Code Review
2018 Changes to International Codes

FLORIDA BUILDING COMMISSION
"Stronger Codes Through Science and Consensus"

Florida dbpr Building Codes and Standards

International Fire Code(IFC) / International Building Code (IBC) – Fire Prevention

Electrical Technical Advisory Committee (TAC)

IBC- Code Change No.	IBC- Section	Change Summary b/t 2015 IBC and 2018 IBC – Electrical TAC	Change Summary b/t 2017 FBC and 2018 IBC.	Staff comments
F56-16	IBC [F] 2702.2.3	Revises section (IBC [F] 2702.2.3) "Emergency responder radio coverage systems" to appropriately bring the power supply requirements in line with that which is required for fire alarm system. **Cost Impact:** Will not increase the cost of construction. It will significantly **reduce the cost of** the system since the proposed 12-HR UPS power back up system is less costly than the currently required 24-HR UPS system.	Same as change between 2015 IBC and 2018 IBC	

TAC Action	Commission Action		TAC	Cmsn.
Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	Accommodate Florida Specific Need: YES (Select Criteria) ☐ NO: ☐ a.☐ b.☐ c.☐ d.☐ e.☐ f.☐ Others (Explain):	☐ No Action Needed	☐	☐
		☐ Overlapping provisions	☐	☐

F57-16	IBC [F] 2702.2.3	Revises section (IBC [F] 2702.2.3) "Emergency responder radio coverage systems," to allow the use of available standby power generators in lieu of 12 hours provided strictly from batteries. **Cost Impact:** Will not increase the cost of construction. This proposal **will reduce the cost** of construction.	Same as change between 2015 IBC and 2018 IBC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

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F75-16	105.7.9 (New), 202, 202 (New), 604.2.6 (New) (IBC [F] 2702.2.6 (New)), 606.8, 606.8.1 (New), 901.5, 901.6, 902.1, 908.1 (IBC [F] 908.1), 908.2 (IBC [F] 908.2), 908.3 (IBC [F] 908.3)] 908.3.1 (IBC [F] 908.3.1), 908.3.2 (IBC [F] 908.3.2), 908.3.3 ([F] 908.3.3), 908.4 (IBC [F] 908.4), 908.5 (IBC [F] 908.5), 908.6 (IBC [F] 908.6), 908.7 (IBC [F] 908.7), 916.(New) (IBC [F] 916 (New)), 6204.1.11; IBC [F] 406.8.5, [F]	Adds new section 105.7.9 “Gas detection systems,” deletes without substitution section 202 definition of “Continuous gas detection system,” adds new section 202 definition of “Gas detection system,” adds new definition of “HPM,” adds new section 604.2.6 (IBC [F] 2702.2.6) “Gas detection systems,” revises section 606.8 “Refrigerant detection,” adds new section 606.8.1 “Refrigerants other than ammonia,” revises section “901.5 Installation acceptance testing,” revises section 901.6 “Inspection, testing and maintenance,” adds new definitions to Chapter 2, revises section 908.1 “Group H occupancies” revises section 908.2 “Group H-5 occupancy,” deletes without substitution sections 908.3 “Highly toxic and toxic materials,” section 908.4 “Ozone gas-generator rooms,” section 908.6 “Refrigeration systems,” section 908.7 “Carbon dioxide (CO2),” adds new section 916.1 “Gas Detection Systems,” section 916.2 “Permits,” section 916.3 “Equipment,” section 916.4 “Power Connections,” section 916.5 “Emergency and standby power,” section 916.6 “Sensor Locations,” revises section 6204.1.11 “Standby power,” revises section [F] 406.8.5 “Gas detection system,” revises section [F] 406.8.5.1 “Operation System activation,” revises section [F] 406.8.5.2 “Failure of the gas detection system,” deletes without substitution sections [F] 406.8.5.1 “System design,” section [F] 406.8.5.1.1 “Gas detection system components,” revises section [F] 415.11.7 “Gas detection systems,” revises section [F] 415.11.7.1 “Where required,” revises section [F] 415.11.7.1.1 “Fabrication areas,” revises section [F]	Same as change between 2015 IBC and 2018 IBC	

Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

	406.8.5.1, [F] 406.8.5.1.1, [F] 406.8.5.2, [F] 406.8.5.3, [F] 415.2, [F] 415.11.7, [F] 415.11.7.1, [F] 415.11.7.1.1, [F] 415.11.7.1.2, [F] 415.11.7.1.3, [F] 415.11.7.1.4, [F] 415.11.7.2, [F] 415.11.9.3, [F] 421.6, [F] 421.6.3, [F] 421.6.1, [F] 421.6.4, [F] 421.6.2	415.11.7.1.2 “HPM rooms,” revises section [F] 415.11.7.1.3 “Gas cabinets, exhausted enclosures and gas rooms,” [F] 415.11.7.1.4 “Corridors,” revises section [F] 415.11.7.2 “Gas detection system operation,” section [F] 415.11.7.1.3 “Gas cabinets, exhausted enclosures and gas rooms,” section [F] 15.11.7.1.4 “Corridors,” section [F] 415.11.7.2 “Gas detection system operation,” section [F] 415.11.9.3 “Signals,” section [F] 421.6 “Gas detection system,” section [F] 421.6.1 “Operation System activation,” deletes without substitution section [F] 421.6.1 “System design,” revises section 421.6.2 “Failure of the gas detection system,” and deletes without substitution section [F] 421.6.2 “Gas detection system components,” to clarify gas detection system requirements. This amendment was approved as modified by the public comment of Jeffrey Shapiro. **Cost Impact: Will increase the cost of construction.** The additional construction requirements in this proposal have the potential to increase construction costs. However, since the features described in Section 916 are currently available with most gas detection equipment on the market today, the additional costs may not be significant and/or construction of walls not necessary for fire or life safety.		

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Rule 61G20-2.002 2. Technical amendments needed to accommodate the specific needs of this state include but are not limited to amendments to the Florida Building Code that provide for the following: a. Establish minimum life safety construction requirements to protect buildings and their occupants from fire, wind, flood, and storm surge using the latest technical research and engineering standards for buildings and materials products. b. Provide for flood protection provisions that are consistent with the latest flood protection requirements of the National Flood Insurance Program. c. Maintain eligibility for federal funding and discounts from the National Flood Insurance Program, the Federal Emergency Management Agency, and the United States Department of Housing and Urban Development. d. Provide for energy efficiency standards for buildings that meet or exceed the national energy standards as mandated by Title III of the Energy Conservation and Protection Act. e. Maintain coordination with the Florida Fire Prevention Code. f. Provide for the latest industry standards and design

F79-16	(IBC [F] 2702.1.2) (New)	Adds new section 2702.1.2 “Fuel Line piping protection” to require fuel lines supplying a generator set inside a building to be separated with fire resistance- rated construction from areas of the building other than in the room in which the generator is located. **Cost Impact: Will increase the cost of construction.** This requirement for protection of the fuel lines supplying stationary generators already applies to high-rise buildings. This proposal, if approved, would require labor to install generic materials or a proprietary system to protect fuels lines in all buildings with stationary generators.	Same as change between 2015 IBC and 2018 IBC	

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Code Change No: F56-16

Original Proposal

Section: 510.4.2.3, 604.2.3, IBC [F] 2702.2.3

Proponent: Sagiv Weiss-Ishai, SFFD, representing San Francisco Fire Department (sagiv.weiss-ishai@sfgov.org)

Revise as follows:

510.4.2.3 Standby power. Emergency responder radio coverage systems shall be provided with standby power in accordance with Section 604. The standby power supply shall be capable of operating the emergency responder radio coverage system for a duration of not less than ~~24~~ 12 hours at 100 percent system operation capacity.

604.2.3 (IBC [F] 2702.2.3) Emergency responder radio coverage systems. Standby power shall be provided for emergency responder radio coverage systems as required in Section 510.4.2.3. The standby power supply shall be capable of operating the emergency responder radio coverage system for a duration of not less than ~~24~~ 12 hours at 100 percent system operation capacity.

Reason: It is not practical to require that 24 hour standby power be provided for these systems, especially for those located in buildings where stationary engine generators are not available. This proposal correlates the IFC/IBC standby power requirements with those included in NFPA 72, Section 24.5.2.5.5.2.

Cost Impact: Will not increase the cost of construction
It will significantly reduce the cost of the system since the proposed 12-HR UPS power back up system is less costly than the currently required 24-HR UPS system.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: This proposal appropriately brings the power supply requirements in line with that which is required for fire alarm systems.

Analysis: Note that proposals F56-16 and F57-16 should be coordinated as they provide slightly different approaches to the same subject.

Assembly Action: **None**

Final Action Results

F56-16	**AS**

Code Change No: F57-16

Original Proposal

Section: 510.4.2.3, 604.2.3; IBC [F] 2702.2.3

Proponent: Alan Perdue, representing Safer Buildings Coalition (alan.perdue@saferbuildings.org)

Revise as follows:

510.4.2.3 Standby power. Emergency responder radio coverage systems shall be provided with dedicated standby batteries or provided with 2 hour standby batteries and connected to the facility generator power system in accordance with Section 604. The standby power supply shall be capable of operating the emergency responder radio coverage system at 100 percent system capacity for a duration of not less than ~~24~~ 12 hours.

604.2.3 (IBC [F] 2702.2.3) Emergency responder radio coverage systems. Standby power shall be provided for emergency responder radio coverage systems as required in Section 510.4.2.3. The standby power supply shall be capable of operating the emergency responder radio coverage system at 100 percent system operation capacity for a duration of not less than ~~24~~ 12 hours.

Reason: In the 2009 IFC the standby power requirements were 12 hours. The requirements in the 2012 IFC to the standby power requirements were changed to 24 hours to align with other fire safety systems such as fire alarms with no real experience or technical justification. The capacity necessary for providing 24 hour battery backup for emergency responder radio enhancement systems is far more significant that that of other systems and can require large battery banks on multiple floors of a building. Other national standards and industry practices utilize 12 hours as the standard and this change brings consistency to backup battery requirements for design professional and the fire code officials.

Cost Impact: Will not increase the cost of construction
This proposal will reduce the cost of construction.

Report of Committee Action Hearings

Committee Action: **Approved as Submitted**

Committee Reason: This proposal, which is similar to code change proposal F56-16, allows the use of available standby power generators in lieu of 12 hours provided strictly from batteries. Note that the duration also has changed from 24 to 12 hours as in code change proposal F56-16.

Analysis: Note that proposals F56-16 and F57-16 should be coordinated as they provide slightly different approaches to the same subject.

Assembly Action: **None**

Final Action Results

F57-16	**AS**

Code Change No: F75-16

Original Proposal

Section(s): 105.7.9 (New), 202, 202 (New), 604.2.6 (New) (IBC [F] 2702.2.6 (New)), 606.8, 606.8.1 (New), 901.5, 901.6, 902.1, 908.1 (IBC [F] 908.1), 908.2 (IBC [F] 908.2), 908.3 (IBC [F] 908.3)] 908.3.1 (IBC [F] 908.3.1), 908.3.2 (IBC [F] 908.3.2), 908.3.3 ([F] 908.3.3), 908.4 (IBC [F] 908.4), 908.5 (IBC [F] 908.5), 908.6 (IBC [F] 908.6), 908.7 (IBC [F] 908.7), 916.(New) (IBC [F] 916 (New)), 2308.2.2, 2309.2.2, 2311.7.1.1, 2311.7.1.2, 2311.7.2, 2311.7.2.2, 2311.7.2.1, 2311.7.2.1.1, 2311.7.2.3, 2702.1, 2703.1.3, 2703.13, 2703.13.1, 2703.13.1.1, 2703.13.1.2, 2703.13.1.3, 2703.13.1.4, 2703.13.2, 5307.5, 5307.5.2, 5808.5, 5808.5.3, 5808.5.1, 5808.5.2, 5808.5.4, 6004.2.2.7, 6004.2.2.10, 6004.2.2.10.1, 6004.2.2.10.2, 6004.2.2.10.3, 6004.2.2.10.4, 6005.3.2, 6005.5, 6204.1.11; IBC [F] 406.8.5, [F] 406.8.5.1, [F] 406.8.5.1.1, [F] 406.8.5.2, [F] 406.8.5.3, [F] 415.2, [F] 415.11.7, [F] 415.11.7.1, [F] 415.11.7.1.1, [F] 415.11.7.1.2, [F] 415.11.7.1.3, [F] 415.11.7.1.4, [F] 415.11.7.2, [F] 415.11.9.3, [F] 421.6, [F] 421.6.3, [F] 421.6.1, [F] 421.6.4, [F] 421.6.2

Proponent: Michael O'Brian representing the Fire Code Action Committee (FCAC@iccsafe.org)

Add new text as follows:

105.7.9 Gas detection systems. A construction permit is required for 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.

Delete without substitution:

SECTION 202 DEFINITIONS

~~**202 CONTINUOUS GAS DETECTION SYSTEM.** A gas detection system where the analytical instrument is maintained in continuous operation and sampling is performed without interruption. Analysis is allowed to be performed on a cyclical basis at intervals not to exceed 30 minutes.~~

Add new definition as follows:

GAS DETECTION SYSTEM. A system or portion of a combination system that utilizes one or more stationary sensors to detect the presence of a specified gas at a specified concentration and initiate one or more responses required by this code, such as notifying a responsible *person*, activating an alarm signal, or activating or deactivating equipment. A self-contained gas detection and alarm device is not classified as a gas detection system.

Delete without substitution:

~~202 GAS DETECTION SYSTEM, CONTINUOUS.~~
~~See "Continuous gas detection system."~~

Add new definition as follows:

HPM. See "Hazardous Production Material."

Add new text as follows:

604.2.6 (IBC [F] 2702.2.6) Gas detection systems. Emergency power shall be provided for *gas detection systems* where required by Sections 604.2.8 and 604.2.14. Standby power shall be provided for gas detection systems where required by Section 916.5.

Revise as follows:

606.8 Refrigerant ~~detector~~ detection. Machinery rooms shall ~~contain~~ be provided with a refrigerant detector with an audible and ~~visual~~ visible alarm. ~~The detector, or a sampling tube that draws air to the detector, shall be located in an area where refrigerant from a leak will concentrate. The alarm shall be actuated at a value not greater than the corresponding TLV-TWA values shown in the International Mechanical Code for~~ Where ammonia is used as the refrigerant ~~classification. Detectors and alarms~~, refrigerant detection shall ~~be placed in approved locations~~ comply with IIAR 2. ~~The detector~~ For refrigerants other than ammonia, refrigerant detection shall ~~transmit a signal to an approved location~~ comply with Section 606.8.1.

Add new text as follows:

606.8.1 Refrigerants other than ammonia. A detector, or a sampling tube that draws air to a detector, shall be provided at an approved location where refrigerant from a leak is expected to accumulate. The system shall be designed to initiate audible and visible alarms inside of and outside each entrance to the refrigerating machinery room and transmit a signal to an approved location where the concentration of refrigerant detected exceeds the lesser of the following:

1. The corresponding TLV-TWA values shown in the International Mechanical Code for the refrigerant classification.
2. 25 percent of the lower flammable limit (LFL).

Detection of a refrigerant concentration exceeding 25 percent of the lower flammable limit (LFL) shall stop refrigerant equipment in the machinery room in accordance with Section 606.9.1.

Revise as follows:

901.5 Installation acceptance testing. Fire detection and alarm systems, emergency alarm systems, gas detection systems, fire-extinguishing systems, fire hydrant systems, fire standpipe systems, fire pump systems, private fire service mains and all other *fire protection systems* and appurtenances thereto shall be subject to acceptance tests as contained in the installation standards and as *approved* by the *fire code official*. The *fire code official* shall be notified before any required acceptance testing.

901.6 Inspection, testing and maintenance. Fire detection and alarm systems, emergency alarm systems, ~~and~~gas detection systems, fire extinguishing systems, mechanical smoke exhaust systems, and smoke and heat vents shall be maintained in an operative condition at all times, and shall be replaced or repaired where defective. Nonrequired *fire protection systems* and equipment shall be inspected, tested and maintained or removed.

902.1 Definitions. The following terms are defined in Chapter 2:

ALARM NOTIFICATION APPLIANCE.
ALARM SIGNAL.
ALARM VERIFICATION FEATURE.
ANNUNCIATOR.
AUDIBLE ALARM NOTIFICATION APPLIANCE.
AUTOMATIC.
AUTOMATIC FIRE-EXTINGUISHING SYSTEM.
AUTOMATIC SMOKE DETECTION SYSTEM.

AUTOMATIC SPRINKLER SYSTEM.
AUTOMATIC WATER MIST SYSTEM.
AVERAGE AMBIENT SOUND LEVEL.
CARBON DIOXIDE EXTINGUISHING SYSTEM.
CLEAN AGENT.
COMMERCIAL MOTOR VEHICLE.
CONSTANTLY ATTENDED LOCATION.
DELUGE SYSTEM.
DETECTOR, HEAT.
DRY-CHEMICAL EXTINGUISHING AGENT.
ELEVATOR GROUP.
EMERGENCY ALARM SYSTEM.
EMERGENCY VOICE/ALARM COMMUNICATIONS.
FIRE ALARM BOX, MANUAL.
FIRE ALARM CONTROL UNIT.
FIRE ALARM SIGNAL.
FIRE ALARM SYSTEM.
FIRE AREA.
FIRE DETECTOR, AUTOMATIC.
FIRE PROTECTION SYSTEM.
FIRE SAFETY FUNCTIONS.
FIXED BASE OPERATOR (FBO).
FOAM-EXTINGUISHING SYSTEM.
GAS DETECTION SYSTEM
HALOGENATED EXTINGUISHING SYSTEM.
IMPAIRMENT COORDINATOR.
INITIATING DEVICE.
MANUAL FIRE ALARM BOX.
MULTIPLE-STATION ALARM DEVICE.
MULTIPLE-STATION SMOKE ALARM.
NOTIFICATION ZONE.
NUISANCE ALARM.
PRIVATE GARAGE.
RECORD DRAWINGS.
SINGLE-STATION SMOKE ALARM.
SLEEPING UNIT.
SMOKE ALARM.
SMOKE DETECTOR.
STANDPIPE SYSTEM, CLASSES OF.
Class I system.
Class II system.
Class III system.
STANDPIPE, TYPES OF.
Automatic dry.
Automatic wet.
Manual dry.
Manual wet.
Semiautomatic dry.
SUPERVISING STATION.
SUPERVISORY SERVICE.
SUPERVISORY SIGNAL.
SUPERVISORY SIGNAL-INITIATING DEVICE.
TIRES, BULK STORAGE OF.
TRANSIENT AIRCRAFT.
TROUBLE SIGNAL.
VISIBLE ALARM NOTIFICATION APPLIANCE.

WET-CHEMICAL EXTINGUISHING AGENT.
WIRELESS PROTECTION SYSTEM.
ZONE.
ZONE, NOTIFICATION.

908.1 Group H occupancies. Emergency alarms for the detection and notification of an emergency condition in Group H occupancies shall be provided as required in Chapter 50.

908.2 Group H-5 occupancy. Emergency alarms for notification of an emergency condition in an HPM facility shall be provided as required in Section 2703.12. ~~A continuous gas detection system shall be provided for HPM gases in accordance with Section 2703.13.~~

Delete without substitution:

~~**908.3 Highly toxic and toxic materials.** Where required by Section 6004.2.2.10, a gas detection system shall be provided for indoor storage and use of highly toxic and toxic compressed gases.~~

~~**908.4 Ozone gas-generator rooms.** A gas detection system shall be provided in ozone gas-generator rooms in accordance with Section 6005.3.2.~~

~~**908.5 Repair garages.** A flammable-gas detection system shall be provided in repair garages for vehicles fueled by nonodorized gases in accordance with Section 2311.7.2.~~

~~**908.6 Refrigeration systems.** Refrigeration system machinery rooms shall be provided with a refrigerant detector in accordance with Section 606.8.~~

~~**908.7 Carbon dioxide (CO_2) systems.** Emergency alarm systems in accordance with Section 5307.5.2 shall be provided where required for compliance with Section 5307.5.~~

Add new text as follows:

SECTION 916
GAS DETECTION SYSTEMS

916.1 Gas detection systems. *Gas detection systems* required by this code shall comply with Sections 916.2 through 916.11.

916.2 Permits. Permits shall be required as set forth in Sections 105.7.9.

916.2.1 Construction documents. Documentation of the gas detection system design and equipment to be used that is adequate to demonstrate compliance with the requirements of this code shall be provided with the application for permit.

916.3 Equipment. *Gas detection system* equipment shall be designed for use with the gases being detected and shall be installed in accordance with manufacturers' instructions.

916.4 Power connections. Gas detection systems shall be permanently connected to the building electrical power supply or shall be permitted to be cord connected to an unswitched receptacle using an approved restraining means that secures the plug to the receptacle.

916.5 Emergency and standby power. Where standby or emergency power is not required elsewhere by this code, standby or emergency power shall be provided or the gas detection system shall initiate a trouble signal at an approved location if the power supply is interrupted.

916.6 Sensor locations. Where a specific location for sensors is not specified elsewhere by this code, sensors shall be installed in approved locations where leaking gases are expected to accumulate.

916.7 Gas sampling. Gas sampling shall be performed continuously. Sample analysis shall be processed immediately after sampling, except as follows:

1. For HPM gases, sample analysis shall be performed at intervals not exceeding 30 minutes.
2. For toxic gases, sample analysis shall be performed at intervals not exceeding 5 minutes in accordance with Section 6004.2.2.7.
3. Where a less frequent or delayed sampling interval is *approved*.

916.8 System activation. A gas detection alarm shall be initiated where any sensor detects a concentration of gas exceeding the following thresholds:

1. For flammable gases, a gas concentration exceeding 25 percent of the lower flammable limit (LFL).
2. For non-flammable gases, a gas concentration exceeding the threshold specified by the section of this code requiring a *gas detection system*.

Upon activation of a gas detection alarm, alarm signals or other required responses shall be as specified by the section of this code requiring a *gas detection system.* Audible and visible alarm signals associated with a gas detection alarm shall be distinctive from fire alarm and carbon monoxide alarm signals.

916.9 Signage. Signs shall be provided adjacent to *gas detection system* alarm signaling devices that advise occupants of the nature of the signals and actions to take in response to the signal.

916.10 Fire alarm system connections. Gas sensors and gas detection systems shall not be connected to fire alarm systems unless approved and connected in accordance with the fire alarm equipment manufacturer's instructions.

916.11 Maintenance, testing and sensor calibration. Inspection and testing of *gas detection systems* shall be conducted not less than annually. Sensor calibration shall be confirmed at the time of sensor installation and calibration shall be performed at the frequency specified by the sensor manufacturer.

Revise as follows:

2308.2.2 Listed equipment. Hoses, hose connections, dispensers, ~~gas detection systems~~ and electrical equipment used for CNG shall be *listed*. Vehicle-fueling connections shall be *listed* and *labeled*.

2309.2.2 Listed or approved equipment. Hoses, hose connections, compressors, hydrogen generators, dispensers~~, detection systems~~ and electrical equipment used for hydrogen shall be *listed* or *approved* for use with hydrogen. Hydrogen motor-fueling connections shall be *listed* and *labeled* or *approved* for use with hydrogen.

2311.7.1.1 Design. ~~Indoor~~ For indoor locations ~~shall be ventilated utilizing,~~ air supply inlets and exhaust outlets for mechanical ventilation shall be arranged to provide ~~uniform~~ uniformly distributed air movement ~~to the extent practical. Inlets shall be~~, with inlets uniformly arranged on exterior walls near floor level~~. Outlets shall be~~ and outlets located at the high point of the room in exterior walls or the roof.

~~Ventilation shall be by a continuous mechanical ventilation system or by a mechanical ventilation system activated by a continuously monitoring natural gas detection system or, for hydrogen, a continuously monitoring flammable gas detection system, each activating at a gas concentration of not more than 25 percent of the lower flammable limit (LFL). In all cases, the system shall shut down the fueling system in the event of failure~~

Failure of the ventilation system shall cause the fueling system to shut down.

The ventilation rate shall be not less than 1 cubic foot per minute [0.03 m^3/minute] per 12 cubic feet [~~0.001390~~0.34 m^3 ~~× (s · m^3)~~] of room volume.

2311.7.1.2 Operation. The mechanical ventilation system shall operate continuously.

Exceptions:

1. Mechanical ventilation systems that are interlocked with a gas detection system designed in accordance with Sections 2311.7.2 through ~~2311.7.2.3~~ 2311.7.2.2.
2. Mechanical ventilation systems in repair garages that are used only for repair of vehicles fueled by liquid fuels or odorized gases, such as CNG, where the ventilation system is electrically interlocked with the lighting circuit.

2311.7.2 Gas detection system. Repair garages used for repair of vehicles fueled by nonodorized gases, including, but not limited to, hydrogen and nonodorized LNG, shall be provided with a ~~flammable~~ gas detection system that complies with Section 916. The gas detection system shall be designed to detect leakage of nonodorized gaseous fuel. Where lubrication or chassis service pits are provided in garages used for repairing nonodorized LNG-fueled vehicles, gas sensors shall be provided in such pits.

~~**2311.7.2.2**~~ **2311.7.2.1** ~~**Operation**~~ **System activation.** Activation of ~~the~~a gas detection ~~system~~ alarm shall result in all of the following:

~~1. Initiation of distinct audible and visual alarm signals in the repair garage.~~
1. Initiation of local audible and visible alarms in approved locations.
2. Deactivation of ~~all~~ heating systems located in the repair garage.
3. Activation of the mechanical ventilation system, where the ventilation system is interlocked with gas detection.

Delete without substitution:

~~**2311.7.2.1 System design.** The flammable gas detection system shall be listed or approved and shall be calibrated to the types of fuels or gases used by vehicles to be repaired. The gas detection system shall be designed to activate when the level of flammable gas exceeds 25 percent of the lower flammable limit (LFL). Gas detection shall be provided in lubrication or chassis service pits of repair garages used for repairing nonodorized LNG-fueled vehicles.~~

~~**2311.7.2.1.1 Gas detection system components.** Gas detection system control units shall be listed and labeled in accordance with UL 864 or UL 2017. Gas detectors shall be listed and labeled in accordance with UL 2075 for use with the gases and vapors being detected.~~

Revise as follows:

~~**2311.7.2.3**~~ **2311.7.2.2 Failure of the gas detection system.** Failure of the ~~gas detection system~~ *gas detection system* shall ~~result in the deactivation of~~ automatically deactivate the heating system, ~~activation of~~ activate the mechanical ventilation system where the system is interlocked with the *gas detection system*, and cause a trouble signal to sound ~~in~~ at an approved location.

2702.1 Definitions. The following terms are defined in Chapter 2:

~~**CONTINUOUS GAS DETECTION SYSTEM.**~~
EMERGENCY CONTROL STATION.
FABRICATION AREA.
GAS DETECTION SYSTEM.
HAZARDOUS PRODUCTION MATERIAL (HPM).
HPM.
HPM ROOM.
PASS-THROUGH.
SEMICONDUCTOR FABRICATION FACILITY.
SERVICE CORRIDOR.
TOOL.
WORKSTATION.

2703.1.3 Signals. The *emergency control station* shall receive signals from emergency equipment and alarm and detection systems. Such emergency equipment and alarm and detection systems shall include, but not be limited to, the following where such equipment or systems are required to be provided either in this chapter or elsewhere in this code:

1. *Automatic sprinkler system* alarm and monitoring systems.
2. Manual fire alarm systems.
3. Emergency alarm systems.
4. ~~Continuous gas~~ Gas detection systems.
5. Smoke detection systems.
6. Emergency power system.
7. Automatic detection and alarm systems for pyrophoric liquids and Class 3 water-reactive liquids required by Section 2705.2.3.4.
8. Exhaust ventilation flow alarm devices for pyrophoric liquids and Class 3 water-reactive liquids cabinet exhaust ventilation systems required by Section 2705.2.3.4.

2703.13 ~~Continuous gas~~ Gas detection systems. A ~~continuous~~ gas detection system complying with Section 916 shall be provided for HPM gases where the physiological warning threshold level of the gas is at a higher level than the accepted permissible exposure limit (PEL) for the gas and for flammable gases in accordance with Sections 2703.13.1 through 2703.13.2.2.

2703.13.1 Where required. A ~~continuous~~ gas detection system shall be provided in the areas identified in Sections 2703.13.1.1 through 2703.13.1.4.

2703.13.1.1 Fabrication areas. A ~~continuous~~ gas detection system shall be provided in *fabrication areas* where HPM gas is used in the fabrication area.

2703.13.1.2 HPM rooms. A ~~continuous~~ gas detection system shall be provided in HPM rooms where HPM gas is used in the room.

2703.13.1.3 Gas cabinets, exhausted enclosures and gas rooms. A ~~continuous~~ gas detection system shall be provided in gas cabinets and exhausted enclosures for HPM gas. A ~~continuous~~ gas detection system shall be provided in gas rooms where HPM gases are not located in gas cabinets or exhausted enclosures.

2703.13.1.4 Corridors. Where HPM gases are transported in piping placed within the space defined by the walls of a *corridor* and the floor or roof above the *corridor*, a ~~continuous~~ gas detection system shall be provided where piping is located and in the *corridor*.

Exception: A ~~continuous~~ gas detection system is not required for occasional transverse crossings of the *corridors* by supply piping that is enclosed in a ferrous pipe or tube for the width of the *corridor*.

2703.13.2 Gas detection system operation. The ~~continuous~~ gas detection system shall be capable of monitoring the room, area or equipment in which the HPM gas is located at or below all the following gas concentrations:

1. Immediately dangerous to life and health (IDLH) values where the monitoring point is within an exhausted enclosure, ventilated enclosure or gas cabinet.
2. Permissible exposure limit (PEL) levels where the monitoring point is in an area outside an exhausted enclosure, ventilated enclosure or gas cabinet.
3. For flammable gases, the monitoring detection threshold level shall be vapor concentrations in excess of 25 percent of the lower flammable limit (LFL) where the monitoring is within or outside an exhausted enclosure, ventilated enclosure or gas cabinet.
4. Except as noted in this section, monitoring for highly toxic and toxic gases shall also comply with Chapter 60.

5307.5 Required protection. Where carbon dioxide storage tanks, cylinders, piping and equipment are located indoors, rooms or areas containing carbon dioxide storage tanks, cylinders, piping and fittings and other areas where a leak of carbon dioxide can collect shall be provided with either ventilation in accordance with Section 5307.5.1 or ~~an emergency alarm system~~ a *gas detection system* in accordance with Section 5307.5.2.

5307.5.2 ~~Emergency alarm~~ Gas detection system. ~~An emergency alarm~~ A *gas detection system* complying with Section 916 shall be provided to monitor areas where carbon dioxide can accumulate. The system shall ~~comply with all~~be designed to initiate a local audible and visible alarm in the room or area in which the sensor is installed when the level of ~~the following:~~ carbon dioxide exceeds 5,000 parts per million (9,000 mg/m3).

~~1. Continuous gas detection shall be provided to monitor areas where carbon dioxide can accumulate.~~
~~2. The threshold for activation of an alarm shall not exceed 5,000 parts per million (9,000 mg/m3).~~
~~3. Activation of the emergency alarm system shall initiate a local alarm within the room or area in which the system is installed.~~

5808.5 Gas detection system. Hydrogen fuel gas rooms shall be provided with ~~an approved flammable gas detection system in accordance~~ a *gas detection system* that complies with Sections 916, and Sections 5808.5.1 ~~through 5808.5.4~~ and 5808.5.2.

~~**5808.5.3**~~ **5808.5.1 ~~Operation~~ System activation.** Activation of ~~the~~ a gas detection ~~system~~ alarm shall result in both of the following:

1. Initiation of distinct audible and ~~visual~~ visible alarm signals both inside and outside of the hydrogen fuel gas room.
2. ~~Activation~~ Automatic activation of the mechanical exhaust ventilation system.

Delete without substitution:

~~**5808.5.1 System design.** The flammable gas detection system shall be listed for use with hydrogen and any other flammable gases used in the hydrogen fuel gas room. The gas detection system shall be designed to activate when the level of flammable gas exceeds 25 percent of the lower flammable limit (LFL) for the gas or mixtures present at their anticipated temperature and pressure.~~

~~**5808.5.2 Gas detection system components.** Gas detection system control units shall be listed and labeled in accordance with UL 864 or UL 2017. Gas detectors shall be listed and labeled in accordance with UL 2075 for use with the gases and vapors being detected.~~

Revise as follows:

~~**5808.5.4**~~ **5808.5.2 Failure of the gas detection system.** Failure of the ~~gas detection system~~ *gas detection system* shall ~~result in activation of~~ automatically activate the mechanical exhaust ventilation system, ~~cessation of~~ stop hydrogen generation, and ~~the sounding of~~ cause a trouble signal ~~in~~to sound at an approved location.

6004.2.2.7 Treatment systems. The exhaust ventilation from gas cabinets, exhausted enclosures and gas rooms, and local exhaust systems required in Sections 6004.2.2.4 and 6004.2.2.5 shall be directed to a treatment system. The treatment system shall be utilized to handle the accidental release of gas and to process exhaust ventilation. The treatment system shall be designed in accordance with Sections 6004.2.2.7.1 through 6004.2.2.7.5 and Section 510 of the *International Mechanical Code*.

Exceptions:

1. Highly toxic and toxic gases—storage. A treatment system is not required for cylinders, containers and tanks in storage where all of the following controls are provided:
   1.1. Valve outlets are equipped with gas-tight outlet plugs or caps.
   1.2. Handwheel-operated valves have handles secured to prevent movement.
   1.3. *Approved* containment vessels or containment systems are provided in accordance with Section 6004.2.2.3.
2. Toxic gases—use. Treatment systems are not required for toxic gases supplied by cylinders or portable tanks not exceeding 1,700 pounds (772 kg) water capacity where the following are provided:
   2.1. A *listed* or *approved* gas detection system with a sensing interval not exceeding 5 minutes.
   2.2. A *listed* or *approved* automatic-closing fail-safe valve located immediately adjacent to cylinder valves. The fail-safe valve shall close when gas is detected at the permissible exposure limit (PEL) by a gas detection system monitoring the exhaust system at the point of discharge from the gas cabinet, exhausted enclosure, ventilated enclosure or gas room. The gas detection system shall comply with Section 6004.2.2.10.
3. Toxic gases—use. Treatment systems are not required for toxic gases supplied by cylinders or portable tanks not exceeding 1,700 pounds (772 kg) water capacity where a *gas detection system* complying with Section 6004.2.2.10 and listed or *approved* automatic-closing fail-safe valves are provided. The *gas detection system* shall have a sensing interval not exceeding 5 minutes. Automatic-closing fail-safe valves shall be located immediately adjacent to cylinder valves and shall close when gas is detected at the permissible exposure limit (PEL) by a gas sensor monitoring the exhaust system at the point of discharge from the gas cabinet, exhausted enclosure, ventilated enclosure or gas room.

6004.2.2.10 Gas detection system. A ~~gas detection system~~ *gas detection system* complying with Section 916 shall be provided to detect the presence of gas at or below the PEL or ceiling limit of the gas for which detection is provided. The system shall be capable of monitoring the discharge from the treatment system at or below one-half the IDLH limit and shall initiate a response in accordance with Sections 6004.2.2.10.1 through 6004.2.2.10.3 if the gas detection alarm is activated.

Exception: A gas detection system is not required for toxic gases when the physiological warning threshold level for the gas is at a level below the accepted PEL for the gas.

Delete without substitution:

~~**6004.2.2.10.1 Gas detection system components.** Gas detection system control units shall be listed and labeled in accordance with UL 864 or UL 2017, or approved. Gas detectors shall be listed and labeled in accordance with UL 2075 for use with the gases and vapors being detected, or approved.~~

Revise as follows:

~~**6004.2.2.10.2**~~ **6004.2.2.10.1 Alarms.** The ~~gas detection system~~ *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 both ~~visual~~ audible and ~~audible~~ visible and shall provide warning both inside and outside the area where gas is detected. The audible alarm shall be distinct from all other alarms.

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.

~~**6004.2.2.10.3**~~ **6004.2.2.10.2 Shut off of gas supply.** The ~~gas detection system~~ *gas detection system* shall automatically close the shutoff valve at the source on gas supply piping and tubing related to the system being monitored for whichever gas is detected.

Exception: Automatic shutdown is not required for reactors utilized for the production of highly toxic or toxic *compressed gases* where such reactors are:

1. Operated at pressures less than 15 pounds per square inch gauge (psig) (103.4 kPa).
2. Constantly attended.
3. Provided with readily accessible emergency shutoff valves.

~~**6004.2.2.10.4**~~ **6004.2.2.10.3 Valve closure.** Automatic closure of shutoff valves shall be in accordance with the following:

1. Where the gas-detection sampling point initiating the ~~gas detection system~~ *gas detection system* alarm is within a gas cabinet or exhausted enclosure, the shutoff valve in the gas cabinet or exhausted enclosure for the specific gas detected shall automatically close.
2. Where the gas-detection sampling point initiating the ~~gas detection system~~ *gas detection system* alarm is within a gas room and *compressed gas* containers are not in gas cabinets or exhausted enclosures, the shutoff valves on all gas lines for the specific gas detected shall automatically close.
3. Where the gas-detection sampling point initiating the ~~gas detection system~~ *gas detection system* alarm is within a piping distribution manifold enclosure, the shutoff valve for the compressed container of specific gas detected supplying the manifold shall automatically close.

   Exception: Where the gas-detection sampling point initiating the ~~gas detection system~~ *gas detection system* alarm is at a use location or within a gas valve enclosure of a branch line downstream of a piping distribution manifold, the shutoff valve in the gas valve enclosure for the branch line located in the piping distribution manifold enclosure shall automatically close.

6005.3.2 Ozone gas generator rooms. Ozone gas generator rooms shall be mechanically ventilated in accordance with the *International Mechanical Code* with not less than six air changes per hour. Ozone gas generator rooms shall be equipped with a ~~continuous gas detection system~~ *gas detection system* complying with Section 916 that will shut off the generator and sound a local alarm when concentrations above the permissible exposure limit (PEL) occur.

Ozone gas generator rooms shall not be normally occupied, and such rooms shall be kept free of combustible and hazardous material storage. Room access doors shall display an *approved* sign stating: OZONE GAS GENERATOR—HIGHLY TOXIC—OXIDIZER.

6005.5 Automatic shutdown. Ozone gas generators shall be designed to shut down automatically under the following conditions:

1. When the dissolved ozone concentration in the water being treated is above saturation when measured at the point where the water is exposed to the atmosphere.
2. When the process using generated ozone is shut down.
3. ~~When the gas detection system detects ozone.~~
3. Failure of the ventilation system for the cabinet or ozone-generator room.
4. Failure of the ~~gas detection system~~ *gas detection system* in an ozone-gas generator room.

6204.1.11 Standby power. Standby power shall be provided in accordance with Section 604 for the following systems used to protect Class I and unclassified detonable organic peroxide:

1. Exhaust ventilation system.
2. Treatment system.
3. ~~Gas detection system.~~
3. Smoke detection system.
4. Temperature control system.
5. Fire alarm system.
6. Emergency alarm system.

2015 International Building Code

Delete without substitution:

~~**202 [F] CONTINUOUS GAS DETECTION SYSTEM.** A gas detection system where the analytical instrument is maintained in continuous operation and sampling is performed without interruption. Analysis is allowed to be performed on a cyclical basis at intervals not to exceed 30 minutes.~~

Add new definition as follows:

[F] GAS DETECTION SYSTEM. A system or portion of a combination system that utilizes one or more stationary sensors to detect the presence of a specified gas at a specified concentration and initiate one or more responses required by this code, such as notifying a responsible *person*, activating an alarm signal, or activating or deactivating equipment. A self-contained gas detection and alarm device is not classified as a gas detection system.

Revise as follows:

[F] 406.8.5 Gas detection system. Repair garages used for ~~the~~ repair of vehicles fueled by nonodorized gases ~~such as~~, including but not limited to hydrogen and nonodorized LNG, shall be provided with a ~~flammable~~ gas detection system that complies with Section 916. The gas detection system shall be designed to detect leakage of nonodorized gaseous fuel. Where lubrication or chassis service pits are provided in garages used for repairing nonodorized LNG-fueled vehicles, gas sensors shall be provided in such pits.

[F] ~~406.8.5.2~~ 406.8.5.1 ~~Operation~~ System activation. Activation of ~~the~~ a gas detection ~~system~~ alarm shall result in all of the following:

~~1. Initiation of distinct audible and visual alarm signals in the repair garage.~~
1. Initiation of local audible and visible alarms in approved locations.
2. Deactivation of ~~all~~ heating systems located in the repair garage.
3. Activation of the mechanical ~~ventilation~~ ventilation system, where the ventilation system is interlocked with gas detection.

[F] ~~406.8.5.3~~ 406.8.5.2 Failure of the gas detection system. Failure of the *gas detection system* shall ~~result in the deactivation of~~ automatically deactivate the heating system, ~~activation of~~ activate the mechanical ventilation system where the system is interlocked with the *gas detection system*, and cause a trouble signal to sound ~~in~~ at an approved location.

Delete without substitution:

~~**[F] 406.8.5.1 System design.** The flammable gas detection system shall be listed or approved and shall be calibrated to the types of fuels or gases used by vehicles to be repaired. The gas detection system shall be designed to activate when the level of flammable gas exceeds 25 percent of the lower flammable limit (LFL). Gas detection shall be provided in lubrication or chassis service pits of repair garages used for repairing nonodorized LNG-fueled vehicles.~~

~~**[F] 406.8.5.1.1 Gas detection system components.** Gas detection system control units shall be listed and labeled in accordance with UL 864 or UL 2017. Gas detectors shall be listed and labeled in accordance with UL 2075 for use with the gases and vapors being detected.~~

Revise as follows:

[F] 415.2 Definitions. The following terms are defined in Chapter 2:

CONTINUOUS GAS DETECTION SYSTEM.
DETACHED BUILDING.
EMERGENCY CONTROL STATION.
EXHAUSTED ENCLOSURE.
FABRICATION AREA.
FLAMMABLE VAPORS OR FUMES.
GAS CABINET.
GAS DETECTION SYSTEM.
GASROOM.
HAZARDOUS PRODUCTION MATERIAL (HPM).
HPM.
HPM FLAMMABLE LIQUID.
HPM ROOM.
IMMEDIATELY DANGEROUS TO LIFE AND HEALTH (IDLH).
LIQUID.
LIQUID STORAGE ROOM.
LIQUID USE, DISPENSING AND MIXING ROOM.
LOWER FLAMMABLE LIMIT (LFL).
NORMAL TEMPERATURE AND PRESSURE (NTP).
PHYSIOLOGICAL WARNING THRESHOLD LEVEL.
SERVICE CORRIDOR.
SOLID.
STORAGE, HAZARDOUS MATERIALS.
USE (MATERIAL).
WORKSTATION.

[F] 415.11.7 ~~Continuous gas~~ Gas detection systems. A ~~continuous gas detection system~~ gas detection system complying with Section 916 shall be provided for HPM gases where the physiological warning threshold level of the gas is at a higher level than the accepted permissible exposure limit (PEL) for the gas and for flammable gases in accordance with Sections 415.11.7.1 ~~and~~ through 415.11.7.2.

[F] 415.11.7.1 Where required. A ~~continuous gas~~ *gas detection system* shall be provided in the areas identified in Sections 415.11.7.1.1 through 415.11.7.1.4.

[F] 415.11.7.1.1 Fabrication areas. A ~~continuous gas~~ *gas detection system* shall be provided in *fabrication areas* where HPM gas is used in the *fabrication area*.

[F] 415.11.7.1.2 HPM rooms. A ~~continuous gas~~ *gas detection system* shall be provided in HPM rooms where HPM gas is used in the room.

[F] 415.11.7.1.3 Gas cabinets, exhausted enclosures and gas rooms. A ~~continuous gas~~ *gas detection system* shall be provided in gas cabinets and exhausted enclosures for HPM gas. A ~~continuous gas~~ *gas detection system* shall be provided in gas rooms where HPM gases are not located in gas cabinets or exhausted enclosures.

[F] 415.11.7.1.4 Corridors. Where HPM gases are transported in piping placed within the space defined by the walls of a *corridor* and the floor or roof above the *corridor*, a ~~continuous gas~~ *gas detection system* shall be provided where piping is located and in the *corridor*.

Exception: A ~~continuous gas~~ *gas detection system* is not required for occasional transverse crossings of the *corridors* by supply piping that is enclosed in a ferrous pipe or tube for the width of the *corridor*.

[F] 415.11.7.2 Gas detection system operation. The ~~continuous gas~~ *gas detection system* shall be capable of monitoring the room, area or equipment in which the HPM gas is located at or below all the following gas concentrations:

1. Immediately dangerous to life and health (IDLH) values where the monitoring point is within an exhausted enclosure, ventilated enclosure or gas cabinet.
2. Permissible exposure limit (PEL) levels where the monitoring point is in an area outside an exhausted enclosure, ventilated enclosure or gas cabinet.
3. For flammable gases, the monitoring detection threshold level shall be vapor concentrations in excess of 25 percent of the lower flammable limit (LFL) where the monitoring is within or outside an exhausted enclosure, ventilated enclosure or gas cabinet.
4. Except as noted in this section, monitoring for highly toxic and toxic gases shall also comply with Chapter 60 of the *International Fire Code*.

[F] 415.11.9.3 Signals. The *emergency control station* shall receive signals from emergency equipment and alarm and detection systems. Such emergency equipment and alarm and detection systems shall include, but not be limited to, the following where such equipment or systems are required to be provided either in this chapter or elsewhere in this code:

1. *Automatic sprinkler system* alarm and monitoring systems.
2. Manual *fire alarm* systems.
3. *Emergency alarm systems.*
4. ~~Continuous gas~~ *Gas detection systems.*
5. Smoke detection systems.
6. Emergency power system.
7. Automatic detection and alarm systems for pyrophoric liquids and Class 3 water-reactive liquids required in Section 2705.2.3.4 of the *International Fire Code*.
8. Exhaust *ventilation* flow alarm devices for pyrophoric liquids and Class 3 water-reactive liquids cabinet exhaust *ventilation* systems required in Section 2705.2.3.4 of the *International Fire Code*.

[F] 421.6 Gas detection system. Hydrogen fuel gas rooms shall be provided with ~~an approved flammable gas detection system in accordance~~ a *gas detection system* that complies with Sections 916, and Sections 421.6.1 through ~~421.6.4~~421.6.2.

[F] ~~421.6.3~~ 421.6.1 ~~Operation~~ System activation. Activation of ~~the~~ a gas detection ~~system~~ alarm shall result in ~~all~~ both of the following:

1. Initiation of distinct audible and ~~visual~~ visible alarm signals both inside and outside of the hydrogen fuel gas room.
2. ~~Activation~~ Automatic activation of the mechanical exhaust ventilation system.

Delete without substitution:

~~**[F] 421.6.1 System design.** The flammable gas detection system shall be listed for use with hydrogen and any other flammable gases used in the hydrogen fuel gas room. The gas detection system shall be designed to activate when the level of flammable gas exceeds 25 percent of the lower flammability limit (LFL) for the gas or mixtures present at their anticipated temperature and pressure.~~

Revise as follows:

~~[F]~~ ~~421.6.4~~ 421.6.2 Failure of the gas detection system. Failure of the ~~gas detection system~~ *gas detection system* shall ~~result in activation of~~ automatically activate the mechanical exhaust ventilation system, ~~cessation of~~ stop hydrogen generation, and ~~the sounding of~~ cause a trouble signal ~~in~~to sound at an approved location.

Delete without substitution:

~~**[F] 421.6.2 Gas detection system components.** Gas detection system control units shall be listed and labeled in accordance with UL 864 or UL 2017. Gas detectors shall be listed and labeled in accordance with UL 2075 for use with the gases and vapors being detected.~~

Reason: Gas detection systems are required for many different applications in the code. There is great inconsistency in how these systems are treated, and some requirements cannot be enforced because required listed gas detectors, controls and systems are not commercially available. A working group of the Fire Code Action Committee that included industry and code officials worked on developing this proposal that addresses these concerns. The significant changes accomplished with this proposal are as follows:

- Section 105.7.9 - A construction permit is required for installation of *gas detection systems*.
- Section 202 – A definition of gas detection system was added that replaces the Continuous Gas Detection System definition. Continuous gas sampling is addressed further in Section 916.6.
- Section 604.2.6 - Gas detection systems are required to be provided with emergency or standby power. By default, Section 604 requires minimum 2 hours' duration. An option for providing a power loss trouble signal in an approved location in lieu of standby power is included in Section 916.5.
- Section 606.8 requires ammonia refrigerant systems to comply with the IIAR 2 standard, which is already referenced in Section 606.
- In Section 908 only items 1 and 2 apply to emergency alarm systems, items 3 through 7 really reference gas detection systems. The unnecessary/incorrect cross references were deleted.
- Section 916 includes basic requirements for all gas detection systems and covers construction documents, equipment, power connections, emergency and standby power, sensor locations, gas sampling, system activation, signage, fire alarm system connections, maintenance, testing and sensor calibration. These are important safety requirements that are applicable to all gas detection systems, including those installed in a small mom and pop operation up to those in large industrial facilities. Gas detection system equipment is commercially available that can comply with these requirements.
- Most of the revisions in Sections 23 through 64 accomplished the following: (1) deleted references to listed detectors and equipment, (2) provided consistency in how gas detection requirements are treated, (3) included cross references to Section 916 for basic system requirements, and (4) clarified existing requirements.

This proposal is submitted by the ICC Fire Code Action Committee (FCAC). The FCAC was established by the ICC Board of Directors to pursue opportunities to improve and enhance assigned International Codes with regard to fire safety and hazardous materials in new and existing buildings and facilities and the protection of life and property in wildland urban interface areas. In 2014 and 2015 the Fire-CAC has held 5 open meetings. In addition, there were numerous conference calls, Regional Work Group and Task Group meetings for the current code development cycle, which included members of the committees as well as any interested parties, to discuss and debate the proposed changes. Related documentation and reports are posted on the FCAC website at: FCAC

Cost Impact: Will increase the cost of construction
The additional construction requirements in this proposal have the potential to increase construction costs. However, since the features described in Section 916 are currently available with most gas detection equipment on the market today, the additional costs may not be significant.

Report of Committee Action Hearings

Committee Action: **As Submitted**

Committee Reason: This proposal was approved based upon the proponent's reason statement.

Assembly Action: **None**

Public Comments

Public Comment 1:

Jeffrey Shapiro, representing Self (jeff.shapiro@intlcodeconsultants.com) requests Approve as Modified by this Public Comment.

Modify as follows:

[F] GAS DETECTION SYSTEM A system or portion of a combination system that utilizes one or more stationary sensors to detect the presence of a specified gas at a specified concentration and initiate one or more responses required by this code, such as notifying a responsible person, activating an alarm signal, or activating or deactivating equipment. A self-contained gas detection and alarm device is not classified as a gas detection system.

[F] HPM. See "Hazardous Production Material."

[F] 415.5.3 Supervision. Emergency alarm systems required by Section 415.5.1 or 415.5.2 shall be electrically supervised and monitored by an approved central, proprietary or remote station service or shall initiate an audible and visual signal at a constantly attended on-site location.

[F] 415.5.4 Emergency alarm systems. *Emergency alarm systems* required by Section 415.5.1 or 415.5.2 shall be provided with emergency or standby power in accordance with Section ~~2702~~ 2702.2.8 and 2702.2.14.

[F] 908.1 Group H occupancies. Emergency alarms for the detection and notification of an emergency condition in Group H occupancies shall be provided in accordance with Section 415.5.

[F] 908.2 Group H-5 occupancy. Emergency alarms for notification of an emergency condition in an HPM facility shall be provided as required in Section 415.11.3.5. ~~A continuous gas detection system shall be provided for HPM gases in accordance with Section 415.11.7.~~

~~**[F] 908.3 Highly toxic and toxic materials.** A gas detection system shall be provided to detect the presence of *highly toxic* or *toxic* gas at or below the permissible exposure limit (PEL) or ceiling limit of the gas for which detection is provided. The system shall be capable of monitoring the discharge from the treatment system at or below one-half the immediately dangerous to life and health (IDLH) limit.~~

~~**Exception:** A gas detection system is not required for *toxic* gases when the physiological warning threshold level for the gas is at a level below the accepted PEL for the gas.~~

~~**[F] 908.3.1 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 both visible and audible and shall provide warning both inside and outside the area where gas is detected. The audible alarm shall be distinct from all other alarms.~~

~~**Exception:** Signal transmission to a constantly attended control station is not required when not more than one cylinder of *highly toxic* or *toxic* gas is stored.~~

~~**[F] 908.3.2 Shutoff of gas supply.** The gas detection system shall automatically close the shutoff valve at the source on gas supply piping and tubing related to the system being monitored for whichever gas is detected.~~

~~**Exception:** Automatic shutdown is not required for reactors utilized for the production of *highly toxic* or *toxic* compressed gases where such reactors are:~~

1. ~~Operated at pressures less than 15 pounds per square inch gauge (psig) (103.4 kPa).~~
2. ~~Constantly attended.~~
3. ~~Provided with readily accessible emergency shutoff valves.~~

~~**[F] 908.3.3 Valve closure.** The automatic closure of shutoff valves shall be in accordance with the following:~~

1. ~~When the gas-detection sampling point initiating the gas detection system alarm is within a gas cabinet or exhausted enclosure, the shutoff valve in the gas cabinet or exhausted enclosure for the specific gas detected shall automatically close.~~
2. ~~Where the gas-detection sampling point initiating the gas detection system alarm is within a gas room and compressed gas containers are not in gas cabinets or exhausted enclosures, the shutoff valves on all gas lines for the specific gas detected shall automatically close.~~
3. ~~Where the gas-detection sampling point initiating the gas detection system alarm is within a piping distribution manifold enclosure, the shutoff valve for the compressed container of specific gas detected supplying the manifold shall automatically close.~~

- ~~**Exception:** When the gas-detection sampling point initiating the gas detection system alarm is at a use location or within a gas valve enclosure of a branch line downstream of a piping distribution manifold, the shutoff valve in the gas valve enclosure for the branch line located in the piping distribution manifold enclosure shall automatically close.~~

~~**[F] 908.4 Ozone gas-generator rooms.** Ozone gas-generator rooms shall be equipped with a continuous gas detection system that will shut off the generator and sound a local alarm when concentrations above the PEL occur.~~

~~**[F] 908.5 Repair garages.** A flammable-gas detection system shall be provided in repair garages for vehicles fueled by nonodorized gases in accordance with Section 406.8.5.~~

~~**[F] 908.6 Refrigerant detector.** Machinery rooms shall contain a refrigerant detector with an audible and visual alarm. The detector, or a sampling tube that draws air to the detector, shall be located in an area where refrigerant from a leak will concentrate. The alarm shall be actuated at a value not greater than the corresponding TLV-TWA values for the refrigerant classification shown in the *International Mechanical Code* for the refrigerant classification. Detectors and alarms shall be placed in *approved* locations. The detector shall transmit a signal to an *approved* location.~~

~~**[F] 908.7 Carbon dioxide (CO_2) systems.** Emergency alarm systems in accordance with Section 5307.5.2 of the *International Fire Code* shall be provided where required for compliance with Section 5307.5 of the *International Fire Code*.~~

SECTION 916
GAS DETECTION SYSTEMS

[F] 916.1 General. *Gas detection systems* required by this code shall comply with Sections 916.2 through 916.11.

[F] 916.2 Construction documents. Documentation of the *gas detection system* design and equipment to be used that is adequate to demonstrate compliance with the requirements of this code shall be provided with the application for permit.

[F] 916.3 Equipment. *Gas detection system* equipment shall be designed for use with the gases being detected and shall be installed in accordance with manufacturers' instructions.

[F] 916.4 Power connections. *Gas detection systems* shall be permanently connected to the building electrical power supply or shall be permitted to be cord connected to an unswitched receptacle using an approved restraining means that secures the plug to the receptacle.

[F] 916.5 Emergency and standby power. Where standby or emergency power is not required elsewhere by this code, standby or emergency power shall be provided or the gas detection system shall initiate a trouble signal at an approved location if the power supply is interrupted.

[F] 916.6 Sensor locations. Where a specific location for sensors is not specified elsewhere by this code, sensors shall be installed in approved locations where leaking gases are expected to accumulate.

[F] 916.7 Gas sampling. Gas sampling shall be performed continuously. Sample analysis shall be processed immediately after sampling, except as follows:

1. For *HPM* gases, sample analysis shall be performed at intervals not exceeding 30 minutes.
2. For toxic gases that are not *HPM*, sample analysis shall be performed at intervals not exceeding 5 minutes in accordance with Section 6004.2.2.7 of the *International Fire Code*.
3. Where a less frequent or delayed sampling interval is approved.

[F] 916.8 System activation. A gas detection alarm shall be initiated where any sensor detects a concentration of gas exceeding the following thresholds:

1. For flammable gases, a gas concentration exceeding 25 percent of the lower flammable limit (LFL).
2. For non-flammable gases, a gas concentration exceeding the threshold specified by the section of this code requiring a gas detection system.

Upon activation of a gas detection alarm, alarm signals or other required responses shall be as specified by the section of this code or the *International Fire Code* requiring a gas detection system. Audible and visible alarm signals associated with a gas detection alarm shall be distinctive from fire alarm and carbon monoxide alarm signals.

[F] 916.9 Signage. Signs shall be provided adjacent to *gas detection system* alarm signaling devices that advise occupants of the nature of the signals and actions to take in response to the signal.

[F] 916.10 Fire alarm system connections. Gas sensors and *gas detection systems* shall not be connected to fire alarm systems unless *approved* and connected in accordance with the fire alarm equipment manufacturer's instructions.

[F] 916.11 Inspection, testing and sensor calibration. *Gas detection systems* and sensors shall be inspected, tested and calibrated in accordance with the *International Fire Code*.

~~**[F] 2702.2.1 Emergency alarm systems.** Emergency power shall be provided for emergency alarm systems as required by Section 415.5.~~

[F] 2702.2.6 Gas detection systems. Emergency or standby power shall be provided for *gas detection systems* in accordance with the *International Fire Code*.

2015 International Fire Code

~~**604.2.2 Emergency alarm systems.** Emergency power shall be provided for emergency alarm systems as required by Section 414 of the *International Building Code*.~~

606.8.1 Refrigerants other than ammonia. A detector, or a sampling tube that draws air to a detector, shall be provided at an approved location where refrigerant from a leak is expected to accumulate. The system shall be designed to initiate audible and visible alarms inside of and outside each entrance to the refrigerating machinery room and transmit a signal to an approved location where the concentration of refrigerant detected exceeds the lesser of the following:

1. The corresponding TLV-TWA values shown in the International Mechanical Code for the refrigerant classification.
2. 25 percent of the lower flammable limit (LFL).

Detection of a refrigerant concentration exceeding the detector's upper detection limit or 25 percent of the lower flammable limit (LFL), whichever is lower, shall stop refrigerant equipment in the machinery room in accordance with Section 606.9.1.

916.7 Gas sampling. Gas sampling shall be performed continuously. Sample analysis shall be processed immediately after sampling, except as follows:

1. For *HPM* gases, sample analysis shall be performed at intervals not exceeding 30 minutes.
2. For toxic ~~gases~~ gase that are not *HPM*, sample analysis shall be performed at intervals not exceeding 5 minutes in accordance with Section 6004.2.2.7.
3. Where a less frequent or delayed sampling interval is *approved*.

916.11 Inspection, testing and sensor calibration. Inspection and testing of *gas detection systems* shall be conducted not less than annually. Sensor calibration shall be confirmed at the time of sensor installation and calibration shall be performed at the frequency specified by the sensor manufacturer.

2311.7.1.1 Design. For indoor locations, air supply inlets and exhaust outlets for mechanical ventilation shall be arranged to provide uniformly distributed air movement, with inlets uniformly arranged on walls near floor level and outlets located at the high point of the room in walls or the roof.

Failure of the ventilation system shall cause the fueling system to shut down. The exhaust ventilation rate shall be not less than 1 cubic foot per minute [0.03 m^3/minute] per 12 cubic feet [0.34 m^3] of room volume.

6004.2.2.7 Treatment systems. The exhaust ventilation from gas cabinets, exhausted enclosures and gas rooms, and local exhaust systems required in Sections 6004.2.2.4 and 6004.2.2.5 shall be directed to a treatment system. The treatment system shall be utilized to handle the accidental release of gas and to process exhaust ventilation. The treatment system shall be designed in accordance with Sections 6004.2.2.7.1 through 6004.2.2.7.5 and Section 510 of the *International Mechanical Code*.

Exceptions:

1. Highly toxic and toxic gases—storage. A treatment system is not required for cylinders, containers and tanks in storage where all of the following controls are provided:
   1.1 Valve outlets are equipped with gas-tight outlet plugs or caps.
   1.2. Handwheel-operated valves have handles secured to prevent movement.
   1.3. Approved containment vessels or containment systems are provided in accordance with Section 6004.2.2.3.
2. ~~Toxic gases—use. Treatment systems are not required for toxic gases supplied by cylinders or portable tanks not exceeding 1,700 pounds (772 kg) water capacity where the following are provided:~~
   ~~2.1. A *listed* or *approved* gas detection system with a sensing interval not exceeding 5 minutes.~~
   ~~2.2. A *listed* or *approved* automatic-closing fail-safe valve located immediately adjacent to cylinder valves. The fail-safe valve shall close when gas is detected at the permissible exposure limit (PEL) by a gas detection system monitoring the exhaust system at the point of discharge from the gas cabinet, exhausted enclosure, ventilated enclosure or gas room. The gas detection system shall comply with Section 6004.2.2.10.~~
2. Toxic gases—use. Treatment systems are not required for toxic gases supplied by cylinders or portable tanks not exceeding 1,700 pounds (772 kg) water capacity where a *gas detection system* complying with Section 6004.2.2.10 and listed or *approved* automatic-closing fail-safe valves are provided. The *gas detection system* shall have a sensing interval not exceeding 5 minutes. Automatic-closing fail-safe valves shall be located immediately adjacent to cylinder valves and shall close when gas is detected at the permissible exposure limit (PEL) by a gas sensor monitoring the exhaust system at the point of discharge from the gas cabinet, exhausted enclosure, ventilated enclosure or gas room.

6005.5 Automatic shutdown. Ozone gas generators shall be designed to shut down automatically under the following conditions:

1. When the dissolved ozone concentration in the water being treated is above saturation when measured at the point where the water is exposed to the atmosphere.
2. When the process using generated ozone is shut down.
3. Failure of the ventilation system for the cabinet or ozone-generator room.
4. Detection of ozone at concentrations above the permissible exposure limit (PEL) or failure of the *gas detection system* in an ozone-gas generator room.

2015 International Mechanical Code

[F] 502.16.1 Design. ~~Indoor~~ For indoor locations ~~shall be ventilated utilizing~~ air supply inlets and exhaust outlets for mechanical ventilation shall be arranged to provide ~~uniform~~ uniformly distributed air movement ~~to the extent practical. Inlets shall be~~ with inlets uniformly arranged on ~~exterior~~ walls near floor level~~. Outlets shall be~~ and outlets located at the high point of the room in ~~exterior~~ walls or the roof.

~~Ventilation shall be by a continuous mechanical ventilation system or by a mechanical ventilation system activated by a continuously monitoring natural gas detection system, or for hydrogen, a continuously monitoring flammable gas detection system, each activating at a gas concentration of 25 percent of the lower flammable limit (LFL). In all cases, the system shall shut down the fueling system in the event of failure~~ Failure of the ventilation system shall cause the fueling system to shut down.

The exhaust ventilation rate shall be not less than 1 cubic foot per minute [0.03 m^3/minute] per 12 cubic feet [~~0.00138 m~~0.34m^3/~~(s • m^3)~~] of room volume.

Commenter's Reason: F75-16 was approved as submitted and included a complete rewrite of IFC gas detection system requirements. The proposal did not include some of the changes needed for correlation of corresponding IBC gas detection system requirements. This public comment makes those additional changes, all of which are denoted with [F] designations as being maintained by the IFC committee. With the exception of correcting a single item in IFC Section 6005.5 that was not copied when the original proposal was entered into cdpACCESS changes are for code correlation and clean-up with no intended technical changes to what was already approved in the original proposal and current IFC/IBC/IMC requirements, including:

1. Changes to Section 415.5.3, which relate to supervision and monitoring, improve correlation with source requirements in IFC Sections 5004.10 and 5005.1.6.
2. Changes to Section 415.5.4 add recognition of standby power to improve correlation with source requirements in IFC Sections 5004.7 and 5005.1.5, which allow standby power in lieu of emergency power in most cases.
3. IFC Section 604.2.2 and IBC Section 2702.2.1 are being deleted because "emergency alarm systems" relate exclusively to hazardous materials storage and use and to semi-conductor manufacturing occupancies. Requirements for these occupancies are already provided by IFC Sections 604.2.8 and 604.2.14 and IBC Sections 2702.2.8 and 2702.2.14.
4. IBC Section 2702.2.6 is being added to correlate with the new IFC Section 604.2.4, which was added by the original F75-16 proposal.
5. IFC Section 916.7 is being revised to clarify that HPM toxic gases are covered by Item 1, not Item 2.
6. IFC Section 606.8.1 is being revised to correlate with the referenced requirement in Section 606.9.1, which also addresses the detector's upper detection limit.
7. Changes to IMC 502.16.1 are for correlation with IFC 2311.7.1.1. Also note that both sections were correlated with the revisions made in F274-16.

Final Action Results

F75-16	AMPC1

Code Change No: F79-16

Original Proposal

Section(s): 604.1.2 (IBC [F] 2702.1.2) (New)

Proponent: Vickie Lovell, InterCode Incorporated, representing 3M (vickie@intercodeinc.com)

Add new text as follows:

604.1.2 (IBC [F] 2702.1.2) Fuel line piping protection. Fuel lines supplying a generator set inside a building shall be separated from areas of the building other than the room the generator is located in by an approved method, or an assembly that has a fire-resistance rating of not less than 2 hours. Where the building is protected throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1, the required fire-resistance rating shall be reduced to 1 hour.

Reason: This proposal is intended to require fuel lines supplying a generator set inside a building to be separated with fire-resistance-rated construction from areas of the building other than in the room in which the generator is located. It mirrors the text that was approved for the 2015 IBC in Section 403.4.8.2 for high-rises and was overwhelmingly supported by the ICC membership.

This proposal extends the requirement to any building that has a generator that is separated from the rest of the building. It is common for diesel-fueled generators to supply the generators with a day tank and resupply the day tank via remote fuel oil tanks. The fuel line piping from those remote tanks to the generator can be exposed to the same fire incident that the generator has been protected against. Loss of the fuel line due to fire exposure has the same impact as loss of the generator itself.

The wording only refers to "fuel lines" to also provide protection in those cases where a gaseous fuel supply is approved for use.

Cost Impact: Will increase the cost of construction
This requirement for protection of the fuel lines supplying stationary generators already applies to high-rise buildings. This proposal, if approved, would require labor to install generic materials or a proprietary system to protect fuels lines in all buildings with stationary generators

Report of Committee Action Hearings

Committee Action: **As Submitted**

Committee Reason: This proposal was seen as over restrictive and too far reaching. The concerns related to the fact that the requirements would include all occupancies, all types of construction and not necessarily relate to the ratings required for the type of construction. Also there was concern that this would include supply piping that is normally empty.

Assembly Action: **None**

Public Comments

Public Comment 2:

Vickie Lovell, InterCode Incorporated, representing 3M (vickie@intercodeinc.com) requests Approve as Modified by this Public Comment.

Modify as follows:

604.1.2 (IBC [F] 2702.1.2) Fuel line piping protection. Fuel lines supplying a generator set inside a high-rise building shall be separated from areas of the building other than the room the generator is located in by an approved method, or an assembly that has a fire-resistance rating of not less than 2 hours. Where the building is protected throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1, the required fire-resistance rating shall be reduced to 1 hour.

Commenter's Reason: This proposal is intended to require fuel lines supplying a generator set inside a high-rise building to be separated with fire-resistance-rated construction from areas of the building other than in the room in which the generator is located.

The original proposal would have applied to all buildings; however, this modification limits the requirement to high-rise buildings. With this revision, it exactly mirrors the text that was approved for the 2015 IBC in Section 403.4.8.2 for high-rises and was overwhelmingly supported by the ICC membership.

It is common for diesel-fueled generators to supply the generators with a day tank and resupply the day tank via remote fuel oil tanks. The fuel line piping from those remote tanks to the generator can be exposed to the same fire incident that the generator has been protected against. Loss of the fuel line due to fire exposure has the same impact as loss of the generator itself. The wording only refers to "fuel lines" to also provide protection in those cases w here a gaseous fuel supply is approved for use.

This public comment is intended to correlate the 2015 IFC with the 2015 IBC section that contains the following new text in Chapter 4:

[F] 403.4.8.2 Fuel line piping protection. Fuel lines supplying a generator set inside a building shall be separated from areas of the building other than the room the generator is located in by an approved method or assembly that has a fire-resistance rating of not less than 2 hours. Where the building is protected throughout with an automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2, the required fire-resistance rating shall be reduced to 1 hour.

Final Action Results

F79-16 **AMPC2**