

November 29, 2018

VIA E-MAIL: sbcc@ga.wa.gov

Washington State  
Building Code Council  
1500 Jefferson Ave SE  
PO Box 41449  
Olympia, WA 98504-1449

**CODE AMENDMENT PROPOSAL B14-2018**  
**LETTER OF OPPOSITION**

Honorable Council:

Please accept this written public comment, submitted in advance of the November 30, 2018 hearing, in opposition of Log Number B14-2018, "Stair-enclosure pressurization increase." This letter is offered consistent with WAC 196-27A-020(1).

Firstly, as a point of fact, the proposal should be deemed incomplete as each of the 3 editions of the form submitted by the proponent as provided with the meeting agenda is incomplete. In every proposal form provided, not a single box in Question 1 is checked to identify the applicable code. The form states, "All questions must be answered to be considered complete. Incomplete proposals will not be accepted."

Secondly, as a point of order, the initial form of the proposal sought only to amend IBC Section 504.4.1, and was therefore administered by the Building Code TAG. The submitted proposal form was later revised to add Section 909.6.3, which should be heard by the Fire Code TAG. The description of the proposal, "Stair-enclosure pressurization increase" is misleading, as the proposed amendments to Section 909.6.3 reduce the diligence prescribed for design and construction of high-rise buildings.

While this opponent appreciates the proponent's long-standing service to the Council, including our prior service together on the Fire Code TAG over 10 years ago, it is essential that the rules and standards be applied consistently. As every proposal presented with Log Number B14-2018 is incomplete, according to the terms of the proposal form itself, it should not have been accepted.

The forgoing findings notwithstanding, the following explanation is offered to express specific opposition to the subject code amendment proposal, demonstrating:

- ✓ Denial of this amendment is needed to address a critical life/safety need.
- ✓ Denial of this amendment is needed to address a specific state policy or statute.
- ✓ Denial of this amendment avoids errors and omissions.

### **HISTORY**

The proponent acknowledges that the 2015 IBC TAG, of which this opponent was a member as a Fire Protection Engineer representative, recommended to revise the language in IBC Section 504.4.1 to simply refer to Section 909. This issue was debated and settled by the 2015 IBC TAG with the resulting recommendation. The proposed amendment, submitted by an individual, effectively undoing the work of the 2015 IBC TAG, should be denied.

### **CREDENTIALS**

A relatively small subset of professional engineers hold the title Fire Protection Engineer, and their knowledge and experience can be varied. Opposition to B14-2018 presented in this letter draws upon my expertise in design and special inspection of smoke control systems, including stair pressurization systems.

In 2006 I founded AEGIS Engineering and serve as Principal Fire Protection Engineer with professional registration throughout the western United States. My education includes a Master's Degree in fire protection engineering from Worcester Polytechnic Institute in Massachusetts. Prior employment includes fire protection engineering consultancies in Chicago and San Francisco, and I have complimentary experience in firefighting, forensic investigation, and civil engineering.

In 2008 I spoke at the NFPA World Safety Conference and Exposition on the topic of smoke control. Since that time, multiple jurisdictions throughout the Puget Sound region have engaged AEGIS Engineering to provide technical assistance in review of smoke control system construction documents, including stairway pressurization systems. Last month I was a presenter at the Fire and Evacuation Technical Modeling Conference.

I was a member of the Fire Code TAG for the 2009 Edition, the Building Code TAG for the 2015 Edition, and currently serve on the L&I Elevator Safety Advisory Council. I am also a professional member of ICC, NFPA (and NFPA Architects, Engineers and Building Officials Section (AEBO)), SFPE (and SFPE COA Public Policy Task Group).

## **2015 CODE REVISIONS**

That revision recommended by the 2015 IBC TAG addressed a critical life/safety need created by the inconsistent application of standards by designers and local authorities, and assured consistency with IBC Section 909.6.3, a new provision in the 2015 Edition.

Section 909.6.3 entered via ICC Code Change No. F189-13, see attached. This code change brought Section 909.6.3 to the Fire and Building Code (and Section 513.6.3 of the Mechanical Code) in the 2015 Edition. This code change was approved by the committee as submitted, and no dissent was recorded from the assembly. This provision was not modified with the 2018 Edition, and appears unchallenged with the 2021 Edition as well.

The cost impact identified in ICC Code Change No. F189-13, as submitted by a public fire authority, is none; zero. Therefore, as ICC recognizes no cost burden associated with this language, there should be no monetary relief to evading it. This point is further clarified in the Economic Impact section below.

### **CRITICAL LIFE/SAFETY NEED**

The form submitted with B14-2018 asserts that this amendment is needed to address a critical life/safety need. This claim is false; this amendment is not needed to satisfy this criteria. The life/safety need is better served by keeping 504.4.1 and 909.6.3 as-written, without amendment. The proposed amendment should be denied.

The provisions for stairway pressurization in Section 909.20 cannot simply be divorced from all other provisions of Section 909 without jeopardizing the life/safety of the public. Pressurized interior exit stairways and elevator hoistways help protect occupants in high-rise buildings, as well as in combustible structures which enjoy an additional story, in the event of a fire, but only if they function when needed. Requirements for the fan equipment to serve these systems cannot be found in either Section 909.20 or 909.21.

Rather, fan equipment requirements to ensure reliable and stable performance critical to the life/safety need they support are found in IBC Section 909.10.5. This is but one example of how the other provisions of Section 909, as prescribed by Section 909.6.3 in its original form, are necessary to provide the degree of life safety intended by Sections 909.20 and 909.21.

### **STATE POLICY OR STATUTE**

WAC 51-50-0504 increases the allowable number of stories permitted in Type VA (combustible, wood frame) construction occupied by Groups R-1 and R-2 (e.g. hotels,

apartments, residential condominiums). State Building Code Interpretation 17-17 extends this provision to licensed care facilities (Group I-1 Condition 2).

Absent stair pressurization as provided for in Section 504.4.1, such a building would need to be of wholly non-combustible construction in order to remain the same number of stories. Therefore, to the extent that the installation of stair pressurization is allowing the substitution of wood framing for steel, such stair pressurization systems must be reliable for the State policy or statute to not jeopardize the public welfare.

B14-2018 erodes such reliability and should be denied.

### **ERRORS AND OMISSIONS**

The individual proponent suggests that current language is in error. As discussed above, the acceptance of the model language in Section 909.6.3 and revised language in Section 504.4.1 was purposefully and dutifully considered by the 2015 IBC TAG. These provisions were subject to public hearings and Council approval prior to adoption.

No error or omission exists with the existing language; B14-2018 should be denied.

### **ECONOMIC IMPACT**

The proponent's assertion that there is an economic impact contradicts the record established with ICC Code Change No. F189-13. There should be no cost impact to retaining the language from the 2015 Edition.

There is no cost impact because the code already intends for pressurization systems serving interior exit stairways and elevator hoistways of Sections 909.20 and 909.21, respectively, to comply with the provisions of Section 909. Examples of this are found within the following provisions, excerpted below:

**909.1 Scope and purpose.** "This section applies to mechanical or passive smoke control systems when they are required by other provisions of the code. The purpose of this section is to establish minimum requirements for the design, installation and acceptance testing of smoke control systems that are intended to provide a tenable environment for the evacuation or relocation of occupants."

The heading of Section 909 is, "Smoke Control Systems." Therefore, systems described in Section 909 are "smoke control systems." Accordingly, the pressurization systems in IBC Sections 909.20 and 909.21 are smoke control systems.

The heading of Section 909.20 is "Smokeproof enclosure." Certainly the intent of an interior exit stairway which is a "Smokeproof Enclosure" is to provide a tenable environment for the evacuation or relocation of occupants. Therefore, by prescribing that pressurization be provided in accordance with Section 909.20, a smoke control system is prescribed.

**909.2 General design requirements.** "...in accordance with the applicable requirements of Section 909 and the generally accepted and well-established principles of engineering relevant to the design."

In 2012, a reference text was published by ASHRAE, in cooperation with ICC, NFPA and SFPE, titled, Handbook of Smoke Control Engineering. Involvement of ICC is remarkable, the organization could have abstained. The text provides design guidance for pressurization systems in both "simple buildings" and "complicated buildings."

Just because a building is only 5 stories tall does not mean it is a "simple building." A design professional component in smoke control engineering should assure compliance with IBC Section 909.2 for pressurization systems described in Sections 909.20 and 909.21. Special attention is often warranted, such as when a pressurized shaft has openings to differing atmospheric or building conditions, or where multiple pressurized shafts open into a common space, such as a lobby or corridor. Failure to account for these nuances of a building jeopardizes the life/safety the system is intended to afford.

**909.16.2 Smoke control panel.** "The fire fighter's control panel shall provide control capability over the complete smoke control system equipment... This includes stairway pressurization fans; ...elevator shaft fans and other operating equipment used or intended for smoke control purposes."

Section 909.16.2 specifically identifies fans employed for pressurization systems of Sections 909.20 and 909.21 as smoke control system equipment. Further, this indicates that the provisions of Section 909.16 are all applicable, and accordingly the provisions of Section 909.12 through 909.12.4 must also be applicable.

Further substantiation that stair pressurization systems were intended by ICC to be treated as smoke control systems prior to the revisions with the 2015 Edition is found in the 2012 Commentaries to the IBC. Attached is a highlighted selection of commentary with Section 909.20.5 which clearly indicates that smoke control provisions of Section 909 are applicable to stair pressurization systems.

**CONCLUSION**

Log Number B14-2018, "Stair-enclosure pressurization increase," reaches far beyond the allowance of IBC Section 504.4.1. The proposed language alters Section 909.6.3, eroding the level of life/safety intended with pressurized stairways, whether in a 5-story wood-frame building or 50-story high-rise tower. B14-2018 should be denied.

Prescribing that stairway pressurization systems comply with all requirements of Section 909 ensures consistent application of the applicable codes and standards by designers and code officials. This contributes to the reliability of the systems and maintains the level of safety intended by the code. Code changes in the 2015 Edition were made to clarify the minimum standard for safety and promote common and consistent application and enforcement of the applicable standards. The proposal erodes this progress and jeopardizes the level of safety currently assured. B14-2018 should be denied.

For the reasons presented in this letter, the Council is urged to deny B14-2018.

Please contact me at (425) 745-4700 or via e-mail at [BrianT@AEGISengineering.com](mailto:BrianT@AEGISengineering.com) for clarification or questions regarding the information presented in this letter.

Sincerely,

**AEGIS ENGINEERING, PLLC**



Brian C. Thompson, P.E

Attachments

cc: Doug Orth, Council Chair / [doug.orth@des.wa.gov](mailto:doug.orth@des.wa.gov)  
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## Code Change No: **F189-13**

### Original Proposal

**Section(s):** 909.6.3 (New) [IBC [F] 909.6.3 (New), IMC [F] 513.6.3 (New)]

**Proponent:** Bob D. Morgan, P.E., Fort Worth, TX Fire Department representing Fire Advisory Board to North Central Texas Council of Governments

**Revise as follows:**

**909.6.3 (IBC [F] 909.6.3, IMC [F] 513.6.3) Pressurized stairways and elevator hoistways.** When stairways or elevator hoistways are pressurized, such pressurization systems shall comply with Section 909 as smoke control systems, in addition to the requirements of the Building Code Sections 909.20 and 909.21.

**Reason:** Section 909.6.3 specifically requires that stairway pressurization systems must comply as smoke control systems. Currently, Sections 909.20 and 909.21 of the Building Code are not copied into the Fire Code, leading to inconsistency with regards to design and controls for such systems, as well as, uncertainty on the part of designers as to the appropriate authority with regards to such. These are complicated systems and involve coordination between fire alarm systems and mechanical components – such should be a coordinated effort between Building and Fire Code Officials.

**Cost Impact:** The code change proposal will not increase the cost of construction.

### Public Hearing Results

**Committee Action:**

**Approved as Submitted**

**Committee Reason:** The committee agreed with the proponent's reason statement that the code change provides needed correlation with the IBC.

**Assembly Action:**

**None**

### Final Hearing Results

**F189-12**

**AS**

to be available when all doors are closed. This pressure difference is lower than that required by the stair pressurization alternative. This would not be considered a pressurized stair. This pressure difference would need to be tested to obtain approval once constructed.

**909.20.5 Stair pressurization alternative.** Where the building is equipped throughout with an *automatic sprinkler system* in accordance with Section 903.3.1.1, the vestibule is not required, provided that interior *exit stairways* are pressurized to a minimum of 0.10 inches of water (25 Pa) and a maximum of 0.35 inches of water (87 Pa) in the shaft relative to the building measured with all *stairway* doors closed under maximum anticipated conditions of stack effect and wind effect.

- ❖ This method is allowed only when the building is fully sprinklered. This is partially related to the fact that these pressure differences were developed based upon a sprinklered fire. It should be noted that smokeproof enclosures are not required to be in fully sprinklered buildings, but the areas where smokeproof enclosures are required are often sprinklered buildings (i.e., high-rise buildings). This alternative would not require vestibules or an exterior exit balcony. The criteria for smoke control design is provided in terms of minimum and maximum pressure differences of 0.10 inch (37 Pa) of water and 0.35 inch (87 Pa) of water, respectively, between the shaft and the building. This pressure difference is to be achieved when all doors are closed and maximum conditions of wind and stack effect have been taken

into account. It should be noted that additional limitations may be placed on the maximum pressure differences for pressurized stairs due to the lower opening forces required in order to comply with Section 1008.1.3. If the maximum pressure difference of .35 would exceed the requirements of Section 1008.1.3, the maximum pressure difference would need to be lowered. Also note that Section 404.2.8 of ICC A117.1 would not require opening forces to be lowered for accessibility purposes if the door is a fire door. Finally, as with all other smoke control systems addressed in Section 909, such systems need to be designed through a rational analysis, tested and documented as such.

**909.20.6 Ventilating equipment.** The activation of ventilating equipment required by the alternatives in Sections 909.20.4 and 909.20.5 shall be by smoke detectors installed at each floor level at an *approved* location at the entrance to the smokeproof enclosure. When the closing device for the *stair* shaft and vestibule doors is activated by smoke detection or power failure, the mechanical equipment shall activate and operate at the required performance levels. Smoke detectors shall be installed in accordance with Section 907.3.

- ❖ This section clarifies that the activation mechanism for both mechanical means of smoke management for interior exit stairways in Sections 909.20.4 and 909.20.5 should be via a smoke detector located at each level outside the door leading into the vestibule and stairway, respectively. For systems that use automatic-closing devices on the doors, whether for vestibules in smokeproof enclosures or for pressur-

