

DISCUSSION:

This proposal is to delete Denver's exception to IBC 705.8.1 since this exception is not related to any physical, environmental, or customary characteristics that are specific to the City and County of Denver. Furthermore, these amendments are less restrictive than the IBC, are not effective in preventing the spread of fire from an adjacent building, and there is no justification to reduce the requirements of the IBC.

Denver's current amendments allow the maximum area of exterior wall openings to increase for fire separation distance (FSD) of 5' to less than 15' where building is sprinklered and openings are protected with water curtains. The IBC limits openings to 25% and 45% for this same range of FSD and does not allow an increase for water curtains. Denver's current amendment effectively replaces a required fire-resistance rated exterior wall with an opening with water curtains, which is in direct conflict with IBC 703.2 which requires fire-resistance rating to be achieved without the use of automatic sprinklers or any other fire suppression system being incorporated (unless approved through the alternative materials, design and methods section). The code requires both passive and active protection against fire and it is generally not acceptable to replace passive protection with active protection since it is not as reliable. Furthermore, water curtain sprinklers have no listing or testing to be used to prevent exposure fires from adjacent building, so their effectiveness is in question for this use.

Water curtain protection may be effective in preventing the spread of fire from the building under consideration to an adjacent building since the sprinkler system would be activated where the fire originates and would presumably be controlled at the place of fire origin. However, the water curtain protection is not effective in preventing spread of fire from an adjacent building into the building under consideration. When the FSD is less than or equal to 10', IBC 705.5 requires exterior walls to be rated for exposure to fire from both sides. IBC 701.1 also indicates that the provisions of Chapter 7 are intended to safeguard against the spread of fire to and from buildings (as well as spread of fire within a building).

In the case of a fire in an adjacent building, the radiant heat from the fire would have to breach the windows and ignite a fire within the building under consideration for the water curtain sprinklers to be activated. The fire in the adjacent building could easily be along the entire length or height of the building which would cause this scenario to occur at multiple openings along the length and height of the building under consideration. In this case, the sprinkler system would be overwhelmed since the hydraulics of these systems are only designed to control a fire at the place of fire origin. For example, in an office building, the sprinkler system is typically designed for activation of sprinkler heads within a design area of 900 SF (30'x30' bay), which only translates to approximately 30' length of wall with water curtain sprinklers. As more windows are breached along the length or height of the building due to an adjacent building fire, the system would not be able to respond due to the hydraulic limitations and fire would spread throughout the building without protection from a sprinkler system. In contrast, the passive protection of a fire-resistance rated wall, in lieu of sprinkler protected openings, would prevent the spread of fire to the building under question. The 2018 Denver fire shown below, or any similar fire, would certainly overwhelm any sprinkler system in an adjacent building:



Note that this proposal will not affect existing buildings that have used the previous amendment with water curtain protection. Where a change of occupancy is made to an equal or lesser-hazard category, IEBC 1011.7.2 requires that existing exterior walls and openings to be accepted. Where a change of occupancy is made to a higher-hazard category, IEBC 1011.7.1 requires exterior walls to have fire resistance and opening protectives as required by the IBC; however, IEBC 1011.7.3 allows protected openings to be up 50% of the total wall area, which is the same as the previous amendment. Also, the exception to IBC 705.8.2 allows water curtain protection to be used in lieu of opening protectives, so water curtain protection would still be considered to be a protected opening.

HISTORY:

A review of previous Denver amendments reveals that this 50% opening limitation with water curtains originated in the 1993 Denver amendments to the 1991 Uniform Building Code and has been carried forward since. The 1991 UBC exterior wall

opening requirements simply had distances where openings were not permitted, where openings had to be protected with a 50% limitation, and where unlimited unprotected openings are allowed. Denver's 1993 amendment allowed sprinkler protection instead of ¾ hour protected openings but did not have the 50% limit since this was part of the base code. With the introduction of the I-codes, the opening limitations for exterior walls changed dramatically and have been refined to have many different limitations on percentage of openings allowed, and these changes account for the latest research and have been approved through the ICC consensus process. However, Denver amendments to the I-codes carried forward the single 50% limit with water curtains from the amendments to the UBC.

SUMMARY:

The water curtain allowance in Denver's amendments to Table 705.8 is less restrictive than the IBC, is not effective in preventing spread of fire from an adjacent building into the building under consideration, and there is no justification for Denver to have opening requirements that are different than the IBC, especially considering the IBC has multiple opening percentages instead of the single 50% limit in the UBC that these amendments originated from.

Bibliography and Access to Materials (as needed when substantiating material is associated with the amendment proposal):

1. *1991 Uniform Building Code*, as published by International Conference of Building Officials
2. *Amendments to the 1991 Uniform Codes of the International Conference of Building Officials (ICBO) for the City and County of Denver*, as published by the City and County of Denver

Other Regulations Proposed to be Affected

***For proposals to delete content from the 2019 Denver Green Code in conjunction with adding it to other mandatory Denver codes and/or regulations, only.**

Please identify which other mandatory codes or regulations are suggested to be updated (if any) to accept relocated content.

Referenced Standards:

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

None.

Impact:

How will this proposal impact cost and restrictiveness of code? ("X" answer for each item below)

Cost of construction: Increase Decrease No Impact

Note: This proposal could increase or decrease cost of construction depending on the situation. If an opening without a window (like a garage opening) needs to be replaced with a fire rated wall, cost will increase. If an opening with a window is replaced with a fire rated wall, cost will likely decrease since glazing typically is more expensive than wall construction.

Cost of design: Increase Decrease No Impact

Restrictiveness: Increase Decrease No Impact

Note: This proposal increases restrictiveness relative to the 2019 DBC, but is the same restrictiveness as the 2021 IBC (i.e. no impact)

Departmental Impact (City use only):

This amendment proposal increases/decreases/is neutral to the cost of plans review.

This amendment increases/decreases/is neutral to the cost of inspections.