

DPD

Director's Rule 7-2012

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TESTING OF STAIRWAY AND HOISTWAY PRESSURIZATION SYSTEMS IN HIGH RISE BUILDINGS	7/16/2012	8/22/2012
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	Seattle Building Code	
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1. BACKGROUND:

1.1. Scope. The Seattle Building Code (SBC) requires the pressurization of stairways in high-rise buildings. The Code also allows pressurization of hoistways as an alternative to lobbies. This Rule provides details about the procedure for acceptance testing of stairway and elevator pressurization systems in high-rise buildings.

This rule applies to buildings in which the only smoke control systems are for pressurization of hoistways and stairways. Special conditions that may impact the performance of pressurization systems, such as atrium smoke control, shall be addressed by the designer. A different test protocol may be required.

1.2. Purpose of pressurization systems. The purpose for pressurization of stairways and hoistways in high-rise buildings is to protect building occupants from smoke during evacuation of the building during a fire emergency. Pressurization also reduces migration of smoke away from the floor of origin. Pressurization systems are not primarily intended to provide assistance for firefighting.

2. SUBSTANTIAL ALTERATIONS

2.1. Stairway and hoistway pressurization complying with the building code in effect at the time of permit application and with this rule shall be provided in high-rise buildings which are undergoing substantial alterations.

3. ACCEPTANCE TESTS

3.1. Minimum code requirements for testing, inspection and acceptance. Hoistway pressurization systems are required to satisfy performance criteria set out in SBC Section 708.14.2.1. Systems that satisfy those criteria may be deemed to comply with prescriptive requirements of Section 708.14.2.

3.2. Special inspection. Section 1704 requires special inspection for smoke control systems. Section 909.18.8.2 requires that special inspection agencies have expertise in fire protection engineering, mechanical engineering and certification as air balancers. DPD will allow the registered design professional who designed the pressurization system to act in the capacity of the special inspector.

3.2.1 Certification of test technicians. Test technicians shall be certified by the Seattle Fire Department.

3.3 Test procedure.

3.3.1. Pressure profile. The testing agency is encouraged to create an initial pressure profile of the building prior to activating the pressurization system. The profile should include measurements of the differences in pressure between both the stairway and hoistway, and adjacent occupied space on each floor. In residential occupancies, the profile should show the pressure difference between the stairway and hoistway, and the dwelling units. Adjustments to the pressurization system during testing will be easier if a pressure profile has been created.

3.3.2 Selection of floors to be tested. The pressurization system shall be tested in blocks of no more than five floors. One of the floors in each block will be selected to be tested as if it is the fire floor. The pressure shall be measured on the two floors immediately below and one floor immediately above that floor, and on the floors in the building with the highest and lowest expected pressure differences. Every block of five floors shall be tested in this manner. Floors representing all conditions that affect pressures, including atypical conditions, shall be tested. It is recognized that some floors may not be included in the test.

3.3.3. Testing of detection devices. Detection devices will be tested during acceptance testing of the fire alarm system. During testing of the stairway and hoistway pressurization system, activation of the pressurization system by a detection device on the assumed fire floor shall be tested at least once for each block of five floors.

3.3.4. Conditions as test begins.

3.3.4.1 Stairway Conditions. The building shall comply with the following at the time stairway pressurization testing begins.

- All stairway doors shall be closed. This includes:

- Doors from the stairway to the exterior, and
- Doors from the stairway to the main lobby where the stairway exits through the main lobby.
- All doors that are part of the boundaries between the pressurized space and adjacent spaces shall be closed.
- Partitions or seals that will not be in place at the issuance of the Certificate of Occupancy are not permitted at the time of testing.
- All opening and penetration protection, electrical wall plates, door hardware, smoke seals, thresholds and door sweeps in the boundary between the pressurized space and adjacent spaces shall be in place when the test is performed.
- Hoistway pressurization shall be operating during stairway pressurization tests.
- Carpets need not be installed.
- Exit passageway doors, if provided, shall be closed.
- The relief dampers at the top of the stairway shall be operable.

3.3.4.2 Elevator Conditions. The building shall comply with the following at the time hoistway pressurization testing begins.

- All elevator cars shall be at the primary recall level with their doors open.
- All doors that are part of the boundaries between the pressurized space and adjacent spaces shall be closed.
- Partitions or seals are prohibited unless they will be in place at the issuance of the Certificate of Occupancy.
- All opening and penetration protection, electrical wall plates, door hardware, smoke seals, thresholds and door sweeps in the boundary between the pressurized space and adjacent spaces shall be in place when the test is performed.
- Stairway pressurization shall be operating during hoistway pressurization tests.
- Carpets need not be installed.
- The testing plan shall specify whether exterior doors will be closed, and shall be consistent with the design of the pressurization system.

3.3.5 Dampers and fans. Operation of each damper must be tested as postured for every fire scenario.

For buildings in which pressurization is provided by separate fans on each floor, the operation of the fans and dampers on each floor shall be tested as if that floor were the fire floor, and operation of the fans and dampers on the other floors in the four test floors shall be observed. Fans and dampers that operate improperly shall be corrected. Pressure differences shall be measured as required for the four-floor blocks.

3.3.6 Pressure. Within the four test floors, stairway and hoistway pressure shall be measured with respect to adjacent occupied space on those floors. In residential buildings, the pressure differential may be measured between the hoistway and the dwelling units. On floors outside the four test floors, stairway and hoistway pressure may be measured relative to atmospheric pressure.

3.3.7. Stairway door operability. Stairway doors shall be set in motion when subjected to a 30-pound force while the pressurization system is running.

3.3.8. Stairway relief vent. Stairway relief vents shall be tested and balanced to ensure the minimum required airflow of the code.

3.3.9. Elevator door operability. If the pressurization system is adjusted for operation of elevator doors on Phase II operation, then Phase I operation must be retested. If pressurization is adjusted, the entire pressurization system must be retested, and must satisfy all the requirements of the code.

3.3.10. Time to reach pressure. The system shall reach a consistent pressure within the required range no more than 5 minutes after the system is activated. For test purposes, there is no minimum duration for the system to operate at the required pressure.

3.3.11. Power source. The pressurization test may be performed using normal building power, except that operation of dampers, fans and controls shall be tested using the emergency power source without normal power.

3.3.12. Witnessing of test. The special inspection agency shall witness the test. The City is not required to witness the test. DPD elevator inspectors will test elevator operation with the pressurization system operating after the pressurization system has been tested.

3.4. Test report. The special inspector or *special inspection* agency shall submit a report of the test to the building official. The report shall include at least the following statements and information:

1. The system, including supply and exhaust fans, started up within the required time.
2. The system configured itself, including posture of dampers, as designed. The system configuration shall be observed for each five-floor block tested.
3. The measured pressure differentials were within code limits. All measured pressures shall be included in the report.
4. The stairway doors operated correctly at the required pressures.
5. The stairwell relief vent airflow is at or above the code minimum.
6. The elevator doors operated correctly at the required pressures.
7. The system operates properly under emergency or standby power.
8. All changes made to the system during the test shall be documented.
9. A summary of the test results shall be included at the beginning of the report.
10. The report shall include a statement that, as tested and modified, the system complies with the code.

3.5 Documentation. The following information shall be included in the copy of the report maintained on file at the building as required by Section 909.18.9.

1. All devices identified by manufacturer, nameplate data and identification tag or mark.
2. Charts, drawings and other documents identifying and locating each component of the pressurization system, and describing its proper function and maintenance requirements.
3. Design values

4. Measured values.
5. The final configuration and adjustments made to the system during testing.

3.6 Final report. A registered design professional shall stamp the final report stating that they have reviewed the test report, and that the results are consistent with the Code, this rule and the design of the pressurization system.

3.7. Final acceptance. The system will not be accepted unless the pressurization system and the stairway and elevator doors operate satisfactorily.

4. ANNUAL TESTING

Annual testing is a smaller-scale test in which fewer locations are tested. The other protocols of this Rule shall be followed. Annual tests shall be conducted in compliance with Seattle Fire Department Administrative Rules.