

# Substituting products is recipe for disaster

by James Shriver

*One chef to another: This recipe comes from a chocolate company and they want you to use their brand of chocolate chips, but the store brand works just as well. And when the recipe calls for butter, I use margarine. It still tastes great!*

Substitutions may work fine for cooking, but substitutions made in construction systems for Life Safety can be a recipe for disaster. This is especially true when it comes to curtain wall and safing insulation for high-rise buildings.

Insulating the exterior curtain walls and the perimeter void at the floor slab of high-rise buildings is more than a temperature control and energy saving issue, it's a life safety concern of the highest magnitude. Substituting one insulation product for another or mixing tested design

systems can make the difference between a fire containment system that works and one that doesn't.

## **Building perimeter life-safety insulation systems**

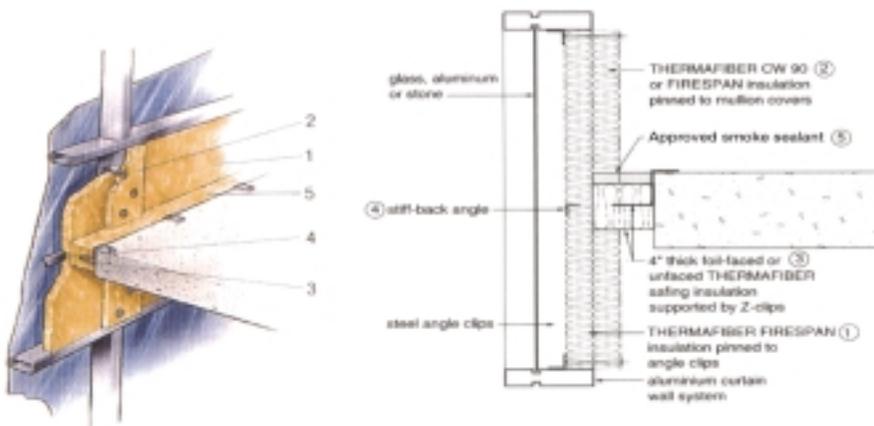
Mineral wool curtain wall insulation is installed on the interior side of the spandrel panels that make up the exterior envelope of a building. The principal role of the insulation is to protect curtain wall components in the event of fire so that the integrity of the structure can be maintained. The mineral wool curtain wall insulation works as a fire barrier, shielding aluminum, glass, steel framing and other curtain wall components from the high temperatures of the flames and hot gasses. It prolongs the time period before any melting, disintegration or combustion of components can occur.

Equally important is the safing insulation that is compression fit into the perimeter between the floor slab and insulated curtain wall spandrel panels, forming a continuous fire barrier at the building perimeter. Once installed, seams formed by the abutment of the safing to both the floor slab and the curtain wall insulation on the spandrel panel must be sealed

with an approved smoke barrier.

Correctly installed safing and curtain wall insulation keeps flames and hot gasses from passing upward between the floor slab edge and the curtain wall spandrel panels. Once that barrier is breached, combustibles on the floor above are ignited, causing significantly more property damage and further compromising the life safety of occupants, firefighters and other emergency responders.

Tested and approved systems that incorporate both curtain wall and safing insulation do an excellent job of confining fire to the room of origin. The more successful the structure is at containing the fire, the better opportunity firefighters and other emergency responders have to successfully extinguish the blaze and



## Substituting products

evacuate personnel. Designed systems are tested by Omega Point Laboratories and Underwriters Laboratory Inc. plus a variety of other construction engineering and testing services. Test results, system components and system construction guidelines are readily available from either the independent testing laboratories or the product manufacturer.

### **Component compatibility**

A critical factor in assuring the insulation system's integrity is to make sure that both the safing insulation and the curtain wall insulation have the same composition and density as was tested in the system being installed. Any mismatch in this regard encourages the fire to find the path of least resistance and causes a breakdown in the perimeter fire barrier system.

Mineral wool insulation is one of the highest heat resistant insulations on the market today. Systems tested with mineral wool insulation have sustained temperatures of 2,050°F for several hours, typically resulting in discontinuation of the test or total consumption of the fuel load before any breakdown in the system occurred. By contrast, glass fiber insulation melts at about 1050°F, resulting in system failure less than 15 minutes into the test. Cellulose insulation pyrolyzes at around 450°F.

While the comparison between mineral wool and glass fiber insulations is dramatic, it is equally important to recognize that differences in the densities of mineral wool insula-

tion used for the curtain wall panels and/or the perimeter void can eventually result in the same type of system breakdown. Curtain wall insulation blankets range in density from 4 pounds per cubic foot (pcf) to approximately 8 pcf, and may vary in thickness. Using insulation, even mineral wool insulation, that is lower in density than specified in the tested system will void the fire integrity rating of the system. System performance is only as good as the lowest rated component.

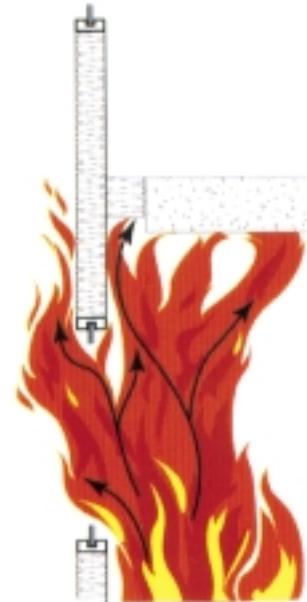
### **Restricting smoke passage**

Finally, attention must be paid to the smoke sealant used to create the smoke barrier over the safing insulation between the edge of the slab and the curtain wall insulation. Caulks and sealants that are useful for sealing cracks and openings for other construction areas simply will not work for sealing the perimeter joint. Many of the common sealants become brittle over time, presenting new cracks where smoke may pass through. Others, while flexible, do not have the heat resistance required to maintain a firm bond between the two materials. Only compounds and adhesives that are specifically designed for this purpose can be used.

No matter what fire integrity rating is prescribed, curtain wall life safety insulation systems are very specific. And unlike cooking recipes, these specifications must be adhered to for the systems to perform as designed.



Spread of fire (unprotected)



THERMAFIBER Fire Containment (protected)

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*Thermafiber Mineral Wool Insulation is manufactured in a variety of densities to meet specific fire protection and sound control needs. In addition to the Thermafiber Curtain Wall Insulation and Thermafiber Safing Insulation required to safeguard high-rise curtain walls and floor slab perimeters, the company also manufactures sound attenuation fire blankets, blowing wool and a variety of specialized insulation products.*

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