**Code Amendment Proposal Form**
For public amendments proposed to the 2018 editions of the International Codes

**Instructions:** Upload this form and all accompanying documentation at www.denvergov.org/BuildingCode. If you are submitting your proposal on a separate sheet, make sure it includes all information requested below.

All proposals must be received by **May 10, 2019**.

---

**CONTACT INFORMATION**

Name: Yanxuan (Simon) Xie, P.E.  
Date: May 2, 2019  
Phone: 303-839-2969  
E-mail: sxie@swansonrink.com  
Organization: Swanson Rink Inc.

By signing below, I hereby grant and assign to City and County of Denver all rights in copyright I may have in any authorship contributions I make to City and County of Denver in connection with this proposal. I understand that I will have no rights in any City and County of Denver publications that use such contributions in the form submitted by me or another similar form and certify that such contributions are not protected by the copyright of any other person or entity.

Signature: 

---

**AMENDMENT PROPOSAL**

Please use a separate form for each proposal.

1) Code(s) associated with this proposal. Please use acronym: DBC-IFC

If you submitted a separate coordination change to another code, please indicate which code:

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Code Name</th>
<th>Acronym</th>
<th>Code Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>DBC-xxxx</td>
<td>Denver Building Code–xxxx (code) amendments (e.g., DBC-IBC, DBC-IEBC)</td>
<td>IFGC</td>
<td>International Fuel Gas Code</td>
</tr>
<tr>
<td>IEB</td>
<td>International Existing Building Code</td>
<td>IMC</td>
<td>International Mechanical Code</td>
</tr>
<tr>
<td>IECC</td>
<td>International Energy Conservation Code</td>
<td>IPC</td>
<td>International Plumbing Code</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IRC</td>
<td>International Residential Code</td>
</tr>
</tbody>
</table>

2) Please check here if a separate graphic file is provided: ☐

*Graphics may also be embedded within your proposal below.*

3) Use this template to submit your proposal or attach a separate file, but please include all items requested below in your proposal. The only formatting needed is **BOLDING, STRIKEOUT AND UNDERLINING**. Please do not provide additional formatting such as tabs, columns, etc., as this will be done by CPD.

**Code Sections/Tables/Figures Proposed for Revision:**

Sections 909.15.3, 909.15.4, and 909.15.5

**Note:** If the proposal is for a new section, indicate (new).

**Proposal:**

**Revise as follows:**

909.15.3 **Smoke exhaust** Floor depressurization systems.

909.15.3.1 Requirements. **Smoke exhaust** Floor depressurization system(s) shall be provided in high-rise buildings system to form a zoned smoke control scheme. The floor depressurization system(s) shall be controlled via the fire alarm system, to operate in conjunction with the other applicable smoke control systems for the building, in order to achieve the objectives as follows:

1. To maintain a zone of negative pressure in the fire floor (or smoke zone) relative to the other floors or adjacent smoke zones, means of egress stair enclosures and elevator lobby/refuge areas; and …
2. To maintain a maximum stair enclosure or smoke barrier door opening force on the fire floor or smoke zone in alarm. The prescriptive approach described herein is not intended to preclude the use of a performance-based smoke control approach, such as that defined by NFPA 92.

909.15.3.2 Configuration. **Smoke exhaust** Floor depressurization systems shall include motorized combination fire/smoke dampers or a motorized smoke and a fire damper on each floor of a multi-level building served by the system(s). The exhaust depressurization damper(s) in the fire floor smoke zone in alarm shall be commanded open, in order to exhaust depressurize that zone, and the **smoke exhaust** floor depressurization fan commanded to “ON”. The exhaust depressurization dampers in other smoke zones shall be driven to, or shall remain in, the closed position. The use of smoke dampers shall not preclude the provision of fire dampers, where required by other sections of this code. **Exhaust Depressurization** damper(s) shall be located within the upper third of the finish floor height.

909.15.3.3 Design criteria. The general building **smoke exhaust** floor depressurization system(s) for each floor/smoke zone shall be sized in accordance with the following:
1. The assumption that make-up air will be available to the smoke zone in alarm. When floor depressurization is activated, supply or makeup air is prohibited in the smoke zone in alarm.
2. The **smoke exhaust** floor depressurization system shall be sized to remove for a minimum of five air changes per hour on the fire floor in Occupancy Groups A, B, E and M or a minimum of 0.10 inch of water (25 Pa) to the adjacent floors that are not in alarm.
3. The **smoke exhaust** floor depressurization system shall be sized to remove for a minimum of 15 air changes per hour or a minimum of 0.10 inch of water (25 Pa) to the adjacent floors that are not in alarm in the typical floor corridors, the typical floor corridors/elevator lobbies, or the typical floor elevator lobbies in Occupancy Groups R-1, R-2, I-1 and I-3. Amenity spaces less than 3,000 sf in Groups R-1 and R-2 occupancies are not required to be provided with a separate **smoke exhaust** floor depressurization system.
4. That appropriate consideration shall be made for damper leakage on non-fire floors connected to a central riser system, when selecting the **smoke exhaust depressurization** fan(s).
5. **Smoke exhaust Floor depressurization** systems shall be in ducts constructed in accordance with Section 909.13.8.
6. The depressurization fan(s) shall be provided in accordance with 909.13.6.
7. The depressurization is not required for individual spaces that are not commonly occupied by multiple occupants.
8. The depressurization is not required for individual rooms that are protected by rated or smoke proof enclosures.

909.15.3.4 Operation. Upon activation of an automatic alarm initiating device as described in Section 907, the following smoke control sequence shall occur:
1. Turn off all supply and make-up air fans on the zone in alarm.
2. Open **exhaust** depressurization dampers on the zone in alarm.
3. Close smoke **exhaust control** dampers to all other smoke zones.
4. Close all supply air dampers to the zone in alarm.
5. Initiate stairway and elevator hoistway pressurization sequences in accordance with Sections 909.15.1 and 909.15.2.

909.15.4 Street level tenant exception. **Smoke exhaust** Floor depressurization and corridor/elevator lobby smoke control systems shall not be required to serve individual tenant areas or lobbies located on the level of building egress.

909.15.5 Small assembly areas or similar uses exception. **Smoke exhaust** Floor depressurization or corridor/elevator lobby smoke control system for assembly areas or similar uses 3,000sf (278m2) or less shall not be required when these areas are separated by smoke partitions constructed in accordance with IBC Section 710.

**Note:** Show the proposal using strikeout, underline format. At the start of each section, give one of the following instructions:
- Revise as follows:
- Add new text as follows:
- Delete and substitute as follows:
- Delete without substitution:

**Supporting Information:**

**Purpose:**
To clarify the intended use of the “smoke exhaust” system on a high-rise floor is to create the negative pressure zone of the floor of fire – or known as the zoned smoke control scheme. This approach is similar to the “sandwiched” system for high-rise building. The proposed approach aims to depressurize the floor with fire so that the floor with fire remain negative to the immediately adjacent floors. The proposed approach, however, does not seek for pressurizing the zones that are not in alarm and are adjacent to the zone in alarm. In this way, existing buildings and systems can match the proposed approach relatively...
easily; the proposed approach will not generate significant hardware changes for smoke control systems. Comparing to the current code language, this proposed changes will make the system align with the intended objective “To maintain a zone of negative pressure in the fire floor (or smoke zone) relative to the other floors or adjacent smoke zones, means of egress stair enclosures and elevator lobby/refuge areas”.

Reasons:
The intent of the zone smoke control scheme is to contain the smoke within the affected area and reduce the possibility that smoke can spread into other areas/zones.

The zoned smoke control scheme is not a smoke exhaust system used in an atrium – such smoke exhaust system is used to remove smoke so that the smoke layer is kept above a threshold height. Thus, makeup air is unnecessary and in fact it will work against the depressurization of the smoke zone. In addition, it is necessary to set up the pressure difference criteria so that the designers can design the system to meet a performance objective instead of just an experience-based ACH value.

Exhaust or depressurization methods will not be practical for small spaces that is largely separated from the majority of the floor space. For rooms that are already protected by rated or smoke proofed enclosures, providing exhaust or depressurization jeopardize the integrity of the rated or smoke proofed enclosure. These enclosures are provided in order to keep smoke and heat outside these rooms or contain smoke or heat within these rooms.

Substantiation:
The zoned smoke control is to “limit the extent of smoke spread beyond the smoke zone”¹. In fact, “it is beyond the capability of smoke control to make condition tenable in the smoke zone, and it is intended that occupants evacuate the smoke zone as soon as possible”¹.

Bibliography:

Note: This section MUST include these items:
- **Purpose**: State the purpose of the proposed amendment to physical, environmental and customary characteristics that are specific to the City and County of Denver (e.g., clarify the code; revise outdated material; substitute new or revised material for physical, environmental and customary characteristics; add new requirements to the code; delete current requirements, etc. to reflect physical, environmental and customary characteristics that are specific to the City and County of Denver)
- **Reasons**: Clearly justify the change to current code provisions, stating why the proposal is necessary to reflect physical, environmental and customary characteristics that are specific to the City and County of Denver. Proposals that add or delete requirements shall be supported by a logical explanation that clearly shows why the current code does not reflect physical, environmental and customary characteristics that are specific to the City and County of Denver and explains how such proposal will improve the code.
- **Substantiation**: Substantiate the proposed amendment based on technical information and substantiation. Substantiation provided which is reviewed and determined as not germane to the technical issues addressed in the proposed amendment shall be identified as such.
- **Bibliography**: Include a bibliography when substantiating material is associated with the amendment proposal. The proponent shall make the substantiating materials available for review.

Referenced Standards:
NA

Note: List any new referenced standards that are proposed to be referenced in the code.

Impact:
No gross increase or decrease of cost or rigorous using these new NFPA standards. Using these latest standards allow the building industry to advance to the latest best practices, which should generator a gross enhancement on fire life safety.

Note: Discuss the impact of this proposal in this section AND indicate the impact of this amendment proposal for each of the following:
- The effect of the proposal on the cost of construction: ☒ Increase ☐ Reduce ☐ No Effect
- The effect of the proposal on the cost of design: ☐ Increase ☒ Reduce ☐ No Effect
- Is the proposal more or less restrictive than the I-codes: ☒ More ☐ Less ☐ Same

Departmental Impact: (To be filled out by CPD staff)
Note: CITY STAFF ONLY. Discuss the impact of this proposal in this section AND indicate the impact of this amendment proposal for each of the following:
- The effect of the proposal on the cost of review:  □ Increase  □ Reduce  □ No Effect
- The effect of the proposal on the cost of enforcement/inspection: □ Increase  □ Reduce  □ No Effect