



City of Bothell™

Shaft Pressurization Only Systems – Appendix D

The City may require additional information as needed. For preparation information, see Standards for Plans and Drawings. If you have any questions concerning your application, please contact the Permit Department at 425-806-6400.

Shaft pressurization is a recognized method of smoke control. Because of the complexity of smoke control systems, it is important that the design documents clearly identify the expected performance of each pressurized shaft. These documents must also clearly identify the expected performance of *each component* in the smoke control system. Components include all passive and active elements that work together to provide smoke control in accordance with International Building Code (IBC) Section 909.

Submittal requirements for this type of permit require this completed checklist and the following details to be submitted. **This submittal checklist must be completed and submitted with the application.**

1. **Detailed Design Report** (including the smoke control system rational analysis), based on the conceptual design report, must be prepared by a professional engineer competent in the design of smoke control systems and in accordance with IBC 106 and 909.4.

The Detailed Design Report must be a bound document, independent of design plans, and minimally include the following:

- The signature, date, and stamp of the professional engineer responsible for the rational analysis/design.
- General narrative description of the building. This description must include identification of building uses and occupancies as well as passive and active fire protection features that will be a part of the smoke control system.
- Narrative description of the shaft pressurization system. This description will include such items as:
 - Specific discussion of how smoke control will be initiated in each shaft and the associated system responses.
 - The sequence of operations (including timing, if necessary, to provide for proper door operation or prevent duct implosion or rupture) and the positioning of each damper for every fire scenario.
 - Measurable performance criteria for each shaft.
 - Description of smoke dampers and fire/smoke dampers, including which dampers will be supervised for damper position, the position of unsupervised dampers when smoke control system is active, damper positions upon loss of power, actuation temperature of fire and fire/smoke dampers.
- Calculations associated with the system design and fan capacities.
- Identification of where variable frequency drives are to be used for smoke control equipment and method of control.
- Description of how the periodic self-test required in IBC Section 909.12 will be accomplished.
- Any related material that supports the design of the system.

Fire Prevention/CRR
City of Bothell Fire Department
18415 – 101st Ave NE
Bothell, WA 98011
425.806.6250
www.bothellwa.gov



City of Bothell™

2. **Detailed Event Matrix** must include:
 - Every initiating device by address down one column.
 - Every smoke control device (i.e., fans, dampers, etc.) and every other event that must occur in order for proper operation of the smoke control system (i.e., HVAC shutdown, etc.) across the top; with prior approval, some devices may be combined.

3. **Drawings:** The following guidelines must be followed in a drawing package designated as “Smoke Control System” to differentiate them from any other plans for that job or project:
 - To clearly identify the smoke control systems, the background systems and floor plans should be in light line weight, with the pertinent systems in heavy line weight.
 - Smoke control system component drawings must be submitted on current architectural backgrounds.
 - Smoke control zone drawings clearly identifying (colored, hatched, etc.) the pressurized shafts.
 - Drawings identifying the fire rating of associated smoke barriers.
 - Location of fire-fighter’s smoke control panel/controls, and room layout.
 - The fire-fighter’s Smoke Control Panel must be submitted, depicting fan/damper controls and status indication as per Bothell Fire Department *Smoke Control* Guidelines Section 9.4
 - Smoke control mechanical equipment and ductwork drawings.
 - Location and design of the emergency generator and transfer switch rooms per IBC Section 909.11.
 - Drawings demonstrating all emergency system wiring methods associated with the pressurization system, from the source (generator) to the device (damper, fan, etc).
 - Drawings must clearly demonstrate pressurization control and power wiring routing and 2-hour protection.
 - Drawings must clearly demonstrate fire alarm wiring routing and 2-hour protection when used to control the pressurization system.

4. **A Special Inspector Test Procedure document** must be submitted with the smoke control permit in accordance with IBC Section 909.3, and as described in Bothell Fire Department *Smoke Control* publication, Section 8.2.6

The architect, engineer of record, or special inspector must prepare the document as a bound document, independent of the design plans and smoke control report, and minimally address the following:

 - Qualifications of the special inspector and special inspection agency.
 - Summary of the testing to be performed, including:
 - A general description of each smoke control component and zone to be evaluated, and
 - The applicable performance criteria as identified in the smoke control report and IBC Section 909.18.
 - Provide representative test forms and inspection reports that will be used.
 - Anticipated testing schedule, minimally addressing IBC Section 909.18.

Fire Prevention/CRR
City of Bothell Fire Department
18415 – 101st Ave NE
Bothell, WA 98011
425.806.6250
www.bothellwa.gov



City of Bothell™

To apply for future permits for associated systems (Building, Mechanical, Electrical, Sprinkler, and Fire Alarm), the following details must be included in those submittals.

5. Architectural Plan Submittal:

- A Concise Narrative Description of the smoke control system and any special requirements of the design must be prepared by the author of the Detailed Design Report. This description will be required to be on every set of associated design plans and be shown on future tenant improvement drawings for the life of the building as described in Appendix C.
- Clear identification of the smoke zone boundaries. These boundaries are required to be constructed as smoke barriers and must be appropriately identified, including wall and/or horizontal listed assembly number and associated assembly details not deviating from the listed assembly.
- A letter prepared by the architect stating that their design satisfies the requirements of the smoke control system. *Note:* A single letter signed by all disciplines is acceptable.
- Plans must provide the location and design of the emergency generator and transfer switch rooms per IBC Section 909.11. In addition, they must detail 2-hour fire-rated separation of power/control wiring to equipment serving the pressurized elevator and stair shafts.
- Provide seismic anchorage of critical systems and include the design with the associated design submittal, as appropriate (IBC Section 403.14).

6. Mechanical Plan Submittal:

- A Concise Narrative Description of the smoke control system and any special requirements of the design must be prepared by the author of the Detailed Design Report. This description will be required to be on every set of associated design plans and be shown on future tenant improvement drawings for the life of the building as described in Appendix C.
- Clear identification of the smoke zone boundaries. These boundaries are required to be constructed as smoke barriers and must be appropriately identified.
- A letter prepared by the mechanical designer stating that their design satisfies the requirements of the smoke control system. *Note:* A single letter signed by all disciplines is acceptable.
- Plans must include identification of the location and address of all devices that will initiate shaft pressurization, components associated with the smoke control process (including actuators, control dampers, fire and smoke dampers, variable air volume controls, and fans), and associated system responses/configurations.
- Provide capacities of each shaft pressurization fan—including applicable calculations for the number of belts and the operating exhaust temperature.
- Identify equipment locations with inlet and outlets clearly identified and separated in accordance with Amended IBC Section 909.10.3.

Fire Prevention/CRR
City of Bothell Fire Department
18415 – 101st Ave NE
Bothell, WA 98011
425.806.6250
www.bothellwa.gov



City of Bothell™

- When applicable, design submittals must include the sequence of operations (including timing, if necessary, to provide for proper door operation or prevent duct implosion or explosion) and the positioning of each damper for every fire scenario.

7. Fire Alarm Plan Submittal:

- A Concise Narrative Description of the smoke control system and any special requirements of the design must be prepared by the author of the Detailed Design Report. This description will be required to be on every set of associated design plans and be shown on future tenant improvement drawings for the life of the building as described in Appendix C.
- Clear identification of the smoke zone boundaries. These boundaries are required to be constructed as smoke barriers and must be appropriately identified.
- A letter prepared by the fire alarm designer stating that their design satisfies the requirements of the smoke control system. *Note: A single letter signed by all disciplines is acceptable.*
- Plans must include identification of the location and address of all devices that will initiate shaft pressurization, components associated with the smoke control process (including actuators, control dampers, fire and smoke dampers, variable air volume controls, and fans), and associated system responses/configurations.
- Submittals must also demonstrate the 2-hour fire-rated protection of wiring when utilizing the fire alarm system for pressurization control functions.

8. Electrical Plan Submittal:

- A Concise Narrative Description of the smoke control system and any special requirements of the design must be prepared by the author of the Detailed Design Report. This description will be required to be on every set of associated design plans and be shown on future tenant improvement drawings for the life of the building as described in Appendix C.
- Clear identification of the smoke zone boundaries. These boundaries are required to be constructed as smoke barriers and must be appropriately identified.
- A letter prepared by the electrical designer stating that their design satisfies the requirements of the smoke control system. *Note: A single letter signed by all disciplines is acceptable.*
- The location and design of the emergency generator and transfer switch rooms per IBC Section 909.11.
- Generator sizing and minimum run time of the generator for evacuation purposes.
- Demonstrate 2-hour protection of wiring controlling/powering fans serving smoke proof enclosures.

Fire Prevention/CRR
City of Bothell Fire Department
18415 – 101st Ave NE
Bothell, WA 98011
425.806.6250
www.bothellwa.gov



City of Bothell™

- Panel schedule (industry standard type) for the emergency panel with connected and demand loads.
- Schedule of smoke control components showing equipment, the load in amps or volt- amps, conduit type and size, conductor type and size, and breaker type and size.
- All emergency system wiring methods pertaining to the smoke control.
- Schedule of individual smoke control components starting loads that will start at the same time and schedule of individual smoke control components running loads.
- The total combined loads of smoke control components for start-up and run (start-up and run shown separately).

9. **Sprinkler Plan Submittal:**

- A Concise Narrative Description of the smoke control system and any special requirements of the design must be prepared by the author of the Detailed Design Report. This description will be required to be on every set of associated design plans and be shown on future tenant improvement drawings for the life of the building as described in Appendix C.
- Clear identification of the smoke zone boundaries. These boundaries are required to be constructed as smoke barriers and must be appropriately identified.
- A letter prepared by the sprinkler designer stating that their design satisfies the requirements of the smoke control system. Note: A single letter signed by all disciplines is acceptable.
- Demonstrate that sprinkler zones are coordinated with smoke zones, as applicable.

Note: Approval of the smoke control system **does not** constitute approval of each component system. Separate fire alarm, sprinkler, building, mechanical, and electrical approvals are required.

Fire Prevention/CRR
City of Bothell Fire Department
18415 – 101st Ave NE
Bothell, WA 98011
425.806.6250
www.bothellwa.gov