Code Update: What Architects Need to Know About AC 385

In February 2015, the ICC-ES Evaluation Committee agreed to adopt a modified AC 385 which allows an exemption for "special-purpose sprinklers used with fixed glass assemblies" as fire barriers in exit passageways, horizontal exits or exit enclosures when the fire area is fully sprinklered, and if the use is approved by an AHJ as described in Sections 104.10 and 104.11 of the IBC 2012. Before rushing out to specify fixed glass assemblies with special purpose sprinklers in lieu of fire resistant glass, there are important issues that every architect and specifier need to consider.

AC 385 Explained

The ICC-ES first adopted AC 385 in October 2007 at the behest of a major manufacturer of sprinkler heads. In 2011, the ICC-ES Evaluation Committee issued a memo to withdraw its Criteria for this alternative in lieu of building materials tested to ASTM E-119. The 2012 IBC (Section 703.4) specifically states that the "fire-resistance rating of a building element, component or assembly shall be established without the use of automatic sprinklers or any other fire suppression system being incorporated as part of the assembly tested in accordance…[with] ASTM E 119 or UL 263." Click here to read more about the origins of AC 385.

AC 385 was revised in February 2013 to try to extend the exception for use the fixed glass assemblies with special purpose sprinklers, but prohibit their use in lieu of firewalls and fire barriers (Section 5.1.11). In October 2014, a proposal to allow this alternative to be used as internal fire barriers or exterior walls was defeated. In February 2015, a new modified AC 385 was adopted that reauthorizes the use of this alternative as a fire barrier.

AC 385 Requires Prior AHJ Approval

Using special-purpose sprinklers in lieu of fire resistive glazing assemblies requires prior approval from the authority having jurisdiction. Section 104.10 of the 2012 IBC clearly addresses that a waiver of code requirements is to be considered "Wherever there are practical difficulties involved in carrying out the provisions of this code, the building official shall have the authority to grant modifications for individual cases, upon application of the owner or owner's representative, provided the building official shall first find that special individual reason makes the strict letter of this code impractical and the modification is in compliance with the intent and purpose of this code and that such modification does not lessen health, accessibility, life and fire safety, or structural requirements."

It would be helpful to know what typical practical difficulties exist that would justify the implementation of AC385 given that fire rated glazing and framing systems are readily available, less costly, and fully code compliant. Neither supportive submittal mentioned any specific practical difficulty being overcome by virtue of AC385.

AC 385 Does Not Address Sprinkler Failure

Fact is, sprinklers can and do fail. According to NFPA's Report U.S. Experience with Sprinklers in June 2013, "Sprinklers operated in 91% of all reported structures large enough to activate sprinklers… When sprinklers operated, they were effective 96% of the time, resulting in a combined performance of operating effectively in 87% of all reported fires where sprinklers were present in the fire area and the fire was large enough to activate them."

In the same NFPA report, majority of sprinkler failures (where sprinklers did not activate at all) occurred because the system was shut off, and that majority of sprinkler ineffectiveness (where sprinklers activated but were not effective) was because water did not reach the fire or not enough water was released. This could be caused by a number of factors, including manual tampering, lack of maintenance, low water pressure or damage to the system, which is a real possibility during natural disasters such as earthquakes. FM Global reported "sprinkler system breakage puts your fire protection out of service at the time that you need it the most. After an earthquake, the threat of fire is greater due to the increased presence of ignition sources and, at some facilities, flammable material releases."

So in the case of the alternate glazing system covered by AC385, its potential effectiveness is entirely dependent on 100% sprinkler reliability and effectiveness, which doesn't exist because as the NPFA report demonstrates that potential for failure is always present. On the other hand, fire resistive glazing assemblies provides built-in life and property protection 24 hours a day, 7 days a week without the mechanical triggers that sprinklers need, which makes it 100% reliable, effective and virtually maintenance-free.

AC 385 Does Not Protect From Radiant Heat

The most important benefit of incorporating fire resistive glazed assemblies is the fact it is best defense against dangerous radiant heat, invisible electromagnetic waves that travel at the speed of light with little resistance. When these waves strike an object, they are absorbed and their energy is converted to heat. If the object is a combustible material, a fire will start when the material´s ignition temperature is reached. Radiant heat is extremely dangerous to building occupants since it can quickly reach a level that causes unbearable pain, followed rapidly by second degree burns, preventing safe egress.

AC 385's alternate glazing assembly incorporates non-rated glazing and a mechanically-triggered water curtain delivered by special purpose sprinklers. When the sprinklers fail to operate, the non-rated glass will be useless in preventing fire, smoke and dangerous radiant heat. In contrast, fire resistive glazed assemblies are tested and certified to meet ASTM E-119, do not need mechanical triggers and readily available without needing prior AHJ approval.

AC 385 Has Hidden Costs

Like most decisions related to construction materials, cost could be one contributing factor why a designer might opt to pursue AHJ approval for
Special purpose sprinklers with fixed non-rated glazing instead of a listed and labeled fire resistive glass assembly. Before assuming that AC 385 is a cheaper solution, here are some things to consider. The cost of design and installation of these special purpose sprinklers and non-rated glass assemblies is just one aspect. There are costs during the life of the building related to sprinkler maintenance, construction and upkeep of water mains to sustain water pressure in the special purpose sprinkler pipes and pipe maintenance. Finally, there are costs associated with loss of life and property in the event of a fire where the sprinklers fail to activate and radiant heat transmission is not controlled.

Design Considerations

Last but not least, there are design elements and aesthetics that architects need to consider. Here is an example of what AC 385 looks like after obtaining AHJ approval:

Here's what an ASTM E-119 rated, listed and labeled fire resistive glazed assembly looks like, without having to obtain AHJ approval:

ASTM E-119 rated SuperLite III-XL Butt-glazed in GPX Architectural Series perimeter framing.

As you can see, using fire resistive glazing eliminates the need for unsightly pipe fixtures and sprinkler heads directly above the glass. Fire resistive glazing also allows for floor-to-ceiling and wall-to-wall expanses of glass, with butt-glazing as an available option as well.