASME" symbol.
- (GG) "Owner or user" means any person, firm or corporation owning or operating any boiler or pressure vessel.
- (HH) "Pressure vessel" means a container for the containment of pressure, either internal or external. This pressure may be obtained from an external source or by the application of heat from a direct or indirect source or any combination thereof.
- (II) "psi" means pounds per square inch.
- (JJ) "psig" means pounds per square inch gage.
- (KK) "Qualified individual" means a service technician trained and thoroughly knowledgeable about the installation, operation, maintenance and service of the specific boiler fuel-burning system, controls, and safety devices.
- ~~(KK)~~(LL) "Reinstallation" means a boiler or pressure vessel removed from its original setting and re-erected at the same location or a new location without a change of ownership.
- ~~(LL)~~(MM) "Repair, major" means the process of restoring a boiler, pressure vessel, or component of a boiler or pressure vessel to a safe and satisfactory condition such that the existing design requirements are met.
- ~~(MM)~~(NN) "Repair, routine" means repairs meeting the conditions prescribed in the "NBIC Part 3" and determined acceptable to the superintendent as a routine repair.
- ~~(NN)~~(OO) "Revised Code" means the general statutes of the state of Ohio as revised and consolidated into titles, chapters, and sections.
- ~~(OO)~~(PP) "Secondhand" means a used boiler or used pressure vessel which has had a change of ownership and location.

~~(PP)~~(QQ) "Stationary Steam Engine" means an engine or turbine in which the mechanical force arising from the elasticity and expansion action of steam or from its property of rapid condensation or from a combination of the two is made available as a motive power.

~~(QQ)~~(RR) "Superintendent" means the superintendent of the division of industrial compliance created in the department of commerce under section 121.04 of the Revised Code, or the person designated by the superintendent as responsible for the enforcement of rules 4101:4-1-01 to 4101:4-10-01 and 1301:3-5-01 to 1301:3-5-10 of the Administrative Code.

4101:4-3-01 Accepted engineering practice and approved standards.

- (A) Where references are made in Chapters 4101:4-1 to 4101:4-10 of the Administrative Code to the applicable section of the "ASME Boiler and Pressure Vessel Code" or to other standards or publications, this rule identifies the specific edition of the code, standard, or publication that is adopted. Conformity to the applicable technical provisions, requirements, recommendations, and determinations in the codes, standards or other referenced publications adopted in "Table 4-3-01" of this rule, is prima-facie evidence of conformity with accepted engineering practice or with an approved standard.
- (B) The board of building standards adopts existing published standards by year of issue as shown in "Table 4-3-01" of the Administrative Code as well as amendments, supplements, and addenda subsequently published prior to issuance of the next edition by the same authority in accordance with section 4104.02 of the Revised Code.

Table 4-3-01

Authority	Edition Date	Designation	Title
ASME	2010	BPVC -Section I (see footnote a)	Power Boilers.
ASME	2010	BPVC -Section II	Material Specifications. Part A-Ferrous. Part B-Non-Ferrous. Part C-Welding Rods, Electrodes and Filler Metals. Part D-Properties.
ASME	2010	BPVC -Section III	Nuclear Facility Components.
ASME	2010	BPVC -Section IV	Heating Boilers.
ASME	2010	BPVC -Section V	Nondestructive Examination.

Table 4-3-01

ASME	2010	BPVC -Section VI	Recommended Rules for Care and Operation of Heating Boilers.
ASME	2010	BPVC -Section VII	Recommended Guidelines for Care of Power Boilers.
ASME	2010	BPVC -Section VIII	Pressure Vessels-Division 1.
ASME	2010	BPVC -Section VIII	Pressure Vessels-Division 2.
ASME	2010	BPVC -Section VIII	Pressure Vessels-Division 3.
ASME	2010	BPVC -Section IX	Welding and Brazing Qualifications.
ASME	2010	BPVC -Section X	Fiber-Reinforced Plastic Pressure Vessels.
ASME	2010	BPVC -Section XI	Rules for Inservice Inspection of Nuclear Power Plant Components.
ASME	2010	BPVC	Code Cases.
ASME	2010	B 31.1	Power Piping.
ASME	2012	CSD-1	"Controls and Safety Devices for Automatically Fired Boilers."
NFPA	2011	NFPA 85	"Boiler and Combustion Systems Hazards Code"
National Board	2011	NBIC	National Board Inspection Code.
National Board	Jul. 2012, Rev.0	NB-27	A Guide for Blowoff Vessels.
National Board	May 2012, Rev. 5	NB-263	Rules for National Board Inservice and New Construction Commissioned Inspectors.
National Board	Feb. 2011, Rev. 4	NB-371	Accreditation of

Table 4-3-01

			Owner-User Inspection Organizations (OUIO).
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Footnote a: For riveted construction, see "ASME, BPVC-Section I, Power Boilers, Part PR (1971 edition)."

4101:4-4-03 Safety devices and controls.

- (A) All boilers and pressure vessels shall be provided with the necessary safety appliances and controls that will prevent pressure and temperature from rising above the design limits. The required safety devices and controls shall be as required in the applicable section of the "ASME Boiler and Pressure Vessel Code" as referenced in rule 4101:4-3-01 of the Administrative Code.
- (B) The operation of a boiler or pressure vessel without the required safety devices or controls is prohibited, except where alternate device(s) are provided for use on a temporary basis.
- (C) Any owner or operator who in any manner loads the safety valve or valves to a greater pressure than that allowed by the certificate of operation shall be subject to the penalty provided in section 4104.99 of the Revised Code.
- (D) The minimum safety or relief valve relieving capacity for electric boilers shall be 3.5 pounds of steam per hour for each kilowatt input.
- (E) The discharge of safety valves and other outlets shall be installed so as not to endanger any person.
- (F) Replacement of existing safety devices and controls shall comply with the requirements for new safety devices and controls as prescribed in the applicable section of the "ASME Boiler and Pressure Vessel Code" as referenced in rule 4101:4-3-01 of the Administrative Code.
- (G) When an owner wishes to install safety devices and controls which will enable a new or an existing boiler to be operated without continuous, manned attendance by a licensed operator, the requirements of paragraph (B)(4) or (B)(5) of rule 4101:4-10-01 of the Administrative Code shall be met.

4101:4-9-01 Existing boilers and pressure vessels.

- (A) All existing boilers and pressure vessels and the associated equipment, controls, devices, and safeguards shall be maintained in a safe and sanitary condition, in good working order, and free of leaks and defects. The owner or the owner's designated agent shall be responsible for the maintenance of such boilers and pressure vessels and associated equipment, controls, devices, and safeguards.
- (B) The rules of the board shall not be retroactively applied to existing boilers or pressure vessels that are not otherwise being altered, repaired, reinstalled, or relocated. Portions of a boiler or pressure vessel not altered or repaired and not affected by an alteration or repair are not required to comply with the code requirements for a new boiler or pressure vessel.
- (C) Routine boiler repairs such as piping or tube replacement or repairs considered general maintenance may be made without inspection provided that application is made for a permit and approval has been obtained from a general or special inspector prior to the repair. In the case where the contractor or owner making the routine repair has obtained a "National Board "R" Certificate of Authorization", the authorized inspector shall authorize the routine repair prior to the work being performed. If the repair requires welding, it shall be in accordance with the provisions of section IX of the "ASME Boiler and Pressure Vessel Code" as referenced in rule 4101:4-3-01 of the Administrative Code.
- (D) Where a major repair or alteration (including a re-rating) is necessary or desired on an existing boiler which bears the stamp of the appropriate "ASME" symbol or which is stamped with a state of Ohio boiler number, the repair or alteration shall comply with the requirements of "Part 3" of the "NBIC" as referenced in rule 4101:4-3-01 of the Administrative Code. The repair or alteration shall meet the requirements for the conditions under which it will be operated.
 - (1) In accordance with rule 4101:4-7-01 of the Administrative Code, unless the contractor or owner has obtained a "National Board "R" Certificate of Authorization", all contractors or owners shall apply for a permit from the division of industrial compliance to make proposed repairs and the repairs shall be approved by a special or general inspector. A repair report, executed and signed by the special or general inspector, shall be filed with the superintendent on forms provided.
 - (2) In accordance with the "NBIC," contractors or owners performing boiler alterations shall obtain a "National Board "R" Certificate of Authorization" prior to making any alterations. All alterations shall be authorized and approved by an authorized inspector.
- (E) Where a major repair or alteration (including a re-rating) is necessary or desired on an existing boiler or pressure vessel which does not bear the appropriate "ASME" symbol stamp or which is not stamped with a state of Ohio boiler number, the boiler or pressure vessel shall be evaluated by the superintendent and required to meet the applicable requirements of the "ASME Boiler and Pressure Vessel Code" referenced in rule 4101:4-

3-01 of the Administrative Code. Otherwise, the boiler or pressure vessel shall be retired from use.

- (F) Repairs made to an existing "Ohio Special" boiler or pressure vessel shall be done in accordance with paragraph (C), (D)(1), or (H)(1) of this rule, as applicable.
- (G) Alterations, including re-ratings, made to an existing "Ohio Special" boiler or pressure vessel shall be approved, prior to the alteration, by the board of building standards in accordance with the special procedure outlined in rule 4101:4-5-01 of the Administrative Code for boilers and pressure vessels of special design.
- (H) Where a major repair or alteration (including a re-rating) is necessary or desired on an existing pressure vessel which bears the stamp of the appropriate "ASME" symbol, the repair or alteration shall comply with the requirements of "Part 3" of the "NBIC" as referenced in rule 4101:4-3-01 of the Administrative Code. The repair or alteration shall meet the requirements for the conditions under which it will be operated.
 - (1) Unless the contractor or owner has obtained a "National Board "R" Certificate of Authorization", all contractors or owners shall notify the division of industrial compliance prior to making repairs to an existing pressure vessel and the repairs shall be approved by a special or general inspector. A repair report, executed and signed by the special or general inspector, shall be filed with the superintendent on forms provided.
 - (2) In accordance with the "NBIC", contractors or owners performing pressure vessel alterations shall obtain a "National Board "R" Certificate of Authorization" prior to making any alterations. All alterations shall be authorized and approved by an authorized inspector.
- (I) Whenever repairs are made to fittings, safety devices, ~~or~~ appliances, or controls or it becomes necessary [or desirable](#) to replace them, the work shall comply with the requirements for new installations as prescribed in the applicable section of the "ASME Boiler and Pressure Vessel Code" as referenced in rule 4101:4-3-01 of the Administrative Code. When an owner wishes to install safety devices and controls which will enable an existing boiler to be operated without continuous, manned attendance by a licensed operator, the requirements of paragraph (B)(4) or (B)(5) of rule 4101:4-10-01 of the Administrative Code shall be met.
- (J) An existing stationary boiler or pressure vessel which bears the appropriate "ASME" symbol or which is stamped with a state of Ohio boiler number may be reinstalled or relocated within Ohio, provided that the installation complies with the applicable section of the "ASME Boiler and Pressure Vessel Code" as referenced in rule 4101:4-3-01 of the Administrative Code and an inspection is made by a special or general inspector prior to operation. The fittings and appliances shall comply with the requirements for a new installation.
- (K) A secondhand boiler or pressure vessel stamped with the appropriate "ASME" symbol or

having the standard stamping of another state that has adopted rules of construction equivalent to those of Ohio may be installed for use in the state of Ohio provided that application is made for the installation, the manufacturer's data report, indicating that the boiler or pressure vessel was inspected during construction by an authorized inspector, is filed in the office of the superintendent, and an inspection is made by a special or general inspector prior to operation. The inspector shall submit a report to the superintendent which contains a facsimile of the code stamping, a statement concerning any corrosion or other deteriorating conditions and the extent and location of any welded or riveted repairs. Upon approval of a secondhand boiler by the superintendent, a certificate of operation shall be issued.

- (L) Except as permitted in paragraph (K) of this rule, an existing boiler or pressure vessel that does not bear the appropriate "ASME" symbol, was not registered with the "National Board," does not have a state of Ohio boiler number stamped upon it, or does not have an "Ohio Special" serial number tagged upon it is prohibited from reinstallation or relocation within the state of Ohio.
- (M) The maximum allowable steam working pressure for cast iron boilers, except for hot water boilers, shall be fifteen psig.
- (N) The maximum allowable working pressure on the shell or drum of an existing nonstandard boiler shall be determined by the strength of the weakest section of the structure, computed from the thickness of the plate, the tensile strength of the plate, the efficiency of the longitudinal joint or the tube ligaments, the inside diameter of the weakest course and the factor of safety allowed by these rules.

$(S)(t)(E)/(R)(F)$ = Maximum allowable working pressure, psig.

Where:

S = ultimate tensile strength of shell plates, psi.

When the ultimate tensile strength, "S", of steel or wrought-iron shell plates is not known, it shall be taken as fifty-five thousand psi for steel and forty-five thousand psi for wrought-iron.

t = minimum thickness of shell plate, in weakest course, inch.

E = efficiency of longitudinal joint.

For riveted construction, "E" shall be determined by rules given in paragraph "PR-15" of the 1971 edition of the "ASME Boiler and Pressure Vessel Code, section I."

For tube ligaments, "E" shall be determined by rules "PG-52" or, "PG-53" of the "ASME Boiler and Pressure Vessel Code, section I" and "PR-25", of the 1971 edition of the "ASME Boiler and Pressure Vessel Code, section I."

R = inside radius of the weakest course of the shell or drum in inches.

F = factor of safety permitted.

- (1) When computing the ultimate strength of rivets in shear, the following values in pounds per square inch of the cross-sectional area of the rivet shank (after driving) shall be used:

Strength of existing rivets in shear

Type of rivet	Strength
Iron rivet in single shear	38,000
Iron rivet in double shear	76,000
Steel rivets in single shear	44,000
Steel rivets in double shear	88,000

- (2) When the diameter of the rivet holes in the longitudinal joints of a boiler is not known, the diameter and cross sectional area of rivets, after driving, may be ascertained from the following table or by cutting out one rivet in the body of the joint:

Sizes of rivets in inches based on plate thickness

Thickness of plate, inches.	1/4	9/32	5/16	11/32	3/8	13/32
Diameter of rivet after driving, inches.	11/16	11/16	3/4	3/4	13/16	13/16
Thickness of plate, inches.	7/16	15/32	1/2	9/16	5/8	-
Diameter of rivet after driving, inches.	15/16	15/16	15/16	17/16	17/16	-

- (3) The resistance of steel to crushing shall be taken as ninety-five thousand psi.
- (4) The lowest factor of safety permissible on existing installations shall be 4.5 excepting for horizontal return tubular boilers having continuous longitudinal lap seams more than twelve feet in length where the factor of safety shall be 8, and when this latter type of boiler is removed from its existing setting, it shall not be reinstalled for pressure in excess of fifteen psig. Reinstalled or secondhand nonstandard boilers shall have a minimum factor of safety of 6 when the longitudinal seams are of lap riveted construction, and a minimum factor of 5 when the longitudinal seams are of butt and double strap construction. A boiler constructed of wrought iron shall have a factor of safety of 7. Upon inspection of the boiler, if conditions are found which justify a reduction of the safe working pressure, the factor of safety as stated above

shall be appropriately increased.

- (O) The maximum allowable working pressure of a nonstandard low pressure steam boiler shall not exceed fifteen psig.
- (P) The maximum allowable working pressure of a nonstandard boiler constructed principally of cast iron or constructed of a cast iron shell or heads and steel tubes shall not exceed thirty psig for hot water service.
- (Q) The maximum allowable working pressure of a nonstandard water tube boiler, the tubes of which are secured to cast iron or malleable iron headers, or which have cast iron mud drums, shall not exceed one hundred sixty psig for steam service.
- (R) If in the judgment of the inspector a low pressure boiler is unsafe for operation at the pressure previously approved, the pressure shall be reduced, proper repair made, or the boiler retired from service.
- (S) Nonstandard pressure vessels except those exempt in section 4104.04 of the Revised Code and paragraph "U-1" of the "ASME Boiler and Pressure Vessel Code, section VIII", are prohibited for use in excess of fifteen psi internal or external pressure.
- (T) Any owner or operator who in any manner loads the safety valve or valves to a greater pressure than that allowed by the certificate of operation shall be subject to the penalty provided in section 4104.99 of the Revised Code.

TO BE RESCINDED

~~4101:4-10-01 — Licensure and attendance requirements of operators.~~

- ~~(A) In accordance with section 4104.05 of the Revised Code, no person shall operate a low pressure steam boiler operating at more than thirty horsepower, a power steam boiler operating at more than thirty horsepower, or a stationary steam engine operating at more than thirty horsepower, unless one of the following applies to that person:
 - ~~(1) The person holds the required license as specified in section 4104.05 of the Revised Code, or~~
 - ~~(2) The person is working under the direct supervision of a person holding the required license as specified in section 4104.05 of the Revised Code.~~~~
- ~~(B) The operator described in paragraph (A) of this rule shall maintain continuous, manned attendance during all times of operation of a steam boiler or stationary steam engine operating at more than thirty horsepower, except as follows:
 - ~~(1) When the steam boiler or stationary steam engine can be monitored, controlled, and shut down from a central control room and is equipped with manual operational resets, the continuous, manned attendance may occur from the central control room~~~~

~~during all times of operation of such steam boiler or stationary steam engine.~~

~~(2) A steam boiler of more than thirty horsepower may be operated without manned attendance for a maximum length of time equal to the time it takes for the boiler to go into a low water condition when subjected to an annual evaporation test conducted in accordance with the "ASME Boiler and Pressure Vessel Code, Section VI, 7.05 (H)" referenced in rule 4101:4-3-01 of the Administrative Code.~~

~~(C) For the purposes of this rule, a horsepower means twelve square feet of boiler heating surface.~~

~~(D) Notwithstanding paragraphs (A) and (B) of this rule, the superintendent of the division of industrial compliance may approve a site specific detailed, written plan to provide for automated electronic monitoring of non-solid fuel-fired steam boilers or stationary steam engines which utilize controls that contain all operational functions, are equipped with manual operational resets, and are labeled for the intended operation, provided that all the following apply:~~

~~(1) The control equipment must be located within the same complex or production facility premises;~~

~~(2) A person licensed under section 4104.19 of the Revised Code is present at all times within the same complex or production facility premises and is available to respond to an emergency condition when summoned by the automated electronic monitoring system;~~

~~(3) A secondary means of alerting such licensed person is within the same complex or production facility premises in the event of failure of the primary electronic monitoring system;~~

~~(4) A qualified technician performs annual operational tests on the automated electronic monitoring system to verify that the system is maintained in accordance with that original manufacturer specification; and~~

~~(5) A copy of a such dated and signed service report or checklist, listing each control and safety device tested with the manufacturer's name, model number, set point, and actual operational test point is provided to the superintendent of the division of industrial compliance upon request. Failure to produce such service report may result in the issuance of an adjudication order within the meaning of Chapter 119. of the Revised Code.~~

4101:4-10-01 [Licensure and attendance requirements of operators.](#)

[\(A\) In accordance with section 4104.05 of the Revised Code, no person shall operate a low pressure steam boiler that has more than three hundred sixty square feet of heating surface, a power steam boiler that has more than three hundred sixty square feet of heating surface, or a stationary steam engine operating at more than thirty horsepower,](#)

unless one of the following applies to that person:

- (1) The person holds the required license as specified in section 4104.05 of the Revised Code, or
 - (2) The person is working under the direct supervision of a person holding the required license as specified in section 4104.05 of the Revised Code.
- (B) The operator described in paragraph (A) of this rule shall maintain continuous, manned attendance during all times of operation of a steam boiler that has more than three hundred sixty square feet of heating surface or a stationary steam engine operating at more than thirty horsepower, except as follows:
- (1) The continuous, manned attendance by the operator during all times of operation of such steam boiler or stationary steam engine may occur from a central control room on the premises when the steam boiler or stationary steam engine can be monitored, controlled, and shut down from that central control room by the operator and is equipped with manual operational resets.
 - (2) The steam boiler may be operated without continuous, manned attendance for a maximum length of time equal to the time it takes for the boiler to go into a low water condition when subjected to an annual evaporation test conducted in accordance with the "ASME Boiler and Pressure Vessel Code, Section VI, 7.05 (H)" referenced in rule 4101:4-3-01 of the Administrative Code.
 - (3) The continuous, manned attendance by the operator during all times of operation of a non-solid-fuel- fired steam boiler or stationary steam engine is not required when the superintendent of the division of industrial compliance has approved a site-specific, detailed written plan to provide for automated electronic monitoring of the steam boiler or stationary steam engine which utilizes controls that contain all operational functions, are equipped with manual operational resets, and are labeled for the intended operation, provided that all of the following apply:
 - (a) The control equipment must be located within the same complex or production facility premises;
 - (b) A person licensed under section 4104.19 of the Revised Code is present at all times within the same complex or production facility premises and is available to respond to an emergency condition when summoned by the automated electronic monitoring system;
 - (c) A secondary means of alerting such licensed person is within the same complex or production facility premises in the event of failure of the primary electronic monitoring system;
 - (d) A qualified individual as defined in rule 4101:4-1-01 of the Administrative Code performs annual operational tests on the automated electronic monitoring system to verify that the system is maintained in accordance with that original manufacturer specification; and

(e) A copy of such dated and signed service report or checklist, listing each control and safety device tested with the manufacturer's name, model number, set point, and actual operational test point is provided to the superintendent of the division of industrial compliance upon request. Failure to produce such service report may result in the issuance of an adjudication order within the meaning of Chapter 119. of the Revised Code.

(4) The continuous, manned attendance by the operator during all times of operation of a non-solid-fuel-fired steam boiler having a fuel input rating of less than 12,500,000 BTU/hr is not required when an automated electronic control system meeting the requirements of "ASME CSD-1" referenced in rule 4101:4-3-01 of the Administrative Code is utilized, provided that all of the following requirements have also been met:

(a) The boiler manufacturer and the installing contractor shall complete and sign a certification report (similar to the report shown in Appendix C of ASME CSD-1) for each boiler. The certification report shall meet the requirements of Section CG-510 of the ASME CSD-1 and shall identify the manufacturer, model number, and operational test date for each specific boiler control and safety device and certify that each control and safety device was installed and tested in accordance with the manufacturer's installation instructions and the ASME CSD-1.

(b) The installing contractor, who shall be registered in accordance with rule 4101:4-7-01 of the Administrative Code, shall obtain and provide to the owner or user the operating, testing, servicing, and cleaning instructions for the controls and safety devices. Additionally, the installing contractor shall provide to the owner or user the complete wiring and piping diagrams and a written precaution that the annual operating, testing, and servicing of the controls and safety devices is to be performed only by a qualified individual. The contractor shall obtain a receipt from the owner or user for the delivery of these instructions.

(c) The certification report and the receipt described in paragraphs (B)(4)(a) and (B)(4)(b) of this rule shall be submitted to the superintendent prior to the required inspection and issuance of the certificate of operation prescribed in rule 4101:4-8-01 of the Administrative Code. Failure to submit this documentation may result in the issuance of an adjudication order within the meaning of Chapter 119. of the Revised Code.

(d) The owner or user shall develop, coordinate, and implement a preventative maintenance program and ensure that the employee responsible for maintaining the boiler is trained, knowledgeable, and competent to operate and maintain such boiler, controls, and safety devices. The maintenance program shall be consistent with the manufacturer's recommendations and shall include regular inspections and operational testing for the boiler controls and safety devices. Annual inspection and operational testing shall be performed and documented by a qualified individual as defined in rule 4101:4-1-01 of the Administrative

Code. Daily, weekly, monthly, and semi-annual inspections and operational testing, as outlined by the manufacturer and as recommended in Appendix D of the ASME CSD-1, shall be performed and documented by an employee who has been trained, is knowledgeable, and is competent to operate and maintain such boiler, controls, and safety devices. The maintenance records shall identify the manufacturer, model number, set point, the operational tests performed, the operational test date, the inspection results, and who performed the tests or inspection for each specific boiler control and safety device. The maintenance records shall be made available to the inspector for review during the certificate inspection. Failure to provide the required maintenance records may result in the issuance of an adjudication order within the meaning of Chapter 119. of the Revised Code.

- (5) The continuous, manned attendance by the operator during all times of operation of a non-solid-fuel-fired steam boiler having a fuel input rating of greater than or equal to 12,500,000 BTU/hr and meeting the requirements of "NFPA 85" referenced in rule 4101:4-3-01 is not required when an automated electronic control system is utilized meeting the requirements of the ASME CSD-1 referenced in rule 4101:4-3-01 of the Administrative Code, provided that all of the following requirements have also been met:
- (a) The certification report, wiring diagrams, instructions, maintenance, and testing requirements for the control system outlined in paragraphs (B)(4)(a) to (B)(4)(d) of this rule shall apply.
 - (b) Prior to installation of the boiler(s), the owner shall submit a detailed, written, process hazard analysis (PHA) to the superintendent of industrial compliance that identifies and evaluates the hazards associated with the unattended operation of the boiler and justifies the method(s) proposed to address the hazards. The analysis shall identify possible incident scenarios, the proposed protection/solution for each scenario, and any such additional information as determined necessary by the superintendent. The PHA shall be reviewed by the owner, updated at least every five years, and submitted to the superintendent for review and filing. Failure to provide the required PHA may result in the issuance of an adjudication order within the meaning of Chapter 119. of the Revised Code.