

403.3.1.2 High-rise building sprinkler system design. Combination standpipe/sprinkler risers using 6 in. pipe minimum, shall be used. Shut-off valves and water-flow devices shall be provided on each floor at the sprinkler system connection to each standpipe. Two four-way fire department connections serving the combination system shall be provided on separate streets well separated from each other. At least one of the fire department connections shall be connected to the riser above a riser isolation valve. Dry pipe sprinkler systems serving parking garages may use one separate two-way fire department connection. The dry pipe sprinkler system shall be supplied by the on-site water tank.

[F] 403.3.2 Water supply to required fire pumps. In buildings that are more than 450 feet in *building height*, required fire pumps shall be supplied by connections to no fewer than two water mains located in different streets and shall not serve other buildings. Separate supply piping shall be provided between each connection to the water main and the pumps. Each connection and the supply piping between the connection and the pumps shall be sized to supply the flow and pressure required for the pumps to operate.

Exception: When approved by the fire code official, two connections to the same main shall be permitted provided the main is valved such that an interruption can be isolated so that the water supply will continue without interruption through no fewer than one of the connections.

[F] 403.3 Automatic sprinkler system. – High-rise building. Buildings and structures shall be equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1 and a secondary water supply where required by Section 403.3.3.

[F] 403.3.3 Secondary water source. A secondary on-site water source shall be provided for high-rise building as follows:

1. High-rise buildings containing R or B occupancy only shall be provided with a net useable volume of 15,000 gallons.
2. High-rise buildings containing an S-2 occupancy shall be provided with a net useable volume of 40,000 gallons.
3. High-rise buildings containing an M occupancy shall be provided with a net useable volume of 50,000 gallons.
4. Multi high-rise complexes that are less than 450' in height may share a common secondary water source shall by combining the highest demand of number 2 or 3 above, with number 1 above. Only one parking/retail area and 2 high-rise buildings may share a common secondary water source.

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An acceptable alternative to items 1 through 4 above, is to prove a calculated net useable volume capable of meeting the hydraulically calculated sprinkler demand, including the total (combined inside and outside) hose stream requirement, as per NFPA 13. The duration of the calculated source shall have a duration of not less than 30 minutes for buildings with light hazard occupancies only and a 60 minute duration for building with ordinary hazard occupancies as defined by NFPA 13.

Exception: Existing buildings, including those undergoing substantial renovation.

403.4.8.1 Equipment room. If the standby or emergency power system includes a generator set inside a building, the system shall be in accordance with Section 2702.1.8.

Exception: In Group I-2, Condition 2, manual start and transfer features for the critical branch of the emergency power are not required to be provided at the *fire command center*.

403.4.8.1.1 Penetrations. Penetrations into and openings through an equipment room containing a standby or emergency generator set inside a building, are prohibited except for required exit doors, equipment and ductwork necessary for heating, cooling or ventilation, sprinkler branch line piping, or electrical raceway, serving the generator set equipment room or being served by the generator set. Such penetrations shall be protected in accordance with Section 713.

Exception: Metallic piping with no joints or openings where it passes through the generator set equipment room.

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 may be reduced to 1 hour.

403.5 Means of egress and evacuation. The means of egress in high-rise buildings shall comply with Sections 403.5.1 through 403.5.6, and in addition to these requirements, shall comply with Bellevue City Code 23.11.907.5.2.2.6, which requires either Phased Evacuation, an additional stair, or occupant evacuation elevators, to facilitate simultaneous building evacuation and firefighter response into the building.

403.5.1 Remoteness of interior exit stairways. Required interior exit stairways shall be separated by a distance not less than 30 feet (9144 mm) or not less than one-fourth of the length of the maximum overall diagonal dimension of the building or area to be served, whichever is less. The distance shall be measured in a straight line between the nearest points of the enclosure surrounding the interior exit stairways. In buildings with three or more interior exit stairways, no fewer than two of the interior exit stairways shall comply with this section. Interlocking or scissor stairways shall be counted as one interior exit stairway.

403.5.2 Additional interior exit stairway. For buildings other than Group R-2 that are more than 420 feet (128 000 mm) in building height, one additional interior exit stairway meeting the requirements of Sections 1011 and 1023 shall be provided in addition to the minimum number of exits required by Section 1006.3. The total width of any combination of remaining interior exit stairways with one interior exit stairway removed shall be not less than the total width required by Section 1005.1. Scissor stairs shall not be considered the additional interior exit stairway required by this section.

Exception: An additional interior exit stairway shall not be required to be installed in buildings having elevators used for occupant self-evacuation in accordance with Section 3008.

403.5.3 Stairway door operation. Stairway doors other than the exit discharge doors shall be permitted to be locked from the stairway side. Stairway doors that are locked from the stairway side shall be capable of being unlocked simultaneously without unlatching upon a signal from the fire command center.

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503.1.4 Occupied roofs. A roof level or portion thereof shall be permitted to be used as an occupied roof provided the occupancy of the roof is an occupancy that is permitted by Table 504.4 for the story immediately below the roof. The area of the occupied roofs shall not be included in the building area as regulated by Section 506.

Exceptions:

1. The occupancy located on an occupied roof shall **not** be limited **to the** occupancies allowed on the story immediately below the roof where the building is equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or 903.3.1.2 and occupant notification in accordance with Section 907.5 is provided in the area of the occupied roof.
2. Assembly occupancies shall be permitted on roofs of open parking garages of Type I or Type II construction, in accordance with the exception to Section 903.2.1.6.

Elements or structures enclosing the occupied roof areas shall not extend more than 48 inches above the surface of the occupied roof.

Exception:

Penthouses constructed in accordance with Section 1510.2, **and** towers, domes, spires, and cupolas constructed in accordance with Section 1510.5.

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[F] 903.2.11 All occupancies. In all occupancies other than Group U, an *automatic sprinkler system* shall be installed for building design or hazards in the locations set forth in Section 903.2.11.1 through 903.2.11.7.

[F] 903.2.11.1 Stories and basements without openings. An *automatic sprinkler system* shall be installed throughout all stories, including basements, of all buildings where the floor area exceeds 1,500 square feet (139.4 m²) and where there is not provided at least one of the following types of *exterior wall* openings:

1. Openings below grade that lead directly to ground level by an exterior *stairway* complying with Section 1011 or an outside ramp complying with Section 1012. Openings shall be located in each 50 linear feet (15,240 mm), or fraction thereof, of exterior wall in the story on at least one side. The required openings shall be distributed such that the lineal distance between adjacent openings does not exceed 50 feet (15 240 mm).
2. Openings entirely above the adjoining ground level totaling at least 20 square feet (1.86 m²) in each 50 linear feet (15,240 mm), or fraction thereof, of exterior wall in the story on at least one side. The required openings shall be distributed such that the lineal distance between adjacent openings does not exceed 50 feet (15 240 mm). The height of the bottom of the clear opening shall not exceed 44 inches (1118 mm) measured from the floor.

[F] 903.2.11.1.1 Opening dimensions and access. Openings shall have a minimum dimension of not less than 30 inches (762 mm). Such openings shall be accessible to the fire department from the exterior and shall not be obstructed in a manner that firefighting or rescue cannot be accomplished from the exterior.

[F] 903.2.11.1.2 Openings on one side only. Where openings in a story are provided on only one side and the opposite wall of such story is more than 75 feet (22,860 mm) from such openings, the story shall be equipped throughout with an *approved automatic sprinkler system* or openings as specified above shall be provided on at least two sides of the story.

SECTION 917 FIREFIGHTER AIR SYSTEMS

[F] 917.1 Scope. The design, installation, and maintenance of firefighter air systems shall be in accordance with this section.

[F] 917.2 Required installations. Firefighter air system shall be installed in the following buildings:

1. Buildings classified as high-rise in accordance with the *International Building Code*.
2. Transportation tunnels constructed in accordance with NFPA 130 or 502 that exceed 300' in length.

[F] 917.3 Plans and contractor qualifications.

[F] 917.3.1 Plans. Prior to the installation of a firefighter air system, a minimum of two sets of plans and specifications shall be submitted to the Bellevue Fire Department for review and approval. Plans shall demonstrate compliance with the requirements of this section and shall include calculations prepared by a registered professional engineer demonstrating that the design criteria for all pressure containing components is satisfied plus a minimum safety factor of 25 percent.

The plans submittal shall also include specifications for the tubing, fittings, and manufacturer data sheets for valves, pressure regulators, pressure relief devices, gauges, RIC universal air connections and cylinder filling hoses.

[F] 917.3.2 Contractor qualification. The firefighter air system shall be installed by Washington state licensed contractors. Proof of licensure shall be provided with the plan submittal.

[F] 917.4 Design criteria.

[F] 917.4.1 The system shall be designed to fill, at each interior cylinder filling panel, two empty 66 standard cubic foot compressed breathing air cylinders to a maximum pressure of 5,500 psig (37 921.17 kPa).

[F] 917.4.2 The filling operation shall be completed in not more than two minutes upon connection of the cylinders to the fill hose.

[F] 917.4.3 The minimum design flow of the breathing air piping system shall be calculated using two interior cylinder filling panels operating simultaneously and located at the highest level above the most remote location from the base station exterior fire department connection panel and enclosure base.

[F] 917.5 Operating pressure. All components used in the system shall be rated to operate at a minimum pressure of 5,500 psig (37 921.17 kPa) at 70°F (21°C).

[F] 917.6 Marking. System piping, gauges, valves and air outlets shall be clearly marked by means of steel or plastic labels or tags indicating their function. Markings used for piping systems shall consist of the content's name and include a direction of flow arrow. Markings shall be provided at each valve; at wall, floor or ceiling penetrations; at each change of direction; and at a minimum of every 20 feet (6096 mm) or fraction thereof throughout the piping system.

[F] 917.7 Base station exterior fire department connection panel and enclosure.

[F] 917.7.1 Location.

A fire department connection panel shall be attached to the building or on a remote monument at the exterior of the building. The panel shall be secured inside of a weather-resistant enclosure. The panel shall be within 50 feet (15 240 mm) of an approved roadway or driveway, or other location approved by the Bellevue Fire Department. The enclosure shall be visible and accessible on approach to the building.

[F] 917.7.2 Construction.

The fire department connection panel shall be installed in a cabinet constructed of minimum 18-gauge carbon steel. When constructed of steel, the cabinet shall be provided with coating to protect the cabinet from corrosion. When the enclosure is constructed of nonmetallic materials, the enclosure shall be resistant to ultraviolet and infrared solar radiation.

[F] 917.7.3 Vehicle protection.

When the panel is located in an area subject to vehicle traffic, impact protection shall be provided in accordance with this code.

[F] 917.7.4 Base station enclosure marking.

The front of the enclosure shall be marked "FIRE-FIGHTER AIR SYSTEM" on securely attached steel, plastic engraved or painted plate. The lettering shall be in a color that contrasts with the enclosure front and in letters that are a minimum of 2 inches (51 mm) high with 3/8-inch (9053 mm) brush stroke. The marking of the enclosure shall be visible.

[F] 917.7.5 Base station enclosure components.

The components in the base station panel shall consist of the necessary components to provide air to the air substations located on upper and/or lower building levels. The fire department air supply source shall be designed to connect to the

base station panel. The following components shall be installed in the base station enclosure.

1. Two Male Rapid Intervention Crew (RIC) Universal Air Connection (UAC) fittings. When connected to a female fitting, the assembled UAC shall meet the construction, performance and dimensional requirements of NFPA 1981, *Standard on Open-Circuit Self-Contained Breathing Apparatus for Fire and Emergency Services*.
2. One downstream shutoff valve.
3. One pressure gauge to check pressure of the piping distribution to air substations located on upper and lower building levels.
4. One pressure relief valve designed for 1.25 times the design discharge of the fire department air supply or air supply trucks. All fittings, hoses and hard piping in the base station supply panel and distribution piping to air substations supply panels, shall be designed for an air pressure of 1.5 times the pressure of the fire department air delivery system.
5. Base station can be designed for an air pressure supply piping system for supply of air to air substations.

The air supply lines will require an intermediate regulator to provide air pressure for a 5,500 psi (37 921.17 kPa), for a 5.5 air pack system. The air supply lines will be fitted with separate pressure relief valves set at 1.25 times the working pressure of the air supply line and the operating pressure of the pressurized lines.

6. The relief valve, piping, pressure regulator, pressure gauges, fittings and connection hoses shall meet the requirement of the ASME Boiler and Pressure Code, 7 Section VIII, Unified Pressure Vessel Code. The installation of the piping system, as a minimum, will be based on ASME B31.3-2012.
7. Mechanical supports for piping, hoses, gauges and pressure components, will be designed and built to provide a solid rigid structure.

[F] 917.7.6 Security.

To prevent unauthorized access to or tampering with the system, the fire department connection panel enclosure shall remain locked by an *approved* means.

[F] 917.7.7 Fire department key box.

A fire department *key box* shall be provided adjacent to the fire department connection panel and enclosure. A key for the enclosure shall be provided in the *key box*.

[F] 917.8 Interior cylinder fill panels and enclosure—air substation.

[F] 917.8.1 Location. Cylinder fill panels shall be installed in the interior of buildings as follows:

1. **Aboveground structure.** An interior air substation cylinder fill panel and enclosure shall be installed on floor landings. In buildings classified as high-rise in two stairwells as approved by the *fire code official* regardless of height of buildings commencing on the second floor landing above grade, below grade and every other floor thereafter. Approved stairwells must extend the full height of the building and separated in accordance with *International Building Code Section 403.5.1*
2. **Underground structure.** An interior air substation cylinder fill panel and enclosure shall be installed in two stairwells as approved by the *fire code official* on the floor landing on the third level below grade and every other below-grade level thereafter. The panel shall be located a minimum of 36 inches (914 mm) but not more than 60 inches (1524 mm) above the finished floor or a stairway landing. Approved stairwells must extend the full height of the underground structure and separated in accordance with *International Building Code Section 1007.1.1*
3. **Transportation tunnels.** An interior air substation cylinder fill panel and enclosure shall be installed within 200' of the tunnel entrance and then at intervals not exceeding 400' thereafter. All fill panels shall be located within 10' of standpipe hose connections. The panel shall be located a minimum of 36 inches (914 mm) but not more than 60 inches (1524 mm) above the finished floor.

[F] 917.8.2 Cabinet requirements.

Each air substation cylinder fill panel shall be installed in a cabinet constructed of minimum 18-gauge carbon steel. The depth of the cabinet shall not create an exit obstruction when installed in building stairways. All components, with the exception of the shutoff valve, pressure gauges, fill hoses and ancillary components, shall be contained behind a minimum 18-gauge interior panel.

[F] 917.8.3 Door.

Hinges for the cabinet door shall be located inside of the cabinet. The door shall be arranged such that when the door is open, it does not reduce the required exit width or create an obstruction in the path of egress. A minimum of 80 percent of the door surface area shall be constructed of tempered glass. The thickness of the glass shall not be greater than 1/8 inch (3.17 mm).

[F] 917.8.4 Cabinet marking.

The front of each cylinder fill panel shall be marked "FIREFIGHTER AIR SYSTEM." The lettering shall be in a color that contrasts with the cabinet front and in letters that are a minimum of 2 inches (50mm) high with 3/8-inch (5 mm) brush stroke. The marking of the cabinet shall be visible to emergency response personnel.

[F] 917.8.5 Air substation cabinet components.

The cabinet shall be of sufficient size to allow for the installation of the following components:

1. One-isolation valve located between the air discharge line to the next air substation and the downstream line to the air base station supply or the air substation immediately below to the next substation above the air base station.
2. The fill hoses and isolation valves shall be installed between the air bottle connection line and the fresh air supply.
3. Excess bleed valves shall be located between the air bottle fill hose and the next air substation.
4. Four SCBA fill hoses are required at a single air substation, the air supply lines shall be identified as 5,500 psig (37 921.17 kPa) pressure and shall be controlled by a single valve between the air supply and air bottle. The SCBA fill hoses shall be designed with RIC UAC fittings. A protective cap shall be provided for each hose.
5. Mechanical supports for piping, hoses, gauges and pressure components shall be designed and built to provide a solid rigid structure.

[F] 917.8.6 Cylinder filling hose.

The design of the cabinet shall provide a means for storing the hose to prevent kinking. When the hose is coiled, the brackets shall be installed so that the hose bend radius is maintained at 4 inches (102 mm) or greater.

The discharge outlet of each cylinder filling hose shall have a female RIC UAC. The female fitting shall be designed to connect to a male RIC UAC. The assembled RIC UAC shall meet the

construction, performance and dimensional requirements of NFPA 1981, *Standard on Open Breathing Circuit Self-Contained Breathing Apparatus for Fire and Emergency Services*.

[F] 917.8.7 Security.

To prevent unauthorized access to or tampering with the system, each panel cover shall remain locked by an *approved* means.

[F] 917.9 Installation of components.**[F] 917.9.1 Air monitoring system.**

An approved air monitoring system shall be provided. The system shall automatically monitor air quality, moisture and pressure on a continual basis. The air monitoring system shall be equipped with not less than two content analyzers capable of detecting carbon monoxide, carbon dioxide, nitrogen, oxygen, moisture and hydrocarbons.

[F] 917.9.1.1 Alarm conditions.

The air monitoring system shall transmit a supervisory signal when any of the following levels are detected:

1. Carbon monoxide exceeds 5 ppm.
2. Carbon dioxide exceeds 1,000 ppm.
3. An oxygen level below 19.5 percent or above 23.5 percent.
4. A nitrogen level below 75 percent or above 81 percent.
5. Hydrocarbon (condensed) content exceeds 5 milligrams per cubic meter of air.
6. The moisture concentration exceeds 24 ppm by volume.
7. The pressure falls below 4,950 psig (34 129.05 kPa) at 70° F (21°C)

[F] 917.9.1.2 Alarm supervision, monitoring and notification.

The air monitoring system shall be electrically supervised and monitored by an approved supervising station.

[F] 917.9.1.3 Air quality status display.

Air quality status shall be visually displayed at within the fire command center.

[F] 917.9.2 Tubing.

Piping shall be constructed of stainless steel or other *approved* materials that are compatible with breathing air. The use of nonmetallic materials shall be compatible with breathing air. When stainless steel tubing is used, it shall meet ASTM A-269, Grade 316 or an equal standard. Stainless steel fitting shall be Grade 316 and a minimum, 0.375 inch (9.5 mm) outside diameter by .065 inch (1.6 mm) wall Grade 316 fully annealed seamless. Stainless steel fittings shall be at least Grade 316 and meet the requirements

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of ASTM A 479 or equal. Routing of tubing and bends shall be such as to protect the tubing from mechanical damage.

[F] 917.9.3 Support.

Piping shall be supported at maximum intervals of 5 feet (1524 mm). Individual tubing clamps and mounting components shall be mechanically secured to the building support members in accordance with the manufacturer's specifications.

[F] 917.9.4 Fittings.

Fittings shall be constructed of stainless steel or other *approved* materials that are compatible with breathing air. The use of nonmetallic materials shall be compatible with breathing air. Stainless steel fittings shall be at least Grade 316 and meet the requirements of ASTM A 479 or an equal standard.

[F] 917.9.5 Prohibition.

The use of carbon steel, iron pipe, malleable iron, high-strength gray iron or alloy steel is prohibited.

[F] 917.10 System assembly requirements.

The system shall be welded except where the tubing joints are readily accessible and at the individual air fill panels. When mechanical high-pressure tube fittings are used, they shall be *approved* for the type of materials to be joined and rated for the maximum pressure of the system. Welding procedures shall meet ASME B31.1-2010, Part 4 and Chapter V (Exhibit VI). Prior to and during the welding of sections of tubing, a continuous, regulated dry nitrogen or argon purge at 3 psig (20.68 kPa) shall be maintained to eliminate contamination with products of the oxidation or welding flux. The purge shall commence a minimum of 2 minutes prior to welding operations and continue until the welded joint is at an ambient temperature between 60° F and 80° F (15.5°C and 26.6°C).

[F] 917.11 Prevention of contamination.

The installing contractor shall ensure that, at all times, the system components are not exposed to contaminants, including, but not limited to, oils, solvents, dirt and construction materials. When contamination of system components has occurred, the effected component shall not be installed in the system.

[F] 917.12 Testing and inspection.

[F] 917.12.1 Testing.

Following fabrication, assembly, and installation of the piping distribution system, exterior connection panel and interior cylinder fill panels, the Bellevue Fire Department shall witness the pneumatic testing of the complete system at a minimum test pressure of 6,050 psi (41 368.54 kPa) using oil-free dry air, nitrogen or argon. A minimum 24-hour pneumatic or hydrostatic test

shall be performed. During this test all fittings, joints and system components shall be inspected for leaks. A solution compatible with the system component materials shall be used on each joint and fitting. Any defects in the system or leaks detected shall be documented on an inspection report, repaired or replaced. As an alternate, a pressure decay test in accordance with ASME B31.3 is allowed. A test of the low-pressure monitoring switch shall be performed. Each air fill panel shall be tested for compatibility with the fire department's SCBA RIC UAC. The pipe or tubing manufacturer mill report shall be provided to the Bellevue Fire Department.

[F] 917.12.2 Air samples.

A minimum of two samples shall be taken from separate air fill panels and submitted to an independent, certified gas analysis laboratory to verify the system's cleanliness and that the air is certified as breathing air. The laboratory shall submit a written report of the analysis to the Bellevue Fire Department documenting that the breathing air complies with this section.

[F] 917.12.3 Quality analysis.

During the period of air quality analysis, the air fill panel inlet shall be secured so that no air can be introduced into the system and each air fill panel shall be provided with a sign stating: "AIR QUALITY ANALYSIS IN PROGRESS, DO NOT FILL OR USE ANY AIR FROM THIS SYSTEM." This sign shall be a minimum of 8 1/2 by 11 inches (215mm by 279 mm) with a minimum of 1-inch (25 mm) lettering.

[F] 917.12.4 Periodic Inspection, Testing and Maintenance.

The Firefighter Air System shall be continuously maintained in an operative condition and shall be inspected not less than annually. Annually two air samples shall be taken from two separate filling stations and tested to verify compliance with NFPA 1989. The laboratory test results shall be maintained on site and readily available for review by the Bellevue Fire Department.

[F] 917.13 System acceptance and certification.

Prior to the final acceptance of the air system, the building owner shall provide for the testing and certification of the system. As a minimum, this shall include verifying the system's compatibility with the fire department's SCBA apparatus; the system's ability to maintain 5,500 psi (37 921.17 kPa) working pressure; the operability of the low-pressure monitoring switch and that the system's air quality complies with the requirements of Section 915.12. Prior to final acceptance, the building owner shall provide the Bellevue Fire Department with written verification of a testing and certification contract. Upon satisfactory completion of all tests and verification of air quality, the system shall be considered complete.

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1612.3 Establishment of flood hazard areas. To establish *flood hazard areas*, the applicable governing authority shall adopt a flood hazard map and supporting data. The flood hazard map shall include, at a minimum, areas of special flood hazard as identified by the Federal Emergency Management Agency in an engineering report entitled "The Flood Insurance Study for King County," dated May 16, 1995, as amended or revised with the accompanying Flood Insurance Rate Map (FIRM) and Flood Boundary and Floodway Map (FBFM) and related supporting data along with any revisions thereto. The adopted flood hazard map and supporting data are hereby adopted by reference and declared to be part of this section.

1612.3.1 Design flood elevations. Where design flood elevations are not included in the flood hazard areas established in Section 1612.3, or where floodways are not designated, the building official is authorized to require the applicant to:

1. Obtain and reasonably utilize any design flood elevation and floodway data available from a federal, state or other source; or

2. Determine the design flood elevation and/or floodway in accordance with the City of Bellevue LUC 20.25H.175A and **Surface Water** Engineering Standards, Section D4-04.5, "Floodplain/Floodway Analysis" to define special flood hazard areas. Determinations shall be undertaken by a *registered design professional* who shall document that the technical methods used reflect currently accepted engineering practice.

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1612.3.2 Determination of impacts. In riverine *flood hazard areas* where design flood elevations are specified but floodways have not been designated, the applicant shall provide a floodway analysis that demonstrates that the proposed work will meet the City of Bellevue **Surface Water Engineering Standards**, Section D4-04.5, "Floodplain/Floodway Analysis."

1612.4 Design and construction. The design and construction of buildings and structures located in *flood hazard areas*, including flood hazard areas subject to high-velocity wave action, shall be in accordance with Chapter 5 of ASCE 7 ASCE 24 and with BCC Section 20.25H.175.

SECTION 1613 EARTHQUAKE LOADS

1613.1 Scope. Every structure, and portion thereof, including nonstructural components that are permanently attached to structures and their supports and attachments, shall be designed and constructed to resist the effects of earthquake motions in accordance with ASCE 7, excluding Chapter 14 and Appendix 11A. The *seismic design category* for a structure is permitted to be determined in accordance with Section 1613 or ASCE 7.

Exceptions:

1. Detached one- and two-family dwellings, assigned to *Seismic Design Category* A, B, or C, or located where the mapped short-period spectral response acceleration, S_s , is less than 0.4 g.
2. The seismic force-resisting system of wood-frame buildings that conform to the provisions of Section 2308 are not required to be analyzed as specified in this section.
3. Agricultural storage structures intended only for incidental human occupancy.
4. Structures that require special consideration of their response characteristics and environment that are not addressed by this code or ASCE 7 and for which other regulations provide seismic criteria, such as vehicular bridges, electrical transmission towers, hydraulic structures, buried utility lines and their appurtenances and nuclear reactors.
5. Seismic design of automatic sprinkler systems when hanging, bracing, and restraint is designed and installed in accordance with the 2013 edition of NFPA 13 and the coefficient C_p for seismic bracing design calculations in accordance with NFPA 13 is either a value of 0.70, or a value based on site specific USGS data.

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SECTION 2701 GENERAL

2701.1 Scope. This chapter governs the electrical components, equipment and systems used in buildings and structures covered by this code. Electrical components, equipment and systems shall be designed and constructed in accordance with the provisions of the Washington Cities Electrical Code.

SECTION 2702 EMERGENCY AND LEGALLY REQUIRED STANDBY POWER SYSTEMS

[F] 2702.1 Installation. Emergency power systems and legally required standby power systems shall comply with Sections 2702.1.1 through 2702.1.7 and Table 2702.

[F] 2702.1.1 Stationary generators. Stationary emergency and legally required standby power generators required by this code shall be *listed* in accordance with UL 2200.

[F] 2702.1.2 Electrical. Emergency power systems and legally required standby power systems required by this code or the *International Fire Code* shall be installed in accordance with the *International Fire Code*, the Washington Cities Electrical Code, NFPA 110 and NFPA 111.

[F] 2702.1.3 Load transfer. Emergency power systems shall automatically provide secondary power within 10 seconds after primary power is lost, unless specified otherwise in this code. Legally required standby power systems shall automatically provide secondary power within 60 seconds after primary power is lost, unless specified otherwise in this code. Transfer to full emergency or legally required standby power shall take place within the maximum time to energize loads specified in Table 2702.

[F] 2702.1.4 Load duration. Emergency power systems and legally required standby power systems shall be designed to provide the required power for a minimum duration of 8 hours for fire pumps serving high-rise buildings in accordance with NFPA 20, and 2 hours for other systems without being refueled or recharged, unless specified otherwise in this code.

[F] 2702.1.5 Uninterruptable power source. An uninterrupted source of power shall be provided for equipment when required by the manufacturer's instructions, the listing, this code or applicable referenced standards.

[F] 2702.1.6 Interchangeability. Emergency power systems shall be an acceptable alternative for installations that require standby power systems.

[F] 2702.1.7 Group I-2 occupancies. In Group I-2 occupancies, in new construction or where the building is substantially damaged, where an essential electrical system is located in flood hazard areas established in Section 1612.3, the system shall be located and installed in accordance with ASCE 24.

[F] 2702.1.8 Equipment room. If a legally required standby or emergency power system includes a generator set inside or serving a building, the generator set shall be located in a separate room enclosed with 2-hour *fire barriers* constructed in accordance with Section 707 or *horizontal assemblies* constructed in accordance with Section 711, or both, to separate it from the remainder of the building, the transfer switches, and from the normal power source including transformers and distribution equipment. The transfer switches shall also be located in a separate room enclosed with 2-hour fire barriers constructed in accordance with Section 707 or horizontal assemblies constructed in accordance with Section 711, or both, to separate it from the remainder of the building. Power distribution from the emergency source to the emergency transfer switch shall be by an independent route from the normal power source. **Independent routes shall mean either a physical separation distance of not less than 50 feet, or a minimum 1-hour fire-resistance rated separation** System supervision with manual start and transfer features shall be provided at the *fire command center* or an *approved* location when a fire command center is not required. Such equipment rooms shall be ventilated directly to the exterior for generator combustion air and radiator cooling air. Any ducts required for such ventilation shall not be dampered, and shall be *fire-resistance rated* to the same level of protection as that required for the equipment room. The requirements of this subsection 2702.1.8 do not apply to optional tenant-owned or landlord-owned generator sets.

Exception:

1. Legally required standby or emergency power system generator sets inside a building other than a high-rise building in accordance with Section 403 and other than an underground building space in accordance with Section 405, may be located in equipment rooms with a 1-hour *fire-resistance rating*.

2. Transfer switches shall be permitted to be located in the same room as the legally required standby or emergency power system generator sets when inside or serving buildings that are neither a high-rise building in accordance with Section 403, nor an underground building in accordance with Section 405.

[F] 2702.1.9 Smoke control power systems. Smoke control equipment and systems requiring legally required standby or emergency power shall be supplied with two sources of power. Primary power shall be from the normal building power system. Legally required standby power or emergency power shall be from an approved source complying with the Washington Cities Electrical Code. The legally required standby power or emergency power source and its transfer switches shall be in separate rooms from the normal power transformers and switch gears, and ventilated directly to and from the exterior. The room shall be completely enclosed in not less than 1-hour fire barriers constructed in accordance with Section 707, or 1-hour horizontal assemblies constructed in accordance with Section 711, or both, except 2-hour fire-resistance construction shall be required for high-rise and underground buildings per Sections 403 and 405 respectively. Power distribution from the two sources shall be by independent routes to the room containing the automatic transfer switch(s). Independent routes shall mean either a minimum 1-hour fire-resistance separation, or a physical distance of not less than 50 feet. Transfer to full emergency power shall be automatic and shall take place within the maximum time to energize loads. The systems shall comply with the *Washington Cities Electrical Code*.

[F] 2702.1.10 Fuel-fired generator sets and fuel storage location. Fuel-fired generator sets and associated fuel storage, including optional landlord-owned or tenant-owned generator sets, located more than 75 feet above the lowest level of Fire Department vehicle access, or located at a floor level more than 30 feet below the lowest level of exit discharge, require the approval of the fire code official.

[F] 2702.2 Where required. Emergency and legally required standby power systems shall be provided where required by Sections 2702.2.1 through 2702.2.16 and other sections of this code.

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

[F] 2702.2.2 Elevators and platform lifts. Legally required standby power shall be provided for elevators and platform lifts used as accessible means of egress as required in Sections 1009.4 and 1009.5. Emergency power shall be provided for elevators in high-rise buildings as required in Section 403.4.8.4.

[F] 2702.2.3 Emergency responder radio coverage systems. Standby power shall be provided for emergency responder radio coverage systems required in Section 916 and the *International Fire Code*. The standby power supply shall be capable of operating the emergency responder radio coverage system for a duration of not less than 24 hours.

[F] 2702.2.4 Emergency voice/alarm communication systems. Emergency power shall be provided for emergency voice/alarm communication systems as required in Section 907.5.2.2.5. The system shall be capable of powering the required load for a duration of not less than 24 hours, as required in NFPA 72.

[F] 2702.2.5 Exit signs. Emergency power shall be provided for exit signs as required in Section 1013.6.3. The system shall be capable of powering the required load for a duration of not less than 90 minutes.

[F] 2702.2.6 Group I-2 occupancies. Essential electrical systems for Group I-2 occupancies shall be in accordance with Section 407.10.

[F] 2702.2.7 Group I-3 occupancies. Emergency power shall be provided for power-operated doors and locks in Group I-3 occupancies as required in Section 408.4.2.

[F] 2702.2.8 Hazardous materials. Emergency or legally required standby power shall be provided in occupancies with hazardous materials where required by the *International Fire Code*.

[F] 2702.2.9 High-rise buildings. Emergency power shall be provided in high-rise buildings as required in Section 403.4.8.

[F] 2702.2.10 Horizontal sliding doors. Legally required standby power shall be provided for horizontal sliding doors as required in Section 1010.1.4.3. The standby power supply shall have a capacity to operate not fewer than 50 closing cycles of the door.

[F] 2702.2.11 Means of egress illumination. Emergency power shall be provided for means of

egress illumination as required in Section 1008.3. The system shall be capable of powering the required load for a duration of not less than 90 minutes.

█ **[F] 2702.2.12 Membrane structures.** Legally required standby power shall be provided for auxiliary inflation systems in permanent membrane structures as required in Section 3102.8.2. Legally required standby power shall be provided for a duration of not less than 4 hours. Auxiliary inflation systems in temporary air-supported and air-inflated membrane structures shall be provided in accordance with Section 3103.10.4 of the *International Fire Code*.