2025 AMENDMENTS TO THE

2024 EDITION OF THE

INTERNATIONAL FIRE CODE (IFC) AND APPENDICES

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AMENDMENTS AND DELETIONS TO THE 2024 INTERNATIONAL FIRE CODE

The 2024 International Fire Code adopted in D.R.M.C. Sec. 10-16 is amended in the following particulars:

CHAPTER 1 SCOPE AND ADMINISTRATION

SECTION 101 SCOPE AND GENERAL REQUIREMENTS
Sections 101.1 Title and 101.2 Scope are replaced as follows:

101.1 Title. These regulations shall be known as the *Denver Fire Code*, hereinafter referred to as "this code."

101.2 Scope. This code establishes regulations affecting or relating to structures, processes, premises and safeguards regarding all of the following:

1. The hazard of fire and explosion arising from the storage, handling or use of structures, materials or devices.
2. Conditions hazardous to life, property or public welfare in the occupancy of structures or premises.
3. Fire hazards in the structure or on the premises from occupancy or operation.
4. Matters related to the construction, extension, repair, *alteration* or removal of fire protection systems.
5. Conditions affecting the safety of firefighters and emergency responders during emergency operations.
6. Recovery of City costs related to emergency response incidents, including the mitigation of hazardous materials incidents; nuisance alarms; problematic systems; fire safety inspections; systems testing; re-inspections; re-testing; investigations; emergency fire watch assigned to private properties, etc.
7. Review of design plans, construction documents and shop/layout drawings for the installation, alteration, modification and repair of conveyances.
8. Inspection of conveyances.

SECTION 102 APPLICABILITY
Section 102.5 Application of residential code is replaced as follows:

102.5 Application of residential code. Where structures are designed and constructed in accordance with the *International Residential Code*, the provisions of this code shall apply as follows:

1. Construction and design provisions of this code pertaining to the exterior of the structure shall apply including, but not limited to, premises identification, fire apparatus access and water supplies. Where interior or exterior systems or devices are installed, construction permits required by Section 105.6 shall apply.

2. Administrative, operational and maintenance provisions of this code shall apply.

   Exception: Other than premise identification (address), Section 102.5 shall not apply to the following:

   a. Interior or exterior renovations constructed under the provisions of the *International Residential Code* to existing detached one- or two-family dwellings

   b. Additions constructed under the provisions of the *International Residential Code* to existing detached one- or two-family dwellings; or

   c. Demolition or removal of a one- or two-family dwelling and replacement with a single new one- or two-family dwelling constructed under the provisions of the *International Residential Code.*

Section 102.7 Referenced codes and standards is replaced as follows:

102.7 Referenced codes and standards. The codes and standards listed in Chapter 80 shall be considered to be part of the requirements of this code and as further regulated by sections 102.7.1, 102.7.2 and 102.8. All references in this code and any referenced codes to the International Building Code (IBC), International Fuel Gas Code (IFGC), International Mechanical Code (IMC), International Plumbing Code (IPC), International Energy Conservation Code (IECC), International Existing Building Code (IEBC), and International Residential Code (IRC), shall mean the Denver Commercial Building Code (DCBC), Denver Fuel Gas Code (DFGC), the Denver Mechanical Code (DMC), the Denver Plumbing Code (DPC), the Denver Energy Code (DEC), the Denver Existing Building Code (DEBC), and the Denver Residential Code (DRC), respectively.

SECTION 103 CODE COMPLIANCE AGENCY

Section 103.1 Creation of agency is replaced as follows:

103.1 Creation of agency. The **Denver Fire Department Prevention Division**, referred to in this code as the Division, is hereby created and the official in charge thereof shall be known as the *fire code official*. The function of the agency shall be the implementation, administration and enforcement of the provisions of this code.

SECTION 104 DUTIES AND POWERS OF THE FIRE CODE OFFICIAL

Section 104.2.2.2 Preparer qualifications is replaced as follows:

104.2.2.2 Preparer qualifications. The technical opinion and report shall be prepared by a qualified engineer, specialist, laboratory or fire safety specialty organization acceptable to the *fire code official*. The *fire code official* is authorized to require design submittals to be prepared by, and bear the stamp of, a *registered design professional*. Technical assistance shall be provided, and the report prepared by a qualified expert preapproved by the *fire code official*. The *fire code official* is authorized to require the report to be prepared by, and bear the stamp of, a registered design professional.

104.2.4.3 Application for modification. [The application for modification shall be in a form as provided by the Division.] The *fire code official* is authorized to modify any of the provisions of this code upon application

in writing by the owner where there are practical difficulties in carrying out the provisions of the Code, provided the intent of the code shall be complied with, public safety secured, and substantial justice done.

Section 104.11.4 Resetting or silencing of alarms is added as follows:

104.11.4 Resetting or silencing of alarms. No person shall reset or silence a fire protection or life safety system unless by direction of the fire chief, *fire code official* or fire department official in charge of the incident.

SECTION 105 PERMITS
Section 105.1 General is replaced:

105.1 General. Permits shall be in accordance with Sections 105.1.1 through 105.6.28.

Section 105.5 Required operational permits and all subsections are replaced as follows:
105.5 Required operational permits. The *fire code official* is authorized to issue operational permits for the operations set forth in Sections 105.5.1 through 105.5.92

105.5.1 Abandoned buildings. An operational permit is required for abandoned and/or vacant buildings. (See Section 311 of the *International Fire Code*.)

105.5.2 *Additive manufacturing*. An operational permit is required to conduct *additive manufacturing* operations regulated by section 4106.3

105.5.3 Aerosol products, aerosol cooking spray products and plastic aerosol 3 products. An operational permit is required to manufacture, store, or handle an aggregate quantity of level 2 or level 3 aerosol products, aerosol cooking spray products or plastic aerosol 3 products in excess of 500 pounds net weight.

105.5.4 Aircraft refueling vehicles. An operational permit is required for each aircraft refueling vehicle.

105.5.5 Reserved.

105.5.6 Reserved.

105.5.7 Aviation facilities. An operational permit is required to use a Group H or Group S occupancy for aircraft servicing or repair and aircraft fuel-servicing vehicles. Additional permits required by other sections of this code include, but are not limited to, hot work, hazardous materials and flammable or combustible finishes.

105.5.8 Battery charging. An operational permit is required to charge batteries on or off powered-industrial trucks and similar equipment having an electrolyte capacity of 10 gallons or more or size of 8kW or greater.

> 105.5.8.1 Battery charging – indoor. An operational permit is required for indoor charging of batteries having an electrolyte capacity of 10 gallons or more or size of 8kW or greater.

105.5.9 Bonfires / Rubbish fires. An operational permit is required for bonfires and rubbish fires.

105.5.10 Carbon dioxide (CO_2).

105.5.10.1 Carbon dioxide (CO_2) systems used in beverage dispensing applications. An operational permit is required for the use of carbon dioxide (CO_2) systems with more than 100 pounds (45.4 kg) of carbon dioxide or any system using any amount of carbon dioxide (CO_2) below grade used in beverage dispensing applications.

105.5.10.2 Carbon dioxide (CO_2) gas enrichment systems using on-site supply tanks and/or cylinders in plant growing (husbandry) applications. An operational permit is required for carbon dioxide enrichment systems with more than 100 pounds (45.4 kg) of carbon dioxide or any system using any amount of carbon dioxide (CO_2) below grade used in plant growing (husbandry) applications.

105.5.10.3 Carbon dioxide (CO_2) gas enrichment systems using a natural gas burner in plant growing (husbandry) applications. An operational permit is required for natural gas burners that are utilized to generate carbon dioxide (CO_2) in plant growing (husbandry) applications.

105.5.11 Reserved.

105.5.12 Cellulose nitrate film. An operational permit is required to store, handle or use cellulose nitrate film in a Group A occupancy.

105.5.13 Combustible dust-producing operations. An operational permit is required to operate a grain elevator, flour starch mill, feed mill, or a plant pulverizing aluminum, coal, cocoa, magnesium, spices or sugar, or other operations producing *combustible dusts* as defined in Chapter 2.

105.5.14 Combustible fibers. An operational permit is required for the storage and handling of *combustible fibers* in quantities greater than 100 cubic feet (2.8 m3).

Exception: A permit is not required for agricultural storage.

105.5.15 Compressed gases. An operational permit is required for the storage, use or handling at *normal temperature and pressure* (NTP) of *compressed gases* in excess of the amounts listed in Table 105.5.15.

Exception: Vehicles equipped for and using *compressed gas* as a fuel for propelling the vehicle.

TABLE 105.5.15
PERMIT AMOUNTS FOR COMPRESSED AND LIQUIFIED GASES [a]

Type of Gas	Gaseous (cubic feet at NTP)	Liquified (pounds)
Biohazard	Any Amount	Any Amount
Carcinogen	200	37
Corrosive	200	37
Flammable	200	37
Highly Toxic	Any Amount	Any Amount
Inert	6,000	1,100
Irritant	200	37
Other Health Hazard	650	120
Oxidizing (including oxygen)	504	50
Pyrophoric	Any Amount	Any Amount
Sensitizer	200	37
Simple Asphyxiant	6,000	1,100
Toxic	Any Amount	Any Amount
Unstable (Reactive)	Any Amount	Any Amount

	Not Sealed (microcurie)	Sealed (millicurie)
Radioactive	Any Amount	Any Amount

For SI: 1 cubic foot = 0.02832m^3

a. See Table 105.5.42 for cryogenic fluids, and Section 105.5.87 and Chapter 61 for liquefied petroleum gases (LPG)

105.5.16 Confined Space An operational permit is required for confined spaces, vacated areas, abandoned tanks, etc.

105.5.17 Conveyances. Annual operating permits are required for all conveyances regulated in accordance with ASME A17.1. See Section 604.

Exception: dumbwaiters and material lifts.

105.5.18 Covered and open mall buildings. An operational permit is required for:

1. The placement of retail fixtures and displays, concession equipment, displays of highly combustible goods and similar items in the mall.
2. The display of liquid- or gas-fired equipment in the mall.
3. The use of open-flame or flame-producing equipment in the mall.

105.5.19 Cryogenic fluids. An operational permit is required to produce, store, transport on site, use, handle or dispense *cryogenic fluids* in excess of the amounts listed in Table 105.5.19.

Exception: Permits are not required for vehicles equipped for and using *cryogenic fluids* as a fuel for propelling the vehicle or for refrigerating the lading.

TABLE 105.5.19
PERMIT AMOUNTS FOR CRYOGENIC FLUIDS

Type of Cryogenic Fluid	Inside Building (gallons)	Outside Building (gallons)
Flammable	More than 1	60
Inert	60	500
Oxidizing (includes oxygen)	10	50
Physical or health hazard not indicated above	Any Amount	Any Amount

105.5.20 Cutting and welding. An operational permit is required to conduct cutting or welding operations within the jurisdiction.

105.5.21 Dry cleaning. An operational permit is required to engage in the business of dry cleaning or to change to a more hazardous cleaning solvent used in existing dry-cleaning equipment.

105.5.22 Emergency responder radio enhancement coverage system (RES). An operational permit is required for the annual and five-year testing of the system.

105.5.23 Energy storage systems. An operational permit is required for stationary and mobile energy storage systems regulated by Section 1207.

105.5.24 Reserved.

105.5.25 Explosives. An operational permit is required for the manufacture, storage, handling, sale or use of any quantity of *explosives*, *explosive materials*, fireworks or pyrotechnic special effects within the scope of Chapter 56.

Exception: Storage in Group R-3 occupancies of smokeless propellant, black powder and small arms primers for personal use, not for resale and in accordance with Section 5606.

105.5.26 Failure to obtain a permit. When a required permit has not been obtained, the fee shall be double the cost of the required permit.

105.5.27 Fire alarm signal delay equipment including alarm verification. A permit is required to install or modify fire alarm signal delay equipment integrated with the FACP.

105.5.28 Fire department fire alarm radio transmitter (wireless Denver Fire Department communicator). A permit is required to install or modify fire department fire alarm radio equipment for monitoring fire and burglar alarms.

105.5.29 Fire hydrants and valves. An operational permit is required to use to operate fire hydrants or valves intended for fire suppression purposes that are installed on water systems and provided with ready access from a fire apparatus access road that is open to or generally used by the public. An operational permit is required to maintain a private fire hydrant system. This applies to existing systems only. New private fire hydrant systems are prohibited.

Exception: A permit is not required for authorized employees of the water company that supplies the system for the fire department to use or operate fire hydrants and valves.

105.5.30 Fire watch. An operational permit is required whenever a fire watch is mandated.

105.5.31 Fireworks/pyrotechnics. An operational permit is required for all professional pyrotechnic programs.

105.5.32 Flammable and combustible liquids. An operational permit is required:

1. To use or operate a pipeline for the transportation within facilities of *flammable* or *combustible liquids*. This requirement shall not apply to the off-site transportation in pipelines regulated by the Department of Transportation (DOT) nor does it apply to piping systems.
2. To store, handle or use Class I liquids in excess of 5 gallons (19 L) in a building or in excess of 10 gallons (37.9 L) outside of a building, except that a permit is not required for the following:
    a. 2.1. The storage or use of Class I liquids in the fuel tank of a motor vehicle, aircraft, motorboat, mobile power plant or mobile heating plant, unless such storage, in the opinion of the *fire code official*, would cause an unsafe condition.
    b. 2.2. The storage or use of paints, oils, varnishes or similar flammable mixtures where such liquids are stored for maintenance, painting or similar purposes for a period of not more than 30 days.
3. To store, handle or use Class II or Class IIIA liquids in excess of 25 gallons (95 L) in a building or in excess of 60 gallons (227L) outside a building, except for fuel oil used in connection with oil-burning equipment.
4. To store, handle or use Class IIIB liquids in tanks or portable tanks for fueling motor vehicles at motor fuel-dispensing facilities or where connected to fuel-burning equipment.
    Exception: Fuel oil and used motor oil used for space heating or water heating.
5. To remove Class I or II liquids from an underground storage tank used for fueling motor vehicles by any means other than the *approved*, stationary on-site pumps normally used for dispensing purposes.
6. To operate tank vehicles, equipment, tanks, plants, terminals, wells, fuel-dispensing stations, refineries, distilleries and similar facilities where *flammable* and *combustible liquids* are produced, processed, transported, stored, dispensed or used.
7. To place temporarily out of service (for more than 90 days) an underground, protected above-ground or above-ground *flammable* or *combustible liquid* tank.
8. To change the type of contents stored in a *flammable* or *combustible liquid* tank to a material that poses a greater hazard than that for which the tank was designed and constructed.
9. To manufacture, process, blend or refine *flammable* or *combustible liquids*.
10. To engage in the dispensing of liquid fuels into the fuel tanks of motor vehicles at commercial, industrial, governmental, or manufacturing establishments in accordance with Section 5706.5.4 or to engage in on-demand *mobile fueling* operations in accordance with Section 5707.
11. To utilize a site for the dispensing of liquid fuels from tank vehicles into the fuel tanks of motor vehicles, marine craft and other special equipment at commercial, industrial, governmental or manufacturing establishments in accordance with Section 5706.5.4 or, where required by the *fire*

code official, to utilize a site for on-demand *mobile fueling* operations in accordance with Section 5707.

105.5.33 Floor finishing. An operational permit is required for floor finishing or surfacing operations exceeding 350 square feet (33 m2) using Class I or Class II liquids.

105.5.34 Fruit and crop ripening. An operational permit is required to operate a fruit- or crop-ripening facility or conduct a fruit ripening process using ethylene gas.

105.5.35 Fuel-fired equipment used in confined spaces. An operational permit is required to operate fuel-fired equipment in confined spaces.

105.5.36 Fumigation and insecticidal fogging. An operational permit is required to operate a business of fumigation or insecticidal fogging, and to maintain a room, vault or chamber in which a toxic or flammable fumigant is used.

105.5.37 Generator Set. An operational permit is required to maintain and operate fueled generator set(s) with or without an integral tank (Denver Residential Code installations are exempt).

105.5.38 Halogenated agent systems/extinguishers. An operational permit is required to install or modify and maintain a halogenated extinguishing agent system or portable fire extinguishers.

105.5.39 Halogenated hydrocarbons. An operational permit is required for the storage or use of halogenated hydrocarbons.

105.5.40 Hazardous materials. An operational permit is required to store, transport on site, dispense, use or handle hazardous materials in excess of the amounts listed in Table 105.5.40.

TABLE 105.5.40
PERMIT AMOUNTS FOR HAZARDOUS MATERIALS

TYPE OF MATERIAL	AMOUNT
Carcinogens	
Liquids	1 gallon
Solids	10 pounds
Combustible liquids	See Section 105.5.32
Corrosive materials	
Gases	See Section 105.5.15
Liquids	55 gallons
Solids	550 pounds
Explosive materials	Any Amount
Flammable materials	
Gases	See Section 105.5.15
Liquids	See Section 105.5.32
Solids	100 pounds
Cryogenics	See Section 105.5.19

Highly toxic materials	
Gases	See Section 105.5.15
Liquids	Any Amount
Solids	Any Amount
Irritants	
Liquids	55 gallons
Solids	550 pounds
Other Health Hazards	
Liquids	55 gallons
Solids	550 pounds
Oxidizing materials	
Gases	See Section 105.5.15
Liquids	
Class 4	Any Amount
Class 3	10 pounds[a]
Class 2	100 pounds
Class 1	550 pounds
Solids	
Class 4	Any Amount
Class 3	10 pounds[a]
Class 2	100 pounds
Class 1	550 pounds
Cryogenics	See Section 105.5.19
Organic peroxides	
Liquids	
Class I	Any Amount
Class II	Any Amount
Class III	10 pounds
Class IV	20 pounds
Class V	No Permit Required
Solids	
Class I	Any Amount
Class II	Any Amount
Class III	10 pounds
Class 1V	20 pounds
Class V	No Permit Required
Pyrophoric materials	
Gases	See Section 105.5.15
Liquids	Any Amount
Solids	Any Amount
Radioactive materials	
Not sealed	1 microcurie
Sealed	1 millicurie
Sensitizers	
Liquids	55 gallons
Solids	550 pounds
Toxic materials	

Gases	See Section 105.5.15
Liquids	Any Amount
Solids	Any Amount
Unstable (reactive) materials	
Liquids	
Class 4	Any Amount
Class 3	Any Amount
Class 2	10 pounds
Class 1	100 pounds
Solids	
Class 4	Any Amount
Class 3	Any Amount
Class 2	10 pounds
Class 1	100 pounds
Water-reactive materials	
Liquids	
Class 3	Any Amount
Class 2	50 pounds
Class 1	100 pounds
Solids	
Class 3	Any Amount
Class 2	50 pounds
Class 1	100 pounds
Biohazard	Any Amount

105.5.41 Hazardous material inventory statement plan review. An operational permit is required for review and comment of any HMIS.

105.5.41.1 HMIS – with less than 10 entries

105.5.41.2 HMIS – with 10 or more entries

105.5.42 HPM facilities. An operational permit is required to store, handle or use hazardous production materials.

105.5.43 High-piled storage. An operational permit is required to use a building or portion thereof with more than 500 square feet (46 m2), including aisles, of *high-piled combustible storage*.

105.5.44 Hot work operations. An operational permit is required for hot working including, but not limited to:

1. Public exhibitions and demonstrations where hot work is conducted.
2. Use of portable hot work equipment inside a structure.
3. Fixed-site hot work equipment such as welding booths.
4. Hot work conducted within a hazardous fire area.
5. Application of roof coverings with the use of an open-flame device.

105.5.45 Hypergolic materials. An operational permit is required to store or use any amount of hypergolic materials.

105.5.46 Indoor plant cultivation. An operational permit is required for plant cultivation where a carbon dioxide (CO2) enriched environment is created.

105.5.47 Industrial ovens. An operational permit is required for operation of industrial ovens regulated by Chapter 30.

105.5.48 Inert gas systems used in commercial, manufacturing or industrial applications. An operational permit is required for the use of inert gas systems with more than 100 pounds (45.4 kg) of an inert gas or any system using any amount of an inert gas below grade used in a commercial, manufacturing, or industrial application, such as water treatment with pH balancing, food processing or laboratories.

105.5.49 Insecticides/pesticides/fumigants. An operational permit is required to apply, sell and manufacture insecticides, pesticides or fumigants.

105.5.49.1 One location/one time

105.5.49.2 Annual/multiple locations

105.5.50 Liquid- or gas-fueled vehicles or equipment in assembly buildings. An operational permit is required to display, operate or demonstrate liquid- or gas-fueled vehicles or equipment in assembly buildings.

105.5.51 Lithium batteries. An operational permit is required for an accumulation of more than 15 cubic feet (0.42 m) of lithium ion and lithium metal batteries, where required by Section 320.2.

105.5.52 Liquefied petroleum gas (LPG). An operational permit is required for:

105.5.38.1 Operate/maintain any container or system

105.5.38.2 Limited operations/construction sites

105.5.38.3 Roofing operations

105.5.38.4 Operation of cargo tankers that transport LP gas

105.5.53 Lumber yards and woodworking plants. An operational permit is required for the storage or processing of lumber exceeding 100,000 board feet (8,333 ft3) (236 m3).

105.5.54 Magnesium. An operational permit is required to melt, cast, heat treat or grind more than 10 pounds (4.54 kg) of magnesium.

105.5.55 Marijuana operations.

105.5.55.1 Carbon dioxide (CO2) enrichment process (use). An operational permit is required for a marijuana CO2 enrichment process. See Section 105.5.10.2.

105.5.55.2 Compressed gas use and storage. An operational permit is required for the use and storage of compressed gas in a marijuana facility. See Section 105.5.15.

105.5.55.3 Extraction process. An operational permit is required for a marijuana extraction process.

105.5.55.4 Fumigation. An operational permit is required for fumigation in a marijuana facility. See Section 105.5.36.

105.5.55.5 Hazardous materials use and storage. An operational permit is required for the use and

storage of hazardous materials in a marijuana facility.

105.5.55.6 Liquefied petroleum gas (LPG) – butane transfilling operations. An operational permit is required for LPG-butane transfilling operations in a marijuana facility.

105.5.55.7 Liquefied petroleum gas (LPG) use and storage. An operational permit is required for the use and storage of liquefied petroleum gas in a marijuana facility.

105.5.55.8 Medical marijuana center (dispensary). An operational permit is required for a medical marijuana center (dispensary).

105.5.55.9 Medical marijuana infused product (kitchen). An operational permit is required for a medical infused product kitchen.

105.5.55.10 Medical marijuana optional premise cultivation. An operational permit is required for medical marijuana optional premise cultivation.

105.5.55.11 Pesticide inventory statement. An operational permit is required for a pesticide inventory statement for a marijuana facility.

105.5.55.12 Private cultivation. An operational permit is required for private marijuana cultivation.

105.5.55.13 Private extraction. An operational permit is required for private marijuana extraction operations.

105.5.55.14 Retail cultivation. An operational permit is required for retail marijuana cultivation.

105.5.55.15 Retail product manufacturing. An operational permit is required for retail marijuana product manufacturing.

105.5.55.16 Retail store. An operational permit is required for a retail marijuana store.

105.5.55.17 Retail testing facility. An operational permit is required for a retail marijuana testing facilities.

105.5.56 Miscellaneous combustible storage. An operational permit is required to store in any building or on any premises in excess of 2,500 cubic feet (71 m3) gross volume of combustible empty packing cases, boxes, barrels or similar containers, combustible pallets, rubber tires, rubber, cork or similar combustible material.

105.5.57 Mobile food vending—fuels, generators, hood extinguishing systems, etc. An operational permit is required for a mobile food vending operation.

105.5.57.1 Compressed gas.

105.5.57.2 Generators.

105.5.57.3 Hood extinguishing system.

105.5.58 Motor fuel-dispensing facilities. An operational permit is required for the operation of automotive, marine and fleet motor fuel-dispensing facilities.

105.5.59 Open burning. An operational permit is required for the kindling or maintaining of an open fire or a fire on any public street, alley, road, or other public or private ground. Instructions and stipulations of the permit shall be complied with.

Exception: *Recreational fires.*

105.5.60 Open flames and torches. An operational permit is required to remove paint with a torch, or to use a torch or open flame device in a wildfire risk area.

105.5.61 Open flames and candles. An operational permit is required to use open flames or candles in connection with assembly areas, dining areas of restaurants or drinking establishments.

105.5.62 Organic coatings. An operational permit is required for any organic-coating manufacturing operation producing more than 1 gallon (4 L) of an organic coating in one day.

105.5.63 Outdoor assembly event. An operational permit is required to conduct an *outdoor assembly event* where planned attendance exceeds 1,000 persons.

105.5.64 Reserved.

105.5.65 Plant extraction systems. An operational permit is required to use plant extraction systems.

105.5.66 Private fire hydrants. An operational permit is required for the removal from service, use or operation of private fire hydrants.

Exception: A permit is not required for private industry with trained maintenance personnel, private fire brigade or fire departments to maintain, test and use private hydrants.

105.5.67 Pyrotechnic event. An operational permit is required for all pyrotechnic events.

105.5.67.1 Use of fog/haze

105.5.67.2 Indoor/Outdoor pyrotechnic event.

105.5.67.3 Use of flame effects.

105.5.68 Pyrotechnician. A permit/certificate of fitness is required for all pyrotechnicians.

105.5.69 Pyrotechnic special effects material. An operational permit is required for use and handling of pyrotechnic special effects material.

105.5.70 Pyroxylin plastics. An operational permit is required for storage or handling of more than 25 pounds (11 kg) of cellulose nitrate (pyroxylin) plastics, and for the assembly or manufacture of articles involving pyroxylin plastics.

105.5.71 Radioactive material. An operational permit is required to store, use, or handle radioactive material.

105.5.72 Refrigeration equipment. An operational permit is required to operate a mechanical refrigeration unit or system regulated by Chapter 6.

105.5.73 Repair garages and motor fuel-dispensing facilities. An operational permit is required for operation of repair garages.

105.5.74 Rooftop heliports. An operational permit is required for the operation of a rooftop heliport.

105.5.75 Spraying or dipping. An operational permit is required to conduct a spraying or dipping operation utilizing *flammable* or *combustible liquids*, or the application of combustible powders regulated by Chapter 24.

105.5.76 Stored electrical energy emergency/standby power systems. An operational permit is required to install or operate stored electrical energy emergency/standby power systems.

105.5.77 Storage of scrap tires and tire byproducts. An operational permit is required to establish, conduct, or maintain storage of scrap tires and tire byproducts that exceeds 2,500 cubic feet (71 m^3) of total volume of scrap tires, and for indoor storage of tires and tire byproducts.

105.5.78 Supervising station/central station. A permit is required to receive fire alarm signals from a protected property.

105.5.79 Temporary fire standpipe. A permit is required to install and maintain a temporary fire standpipe.

105.5.80 Temporary generator. A permit is required to use a temporary generator.

105.5.81 Temporary heating appliance. A permit is required to install or use a temporary heating appliance.

105.5.82 Reserved.

105.5.83 Tire-rebuilding plants. An operational permit is required for the operation and maintenance of a tire-rebuilding plant.

105.5.84 Tire storage. A permit is required for tire storage of 2500 cubic feet or more in any one control area.

105.5.85 Training fees. A permit is required for Fire Department training.

105.5.85.1 High-rise building evacuation exercise.
105.5.85.2 Low-rise building evacuation exercise.
105.5.85.3 Building management/facility manager emergency procedures certification training (per person).
105.5.85.4 Fire extinguisher training (2 hours – does not include extinguisher; limited to 5 persons).
105.5.85.5 Floor warden training (limited to 5 persons).
105.5.85.6 Hazardous materials closure plan.
105.5.85.7 Hazardous materials waste generation plan.
105.5.85.8 Hazardous materials inventory statement training (2 hours; limited to 5 persons).
105.5.85.9 Hazardous materials management plan (2 hours; limited to 5 persons).
105.5.85.10 Hazardous materials release mitigation training (2 hours; limited to 10 persons).
105.5.85.11 Safety and evacuation training (2 hours; limited to 10 persons).
105.5.85.12 Fire safety public education presentation.

105.5.86 Vacant properties. A permit is required for vacant properties.

105.5.87 Waste handling. An operational permit is required for the operation of wrecking yards, junk yards and waste material-handling facilities.

105.5.88 Woodworking operations. An operational permit is required to operate a woodworking operation that meets one of the following criteria:

1. Has more than three fixed or table-mounted wood sawdust-producing pieces of equipment, or

2. Has a floor area greater than 2,500 square feet, or

3. Has a room or building considered to be an explosion hazard based on dust accumulations exceeding 1/8-inch or a visible dust cloud.

105.5.89 Wood products. An operational permit is required to store chips, hogged material, lumber or plywood in excess of 200 cubic feet (6 m^3).

105.5.90 Temporary heating or cooking in tents or membrane structures. An operational permit is required to operate temporary heating or cooking equipment within tents or membrane structures.

105.5.91 Temporary heating or cooking in wildfire risk areas. Where required by local regulations, an operational permit is required to operate temporary heating or cooking equipment in wildfire risk areas.

105.5.92 Temporary heating for construction sites. An operational permit is required to operate temporary heating equipment in structures during the course of construction, *alteration* or demolition.

Section 105.6 Required construction permits and all of its subsections are replaced in their entirety as follows:

105.6 Required construction permits. The *fire code official* is authorized to issue construction permits for work as set forth in Sections 105.6.1 through 105.6.34. Permit submittals shall comply with and bear the seal and signature of the *design professional* in accordance with DORA Rules and Regulations and Policy 105.6 (Shop Drawing Submittal Requirements for Construction Permits) found at the Denver Fire Department online portal. The process of application, submittal, securing of the construction permit (including fees) and obtaining inspections shall comply with this code and Chapter 1 Scope & Administration of the *Denver Commercial Building Code*.

105.6.1 Automatic fire extinguishing systems. A construction permit is required prior to the installation or modification of automatic fire extinguishing systems including fire lines. Water supply infrastructure including hydrants must obtain Division approval via Water Plan submittals (e-permits), however final permitting is approved & issued by Denver Water. Fire lines require a permit and must be installed by a contractor licensed by the Building Permitting and Inspections Services Agency.

Work performed to keep equipment operable or to make repairs is considered maintenance and does not require a permit.

105.6.2 Carbon dioxide (CO_2)

105.6.2.1 Carbon dioxide (CO_2) systems used in beverage dispensing applications. A construction permit is required for the installation of carbon dioxide (CO_2) systems with more than 100 45.4 kg) of carbon dioxide or any system using any amount of carbon dioxide (CO_2) used in beverage dispensing applications.

105.6.2.2 Carbon dioxide (CO_2) gas enrichment systems using on-site supply tanks and/or cylinders in plant growing (husbandry) applications. A construction permit is required for the

installation of carbon dioxide enrichment systems with more than 100 pounds (45.4 kg) of carbon dioxide or any system using any amount of carbon dioxide (CO_2) below grade used in plant growing (husbandry) applications.

105.6.2.3 Carbon dioxide (CO_2) gas enrichment systems using a natural gas burner in plant growing (husbandry) applications. A construction permit is required for the installation of natural gas burners that are utilized to generate carbon dioxide (CO_2 applications.

105.6.3 Cellular / Wireless signal repeater site. A construction permit is required to install a cellular/wireless signal repeater site.

105.6.4 Compressed gases. Where the *compressed gases* in use or storage exceed the amounts listed in Table 105.5.9, a construction permit is required to install, repair damage to, abandon, remove, place temporarily out of service, or close or substantially modify a *compressed gas* system.

Exceptions:

1. Routine maintenance.
2. For emergency repair work performed on an emergency basis, application for permit shall be made within two working days of commencement of work.

105.6.5 Conveyances. Construction permits are required for the installation, alteration, modification, removal, maintenance, and testing of all elevators and conveyances within the City and County of Denver. Shop and/or layout drawings shall be submitted for review and approval prior to issuance of permits. Drawings shall comply with ASME A17.1 and Division policy. Two sets of specifications and accurately scaled and fully dimensioned construction plans shall be provided in accordance with Policy 105.6. These plans shall include the applicable code edition which shall conform to the edition of the code currently adopted and shall include specifications of interior cab materials or indication on the plans that interior cab work is to be completed by others. Permits issued shall be displayed in the conveyance control room or control space associated with the permitted conveyance. See also Section 604 for additional requirements.

105.6.5.1 Conveyance Permits. The Division shall be notified by a responsible party from the conveyance contractor or the permit applicant upon the completion of the scope of work set forth in the issued and *approved* permit. Notification to Denver Fire Conveyance Section shall be in written format and include the signature of the permit applicant. Notification shall include all known variances or deviations from the scope of work submitted for approval. Notification shall be submitted prior to or on the expiration date of the issued permit. If for any reason the original permit applicant is unable to complete the scope of work specified in the permit and the work is to be completed by a contractor other than the original, a new permit must be applied for and obtained by the conveyance contractor who will complete the specified scope of work.

105.6.6 Cryogenic fluids. A construction permit is required for installation of or *alteration* to outdoor stationary *cryogenic fluid* storage systems where the system capacity exceeds the amounts listed in Table 105.5.19. Maintenance performed in accordance with this code is not considered to be an *alteration* and does not require a construction permit.

105.6.7 Emergency responder communication coverage system. A construction permit is required for installation of or modification to in-building, two-way emergency responder communication coverage systems and related equipment. Maintenance performed in accordance with this code is not considered to be a modification and does not require a construction permit.

105.6.8 Energy storage systems. A construction permit is required to install energy storage systems regulated by Section 1207.

105.6.9 Fire alarm and detection systems and related equipment. A construction permit is required prior to the installation or modification of fire alarm and detection systems and related equipment. Work performed to keep equipment operable or to make repairs is considered maintenance and does not require a construction permit.

105.6.10 Fire pumps and related equipment. A construction permit is required prior to the installation or modification of fire pumps and related fuel tanks, jockey pumps and controllers. Work performed to keep equipment operable or to make repairs is considered maintenance and does not require~~s~~ a permit.

105.6.11 Fire watch. A permit is required whenever a fire watch is mandated.

105.6.12 Flammable and combustible liquids. A construction permit is required:

1. To install, repair or modify a pipeline for the transportation of *flammable* or *combustible l liquids*.
2. To install, construct or alter tank vehicles, equipment, tanks, plants, terminals, wells, fuel-dispensing stations, refineries, distilleries and similar facilities where *flammable* and *combustible liquids* are produced, processed, transported, stored, dispensed or used.
3. To install, alter, remove, abandon or otherwise dispose of a *flammable* or *combustible liquid tank*.

105.6.13 Fuel cell power systems. A construction permit is required to install *stationary fuel cell power systems*.

105.6.14 Gas detection systems. A construction permit is required for the installation of or modification to *gas detection systems.* Maintenance performed in accordance with this code is not considered a modification and shall not require a permit.

105.6.15 Gates and barricades across fire apparatus access roads. A construction permit is required for the installation of or modification to a gate or barricade across a *fire apparatus access road*.

105.6.16 Generator Set. A construction permit is required to install the following fueled generator set(s) with or without an integral tank (Denver Residential Code installations are exempt).

105.6.16.1 Fuel Oil

105.6.16.2 Natural Gas

105.6.17 Hazardous materials. A construction permit is required to install, repair damage to, abandon, remove, place temporarily out of service, or close or substantially modify a storage facility or other area regulated by Chapter 50 where the hazardous materials in use or storage exceed the amounts listed in Table 105.5.40.

Exceptions:

1. Routine maintenance.
2. For repair work performed on an emergency basis, application for permit shall be made within two working days of commencement of work.

105.6.18 High-piled combustible storage. A construction permit is required for the installation of or modification to a structure with more than 500 square feet (46 m2), including aisles, of *high-piled combustible storage*. Maintenance performed in accordance with this code is not considered to be a modification and does not require a construction permit.

105.6.19 Industrial ovens. A construction permit is required for installation of industrial ovens covered by Chapter 30.

Exceptions:

1. Routine maintenance.
2. For repair work performed on an emergency basis, application for permit shall be made within two working days of commencement of work.

105.6.20 Inert gas systems used in commercial, manufacturing, or industrial applications. A construction permit is required for the use of inert gas systems with more than 100 pounds (45.4 kg) of an inert gas or any system using any amount of an inert gas below grade used in a commercial, manufacturing, or industrial application, such as water treatment with pH balancing, food processing or laboratories.

105.6.21 Liquid Propane Gas. A construction permit is required for installation of or modification to an LP-gas system. Maintenance performed in accordance with this code is not considered to be a modification and does not require a permit.

105.6.21.1 Cage An installation permit is required to install a cage for storage of portable LP gas containers awaiting use or resale.

105.6.21.2 Tank A construction permit is required to install, repair damage to, abandon, remove or place temporarily out of service an LP gas tank.

105.6.21.3 Automated cylinder exchange station. A construction permit is required to install an automated cylinder exchange station.

105.6.22 Motor vehicle repair rooms and booths. A construction permit is required to install or modify a motor vehicle repair room or booth. Maintenance performed in accordance with this code is not considered to be a modification and does not require a permit.

105.6.23 Phased Occupancy for TCO. A construction permit is required to obtain approval for a phased occupancy approach of a new building. Visit Denver Fire Department website to obtain Phased Occupancy Policy outlining requirements and procedures to satisfy Section 901.5.1.

105.6.24 Plant extraction systems. A construction permit is required for installation of or modification to plant extraction systems. Maintenance performed in accordance with this code is not considered to be a modification and does not require a permit.

105.6.25 Private fire hydrants. A construction permit is required for the installation or modification of private fire hydrants. Maintenance performed in accordance with this code is not considered to be a modification and does not require a permit.

105.6.26 Refrigeration equipment. A construction permit is required for a mechanical refrigeration unit or system regulated by Chapter 6.

105.6.27 Smoke control or smoke exhaust systems. Construction permits are required for installation of or alteration to smoke control or smoke exhaust systems. Maintenance performed in accordance with this code is not considered to be an *alteration* and does not require a permit.

105.6.28 Solar photovoltaic power systems. A construction permit is required to install or modify solar photovoltaic power systems. Maintenance performed in accordance with this code is not considered to be a modification and does not require a permit.

105.6.29 Reserved.

105.6.30 Spraying or dipping. A construction permit is required to install or modify a spray room, dip tank or booth. Maintenance performed in accordance with this code is not considered to be a modification and does not require a permit.

105.6.31 Standpipe systems. A construction permit is required for the installation, modification or removal from service of a standpipe system. Maintenance performed in accordance with this code is not considered to be a modification and does not require a permit.

105.6.32 Reserved.

105.6.33 Underground and above-ground hazardous materials storage tanks. A construction permit is required to install any hazardous materials storage tank.

105.6.34 Woodworking operations. A construction permit is required to install a woodworking operation.

SECTION 108 FEES

Section 108.2 Schedule of permit fees is amended by replacing it in its entirety as follows:

108.2 Schedule of permit fees. A fee necessary to cover administrative costs of inspection, licensing, record-keeping, and other requirements for all fire prevention programs under this code shall be paid in accordance with fee schedules established by the Executive Director of the Department of Public Safety.

SECTION 109 INSPECTIONS

Section 109.2.3 Special inspections is added as follows:

109.2.3 Special inspections. The *fire code official* is authorized to conduct special fire safety inspections, outside of normal business hours as deemed necessary to determine the extent of compliance with the provisions of this Code. The fire safety inspections shall be performed by Denver Fire Department Fire Prevention personnel. The property owner, property manager, or contractor shall reimburse the City and County of Denver at the hourly rate established by the Executive Director of the Department of Public Safety. Special inspections outside of normal business hours shall be a minimum of three hours Monday through Friday and a minimum of four hours on weekends and designated City holidays.

SECTION 112 MEANS OF APPEALS

Section 112 is replaced in its entirety as follows:

112.1 Appeals. The Executive Director of the Department of Public Safety may hear and decide appeals of orders, decisions, or determinations made by the *fire code official* relative to the application and interpretation of this code.

112.1.1 Application. Prior to any action by the Executive Director of the Department of Public Safety, an application in writing providing the basis of the appeal, shall be filed in the office of the Director within 30 days after receiving the order, decision, or determination made by the *fire code official*. A copy of such application shall be furnished to the *fire code official* by the applicant. Payment of the fee established by the Executive Director of the Department of Public Safety, in the form a check made payable to the Denver Manager of Finance, must accompany the application.

112.1.2 Meetings and records. The Executive Director of the Department of Public Safety shall keep records of the final decision.

112.1.3 Appeal from decision of the Executive Director of the Department of Public Safety. Any person subject to a decision of the Executive Director of the Department of Public Safety may have that decision reviewed in the manner provided by Colorado Rules of Civil Procedure.

112.2 Limitations on authority. An application for appeal shall be based on a claim that the true intent of this code or the rules legally adopted thereunder have been incorrectly interpreted, the provisions of this code do not fully apply or an equivalent or better form of construction is proposed. The Executive Director of the Department of Public Safety shall not have authority to waive requirements of this code.

Section 112.3 Qualifications is deleted in its entirety.

112.4 Administration. The *fire code official* shall take action without delay in accordance with the decision of the Executive Director of the Department of Public Safety.

SECTION 113 VIOLATIONS

Section 113.4 Violation penalties is replaced as follows:

Section 113.4 Violation penalties. Persons who shall violate a provision of this code or shall fail to comply with any of the requirements thereof or who shall erect, install, alter, repair, or do work in violation of the *approved construction documents* or directive of the *fire code official*, or of a permit or certificate used under the provisions of this code shall be punishable as prescribed in Denver Municipal Code Section 1-13. Each day that a violation continues after due notice has been served shall be deemed a separate offense.

Section 113.5 Administrative citation is added as follows:

113.5 Administrative citation. The *fire code official* is authorized to issue administrative citations for violations of this code.

Sections 113.6 Interference with enforcement is added as follows:

113.6 Interference with enforcement. It shall be unlawful for persons to interfere or cause conditions that would interfere with the *fire code official* in carrying out any duties or functions prescribed by this code.

Sections 116 Licenses through 117 Fire alarm Monitoring – Permits and Licenses/Registration are added as follows:

SECTION 116 LICENSES

116.1 General. A license is authority granted to the person to whom it is issued to perform the work authorized by the license.

116.2 Licenses required. Denver Fire Department licenses shall be required for the design, installation, modification, inspection, and testing of all life safety and conveyance systems and equipment. All life safety fitters/technicians shall be licensed to design, install, add to, modify, and perform all types of inspections, testing, maintenance, and repair of factory-engineered equipment. Conveyance inspectors and mechanics shall be licensed/registered by the Fire Department per Section 116.3. All persons required to have a permit, license, or certificates shall have a current—for calendar year—permit, license, or certificate.

116.2.1 (BDA) Radio Enhancement System
116.2.2 Central station operator.
116.2.3 Central station runner.
116.2.4 Commercial Kitchen Hood
116.2.5 Commercial Kitchen Hood/Extinguisher
116.2.6 Conveyances.
116.2.7 Emergency communication systems.
116.2.8 Fire alarm systems.
116.2.9 Fire pumps. Except: Building engineers trained by the service provider to conduct weekly and monthly churn test on fire pumps.
116.2.10 Fire sprinkler systems – NFPA 13.
116.2.11 Fire sprinkler systems – NFPA 13D.
116.2.12 Fire sprinkler systems – NFPA 13R.
116.2.13 Portable fire extinguishers.

116.3 Conveyance licensing. Division licenses shall be required for the installation, alteration, replacement, maintenance, removal, dismantling, or inspection activities of conveyances. A conveyance contractor license issued by the *Division* is required for installation or alteration of equipment.

SECTION 117 FIRE ALARM MONITORING-PERMITS AND LICENSES is added:

FIRE ALARM MONITORING - PERMITS AND LICENSES

117.1 General. The provisions of this section apply to the installation, operation of, and scope of fire alarm monitoring.

117.2 Central alarm station / Supervising station. These facilities, licensed by the Denver Fire Department, monitor remote fire alarm signaling systems when personnel licensed by the Denver Fire Department are in attendance at all times to take such action as required for the notification of the Denver Fire Department.

117.3 Permits. Permits shall be obtained annually for central alarm station / supervising stations and the operators who take such action as required for notification of the Denver Fire Department. All central alarm station / supervising stations and operators shall have current—for current calendar year—permits and licenses.

117.4 Definitions. The following terms are defined in

Chapter 2:

CENTRAL ALARM STATION/SUPERVISING STATION

CLASS I FIRE ALARM MONITORING

CLASS II FIRE ALARM MONITORING

OPERATOR

RUNNER

117.5 License Required

117.5.1 Central alarm station/supervising station. No person or public agency shall monitor fire alarm systems in the City and County of Denver without first obtaining a license to operate a Class I or Class II central alarm station/supervising station.

117.5.2 Operator. No person shall be employed as an operator in a central alarm station/supervising station that monitors fire alarm systems in the City and County of Denver unless licensed as an apprentice operator or operator by the Denver Fire Department.

117.5.2.1 Class I operator. A Denver Fire Department Class I Operator license shall authorize the holder to act as an operator in any central alarm station/supervising station.

117.5.2.2 Class II operator. A Denver Fire Department Class II Operator license shall authorize the holder to act as an operator in any Class II central alarm station/supervising station.

117.5.2.3 Apprentice operator. A Denver Fire Department Apprentice Operator license shall authorize the holder to act as an operator only under the constant supervision of a licensed operator.

CHAPTER 2 DEFINITIONS

SECTION 202 GENERAL DEFINITIONS

Section 202 General Definitions is amended by the addition of the following terms:

ALARM CONTROL UNIT. A component of the [CO detection] system provided with a primary and secondary power source that receives signals from initiating devices or other control units and processes these signals to determine the required system output functions.

ALCOHOL BEVERAGE (also, "ALCOHOL BEVERAGE"). A liquid ethanol mixture intended for human consumption including wine, beer, and beverage spirits.

ALCOHOL BEVERAGE PRODUCTION FACILITY (ABPF). Any building or portion thereof where ethanol mixtures are produced, stored, handled, blended, dispensed, or bottled in the production of alcohol beverages including areas for grain storage and handling.

ALCOHOL BY VOLUME (ABV). Volume percentage of ethanol in an ethanol mixture.

ALTITUDE. Altitude is the measure of elevation typically relative to sea level. The generally recognized altitude of Denver, CO is 5,280 feet. Altitude has a direct impact on design considerations for life safety and property protection including but not limited to the physical properties of flammable and combustible liquids. See Section 3401.5.1.

APPLIANCE. Visible notification component such as a bell, horn, speaker, light, or text that provides audible, visible, and/or tactile outputs to alert occupants of a hazardous condition. Single-station alarms contain both a [initiating] device and a [notification] appliance.

BATTERY BACKUP. The listed device has a battery that powers it when the power provided through the building electrical system fails.

BATTERY-POWERED. The listed device is powered solely by a primary battery for all power requirements and the battery is monitored for end-of-life by producing an audible trouble signal.

BEVERAGE SPIRIT. A liquid ethanol mixture with greater than 16% ABV intended for human consumption including neutral or grain spirits, vodka, whiskey, gin, brandy, applejack, rum, tequila, cordials and liqueurs. Beverage spirits do not include beer, wine, or alcohol beverages produced from fermentation.

BIOHAZARD. An infectious agent or hazardous biological material that presents a risk or potential risk to the health of humans, animals or the environment. The risk can be direct through infection or indirect through damage to the environment. Biohazardous materials include certain types of recombinant DNA; organisms and viruses infectious to humans, animals or plants (e.g., parasites, viruses, bacteria, fungi, prions, rickettsia); and biologically active agents (i.e., toxins, allergens, venoms) that may cause disease in other living organisms or cause significant impact or the environment or community.

BREWERY. An *alcohol beverage production facility* (ABPF) or portion thereof, including accessory uses, in which beer or other malt liquors, 16% or less ABV, are produced by fermentation. In spirit production, beer and wash are synonymous as precursors to distillation.

BULK STORAGE FOR DISTILLING. The storage of ethanol mixtures in containers exceeding 1.3 gallons (5L) in volume.

CARBON MONOXIDE (CO). A colorless odorless gas that is produced as a result of incomplete burning of carbon-containing fuels.

CARCINOGEN. A substance that causes the development of cancerous growths in living tissue. A chemical is considered to be a carcinogen if: It has been evaluated by the International Agency for Research on Cancer (IARC) and found to be a carcinogen or potential carcinogen, or It is listed as a carcinogen or potential carcinogen in the latest edition of the Annual Report on Carcinogens published by the National Toxicology Program, or It is regulated by OSHA as a carcinogen.

CASK. A closed vessel of 185 gallons (700 L) or less capacity, constructed of wooden staves and heads, held together by metal hoops, not equipped with provisions for emergency venting, and not intended for fixed installation. In *alcohol beverage production facilities (ABPFs)*, "barrel" is a subset of, and often used interchangeably with "cask". These vessels are used primarily for storing ethanol mixtures.

CENTRAL ALARM STATION/SUPERVISING STATION. A facility that receives fire alarm signals and at which personnel are in attendance at all times to respond to these signals. A supervising station that is licensed for central station service.

CENTRAL FUEL-BURNING APPLIANCE ROOM. A room containing a fuel burning appliance serving multiple dwelling units, such as a boiler, fireplace, stove, furnace, or similar equipment, with the potential to distribute CO to multiple dwelling units.

CLASS 1 LIQUIDS. Class IA, Class IB or Class IC flammable liquids. For Chapter 40, ethanol mixtures are either Class IB or Class IC flammable liquids.

CLASS I FIRE ALARM MONITORING. The monitoring of a fire alarm system by a licensed central station that is required by Denver's Building and Fire Codes.

CLASS II FIRE ALARM MONITORING. The monitoring of a fire alarm system by a licensed central station that is not required by Denver's Building and Fire Codes.

CONTAINER. In an *alcohol beverage production facility (ABPF)*, any closed *vessel* of 119 gallons (450 L) or less capacity used for transporting or storing *Class 1 Liquids*, not intended for fixed installation and not constructed of wood, but possibly equipped with an overpressure-relieving mechanism in accordance with FM Global Approved Standard for Plastic Plugs for Steel Drums, Class Number 6083, or equivalent.
CO ALARM. A single- or multiple-station device having a sensor that responds to CO and listed in accordance with UL 2034 that provides audible notification. Required CO alarms may be monitored by an alarm control unit, but shall be powered independently and shall function autonomously in the event the alarm control unit is nonfunctional.
CO DETECTOR. A device listed per UL 2075 having a sensor that responds to CO, is monitored and powered by an alarm control unit, and does not necessarily have an integral notification appliance.

DEVICE. An alarm initiating component that originates transmission of a change-of-state condition, such as a CO detector, manual fire alarm box, etc. Single-station alarms are both a [initiating] device and a [notification] appliance.
DENVER COMMERCIAL BUILDING CODE . The collection of International Code Council (ICC) publications as adopted and amended by the City and County of Denver excluding the *International Fire Code*, as found in Article I of this document.
DISTILLATION. In an *alcohol beverage production facility (APBF),* the concentration of *ethanol* by slowly raising the temperature of an *ethanol mixture* through the boiling points of its constituents then collecting and condensing the constituent vapors separately from the remaining water.
DISTILLERY (also DISTILLED SPIRITS PLANT – BEVERAGE). An *alcohol beverage production facility (ABPF)* licensed by the TTB to produce, bottle, rectify, process or store *beverage spirits* including areas for *fermentation*, *distillation*, storage, blending, packaging, and accessory uses. Other types of distilleries licensed by the TTB include Distilled Spirits Plant – Experimental, Distilled Spirits Plant –Industrial and Distilled Spirits Plant – Industrial/Beverage.

ELECTROLYTE. A solid, liquid, or aqueous salt solution that permits ionic conduction between positive and negative electrodes of a cell.
EMERGENCY RESPONDER RADIO ENHANCEMENT COMMUNICATION SYSTEM (RES/BDA).
The RES/BDA is a network of amplifiers, fiber optic cable, coaxial cable, and radiating cable and/or discrete antennas with or without a distributed antenna system (DAS) controller, or an equivalent technology installed on or inside the property to enhance indoor public safety radio communications.
ETHANOL (also ETHYL ALCOHOL or GRAIN ALCOHOL). A volatile, flammable, colorless, neurotoxic liquid fit for human consumption with structural formula CH-3CH-2OH (abbreviated as C2H5OH or C2H6O).
ETHANOL MIXTURE. Liquid mixture comprised primarily of water, and also including ethanol and materials with hazards not regulated by the Denver Commercial Building Code or Denver Fire Code.
EXTRACTION. The process of using solvents to remove essential oils or other botanic material from the marijuana plant.
FALSE FIRE ALARM. The activation of any fire alarm system resulting in a response by the Fire Department, caused by the negligent or intentional misuse of the fire alarm system by an owner, employee, agent, tenant, guest, visitor, or any other activation of a fire alarm system not caused by a valid alarm signal, exclusive of a nuisance fire alarm.
FERMENTATION. An enzymatically controlled, anaerobic breakdown of energy-rich compounds by microorganisms, to yield carbon dioxide and ethanol.
FUEL-BURNING APPLIANCE. An appliance that burns carbon-containing solid, liquid, and/or gaseous fuels.
HARDWIRED. Device installed by wiring directly to the building electrical system, with battery backup, and not controlled by any disconnecting switch other than as required for over-current protection.
HAZMAT (HAZARDOUS MATERIALS). Materials with harmful physical and health properties regulated by the Denver Commercial Building Code or Denver Fire Code.

HAZARDOUS MATERIAL INVENTORY STATEMENT (HMIS). A portion of an HMR containing a list of all the HazMat in a facility including information related to the materials such as product names, locations, quantities, regulated hazards, and Chemical Abstract Service (CAS) numbers.

HAZARDOUS MATERIAL MANAGEMENT PLAN (HMMP). A portion of a HazMat Permit Application containing site maps and facility floor plans identifying HazMat locations and site and building features relevant to the management of HazMat inventories, systems and operations.

HAZARDOUS MATERIALS REPORT (HMR). A consolidated description of a facility and the HazMat therein including a contact list, code-based description of the building and adjacent outdoor areas, and a HazMat Inventory Statement (HMIS).

INSTALLED. Fit into position and made ready as set forth in the manufacturer's guidelines, listing requirements and applicable standards, to perform the intended functions of detection, notification, and annunciation.

INTERMEDIATE BULK CONTAINER. Any closed vessel defined in Title 49, *Code of Federal Regulations,* Parts 100 through 199 or in Part 6 of the United Nations' Recommendations on the Transport of Dangerous Goods having a liquid capacity of 793 gallons (3000 L) or less, used for transporting or storing Class 1 Liquids, not equipped with provisions for emergency venting, not intended for fixed installation, and not constructed of wood.

LOWER FLAMMABLE LIMIT (LFL) also [LOWER EXPLOSIVE LIMIT (LEL)]. The atmospheric volumetric concentration of a flammable vapor in air at which propagation of flame will occur in the presence of an ignition source. The LFL at sea level for ethanol vapor is 3.3 percent.

LOWEST LEVEL OF FIRE DEPARTMENT VEHICLE ACCESS. The lowest level of Fire Department vehicle access shall be measured from the lowest elevation of any required Fire Department access road located no more than 30 feet from any exterior wall of the building.

Exceptions:

1. Where the access road is permitted to be farther than 30 feet from any exterior wall of the building, the lowest level of fire department vehicle access shall be measured from the lowest elevation of any required Fire Department access road located no more than 50 feet from any exterior wall of the building.

2. If any topography, waterway, non-negotiable grades or other similar conditions exist that preclude required Fire Department vehicular access, the *fire code official* is authorized to require additional fire protection systems as required by Chapter 9.

MACHINERY ROOM. See Section 1104.2 of the *Mechanical Code of the City and County of Denver.*

MASH. During *fermentation*, the mixture of ground or cracked grains and other crushed edible organic material steeped in hot water to release carbohydrates and reduce it to sugars. The term is used inconsistently (often overlapping with *wort*) for the various solutions in process up to the point where *fermentation* is complete.

MASS NOTIFICATION SYSTEM. A mass notification system (MNS) is a system used to provide emergency information and instructions to people in a building, area, site or other space using intelligible voice communications and possibly including visible signals, text, graphics, tactile, or other communications methods.

MINIMUM EXPLOSIVE CONCENTRATION (MEC). The lowest mass to volume concentration in air of combustible dust that will propagate a flame. The MEC for grain dust is 0.055 oz/ft^3 (55 g/m^3).

MULTIPLE PURPOSE ALARM. A single device that incorporates the capability to detect more than one hazard, such as smoke, vapors, and/or gases. Multiple purpose devices shall emit audible alarms in a manner that clearly differentiates between the detected hazards.

MULTIPLE STATION ALARM. [1] A single alarm device capable of being physically or wirelessly interconnected to one or more similarly capable devices so the actuation of any one device causes the appropriate notification signal to occur in all interconnected devices. [2] An interconnected group of single- alarm devices defined in [1].

NON-DEDICATED SMOKE CONTROL SYSTEM. Smoke control components and equipment that are shared with other systems, such as the building HVAC system. Upon activation of fire alarm, non-dedicated smoke control equipment changes mode of operation to achieve the smoke control performance objectives. "Non-dedicated systems" shall refer only to equipment and components controlled from the firefighters' smoke control panel.

NORMALLY CLOSED. A system or *vessel* in an *alcohol beverage production facility (ABPF)* used for storage, production, dispensing, blending, bottling, or handling of *Class 1 Liquids* where, for less than 50 percent of the time it is in operation, its contents are not exposed to atmosphere and vulnerable to evaporation. Processes involving *casks* opened only for filling, draining or sampling, *distillation* where all vapors are condensed below their flash point prior to collection, uncovered *vessels* of 5.3-gallon (20 L) capacity or less used to collect distillate below its f*lash point*, and covered blending or maceration *vessels* are typically considered normally closed.

NORMALLY OPEN. A system or *vessel* in an *alcohol beverage production facility (ABPF)* used for storage, production, dispensing, blending, bottling, or handling of *Class 1 Liquids* where, for 50 percent or more of the time it is in operation, its contents are continuously exposed to atmosphere and vulnerable to evaporation, or where a *Class 1 Liquid* at or above its *flash point* is exposed to atmosphere at any time. Continuous blending or maceration in uncovered *vessels*, open draining of *Class 1 Liquids* above their *flash points*, and the act of "bleeding" heads (the initial vapors generated during *distillation*) or tails (the last vapors generated during distillation) to atmosphere are typically considered normally open.

NUISANCE FIRE ALARM. The activation of any fire alarm system resulting in a response by the Fire Department, caused by mechanical failure, malfunction, improper installation, lack of maintenance or other condition for which Fire Department personnel are unable to determine initiation of a valid alarm signal. (See Sections 401.5 and 907.1.5).

OPERATIONAL PERMIT. A permit issued in conjunction with the operations listed in Section 105.5.

OPERATOR. A competent person employed by a central alarm station and licensed by the Denver Fire Department to take such action as required for notification of the Denver Fire Department.

OTHER HEALTH HAZARD MATERIAL. A hazardous material which affects target organs of the body, including but not limited to, those materials which produce liver damage, kidney damage, damage to the nervous system, act on the blood to decrease hemoglobin function, deprive the body tissue of oxygen, or affect reproductive capabilities, including mutations (chromosomal damage) or teratogens (effects on fetuses).

PERMITTABLE QUANTITY. The minimum amount of hazardous or any other regulated material allowed to be stored or used at a property before an operations permit is required by Section 105.6.

PILE. Independently stacked commodities possibly organized by separate spacers, dunnage, or pallets in which the demise of any item on a lower layer or tier compromises the structural stability of the storage system.

PLUG-IN. CO alarm with battery backup, installed by being plugged into an electrical outlet for primary power.

PORTABLE TANK. A *tank* that is readily capable of being relocated within a facility, not permanently attached to immovable structure or ground, and not constructed of wood.

POST OIL PROCESSING. The process of refining essential oils after the extraction, including but not limited to, dewaxing and winterization processes.

PRESSURE VESSEL. Containers, intermediate bulk containers, processing vessels, and tanks that under normal conditions, are permitted to operate above 15 pounds per square inch gauge (psig; 103.4 kPa).

PROCESS DESCRIPTION. In an *alcohol beverage production facility (ABPF),* an operational description such as a flow chart of the sequence of events required to convert raw materials from the state in which they enter the APBF through each development point until the finished products are derived. The *process description* identifies all input and output materials and includes quantities, concentrations, temperatures, pressures, types of equipment, systems, etc. at each development point using code-based terminology, e.g., "37 gallons of 55 percent ABV at standard temperature and pressure (STP)" vs. "all the high wines collected." All systems and processes utilized to produce all intermediate and finished products are required to be included in the process description.

PROCESSING VESSEL. In *alcohol beverage production facility (ABPF)*, an open or closed *vessel* other than *stills* used in the manufacture of *ethanol mixtures*. *Processing vessels* include fermentation tanks, mash tuns, blending tanks, etc., but do not include long-term storage vessels such as *vats* or *casks*.

PROPERTY. Private and public land in the undeveloped and developed state including the buildings, structures, paving and all other immobile improvements; natural features such as trees, shrubbery and similar botanical growth; and vehicles, *vessels*, equipment, materials and similar movable items located on them.

RACK. Shelves or similar structural frame-supported system of tiers in which the demise of any item on a lower tier does not affect the structural stability of the storage system.

RADIO FREQUENCY MAINTENANCE PLAN. The radio frequency maintenance plan is a document developed and distributed by the building owner for the purpose of maintaining the Department of Public Safety radio system from harmful interference generated on the property or otherwise under the control of the owner.

RADIOACTIVE MATERIAL. Any material or combination of materials that spontaneously emits ionizing radiation.

REGULATED MATERIAL. Any material regulated by the fire code for which an operations permit could be required including storage and/or use of hazardous materials, LPG, combustible dust operations, etc.

RELEASE/UNAUTHORIZED DISCHARGE. Any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment including the abandonment or discharging of *barrels*, *containers*, and other receptacles containing any hazardous substances or pollutant or contaminant.

REMOTE AREA. (c.f. NFPA 13). The specified floor area over which an assigned sprinkler density (in volume per minute per unit area) is required in the design of an automatic sprinkler system.

RUNNER. A qualified person who responds to the location where a reported fire alarm system has been activated for the purpose of silencing, restoring, or confirming the system is restored to a normal condition.

SELF-SERVICE MOTOR FUEL-DISPENSING FACILITY. That portion of motor fuel-dispensing facility where flammable and combustible liquids, liquefied petroleum gas, compressed natural gas, or hydrogen motor fuels are dispensed from fixed *approved* dispensing equipment into the fuel tanks of motor vehicles by persons other than a motor fuel-dispensing facility attendant.

SENSITIZER. A chemical that causes a substantial proportion of exposed people or animals to develop an allergic reaction in normal tissue after repeated exposure to the chemical.

SINGLE-FAMILY DWELLING. Any improved real property used or intended to be used as a residence and that contains one dwelling unit.

SINGLE STATION ALARM. A single device comprised of a sensor, alarm-initiating device, control components, and an alarm notification appliance.

SINGLE STATION [CO] ALARM. A device comprised of a sensor, alarm-initiating device, control components, and an alarm notification appliance in one unit.

SLEEPING ROOM. A room furnished with a bed and primarily used for sleeping purposes.

SPIRIT. An *ethanol mixture* with greater than 16% ABV produced by *distillation* or fortification of wine, wash, beer or a previously distilled *spirit*.

STATIONARY TANK. A *tank* not intended to be relocated that is physically attached to immovable structure or ground.
STILL. In an *alcohol beverage production facility (ABPF)*, any appliance is which *distillation* of an *ethanol mixture* is performed. *Stills* include pots, columns, condensing coils, and the piping between them.
STORAGE AREA. An *alcohol beverage production facility (ABPF)* or portion thereof where *alcohol beverages*, *ethanol mixtures*, or materials incorporated or utilized in the manufacture of either are held for aging, awaiting transport, or subsequent handling (c.f., *use area*).
TANK. In an alcohol beverage production facility (ABPF), any normally open or normally closed vessel having a capacity greater than 60 gallons (230 L) intended for storing or processing (but not transporting outside the facility) Class 1 Liquids and equipped with provisions for emergency venting.
TENANT. A person or legal entity who rents a unit from the *owner* for a fixed period of time usually under the terms of a lease or a similar legal entitlement or agreement.
USE AREA. An *alcohol beverage production facility (ABPF)* or portion thereof where *ethanol mixtures* or materials incorporated or utilized in the manufacture of *alcohol beverages* or other *ethanol mixtures* are actively handled in processes such as *fermentation*, *distillation*, rectification, transportation, remixing, dispensing, bottling, blending, etc. (c.f., *storage area*).
VAT (also **FOUDRE).** In an *alcohol beverage production facility (ABPF)*, a *stationary tank* constructed primarily of wood.
VESSEL. In an *alcohol beverage production facility (ABPF)*, any reservoir holding – unless otherwise noted – C*lass 1 Liquids* including casks, containers, *intermediate bulk containers*, *processing vessels*, and *tanks*.
WALL HYDRANT. Valved 2-1/2-inch (64 mm) exterior standpipe connection.
WASH (also **BEER**, **MALT LIQUOR).** The *ethanol mixture* intended for *distillation* produced by the *fermentation* of *mash* or *wort*. For *spirit* production, *wash* and *wine* are analogous as precursors to *distillation*.
WINE. An *ethanol mixture* produced by the *fermentation* of organic products, namely fruits, including agave. For *spirit* production, *wine* and *wash* are analogous as precursors to *distillation*.
WINERY. An *alcohol beverage production facility (ABPF)* or portion thereof, including accessory uses, in which *wine* at 16% or less ABV is produced by fermentation.
WORT. The sugar solution strained from *mash* for *fermentation*.

CHAPTER 3 GENERAL REQUIREMENTS

SECTION 301 GENERAL

Section 301.2 added after the last sentence :
301.2 Permits. The following activities or uses require permits as regulated by Section 311- Vacant Premises and 316- Confined Space.

SECTION 311 VACANT PREMISES

Section 311.1.1 Abandoned premises is amended by removing the reference to the *International Property Maintenance Code*

SECTION 315 GENERAL STORAGE

Section 315.4.3 Pile size, aisles and driveways is added as follows:
315.4.3 Pile size, aisles, and driveways. Combustible material shall be piled with due regard to stability of piles and in no case higher than 20 feet. When the area used for outside storage exceeds 50 feet but is less than 150 feet, in any dimension, aisles of not less than eight feet clear width shall be provided between piles. When the area used for outside storage exceeds 150 feet in any dimension, a driveway

between and around piles shall be at least 15 feet in width and maintained free of rubbish, equipment or other articles or materials. Driveways shall be so spaced that a maximum grid system unit of 50 feet by 150 feet is produced.

SECTION 316 HAZARDS TO FIRE FIGHTERS

Section 316.7 Fences, walls, retaining walls and similar barriers is added as follows:

Fences, walls, retaining walls, and similar barriers. The use of barbed wire or any other sharp- pointed material, devices or features that deliver a physical or health hazard on, as, or on top of, fences, walls, retaining walls, or similar barriers, regardless of height, is prohibited except as provided in accordance with Section 316.7.1.

> **Exception**: Barbed wire may be installed where *approved* by the *fire code official* and a permit is obtained in accordance with Section 105.5

Section 316.7.1 Electrified fences is added as follows:

Electrified fences. Electrified fences may be permitted by specific approval of the *fire code official*. Requirements of submission for an electrified fence shall comply with DFD policy 316-1. All fences shall be designed in accordance with Sections 1609 and 1807 of the *Denver Commercial Building Code*. Only fences powered by a 12- volt direct current (DC) power source shall be considered.

Section 316.8 Confined spaces is added as follows:

Confined spaces. Tanks that contain materials that would not contain enough oxygen to support life or contain a toxic atmosphere shall have at each entry point; a warning sign posted indicating the need for procedures for safe entry into confined spaces.

SECTION 317 LANDSCAPED ROOFS

Section 317.5 Fire access is added as follows:

317.5 Fire access. All roofs containing vegetated areas shall be afforded access via exit stairways and fixed permanent ladders to upper roofs. The exit stairways and fixed permanent ladders to upper roofs shall be located within 230 feet from any vegetated area. Access points shall be separated by a minimum of 10 feet from the vegetated areas.

> **Exception:** In buildings less than 4 stories in height, exit stairways and fixed permanent ladders need not be provided, but there shall be a minimum 8-foot-wide clear perimeter around the edges of the roof. In existing buildings, the *fire code official* shall approve methods of access to all vegetated areas.

CHAPTER 4 EMERGENCY PLANNING AND PREPAREDNESS

SECTION 401 GENERAL

Section 401.1 Scope is amended by deleting the Exception.

Section 401.3 Emergency responder notification and all of its subsections are deleted in their entirety and replaced as follows:

401.3 Emergency responder notification. In the event of an emergency on a property, the owner, occupant, or other person in responsible charge of the property or portion thereof, including tenants, employees and property or equipment maintenance personnel, shall immediately report the emergency to 911 unless the Fire Department has *approved* an alternative emergency procedure for the event. Building employees, tenants and maintenance personnel shall implement the appropriate emergency plans and procedures. No person shall, by any means, require or otherwise purposely cause any delay in the reporting of an emergency.

401.3.1 Evidence of emergency. Upon discovery of evidence of an unwanted fire, hazardous materials discharge, medical incident, or environmental calamity, even though it appears to have been extinguished or otherwise stabilized, the owner, occupant, or any other person in responsible charge of the property or portion thereof, including tenants, employees and property or equipment maintenance personnel shall immediately notify the Denver Fire Department of the evidence including what is known of the location and circumstances. Such evidence shall not be disturbed, thus preserving data for the Denver Fire Department to investigate.

401.3.2 Elevator entrapment communication procedures for new, altered, and existing conveyances. Upon an entrapped party's activation of the elevator car 2-way communication system required by ASME A17.1, the authorized personnel receiving the call (call recipient), shall request the following information:

1. The number of occupants in the car; and

2. Whether any occupants are in medical distress; and

3. Whether smoke or fire is apparent; and

4. Whether any occupant has a physical or mental handicap

If the response to 2, 3 and 4 above are all negative and the call recipient is located at a call center remote from the elevator location, the call recipient shall immediately notify the appropriate emergency contact for the property. Once known, the call recipient shall provide the trapped party with the estimated time of arrival of assistance.

The call recipient shall immediately notify the Denver Fire Department if any of the following occur:

1. The response to either 2, 3 or 4 above is affirmative.

2. Communication with a trapped party is lost prior to obtaining the information required above and cannot be re-established within 5 minutes.

3. Receive a second call from the same elevator within 5 minutes of the first call.

4. The expected authorized building or elevator contractor or technician is unable to respond within 20 minutes of the first notification of entrapment.

5. There is contact from the same stalled elevator 20 minutes after the original call indicating that help has not arrived.

Section 401.5 Making false report is replaced as follows:
401.5 False alarm. No person shall deliberately or maliciously report a fire or unauthorized discharge of hazardous materials when that person knows that no fire or discharge exists. The person responsible for the false alarm shall reimburse the City for the total cost of responding to the false alarm.

Section 401.9 Misleading information is added as follows:
401.9 Misleading information. It shall be unlawful for a person to willfully make any false, fraudulent, misleading, or unfounded report or statement or to willfully misrepresent any fact with the intention of misleading any Fire Department personnel or interfering with Fire Department operations.

SECTION 402 DEFINITIONS
Section 402.1 Definitions is amended by adding the following term:
402.1 Definitions. The following term is defined in Chapter 2:
PROPERTY

SECTION 403 EMERGENCY PREPAREDNESS REQUIREMENTS
Section 403.11.2 Public safety plan for gatherings is amended by adding the following to the list of items required to be addressed in the public safety plan:

11. Fire hydrant locations.
12. Local fire protection (suppression and alarm).
13. Public assembly areas.
14. Emergency procedures and employee training.
15. Locations of hazardous operations identified in Sec. 105.5.

Section 403.12 Facility manager certification is added as follows:
403.12 Facility manager certification. All personnel responsible for facility maintenance, fire safety emergency procedures, evacuation plans, evacuation drills, employee training and response procedures, hazard communication, resident training, tenant identification, emergency response team formulation and training, hazardous materials management plans, hazardous materials inventory statement, etc. shall complete a Denver Fire Department training course and shall have a current certification by the Denver Fire Department.

SECTION 404 FIRE SAFETY EVACUATION AND LOCKDOWN PLANS
Section 404.2 Contents is replaced as follows:
404.2 Contents. Fire safety and evacuation plan contents shall be in accordance with Sections 404.2.1 through 404.2.3.2 and Denver Fire Department policy on Emergency Procedures and Emergency Evacuation.

Section 404.2.2 Fire safety plans is amended by adding item 8 as follows:
8. Provide a description of the building's life safety systems including fire alarm, fire sprinkler (including special suppression, standpipes, fire pumps, etc.), smoke control and/or removal, elevator recall, areas of refuge, emergency power, etc.

CHAPTER 5 FIRE SERVICE FEATURES

SECTION 502 DEFINITIONS

Section 502.1 Definitions is amended by adding the following term:

502.1 Definitions. The following term is defined in Chapter 2.

LOWEST LEVEL OF FIRE DEPARTMENT VEHICLE ACCESS

SECTION 503 FIRE APPARATUS ACCESS ROADS

Section 503.1.1 Buildings and facilities is amended by adding the following to the end of the last sentence: …and the interior of all courts (also see Section 504.5). The *approved* route shall be not less than a 3-foot-wide access walkway leading from fire apparatus access roads to all portions of the exterior walls of the first floor.

Section 503.1.1 Buildings and facilities, Exception 1, Item 1.1 is replaced & item 1.4 is added:

1.1 Where a building is equipped throughout with an *approved* automatic sprinkler system installed in accordance with Sections 903.3.1.1, 903.3.1.2 or 903.3.1.3, the 150-foot dimension may be increased to 250 feet

1.4 The structure is comprised of an accessory dwelling unit constructed in accordance with the Denver Residential Code and not located on a carriage or flag lot as defined by the Denver Zoning Code.

Section 503.2.1 Dimensions is replaced as follows:

503.2.1 Dimensions. Fire apparatus access roads shall comply with currently adopted Department of Transportation and Infrastructure *Rules and Regulations for Standard Right-of-Way Cross Sections and Utility Locations* but shall have an unobstructed width of not less than 20 feet, exclusive of shoulders. Existing fire apparatus access roads shall maintain their width but shall be not less than the minimum clear width allowed in Table 503.2.1. Alleys, service drives, drive aisles and similar driving surfaces shall not serve as *fire apparatus access roads*. *Approved* security gates shall comply with Section 503.6 and fire apparatus access roads shall have an unobstructed vertical clearance of not less than 13 feet 6 inches and be open to sky without obstruction.

Exceptions:

1. Low profile bikeway elements four inches or less in height are permitted in required width but shall not reduce drive lane to less than ten feet.
2. When approved by DOTI in the right-of-way or for private fire apparatus access roads, approval of overhead decorative lighting systems shall be made on a case-by-case basis by the fire code official. Approved lighting systems will be evaluated annually and shall demonstrate the ability to be retracted in a timely fashion in the event of an emergency.

TABLE 503.2.1
MINIMUM CLEAR WIDTHS FOR EXISTING FIRE APPARATUS ACCESS ROADS

Type of Building/Structure to Be Served by Existing Fire Apparatus Access Road	Minimum Unobstructed Width[1,2]
Single-family detached buildings, two-dwelling unit attached buildings, or townhouses with alleys	14 feet
Single-family detached buildings, two-dwelling unit attached buildings, or townhouses without alleys but with driveways that extend to the road	16 feet
Single-family detached buildings, two-dwelling unit attached buildings, or townhouses without alleys or driveways that extend to the road	16 feet
Multi-family residential buildings, three (3) stories or less AND with 15 or less dwelling units per building[3]	16 feet
Multi-family non-high-rise buildings, four (4) or more stories OR with 16 or more dwelling units per building[3] Non-residential non-high-rise buildings/structures	20 feet with an additional 40-feet (length) of "no parking" fire lane at the main entrance of the building. Where 25 feet or greater unobstructed width is provided, a 40-foot "no parking" fire lane is not required.
High-rise buildings/structures[3]	20 feet with an additional 40 feet (length) of "no parking" fire lane at the main entrance of the building. Where building/structure is located on a corner, 20 feet is required on 2 sides of the building. Where 25 feet or greater unobstructed width is provided, a 40-foot "no parking" fire lane is not required.

[1] Based on 8-foot parking and 18-inch curb-to-tire widths in accordance with City and County of Denver standards, unless a 7-foot parking lane is allowed by Denver Fire when existing streets are 32 feet wide or less.

[2] Where a fire apparatus access road serves two or more uses, the larger required minimum unobstructed width shall be maintained.

[3] A multi-family building with commercial on the first floor shall comply with the non-residential non-high-rise minimum clear width requirement, except that high-rise buildings/structures shall comply with high-rise minimum clear width requirement.

Section 503.2.3 Surface is replaced to read as follows:

503.2.3 Surface. All–weather permanent fire access surfaces shall be asphalt, concrete, or other *approved* surface providing all weather driving capabilities. Temporary fire access surfaces during construction are permitted to consist of a gravel road base or asphalt or other *approved* surface. See Section 1607.8.2 of the *Denver Commercial Building Code* for Fire Department apparatus loading.

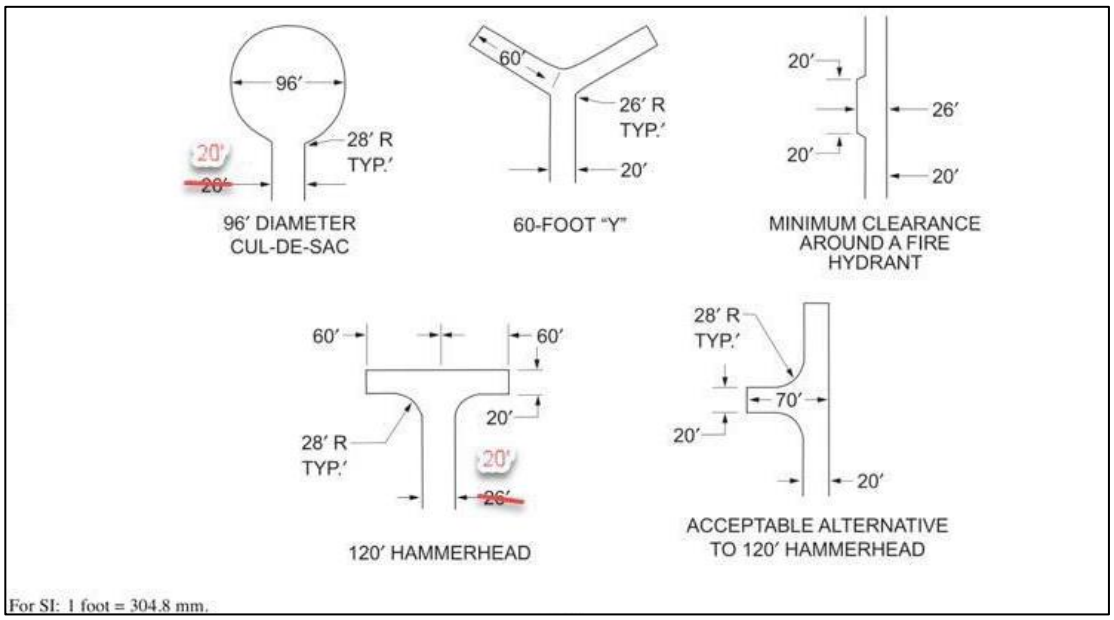
Section 503.2.4 Turning radius is replaced as follows:

503.2.4 Turning radius. The required turning radius of a *fire apparatus access road* shall be a minimum of 25 feet inside and 50 feet outside unless approved by the *fire code official*. An auto turn submittal utilizing DFD's platform truck may be accepted and approved by the fire code official with a 10 percent safety factor.

Section 503.2.5 Dead ends is replaced as follows:

Dead ends. Dead-end fire apparatus access roads in excess of 150 feet (45,720 mm) in length shall be provided with an *approved* area for turning around fire apparatus in accordance with Figure 503.2.5.

Figure 503.2.5 Dead-end fire apparatus access road turnaround is added as follows:



Section 503.2.6.1 Grade-level structural deck is added as follows:

503.2.6.1 Grade-level structural deck. See Chapter 16 of the *Denver Commercial Building Code* for structural loading. All structural decks shall have permanent, all-weather load posting sign(s) indicating gross maximum vehicle loads, maximum tandem axle load and maximum single-axle load. Signs shall be posted in a conspicuous location at each deck entrance and shall be maintained by the owner at all times. Where not designed for emergency vehicle use, *approved* barriers and signs shall be installed and maintained at each deck entrance.

Section 503.2.7 Grade is replaced in its entirety as follows:

503.2.7 Grade. The grade of the fire apparatus access road shall not exceed 7 percent (4 degrees). All other criteria shall meet Transportation Engineering design criteria as specified by Denver Department of Transportation and Infrastructure.

Section 503.2.8 Angles of approach and departure is replaced in its entirety as follows:
503.2.8 Angle of approach and departure. The angles of approach and departure for fire apparatus access roads shall not exceed 6 degrees or based on the manufacturer's published minimums as *approved* by the *fire code official*.

Section 503.3 Marking is amended by adding the following sentence at the end of the section:
Signs shall have a 12-inch by 18-inch dimension and shall comply with the Traffic Engineering Services Department of Transportation and Infrastructure Sign Manual as depicted in Figure 503.3

FIGURE 503.3 - FIRE LANE SIGNS

Sections 503.4.1 Traffic calming devices is replaced as follows:
503.4.1 Traffic calming devices. Prior to placement, traffic calming devices shall be approved by the *fire code official.* Where *approved*, devices shall comply with Denver Department of Transportation and Infrastructure's Rules and Regulations and specifications including speed cushion and traffic circles.

Sections 503.6.1 Width and 503.6.2 Approved means of emergency operation are added as follows:
503.6.1 Width. Security gates across a fire apparatus access road shall be a minimum 16-feet wide.

503.6.2 Approved means of emergency operation. Secured gates across a fire apparatus access road shall be provided with one or more of the following features:

1. Key box in accordance with Section 506.

2. An *approved* lock

3. Chains used to secure gates shall be ¼-inch maximum, non-case-hardened steel.

4. Emergency operation *approved* by *fire code official*.

SECTION 504 ACCESS TO BUILDING OPENINGS AND ROOFS
Section 504.1 Required access is amended by adding the following at the end of the paragraph:
A five-foot wide (1524 mm) access walkway leading from fire apparatus access roads to required exterior openings shall be provided. The location and configuration shall be *approved* by the *fire code official*.

Exception: The *fire code official* is permitted to require a lesser width.

Section 504.4 Roof hatches is added as follows:

504.4 Roof hatches. All *interior exit stairways and ramps* extending to the uppermost *story* in buildings four or more *stories above grade plane* shall be provided with a roof hatch openable to the exterior. The hatch shall be a minimum of 16 square feet (1.5 m2) in area with a minimum dimension of 2 feet (610 mm).

Exceptions:

1. Pressurized stairway enclosures.

2. Enclosures of *interior exit stairways and ramps* that extend to the roof in accordance with Sections 1011.12 and 1011.12.2 of the *International Building Code* and are provided with a penthouse complying with Section 1510.2 of the *International Building Code*.

3. Buildings with all roof slopes exceeding 4 units vertical in 12 units horizontal (33-percent).Section 504.5 Courts is added as follows:

504.5 Courts. For buildings of Type III, IV, or V construction, access shall be provided to exterior walls of *courts* located on the level of exit discharge. Access points to the *court* shall be comprised of an open- air breezeway not less than 6 feet (1829 mm) wide and not less than the height of the first story of the building. The breezeways shall lie perpendicular and shall have direct view of the *court* from the frontage location. Exterior wall access shall be measured within 150' for unsprinklered buildings or 250' for sprinklered buildings from an approved fire department access road. Where access distances cannot be met additional breezeways shall be provided. Where access gates are provided, a key box shall be placed at each entrance. Locations and configurations shall be *approved* also in accordance with Sections 202, 1004.7, 1029 and Section 1205.3 of the *Denver Commercial Building Code* .

SECTION 505

PREMISES IDENTIFICATION

Section 505.1 Address identification is replaced and an exception is added as follows:

505.1 Address identification. New and existing buildings shall be provided with *approved* address identification. The address identification shall be legible and placed in a position that is visible from the street or road fronting the property. Address identification characters shall contrast with their background. Address numbers shall be Arabic numbers or alphabetical letters. Numbers shall not be spelled out. Each character shall be not less than six inches (153 mm) high with a minimum stroke width of 3/4 inch (19.1 mm). Where required by the *fire code official*, address identification shall be provided in additional *approved* locations to facilitate emergency response.

Where access is by means of a private road and the building cannot be viewed from the public way, a graphic site map monument (GSMM) shall be used to identify the structure(s). The GSMM shall be comprised of a monument, pole, sign, or other means of identification of the address as *approved* by the *fire code official.* All address identification provided to facilitate emergency response shall be located at ALL entrances into the property.

All GSMM's shall comply with the following:

1. Shall maintain the visual clarity of the plastic/polycarbonate cover as scratches, markings, fading and other environmental conditions which deteriorate or reduce the intended legibility.

2. Shall be approved by the fire code official for location and compliance to the intended function.
3. Shall be located on the premises and out of the Right of Way (ROW).
4. Shall be part of the recurring fire alarm system maintenance, testing, and inspection program.
5. The complex name and address shall be located at the top of the GSMM with a minimum letter height of 1 inch with contrasting backgrounds. The streets shall be identified with minimum letter heights of 1 inch. It is recognized that all lettering and backgrounds may not contrast very well in certain ambient conditions and therefore it shall be the responsibility of the property owner to meet the intent of legibility during an emergency response.
6. Shall be sized so that the building numbers are a minimum of 1 1⁄4 inches in height with contrasting backgrounds. It is recognized that all lettering and backgrounds may not contrast very well in certain conditions and therefore shall be the responsibility of the property owner to meet the intent of legibility during emergency response.
7. Shall include at a minimum: building name; building address, north orientation arrow, "YOU ARE HERE" in contrasting and bold font, adjacent streets & local fire hydrants.

Exception: Existing dwellings regulated by the *Denver Residential Code*.

SECTION 507
507.2 FIRE PROTECTION WATER SUPPLIES
Section 507.2 Type of water supply is replaced as follows:

507.2 Type of water supply. A water supply shall be connected to a reliable public water works system.

Section 507.2.1 Private fire service mains is deleted in its entirety.

Section 507.2.2 Water tanks is replaced as follows:

507.2.2 Water tanks. New water tanks for fire protection shall be prohibited.

Exceptions:

1. Water tanks for fire protection, when *approved* by the *fire code official*, are permitted for NFPA 13D systems in accordance with Section 903.3.1.3.
2. Existing water tanks for fire protection that were previously *approved* by the Fire Department. These tanks shall be inspected, tested, and maintained in accordance with NFPA 25.

Section 507.2.3 Water supply serving high-rise buildings is added as follows:

507.2.3 Water supply serving high-rise buildings. High-rise buildings as classified by the Denver Commercial Building Code shall be supplied by connections to a minimum of two public water mains located in different streets. Separate supply piping shall be provided between each water main connection and the building. Backflow prevention devices and flow switches shall be provided in accordance with Section 912.6 at each water main entry to the structure. Each fire main shall be sized to meet the full demand of the fire protection system at each connection to achieve redundancy.

Exception: Where *approved* by the *fire code official*, high-rise buildings without access to different water mains shall have two fire main connections to the same public main. The public main shall have valves such that an interruption of one water source can be isolated so that water supply will continue without interruption through the other connection. The two required fire mains shall have a minimum separation distance from each other of five feet at all points from the

public main to the building. Each fire main shall be sized to meet the full demand of the fire protection system at each connection to achieve redundancy.

Section 507.3 Fire flow is replaced as follows:
507.3 Fire flow. Fire flow requirements shall be as determined in Appendix B. Each new or existing fire hydrant as required in accordance with Appendix C, shall be capable of providing not less than 1500 GPM at 20 PSI residual pressure.

Section 507.5.5 Clear space around hydrants is replaced as follows:
507.5.5 Clear space around hydrants. A five-foot (1524 mm) clear space shall be maintained around the circumference of fire hydrants, except as otherwise required or *approved*.

SECTION 508 FIRE COMMAND CENTER
Section 508.1 General
Replace 508.1.7 with 508.1.9

Section 508.1.1 Location and access is replaced as follows:
508.1.1 Location and access. The *fire command center* shall:

1. Be on the ground floor.
2. Have a secured entrance directly accessible to and in immediate proximity of the main building entrance.
3. Have access within the building to all fire service access elevators.

Exception: Unless otherwise *approved* by the *fire code official*.

Section 508.1.2 Separation is replaced as follows:
508.1.2 Separation. To meet the system survivability requirements of NFPA 72, the *fire command center* shall be separated from the remainder of the building by not less than a 2-hour fire barrier constructed in accordance with Section 707 of the *Denver Commercial Building Code* or a horizontal assembly in accordance with Section 711 of the *Denver Commercial Building Code* or both.

Section 508.1.6 Required features is added as follows:

19. A key vault *approved* by the Fire Department to house keys to access mechanical and electrical equipment.

20. Two-way communication systems and two-way communication system required for elevator communication in accordance with ASME A17.1.

21.Mass Notification System (MNS) equipment.

508.1.6.1 Elevator status/control panel. An elevator status/control panel shall be provided. The elevator status/control panel shall comply with DFD policy 508.1.6.1 and:

1. Identify each elevator cab alphanumerically and the floors it serves. Identify corresponding cab number in elevator cab.

2. Indicate elevator(s) that are operating on emergency power. Visual indicators in accordance with ASME A17.1 are required.

3. Have a placard at elevator status/control panel stating how many elevators can operate under emergency power simultaneously.

4. Indicate elevator car position.

5. Indicate whether the elevators are operational.

6. Indicate direction of travel.

7. Have key switches as required for selective activation of cars if all are not capable of simultaneous operation on secondary power.

8. Phase I Fire Service Recall Key switches in accordance with ASME A17.1.

9. Two-way communication system from the elevator to the *fire command center* shall be incorporated on the elevator status panel. Two-way communication systems shall meet ASME A17.1.

10. Indicate whether the hoistway doors are open or closed.

11. Visual signal (flashing firefighter hat) for each elevator that has a corresponding in-car visual signal (flashing firefighter hat). Shall include wording "WHEN FLASHING DO NOT USE ELEVATOR" engraved on panel.

Section 508.1.8 Construction requirements is added as follows:
508.1.8 Construction . No piping, ducts, or equipment foreign to required fire operations shall be permitted to enter, pass through, or be installed within the *fire command center* boundaries including the overhead space to deck above.

Section 508.1.9 Heating/cooling zone or system for *fire command center* is added as follows:
508.1.9 Heating/cooling zone or system for *fire command center*. A separate heating/cooling zone or system operating continually shall be provided for the fire command center.

Section 508.2 Fire command room is added as follows:
508.2 Fire command room. A fire command room shall be provided in the following:

1. In a building with any emergency voice/alarm communication system.
2. In a building where the owner requests that the fire alarm and life safety equipment not be installed in the lobby of the building.
3. In a building where elevator cabs or lobbies must be monitored by surveillance equipment.

The fire command room shall be not less than 48 square feet (4.46 m^2) with a minimum dimension of 8 feet (2.44 m), but not less than that required to accommodate the equipment on one wall. A minimum clear

dimension of 6 feet (1.82 m) shall be provided in front of the equipment. The room shall be separated from the remainder of the building by not less than a 1-hour fire barrier constructed in accordance with Section 707 of the *Denver Commercial Building Code*, or horizontal assembly constructed in accordance with Section 711 of the *Denver Commercial Building Code*, or both. The fire command room shall be located in accordance with Section 508.1.1 and shall contain the following equipment, where provided:

1. Fire alarm control unit.
2. Emergency voice/alarm communication equipment.
3. Smoke control panel.
4. Emergency/Standby generator status panel.
5. Fire Pump remote status panel.
6. MNS equipment.
7. Two-way communication systems and two-way communication system required for elevator communication in accordance with ASME A17.1.
8. Elevator surveillance equipment.

The building annunciator shall be located as *approved* by the *fire code official*.

Exception: Unless *approved* by the *fire code official.*

SECTION 509 FIRE PROTECTION AND UTILITY EQUIPMENT IDENTIFICATION AND ACCESS

Section 509.3 Location and access to indoor fire pumps is added as follows:
509.3 Location and access to indoor fire pumps. Fire pumps shall be located both at grade level and accessible directly from the outside. Location of the fire pump room is subject to approval by the *fire code official*.

Exceptions:

1. Fire pump rooms may be located one level below grade, provided that the following requirements are met:

   1.1 Maximum total travel distance from exterior access at grade level to the most remote portion of the fire pump room shall not exceed 60 feet.

   1.2 Stairways providing access shall comply with Section 1011 of the *Denver Commercial Building Code* and shall terminate at an exit discharge at grade level. Curved *stairways*, *spiral stairways*, *alternating tread devices*, ship's ladders, and ladders are prohibited.

   1.3 Travel path from the exterior to the fire pump room shall be through a corridor or exit passageway with a minimum fire-resistance rating to match interior exit stairway enclosure rating requirements for the building.

   1.4 No intervening rooms between the *stairway* termination and the fire pump room.

2. In high-rise buildings where the use of fire pumps arranged in series is required due to maximum pressure limitations, the fire pumps supplying the higher zones may be located above *grade* level.

3. In existing buildings where a new fire pump is being added or an existing fire pump is being replaced with a new fire pump of different nominal rating, the location and access shall be preplanned and *approved* by the *fire code official*.

4. Existing fire pumps, including where an existing fire pump and/or controller is being replaced with new equipment of the same nominal rating

SECTION 510 EMERGENCY RESPONDER COMMUNICATIONS ENHANCEMENT SYSTEMS (ERCES)
Section 510.1 Emergency responder communications enhancement systems in new buildings is replaced as follows:

510.1 Where required. Buildings shall have *approved* radio coverage in accordance with Section 510 for emergency responders as follows:

1.High-rise buildings

2. Underground buildings (constructed in accordance with Section 405 of the *Denver Commercial Building Code*)

3. Airport buildings and structures

4. In accordance with Section 510.1.1 & 510.1.2

510.1.1 Compliance Testing for New Buildings.

New buildings shall be tested upon substantial construction completion when any of the following apply:

1. Type I & II buildings exceeding 50,000 gross square feet.
2. Group E and I occupancies over 12,000 gross square feet on any story.
3. Buildings of Type III, IV & V construction exceeding 100,000 gross square feet where masonry materials are used in the construction of shafts, walls, or above grade floor/ceiling assemblies.
4. Occupiable below-ground area(s) exceeding 10,000 gross square feet.

Where lacking required coverage, the building shall be provided with an ERCES. Buildings having compliant initial radio coverage shall be tested every five years thereafter in accordance with DFD Policy 510-1 for continued adequacy of emergency responder radio communications coverage. Buildings failing to meet the minimum coverage requirements after testing shall be provided with a ERCES in accordance with Section 510. Where it is determined by the fire code official the radio coverage system is not needed, written documentation of the adequacy of existing radio coverage shall be maintained on site.

510.1.2 Emergency responder radio coverage in existing buildings. For existing high-rise, underground buildings, I-1, I-2, I-3, and E occupancies and airport buildings, when undergoing an upgrade to install a Mass Notification System (MNS) or complete fire alarm head-end equipment replacement, the building shall be tested to Section 510 for public safety radio coverage and where deficient, ERCES coverage shall be provided. Buildings with currently acceptable signal strength shall be retested at five- year intervals in accordance with Section DFD Policy 510-1 to ensure continued compliant radio coverage. Where it is determined by the fire code official the radio coverage system is not needed, written documentation of the adequacy of existing radio coverage shall be maintained on site.

Section 510.2 Emergency responder communications enhancement system in existing buildings is deleted.

Section 510.3.1 Permits required is replaced as follows:
510.3.1 Construction Permit . A construction permit for the installation of or modification including maintenance to in-building emergency responder communications enhancement systems and related equipment is required as specified in Section 105.6.

Section 510.3.1.1 Shop Drawings is added as follows:

510.3.1.1 Shop drawings. Shop drawings, including RF grids, shall be submitted in accordance with Policy 105.6 and approved prior to installation of any ERCES. Drawings shall be a deferred submittal in accordance with Section 133.5 of the Administration of the Denver Commercial Building Code . Documents shall be of sufficient clarity and detail to fully describe the proposed installation and equipment. Handwritten notes or comments on drawings are not acceptable.

Section 510.3.2 Operational Permit is replaced as follows:
510.3.2 Operational Permit. An operational permit is required for the annual & 5-year testing of the system as specified in Section 105.5.

Section 510.4.1.3 System Performance is replaced as follows:
510.4.1.3 System Performance. Where required by Section 510.1, buildings shall have approved radio coverage for emergency responders within the building based upon the existing coverage levels of the Department of Safety communication system at the exterior of the building. Systems shall operate at the frequency of 806-816MHz and 851-861MHz. This section shall not require improvement of the existing Department of Safety communication system.

The radio system control channel signal level shall exceed -100 dBm with 95 percent floor area signal coverage or more of the locations measured within each floor plate. Equivalently, the service area reliability shall be 95 percent floor area or greater on each floor of the structure and parking areas.

All critical areas including fire pump rooms, areas of refuge, f*ire command centers*, stairways, exit passageways, main building lobbies, standpipe cabinets, sprinkler sectional valve locations and elevator lobbies shall have 99 percent floor area signal coverage of -100dBm or stronger.

Section 510.4.2 System design is replaced as follows:
510.4.2 System Design. A maximum of one Public Safety BDA (Bi-directional amplifier) is permitted per building. Multiple buildings, structures, towers, underground buildings, and high rises connected by common floors, parking levels, hallways, stairways or walkways will be considered as one building. Some extended long walkways may be exempt as determined by the Fire Code Official.

The Emergency Responder Radio Enhancement Coverage system shall be a standalone system totally dedicated to public safety and no components of this system may be shared with any other radio or cell phone systems. Modification, alteration, repair or removal of any ERCES system or component is specifically prohibited without the approval of the fire code official. The in-building emergency responder communications enhancement system shall be designed in accordance with Sections 510.4.2.1 through 510.4.2.10 and NFPA 1225.

Structures with multiple Public Safety BDA configurations prior to 2-1-2018 may be subject to upgrading to a one (1) BDA configuration at the discretion of the Fire Code Official.

Section 510.4.2.2 Technical criteria is amended by adding the following after the last sentence:
510.4.2.2 Technical Criteria. Refer to DFD Policy 510.4.2.2 for technical criteria.

Section 510.4.2.10 Equipment protection is added as follows:

510.4.2.10 Equipment protection. Active components (such as the Bi-directional Amplifiers (BDA), Distributed Amplifier System (DAS) controller, and UPS) of the ERCES shall be installed in a secure, conditioned and protected room or space separated from the remainder of the building. Where the backbone cables & backbone cable components are required to be fire resistance rated per NFPA 1225, the room or space shall match the fire-resistance rating.

The UPS input circuit shall be a dedicated circuit and any cord and plug connection(s) shall be secured in an approved cabinet to prevent inadvertent disconnection. The circuit shall also be connected to the emergency generator where one is provided. The circuit shall be provided with a "lock-on" device. The ERCES shall be maintained in an operative condition at all times.

Section 510.4.2.11 Mounting of the Donor Antenna is added as follows:
510.4.2.11 Mounting of Donor Antenna. The Donor antenna horizontal half-power (-3 dB) beam width shall not exceed 45 degrees.

510.4.2.11.1 Mounting of Donor Antenna. Choosing the most appropriate simulcast site to point the donor antenna is an important part of proper design, it is best to use a simulcast site a minimum of a mile away rather than using the closest one. The DFD Line shop can assist installation contractors in choosing the most appropriate simulcast site to select. Acceptance of the design and performance of the completed Public Safety ERCES communication system will be subject to approval by the fire code official. Donor antenna path should have line of site to the donor site.

Section 510.5.3 Minimum qualifications of personnel is amended by adding item #3 as follows:

3. No contractor shall install, modify, repair, alter or replace an ERCES without a valid Denver Fire Department license. Each certified installer shall be permitted to supervise one apprentice/helper.

Section 510.5.4 Acceptance test procedure is amended by replacing the following:

1.Test procedures shall comply with DFD Policy 510-1. Measurement locations shall be uniformly distributed to the extent practical. There shall be at least 10 sampling measurements per16,000 square feet (one per every 40-foot X 40-foot square) of gross building area. Adequate radio coverage shall be determined for the structure and parking areas separately. Elevators, stairways and enclosed areas within each grid must be included in the testing. Where grid points exhibit marginal RF signal levels, DFD personnel will perform a radio test to determine if intelligible transmissions can be made through the enhanced radio system to and from the individual grid point without the need for retransmission. If this test fails, communications will be considered inadequate at that grid location and that grid will have failed to meet the required signal level.

Section 510.5.4 items 3 & 4 have been removed.

Section 510.5.6 Signage is added as follows:
510.5.6 Signage. A legible sign stating "THIS BUILDING IS EQUIPPED WITH A PUBLIC SAFETY RADIO REPEATER SYSEM" shall be conspicuously posted at the fire alarm panel. An additional sign stating, "THIS BUILDING IS EQUIPPED WITH A PUBLIC SAFETY RADIO REPEATER SYSTEM – DO NOT TAMPER WITH OR DISCONNECT" shall be located at each ERCES amplifier location. Signs shall be permanent & constructed of plastic or metal and subject to approval by the fire code official.

Section 510.6.1 Testing and proof of Compliance is amended as follows and by adding item #5:
510.6.1 Testing and proof of compliance. The owner of the building or owner's authorized agent shall have the in-building, two-way emergency responder communication coverage system inspected and tested by a Denver ERCES licensed contractor annually or where structural changes occur and 5-year intervals, including additions or remodels that could materially change the original field performance tests. Testing shall consist of the following:

5. 5-year inspections are required to pass an inspection witnessed by the DFD Line Shop.

Section 510.5.7 Wiring methods is added as follows:
510.5.7 Wiring methods. Installation wiring for radio communications shall comply with the manufacturer's recommendations, equipment listings, NFPA 1225 and NFPA 70 (NEC). Radiating cables shall be *fire command center* type approved and installed using manufacturer's specifications to secure cables to the supporting structure. All terminations shall be made with manufacturer's approved devices. Cable cuts shall be made with manufacturer approved tools and methods. Limited-use cable is not permitted. All membrane or through penetrations shall comply Section 714 of the Denver Commercial Building Code.

Section 510.6.5 Records is added as follows:
510.6.5 Records. Records of all system inspections, ERCES uplink and downlink gain settings, maintenance, annual tests and five-year test results shall be maintained on the premises in the "ERCES Maintenance and Test Results Logbook" which shall remain on the building premises and shall be available to the fire code official upon request.

CHAPTER 6 BUILDING SERVICES AND SYSTEMS

SECTION 604 ELEVATOR OPERATION, MAINTENANCE, AND FIRE SERVICE KEYS
604.1 General is replaced as follows:
604.1 General. Elevators and other conveyances shall comply with this code, referenced codes and standards, Colorado State Regulation 7CCR 1101-8, DFD Policy 604.1 and the applicable equipment installation and maintenance standards.

604.3.3 is replaced as follows:
604.3.3. Two or more elevators in high-rise buildings without fire service access elevators. In high-rise buildings without fire service access elevators, not less than two elevators shall remain simultaneously operable from the standby/emergency power source. One of these elevators shall be the elevator required to accommodate an ambulance stretcher.

Exception: Where emergency or standby power is required for platform lifts as part of an accessible means of egress in accordance with Section 1009.5 of the *Denver Commercial Building Code*, battery-powered units are acceptable where the battery capacity meets the requirements of ASME A18.1. Battery-powered units shall be provided directly by the platform lift manufacturer in accordance with the equipment listing.

604.4.1 Signage for existing elevators without a visual signal (flashing firefighter hat) is added as follows:
604.4.1 Signage for existing elevators without a flashing hat indicator. Existing elevators with shunt trip capability that do not provide a visual signal (flashing firefighter hat) indication in accordance with Section 907.3.3 shall have an *approved* sign mounted adjacent to the FACP stating; **"CAUTION –Elevator is not equipped with "Visual Signal."** Sign shall be black lettering on a yellow background.

604.6.2.1 item 3 is replaced as follows:
604.6.2.1. Requirement for standardized fire service elevator keys.

3. Key switches required for Firefighters' Emergency Operation and Emergency or Standby Power Systems selection on all elevators within a building shall be retrofitted with the *approved* standardized key.

604.8-604.21 is added as follows:

604.8 Modification or alteration in conveyance structural elements. Engineered installation shop drawings, specifications, analysis and calculations for structural field modification or alteration to a conveyance shall be submitted to the Denver Fire Department for review and approval. Drawings shall include all connections impacted by the modification or alteration. All submittals shall bear the stamp and signature of a structural engineer registered in the State of Colorado. Technical assistance shall be provided as required by the *fire code official* to evaluate submittals for adequacy. Special inspection of all field welds shall be required for quality control. All welding shall be performed by appropriately certified personnel. Costs for technical assistance and special inspections shall be borne by the installation contractor. Field modification or alteration of conveyance structural elements is not permitted without Denver Fire Department approval.

604.9 New installations. Installation shop drawings shall be submitted for approval prior to installation of any conveyance. Conveyances shall be registered with the State of Colorado Division of Oil and Public Safety before issuance of any installation permit. Shop drawing submittal shall comply with this section and Policy 105.6. Colorado State registration is not required for residential conveyances and temporary construction elevators.

604.10 Alterations to existing conveyances. Alterations to existing conveyances as defined in Colorado Code of Regulations 7CCR1101-8 shall require submittal of shop drawings for approval in accordance with Section 604.8. Conveyances shall have a valid Colorado State registration number, a current Certificate of Operation, and Operational Permit prior to approval of any alterations. Colorado State registration is not required for residential conveyances and temporary construction elevators. Operational permits are not required for dormant conveyances.

604.10.1 Elevators undergoing alteration. Where an existing elevator is undergoing an alteration in accordance with Colorado Code of Regulations, 7CCR1101-8, fire protection and emergency operation shall be provided in accordance with this Section and Section 604. In existing buildings with either a partial or complete fire sprinkler system and the elevator hoistway and/or the

elevator machine room is not protected with sprinklers, sprinklers shall be installed per NFPA 13 Section 9.3.6 Installation of automatic sprinklers shall comply with Section NFPA 13.

604.10.2 Elevator firefighter indicator. Section 2.27.3.2.6 of ASME A17.1/CSA B44 is deleted as a reference. Operation of the elevator visual signal (flashing firefighter hat) shall comply with Section 604.10.2.1 or 604.10.2.2.

604.10.2.1 New elevators. When elevator recall is initiated by detection devices located in the elevator lobby, the visual signal (flashing firefighter hat) shall illuminate steady. Independent of the initiating device, when a detection device located in the elevator hoistway, machine room or other elevator control space activates, the visual signal (flashing firefighter hat) shall illuminate intermittently (flashing).

604.10.2.2 Alterations to existing elevators. Where an existing elevator is modified under an alteration encompassing a scope of work of a substantial alteration under 7CCR 1101-8, the elevator visual signal (flashing firefighter hat) shall function in accordance with Section 604.10.2.1

604.11 Removal from service. Permits shall be obtained from the fire department prior to any conveyance being removed from service, made dormant or otherwise rendered inoperable. If an entire building is being demolished a valid demolition permit issued by the City and County of Denver shall be accepted as verification of a conveyance being removed from service and may eliminate the need for a permit for removal to be obtained.

604.12 Annual conveyance operating permit. All buildings or facilities where an elevator, escalator, or AGTS are located shall obtain an annual conveyance Operational/Certificate of Operation permit in accordance with DFD policy 604.13. No conveyance shall be operated without a valid Operational/Certificate of Operation permit. Elevators, escalators, and the AGTS operating without a current Operational/Certificate of Operation will be subject to double Operational Permit fees. Conveyance contractors shall not perform maintenance, replace components, conduct repair work or perform testing on elevators, escalators, or AGTS that do not have a current Operational/Certificate of Operation permit.

Exceptions:
1. Conveyances issued a Construction Use Certificate of Operation when operating under the terms of that Certificate.

2. Residential elevators complying with Section 604.17.

604.13 Inspections. Conveyance annual and periodic inspections shall comply with State Conveyance Regulations 7CCR 1101-8, manufacturer's specifications, the Maintenance Control Program, and this code.

604.13.1 Inspection. All conveyances shall be inspected annually.

604.13.1.1 Dumbwaiters shall be inspected annually and all applicable ASME A17.1 Category tests be completed every five years.

604.13.1.2 Private Residential Elevators installed in commercial settings shall have all applicable ASME A17.1 Category One Tests completed annually and all Category One and Five Tests completed and witnessed by a 3rd party conveyance inspector every five years in accordance with Colorado State Regulation 7CCR 1101-8.

604.13.2 Certificate of operation. A conveyance shall not operate unless the conveyance owner maintains a current certificate of operation for the conveyance. The certificate of operation shall be available for review at the property where the conveyance is located.

604.13.2.1 Temporary Certificate of Operation, (TCO) for escalators and moving-walks. For any violation noted by the 3rd party conveyance inspector, only a TCO will be issued. For all other conveyances, the requirements of State Conveyance Regulation shall apply.

604.13.3 Inspection submittal. Licensed Conveyance Inspectors shall submit complete and accurate inspection reports to DFD Conveyance Program within 5 business days of the inspection.

604.14 Elevator building communications for elevator rise of 60 feet (18.5m) or more. Where required by ASME A17.1, two-way communications shall be provided for emergency personnel to communicate directly with occupants of the elevator car. Communications equipment for emergency responder use shall be located in the *fire command center*, where provided, or adjacent to the fire alarm control unit. Where elevators within a building are required to comply with this section, these elevators shall be identified at the emergency responder communication means. Two-way communication system from the elevator to the *fire command center* shall be incorporated on the elevator status panel.

604.15 Automated Guideway Transportation Systems (AGTS). AGTS shall comply with Sections 604.9, 604.10, 604.12, and ASCE 21 as adopted by the State of Colorado.

604.16 Conveyances used during construction. Elevators used during construction shall comply with ASME A17.1 Section 5.10, and DFD Policy 604.5. Upon installation certification shall be provided to the Department that the required acceptance test was performed in accordance with the *approved* plans. and the manufacturer's installation instructions. Such certification shall also be provided for each periodic inspection required at intervals not to exceed 90 days. Certifications shall bear the signature and license number of a Denver registered inspector.

604.17 Residential elevators. All elevators used in private residences shall comply with ASME A17.1 Section 5.3 and DFD policy 604.1. Installation or alteration of an elevator in a private residence shall be submitted for approval in accordance with Section 604.9 or Section 604.10.

604.18 Disconnect location. The Licensed Elevator Contractor shall ensure the location of each elevator electrical disconnect is detailed on a matrix and included on the graphic map in accordance with Section 907.6.4.1. The matrix shall be posted within a display of durable construction, easily readable in normal lighting, protected by a smooth, transparent plastic surface and shall include the following information.

1. The floor number(s) that the disconnect(s) are located

2. Which elevator the disconnect operates

3. Room name/number

This display shall be located in the *fire command center* adjacent to elevator panels where provided or next to the fire alarm control panel.

604.18.1 Existing Elevators. Existing elevators shall conform with Section 604.18 by January 1, 2024.

604.19 Fire-rated suspension and controller replacements. Noncircular elastomeric-coated or polyurethane coated steel belts used in new elevator installations and alterations shall be fire rated. Coated steel belts utilized in existing elevators shall be replaced with the fire-rated type at time of suspension means or controller replacement. The fire rating shall not be less than an FT-1 rating when tested to the vertical burn test requirements of UL 2556, Wire and Cable Test Methods, where the suspension means shall not continue to burn for more than 60 seconds, nor shall the indicator flag be burned more than 25 percent.

Section 604.20 Elevator recall for high-rise buildings with pressurized hoistways is added as follows:

604.20 Elevator recall for high-rise buildings with pressurized hoistways. In addition to the requirements of ASME A17.1, Firefighters' service elevator operation within high-rise buildings with pressurized hoistways shall be as follows:

1. The elevator doors shall automatically open when the car reaches the designated level. After a period of one minute, elevators shall automatically close their doors. The doors shall be responsive by pressing the designated return floor call button in the elevator lobby or by pressing the door open button in the interior of the elevator cab. Elevators shall remain at that level until manually overridden by the key-operated switch required by ASME A17.1.tOnly the hall call buttons at the designated return level, the level the car(s) have returned to, shall function as door open buttons. All doors shall open simultaneously when operating under normal building power. When operating under emergency power, only the cars selected for emergency operation shall open their doors simultaneously.
2. During Phase 1 operation, the door recycle shall be 60 seconds.
3. Once the car is placed on Phase II, the fire department has control of the elevator; it shall operate in accordance with ASME A17.1, Section 2.27.3.3.

604.21 Elevator Access Control. For new and existing elevators where access control is being installed. No wiring conduit, wires or interface equipment shall be installed in the hoistway. In the elevator machine room, machine space, control room, or control space no access control interface equipment shall be installed. Wiring conduit and wring being connected directly to the elevator controller may be installed in the elevator machine room, machine space, control room, or control space.

Exception. Elevator access control interface equipment provided by the elevator manufacturer and maintained by an elevator contractor as stated in the Maintenance Control Program may be installed in the elevator machine room, machine space, control room, or control space.

Section 604.22 Elevator status/control panel and its subsection are added as follows:

604.22 Elevator status/control panel. An elevator status/control panel shall be provided. The elevator status/control panel shall comply with DFD policy 604.22 and:

1. Identify each elevator cab alphanumerically and the floors it serves. Identify corresponding cab number in elevator cab.
2. Indicate elevator(s) that are operating on emergency power. Visual indicators in accordance with ASME A17.1 are required.
3. Have a placard at elevator status/control panel stating how many elevators can operate under emergency power simultaneously.
4. Indicate elevator car position.
5. Indicate whether the elevators are operational.
6. Indicate direction of travel.
7. Have key switches as required for selective activation of cars if all are not capable of simultaneous operation on secondary power.
8. Phase I Fire Service Recall Key switches in accordance with ASME A17.1.
9. Two-way communication system from the elevator to the *fire command center* shall be incorporated on the elevator status panel. Two-way communication systems shall meet ASME A17.1.
10. Indicate whether the hoistway doors are open or closed.

11. Visual signal (flashing firefighter hat) for each elevator that has a corresponding in-car visual signal (flashing firefighter hat). Visual signal (flashing firefighter hat) for each elevator that has a corresponding in-car visual signal (flashing firefighter hat). Shall include wording "WHEN FLASHING DO NOT USE ELEVATOR" engraved on panel.
12. No other elevator functions shall be installed on these panels without approval from the *fire code official*.

Section 604.22.1 Fire service elevator status panels is added as follows:

604.22.1 Fire service elevator status panels. Status of designated fire service elevators shall be displayed on an *approved* standard emergency services interface. These indications shall be combined with the requirements of Section 604.22.

CHAPTER 9 FIRE PROTECTION SYSTEMS

SECTION 901 GENERAL

Section 901.2 Construction documents is amended by adding the following after the last sentence:
Shop drawings shall be provided in accordance with Policy 105.6.

SECTION 902 DEFINITIONS

Section 902.1 Definitions is amended as follows:
902.1 Definitions. The following terms are defined in Chapter 2:
ALARM CONTROL UNIT
APPLIANCE
BATTERY BACKUP

BATTERY-POWERED
DEVICE
DUPLEX
HARDWIRED
INSTALLED
SINGLE STATION [CO] ALARM
SLEEPING ROOM

SECTION 903 AUTOMATIC SPRINKLER SYSTEMS
Section 903.2.8 Group R is amended by adding the exception as follows:
Exception: Group R-X occupancies.

Section 903.2.8.4 Townhouses is added as follows:
903.2.8.4 Townhouses. When two or more contiguous residential dwelling units constructed as townhouses, including those permitted under the *Denver Residential Code*, are protected by a single, monitored sprinkler system, that system shall be configured so it can be isolated (with valve and tamper switch), and water flow is annunciated separately at the fire alarm control panel for each dwelling unit and each protected common area. *All isolation and tamper valves shall be located in the heated riser room.*

Section 903.2.9.1 Repair garages is amended by adding Items 6 and 7 as follows:

6. Repair garages with a spray booth and/or a mixing area greater than 16 square feet utilizing flammable finishes.

Exception: Where a previously *approved* booth is replaced with either an *approved* packaged booth or one constructed in accordance with Section 2404.3.3 and 2404.4.

7. Repair garages using open flame or welding of any type where the garage floor area exceeds 3,000 square feet.

Section 903.2.11.7 Shafts in high-rise buildings is added as follows:
903.2.11.7 Shafts in high-rise buildings. Where a reduction in shaft construction fire rating is permitted by Section 403 of the *Denver Commercial Building Code,* required sprinklers shall be located at the top of the shaft and at alternate floor levels. Sprinklers shall be provided with a dedicated riser with an isolation valve and flow and tamper switch. Activation of the flow switch shall communicate an alarm to the central station and activate vertical pressurization, but not occupant notification.

Section 903.3 Installation requirements is amended by adding the following after the last sentence:
All fire sprinkler systems and special extinguishing system designs shall be submitted in accordance with Policy 105.6.

Section 903.3.1.1.1 Exempt locations is amended by deleting items 2 and 3.

Section 903.3.3.1 Insulation above sprinklers is added as follows:
903.3.3.1 Insulation above fire sprinklers. Flexible non-supporting insulation installed above sprinklers on the underside of floor or roof sheathing shall be secured in place with 20-gauge metal netting with a mesh size not greater than 2 inches by 2 inches.

Section 903.3.5 Water supplies is replaced as follows:

903.3.5 Water supplies. The potable water supply shall be protected against backflow in accordance with Section 912.6 and the Colorado Cross Connection Manual. Hydraulic calculations shall be based on water supply information provided by Denver Water. Water supply information provided shall be obtained within the last 12 months. Hydraulic calculations shall be based on the water data provided with static and residual pressures reduced by 10 percent of the static value or 10 psi, whichever is smaller. Where water supply data is provided by a Denver Water system model, the high static pressure shall be used to verify that the fire pump churn pressure shall be maintained below the system design pressure. Shop drawings shall indicate the initial pressures and the reduced values as used in the hydraulic calculations.

Exception: Sprinkler systems installed in accordance with Section 903.3.1.3.

Section 903.3.5.1 Domestic service is replaced as follows:

903.3.5.1 Domestic service. Use of domestic service for water supply to automatic fire sprinklers shall be prohibited.

Exceptions:

1. Water supply for new NFPA 13D system.
2. UL-300 listed fire suppression systems in buildings that are not provided with automatic sprinklers.
3. Medical gas rooms in accordance with Section 5306.

Section 903.3.5.2 Residential combination services is deleted.

Section 903.3.9 Floor Control Valves is replaced as follows:

903.3.3.9 Floor control valves. An *approved* floor control valve, check valve, drain valve, and flow switch (floor control valve assembly) for isolation, control, and annunciation shall be provided for each level, including those where sprinklers are supplied by piping on the floor below, of buildings meeting at least one of the following conditions:

1. More than two stories with a total area of all floors, including mezzanines, exceeding the NFPA 13 system protection area limitations or;

2. Required to have standpipes in accordance with Section 905.

Exception: Attic-level sprinklers supplied from the level below are not required to have a separate floor control valve assembly

903.3.10 Elevators undergoing alteration. Where an existing elevator is undergoing an alteration fire protection and emergency operation shall be provided in accordance with this Section and Section 604 and 907.3.3. In existing buildings with either a partial or complete fire sprinkler system and the elevator hoistway and/or the elevator machine room is not protected with sprinklers, sprinklers shall be installed per NFPA 13 Section 9.3.6. Installation of automatic sprinklers shall comply with Section 903.

Section 903.3.11 Pressure reducing valves in high-rise buildings is added as follows:

903.3.11 Pressure reducing valves in high-rise buildings. Where pressure reducing valves are utilized in high-rise buildings, each sprinklered level shall be provided with an individual pressure reducing valve.

Exception: Multiple sprinklered levels may be supplied by a pressure reducing valve on a system riser where all the following conditions are met. (See Figure 903.3.11)

1. A method to isolate the pressure reducing valves shall be provided for maintenance & repair.

2. To provide redundancy, pressure reducing valves shall be arranged in series so that failure of any single device does not allow downstream pressure in excess of 10 psi (0.7 bar) below the minimum rated pressure of any component within that portion of the system.

3. An equally sized bypass around the pressure reducing valves, with normally closed control valves, shall be installed.

4. The pressure reducing valve(s) arrangement shall be installed not more than 7 feet 6 inches (2.31 m) above the floor.

5. The pressure reducing valves shall be provided with inlet and outlet pressure gauges.

6. The pressure reducing valves shall be provided with a pressure relief valve of not less than 3/4 inch (20 mm) in accordance with the manufacturer's recommendations.

7. Means shall be provided downstream of all pressure reducing valves for flow tests at sprinkler system demand.

8. The system riser does not supply any fire hose connections.

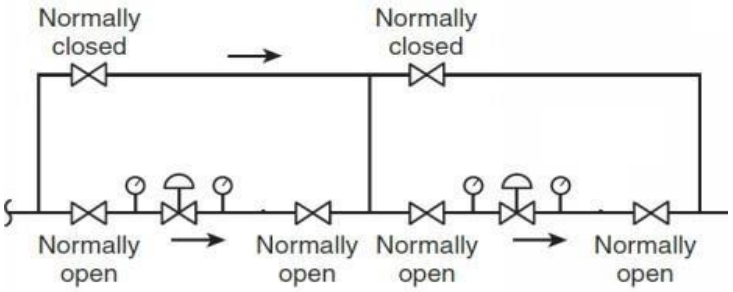


Figure 903.3.11 Example of a PRV arrangement

Section 903.4.2.1 Sprinkler monitoring panels is added as follows:

903.4.2.1 Sprinkler monitoring panels. Control panels installed for monitoring of sprinkler systems shall be located in accordance with Section 907.1.5.

Section 903.4.3 Alarms is replaced as follows and exception remains:
903.4.3 Alarms. *Approved* audible/visible devices (24 VDC supervised) shall be provided for every *building* or *structure* with an *automatic sprinkler system*. These sprinkler water flow alarm devices shall be activated in accordance with Section 912.6 by main and/or zone water flow equivalent to the flow of a single sprinkler of the smallest orifice size installed in the system. Alarm devices shall be provided on the exterior of the *building* at least 10 feet above *grade* and within 25 feet of and visible from the fire department connections. Where a fire alarm system is installed, actuation of the *automatic sprinkler system* shall actuate the building *fire alarm system* and *approved* notification scheme. The exterior audible/visible device shall be non-latching and shall track waterflow.

SECTION 904 ALTERNATIVE AUTOMATIC FIRE-EXTINGUISHING SYSTEMS

904.2 Where permitted is amended by adding the following to the end of the sentence:

…via administrative modification.

Section 904.3.4.1 Visible notification is added as follows:

904.3.4.1 Visible notification. Visible notification shall be provided by yellow or amber strobes. Pending discharge and discharge warning strobes shall be in conspicuous locations as *approved* by the *fire code official* and activated by the agent releasing panel. Subject to the approval of the *fire code official*, pending discharge and discharge warning may be provided by combined audible/visible appliances. No more than two flash rates shall be possible in a single field of view in accordance with NFPA 72. Where pending-discharge and discharge warning strobes are provided in addition to visible fire alarm notification appliances, the warning strobes shall be synchronized, and fire alarm visible notification appliances shall be synchronized. A warning sign shall be provided that reads, "**WARNING – Fire Extinguishing Agent Release in Progress**." Warning sign format, color and letter style shall be as *approved* by the *fire code official*. Warning signs shall be posted at each entrance door stating: "In the event of a system discharge, DO NOT enter without a self-contained breathing apparatus or until the area is thoroughly ventilated."

Section 904.3.5 Monitoring is amended by adding the following at the end of the last sentence:

"and Section 907."

Section 904.3.5.1 Releasing panel is added as follows:

904.3.5.1 Releasing panel. Pre-action and clean agent automatic fire-extinguishing system releasing panels shall be installed in accordance with Section 907.6.7.

Section 905.2 Installation standard is replaced as follows:

905.2 Installation standard. Standpipe systems shall be installed in accordance with this section and NFPA 14. When water pressure at a standpipe outlet exceeds 175 psi static or residual at 250 gpm flow, a pressure-reducing valve shall be provided. The required pressure-reducing valves shall be located at the hose valve outlet only. Only field-adjustable valves shall be allowed. The valve shall have five field-adjustable valve settings (A-E) on a color-coded indication label. Pin-in hex security screws shall be installed to secure the hand wheel and a high-impact plastic shield covering the pressure-reducing adjustment mechanism shall be provided. A pin-in hex bit shall be supplied with each valve. The pressure adjustment mechanism shall be actuated using an aluminum adjustment rod provided with each valve and actuated by rotating in either a clockwise or counter-clockwise direction. Pressure gauge taps shall be provided on inlet and discharge sides of each valve. A reflective decal shall be installed on the high-impact plastic shield valve with arrows and words indicating the direction to increase or decrease pressure. If special tools are required to make field adjustments, a minimum of four such tools shall be provided at locations *approved* by the Fire Department.

Section 905.2.1 Maximum pressure is added as follows:

905.2.1 Maximum pressure. The maximum pressure at any point in the standpipe system at any time shall not exceed 350 psi

Section 905.3.1 Height is replaced as follows:

905.3.1 Height. Class I standpipe systems shall be installed throughout *buildings* where any of the following conditions exist:

1. Four or more stories are above or below *grade plane*.

2. The floor level of the highest story or occupied roof is located more than 30 feet (9144 mm) above the lowest level of the fire department vehicle access.

3.The floor level of the lowest story is located more than 30 feet (9144 mm) below the highest level of the fire department vehicle access.

Section 905.3.7 Vegetative Roof and Landscaped Roofs sentence is added as follows:
905.3.7 Landscaped roofs: The standpipe hose outlet shall be located within 230 feet of all vegetated areas.

Section 905.4 Location of Class I standpipe hose connections is amended by replacing Items 1 and 2 as follows:

1. In every required interior exit stairway, a hose connection shall be provided for each story above and below grade plane. Hose connections shall be located at an intermediate landing between stories, unless otherwise *approved* by the *fire code official*. Where exterior stairways are provided as part of the required exit stairway, hose connections shall be located at the floor landing or as otherwise *approved* by the *fire code official*.

2. Hose valves at horizontal exits shall be located per NFPA 14

Section 905.4.1 Protection is amended by adding exception 2 as follows:

Exceptions:

2. Where additional standpipes are needed to meet travel distance requirements in non-high-rise buildings, protection of piping is not required in buildings equipped with an *approved* automatic sprinkler system.

Section 905.5 & subsections Location of Class II standpipe hose connection is deleted in its entirety.

Section 905.8 Dry standpipes is replaced as follows:
905.8 Dry standpipes. Dry standpipes shall not be installed.

Exceptions:

1. Where subject to freezing and in accordance with NFPA 14.
2. Class I manual wet standpipes standpipes served by an automatic dry valve shall be permitted in mixed-use open parking garages where the highest floor is located not more than 75 feet above the lowest level of fire department vehicle access. The standpipe system serving the open parking garage shall be integrated with the fire protection system serving the other occupancies and shall not be a stand-alone system.

3. Class I manual wet standpipes standpipes served by an automatic dry valve shall be permitted in single-use open parking garages where the highest floor is located not more than 75 feet above the lowest level of fire department vehicle access.

4. Class I manual dry standpipes shall be permitted in single-use open parking garages where the highest floor is less than 55 feet from the lowest level of fire department vehicle access. This provision is applicable to open parking garages with one level of underground enclosed parking garage.

Section 905.13 Combined systems is added as follows:
905.13 Combined systems. Working pressure and NFPA 13 pressure reducing valve requirements for combined sprinkler and standpipe systems shall include and be based on the manual standpipe system demand pressure provided at the most remote fire department connection.

SECTION 907 FIRE ALARM AND DETECTION SYSTEMS
Section 907.1.2 Fire alarm shop drawings is amended by adding the following:
907.1.2 Fire Alarm shop drawings. Submittals shall comply with Policy 105.6.

Section 907.1.4 Connections to other systems is added as follows:
Connections to other systems. A fire alarm system shall not be used for any purpose other than fire warning, as directed in this code, or as *approved* by the *fire code official*.

Section 907.1.5 Control units, annunciators and access keys is added as follows:
907.1.5 Control units, annunciators and access keys. All fire alarm control units and annunciators shall be UL 864 listed or equivalent. Locations shall be within 10 feet (3.048m) of the main building entrance, excluding vestibules, unless an alternate location is specifically *approved*. All control panel locations are subject to field approval prior to installation. Installation shall comply with NFPA 72. Access keys to locked fire alarm equipment shall be maintained in an *approved* location. Fire alarm control units shall not be equipped with a key or special numeric code to access system reset and silence functions. Access to the reset and silence operator interface shall be secured behind a locked door. Field modification of control units or annunciators is not permitted. System zone and device disable functions shall not be accessible without a maintenance-level access code. Alarm signals shall be protected from unauthorized deactivation. This applies to disconnection of the panel alarm transmission to the monitoring station and the alarm output circuit(s) to notification appliances. Deactivation shall only be allowed by Fire Department personnel or authorized entities responsible for system testing and maintenance. Any system deactivation shall be reported to the monitoring station and the Fire Department. Facilities whose systems are estimated to be deactivated for 10 hours or more shall be provided with an *approved* fire watch.

Exceptions:
1. In existing buildings undergoing a panel replacement, remote annunciators with silence and reset functions may be provided when *approved* by the *fire code official*. These units shall not be equipped with "enable/disable" switches and shall be contained behind a transparent, lockable cover.

2. Low-power radio (wireless) systems shall comply with NFPA 72 and are permitted only for installations where the total system coverage does not exceed 1500 square feet. Multiple low-power systems in a building are not permitted. Installation of low-power and wired systems is not permitted in the same building.

Section 907.1.6 Central alarm station connection is added as follows:
907.1.6 Central alarm station connection. All fire alarm and sprinkler protection systems required by this code or by special agreement shall be monitored by an *approved* Class I supervising station complying with Section 918. Multiple central alarm station connections from one building are not permitted.

Alternatively, Fire Department radio boxes may be installed at locations *approved* by the Fire Department. Under no circumstances shall a DFD radio box be removed from a protected premise without written approval of the *fire code official*.

Campus arrangements or a complex of buildings requiring a graphic site map monument per Section 505.1 shall have each building's address transmitted to the central station.

With the exception of DFD radio boxes, point or contact ID transmittance is required for fire alarm control units. Central Station operators shall provide DFD Dispatch the specific point(s) that have been reported.

Section 907.1.7 Multiple fire alarm systems in a single building added as follows:
907.1.7 Multiple fire alarm systems in a single building. Only one fire alarm system shall be installed per building. Multiple points of silence and reset are prohibited on a single system.

Exceptions:

1. When permitted by the *fire code official*, portions of a building separated by fire walls without openings and identified with separate legitimate addresses are allowed to be considered separate buildings. When protected by an automatic sprinkler system, each portion of the building so considered shall be protected by a separate independent sprinkler system or a portion of a single sprinkler system dedicated to the separated portion of the building.

2. Multiple points of silence and reset as allowed by Section 907.1.9

3. Multiple buildings constructed over a common structure where *approved* by the *fire code official*.

Section 907.1.8 Systems out of service is added as follows:
907.1.8 Systems out of service. Systems undergoing maintenance or modification shall not have any portion of the system out of service for more than ten hours. During maintenance or modification, all manual pull stations and notification appliances shall remain operational. Fire watch must be provided in all areas of the building where maintenance or modification will place any portion of the system out of service.

Section 907.1.9 Phased Fire Alarm System Replacement is added as follows:
907.1.9 Phased Fire Alarm System Replacement: Where practical difficulties are associated with replacement of fire alarm detection systems in existing buildings, phased replacement of an existing fire alarm system shall be permitted as follows:

1. An Administrative Modification (AM) request for the phased replacement of the fire alarm and detection system shall be submitted to the *fire code official* for evaluation and approval prior to submission of shop drawings.

2. Two fire alarm control panels shall be allowed during the phased system upgrade. Existing and new fire alarm control panels shall be co-located at a location *approved* by the *fire code official*. During this period, it shall be acceptable to have two points of system reset via the two fire alarm control panels. A wall map showing each floor with descriptions of which system is controlling devices in each area shall be posted adjacent to the fire alarm control panels during construction. Upon completion of the new front-end equipment installation and after all compatible devices have been transferred, tested, and *approved* by the *fire code official*, the contractor will remove the old panel and related equipment.

3. Installation within each floor shall be completed prior to commencement of work on any other floor unless the contractor can complete multiple floors simultaneously.

4. Project duration shall not exceed 24 months from the date the fire alarm permit is issued, nor shall the total duration, including project planning, design, and installation, exceed 36 months. Subject to the approval of the *fire code official*, a single extension of up to a maximum of one year may be requested in writing. Extensions shall be granted only in cases of unforeseen difficulties. Building owners and contractors shall make every effort to minimize delays to project completion.

5.The applicant shall present a planned schedule with phased replacement of the system and components, including scope of work and sequence of operation with coordination of the two fire alarm panels, to the *fire code official* for review and approval prior to preparation of shop drawings.

6. Fire alarm and detection system protection shall be maintained at all times and in all areas, except where system/component replacement is taking place while installers are present. Existing and new devices and appliances not affected and outside of the installation area shall be maintained fully operational at all times.

7.Phasing of fire alarm system replacement shall be in an organized, coherent, and logical sequence to reduce system disruption and allow work while maintaining the life safety systems of the building.

8. Where the building has a smoke control system, detailed interface of the new fire alarm system with the existing or upgraded smoke control system shall be provided in the AM submission with details also shown on the shop drawings.

Section 907.2.6 Group I is amended by adding the following after the last sentence:
907.2.6 Group I. An emergency voice/alarm communication system in accordance with Section 907.5.2.2 shall be installed where partial evacuation is provided.

Section 907.2.13 High-rise buildings is modified by adding the following to the last sentence:
907.2.13 High-rise buildings manual fire alarm system with fire alarm boxes located in accordance with Section 907.4.2

Exceptions 1-6 to remain.

Section 907.2.13.1.1 Area smoke detection is amended by adding items 3, 4, 5 and 6 as follows:

3. In all interior corridors serving as a means of egress for Group R-1, R-2 and R-4 occupancies, with an occupant load of 10 or more.

4. Not less than one foot but no more than three feet on the occupied side of each door that enters a refuge area, elevator lobby and exit stairway which does not directly exit from a refuge area, for occupancies other than R-1, R-2 and R-4.

5. At the top of stairwells and in elevator hoistways (automatic fire detectors in accordance with Section 907.3.3). These devices shall initiate an alarm condition and illuminate the respective indicator at the graphic annunciator. They shall not initiate occupant notification or the smoke control sequence.

6. Where unenclosed vertical openings are permitted by Section 712 of the *Denver Commercial Building Code*, smoke detectors shall be located around the perimeter of the opening, on each level, not less than four feet from the edge of the opening. Unenclosed stairway and escalator openings shall comply with this Section and 712.1.3 of the *Denver Commercial Building Code*. Two-story openings in other than I-2 and I-3 occupancies shall comply with Section 712.1.9 of the *Denver Commercial Building Code*. See Section 907.2.14 for atriums.

Section 907.2.13.4 Annunciation is added as follows:
907.2.13.4 Annunciation. Graphic annunciation in accordance with Section 907.6.4.1.2 or computer graphic annunciation in accordance with Section 907.6.4.1.3 shall be provided.

Section 907.2.24 Airport buildings and structures is added as follows:
907.2.24 Airport buildings and structures. See NFPA 415, as amended in accordance with Appendix S of the *Denver Commercial Building Code*.

Section 907.5.1 Alarm activation and annunciation is amended by adding an exception as follows:

Exception: In highrise buildings, occupant notification shall not activate upon operation of detectors at the top of stairwells or in elevator hoistways or main or service chute water flow devices.

Section 907.5.1.2 Alarm reset and silence is added as follows:
907.5.1.2 Alarm reset and silence notification appliances. The fire alarm control panel shall incorporate an alarm silencing switch that shall only de-activate the audible notification appliances until the system is manually reset. Alarms shall be provided in accordance with Sections 907.5.2.1, 907.5.2.2 and 907.5.2.3, and as required by other sections of this code.

Exception: The silencing switch is not permitted in healthcare facilities regulated by the Colorado Division of Fire Prevention & Control (DFPC) on behalf of the Center for Medicaid Services (CMS).

907.5.2.1 Audible alarms is amended by adding the following after the *last sentence*:
907.5.2.1 Audible alarms.

In theaters, nightclubs, dance halls, ballrooms, and similar areas, means shall be provided to reduce or eliminate background noise upon activation of the fire alarm system. Fire alarm audible notification shall comply with Sections 907.5.2.1.1 through 907.5.2.1.3

Section 907.5.2.2 Emergency Voice/Alarm Communication System is added to the end of the *third sentence:*
907.5.2.2 Emergency Voice/Alarm Communication System. And the notification zone of the level of exit discharge. In high-rise buildings, occupant notification shall not activate upon operation of detectors at

the top of stairwells, elevator hoistways, main or service chute water flow devices.

Section 907.5.2.2.3 Alternate uses is replaced as follows:
907.5.2.2.3 Alternate uses. The emergency voice/alarm communication system may be used for other emergency communication announcements with the approval of the *fire code official*.

Section 907.5.2.2.6 Background noise reduction is added as follows:
907.5.2.2.6 Background noise reduction. In theaters, nightclubs, dance halls, ballrooms, and similar areas, means shall be provided to reduce or eliminate background noise upon activation of the emergency voice/alarm communication system.

Section 907.5.2.2.7 Communication system location is added as follows:
907.5.2.2.7 Communication system location. All buildings provided with an emergency voice/alarm communications system shall have the communication systems and other life safety equipment located in a *fire command center* or room constructed in accordance with Section 508.2.

907.6.1.1 Circuit Survivability is added:
907.6.1.1 Circuit Survivability. Stacked closets dedicated for fire alarm and other approved emergency equipment that are separated from the remainder of the *building* by two-hour *fire-resistance rated* fire barriers are permitted as a “protected area” for application of NFPA 72, 12.4.

Section 907.6.1.2 Communication systems in existing buildings is added as follows:
907.6.1.2 Communication systems in existing buildings. Where occupant partial evacuation/relocation notification is provided and the existing communication systems comply with one of the performance design alternatives below, those systems shall be permitted to remain. The systems shall be maintained in accordance with the original design. Retrofit of existing systems are permitted to comply with the provisions of this section.

1. Separate "A" and "B" risers with alternating floor speakers, designed such that no more than one- half of the speakers on a floor shall be affected by loss of any one amplifier, pre-amplifier or cable within the floor or communication zone.

2. Class A wiring configuration for risers and floor distribution provided system survivability is maintained in the event of a failure of any distributed or banked amplifier to limit the failure to no more than one-half of the notification appliances on the floor plate in the notification zone. Internally backed-up amplifier modules are acceptable.

3. Class A wiring configuration for risers and class B floor distribution wiring with alternating speakers such that system survivability is maintained in the event of a failure of any distributed or banked amplifier to limit the failure to no more than one-half of the notification appliances on the floor plate in the notification zone. Internally backed-up amplifier modules are acceptable.

Section 907.6.4 Zones is replaced as follows exception to remain:
907.6.4 Zones. All *fire alarm systems* shall be divided into alarm zones. Each floor shall be zoned separately, and zone shall not exceed 22,500 square feet (2,090 square meters). The length of any zone shall not exceed 300 feet (91.4 m) in any direction. When two or more alarm zones are provided, visible zone indication shall be provided at an *approved* location. Zones shall comply with this section unless otherwise *approved* by the *fire code official.* Annunciator panels shall be provided to comply with Section

907.6.4.1. Annunciation zones shall comply with the following:

Each building level shall be annunciated separately as follows:

1. All manual fire alarm boxes.
2. All automatic smoke and heat detectors.
3. Each fire sprinkler water flow zone.
4. Other approved types of automatic fire protection systems.
5. Emergency alarms/Gas detection
6. Carbon Monoxide

Section 907.6.4.1 Zoning indicator panel and subsections are replaced as follows:
907.6.4.1 Annunciator panels. Annunciator panels shall be point-lit graphic or computer graphic, or a directory LED point display type as *approved* by the *fire code official*. Upon initiation of an alarm, supervisory or trouble condition the panel shall record the status. Alarms shall "lock-in" until the fire alarm system is reset with a dedicated reset switch located at the main fire alarm control panel.

Exception: Where a monitored building fire alarm control unit is not provided, annunciator panels are not required for a dedicated function elevator recall control and supervisory control unit or sprinkler waterflow and supervisory control unit.

907.6.4.1.1 Directory annunciator. A directory annunciator shall be provided as required. Location shall be field *approved*. The annunciator shall be provided with individual alarm indications in accordance with Section 907.6.4 for each zone. Indicators shall be of sufficient size and intensity to be visible in normal lighting.

907.6.4.1.1.1. Building plans. Scaled floor plans shall be permanently mounted adjacent to directory type annunciator panels. Plans shall be of durable construction, easily readable in normal lighting, protected by a smooth, transparent, plastic surface and shall include every building level including mezzanines and roofs. Building plans can be secured behind a locking door keyed the same as the fire alarm panel. Plan content shall comply with Policy 105.6.

907.6.4.1.2 Point-lit graphic annunciator. A graphic annunciator shall be provided as required in Sections 907.6.4.1.2.1 through 907.6.4.1.2.3.

907.6.4.1.2.1 When required. A point-lit graphic annunciator is required for the following: underground buildings, high-rise buildings, buildings with a smoke control system in accordance with Section 909 and where required for a pre-action fire sprinkler or clean agent extinguishing system in accordance with Section 907.6.7.

907.6.4.1.2.2. Location in building. Location of annunciators shall be field *approved*. Locations depicted on reviewed drawings are not permitted until field verification is secured.

907.6.4.1.2.3 Graphics. The annunciator shall consist of building plans in accordance with Policy 105.6, with the addition of discrete LED indications for each alarm initiating device. The annunciator shall be provided with a momentary push-button "Lamp Test." Building plans can be secured behind a locking door keyed the same as the fire alarm panel.

907.6.4.1.3 Computer graphic display. Computer graphic displays shall be permitted for individual system designs. Systems shall be fully compliant with UL 864. Systems shall contain a full color primary and secondary display. Demonstration of the specific equipment to be installed with the actual operating software for the proposed system shall be presented to the *fire code official*. Operator interface to the graphic shall be based on:

1. Ease of use. Primary operator interface shall be standard 2-button mouse driven. Optional secondary interfaces may be provided.

2. Adequacy of display for operational purposes. Displays shall be capable of presenting the entire floor plate with all devices and device status shown on an initial alarm screen. On any alarm indication, the floor plate in alarm shall come up on the screen with all devices shown and the device in alarm highlighted. Display segmentation from this initial view shall be possible for expanding the view of the area of alarm incidence. Displays shall be contrasting black lines and lettering on a white background.

3. Flexibility of system for upgrade.

4. Minimal proprietary components. Accepts standard picture file types.

5. Plain English report generation of events, histories, maintenance schedules, device status and settings and user access.

6. UL-864 listed event-driven primary display. Secondary display(s) as *approved* by the *fire code official*. All displays shall be specified for 24-hour, 7-day continuous operation. A 3-year warranty is recommended.

7. Secure access.

8. Fire alarm device icons shall be in accordance with NFPA 70 or graphic icons as *approved* by the *fire code official*.

Building plans in accordance with Section 907.6.4.1.1.1 shall be provided and shall be located as *approved* by the *fire code official*.

Section 907.6.4.2 is deleted.

Section 907.6.7 Pre-action and clean agent extinguishing systems and subsections are added as follows:

907.6.7 Pre-action and clean agent extinguishing systems. Pre-action and clean agent extinguishing systems shall have a dedicated releasing panel and annunciator connected to the building fire alarm system where provided.

907.6.7.1 Annunciation. Pre-action and clean agent systems shall be provided with a local directory annunciator zoned for manual, smoke detector, flow alarm indications in accordance with Section 907.6.4.1.1. Systems with under floor and/or above ceiling detection devices shall be provided with a point-lit graphic annunciator in accordance with Section 907.6.4.1.2. Systems shall annunciate alarm and supervisory conditions at the main building fire alarm panel.

907.6.7.2 Control panels for pre-action systems. Control panels shall be listed for releasing service. Control panel and annunciator shall be located outside the protected area in a location *approved* by the *fire code official*. Areas protected by a single releasing panel shall be contiguous.

907.6.7.3 Cross-zoned detection. Cross-zoned detection systems shall transmit a building alarm on activation of the first initiating device. Double-interlock pre-action systems shall not have cross-zoned detection.

Section 907.11 Non-required full or partial systems is added as follows:
907.11 Non-required full or partial systems. Fire alarm systems and fire detection systems not required in this code or by special agreement are not required to be connected to a central station. Where non-required fire alarm and/or fire detection systems are connected to a central station, the central station shall be an *approved* Class I central station. Multiple central station connections from one building are not permitted unless *approved* by the *fire code official*. Installation of non-required full or partial fire alarm or fire detection systems shall comply with this Code and NFPA 72. Zone annunciation shall be provided in accordance with Section 907.6.4. Annunciator and control panels for non-required or partial systems shall be of an *approved* type and have permanent signage indicating "Non-required System" or "Partial System." Partial and non-required systems shall be maintained operational. System removal shall be permitted only with the approval of the *fire code official*.

Exception: New and existing dwellings regulated by the *Denver Residential Code.*

SECTION 908 EMERGENCY ALARM SYSTEMS

Section 908.3 Fire alarm system interface is replaced with Emergency alarm systems as follows:
908.3 Manual Emergency alarm systems. Manual emergency alarm systems shall be designed in accordance with this section and the manual fire alarm requirements of NFPA 72. Manual emergency alarm-initiating devices shall be yellow or amber, comply with the mounting requirements of Section 907.4.2 and be installed outside of each interior exit and exit access door, and inside of each exterior exit and exit discharge directly serving the potentially contaminated area(s) identified in Sections 908.1 through 908.3 unless otherwise *approved* by the *fire code official*.

Emergency alarm systems shall be monitored by the building fire or sprinkler alarm control panel unless otherwise *approved* by the *fire code official*. An emergency alarm system shall be annunciated as a separate zone on the building annunciator and transmitted to the central station as a separate/distinct signal and be relayed to DFD Dispatch as such. Where the fire or sprinkler alarm control panel is not monitored by a supervising station, annunciation shall be provided in an *approved* location. Floor plans of the area protected by an emergency alarm system shall be provided as part of the building graphic maps Fire alarm notification shall not be activated on an emergency alarm.

Audible and visible emergency alarm notification appliances shall be installed on the interior and exterior of the areas identified in Sections 908.1 through 908.3 per the notification requirements of NFPA 72. Audible and visible notification appliances along with clearly legible signage shall be installed inside and outside of these occupancies in *approved* locations to alert all occupants possibly inside or entering the potentially contaminated area.

Audible emergency alarm notification shall have tone and pattern distinctly different from fire alarm notification. Visible notification appliances shall be amber strobes or beacons. Subject to the approval of

the *fire code official*, complete notification in accordance with NFPA 72 throughout a building or facility beyond the potentially contaminated area is not required provided the potential for migration of the hazard to other occupied areas is small. Signage shall be placed adjacent to the amber strobes/horns. The sign shall have a minimum 2-inch block lettering with a minimum one-half-inch stroke unless otherwise *approved* by the *fire code official*. The sign shall be on a contrasting surface of black on yellow and shall be of durable construction. Language shall be as *approved* by the *fire code official*.

SECTION 909 SMOKE CONTROL SYSTEMS

909.2.1 Construction document submittals. Construction documents for smoke control systems shall be submitted for permit application with the construction drawings for the project in accordance with Section 133.of the *Denver Building Code*, including the seal and signature of the design professional responsible for the coordination of the smoke control design package. When required by 909.4, a rational analysis shall be provided with construction permit documents.

909.2.2 Shop drawing submittals (deferred submittal). The deferred submittal shall be consistent with the *approved* construction document submittal and reviewed by the engineer of record prior to submission to the Denver Fire Department in accordance with Policy 105.6.

909.10.5.1 Variable Frequency Drives (VFDs) is added:
909.10.5.1 VFDs. Upon smoke control activation, VFD's shall operate in override or life safety mode where faceplate commands and non-smoke control commands are ignored. In addition, non-critical faults (safeties) shall be ignored to ensure the continued and stable performance of the smoke control fan. VFDs for smoke control system fans shall not be equipped with a manual or automatic bypass switch except where fans are designed and set for 60 hertz, nominal.

909.10.5.2 VFDs location is added.
909.10.5.2 VFDs. VFDs shall be located in a locked room or other approved location and be accessible without the use of a ladder.

909.12 Detection & Control Systems is modified.
909.12 Detection & Control Systems is modified by adding the following sentence at the end: The control unit shall be the building fire alarm control panel taking direct control of all smoke control systems or elements with priority over any building automation systems, temperature control systems, or other HVAC controls.

909.16.4 Smoke removal systems is added.
909.16.4 Smoke removal systems shall be provided with a single ON-OFF switch per floor that activates associated fan(s) and damper(s) for smoke removal. Garage fans may be controlled together as a single zone.

909.20.3 Natural ventilation alternative and subsections are deleted.

909.21 Elevator hoistway pressurization alternative is modifiedby replacing the first sentence as follows:

909.21 Elevator hoistway pressurization alternative. In all *high-rise buildings or where required by Denver Commercial Building Code* Section 1006.3.4, where elevator hoistway pressurization is provided in lieu of required enclosed elevator lobbies, the pressurization system shall comply with Sections 909.21.1 through 909.21.11.

909.21.1 Pressurization requirements
909.21.1 Pressurization requirements. This section is modified as follows:
Replace the 2nd sentence with the following: Pressures shall be measured at the mid point of doors, with all hoistway doors in the closed position.

The following is added after the last sentence:
For areas of rescue assistance, the pressure differentials shall be measured between the area of rescue assistance and the occupied floorplate.

909.22.2 Records – Add the following after the last sentence:
909.22.2 Records- Firefighter Smoke Control System Tagging shall comply with DFD Tagging Policy..

909.22.7 Existing systems prior to the adoption of the 2025 Denver Fire Code annual tests is added as follows:
909.22.7 Existing Systems Prior to the Adoption of the 2025 Denver Fire Code Annual tests. Annual tests shall be performed in accordance with this section on all smoke control systems installed prior to adoption of the 2025 Denver Fire Code. Smoke control systems shall be maintained in operational condition as required by the code under which the system was installed. Denver Fire Department representatives shall have the authority to witness any regularly scheduled annual testing of smoke control systems.

909.22.7.1 Equipment operating tests. The following equipment operating tests shall be conducted annually on the smoke control system components:

1. Verify the proper control and status indication of smoke control dampers (i.e., "OPEN/CLOSED") and fans (i.e., "ON/OFF") by visual observation at each damper and fan location and at the smoke control status/control panel in the *fire command center*.

2. Verify that all smoke control dampers and fans assume the correct operating position under both normal and fire modes and when the manual override switches at the smoke control status/control panel are placed in the "auto" position.

3. Verify that the manual override switches function properly for smoke control dampers and fans.

4. Items l, 2 and 3 above may be performed by qualified service technicians who are familiar with the proper operation of the smoke control systems and equipment. The engineer responsible for conducting the smoke control system performance tests shall develop the test procedures to be used and review the results obtained by the service technicians, including an actual sampling to confirm the accuracy of the test. A statement summarizing this review shall be included in the performance test report described in Section 909.10.4 that is required to be submitted by the engineer to the Fire Department.

5. A copy of the written test procedure and an accurate log of tests shall be maintained in the *fire command center* and at either the building management office or the maintenance office. A copy of the previous test report shall be submitted to the engineer responsible for the smoke control performance tests for the engineer's review and approval prior to the smoke control test. Any defects, system modifications and repairs shall be recorded in the log. Necessary corrections shall be made prior to the smoke control performance test.

909.22.7.2 Performance tests. Within 30 days after completion of annual equipment operating tests defined above, conduct the following smoke control system performance tests. The annual smoke control systems tests shall be conducted under the direct supervision of a professional engineer qualified in the testing of such smoke control systems.

1.Activate the smoke control systems automatically through the fire alarm system for tests used t to confirm proper sequencing of the system components. Measure actual relative pressure differentials between areas in alarm and adjacent areas and actual door opening forces.

2. For high rise buildings, conduct smoke control tests, observations and measurements of all aspects of the smoke control system at a minimum of 15 percent of the smoke-controlled floors with a minimum of 3 floors, evenly spaced throughout the vertical sections of the building. Smoke control tests in subsequent years shall be conducted on previously untested floors, as may be practical so that all floors ultimately are tested.

3. For all other buildings, conduct smoke control tests, observations and measurements of all aspects of the smoke control system at a minimum number of locations to demonstrate proper performance as *approved* by the Fire Department. Each test shall attempt to involve as many different fan systems as practical. Smoke control tests in subsequent years shall be conducted on previously untested locations, as may be practical so that all locations ultimately are tested over a three-year period.

4. Tests of the smoke control system shall be conducted by activation of at least one smoke detector in each smoke control zone on each floor being tested. One test of at least one of the smoke control zones shall include activation of one sprinkler flow switch. In addition, the smoke control tests shall include activation of at least one manual fire alarm box. For high rise buildings, pressure differentials shall be measured across stairway doors, between floors in alarm and floors immediately above and below floors in alarm, across elevator/lobby/refuge corridor area doors and adjoining spaces in Group R-1, R-2 or I-1 occupancies, and between atriums and areas immediately adjacent to atriums where atriums are part of high rise buildings.

5. Upon activation of the fire alarm system for each test, confirm that the smoke control system fans and dampers have assumed the correct operating condition for the type of alarm initiating device and the location of the initiating device. This shall be confirmed also at the smoke control panel in the *fire command center*.

6. Manually override the operation of a sampling of fans and dampers during each test, taking care not to damage system components. Return all override switches to their "auto" position after each test.

909.22.7.3 Test reports. Within 30 days of completing any smoke control test, submit a test report to the Fire Department. A copy of the previous and current test reports shall be kept in the *fire command center*. The test report shall be written by the professional engineer who conducted the testing. The test report shall bear the seal and signature of the professional engineer. Any defects, modifications and repairs shall be recorded in a log kept in the *fire command center* and at either the building management office or the maintenance office. The test report shall include, but is not limited to the following:

1.Provide a brief description of the smoke control system installed in the building being tested and state the year the building received its construction permit for the smoke control system. Provide a sequence of operation for the smoke control system.
2. Describe in general terms the equipment operating test procedures. Include a list of the equipment operating and smoke control test deficiencies along with a schedule of the proposed corrective action.

3. Describe detailed procedures followed during the equipment operating tests. Describe detailed procedures followed during the smoke control tests.

4. List test equipment used and outside air temperature and wind conditions at the time the smoke control tests were conducted.

5. State sequences and timing of the system operations during all smoke control tests (e.g., smoke detector activation time, fan start times, time for dampers to assume the correct position, etc.).

6.List the location of test measurements and the measured values for pressure differentials and door- opening forces for each test location.

7. Record any operational defects and performance deficiencies with respect to the requirements of this section, and state recommendations for corrective action. Include a schedule to re-test each deficiency. Submit results of any subsequent tests performed after completion of the corrective action.

8. Engineer's assessment indicating that the smoke control system, as installed and tested, conforms to the requirements of Section 909.

909.22.7.4 Functional test requirements for smoke control system equipment. Testing of smoke control equipment shall be performed in accordance with this section to determine that the installed systems continue to operate in accordance with the *approved* design. Operational testing of the smoke control system shall include all equipment such as fans, dampers, controls, and doors. Testing shall include positive confirmation of actuation. System equipment and components shall be exercised for sufficient time to provide positive confirmation of proper operation or fault condition. Annual tests. Annual tests shall be performed in accordance with Sections 909.10.3.1 and 909.10.3.2, on all smoke control systems including those installed prior

to adoption of this code. It is recognized that smoke control systems installed prior to adoption of this code could have parameters that are different than those described in this section. In those cases, smoke control tests shall be adjusted accordingly to meet the intent of this section.

Denver Fire Department representatives shall have the authority to witness any regularly scheduled annual testing of smoke control systems.

909.22.7.4.1 Written record. Results of the tests shall be documented in the building's life safety systems testing and maintenance log and printed reports generated during the automated testing. Testing documents must be maintained on-site in the *fire command center* or in a location *approved* by the *fire code official*.

909.22.7.4.2 Dedicated systems.

909.22.7.4.2.1 Dedicated systems shall be tested semiannually.

909.22.7.4.2.2 The smoke-control system shall be operationally tested as prescribed in Section 909.22 Dedicated smoke control systems shall be operated for each control sequence.

909.22.7.4.2.3 Operation of the correct outputs for each given input shall be verified and recorded.

909.22.7.4.3 Non-dedicated systems. Non-dedicated systems shall be tested annually. The smoke-control system shall be operationally tested as prescribed in Section 910.5. Nondedicated smoke control systems shall be operated on a representative sample of each type of equipment sufficient to verify proper operation for each control sequence. For high rise buildings, tests shall be conducted at a minimum of 15 percent of the smoke-controlled floors with a minimum of 3 floors, evenly spaced throughout the vertical sections of the building. Tests in subsequent years shall be conducted on previously untested floors, as may be practical so that all floors ultimately are tested. For all other buildings, tests shall be conducted at a minimum number of locations to demonstrate proper performance as *approved* by the Fire Department. Tests in subsequent years shall be conducted on previously untested locations, as may be practical, so that all locations ultimately are tested over a three-year period. Operation of the correct outputs for each given input shall be verified and recorded.

909.22.7.5 System repairs and maintenance. All deficiencies noted in the annual report shall be corrected within 30 days and, if required by the engineer, the smoke control system shall be re-tested. All smoke control systems will be maintained to perform its intended purpose under the code version with which it was built. With approval of the Denver Building Department and the Denver Fire Department smoke control systems may be remodeled to comply with current code.

909.23 Smoke removal Systems is added

909.23 Smoke removal systems required by Denver Commercial Building Code 403.4.7(2) shall comply with the following sections:

909.23.1 Control systems shall comply with 909.12 and Sections 909.12.3 and 909.12.4 shall not apply.

909.23.2 Smoke removal systems shall be manually activated with controls complying with 909.16.4.

909.23.3 The following sections shall not apply to smoke removal systems: 909.4, 909.10, 909.11, 909.17, 909.18.8.1(1) and 909.22.

909.23.4 Smoke removal system shall be tested annually including fans, dampers, and controls.

SECTION 910 SMOKE AND HEAT REMOVAL

Section 910.3.1 Listing and labeling is replaced in its entirety as follows:
910.3.1 Listing and labeling. Smoke and heat vents shall be *listed* and labeled to indicate compliance with UL 793 or FM 4430.

Exception: Gravity-operated drop out vents are not permitted

Section 910.3.6 Smoke and heat vent fall protection and its subsection are added as follows:
910.3.6 Smoke and heat vent fall protection. In Group F, M, and S occupancies fall protection shall be provided meeting minimum requirements of Sections 910.3.6.1 and 1109 Items 1, 2 and 3.

910.3.6.1 Fall protection construction. Fall protection shall be of such construction and mounting that they are capable of withstanding a load of at least 400 pounds per square foot applied perpendicularly at any one area on the screen. Covers shall be secured in place to prevent accidental removal or displacement. Opening limitation shall be not more than 6 inches in diameter or of slat work with openings not more than 2 inches wide with length unrestricted.

SECTION 912 FIRE DEPARTMENT CONNECTIONS

Section 912.2 Location is replaced in its entirety as follows:
912.2 Location. With respect to hydrants, driveways, buildings and landscaping, fire department connections shall be so located that fire apparatus and hose connected to supply the system will not obstruct access to the buildings for other fire apparatus. The location of fire department connections shall be field *approved* by the *fire code official* prior to installation. Fire department connections shall be a minimum of one 2½ x 2½ x 4-inch Siamese or single 2½-inch, as *approved* by the *fire code official*.

Section 912.6
912.6 Backflow protection. The following sentence is added to the end of the section as follows:
912.6 Backflow protection. The backflow preventer shall be installed within 5 feet (610mm) of the point where the fireline first penetrates the envelope of the building or structure.

SECTION 913 FIRE PUMPS

Section 913.1 General is added to the end of the section as follows:

Section 913.1. General. Limited service controllers are not permitted.

Section 913.4 Valve supervision is replaced as follows:
913.4 Valve supervision. Fire pump suction, discharge and bypass valves and isolation valves on the backflow prevention device or assembly shall be supervised in accordance with Section 903.4.

Section 913.4.1 Test outlet valve supervision is replaced as follows:
913.4.1 Test outlet valve. The hose control valves for the fire pump test outlet(s) shall be located on the exterior of the building. The main supply valve controlling the fire pump test outlet(s) shall be supervised in the closed position.

Section 913.6 Remote status panel is added as follows:
913.6 Remote status panel. Where the fire pump room is not constantly attended, a fire pump remote operating status panel shall be provided in accordance with NFPA 20. The fire pump remote operating status panel shall be located adjacent to the fire alarm control panel or as determined by the *fire code official*.

Section 913.7 Diesel engine pump drivers is added as follows:
913.7 Diesel engine pump drivers. Diesel drivers for fire pumps shall comply with NFPA 20. A dedicated fuel supply shall be provided sufficient for eight hours of operation. Fill openings shall be located on the exterior of the building with an *approved* fill port. If fuel pumping is required from a main fuel tank to a diesel engine pump driver, a duplex pumping system shall be provided.

SECTION 916 GAS DETECTION SYSTEMS
Section 916.2.1 Construction documents is added as follows:
916.2.1 Construction documents. Submittals shall comply with Policy 105.6.

Section 916.3 Equipment is replaced as follows:
916.3 Equipment. Gas detection system equipment shall be designed for use with the gases being detected and shall be installed in accordance with manufacturer's instructions. Gas detection system control panels shall be installed in *approved* location outside of the potentially contaminated areas. Floor plans of the area protected by a gas detection system shall be provided in accordance with the requirements of Section 907.6.4.1.1.1.

Section 918 Central Alarm Stations is added as follows:
SECTION 918 CENTRAL ALARM STATIONS

918.1 General. Where required by Section 907.1.6 as amended, monitored protected premises systems shall be connected to an *approved* central alarm station. A Class I central alarm station shall comply with this section. Signals shall be transmitted, received and managed in accordance with NFPA 72. *Approved* central alarm stations shall be listed to UL 827 and as *approved* by the *fire code official*. All central alarm stations shall obtain an annual operating license from the Fire Department and meet the facility

construction and operational requirements of NFPA 72. Central alarm stations shall be subject to Fire Department inspection during normal business hours. Installations found not to maintain facility requirements and/or operating procedures in accordance with NFPA 72 or the certificated listing, shall be subject to license revocation by the Fire Department.

Exception: *Approved* protected premises connected directly to Denver Fire Department Dispatch.

918.2 Communication methods. Communication from a protected premises to a central alarm station shall be by digital alarm communicator transmitter (DACT), two-way RF multiplex system or one-way private radio alarm system in accordance with NFPA 72. Alternative performance-based communication technologies may be presented for consideration by the *fire code official* for application in the jurisdiction. Performance-based systems shall be submitted for approval under Section 104.

918.3 Transmission channels. Transmission channels between a protected premises and central alarm stations shall consist of one of the methods of Sections 918.3.1, 918.3.2, 918.3.3 or as *approved* in accordance with Section 918.2 for performance-based technologies. Transmission channels shall be monitored for integrity in accordance with NFPA 72.

918.3.1 DACT transmission. For existing buildings, DACT transmission shall consist of a minimum of one seizable public phone line and an *approved* NFPA 72 Type 4 or Type 5 two-way RF multiplex system, with a network connectivity (Net/Con) of 6 or less, a minimum one-way private radio alarm system complying with Section 918.3.3 or an *approved* alternative communication technology in accordance with Section 918.2.

918.3.2 RF multiplex systems. RF multiplex systems shall consist of sufficient UL-listed fire system transmitter/receivers to establish and maintain a minimum Net/Con of 5 or less as measured by manufacturer-approved test equipment. Primary RF multiplex systems shall meet NFPA 72 requirements for a Type 4 network. RF systems that cannot achieve this required level of reliability shall only be permitted as a secondary communication means in accordance with Section 918.3.1. RF communications of fire alarm signals shall only be permitted over a network dedicated to and listed for transmission and receipt of fire alarm signals. Upon application for a system installation permit for any subscriber unit, the central station licensee shall provide documentation verifying that their network complies with the requirements for a listed, dedicated fire alarm signal network for the protected premises.

918.3.3 One-way private radio alarm systems. One-way private radio alarm systems shall consist of a network of radio alarm supervising station receivers, radio alarm repeating station receivers and radio alarm transmitters. The system shall be configured for Type 6 or Type 7 operation in accordance with NFPA 72. Radio communications of fire alarm signals shall only be permitted over a network dedicated to and listed for transmission and receipt of fire alarm signals. Upon application for a system installation permit for any subscriber unit, the central station licensee shall provide documentation verifying that their network complies with the requirements for a listed, dedicated fire alarm signal network for the protected premises. Signal quality shall be supervised and maintained in accordance with NFPA 72.

Section 918.4 Runner service is added as follows:

Runner service. Central stations licensed by the Denver Fire Department shall provide runner service to all properties monitored, in accordance with Section 117.6 and NFPA 72.

Section 919 Transmission of City Microwave Signals is added as follows:

SECTION 919 TRANSMISSION OF CITY MICROWAVE SIGNALS

919.1 General. Construction permits shall not be issued and inspections will not be approved for any building or structure exceeding 60 feet (18.3m) in height which interferes or may interfere with the transmission or reception of City microwave communication signals unless the owner of the building or structure provides for installation of equipment to retransmit or redirect the signal as necessary to eliminate any interference. Such equipment shall be *approved* by and installed at the direction of the Department of Public Safety. A service agreement must also be approved by the Department of Public Safety where transmission is affected by the proposed building or structure prior to the issuance of any permit or Certificate of Occupancy. Such agreements shall include provisions for easements and access for maintenance, electricity for operation, and replacement of equipment.

CHAPTER 10 MEANS OF EGRESS

Chapter 10 of the International Fire Code is amended in accordance with Chapter 10 of the Denver Commercial Building Code and Section 1032 Maintenance of the Means of Egress is retained.

CHAPTER 11 CONSTRUCTION REQUIREMENTS FOR EXISTING BUILDINGS

SECTION 1101 GENERAL
Section 1101.1 Scope is replaced as follows:
1101.1 Scope. The provisions of this chapter shall apply to existing buildings constructed prior to the adoption of this code when the applicable requirements for such buildings cannot be ascertained by the following:

1. The building and fire codes in effect when the building was permitted for construction and no change of occupancy occurred since that time.

2. The building and fire codes in effect when the building was last certified for occupancy

3. All applicable retrofit ordinances, including retroactive regulations contained elsewhere in this Code.

4. Approved & recorded administrative modifications.

5. Subject to approval by the *fire code official*, existing life safety features that exceed the requirements for new buildings shall be permitted to be decreased to those required for new buildings.

6. Existing life safety features that do not meet the requirements for new buildings, but that exceed the requirements for existing buildings, shall not be further diminished.

1101.1.1 Existing buildings. Existing buildings shall comply with the requirements of Sections 1103.2, 1103.3, 1103.7.5, 1103.8 1103.9, 1107, and 1108. 1109

Section 1101.2 Intent is replaced as follows:
1101.2 Intent. The intent of this chapter is to provide a minimum degree of fire and life safety to persons occupying existing buildings by providing minimum construction requirements where such existing buildings do not comply with the minimum requirements of the Denver Commercial Building Code . It is intended for an existing building to comply under the Building & Fire Codes in effect when constructed, certified for occupancy, any alternate means of Code compliance approvals, and retrofit / retroactive Codes previously adopted.

SECTION 1103 FIRE SAFETY REQUIREMENTS FOR EXISTING BUILDINGS

Section 1103.2 Emergency responder radio coverage in existing buildings is replaced as follows:
1103.2 Emergency responder radio coverage in existing buildings. See Section 510.1.2.

Section 1103.3.1 Elevators, escalators and moving walks is replaced as follows:
1103.3.1 Elevators, escalators and moving walks. Existing elevators, escalators and moving walks in Group I-2 Condition 2 occupancies shall comply with *Colorado State Regulations,* as amended.

Section 1103.3.2 Elevator emergency operation is replaced as follows:
1103.3.2 Elevator emergency operation. Existing elevators with a travel distance of 25 feet (7620 mm) or more above or below the main floor or other level of a building and intended to serve the needs of emergency personnel for firefighting or rescue purposes shall be provided with emergency operation in accordance with *Colorado State Regulations.*

Exceptions 1 and 2 to remain; Exception 3 is amended as follows:

3. Freight elevators in buildings provided with automatic sprinkler systems installed in accordance with Section 903.3.1.1 or 903.3.1.2.

Section 1108 Requirements for Compressed Gas Systems is added as follows:
SECTION 1108 REQUIREMENTS FOR COMPRESSED GAS SYSTEMS

1108.1 Compressed gas systems. Existing compressed gas systems located within existing buildings shall meet all the requirements of Sections 1108.1.1 through 1108.1.4.

1108.1.1 Carbon dioxide (CO_2) systems used in beverage dispensing applications. Existing carbon dioxide (CO_2) systems used in beverage dispensing applications shall comply with Section 5307.3.

1108.1.2 Inert gas systems used in commercial, manufacturing, or industrial applications. Existing inert gas systems used in commercial, manufacturing or industrial applications shall comply with Section 5307.6.

1108.1.3 Carbon dioxide (CO_2) gas enrichment systems using on-site supply tanks and/or cylinders in plant growing (husbandry) applications. Existing carbon dioxide (CO_2) gas enrichment systems using on-site supply tanks and/or cylinders in plant growing (husbandry) applications

shall comply with Section 5307.4.

1108.1.4 Carbon dioxide (CO_2) gas enrichment systems using a natural gas burner in plant growing (husbandry) applications. Existing carbon dioxide (CO_2) gas enrichment systems using a natural gas burner in plant growing (husbandry) applications shall comply with Section 5307.5.

SECTION 1109 Firefighter Fall Protection is added as follows:
SECTION 1109 FIREFIGHTER FALL PROTECTION

1109.1 Firefighter fall protection. All existing buildings are required to meet the following to ensure safe and effective rooftop access for rooftop maintenance and firefighting operations. Materials shall comply with UL 1994. Signs or decals shall be posted in English and in the predominant language of workers. Signs, decals, and striping affixed to the exterior of the building shall be suitable for the environment.

1. Self-luminous or reflective signs or decals *approved* by the *fire code official* are required on building exterior walls when the locations of rooftop access landing areas are not apparent from the street.

2.Self-luminous or reflective signs or decals *approved* by the *fire code official* shall be attached to each skylight, trap door, roof hatch, and scuttle cover; the sign or decal shall be on the surface, with striping around the entire perimeter.

3.Self-luminous or reflective signs or decals *approved* by the *fire code official* shall be placed at entries (doors, stairs, ladders, or roof hatches) to areas containing skylights, trap doors, roof hatches, and scuttle covers.

4. Existing non-metallic panels with curb heights eight inches or less that are present between metal panels on roofs shall be replaced with metal panel(s) with the equivalent gauge and material properties as the existing roof panels. Perimeter guardrails or fall protection can be used in lieu of replacement of existing non-metallic panels when these systems comply with OSHA 29 CFR1926.502. Self-luminous or reflective signs or decals *approved* by the *fire code official* shall be placed on perimeter guardrails.

Exception: Existing *One- and two-family dwellings* and *townhouses* constructed in accordance with the *Denver Residential Code*.

CHAPTER 12 ENERGY SYSTEMS

SECTION 1203 EMERGENCY AND STANDBY POWER SYSTEMS

Section 1203.1 General is replaced as follows: Emergency power systems, standby power systems and optional standby power systems shall comply with Sections 1203.1.1 through 1203.1.9.

Section 1203.1.1 Stationary generators is amended by adding the following to the end of the sentence:

"and operated by a diesel-fueled prime mover."

Section 1203.1.1.1 Optional standby generators is added as follows:
1203.1.1.1 Optional standby generators. Optional standby generators shall be permitted in accordance with NFPA 70 (NEC) Article 702. Generators shall be fueled by a diesel or natural gas fuel source. Gaseous fuels shall be provided by a public utility and piped to the unit.

Section 1203.1.3 Installation is amended by adding the following after the last sentence:
1203.1.3 Installation. All generators installed shall be provided with a remote status panel in accordance with NFPA 110. Optional standby generators shall also be provided with a remote status panel. Panel location shall be adjacent to the fire alarm control panel when provided or in an area *approved* by the *fire code official*.

Exception:
Generators located at one & two family dwellings constructed in accordance with the Denver Residential Code.

Section 1203.1.5 Load duration is added as follows:
1203.1.5 Load duration. If fuel pumping is required from a main fuel tank to a day tank, a duplex pumping system shall be provided. Fuel storage and handling shall comply with Chapter 57.

Section 1203.1.10 Location is added as follows:
1203.1.10 Location All generators required by this code shall be located at grade level, one level below, or one above grade. Where pumping systems between fuel tanks are utilized, duplex pumping shall be provided.

Exception:
Stationary emergency and legally required standby power generators in a stand-alone open parking garage less than 55 feet in height, shall be permitted to be located on the topmost atmospheric level.

Section 1203.1.10.1 Outdoor locations is added as follows:
1203.1.10.1 Outdoor locations. Where generators are located outside of a building, the following provisions shall apply:

1.Generators shall be located at least 5 feet from the exterior wall of the building. A generator may be located within 5 feet of the building if the exterior wall is non-combustible and has a 2-hour fire resistance rating. The separation distance of the generator to the exterior wall shall be maintained as required by NFPA 70 and the manufacturer's recommendations. The fire resistance rated exterior wall shall extend at least 3 feet above the generator enclosure.

2. A minimum 10-foot separation shall be maintained between a generator and any transformer, or a 2- hour fire resistance rated masonry or concrete wall shall be provided between the generator and the transformer. The separation wall shall be no less than 6 feet above the highest ground elevation on either side of the wall and not less than 2 feet above the top of the generator or transformer whichever is lower. Separation distance between this equipment and the exterior wall shall comply with NFPA 70.

1203.2.2 Elevators and platform lifts is amended by adding the following to the end of the paragraph:

Standby power for platform lifts shall comply with ASME A18.1.

Section 1203.2.11 High-rise buildings is replaced as follows:
1203.2.11 High-rise buildings. Emergency power shall be provided for high-rise buildings as required in Section 403 of the *Denver Commercial Building Code* and shall be in accordance with Section 1203.

CHAPTER 20 AVIATION FACILITIES

SECTION 2001 GENERAL
Section 2001.1 Scope is replaced as follows:
2001.1 Scope. Airports, heliports, helistops, and aircraft hangars shall be in accordance with this Chapter and applicable sections of Appendix S of the *Denver Commercial Building Code*.

Section 2001.3 Permits is replaced as follows:
2001.3 Permits. Permits to operate aircraft-refueling vehicles, application of flammable or combustible finishes, hot work, aviation fuel dispensing facilities – maintenance and inspection, and emergency fuel shut off (EFSO) impairment fire watch shall be in accordance with Section 105.5.

SECTION 2005 PORTABLE FIRE EXTINGUISHERS
Section 2005.6 At fuel-dispensing stations is replaced as follows:
2005.6 At fuel-dispensing stations. Portable fire extinguishers shall not be located in probable spill areas. To provide accessibility from adjoining gates, portable fire extinguishers shall be located approximately midway between gate positions.

SECTION 2006 AIRCRAFT FUELING
Section 2006.6 Emergency fuel shutoff is amended by adding the following at the end of the paragraph:
The emergency fuel shutoff system (EFSO) is an emergency alarm and shall comply with this section and Section 908.3. Emergency fuel shutoff switches shall be of a yellow back plate with a red, mushroom head type, listed for use, with a protective cover to prevent inadvertent contact and shall only be reset by a key accessible only to authorized personnel. Activation of the emergency alarm system shall activate a local blue strobe or beacon. Locations, performance, and marking shall comply with NFPA 407 and shall be field approved prior to installation by the DFD DEN fueling inspector.

Section 2006.12.1 Auxiliary power unit (APU) is added as follows:
2006.12.1 Auxiliary power unit (APU). Fuel servicing shall not be performed on a fixed-wing aircraft while an onboard engine, APU or heater, is operating.

> Exception: In an emergency resulting from the failure of an onboard auxiliary power unit on a jet aircraft, and in the absence of suitable ground support equipment, a jet engine mounted at the rear of the aircraft or on the wing on the side opposite the fueling point shall be permitted to be operated during fueling or defueling to provide power, provided that the operation follows written procedures approved by Denver International Airport and the Denver Fire Department.

CHAPTER 23 MOTOR FUEL-DISPENSING FACILITIES AND REPAIR GARAGES

SECTION 2304 DISPENSING OPERATIONS

Section 2304.3 Unattended self-service motor fuel-dispensing facilities and all subsections are replaced as follows:

2304.3 Unattended self-service motor fuel-dispensing facilities. Unattended public self-service motor fuel-dispensing facilities are prohibited.

Section 2311.8.9.1 System activation - Item 1 is replaced as follows:

2311.8.9.1. System activation. Initiation of distinct audible and visual alarm signals in the repair garage shall be in accordance with Section 916. Signage required by Section 916.9 shall state outside of the room: "**DO NOT ENTER WHEN LIGHT IS FLASHING – NONODORIZED FLAMMABLE GAS LEAK DETECTED**" and inside of the room: "**FLASHING LIGHT MEANS NONODORIZED FLAMMABLE GAS LEAK DETECTED – EVACUATE ROOM AND BUILDING**".

CHAPTER 24 FLAMMABLE FINISHES

SECTION 2404 SPRAY FINISHING

Section 2404.8.1.2.1 Interlocks Item 3 is replaced as follows:

2404.8.1.2.1 Interlocks.

3. Have the ventilating system maintain a concentration 25 percent below the lower flammable limit (LFL) within the spray booth or spray room during the drying process and automatically shut off drying apparatus in the event of a failure of the ventilating system.

SECTION 2405 DIPPING OPERATIONS

Section 2405.7 Ventilation is replaced follows:

2405.7 Ventilation of flammable vapor areas. Mechanical ventilation shall be provided to maintain airborne concentrations below 25 percent the lower flammability limit (LFL). Required ventilation systems shall be arranged such that the failure of any ventilating fan shall automatically stop the dipping conveyor system.

CHAPTER 26 FUMIGATION AND INSECTICIDAL FOGGING

SECTION 2603 FIRE SAFETY REQUIREMENTS

Section 2603.3.1 Warning signs is amended by adding the following after the first sentence:

2603.3.1 Warning signs. Where fumigants and insecticidal fogging products are used, *approved* warning signs bearing the "skull and crossbones" emblem with the warning "**DANGER! POISON GAS! KEEP OUT!**" shall be posted.

Section 2603.8 Fumigations restricted is added as follows:

2603.8 Fumigations restricted. Heated elemental sulfur processes creating sulfur dioxide shall be prohibited.

CHAPTER 27 SEMICONDUCTOR FABRICATION FACILITIES

SECTION 2703 GENERAL SAFETY PROVISIONS

Section 2703.12.1 Where required is replaced as follows:
2703.12.1 Where required. Emergency alarm systems shall be provided in accordance with Section 908.3 in the areas indicated in 2703.12.1.1 through 2703.12.1.3.

Section 2703.12.3.1 Emergency alarm signage is added as follows:
2703.12.3.1 Emergency alarm signage. Signage required by Section 908.4 shall state,
Outside the room: "**DO NOT ENTER WHEN LIGHT IS FLASHING – HAZARDOUS PRODUCTION MATERIAL SPILL DETECTED**." Inside the room: "FLASHING LIGHT MEANS HAZARDOUS PRODUCTION MATERIAL SPILL DETECTED – EVACUATE ROOM AND BUILDING."

Section 2703.13.2.1.1 Emergency alarm signage is added as follows:
2703.13.2.1.1 Emergency alarm signage. Signage required by Section 916 shall state,
Outside the room: "**DO NOT ENTER WHEN LIGHT IS FLASHING – HAZARDOUS PRODUCTION MATERIAL SPILL DETECTED**." Inside the room: "FLASHING LIGHT MEANS HAZARDOUS PRODUCTION MATERIAL SPILL DETECTED – EVACUATE ROOM AND BUILDING."

CHAPTER 28 LUMBER YARDS AND AGRO-INDUSTRIAL, SOLID BIOMASS AND WOODWORKING FACILITIES

SECTION 2804 FIRE PROTECTION
Section 2804.3 Portable fire extinguishers or standpipes and hose is replaced as follows:
2804.3 Portable fire extinguishers Portable fire extinguishers shall be provided within 50 feet (15240 mm) of travel distance to any machine producing shavings or sawdust. Extinguishers shall be provided in accordance with Section 906 for extra-high hazards.

CHAPTER 32 HIGH-PILED COMBUSTIBLE STORAGE

SECTION 3201 GENERAL
Section 3201.3 Construction documents is replaced as follows:
3201.3 Construction documents. A construction permit shall be required in accordance with Section 105 for the installation or reconfiguration of all high-piled storage systems. Installation plans and specifications shall be submitted for review and approval and shall include the information specified in Policy 105.6. *Approved* plans shall be maintained on the premises in an *approved* location and available to Fire Department personnel upon request.

SECTION 3206 GENERAL FIRE PROTECTION AND LIFE SAFETY FEATURES
Table 3206.2 General Fire Protection and Life Safety Requirements is amended as follows:
3206.2 Type of protection.
Type of protection. Where required by Table 3206.2, smoke and heat removal and automatic sprinkler design densities shall be provided to protect the high-piled storage area.

Table 3206.2 is amended by deleting both (Option 2) rows from the table.

CHAPTER 33 FIRE SAFETY DURING CONSTRUCTION AND DEMOLITION

Section 3303.1 PROGRAM DEVELOPMENT AND MAINTENANCE
is modified as follows (subsection remains):
Replace the 2nd to last sentence with: The *site safety plan* shall comply with Section 3302.1 of the *Denver Commercial Building Code.*

Section 3303.2.1 Violations
Delete section in its entirety.

Section 3313 Asbestos Operations is added as follows:
SECTION 3313 ASBESTOS OPERATIONS

3313.1 General. Operations involving asbestos or asbestos-containing materials in buildings and other structures regulated by this code shall be conducted in accordance with this Section.

3313.2 Notification. The *fire code official* shall be notified 24 hours prior to the commencement and closure of asbestos operations. The permit applicant shall notify the *building official* when asbestos abatement involves the removal of materials which were used as a feature of the building's fire resistance.

3313.3 Signs. *Approved* signs shall be posted at the entrance, exit, decontamination areas and waste-disposal areas for asbestos operations. The signs shall state asbestos abatement operations are in progress in the area, asbestos is a suspected carcinogen and proper respiratory protection is required. Signs shall have a reflective surface and lettering shall be a minimum of two inches (51 mm) in height.

CHAPTER 34 TIRE REBUILDING AND TIRE STORAGE

SECTION 3401
GENERAL
Section 3401.3 Waste Tire Facilities/Operations is added as follows:

3401.3 Waste tire facilities or operations. Waster tire facilities or operations shall comply with Colorado Revised Statute (CRS) 30-20-1401 as administered by the Division of Fire Prevention & Control.

SECTION 3405 OUTDOOR STORAGE
Section 3405.4 Distance from lot lines and buildings is replaced as follows:
3405.4 Distance from lot lines and buildings. Tire storage piles shall be located not less than 50 feet (15 240 mm) from *lot lines* and buildings where outdoor storage is in excess of 5,000 square feet (464.5 square meters).

Exceptions:
1. Tire storage piles shall be located at least 10 feet (3048 mm) from *lot lines* and *buildings* if storage is no higher than six feet (1836 mm) and storage is equal to or less than 5,000 square feet (464.5 square meters).
2. Storage heights from six feet (1836 mm) to 10 feet (3048 mm) shall be no closer to *lot lines* and *buildings* than 20 feet (6096 mm) and storage is equal to or less than 5,000 square feet (464.5 square meters).

CHAPTER 39 PROCESSING & EXTRACTION FACILITIES

Chapter 39 Processing and extraction facilities is replaced in its entirety as follows:

SECTION 3901
GENERAL

3901.1 Scope. Facilities where plant processing and solvent-based extraction are conducted, including but not limited to cultivation and related activities, pre-extraction, or post- extraction, shall comply with this chapter and the Denver Commercial Building Code. The use, storage, transfilling and handling of hazardous materials in these facilities shall comply with this chapter, other applicable provisions of this code and the Denver Commercial Building Code.

3901.2 Permits. Permits shall be required as set forth in Section 105

3903.3 Existing operations. Existing buildings or facilities used for the growing or processing of marijuana shall comply with this chapter. Existing extraction processes where the medium of extraction or solvent is changed shall comply with this chapter.

SECTION 3902
DEFINITIONS

3902.1 Definitions. The following terms are defined in Chapter 2.
CHEMICAL FUME HOOD
EXTRACTION
POST OIL PROCESSING

SECTION 3903 EXTRACTION OPERATIONS
3903.1 Construction Requirements.

3903.1.1 Location. Extraction processes shall be performed in a room dedicated to the extraction process. Extraction processes utilizing *flammable liquefied gas* shall not be located in any building containing Group A, E, I, or R occupancies.

3903.1.2 Egress. Exit doors from extraction rooms utilizing hazardous materials shall swing in the direction of egress and be self-closing. Panic hardware shall be provided on doors in liquefied petroleum gas (LPG) extraction rooms. Where latching door hardware is provided on extraction rooms utilizing hazardous materials, panic hardware shall be provided.

3903.1.3 Extraction Rooms. Extraction room shall be fully enclosed. The floor, ceiling, and walls of extraction rooms shall be constructed in accordance with the Denver Commercial Building Code and be continuous,
non-combustible, and smooth. Rooms designed in accordance with Section 3903.4.1.1 shall be constructed to permit the free passage of exhaust air from all parts of the room.

Exceptions:

1. Enclosed booths constructed in accordance with Section 2404.3.3.1 through 2404.3.3.3.

2. CO_2 extraction rooms and extraction rooms containing processes not utilizing hazardous materials.

3903.1.4 Openings and penetrations. Openings and penetrations into extraction rooms utilizing hazardous materials shall only be provided for egress, mechanical, electrical, or plumbing systems serving the extraction room. Penetrations into LPG extraction rooms shall be sealed vapor tight. Non-operable glazing is permitted where glazing does not interfere with required exhaust systems.

3903.1.5 Extraction room illumination. Luminaires inside the extraction room shall comply with Section 3903.2.2. Luminaires attached to the walls or ceilings of an extraction room or booth, but outside of any classified area and separated from the flammable vapor areas by vapor-tight glass panels, shall be suitable for use in ordinary hazard locations. Such luminaires shall be serviced from outside the flammable vapor areas.

3903.1.6 Fire protection. Extraction rooms, booths, or hoods, including ductwork where required for hazardous exhaust systems, shall be protected by an *approved* automatic fire extinguishing system complying with Chapter 9 where any of the following exist:

1. Extraction processes utilizing LPG or off gassing LPG from spent plant material or oil

2. Vapors are released exceeding 25 percent of the lower flammable limit from flammable liquid extraction processes or flammable liquid post oil processing.

3903.2 Sources of ignition. Extraction or post oil processing operations which use flammable liquids or liquefied petroleum gas (LPG) shall comply with Sections 3903.2.1 through 3903.2.3.

3903.2.1 Open flame and sparks. Smoking, open flames, direct fired heating devices, etc. shall be prohibited in areas where flammable vapors exist.

3903.2.2 Electrical equipment. Electrical equipment installed in rooms designed in accordance with Section 3903.4.1.1, hoods, or booths containing LPG extraction processes shall be in accordance with NFPA 70 (NEC) as a Class I Division I location. Areas adjacent to classified locations shall be in accordance with NFPA 70 (NEC). Electrical equipment installed in areas of flammable liquid extractions or post oil processing shall be in accordance with Chapter 50, and NFPA 70 (NEC).

Exception: Subject to approval of the *fire code official*, rooms or booths containing LPG

extraction equipment that is not normally opened within the room or booth for oil or plant material retrieval, and frequent leakage in the closed system does not occur, may be considered a Class I Division II location.

3903.2.3 Grounding and Bonding. LPG extraction rooms must use static bonding and grounding of extraction equipment, ducts, and piping etc. installed in accordance with NFPA 70 (NEC).

3903.3 Equipment. Extraction process equipment utilizing hazardous materials shall be listed or *approved*.

3903.4 Exhaust required. Extraction and post oil processing, utilizing LPG or flammable liquids shall be provided with an exhaust system in accordance with Section 3903.4.1 or 3903.4.2. The exhaust system shall be in operation at all times when extractions or post oil processing is being performed and until LPG is off gassed from oil and/or plant material removed from LPG extraction equipment. Fans shall be of the type approved for use when flammable or explosive vapors are present in accordance with the *Denver Mechanical Code,* Section 503. Capture and containment air velocity shall be provided across booths, hoods, or exhausted enclosures to capture and convey emissions to the exhaust system and shall be no less than 75 fpm.

3903.4.1 Exhaust for LPG extraction processes. A hazardous exhaust system engineered in accordance with the *Denver Commercial Building Code* or this code shall be provided for LPG extraction processes including LPG degassing from processed plant material or oil removed from extraction equipment.

3903.4.1.1 Exhausted enclosure. Where the extraction room is used as the exhausted enclosure, the exhaust system shall be designed to provide capture and containment air velocity across all areas of the enclosure.

3903.4.1.2 Electrical Interlocks. The exhaust system shall be interlocked with the room power, such that when the exhaust system is not operating, power and lighting will be disabled.

3903.4.2 Exhaust for Flammable Liquid Extraction processes. A hazardous exhaust system in accordance with the *Denver Commercial Building Code* or this code shall be provided for flammable liquid extraction processes.

Exceptions:

1. Distillation process with less than 5 gallons of flammable liquid performed under a chemical fume hood installed in accordance with the *Denver Commercial Building Code* or this code unless a hazardous exhaust system is required by the *Denver Commercial Building Code* or this code.

2. Solvent distillation units in compliance with Section 5705.4.

3.Extractions performed in accordance with Denver Revised Municipal Code Section 38-177.

3903.5 Gas Detection. A continuous gas detection system complying with Section 916 shall be provided within rooms, booths, or hoods, containing CO_2 or LPG extraction processes. Actuation of the gas detection system shall initiate a local alarm within the room. CO_2 gas detection systems shall alarm at

5000ppm. LPG gas detection systems shall alarm at no greater than 25 percent of the LFL. Portable LPG gas detection shall be utilized by the extraction system operator to verify local hydrocarbon levels, including system leaks.

3903.6 CO_2 Extraction Equipment Process discharge. CO_2 discharges shall be piped to the exterior.

3903.7 Refrigeration and Cooling Equipment. Refrigerators, freezers, and other cooling equipment used to store, or process flammable liquids shall be in accordance with NFPA 45 and applicable provisions of the *Denver Commercial Building Code* or this code.

3903.8 Stand-by power systems. For new or modified hazardous exhaust systems, a stand-by power system complying with Chapter 12, shall be provided for the following items, when installed:

1. Extraction room lighting

2. Extraction room ventilation system

3. Solvent gas detection system

Exception: Stand-by power shall not be required where it can be shown by engineering analysis that the hazardous process conducted will not create hazardous conditions when normal power is lost.

Section 3904 Marijuana growing operations is added as follows:
SECTION 3904 PLANT PROCESSING OPERATIONS

3904.1 CO_2 Enrichment Systems. CO_2 enrichment systems shall comply with Section 5307.4 or 5307.5 as applicable.

3904.2 Vertical growing systems. Vertical growing systems, racks, and shelves where the top of the plants or lighting is greater than 12 feet in height shall be in accordance with Chapter 32 as a commodity classification. The amount of plastic utilized in grow containers and irrigation components shall be accounted for in the commodity analysis for determining the hazard classification.

CHAPTER 40 ALCOHOL BEVERAGE PRODUCTION FACILITIES

Chapter 40 Storage of distilled spirits and wines is deleted in its entirety and replaced as follows:

SECTION 4001 GENERAL

4001.1 Scope. Buildings and portions thereof where ethanol mixtures are produced, stored, handled, or dispensed in the production of alcohol beverages shall be regulated in accordance with this Chapter and this code.

Unless otherwise noted, where provisions in this chapter conflict with provisions in other sections of the *Denver Commercial Building Code* and this code for ABPFs, the provisions of this chapter shall supersede the provisions in those sections.

4001.2 Referenced standards. The fire code official is authorized to enforce applicable provisions of the standards listed in Chapter 80 of the *Denver Fire Code* to ensure the safe operation of ABPFs. Table 4001.2 lists the standards most often utilized for ABPFs.

TABLE 4001.2 REFERENCED STANDARDS

DOCUMENT	TITLE
NFPA 13	Standard for the Installation of Sprinkler Systems
NFPA 30	Flammable and Combustible Liquids Code
NFPA 61	Standard for the Prevention of Fires and Dust Explosions in Agricultural and Food Processing Facilities
NFPA 69	Standard on Explosion Prevention Systems
NFPA 70	National Electrical Code (NEC)
NFPA 72	National Fire Alarm and Signaling Code
NFPA 505	Fire Safety Standard for Powered Industrial Trucks Including Type Designations, Areas of Use, Conversions, Maintenance, and Operations
NFPA 704	Standard System for Identification of Hazards of Materials for Emergency Response
NFPA 780	Standard for the Installation of Lightning Protection Systems

4001.3 Recommended practices. The *fire code official* and *building official* shall have the authority to utilize the recommended practices and data sheet listed in Table 4001.3 to render interpretations and develop policies and procedures in the application of the provisions of the *Denver Commercial Building Code and Denver Fire Code* and referenced standards. Such interpretations, policies, and procedures shall be in compliance with the intent and objective of this chapter.

TABLE 4001.3 RECOMMENDED PRACTICES

NFPA 77	Recommended Practice on Static Electricity
NFPA 497	Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas
NFPA 499	Recommended Practice for the Classification of Combustible Dusts and of Hazardous Locations for Electrical Installations in Chemical Process Areas

FM Global Property Loss Prevention Data Sheet 7-29	Ignitable Liquid Storage in Portable Containers
The Distilled Spirits Council of the United States, Inc.	Recommended Fire Protection Practices for Distilled Spirits Beverage Facilities

4001.4 Construction Documents. Construction documents shall be submitted for review and permit prior to the installation, construction, or modification of ABPFs or the operational and storage equipment therein.

4001.5 Operational Permits. Operational permits shall be required as set forth in Section 105.

SECTION 4002
DEFINITIONS, ACRONYMS AND ABBREVIATIONS
4002.1 Definitions. The following terms are defined in Chapter 2.
ALCOHOL BEVERAGE
ALCOHOL BEVERAGE PRODUCTION FACILITY (*ABPF)*
ALCOHOL BY VOLUME (*ABV*)
BEVERAGE SPIRIT
BREWERY
BULK STORAGE FOR DISTILLING
CASK
CLASS 1 LIQUIDS
CONTAINER
DENVER COMMERCIAL BUILDING CODE
DISTILLATION
ETHANOL (ALSO, "ETHYL ALCOHOL" OR "GRAIN ALCOHOL")
ETHANOL MIXTURE
FERMENTATION
HAZMAT
HAZMAT
INVENTORY STATEMENT (HMIS)
HAZMAT MANAGEMENT PLAN (HMMP)
HAZMAT REPORT (HMR)
INTERMEDIATE BULK CONTAINER
LOWER FLAMMABLE LIMIT (LFL) MASH
MINIMUM EXPLOSIVE CONCENTRATION (MEC)
NORMALLY CLOSED
NORMALLY OPEN
PILE
PORTABLE TANK
PROCESS DESCRIPTION
PRESSURE VESSEL
PROCESSING VESSEL

RACK
REMOTE AREA (c.f., NFPA 13)
SPIRIT
STATIONARY TANK
STILL
STORAGE AREA
TANK
USE AREA
VAT (ALSO FOUDRE)
VESSEL
WASH (ALSO BEER, MALT LIQUOR)
WINE
WINERY
WORT

4002.2 Acronyms and abbreviations. The following acronyms and abbreviations shall, for the purposes of this chapter, have the meanings identified below:

ABPF. Alcohol Beverage Production Facility.
ABV. Alcohol by Volume.
ASME. American Society of Mechanical Engineers.
ASTM. American Society for Testing and Materials.
DFD. Denver Fire Department.
HMIS. HazMat Inventory Statement.
HMMP. HazMat Management Plan.
HMPA. HazMat Permit Application.
HMR. HazMat Report.
LEL. Lower Explosive Limit.
LFL. Lower Flammable Limit.
MAQ. Maximum allowable quantity per control area in accordance with Section 5003.1.1.
MEC. Minimum Explosive Concentration.
MSDS. Material Safety Data Sheet
NEC. National Electrical Code
TTB. Alcohol and Tobacco Tax and Trade Bureau

SECTION 4003
GENERAL REQUIREMENTS

4003.1 Material classification. Hazard classifications and analyses of *ethanol mixtures* shall account for altitude-dependent properties based on an elevation of 5,280 feet (1,609 m) above sea level.

Ethanol mixtures that have no fire point when tested in accordance with ASTM D 92, *Standard Test Method for Flash and Fire Points,* by Cleveland Open Cup Tester and ethanol mixtures with 16 percent or less ABV with the remainder comprised of materials without hazards regulated by the *Denver Commercial Building Code* and this code shall not be regulated as flammable or combustible liquids.

Ethanol mixtures with greater than 20 percent ABV and less than or equal to 34 percent ABV, and the remainder comprised of water and other materials without hazards regulated by the *Denver Commercial Building Code* and this code, shall be classified as Flammable 1C liquids.

Ethanol mixtures with greater than 34 percent ABV, and the remainder comprised of water and other materials without hazards regulated by the *Denver Commercial Building Code* and this code, shall be classified as Flammable 1B liquids.

4003.2 Occupancy classification. The occupancy classification of *use areas* and *storage areas* including grain- handling and bottling/packaging systems and processes shall be classified in accordance with Sections 4003.2.1 through 4003.2.3. Quantities of *ethanol mixtures* exceeding the MAQs but packaged in individual, closed and unpressurized containers not exceeding 1.3 gallons (5 L) in volume shall not be counted towards the MAQs.

4003.2.1 H-2 occupancy classification. An H-2 occupancy classification shall be assigned to buildings or portions thereof in accordance with Sections 4003.2.1.1 and 4003.2.1.2.

4003.2.1.1 Combustible dust producing operations. ABPFs or portions thereof containing equipment, systems, and processes where grains are stored, transferred or milled in such a manner that the confinement conditions and dust concentrations create a fire or explosion hazard shall be in accordance with Chapter 22. The *fire code official* is authorized to require technical assistance in accordance with Section 104 to establish whether the building or portion thereof is required to be assigned an H-2 occupancy classification and to determine explosion and deflagration hazard reduction criteria.

4003.2.1.2 Flammable liquids. ABPFs and portions thereof with quantities of *Class 1 Liquids* in excess of the MAQs, that are stored or processed in *normally open vessels* or systems, or *vessels* or in systems that are pressurized at more than 15 pounds per square inch gauge (psig; 103.4 kPa), or where a *Class 1 Liquid* is released to atmosphere at or above its flash point temperature as part of normal operations shall be assigned an H-2 occupancy classification.

4003.2.2 H-3 occupancy classification. ABPFs and portions thereof with quantities of *Class 1 Liquids* in excess of the MAQs, that are stored or processed in *normally closed vessels* or in systems pressurized to 15 pounds per square inch gauge (psig; 103.4 kPa) or less, shall be classified as H-3 occupancies.

4003.2.3 Non-high hazard occupancy classification. *Control areas* with *Class 1 Liquids*, *combustible dust* production, or other regulated hazards shall be assigned an occupancy classification in accordance with the *Denver Building* according to the fire safety and relative hazard involved.

4003.3 Hazardous materials permit application (HMPA). An HMPA in an *approved* format is required for all ABPFs using or storing *HazMat*. It shall contain at a minimum, an HMR, HMMP, process description, fire- safety and evacuation plans, and a storage plan.

4003.3.1 Hazardous materials report (HMR). An HMR in an *approved* format is required for all facilities using or storing *HazMat*. It shall contain at a minimum, critical personnel contact information, pertinent building construction and occupancy information, and an HMIS in accordance with Section 5001.5.2, Appendix H102 and DFD policy.

4003.3.2 Hazardous materials management plan (HMMP). An HMMP in accordance with Section 5001.5.1 and DFD policy shall be provided in an *approved* format.

4003.3.3 Process description. A process description shall be provided in an *approved* format. All relevant process and storage operations in all *control areas* and Group H Occupancies shall be identified. The quantities of all materials with regulated hazards in each area at each step of all processes shall be calculated. The maximum capacity of all *Class 1 Liquid bulk storage vessels for distilling*, *processing vessels* and *stills* shall be used in the quantity calculation. The capacities of all such *vessels* and *stills* that can be used simultaneously shall be counted as being simultaneously full.

4003.3.4 Emergency Planning. Fire safety and evacuation plans in accordance with Section 404 shall be prepared and maintained.

4003.3.5 Storage plan. Aisle and storage plans shall be submitted in accordance with Chapters 32 and 50.

4003.3.6 Material safety data sheets. MSDS shall be readily available on the premises for *HazMat* therein and made available to DFD inspectors upon request.

4003.3.7 Unauthorized Discharges Preparation. Plans and provisions shall be made for controlling and mitigating unauthorized discharges.

4003.3.8 Personnel training and written procedures. Persons responsible for the operations in *Class 1 Liquid* storage areas or use areas shall be familiar with the chemical nature of the materials and the appropriate mitigating actions necessary in the event of fire, leak, or spill.

4003.3.9 Fire department liaison. Responsible persons shall be designated and trained to be liaison personnel to the fire department. They shall aid the fire department in preplanning emergency responses and identifying the locations of *HazMat*, shall have access to MSDS and be knowledgeable in the site's emergency response procedures.

4003.4 Unauthorized discharges. When *Class 1 Liquids* are released in quantities reportable under state, federal or local regulations, the *fire code official* shall be notified, and action shall be taken in accordance with Sections 4003.4.1 and 4003.4.2.

4003.4.1 Records. Accurate records shall be kept of all unauthorized discharges of *Class 1 Liquids* by the permittee.

4003.4.2 Responsibility for cleanup. The person, firm, or corporation responsible for an unauthorized discharge shall institute and complete all actions necessary to remedy the effects of such unauthorized discharge, whether sudden or gradual, at no cost to the jurisdiction. When deemed necessary by the *fire code official*, cleanup may be initiated by the fire department or by an authorized individual or firm. Costs associated with such cleanup shall be borne by the owner, operator, or other person responsible for the unauthorized discharge.

4003.5 Construction. The construction of ABPFs shall be in accordance with Sections 4003.5.1 and 4003.5.2.

4003.5.1 General. Special detailed requirements, building heights, allowable areas, construction types, control areas, rated assemblies, finishes, means of egress, accessibility, interior environment, energy efficiency, exterior walls, roofing, structural design, fire service features, building services and systems, and fire and smoke protection shall be in accordance with the *Denver Commercial Building Code* and this code for the assigned occupancy classifications and this Chapter.

4003.5.2 Floors. Floors of *use areas* and *storage areas* for *Class 1 Liquids* shall be of noncombustible construction. Floor surfacing shall not be reactive with ethanol.

4003.6 Systems, features, and components. Systems, features, and components shall be provided in accordance with Sections 4003.6.1 through 4003.6.13.

4003.6.1 Deflagration prevention by combustible concentration reduction. Atmospheric concentration of *flammable vapors* shall be maintained at or below 25 percent of the LFL, and *combustible dusts* at or below 25 percent of the MEC, in all areas of the ABPF or portion thereof where they could collect or migrate. Accumulation of *combustible dust* on all exposed surfaces at all levels throughout the building is prohibited.

Indoor storage areas and use areas are permitted to be provided with natural ventilation where it can be shown to maintain the atmospheric concentrations at or below 25 percent of the LFL and MEC for the materials under consideration. This shall be confirmed by sampling the actual vapor concentration under normal operating conditions. The sampling shall be conducted throughout the enclosed storage area, extending to or toward the bottom and the top of the enclosed storage area. The vapor concentration used to determine the required ventilation rate shall be the highest measured concentration during the sampling procedure. The sampling shall be conducted manually or by installation of a continuously monitoring flammable vapor detection system.

Where natural ventilation is not adequate, *Class 1 Liquid use areas*, *storage areas* and equipment, machinery, and operations which produce or emit *combustible dust*, shall be provided with an *approved* mechanical collection and exhaust system in accordance with Sections 501, 502.1, 502.8, 502.9.5 and 503 of the *Denver Mechanical Code*.

Use areas and *storage areas* in ABPFs or portions thereof where *Class 1 Liquid* vapor concentrations cannot be maintained at or below 25 percent of the LFL, or confined enclosures, where the concentration of *combustible dust* cannot be maintained at or below 25 percent of the MEC, shall be provided hazardous exhaust in accordance with Sections 510 and 511 of the *Denver Mechanical Code*.

4003.6.1.1 System requirements. Exhaust ventilation systems shall comply with all of the following:

1. Installation shall be in accordance with the *Denver Mechanical Code.*

2. Mechanical ventilation over the *storage area* or *use area* shall be at a rate of not less than 1 cubic foot per minute per square foot (cfm/ft^2; 0.00508 cms/m^2) of floor area.

Exception: Areas where *Class 1 Liquids* are stored in casks are permitted to be provided with an engineered ventilation system in accordance with Chapter 4 of the *Denver Mechanical Code*. The air flow rate shall not be less than the greater of (1) that required to maintain the flammable vapor concentration in the storage area at or below 25 percent of the LFL, or (2) 0.06 cubic feet per minute per square foot (cfm/ft^2; 0.000305 cms/m^2).

3. Systems shall operate continuously.

Exception: An approved engineered design alternative.

4. A manual shutoff control shall be provided outside of the room in a position adjacent to the access door to the room, or in an *approved* location. The switch shall be a break-glass or other *approved* type and shall be labeled, "VENTILATION SYSTEM EMERGENCY SHUTOFF."

5. Exhaust ventilation shall be designed to consider the density of the material released. For *ethanol* vapor, inlet air shall be introduced, and exhaust shall be taken, from a point within 12 inches (305 mm) of the floor. For dust, inlet air shall be introduced at a point within 12 inches (305 mm) of the floor and exhaust shall be taken as close to the dust generation source as possible.

6. The location and configuration of both the inlet and exhaust air openings shall be designed to provide air movement across all portions of the floor or room to prevent the accumulation of *flammable vapors* and suspended *combustible dust*.

7. Exhaust air shall not be recirculated to occupied areas.

4003.6.2 Spill control and secondary containment. Spill control and secondary containment shall be provided in accordance with Sections 4003.6.2.1 through 4003.6.2.2.

4003.6.2.1 Indoor. Spill control and secondary containment shall be provided for H-2 and H-3 occupancies in ABPFs where:

1. The capacity of any single *vessel* or system holding *Class 1 Liquids* exceeds 55 gallons (208 L);

2. The aggregate capacity of multiple *vessels* or systems holding *Class 1 Liquids* exceeds 1,000 gallons (3,785 L); or

3. *Class 1 Liquids* are dispensed into or from a *normally open vessel* or system exceeding a 5.3- gallon (20 L) capacity.

4003.6.2.1.1 Design. The drainage system shall be in accordance with the *Denver Plumbing Code* and the following:

1. All portions of the drainage system including floors shall be liquid-tight and constructed of noncombustible materials compatible with *ethanol*.

Exception: Where *approved* by the *fire code official* , and in compliance with federal, state, and local government agencies' regulations and permits, floors of buildings or portions thereof used for the *bulk storage* of *Class 1 Liquids* for distilling are permitted to be exposed earth. Combustible materials such as tilled organic matter are permitted to be mixed with dirt provided the mixture is noncombustible.

2.The drains and drainage system capacity shall be sized to carry the volumetric flow of water discharged from the automatic sprinkler system without backing up at the drains or pooling to a depth greater than ¼-inch (6.5mm). The sprinkler coverage area used to calculate the required volumetric flow is permitted to be based on the smaller of the following:

1.The remote area in accordance with NFPA 13 – provided it is located in the area served by the drains.

2. The area of the building or portion thereof served by the drains.

Exception: When released onto the ground within a fire area, the volumetric flow of water is permitted to be reduced to account for the percolation into the soil. An engineering analysis shall be provided to establish the reduction.

3.Floors shall slope to drains. Impermeable curbs and floor slope shall be designed to prevent spilled *Class 1 Liquids* and water discharged from the automatic sprinkler system from flowing to adjoining areas. Floor slope shall not be less than 2 percent.

Exceptions:

1. Floors in existing buildings with less than 2 percent slope are permitted to be used provided they are made liquid tight and floor sinks are installed as necessary to preclude water discharged from the automatic sprinkler system from pooling in low spots. These drains shall be installed in addition to the drains required in Section 4003.6.1.1, Item 2.

2. Where trench drains or a combination of impermeable curbs and trench drains surround the sprinkler coverage area, the floors shall slope to the drains at a rate of not less than 1 percent. Where a combination of impermeable curbs and trench drains is used, no less than 50 percent of the perimeter shall be protected by trench drains.

3 . Drainage systems shall terminate in an *approved* secondary containment reservoir designed to contain a spill from the largest *vessel* in the area served by the drains plus the volumetric flow of water calculated in Section 4003.6.1.1, Item 2 for a period of 20 minutes. An *approved* automatic monitoring method shall be provided to detect material in the reservoir. Monitoring devices shall be connected to *approved* visual and audible alarms. Reservoir capacity to

accommodate the required secondary containment volume shall be maintained at all times.

Exception: Release of *Class 1 Liquids* and fire protection water directly into a sanitary or storm-water drainage system, onto the ground, or a combination thereof is permitted when in compliance with federal, state, and local governmental agencies' regulations and permits.

4003.6.2.2 Outdoor. Secondary containment for outdoor storage areas shall be in accordance with Chapter 57.

4003.6.3 Occupant and property protection. Occupant and property protection shall be provided in accordance with Sections 4003.6.3.1 through 4003.6.3.4.

4003.6.3.1 Automatic sprinklers. An automatic sprinkler system shall be installed throughout ABPF H-2 and H-3 fire areas in accordance with Sections 4003.6.3.1.1 through 4003.6.3.1.3.

4003.6.3.1.1 Flammable liquids. Sprinkler discharge criteria in areas of ABPFs or portions thereof, with bulk storage (for distilling) of *Class 1 Liquids* in combustible containers, including casks, classified as H-2 or H-3, shall be in accordance with NFPA 30 but shall not be less than that required in accordance with NFPA 13 for Extra Hazard occupancies.

Exception: Sprinkler discharge criteria established by an *approved* engineered design.

Sprinkler discharge criteria for all *Class 1 Liquid use are*as and *storage areas* other than *Class 1 Liquid bulk storag*e (for distilling) in ABPFs or portions thereof classified as H-2 or H-3 occupancies, shall be in accordance with NFPA 30 but shall not be less than that required by NFPA 13 for Ordinary Hazard Group 2 over a minimum design area of 3,000 square feet (279 m2).

4003.6.3.1.2 Combustible dust producing operations. Automatic sprinkler protection criteria for H-2/*Combustible Dust* Producing Operations shall be determined in accordance with Section 4003.2.1.1.

4003.6.3.1.3 Non-high hazard occupancies. Sprinkler discharge criteria for ABPFs or portions thereof not classified as a division of the high-hazard occupancy classification and where *Class 1 Liquids* are not present in quantities or conditions required to be regulated by NFPA 30 or this chapter, shall be in accordance with NFPA 13.

4003.6.3.2 Sprinkler system supervision and alarms. Automatic sprinkler systems shall be electrically supervised in accordance with Section 903.4. Audible and visible occupant notification upon activation of water flow shall be provided in accordance with Section 907.5throughout all areas in ABPFs with automatic sprinkler protection.

4003.6.3.3 Emergency alarm. In addition to automatic sprinkler system flow detection and all fire safety functions required by other sections of this code, an *approved* manual fire alarm system in accordance with Sections 4003.6.3.3.1 through 4003.6.3.3.3 shall be provided in H-2 and H-3 occupancies in ABPFs.

4003.6.3.3.1 Initiation. Manual fire alarm boxes shall be installed in accordance with Section. 907.4.2 outside of each interior *exit* or *exit access* door in the *fire barrier* walls separating the H- 2 or H-3 occupancies, and in the exterior walls surrounding the H-2 or H-3 occupancies.

Exception: On exterior walls of H-2 or H-3 occupancies, fire alarm boxes are permitted to be installed inside of and adjacent to each interior *exit*, *exit access*, or *exit discharge* door.

Manual fire alarm boxes shall be installed at not more than 150-foot (45,720 mm) intervals along corridors, interior *exit* stairways or ramps, or *exit passageways* where *Class 1 Liquids* are transported.

4003.6.3.3.2 Notification. Emergency alarm audible and visible occupant notification shall be provided in accordance with Section 907 throughout *fire areas* containing H-2 or H-3 occupancies.

4003.6.3.3.3 Annunciation. The emergency alarm system shall be monitored and annunciated as a separate zone at the Fire Alarm Control Panel (FACP). A separate emergency alarm panel is required when prescribed by other sections of this code for regulated hazards other than, or in addition to, *Class 1 Liquids* or *combustible dust* production in the manufacture of *ethanol mixtures*. When the emergency alarm system is activated, information shall be communicated to the supervising station that the zone in alarm contains flammable liquids or *combustible dust*, or both.

4003.6.3.4 Portable fire extinguishers. A minimum of one *approved* portable fire extinguisher complying with Section 906 and having a rating of not less than 20-B shall be located not less than 10 feet (3048 mm) or more than 50 feet (15 240 mm) from any *Class 1 Liquid* storage or *use area* or *combustible dust* production area.

4003.6.4 Electrical. Electrical wiring, equipment and systems shall be installed and maintained in ABPFs in accordance with NFPA 70 (NEC), Section 605 and Sections 4003.6.4.1 through 4003.6.4.4.

4003.6.4.1 Classified electrical equipment. Classified electrical equipment per NFPA 70 (NEC) shall be installed in accordance with Section 5703.1.1. in areas of ABPFs or portions thereof, where an atmospheric concentration at or below 25 percent of the LFL or MEC can be maintained.

A classified area shall not be required to extend beyond an unpierced floor, roof or other solid partition that prevents the migration of liquids, vapors, and dust.

4003.6.4.1.1 Stills. Electrical equipment attached to or part of *stills* in H-2 or H-3 occupancies shall be Class 1, Division 1 in accordance with NFPA 70 (NEC).

4003.6.4.1.2 Electric motors. Electric motors located 8 feet (2438 mm) or less from any edge of equipment where *Class 1 Liquid* vapor/air mixtures could exist

under normal operations and 3 feet (914 mm) or less above the floor or grade level within 25 feet (7620 mm) horizontally from any equipment with *Class 1 Liquids* shall be considered Class 1, Division 2 in accordance with NFPA 70 (NEC).

4003.6.4.1.3 Other applications. The *fire code official* is authorized to determine the extent of the Class 1 electrical equipment and wiring locations when a condition is not specifically covered by this chapter, Section 5703.1.1 or NFPA 70 (NEC).

4003.6.4.1.4 Industrial trucks. Powered industrial trucks used in areas designated as classified electrical locations in accordance with Section 4003.6.4.1 shall be listed and labeled for use in the intended environment in accordance with NFPA 505.

4003.6.4.2 Grounding. Equipment used for grain or *Class 1 Liquids* shall be electrically connected in accordance with NFPA 70 (NEC) and NFPA 77, and Sections 4003.6.4.2.1 and 4003.6.4.2.2 to prevent the accumulation of static electricity and sparking.

4003.6.4.2.1 Conveyance equipment. All conveyance equipment including that used for grain or *Class 1 Liquid* transfer shall be electrically connected by bond wires, ground cables, piping, or similar means to a static grounding system. Conveyor belts shall be electrically conductive and equipped with static eliminators.

Nozzles and vessels used for the transfer of *Class 1 Liquids* shall be electrically interconnected by:
1. Metallic floor plates on which *vessels* stand while filling, when such floor plates are electrically connected to the fill stem and grounded; or

2. Where the fill stem is bonded to the container during filling by means of a bond wire.

Exceptions:

1.Vats or *casks* without internal metal or plastic components that could hold a potential difference.

2.Equipment used in post bottling operations such as packaging and box storage shall be grounded in accordance with standards applicable to that equipment and industry practice.

4003.6.4.2.2 Storage equipment. Plastic and metal grain storage bins or silos and *Class 1 Liquid* stationary tanks that are drawn down and refilled on a regular basis or are otherwise subjected to processes that could create an electric potential difference and sparking, shall be grounded.

4003.6.4.3 Lightning protection. Lightning protection in accordance with NFPA 780 and NFPA 70 shall be provided on ABPFs with an H-2 occupancy; on miscellaneous structures

with a *combustible dust* production hazard due to the storage, handling, or processing of grains; and on ABPFs with an H-2 occupancy and a *still* having a 750 gallon (2839L) or larger capacity, or aggregate bulk storage of *Class 1 Liquids* of 7,800 gallons (29,526L) or greater (for distilling).

4003.6.4.4 Standby or emergency power. Where mechanical ventilation, treatment systems, limit controls, alarm, detection, or other electrically operated systems are required, such systems shall be provided with an emergency or standby power system in accordance with NFPA 70 (NEC) and Section 604.1.
Exception: Standby power for mechanical ventilation and limit control systems shall not be required where an *approved* fail-safe engineered system is installed.

4003.6.5 Location of stills and vessels. *Stills* and *vessels* in *Class 1 Liquid use areas* shall be located with respect to the lot lines of adjoining property which can be built on, in accordance with Tables 5703.4(1) and 5703.4(2).

Exceptions:

1. Where the exterior wall facing the adjoining lot line is without openings, has a fire-resistance rating of not less than 2 hours, and the ABPF is protected throughout with an automatic sprinkler system in accordance with Section 4003.6.3.1, the fire code official is authorized to reduce the minimum separation distances to not less than 1 foot (305 mm), or the minimum separation distance required by other provisions of the *Denver Commercial Building Code* or this code, whichever is greater.

2. Where the capacity of the largest still or vessel within the minimum separation distance is 250 gallons (946 L) or less, the aggregate volume of all stills and vessels within the minimum separation distance is 750 gallons (2839 L) or less, the normal operating pressure of all vessels within the minimum separation distance is 2.5 psig (17.2 kPa) or less, and the ABPF is protected throughout with an automatic sprinkler system in accordance with Section 4003.6.3.1, the minimum separation distance to lot lines is permitted to be 1 foot (305 mm), or the minimum separation distance required by other provisions of the *Denver Commercial Building Code* or this code, whichever is greater.

4003.6.6 Security. *Class 1 Liquid use areas* and *storage areas* shall be secured against unauthorized entry and safeguarded in a manner *approved* by the *fire code official*.

4003.6.7 Protection from vehicles. Bollards in accordance with Section 312 or other *approved* means shall be provided to protect all *vessels*, *stills*, and piping which handle *Class 1 Liquids* and are subject to vehicular, including industrial truck, damage.

4003.6.8 Labeling and signage. When a permit is required in accordance with Section 105, visible hazard identification markings, labels, signs and placards shall be placed on *vessels* and process piping used for *Class 1 Liquids*, and in *Class 1 Liquid storage areas*, *Class 1 Liquid use areas*, *combustible dust* production areas, and at the entrances thereto in accordance with applicable federal, state, and standards regulations, Sections 4003.6.8.1 through 4003.6.8.6, Chapters 50 and 57 and NFPA 704, or as *approved*. Content shall be in English, symbols permitted by this code and referenced standards, or both. Placards shall be in accordance with NFPA 704. The *fire code*

official is authorized to require additional signs and placards at specific entrances and locations. Markings, labels, signs, and placards shall not be obscured or removed.

Exception: *Casks* are not required to be labeled.

4003.6.8.1 Warning signs. Warning signs shall be of a durable material, have a yellow background with black text, red text, or symbols, and shall convey the danger being identified. Warning sign text shall not be less than 3 inches (76 mm) in height with a 5/8-inch (15 mm) stroke.

4003.6.8.2 Information signs. Information signs shall be of a durable material, have a blue background with white text, red text, or symbols, or a white background with blue text, and shall convey the information required. Information sign text shall not be less than 3 inches (76 mm) in height with a 5/8-inch (15 mm) stroke.

Exception: Where otherwise specified by applicable regulations or standards.

4003.6.8.3 Location. Placards shall be located in accordance with NFPA 704 and shall be provided on the outside of each interior *exit* or *exit access* door in the *fire barrier* walls separating the H-2 or H-3 occupancies. Placards shall also be located on access or exit discharge doors in the exterior walls surrounding the H-2 or H-3 occupancies.

4003.6.8.4 Piping. Piping and tubing conveying Class 1, 2, or 3 flammable or combustible liquids between *vessels* including heat transfer fluids shall be identified in accordance with ASME A13.1 to indicate the material conveyed.

4003.6.8.5 Individual containers, packages, and cartons. Individual containers, *intermediate bulk containers*, packages, and cartons shall be conspicuously identified in accordance with federal regulations and applicable state laws.

4003.6.8.6 Tank marking. Every *tank* shall bear a permanent nameplate or marking indicating the standard used as the basis of design. *Stationary tanks* more than 100 gallons (379 L) in capacity used for the storage of *Class 1 Liquids* shall bear a warning sign and placard in accordance with Section 4003.6.8 corresponding to the material therein.

Exception: *Vats*.

4003.6.9 Sources of ignition. Control of sources of ignition shall be in accordance with Sections 4003.6.8.1 and 4003.6.8.2.

4003.6.9.1 Smoking. Smoking areas shall be in accordance with Section 310 and shall be prohibited in *Class 1 Liquid storage areas* or *use areas* and in *combustible dust* production areas. "No Smoking" warning signs in accordance with Sections 310.3 shall be provided in such areas and at all entrances to them.

Exception: Where designated smoking areas within ABPFs are permitted, they shall be separated from *Class 1 Liquid storage areas*, *Class 1 Liquid use areas*, and *combustible dust* production areas by a minimum of 25 feet (7620 mm) and shall be clearly identified with information signs in accordance with Section 4003.6.8.

4003.6.9.2 Open flames. Open flames including barrel charring operations, and devices operating at temperatures above 680°F are prohibited throughout *fire areas* containing *Class 1 Liquid storage areas*, *Class 1 Liquid use area*s, or *combustible dust* production areas.

Exceptions:

1. Areas permitted as designated smoking.

2. Areas where hot work permits have been issued in accordance with Section 105.

3. Listed and labeled gas fired or electric unit heaters installed in accordance with the *Denver Mechanical Code, Denver Fuel Gas Code, and NFPA 70 (NEC)*. Such equipment shall be located more than eight feet (2438 mm) from any edge of equipment where *Class 1 Liquid* vapor/air mixtures could exist under normal operations and more than three feet (914 mm) above the floor or grade level within 25 feet (7620 mm) horizontally from any equipment with *Class 1 Liquids*.

4003.6.10 Separation of incompatible materials. Incompatible materials shall be separated in accordance with Section 5003.9.8.

4003.6.11 Seismic protection. All equipment in ABPFs including machinery, racks, piping, and stationary tanks shall be braced and anchored in accordance with the seismic design requirements of the *International Building Code* for the seismic zone in which the ABPF is located

4003.6.12 Protection from corrosion. Machinery, piping, tank, process vessel, and container materials exposed to *Class 1 Liquids* shall be protected in accordance with Sections 4003.6.12.1 and 4003.6.12.2.

4003.6.12.1 Protection from external corrosion and galvanic action. Where subject to external corrosion or galvanic action, machinery, piping, tank, process vessel, and container holding or conveying *Class 1 Liquids* shall be fabricated from noncorrosive materials or provided with corrosion protection. Dissimilar metallic parts subject to galvanic action shall not be joined.

4003.6.12.2 Chemical protection. Machinery, piping, tank, *process vessel*, and container materials used for *Class 1 Liquids* shall be compatible with all chemicals to which they are exposed including *ethanol*. Clean-in-place (CIPs) fittings shall be compatible with the cleaning agents used on the *vessels* and piping to which they are attached. Tank lining shall be in accordance with Section 4004.1.2.6.

4003.6.13 Limit controls. Limit controls shall be provided in accordance with Sections 4003.6.13.1 through 4003.6.13.3.

4003.6.13.1 Pressure control. Machinery, piping, *tanks*, *vessels*, and *stills* containing or conveying *Class 1 Liquids* shall be designed for the pressures they will be subjected to in accordance with applicable standards. Machinery, piping, *tanks*, *containers*, *processing*

vessels, and *stills* containing or conveying *Class 1 Liquids* that can generate pressures exceeding design limits because of exposure fires or internal reaction shall have an *approved* means to relieve excessive positive and negative internal pressure. Vents provided to relieve excessive positive pressure shall discharge to an *approved* location.

4003.6.13.2 High-liquid-level control. *Stationary tanks* and *process vessels* with *Class 1 Liquids* having a capacity greater than 500 gallons (1893 L) shall be equipped with a device or other means to prevent overflow into the building including, but not limited to a float valve, preset meter on the fill line, valve actuated by the weight of the tank's contents, low-head pump incapable of producing overflow, or a liquid-tight overflow pipe at least one pipe size larger than the fill pipe and discharging by gravity to an *approved* location.

Exception: Liquid-level sight gauges or other manual means *approved* by the *fire code official* to determine fill level are permitted in ABPFs where the *use area* or *storage area* is small enough that the *stationary tank* or *process vessel* is effectively under constant observation during filling operations.

4003.6.13.3 Low-liquid-level control. *Approved* safeguards shall be provided to prevent a low- liquid level in *stationary tanks*, *processing vessels* and *stills* from creating a hazardous condition, including but not limited to overheating.

4003.6.14 Handling and transportation. *Containers*, *portable tanks*, and *casks* holding more than 5 gallons (19 L) of *Class 1 Liquids* being transported in a corridor or enclosed *exit* shall be on a cart or truck in accordance with Sections 5003.10.2 and 5003.10.3.

SECTION 4004 EQUIPMENT

4004.1 General. Equipment utilized for the production, storage, dispensing, blending, or handling of *Class 1 Liquids* shall be listed or *approved* and shall be in accordance with Sections 4004.1.1 through 4004.1.4.4.2.

4004.1.1 Piping systems. Piping systems for conveying *Class 1 Liquids* including piping, tubing, valves, pumps, and fittings shall be designed, installed, and maintained in accordance with Sections 4004.1.1.1 through 4004.1. 1.7, Section 5703.6, and ASME B31. The use of other standards is permitted when *approved*.

4004.1.1.1 Component design and construction. Piping, tubing, hoses, valves, fittings, and related components conveying *Class 1 Liquids* shall be in accordance with the following:

1. Piping, tubing, hoses, valves, pumps, fittings, and related components shall be designed and fabricated from materials of adequate strength and durability to withstand the structural and environmental conditions to which they are subjected.

2. Piping, tubing, hoses, valves, pumps, fittings, and related components used in liquid transfer operations shall be *approved* or listed for the intended use.

3. Where provided, in-line flame arresters in piping systems shall be installed and maintained in accordance with their listing or API 2028.

4. Where *Class 1 Liquids* are carried in piping pressurized above 15 pounds per square inch gauge (psig; 103 kPa), an *approved* means of leak detection shall be provided.

Exception: Piping provided with overpressure relief devices.

4004.1.1.2 Piping supports. Piping systems shall be substantially supported and protected against physical damage and excessive stresses arising from seismic activity, settlement, vibration, expansion, and contraction. Piping supports shall be protected against exposure to fire by:

1. Draining spilled *Class 1 Liquids* away from the piping support system; or
2. Providing protection with a fire-resistance rating of not less than 2 hours; or
3. Other *approved* methods.

4004.1.1.3 Pipe joints. Pipe joints shall be in accordance with Sections 5703.6.9 and 5703.6.10.

Exception: Where located in concealed spaces within buildings, joints in piping systems used to convey *Class 1 Liquids* shall be welded.

4004.1.1.4 Valves. Piping systems with and without pumps shall contain a sufficient number of manual-control, auto-control, and check valves to protect the ABPF and properly control the flow of *Class 1 Liquids* in normal operation, in the event of physical damage, or the condition of fire exposure, and shall be in accordance with the following:

1. Readily accessible manual valves, automatic remotely-activated fail-safe emergency shutoff valves, or excess flow control shall be installed on gravity-fed supply piping and tubing and in systems pressurized above 15 pounds per square inch gauge (psig; 103 kPa) as close to the source as practical.

2. Manual emergency shutoff valves and controls for remotely activated emergency shutoff valves shall be clearly visible and readily accessible. Information signage in accordance with Section 4003.6.8 shall be provided identifying the emergency shutoff valves and controls.

3.Backflow prevention or check valves shall be provided when backflow could create a hazardous condition or cause an unauthorized discharge.

4004.1.1.5 Pumps. Solid or liquid fueled pumps are not permitted in *Class 1 Liquid use areas* or *storage areas*.

Exception: Fire pumps separated from the *Class 1 Liquid use areas* and *storage areas* by 2- hour fire-resistance rated *fire barriers* in accordance with Section 707 of the *Denver Commercial Building Code*.

Positive-displacement pumps shall be provided with pressure relief discharging back to the *vessel*, pump suction or other *approved* location, or shall be provided with interlocks to prevent over- pressure.

4004.1.1.6 Pressurized transfer systems. Gases introduced to provide for transfer of *Class 1 Liquids* shall be inert. Controls, including pressure relief devices, shall be provided to limit the pressure so the maximum working pressure of vessels cannot be exceeded. Where devices operating through pressure within a *tank*, *intermediate bulk container*, or *container* are utilized, the *tank*, *intermediate bulk container*, or *container* shall be a pressure vessel *approved* for the intended use.

4004.1.1.7 Maintenance. Piping and appurtenances shall be maintained in a safe operating condition and in accordance with their applicable listings and standards. Damage to piping or appurtenances shall be repaired using materials having equal or greater strength and fire resistance or the equipment shall be replaced, taken out of service, repaired, or disposed of in an *approved* manner. The repair, alteration, or reconstruction, including welding, cutting and hot tapping of piping that has been placed in service, shall be in accordance with NFPA 30.

4004.1.2 Vessels. The design and construction of *vessels* used in ABPFs for *Class 1 Liquids* shall comply with the applicable Sections 4004.1.2.1 through 4004.1.2.13.4 and NFPA 30 or shall be of an *approved* type. Pressure vessels shall comply with the *ASME Boiler and Pressure Vessel Code.*

4004.1.2.1 Underground storage of Class 1 Liquids. Underground storage of *Class 1 Liquids* in *tanks* shall comply with Chapters 50 and 57. Vaults shall be in accordance with Chapter 57. Underground storage of *Class 1 Liquids* in other *vessels* is prohibited.

4004.1.2.2 Outdoor storage of Class 1 Liquids. Outdoor storage shall be in accordance with Chapters 50 and 57.

4004.1.2.3 Tank vehicles and tank cars. Tank vehicles and tank cars shall not be used as storage or *processing vessels*.

4004.1.2.4 Design of supports. The supporting structure for *stationary tanks* and *portable tanks* with capacity greater than 660 gallons (2498 L) shall be designed in accordance with the *Denver Commercial Building Code* and NFPA 30.

4004.1.2.5 Locations subject to flooding. Where a *portable tank* or *intermediate bulk container* with capacity in excess of 660 gallons (2498 L), or a *stationary tank* is located in an area where it is subject to a rise in the water table, flooding or accumulation of water from fire suppression operations, uplift protection shall be provided in accordance with NFPA 30, Sections 22.14 and 23.14.

4004.1.2.6 Tank lining. Steel *stationary tanks* and steel *portable tanks* with capacity greater than 660 gallons (2498 L) are permitted to be lined only for the purpose of protecting the interior from corrosion or providing compatibility with a material to be stored. Only those liquids tested for compatibility with the lining material are permitted to be stored in lined tanks.

4004.1.2.7 Manual drainage. Manual drainage control valves shall be provided on *stationary tanks* and *portable tanks* with capacity greater than 660 gallons (2498 L). Manual drainage control valves on *stationary tanks* shall be located at *approved* locations remote from the tanks to ensure their operation in a fire condition.

4004.1.2.8 Connections. Filling and emptying connections to *vessels* shall be provided with liquid-tight caps, covers, plugs, or valves which shall be closed when not in use.

Connections located below normal *Class 1 Liquid* levels in *stationary tanks* with capacity of 500 gallons (1893 L) or more shall be provided with internal or external isolation valves located as close as practical to the shell of the tank.

4004.1.2.9 Materials used in tank construction. The materials used in tank construction shall be in accordance with NFPA 30.

4004.1.2.10 Separation between adjacent tanks. The separation between stationary tanks containing *Class 1 Liquids* shall be in accordance with NFPA 30, Table 22.4.2.1.

Exceptions:

1. Where a group of no more than 4 *stationary tanks* are aligned in a single row, the minimum separation distance between tanks is permitted to be reduced to 18 feet (457 mm) provided no single tank is over 960 gallons (3634 L) and clear access of 3 feet (914 mm) is provided around the group.

2. Where *stationary tanks* are in the drainage path of *Class 1 Liquids* and are compacted in three or more rows or in an irregular pattern, the *fire code official* is authorized to require greater separation than specified in NFPA 30, Table 22.4.2.1 or other means to make tanks in the interior of the pattern accessible for emergency response including firefighting purposes.

4004.1.2.11 Maintenance. *Vessels* and their appurtenances shall be maintained in a safe operating condition in accordance with their listings, applicable standards, and industry practice. Damage and malfunctions shall be repaired using materials having equal or greater strength and fire resistance. *Vessels* leaking *Class 1 Liquids* shall be promptly emptied, repaired, and returned to service. *Stationary tanks* not returned to service shall be abandoned in accordance with Section 5704.2.13 or removed in accordance with Section 5704.2.14.

4004.1.2.12 Vent lines. *Portable tanks* with a storage capacity of 660 gallons (2498 L) or more and *stationary tanks* shall be provided with normal and emergency vents in accordance with Sections 4004.1.2.12.1 through 4004.1.2.12.5 to relieve positive and negative pressures such as those created from filling and draining.
Vent lines shall not be used for purposes other than venting unless *approved*.

4004.1.2.12.1 Installation of vent piping. Vent pipes shall be designed, sized, constructed, and installed in accordance with Sections 5703.6, 5704.2.7.3, and

5704.2.7.4. Vent pipes shall be installed to drain toward the tank without sags or traps in which liquid can collect. Vent pipes shall be protected from physical damage and vibration.

4004.1.2.12.2 Vent-line flame arresters and pressure-vacuum vents. Normal vents shall be equipped with vent-line flame arresters and pressure-vacuum vents in accordance with Section 5704.2.7.3.2.

4004.1.2.12.3 Vent pipe outlets. To facilitate atmospheric dispersion, vent outlets shall be located so *flammable vapors* are released at a safe point outside of buildings, directed upward or horizontally away from adjacent walls so vapors will not be trapped by eaves or other obstructions. Vent outlets shall not be less than 12 feet (3658 mm) above the finished ground level and shall not be less than 5 feet (1524 mm) from building openings or lot lines of properties that can be built upon.

4004.1.2.12.4 Manifolding. Vent pipes are permitted to be manifolded only for special purposes such as vapor recovery, vapor conservation or air pollution control. Manifolded vent pipes shall be adequately sized to prevent system pressure limits from being exceeded when manifolded tanks are subject to the same fire exposure.

4004.1.2.12.5 Emergency venting. Tanks shall be equipped with additional venting that will relieve rapid overpressure due to fire. Emergency vents shall not discharge inside buildings. The venting shall be installed and maintained in accordance with NFPA 30, Section 22.7.

4004.1.2.13 Vessel openings other than vents. *Vessel* openings other than vents shall comply with Sections 4004.1.2.13.1 through 4004.1.2.13.4

4004.1.2.13.1 Filling and emptying connections. Filling and emptying connections to *stationary tanks* shall be properly identified in accordance with Section 4003.6.8.

4004.1.2.13.2 Fill pipes and discharge lines. For top-loaded *stationary tanks* and *portable tanks* with capacity greater than 660 gallons (2498 L), a metallic fill pipe shall be designed and installed to minimize the generation of static electricity by terminating the pipe within 6 inches (152 mm) of the bottom of the tank. It shall be installed in a manner which avoids excessive vibration.

4004.1.2.13.3 Manual gauging. *Vessel* openings for manual gauging, if independent of the fill pipe, shall be provided with a liquid-tight cap, cover, or plug. Covers shall be kept closed when not gauging. Such openings shall be protected against liquid overflow and possible vapor release by means of a spring-loaded check valve or other *approved* device.

4004.1.2.13.4 Protection against vapor release. *Tank* openings provided for purposes of vapor recovery shall be protected against possible vapor release by

means of a spring-loaded check valve or dry-break connection, or other *approved* vapor-tight device. Openings designed for combined fill and vapor recovery shall be protected against vapor release.

Exceptions:

1. Where the opening is a pipe connected to a vapor processing system.

2.Where connection of the liquid delivery line to the fill pipe simultaneously connects the vapor recovery line.

4004.1.3 Stairs, platforms, and walkways. Stairs, platforms, and walkways installed to facilitate access to *vessels*, storage, pipes, and process equipment shall be noncombustible and designed and constructed in accordance with NFPA 30 and the *Denver Commercial Building Code*.

4004.1.4 Testing. Equipment, devices, and systems shall be tested in accordance with Sections 4004.1.4.1 through 4004.1.4.4.2.

4004.1.4.1 Piping systems. Before being covered, enclosed or placed in use, piping shall be hydrostatically tested to 150 percent of the maximum anticipated pressure of the system, or pneumatically tested to 110 percent of the maximum anticipated pressure of the system, but not less than 5 pounds per square inch gauge (psig; 34.5 kPa) at the highest point of the system. This test shall be maintained for a sufficient time period to complete visual inspection of joints and connections. For a minimum of 10 minutes, there shall be no leakage or permanent distortion. *Storage tanks* shall be tested independently from the piping.

Exception: Piping tested in accordance with the applicable section of ASME B31.9.

4004.1.4.1.1 Existing piping. Existing piping shall be tested in accordance with this section when the *fire code official* has reasonable cause to believe a leak exists. Piping used for *Class 1 Liquids* shall not be tested pneumatically.

Exception: Vapor-recovery piping is permitted to be tested using an inert gas.

4004.1.4.2 Tanks. Prior to being placed into service, *tanks* shall be tested in accordance with NFPA 30, Section 21.5.

4004.1.4.3 Safety systems. Automatic sprinkler systems, automatic sprinkler system monitoring, fire alarm systems, all limit controls, and all other fire- and life-safety systems shall pass the commissioning or acceptance tests in accordance with their respective design, installation, and testing standards prior to occupancy and use of the facility. Emergency alarms and limit-control monitoring shall be tested as for fire alarm systems in accordance with NFPA 72.

4004.1.4.4 Periodic testing. Equipment and safety systems shall be periodically tested in accordance with Sections 4004.1.4.4.1 and 4004.1.4.4.2. Written records of the tests

conducted or maintenance performed shall be maintained in accordance with the provisions of Section 107.

Exceptions:

1. Periodic testing shall not be required when *approved* written documentation is provided substantiating testing will damage the equipment, device or system and the equipment, device or system is maintained as specified by the respective manufacturer.

2. Periodic testing shall not be required when the equipment and systems are utilized routinely as part of normal operations and maintained in good operating condition.

3.Periodic testing shall not be required for equipment, devices and systems that fail in a fail-safe manner.

4. Periodic testing shall not be required for equipment, devices and systems that self- diagnose and report trouble. Records of the self-diagnosis and trouble reporting shall be made available to the *fire code official*.

5. Periodic testing shall not be required if system activation occurs during the required test cycle for the components activated during the test cycle.

6. Approved maintenance in accordance with Section 5003.6 that is performed not less than annually or in accordance with an *approved* schedule shall be permitted to meet the testing requirements set forth in Sections 5003.2.9.1 and 5003.2.9.2.

4004.1.4.4.1 Equipment. The following equipment shall be tested periodically:

1. Piping
2. Limit controls required by Section 4003.6.13

4004.1.4.4.1.1 Testing frequency. The equipment listed in Section 4004.1.4.4.1 shall be tested at one of the frequencies listed below:

1. Not less than annually;
2. In accordance with the *approved* manufacturer's requirements;
3. In accordance with *approved* recognized industry standards; or
4. In accordance with an *approved* schedule.

4004.1.4.4.2 Safety systems. Safety systems listed in Section 4004.1.4.3 shall be periodically tested in accordance with their design, installation, and testing standards.

Emergency alarms and limit-control monitoring shall be tested as for fire alarm systems in accordance with NFPA 72.

4004.2 Storage and use areas. Storage and process operations shall be in accordance with Sections 4004.2.1 through 4004.2.3.3.

4004.2.1 Storage areas. Storage of *Class 1 Liquids* and empty *containers* previously used to store *Class 1 liquids* shall be in accordance with Sections 4004.2.1.1 through 4004.2.1.4, Chapter 32, and NFPA 30.

Exception: Empty containers that are free from explosive vapors.

4004.2.1.1 General. Storage of *vessels* in closely packed *piles*, on pallets, in racks, or on shelves shall be in accordance with Sections 4004.2.1.1.1 through 4004.2.1.1.3.

4004.2.1.1.1 Basement storage. *Class 1 Liquids* shall be allowed to be stored in basements in amounts not exceeding the maximum allowable quantity per control area for "use-open" systems in Table 5003.1.1(1), provided that automatic suppression and other fire protection are provided in accordance with Chapter 9. Class II and IIIA liquids shall also be allowed to be stored in basements, provided that automatic suppression and other fire protection are provided in accordance with Chapter 9.

4004.2.1.1.2 Limited combustible storage. Limited quantities of class 1 through 4 commodities are permitted to be stored in the same non-separated area, room, or building as *Class 1 Liquids* provided the combustibles, other than those used for packaging the *Class 1 Liquids*, are separated from the *Class 1 Liquids* in storage by a minimum of 8 feet (2438 mm) horizontally either by open aisles, open racks, or racks filled with noncombustible commodities.

4004.2.1.1.3 Shelf storage. Shelving shall be of substantial construction and shall be braced and anchored in accordance with the seismic design requirements of the *Denver Commercial Building Code* for the seismic zone in which the ABPF is located. Shelving, chocks, scuffboards, floor overlay and similar installations shall be of noncombustible construction or of wood not less than a 1-inch (25 mm) nominal thickness; treatments, coatings and construction materials shall be compatible with *ethanol*. Shelves shall be provided with a lip or guard when used for the storage of individual *containers* or *casks*.

Exception: Storage in flammable liquid storage cabinets specifically designed for such use.

4004.2.1.1.4 Separation and aisles. Aisles shall be provided in *storage areas* such that all storage *vessels* are located no more than 20 feet (6096 mm) horizontally from a main aisle or access aisle. Main aisles shall be a minimum of 8 feet (2438 mm) wide in high piled combustible storage areas and a minimum of 4 feet wide in non-high piled combustible storage areas. Access aisles shall be a minimum of 4 feet (1219 mm) wide in high piled combustible storage areas and a minimum of 44 inches (1118 mm) wide in non-high piled combustible storage areas. Aisles utilized for manual stocking, separation between piles, separation between

adjacent rows of racks, and separation between racks and adjacent pile storage shall be main aisles or access aisles. Aisles utilized for mechanical stocking shall be main aisles. All *piles* including palletized storage shall border a main aisle on a minimum of one side or end. Additional aisles shall be provided for access to doors, required windows, ventilation openings, standpipe connections, fire extinguishers, mechanical equipment, and switches. Such aisles shall be a minimum of 3 feet (914 mm) in width. A single aisle is permitted to serve multiple functions provided its minimum width is the largest of the widths required for the functions served.

4004.2.1.1.5 Material handling equipment. Material handling equipment shall be suitable to manipulate *vessels* at the highest tier level.

4004.2.1.1.6 Housekeeping. Storage shall be maintained in an orderly manner.

4004.2.1.1.7 Dunnage, scuffboards, floor overlay. Dunnage, scuffboards, floor overlay and similar installations shall be of noncombustible construction or of wood not less than a 1-inch (25 mm) nominal thickness.

4004.2.1.1.8 High piled combustible storage. Storage of vessels in closely packed *piles*, on pallets, in racks, or on shelves, where the top of storage is greater than 6 feet (1829 mm) in height, shall be considered high piled combustible storage. Where applicable requirements in Chapter 32 are in conflict with those in Section 4004.2.1, the more restrictive shall govern.

4004.2.1.1.9 Bulk beverage storage areas. There shall be no storage of combustible materials in the bulk beverage storage areas not related to beverage storage activities.

4004.2.1.1.10 Empty containers and tanks. Empty *containers* and *tanks* previously used for the storage of hazardous materials shall be free from residual material and vapor as defined by DOTn, the Resource Conservation and Recovery Act (RCRA) or other regulating authority or maintained as specified for the storage of hazardous material.

4004.2.1.2 Pile storage. *Pile* storage including palletized storage shall be in accordance with Sections 4004.2.1.3.1 through 4004.2.1.3.2.2.

4004.2.1.2.1 Stabilizing and supports. *Intermediate bulk containers*, *containers*, and *portable tanks* shall be stored in accordance with NFPA 30. Horizontally oriented *casks* stored in *piles* shall be supported by stackable racks or cradles of substantial construction designed for that purpose. Lateral bracing shall be provided for horizontally oriented *casks* stored in *piles* where the height of the *pile* exceeds three times the least dimension of the base rack or cradle. Storage height of horizontally oriented casks in this configuration shall not exceed the lesser of the rack manufacturer's recommendations or industry standards.

Exception: Where an *approved* engineering analysis is submitted demonstrating taller interior storage configurations are stable against overturning in accordance with the seismic design requirements of the *Denver Commercial Building Code* for the seismic zone in which the ABPF is located.

4004.2.1.2.2 Palletized storage. Palletized storage shall be in accordance with Sections 4004.2.1.3.2.1 and 4004.2.1.3.2.2.

4004.2.1.3.2.1 Stabilizing and supports. *Tiers of casks* oriented vertically for storage shall be separated by pallets or other dunnage that spreads the weight of the casks on the tier above over the casks on the tier below. A lower tier shall not have less than four casks and shall not have an empty cask when a tier above has a cask that is not empty. No more than two tiers of casks are permitted to be stacked vertically in this configuration.

Exceptions:

1. Where the collapse strength of the casks on the lowest tier is not exceeded, palletized storage of vertically oriented casks are permitted to be stacked to a height of four tiers where the casks are bound together in a square pattern groups of no less than four, by a steel band or other *approved* binding.

2. Where the collapse strength of the casks on the lowest tier is not exceeded, palletized storage of vertically oriented casks are permitted to be stacked to a height of six tiers where the casks are bound together in a square pattern in groups of no less than nine, by a steel band or other *approved* binding.

3. Where the collapse strength of the casks on the lowest tier is not exceeded, an engineered overturning analysis shall be provided demonstrating stability in accordance with the seismic design requirements of the *Denver Commercial Building Code* for the seismic zone in which the ABPF is located for storage configurations other than permitted in Exceptions 1 and 2.

4004.2.1.2.2.2 Idle combustible pallets. Storage of idle wood pallets shall be limited to a maximum pile size of 2,500 square feet (232 m^2) and a maximum storage height of 6 feet (1829 mm). Storage of idle plastic pallets shall be in accordance with Section 3206.4.1.1 and as limited by the capacity of the automatic sprinkler system in accordance with NFPA 13. Pallet storage shall be separated from all *Class 1 Liquid* storage by a minimum of 8 feet (2438 mm).

4004.2.1.3 Portable tank, intermediate bulk container, and container storage. *Portable tanks* and *intermediate bulk containers* stored over one tier in height

shall be designed to nest securely without dunnage. Stacked *containers* shall be separated by pallets or dunnage to provide stability and to prevent excessive stress to container walls. The storage height and configuration shall be in accordance with NFPA 30.

4004.2.2 Grain storage. Grain storage shall be in accordance with Section 4003.2.1.1.

4004.2.3 Use areas. *Use areas* for *Class 1 Liquids* in amounts exceeding the MAQ shall be in accordance with Sections 4004.2.3.1 through 4004.2.3.3.

4004.2.3.1 General. Systems shall be suitable for the use intended and shall be designed by persons competent in such design. Controls shall be designed to prevent materials from entering or leaving the process or reaction system at other than the intended time, rate, or path. Where failure of an automatic control could result in a dangerous condition or reaction, the automatic control shall be fail-safe. *Use areas* with *Class 1 Liquids* in excess of the MAQs are prohibited in basements.

4004.2.3.2 Non-listed appliances. *Stills* where internal operating vapor pressures normally exceed 2.5 psig (103.4 kPa) or could potentially exceed 2.5 psig (103.4 kPa) due to failures in operating methods such as clogged head packing or other materials held on column plates shall be provided with a listed pressure relief valve piped to discharge to the exterior in an *approved* location.

Exception: *Stills* listed for operation above 2.5 psig (103.4 kPa) and, where *approved*, *stills* constructed in accordance with the *ASME Boiler and Pressure Vessel Code.*

4004.2.3.3 Class 1 Liquid transfer. *Class 1 Liquids* shall be transferred by one of the following methods:

1. From safety cans in accordance with NFPA 30.

2. Through an *approved* closed piping system.

3. From *vessels* by an *approved* pump taking suction through an opening in the top of the *vessel*.

4. By gravity from a *tank*, *intermediate bulk container*, or *container* through an *approved* self- closing or automatic-closing valve.

5. Approved engineered liquid transfer systems.

Exception: *Class 1 Liquids* transferred into and from *containers* not exceeding a 5.3-gallon (20 L) capacity.

CHAPTER 50 HAZARDOUS MATERIALS—GENERAL PROVISIONS

SECTION 5001 GENERAL

Section 5001.1 Scope is amended by replacing Exception 10 and 15, deleting exception 16, and adding exception 18 as follows:

10. The manufacture, storage, dispensing, and use of alcoholic beverages with 20 percent or less alcohol by volume and the remaining constituents having no hazardous properties regulated by the Denver Commercial Building Code or Denver Fire Code.

15. The manufacture, storage, dispensing, and handling of alcoholic beverages with greater than 20 percent alcohol by volume regulated in accordance with Chapter 40.

18. The manufacture, storage, dispensing, and use of alcoholic beverages not meeting the criteria of Exception 10, shall be in accordance with Chapter 40.

Section 5001.5.2.1 Preparation is added as follows:

5001.5.2.1 Preparation. The *fire* code official is authorized to require Hazardous Material Reports and Hazardoud Material Inventory Statement submittals to be prepared by a qualified individual or firm acceptable to the fire code official in accordance with Section 104.

Section 5001.7 Laboratories using chemicals is added as follows:

5001.7 Laboratories using chemicals. Laboratory buildings, laboratory units, and laboratory work areas in which chemicals are handled or stored shall comply with NFPA 45 and this code.

Exception: Higher education laboratories shall comply with Chapter 38.

SECTION 5002 DEFINITIONS

Section 5002.1 Definitions is amended by adding the following definitions:

5002.1 Definitions. The following terms are defined in Chapter 2:

BIOHAZARD
CARCINOGEN
OTHER HEALTH HAZARD MATERIAL
RADIOACTIVE MATERIAL
RELEASE/UNAUTHORIZED DISCHARGE
SENSITIZER

SECTION 5004 STORAGE

Section 5004.9 Emergency alarm is replaced as follows:

5004.9 Emergency alarm. An *approved* manual emergency alarm system shall be provided in buildings, rooms, and areas used for the storage of hazardous materials in accordance with Section 908.3.

CHAPTER 53 COMPRESSED GASES

SECTION 5302 DEFINITIONS
5302.1 Definitions is added as follows:

Asphyxiation: to lose consciousness by impairing normal breathing, to suffocate or smother.
Dewar: a vacuum flask that holds a cryogenic or liquefied gas.
CO2 Detector: a device to measure the concentration of CO_2 in the air.
CO2 Gas Detection Control Unit: a system component that monitors inputs and controls outputs through various types of circuits.
Indoor use of CO2: Rooms or areas sheltered from the weather and environmental conditions.
Liquid CO2 Systems: An assembly of equipment consisting of one or more CO_2 supply containers, interconnecting piping, pressure regulators, and pressure relief devices.
PEL: Permissible Exposure Limit for CO_2 gas is 5,000 PPM (0.5 percent) Time Weighted Average (TWA) @ 8 hours a day, 40 hours per week.
STEL: Short-Term Exposure Limit for CO_2 is 30,000 PPM (3.0 percent) for less than 15 minutes.
IDLH: Immediately Dangerous to Life & Health for CO_2 is 40,000 PPM (4.0 percent).

COMPRESSED GASES NOT OTHERWISE REGULATED
5307.2 Exception is added as follows:
5307.2 Ventilation. Areas containing insulated liquid carbon dioxide systems used in enrichment system applications shall comply with Section 5307.4.

Section 5307.3 Insulated liquid carbon dioxide systems used in beverage dispensing applications and all subsections are replaced as follows:
5307.3 CO2 Systems used in beverage dispensing applications. CO_2 systems with more than 100 pounds (45.4 kg) of CO_2 or any system using any amount of CO_2 below grade used in beverage dispensing applications shall comply with Sections 5307.3.1 through 5307.3.8.

Exception: Basements utilizing 20lb or less with a room size greater than 400 square feet.

5307.3.1 Reserved.

5307.3.2 Equipment. The storage, use, and handling of CO_2 shall be in accordance with Chapter 53 and the applicable requirements of NFPA 55, Chapter 13. All equipment utilized in compressed gas systems shall be compatible with the intended gas and use.

5307.3.2.1 Containers, cylinders, and tanks. Gas supply containers, cylinders, and tanks shall be designed, fabricated, tested, labeled, and installed in accordance with manufactures' specifications and shall be maintained in accordance with the regulations of *DOTn 49 CFR, Parts 100-185* or the *ASME Boiler and Pressure Vessel Code*, *Section VIII*. Labels identifying the hydrostatic test date of containers, cylinders, and tanks must be always visible for inspection.

5307.3.2.1.1 Location. Location of gas supply containers, cylinders, and tanks, inside or outside the building, shall be at an *approved* location.

5307.3.2.1.2 Security. Gas supply containers, cylinders, and tanks shall be secured in an *approved* manner to prevent overturning. Containers, cylinders, and tanks located outside shall be secured and safeguarded against tampering and protected from physical damage if exposed to vehicle traffic.

5307.3.2.1.3 Design and construction. Bulk tank installations over 2,000 pounds will require an engineered foundation and construction permit in accordance with Section 105.7.31.

5307.3.3 Piping systems. Piping, tubing, fittings, valves, and pressure regulating devices shall be designed and installed in accordance with *approved* standards and manufacturers' recommendations.

5307.3.3.1 Piping, tubing, and hoses. Piping, tubing, and hose materials shall be compatible with CO_2 and rated for the temperatures and pressures encountered in the system. All hoses and tubing used in CO_2 service shall be designed for a bursting pressure of at least four times their design pressure. PVC/ABS and other types of rigid plastic piping are not *approved* materials. Acceptable piping for CO_2 shall be the following:

1.Stainless steel A269 grade, which is either seamless or welded drawn over mandrel.

2. Copper K grade, hard drawn seamless.

3. Copper ACR grade (1/2-inch outside diameter or less) annealed seamless.

4. Plastic/polymer materials rated for use with CO_2 and compliant with *Code of Federal Regulations Title 21 FDA Part 177 Indirect Food Additives: Polymers.*

5. Additional *approved* piping, tubing and hoses found in the Compressed Gas Association (CGA) standards for CO_2.

5307.3.3.2 Support. Gas piping shall not be attached or supported by any electrical light supports or wiring. All gas piping shall be supported by the building structures or other *approved* means.

5307.3.3.3 Identification. Markings for CO_2 piping systems shall consist of the content's name CO_2 and direction-of-flow arrow. Markings shall be provided at each valve; at wall, floor or ceiling penetrations; at each change of direction; and at not less than every 20 feet or fraction thereof throughout the piping run.

5307.3.3.4 Fittings, joints, and connections. Fittings, joints, and connections shall be subject to the approval of the *fire code official*.

5307.3.3.4.1 Fittings and joints between gas supply containers and automatic shutoff valve. Joints and fittings on the supply piping or tubing between the CO_2 supply source and the automatic system shutoff valve shall be threaded, compression, or welded.

5307.3.3.4.2 Unused connections. Unused piping or tubing connected to the supply system shall be capped or plugged. A closed valve will not be allowed in lieu of a cap or plug.

5307.3.3.4.3 All connections. All fittings and joints shall be exposed and located adjacent to the supply source or points of use and shall be protected by a detector.

5307.3.3.5 Valves. Piping systems shall be provided with valves in accordance with Sections 5307.3.3.5.1 through 5307.3.3.5.5.

5307.3.3.5.1 Pressure relief valves. Pressure relief valves shall be provided and piped to the outdoors.

5307.3.3.5.2 System shutoff valve. An automatic system shutoff valve shall be provided as near to the supply pressure regulator as possible and shall be designed to fail in a closed condition. Loss of electrical power to the valve and gas detection shall close the system automatic shut off valve. Automatic shutoff valves shall be designed and located so that all phases (i.e., gas, liquid and solid) of CO_2 will not interfere with the operation of the devices. Automatic system shutoff valve shall have components that indicate the valve operating position, open or closed.

5307.3.3.5.3 Appliance shutoff valves. Each appliance shall be provided with a shutoff valve within 3 feet of the appliance. All shutoff valves shall be capable of being locked or tagged in the closed position for servicing.

5307.3.3.5.4 Check valves. One-way flow check valves shall be installed at the most downstream end of copper runs that are used for beverage consumption.

5307.3.3.5.5 Accessibility and identification. Valves and controls shall be readily accessible at all times. Normal and emergency system shut-off valves shall be clearly identified. All valves shall be designed or marked to indicate clearly whether it is open or closed.

5307.3.3.6 Venting. Venting of gases shall be directed to an *approved* location outside the building. Insulated liquid CO_2 systems shall have pressure relief devices vented in accordance with NFPA 55.

5307.3.3.6.1 Beverage pumps. Beverage pumps shall be vented to the outside.

5307.3.4 Protection from damage. CO_2 systems shall be installed so the supply tanks, cylinders, piping, fittings, and other appurtenances are protected from damage by occupants or equipment during normal facility operations.

5307.3.5 Required protection. Where CO_2 supply tanks, cylinders, piping, and equipment are

located indoors, rooms, or areas containing CO_2 supply tanks, cylinders, piping, and fittings and other areas where a leak of a CO_2 system can collect shall be provided with either ventilation in accordance with Section 5307.3.5.1 or a gas detection system in accordance with Section 5307.3.5.2.

5307.3.5.1 Ventilation. Mechanical ventilation shall be in accordance with the *Denver Mechanical Code* and shall comply with all the following:

1. Mechanical ventilation in the room or area shall be at a rate of not less than 1 cubic foot per minute per square foot [0.00508 $m^3/(s \bullet m^2)$].

2. Exhaust shall be taken from a point within 12 inches of the floor.

3. The ventilation system shall be designed to operate at a negative pressure in relation to the surrounding area.

4. Ventilation shall run continuously or be activated by a sensor or detector to maintain an atmosphere of less than 5,000 ppm.

5. A mechanical permit is required in accordance with Section 1 of the *Denver Commercial Building Code* .

5307.3.5.2 Gas Detection System. A gas detection system shall comply with all the following:

1. Continuous gas detection shall be provided to monitor areas where CO_2 can accumulate. Detection equipment shall be provided to indicate CO_2 levels at each point of use and at each supply tank area/room.

2. Detectors shall comply with all the below:

a. Listed or *approved* devices.

b. Permanently mounted.

c. Installed at a height of no more than 12 inches above the floor or as *approved* by the fire code official. Detectors shall have no storage or other equipment within 3 inches on all sides of the detector, and/or placed in an area that would prevent CO_2 from reaching the detector

d. Connected to building electrical system by either hardwiring (requiring a separate electrical permit) or to a non-spliced cord and plug connection that is secured in an approved manner to prevent accidental disconnection/damage or to a CO_2 gas detection system unit.

e. Auto calibrating and self “zeroing” devices are not permitted unless they can be zeroed and spanned.

f. Located within manufacturers' specified detection range or within 15 feet (whichever is less) for each point of use and supply location.

g. Listed to operate under environmental conditions such as temperature, humidity, and velocity variations.

h. Devices used must be able to be calibrated for altitude.

i. Detectors shall be provided with an open cage type cover or other approved device to protect from damage resulting from normal operation in the area or adjacent equipment or storage.

3. Alarm set points shall be set at:

a. 5,000 PPM (0.5 percent) Time Weighted Average (TWA) – Self re-setting (non-latching) alarm.

- Audible notification for employees only in *approved* locations with instructional signage.

b. 15,000 PPM (1.5 percent) – Latching Alarm.

- Audible notification for employees only in *approved* locations with instructional signage.

- Requires a service company or *approved* trained employees to investigate, repair and reset.

c. 30,000 PPM (3 percent) – Latching Alarm.

- Initiate all amber horn/strobes provided near each interior supply container, cylinder, or tank and at each point of use. Additional amber horn/strobes shall be placed at the entrances to below grade locations, confined spaces including small volume rooms, and at walk-in coolers. The notification appliances shall be rated at a minimum of 80cd for visual intensity and 75 dBA for audibility. Notification appliances shall be mounted per NFPA 72 requirements with the entire lens mounted between 80 inches and 96 inches above finished floor. Notification appliances shall be listed to operate in special environments, such as outdoors, indoors, high or low temperatures, and high humidity.

- Activation of automatic system shutoff valve.

- Evacuate room/area and call 911.

- Provide an annunciator panel/unit that annunciates the location of the CO_2 detection zone in alarm by means of a directory LED (light-emitting diode) point display or LCD (liquid crystal display) to assist the responding firefighters. Annunciator panel/unit shall be installed in an *approved* location outside of the potentially CO_2 contaminated areas.

- Provide a graphic floor plan map of the area protected by the CO_2 gas detection system that is permanently mounted adjacent to the annunciator panel/unit or CO_2 gas detection control unit. Plans shall be of durable construction, easily readable in normal lighting, protected by a smooth, transparent, plastic surface and shall indicate the location of supply tank, points of use, and CO_2 detectors. The graphic map shall state "You Are Here" and be properly oriented to assist the responding firefighters.

- Provide a labeled and secured alarm silencing switch adjacent to the annunciator panel/unit that shall only de-activate the audible notification appliances (amber strobes shall remain on and automatic system shutoff valve shall remain closed) until the system is manually reset.

- Alarm silencing can only be performed by Denver Fire Department personnel. Manual reset can only be performed by a qualified service company or Denver Fire Department personnel.

- Alarm Signal shall be defined as the following: In buildings with a monitored sprinkler or fire alarm/detection system having basement or cooler hazards, the CO_2 gas detection system shall be connected to the building fire alarm control panel. This shall include a monitor modules or zones for a high alarm (30,000 ppm or 3.0 percent), a LED hazmat CO_2 alarm zone on the building annunciator, a non-latching supervisory CO_2 maintenance/testing bypass switch, and modified building graphic map indicating the location of the CO_2 gas detection control unit, annunciator panel/unit, CO_2 detectors, and CO_2 supply tank. Building fire alarm notification appliances shall not activate on this CO_2 hazmat alarm. The central station monitoring shall receive and dispatch a CO_2 hazmat alarm.

4. Signage shall be required adjacent to each horn/strobe as follows:

Outside the supply tank room or point of use area/room: ***"DO NOT ENTER WHEN LIGHT IS FLASHING – CO_2 LEAK DETECTED – EVACUATE IMMEDIATELY AND CALL 911"***

Inside the supply tank room or point of use area/room: ***"FLASHING LIGHT MEANS CO_2 LEAK DETECTED – EVACUATE IMMEDIATELY AND CALL 911"***

The sign shall have a minimum 1-inch block lettering with a minimum ¼-inch stroke. The sign shall be on a contrasting surface of black on yellow and shall be of durable construction.

NFPA 704 placards for simple asphyxiants shall also be provided at the main entrance to supply tank rooms, areas, or confined spaces.

5. CO_2 Gas Detection Control Unit shall be:

a. Listed or *approved*.

b. Used as the required annunciator panel/unit and silencing switch.

c. Connected to building electrical by either hardwiring (requiring a separate electrical permit from the building department) or non-spliced cord and plug connection that is visible from control unit and is labeled and protected from accidental disconnection or damage.

d. Labeled and installed in an *approved* location outside of the potentially CO_2 contaminated areas and shall be secured from unauthorized access. Buildings with a fire department key box can secure the control unit with a lockable cover whereas all other covers shall be secured with an *approved* breakable, recordable tie, or wire. Subject to field approval. Ties and wires that have been replaced shall be recorded with the record presented to Denver Fire Department Inspection personnel upon request.

6. Wiring:

a. Wiring diagrams shall be provided for all initiating devices and notification appliances.

b. Pathway wiring, cable, and equipment shall be in accordance with NFPA 70, Article 760 and 770, as applicable.

c. Gas detection circuits shall be installed in a neat and workmanlike manner. Cables and conductors installed exposed on the surface of ceilings and sidewalls shall be supported by the building structure in such a manner that the cable will not be damaged by normal building use. Such cables shall be supported by straps, staples, cable ties, hangers, or similar fittings designed and installed so as not to damage the cable. The installation shall also comply with Article 300 as well as other referenced articles.

d. Design shall account for voltage-drops for notification appliance circuits.

5307.3.6 Transfilling. Filling and transfilling of gases between storage containers, cylinders, tanks, and delivery vehicles shall be performed by qualified personnel using equipment and operating procedures in accordance with CGA P-1. Interior storage containers, cylinders and tanks shall be filled via remote fill ports on the exterior of the building at grade level. Exterior remote fill ports shall be fitted with a vent line to the outside. Delivery personnel shall have access to interior storage areas to inspect valves and piping prior to initiating filling operations. Interior supply containers, cylinders, and tanks shall be filled via a remote fill port on the exterior of the building positioned 3 feet from any pedestrian or overhead door and 3 feet above grade and 10 feet from air intakes and stairwells that go below grade. If the interior supply tank exceeds 1,000 pounds the fill connection port shall be positioned 10 feet from exits (pedestrian and overhead doors), air intakes, and 2 feet from all other openings (windows).

5307.3.7 Inspection and testing. All piping installations shall be visually inspected, calibrated, and pressure tested to determine that the materials, design, fabrication, and installation practices comply with the requirements of this code.

5307.3.7.1 Records. A written record of all alarm activations/resets, required inspections, testing, calibration, and maintenance shall be maintained in a logbook on the premises containing the 3 most current years of records and be available for review by Denver Fire Department personnel.

5307.3.7.2 Required inspections and testing. All piping installations shall be tested and inspected in accordance with Sections 5307.3.7.2.1 through 5307.3.7.2.5.

5307.3.7.2.1 Acceptance testing. Devices, appliances, and related equipment shall not be placed in operation until after the piping system has been checked for leakage as well as detectors, notification appliances and automatic shutoff valves have been tested by a qualified service company. All piping installations shall be visually inspected and pressure tested prior to initial operation. The test pressure downstream of the pressure regulator shall be not less than 110 percent of the operating pressure. Joints shall be checked with a bubble-forming solution. Acceptance testing is required to be witnessed by the fire code officials. Provide an inspection report to the *fire code official* for the piping and joint visual inspection and pressure test.

5307.3.7.2.2 Daily inspections. All detectors and alarms shall be visually inspected daily. These inspections are permitted to be conducted by trained employees.

5307.3.7.2.3 Monthly inspections. All storage vessels, piping, and appurtenances shall be visually inspected monthly. These inspections are permitted to be conducted by trained employees.

5307.3.7.2.4 Semi-annual inspections. Systems shall be visually inspected, gas detectors calibrated in accordance with manufacturers' specifications, alarms tested, and tested for leaks semi-annually by a qualified service company.

5307.3.7.2.5 Alterations and repair. In the event alterations, repairs, or additions are made, the affected piping shall be retested in accordance with Section 5307.3.7.2.1.

5307.3.7.3 Reserved.

5307.3.7.4 Calibration. Detectors shall be checked for accuracy, calibrated to a reference gas concentration, and span reset.

5307.3.7.5 Pressure testing. Pipe joints shall be exposed for examination during the test.

5307.3.7.5.1 Test medium. The test medium shall be air, nitrogen, CO_2, or an inert gas.

5307.3.7.5.2 Section testing. Piping systems shall be permitted to be tested as a complete unit or in sections. A valve shall not be subjected to the test pressure unless it can be determined that the valve, including the valve-closing mechanism, is designed to safely withstand the test pressure.

5307.3.7.5.3 Regulators and valve assemblies. Regulator and valve assemblies fabricated independently of the piping systems in which they are to be installed shall be permitted to be tested with inert gas or air at the time of fabrication. Test records shall be maintained in accordance with Section 5307.3.7.2.1.

5307.3.7.5.4 Test preparation. All joints and fittings shall be exposed for examination during and after the test.

5307.3.7.5.4.1 Pipe clearing. Prior to testing, the interior of the pipe shall be cleared of all foreign material.

5307.3.7.5.4.2 Appliance and equipment isolation. Devices, appliances, and equipment that are not to be included in the test shall be isolated from the piping by closing the device shutoff valve.

5307.3.7.5.4.3 Test pressure measurement. Test pressure shall be measured with a pressure- measuring device designed and calibrated to read, record, or indicate a pressure loss caused by leakage during the pressure test period. The source of pressure shall be isolated before the pressure tests are made. Mechanical gauges used to measure test pressures shall have a range such that the highest end of the scale is not greater than five times the test pressure.

5307.3.7.5.4.4 Test pressure. The test pressures shall be as specified in Section 5307.3.7.2.1. Where the test pressure exceeds 125 psig (862 kPa gauge), the test pressure shall not exceed a value that produces a hoop stress in the piping greater than 50 percent of the specified minimum yield strength of the pipe or tubing. Pressures shall be adjusted smoothly and slowly to avoid pressure spikes.

5307.3.7.5.5 Test duration. The test duration shall be not less than 10 minutes.

5307.3.7.5.6 Visual inspection and cleaning. After testing is complete and the pressure is reduced to at or below operating pressure, all joints shall be cleaned of bubble-forming solution and visually inspected.

5307.3.7.5.7 Detection of leaks and defects. The piping system shall withstand the test pressure specified without showing any evidence of leakage or other defects. Any reduction of test pressures as indicated by pressure gauges shall be deemed to indicate the presence of a leak.

5307.3.7.5.8 Corrections. Where leakage or other defects are located, the affected portion of the piping system shall be repaired or replaced and retested.

5307.3.8 Training. All employees shall receive annual training in hazard identification, physical properties, inspection, and emergency procedures. Training records shall be maintained on site and be available to fire inspectors upon request.

Section 5307.4 Carbon dioxide enrichment systems and all subsections are replaced as follows:

5307.4. Carbon Dioxide (CO_2) gas enrichment systems using on-site supply tanks and/or cylinders in plant growing (husbandry) application. CO_2 enrichment systems using on-site supply tanks and/or cylinders with more than 100 pounds (45.4 kg) of CO_2 or any system using any amount of CO_2 below grade used in plant growing (husbandry) applications shall comply with Sections 5307.4.1 through 5307.4.12.

5307.4.1 Permits. Permits shall be required in accordance with Sections 105.

5307.4.2 Equipment. The storage, use, and handling of CO_2 shall be in accordance with Chapter 53 and the applicable requirements of NFPA 55, Chapter 13. All equipment utilized in compressed gas systems shall be compatible with the intended gas and use.

5307.4.2.1 Containers, cylinders, and tanks. Gas storage containers, cylinders and tanks shall be designed, fabricated, tested, and labeled with manufactures' specifications and shall be maintained in accordance with the regulations of DOTn 49 CFR, Parts 100-185 or the ASME Boiler and Pressure Vessel Code, Section VIII. Labels identifying the hydrostatic test date of containers, cylinders, and tanks must be always visible for inspection.

5307.4.2.1.1 Location. Location of gas storage containers, cylinders, and tanks, inside or outside the building, shall be at an *approved* location.

5307.4.2.1.2 Security. Gas storage containers, cylinders and tanks shall be secured in an *approved* manner to prevent overturning. Containers, cylinders and tanks located outside shall be secured and safeguarded against tampering and protected from physical damage if exposed to vehicle traffic.

5307.4.2.1.3 Design and construction. Bulk tank installations over 2,000 pounds will require an engineered foundation and construction permit in accordance

with Section 1 of the *Denver Commercial Building Code* , or other *approved* engineered solutions.

5307.4.2.2 Piping systems. Piping, tubing, fittings, valves, and pressure regulating devices shall be designed and installed in accordance with *approved* standards and manufacturers' recommendations.

5307.4.2.2.1 Piping, tubing and hoses. Piping, tubing, and hose materials shall be compatible with CO_2 and rated for the temperatures and pressures encountered in the system. All hoses and tubing used in CO_2 service shall be designed for a bursting pressure of at least four times their design pressure. PVC/ABS and other types of rigid plastic piping are not *approved* materials. Acceptable piping for CO_2 shall be the following:

1. Stainless steel A269 grade, which is either seamless or welded drawn over mandrel.
2. Copper K grade, hard drawn seamless.
3. Copper ACR grade (1/2-inch outside diameter or less) annealed seamless.
4. Plastic/polymer materials rated for use with CO_2.
5. Additional *approved* piping, tubing and hoses found in the Compressed Gas Association (CGA) standards for CO_2.

5307.4.2.2.2 Support. Gas piping shall not be attached or supported by any electrical light supports or wiring. All gas piping shall be supported by the building structures or other *approved* means.

5307.4.2.2.3 Identification. Markings for CO_2 piping systems shall consist of the content's name CO_2 and direction-of-flow arrow. Markings shall be provided at each valve; at wall, floor or ceiling penetrations; at each change of direction; and at not less than every 20 feet or fraction thereof throughout the piping run.

5307.4.2.3 Fittings, joints and connections. Fittings, joints, and connections shall be subject to the approval of the *fire code official.*

5307.4.2.3.1 Fittings and joints between gas supply containers and automatic shutoff valve. Joints and fittings on the supply piping or tubing between the CO_2 supply source and the automatic system shutoff valve shall be threaded, compression or welded.

5307.4.2.3.2 Unused connections. Unused piping or tubing connected to the supply system shall be capped or plugged. A closed valve will not be allowed in lieu of a cap or plug.

5307.4.2.3.3 Concealed connections. All fittings and joints shall be exposed and located adjacent to the supply source or points of use and shall be protected by a detector.

5307.4.2.4 Valves. Piping systems shall be provided with valves in accordance with Sections 5307.4.2.4.1 through 5307.4.2.4.4.

5307.4.2.4.1 Pressure relief valves. Pressure relief valves shall be provided and piped to the outdoors.

5307.4.2.4.2 System shutoff valve. An automatic system shutoff valve shall be provided as near to the supply pressure regulator as possible and shall be designed to fail to a closed condition closing on loss of electrical power to the valve and gas detection. Additional automatic shutoff valves may be provided at each point of use. Automatic shutoff valves shall be designed and located so that all phases (i.e., gas, liquid and solid) of CO_2 will not interfere with the operation of the device.

5307.4.2.4.3 Appliance shutoff valves. Each appliance shall be provided with a shutoff valve within 3 feet of the appliance. All shutoff valves shall be capable of being locked or tagged in the closed position for servicing.

5307.4.2.4.4 Accessibility and identification. Valves and controls shall be readily accessible at all times. Normal and emergency system shut-off valves shall be clearly identified. All valves shall be designed or marked to indicate clearly whether it is open or closed.

5307.4.2.5 Venting. Venting of gases shall be directed to an *approved* location outside the building. Insulated liquid CO_2 systems shall have pressure relief devices vented in accordance with NFPA 55.

5307.4.3 Protection from damage. systems shall be installed so the storage tanks, cylinders, piping and fittings are protected from damage by occupants or equipment during normal facility operations.

5307.4.4 Required protection. Where CO_2 storage tanks, cylinders, piping and equipment are located indoors, rooms or areas containing CO_2 storage tanks, cylinders, piping and fittings and grow room/areas where CO_2 is released and can collect shall be provided with a gas detection system in accordance with Section 5307.4.4.1.

5307.4.4.1 Gas detection system. A gas detection system shall comply with all of the following:

1. Continuous gas detection shall be provided to monitor areas where CO_2 can accumulate. Detection equipment shall be provided to indicate CO_2 levels in each grow cultivation area/room and interior CO_2 storage location.

2. Detectors shall be:

a. Listed or *approved* devices.

b. Permanently mounted.

c. Installed at a height of no more than 48 inches above the floor or as *approved* by the *fire code official.* Detectors shall have no storage or other equipment within 3 inches on all sides of the detector, and/or placed in an area that would prevent CO_2 from reaching the detector.

d. Directly connected to building electrical supply and secured in an approved manner to prevent accidental disconnection or damage.

e. Auto calibrating and self "zeroing" devices are not permitted unless they can be zeroed and spanned.

f. Located within manufacturers specified detection range for each point of use and storage location.

g. Listed to operate under environmental conditions such as temperature, humidity, and velocity variations.

h. Devices used must beable to be calibrated for altitude. Devices used must be able to be calibrated for altitude.

3. Activation of the gas detection system shall initiate amber horn/strobes provided in the vicinity of each interior storage container, cylinder or tank and at each point of release. Additional amber horn/strobes shall be placed at the entrances to below grade locations and confined spaces. The notification appliances shall be rated a minimum of 80cd for a visible and 75 dBA for audibility. Notification appliances shall be mounted per NFPA 72 requirements with the entire lens mounted between 80 inches and 96 inches above finished floor. Notification appliances shall be listed to operate in special environments, such as outdoors, indoors, high or low temperatures, and high humidity. Provide notification appliances at the following locations:

a. Inside an interior storage room/area and outside the room/area at each entrance.

b. Inside grow cultivation room/areas.

4. Local alarm set points shall be set at: 5,000 PPM – Latching Alarm

a. Visual and audible notification in *approved* locations at room or area in alarm.

b. Activation of automatic system shut off valve.

c. Evacuate the room in alarm and contact a qualified service company to investigate and address the condition.

d. Reset of the emergency alarm to be conducted by qualified personnel.

5. Signage shall be required adjacent to each horn/strobe as follows.
Storage area/room: "DO NOT ENTER WHEN LIGHT IS FLASHING - CO2 LEAK DETECTED"

Grow cultivation room/area dispensing: "FLASHING LIGHT MEANS CO2 LEAK DETECTED –EVACUATE ROOM"

The sign shall have a minimum 1-inch block lettering with a minimum 1⁄4-inch stroke. The sign shall be on a contrasting surface of black on yellow and shall be of durable construction.

Signage on entrance doors to grow cultivation and storage rooms: Signage shall be provided at entrance doors to each grow cultivation room/area and at each entrance to storage rooms/areas:

NFPA 704 placards for simple asphyxiants shall also be provided at the exterior main entrance and at each entrance to storage rooms/areas.

6. CO2 Gas Detection Control Unit shall be:

a. Listed or *approved*.

b. Used as the required annunciator panel/unit and silencing switch.

c. Connected to building electrical system by either hardwiring (requiring a separate electrical permit) or non-spliced cord and plug connection that is visible from control unit and is labeled and secured in an approved manner to prevent accidental disconnection or damage.

d. Labeled and installed in an *approved* location outside of the potentially CO_2 contaminated areas and shall be secured from unauthorized access. Buildings with a fire department key box can secure the control unit with a lockable cover whereas all other covers shall be secured with an *approved* breakable, recordable tie or wire. Subject to field approval. Ties and wires that have been replaced shall be recorded with the record presented to Denver Fire Department Inspection personnel upon request.

7. Wiring shall be:

a. Wiring diagrams shall be provided for all initiating devices and notification appliances.

b. Pathway wiring, cable, and equipment shall be in accordance with NFPA 70, Article 760 and 770, as applicable.

c. Gas detection circuits shall be installed in a neat and workmanlike manner. Cables and conductors installed exposed on the surface of ceilings and sidewalls shall be supported by the building structure in such a manner that the cable will not be damaged by normal building use. Such cables shall be supported by straps, staples, cable ties, hangers, or similar fittings designed and installed so as not to damage the cable. The installation shall also comply with Article 300 as well as other referenced articles.

d. Design shall account for voltage-drops for notification appliance circuits.

8. A minimum of one portable CO_2 meter shall be in use during business hours.

5307.4.5 Transfilling. Filling and transfilling of gases between storage containers, cylinders, tanks, and delivery vehicles shall be performed by qualified personnel using equipment and operating procedures in accordance with CGA P-1. Interior storage containers, cylinders and tanks shall be filled via remote fill ports on the exterior of the building at grade level. Exterior remote fill ports shall be fitted with a vent line to the outside. Delivery personnel shall have access to interior storage areas to inspect valves and piping prior to initiating filling operations. Interior supply containers, cylinders, and tanks shall be filled via a remote fill port on the exterior of the building positioned 3 feet from any pedestrian or overhead door and 3 feet above grade and 10 feet from air intakes and stairwells that go below grade. If the interior supply tank exceeds 1,000 pounds the fill connection port shall be positioned 10 feet from exits (pedestrian and overhead doors), air intakes, and 2 feet from all other openings (windows).

5307.4.6 Inspection and testing. All piping installations shall be visually inspected, calibrated, and pressure tested to determine that the materials, design, fabrication and installation practices comply with the requirements of this code.

5307.4.7 Records. A written record of all required inspections, testing, calibration, and maintenance shall be maintained in a logbook on the premises containing the three most current years of records and be available for review by Denver Fire Department personnel.

5307.4.8 Required inspections and testing. All piping installations shall be tested and inspected in accordance with Sections 5307.4.8.1 through 5307.4.8.5.

5307.4.8.1 Acceptance testing. Appliances and equipment shall not be placed in operation until after the piping system has been checked for leakage and detectors, notification devices and automatic shutoff valves have been tested by a qualified service company. All piping installations shall be visually inspected and pressure tested prior to initial operation. The test pressure downstream of the pressure regulator shall be not less than 110 percent of the operating pressure. Joints shall be checked with a bubble-forming solution. Acceptance testing is required to be witnessed by the fire code official and/or *building official*s. Provide an inspection report to the fire code official and/or *building official* for the piping and joint visual inspection and pressure test.

5307.4.8.2 Daily inspections. All detectors and alarms shall be visibly inspected daily. These inspections are permitted to be conducted by trained employees.

5307.4.8.3 Monthly inspections. All storage vessels, piping, and appurtenances shall be visually inspected monthly. These inspections are permitted to be conducted by trained employees.

5307.4.8.4 Semi-annual inspections. Systems shall be visually inspected, gas detectors calibrated in accordance with manufacturer's specification, alarms tested, and tested for leaks semi-annually by a qualified service company.

5307.4.8.5 Alterations and repair. In the event alterations, repairs or additions are made, the affected piping shall be retested in accordance with Section 5307.4.8.1.

5307.4.9 Reserved.

5307.4.10 Calibration. Detectors shall be checked for accuracy, calibrated to a reference gas concentration, and span reset.

5307.4.11 Pressure testing. Pipe joints shall be exposed for examination during the test.

5307.4.11.1 Test medium. The test medium shall be air, nitrogen, CO_2, or an inert gas.

5307.4.11.2 Section testing. Piping systems shall be permitted to be tested as a complete unit or in sections. A valve shall not be subjected to the test pressure unless it can be determined that the valve, including the valve-closing mechanism, is designed to safely withstand the test pressure.

5307.4.11.3 Regulators and valve assemblies. Regulator and valve assemblies fabricated independently of the piping systems in which they are to be installed shall be permitted to be tested with inert gas or air at the time of fabrication. Test records shall be maintained in accordance with Section 5307.4.8.1.

5307.4.11.4 Test preparation. All joints and fittings shall be exposed for examination during and after the test.

5307.4.11.4.1 Pipe clearing. Prior to testing, the interior of the pipe shall be cleared of all foreign material.

5307.4.11.4.2 Appliance and equipment isolation. Appliances and equipment that are not to be included in the test shall be isolated from the piping by closing the appliance shutoff valve.

5307.4.11.4.3 Test pressure measurement. Test pressure shall be measured with a pressure- measuring device designed and calibrated to read, record, or indicate a pressure loss caused by leakage during the pressure test period. The source of pressure shall be isolated before the pressure tests are made. Mechanical gauges used to measure test pressures shall have a range such that the highest end of the scale is not greater than five times the test pressure.

5307.4.11.4.4 Test pressure. The test pressures shall be as specified in Section 5307.6.6.5. Where the test pressure exceeds 125 psig (862 kPa gauge), the test pressure shall not exceed a value that produces a hoop stress in the piping greater than 50 percent of the specified minimum yield strength of the pipe or tubing. Pressures shall be adjusted smoothly and slowly to avoid pressure spikes.

5307.4.11.5 Test duration. The test duration shall be not less than 10 minutes.

5307.4.11.6 Visual inspection and cleaning. After testing is complete and the pressure is reduced to at or below operating pressure, all joints shall be cleaned of bubble-forming solution and visually inspected.

5307.4.11.7 Detection of leaks and defects. The piping system shall withstand the test pressure specified without showing any evidence of leakage or other defects. Any reduction of test pressures as indicated by pressure gauges shall be deemed to indicate the presence of a leak.

5307.4.11.8 Corrections. Where leakage or other defects are located, the affected portion of the piping system shall be repaired or replaced and retested.

5307.4.12 Training. All employees shall receive annual training in hazard identification, physical properties, inspections, and emergency procedures. Training records shall be maintained on site and be available to inspectors upon request.

Section 5307.5 Carbon Dioxide (CO2) Gas Enrichment Systems Using a Natural Gas Burner in Plant Growing (Husbandry) Applications is added as follows:

5307.5 Carbon Dioxide (CO2) Gas Enrichment Systems Using a Natural Gas Burner in Plant Growing (Husbandry) Applications. Natural gas burners that are utilized to generate CO_2 in plant growing applications shall comply with Sections 5307.5.1 through 5307.5.6.

5307.5.1 Permits. Permits shall be required in accordance with Section 105.

5307.5.2 Equipment. Natural gas burners shall be listed, labeled and installed in accordance with the manufacturer's installation instructions. Piping systems, combustion and ventilation air and venting for natural gas appliances shall be designed and installed in accordance with *approved* standards, the *International Fuel Gas Code* and manufacturer's recommendations.

5307.5.3 Required protection. Where natural gas burners are located indoors for CO_2 enrichment, grow room/areas shall be provided with a gas detection system in accordance with Section 5307.5.3.1 and carbon monoxide detection in accordance with Section 5307.5.3.2.

5307.5.3.1 Gas detection system. A gas detection system shall comply with all the following:

1.Continuous gas detection shall be provided to monitor areas where CO_2 can accumulate. Detection equipment shall be provided to indicate CO_2 levels in each grow cultivation area/room.

2. Detectors shall be:

a. Listed or *approved* devices.

b. Permanently mounted.

c. Installed at a height of no more than 48 inches above the floor or as *approved* by the *fire code official.* Detectors shall have no storage or other equipment within 3 inches on all sides of the detector, and/or placed in an area that would prevent CO_2 from reaching the detector.

d. Directly connected to building electrical supply and/or fire alarm systems and secured in an approved manner to prevent accidental disconnection or damage.

e. Auto calibrating and self "zeroing" devices are not permitted unless they can be zeroed and spanned.

f. Located within manufacturer's specified detection range for each point of release.

g. Listed to operate under environmental conditions such as temperature, humidity, and velocity variations.

h. Devices used must be able to be calibrated for altitude.

3. Activation of the emergency alarm system shall initiate amber strobes/horns provided in each room/area where CO_2 can accumulate. Additional amber strobes and audible horns shall be placed at the entrances to below grade locations. The notification appliance shall be rated a minimum of 80cd for a visible and 75 dBA for audibility. Notification appliances shall be mounted per NFPA 72 requirements with the entire lens mounted between 80 inches and 96

inches above finished floor. Notification appliances shall be listed to operate in special environments, such as outdoors, indoors, high or low temperatures, and high humidity. Provide notification appliances at the following locations:

a. Inside grow cultivation room/areas.

4. Local alarm set points shall be set at: 5,000 PPM – Latching Alarm

a. Visual and audible notification in *approved* locations at room or area in alarm.

b. Activation of the automatic natural gas control valves to each burner to a closed position stopping the generation of CO_2.

c. Evacuate the room in alarm and contact a qualified service company to investigate and address the condition.

d. Reset of emergency alarm to be conducted by qualified personnel.

5. Signage will be required adjacent to each horn/strobe as follows:
Entrance to below grade location: "DO NOT ENTER WHEN LIGHT IS FLASHING – CARBON DIOXIDE LEAK DETECTED".

Grow cultivation room/area dispensing: "FLASHING LIGHT MEANS CARBON DIOXIDE LEAK DETECTED – EVACUATE ROOM".

The sign shall have a minimum 1-inch block lettering with a minimum ¼-inch stroke. The sign shall be on a contrasting surface of black on yellow and shall be of durable construction.

Signage at entrance doors shall be provided at entrance doors to each grow cultivation room/area:

NFPA 704 placards for simple asphyxiants shall also be provided at the exterior main entrance.

6. All CO2 burner systems shall shut down in the event of a loss of electrical power to the CO2 detectors.

7. A minimum of one portable CO_2 meter shall be in use during business hours.

5307.5.3.2 Carbon monoxide (CO) gas detection.

1. CO gas detection shall be provided to monitor products of combustion continuously.

2. Detectors shall be:

a. Listed or *approved* devices.

b. Permanently mounted.

c. Installed per manufacturer's recommendations and directions.

d. Directly connected to building electrical supply and fire alarm systems and protected from accidental disconnection or damage.

3. CO detection shall be at set at 35 PPM and upon activation shall initiate the following:

- Close the automatic valve to each burner.
- Activate the mechanical ventilation system.

4. All CO2 burner systems shall shut down in the event of a loss of electrical power to the carbon monoxide detector.

5. A minimum of one portable CO meter shall be in use during business hours.

5307.5.4 Inspection and testing. All detectors, alarms and CO_2 burners must be visually inspected, calibrated, and tested to determine that the materials, design, fabrication and installation practices comply with the requirements of this code.

5307.5.4.1 Records. A written record of all required inspections, testing, calibration, and maintenance shall be maintained in a logbook on the premises containing the three most current years of records and be available for review by Denver Fire Department personnel.

5307.5.4.2 Required inspections and testing. All detectors, alarms and CO_2 burner equipment shall be tested and inspected in accordance with Sections 5307.5.4.2.1 through 5307.5.4.2.6.

5307.5.4.2.1 Acceptance testing. Appliances and equipment shall not be placed in operation until after the detectors, notification appliances automatic gas

control valves, and mechanical ventilation system have been tested by a qualified service company. Acceptance testing is required to be witnessed by the Division.

5307.5.4.2.2 Daily inspections. All detectors and alarms shall be visually inspected daily. These inspections are permitted to be conducted by trained employees.

5307.5.4.2.3 Monthly inspections. All CO_2 burners and appurtenances shall be visually inspected monthly. These inspections are permitted to be conducted by trained employees.

5307.5.4.2.4 Semi-annual inspections. Systems shall be visually inspected, and gas detectors calibrated in accordance with manufacturer specification semi-annually by a qualified service company.

5307.5.4.2.5 Annual testing. All detectors, alarms, gas control valves and mechanical ventilation systems shall be tested annually by a qualified service company.

5307.5.4.2.6 Alterations and repair. In the event alterations, repairs or additions are made, the affected equipment shall be retested in accordance with Section 5307.5.4.2.1

5307.5.4.3 Reserved

5307.5.4.4. Calibration. Detectors shall be checked for accuracy, calibrated to a reference gas concentration, and span reset.

5307.5.5 Training. All employees shall receive annual training in hazard identification, physical properties, inspections, and emergency procedures. Training records shall be maintained on site and be available to inspectors upon request.

5307.5.6 Mechanical Ventilation. A mechanical ventilation system shall be provided in accordance with the *Denver Mechanical Code* that complies with all the following:

1. Mechanical ventilation system shall be provided in enriched spaces capable of producing a ventilation airflow rate of 0.75 cfm per square foot (0.0038 m3/s • m2) of floor area.

2. The ventilation system shall discharge to the outdoors.

3. When active, the ventilation system shall operate at a negative pressure to adjacent indoor spaces.

CHAPTER 56 EXPLOSIVES AND FIREWORKS

SECTION 5601 GENERAL

5601.1.3 Fireworks is amended by deleting Exceptions 1, 2, and 4.

5601.2.4 Financial responsibility is replaced as follows:

> 5601.2.4 Financial responsibility. Before a permit is issued, as required by Section 105.5, the applicant shall file with the Fire Prevention Division a surety bond in the principal sum of $2,000,000 or a public liability insurance policy for the same amount, for the purpose of the payment of all damages to persons or property which arise from, or are caused by, the conduct of any act authorized by the permit upon which any judicial judgment results. The *fire code official* is authorized to specify a greater or lesser amount when conditions at the location of use indicate a greater or lesser amount is required. Government entities shall be exempt from this bond requirement.

Section 5601.4 Qualifications is replaced as follows:
5601.4 Qualifications. Persons in charge of magazines, blasting, fireworks display, or pyrotechnic special effect operations shall obtain the appropriate State of Colorado license. For pyrotechnic special effect operations, the license is that required for an outdoor display operator. Persons in charge of magazines, blasting, fireworks display, or pyrotechnic special effect operations shall not be under the influence of alcohol or drugs which impair sensory or motor skills, shall be at least 21 years of age, and shall demonstrate knowledge of all safety precautions related to the storage, handling, or use of explosive, explosive material, or fireworks.

Section 5601.5 Supervision is replaced as follows:
5601.5 Supervision. The *fire code official* is authorized to require operations permitted under the provisions of Section 105.5 to be supervised at any time by theDivision in order to determine compliance with all safety and fire regulations. The Division shall be retained for fire watch and to inspect all equipment and powder charges. The pyrotechnics firm to which the permit is issued shall be responsible for the cost of this personnel.

CHAPTER 57 FLAMMABLE AND COMBUSTIBLE LIQUIDS

SECTION 5701 GENERAL
Section 5701.2 Non-applicability is amended by replacing Item 10 and adding Item 14 as follows:

10. The manufacture, storage, dispensing, and use of alcoholic beverages with 20 percent or less alcohol by volume and the remaining constituents having no hazardous properties regulated by the Denver Commercial Building Code or Denver Fire Code.
The manufacture, storage, dispensing, and handling of alcohol beverages with greater than 20 percent alcohol by volume shall comply with Chapter 40.

Section 5701.5.1 Altitude correction is added as follows:
5701.5.1 Altitude correction. Flash point and boiling point information for flammable and combustible liquids is referenced to sea level. In Denver, Colorado, the flash point and boiling point of flammable and combustible liquids will reduce by 8 degree °F and may cause reclassification of flammable and combustible liquids. Altitude reclassification shall be documented on submitted plans.

SECTION 5703

GENERAL REQUIREMENTS

Section 5703.6.2.2 Bulk transfer and process transfer piping is added as follows:

5703.6.2.2 Bulk transfer and process transfer piping. Closed double-wall steel piping and leak monitoring shall be required for bulk transfer and process transfer of flammable and combustible liquids inside buildings in the following applications:

1. Piping used for the manual transfer of fuel oil

2. Piping used for the automatic transfer of fuel oil from a stationary supply tank, located inside or outside the building, to fuel-burning equipment with or without a day tank

3. Piping used to transfer Class 1A, 1B and 1C flammable liquids

Exception: Single wall metallic piping may be used where:

1. The fuel storage tank and fuel-burning equipment are located in a parking garage.

2. The fuel storage tank and fuel-burning equipment are located aboveground exterior to the building.

3. Fuel is automatically transferred from a tank vehicle to a stationary tank, provided the piping system is exposed and continuously supervised by trained personnel during the transfer operation.

4. Fuel is manually transferred inside a building from a portable tank not greater than 55 gallons provided the piping system is exposed and continuously supervised by trained personnel during the transfer operation.

SECTION 5704

STORAGE

Section 5704.3.3 Indoor storage is amended by deleting Exception 2

Section 5704.3.8.5 Warehouse hose lines is deleted.

CHAPTER 60 HIGHLY TOXIC AND TOXIC MATERIALS

SECTION 6004 HIGHLY TOXIC AND TOXIC COMPRESSED GASES

Section 6004.2.2.10.1 Alarms is replaced as follows:

6004.2.2.10.1 Alarms. The gas detection system shall initiate a local alarm and transmit a signal to a constantly attended control station when a short-term hazard condition is detected. The alarm shall be in accordance with Section 916.

Exception: Signal transmission to a constantly attended control station is not required where not more than one cylinder of highly toxic or toxic gas is stored.

CHAPTER 61 LIQUEFIED PETROLEUM GASES

SECTION 6101 GENERAL

Section 6101.4 Prohibition is added as follows:

6101.4 Prohibition. The installation of LP-gas containers and use of LP-gas is prohibited where a source of natural gas is within 300 feet of the nearest property line.

> Exception:
> LP-gas containers used in accordance with Section 6103.2 and the applicable provisions of Chapters 3, 6, 31, 33 and 35. Dispensing installations and operations in accordance with Chapter 23.

SECTION 6103 INSTALLATION OF EQUIPMENT

Section 6103.2.1.7 Use for food preparation is amended by adding the following sentence to the end of the section:

Such containers shall not exceed a water capacity of 2.7 pounds. (1.02 kg).

SECTION 6104 LOCATION OF LP-GAS CONTAINERS

Section 6104.2 Maximum capacity within established limits is amended by adding the following to the end of section:

For *one- and two-family dwellings* constructed under the *Denver Residential Code*, a maximum of 40 pounds of propane [or two 20-pound cylinders—one for use and one spare bottle] shall be permitted on the premises and a maximum of 5.4 pounds of propane (in maximum 2.7-pound cylinders) shall be permitted within the *dwelling*, including attached and detached garages.

For *townhouses*, condominiums, and apartments, one 20- pound propane cylinder is allowed to be stored in each detached garage or detached storage area.

SECTION 6107 SAFETY PRECAUTIONS AND DEVICES

Section 6107.4 Protecting containers from vehicles is amended by changing the reference from "NFPA 58" to "Section 312 of the Denver Fire Code."

CHAPTER 80REFERENCED STANDARDS

Chapter 80 REFERENCED STANDARDS is amended by modifying the edition of NFPA with the editions listed below:

NFPA 13, 13D, & 13R— 2025 Edition
NFPA 14— 2024 Edition
NFPA 17 & NFPA 17A – 2024 Edition
NFPA 20— 2025 Edition
NFPA 24 - 2025 Edition
NFPA 70—as adopted by State of Colorado
NFPA 72— 2025 Edition

Chapter 80 Referenced Standards is amended by adding the following standards:

ASHRAE 15	2024 with addendum a, af, d and g
ANSI	American National Standards Institute 25 W 43rd Street, Fourth Floor New York, NY 13045
ASCE	American Society of Civil Engineers 101 Constitution Avenue NW Washington, D.C. 20001
ASCE 21 – as adopted by State of CO	Automated People Mover Standards (as adopted by the State of Colorado - Parts 1 through 4, as amended by ASCE)
ASME	American Society of Mechanical Engineers Three Park Avenue New York, NY 10016-5990
ASME A17.1/CSA B44	Safety Code for Elevators and Escalators (as adopted by the State of Colorado)
ASME A17.3 ASME A18.1	Safety Code for Existing Elevators and Escalators (as adopted by the State of Colorado)
ASME B31 – 2016	Safety Standard for Platform Lifts and Stairway Chair Lifts (as adopted by the State of Colorado)
	Safety Standard for Belt Manlifts
	Safety Standard for Conveyors and Related Equipment
Chlorine Manual 8th printing — 2014	Standard for Pressure Piping National Chlorine Institute 1300 Wilson Boulevard, Suite 525 Arlington, VA 22209
NFPA 82 - 2024 Edition	
NFPA 150 – 2025 Edition	
NFPA 415 – 2022 Edition	
NFPA 418 – 2024 Edition	

INTERNATIONAL FIRE CODE APPENDICES STATUS OF APPENDICES ON ADOPTION

Appendices are Added, Adopted, Adopted as Amended, or Not Adopted as part of this code as Provisions in Appendices that are added, adopted, or adopted as amended carry the full weight and mandatory enforceability of the Code.

APPENDIX	TITLE	STATUS
A	Board of Appeals	Not Adopted
B	Fire-flow Requirements for Buildings	Adopted as Amended
C	Fire Hydrant Locations and Distribution	Adopted as Amended
D	Fire Apparatus Access Roads	Adopted as Amended
E	Hazard Categories	Not Adopted
F	Hazard Ranking	Adopted
G	Cryogenic Fluids—Weight and Volume Equivalents	Not Adopted
H	Hazardous Materials Management Plan (HMMP)	Not Adopted
I	Fire Protection Systems—Noncompliant Conditions	Not Adopted
J	Building Information Sign	Not Adopted
K	Construction Requirements for Existing Ambulatory Care Facilities	Not Adopted
L	Requirements for Fire Fighter air Replenishment systems	Not Adopted
M	High-rise Buildings – Retroactive Automatic sprinkler Requirements	Not Adopted
N	Indoor Trade Shows and Exhibitions	Not Adopted
O	Valet Trash and Recycling and Collection in Group R-2 Occupancies	Adopted
P	Shop Drawing Submittal Requirements for Construction Permit Applications	Added

APPENDIX B FIRE-FLOW REQUIREMENTS FOR BUILDINGS

SECTION B104 FIRE-FLOW CALCULATION AREA
Section B104.1 General is amended as follows:
B104.1 General. The fire-flow calculation area shall be the total area of all floor levels within the exterior walls, and under the horizontal projections of the roof of a building, except as modified in Section B104.3 of the *International Fire Code*. In buildings with mixed construction types as defined in *the International Building Code*, the fire-flow calculations shall follow the method described in the *2024 International Fire Code Commentary*. **Exceptions 1 & 2 to remain.**

Section B104.3 is added as follows:
Section B104.3 Fire Flow Data. For new building construction or addition, each set of construction drawings submitted for permit shall contain the required fire flow calculation as follows:
Fire Flow Data Block

TOTAL FIRE FLOW REQUIRED FOR THIS IS GPM MINIMUM @ 20 PSI RESIDUAL PRESSURE.
THIS FLOW MUST BE PROVIDED FROM A MINIMUM OF FIRE HYDRANTS.

EACH FIRE HYDRANT SHALL SUPPLY A MINIMUM OF 1500 GPM @ 20 PSI RESIDUAL PRESSURE AT THE HYDRANT OUTLET TO BE ACCEPTABLE.

CODE USED FOR ANALYSIS: 2024 IFC WITH 2025 AMENDMENTS OCCUPANCY GROUP(S):
CONSTRUCTION TYPE(S):
FIRE FLOW CALCULATION AREA:

THIS BUILDING **IS/IS NOT** FULLY PROTECTED WITH AN AUTOMATIC SPRINKLER SYSTEM.

SECTION B105 FIRE-FLOW REQUIREMENTS FOR BUILDINGS
Section B105.1 One- and two-family dwellings, Group R-3 and R-4 buildings and townhouses is replaced as follows:
B105.1 One-and-two-family dwellings, Group R-3 and R-4 buildings and townhouses. The minimum fire flow and flow duration for one- and two-family dwellings, Group R-3 and R-4 buildings and townhouses shall be as specified in Table B105.1(2). All hydrants, new and/or existing shall flow no less than 1,500 gpm with a minimum residual pressure of 20 psi.

Exception: A reduction in required fire flow of up to 50 percent, as approved, is allowed for one and two family dwellings when the building is protected throughout with an automatic fire sprinkler system installed in accordance with NFPA 13D

Table B105.1(1) is deleted.

Section B105.2 Buildings other than one- and two-family dwellings is replaced as follows:
B105.2 Buildings other than one- and two-family dwellings. The minimum fire flow and flow duration for buildings other than one- and two-family dwellings shall be as specified in Table B105.1(2).

Exception: A reduction in required fire flow of up to 50 percent, as *approved*, is allowed when the building is protected throughout with an automatic fire sprinkler system installed in accordance with

NFPA 13 or NFPA 13R. The resulting fire flow shall not be less than 1,500 gallons per minute (5,678 L/min) for the prescribed duration as specified in Table B105.1(2). All hydrants, new and/or existing shall flow no less than 1,500 gpm with a minimum residual pressure of 20 psi.

Table B105.2 is deleted.

APPENDIX C FIRE HYDRANT LOCATIONS AND DISTRIBUTION

IFC Appendix C Table C102.1, Footnotes f and g are deleted.

APPENDIX D FIRE APPARATUS ACCESS ROADS

Only the following sections of Appendix D are adopted as follows:

D103.5 Fire apparatus access road gates is adopted and item 1 is replaced with section 503.6.1.

D103.6 Signs is adopted and modified by replacing Figure D103.6 with Figure SR7-13 & the noted text as follows:

Signs shall comply with the Traffic Engineering Services Department of Transportation and Infrastructure Sign Manual as depicted SR7-13.

Adopt sections D104, D106, D107 and D108