

Subject: Building Enclosure News #12

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Hi all, Richard here ...

As I know you're interested in Building Envelope issues, I'm sending you my "monthly" newsletter. As always, I'd be glad to discuss your concerns and comments on these issues.

Tip of the Month:

In the last issue I am attached curtain wall details that have now been posted on the Building Envelope Design Guide (http://www.wbdg.org/design/env_fenestration_cw.php) which are part of the Whole Building Design Guide (www.wbdg.org). Absent from those details were spandrel or shadow-box details. The reason for their absence is the tricky nature of how to accomplish such details. My recommendation, based on a lengthy discussion amongst the several experts whom I respect, excerpted below, is to avoid the use of shadow boxes (unless you have engaged a curtain wall consultant who advises that it can be done for the specific project; indoor relative humidity levels, outdoor climate, and specific details are very relevant). For spandrel panels, I have attached a detail that could be the basis of your design for a climate such as Boston. It should be reviewed with your curtain wall manufacturer for condensation, and other issues, such as the materials used for sealants (off-gassing can be a problem), the specific profiles, the indoor relative humidity for the project, etc.

The excerpted discussion regarding shadow boxes:

Opinion No. 1: I agree that shadow boxes are problematic and there is no single answer to the problem. Like many other design problems, the climate, the orientation, the materials all make a difference. In relatively cool climates with clear glass and reflective surfaces inside the shadow box you can probably get away with sealing the air space and not have the glass get too hot. If it is somewhere sunny and you have dark surfaces inside the shadow box then you better vent the air space or else the glass might break from the high temperature. Verify with the glass manufacturer. With filters in the vents I haven't noticed dirt build up problems but I agree I don't like that aspect. For either condition but especially for the vented air space type, the air space should have at least 1/2 inch of insulation separating it from the sides of the surrounding mullions or else you can conduct temperatures cold enough to cause condensation or hot enough to be uncomfortable onto the opposite side of the mullion. I've attached my current favorite detail [I have attached it, with attribution removed]. Note that the vapor barrier goes from the back of the glazing pocket, down the side of the frame and then across the galvanized back pan (sorry I left out some sealant

around one of the shim packs). The air barrier follows the sloping extrusion and back pan. I also try to get the insulation space vented if I can. Finally, be careful with sealants inside the shadow box, I have heard the extra heat can cause them to give off VOCs which create a foggy coating on the inside of the glass. Of course, on any particular project all of the fine points change.

Opinion No. 2: [We] typically require a shadow box complete with specified glass, 1/8 in. (3mm) thick aluminum back panel, foil faced curtain wall insulation and 1/16 in. (1.5mm) thick galvanized steel insulation back panel cover. [Our] building that I am presently sitting in used a stainless steel cw and shadow box (very nice). The attached file from Viracon may also be helpful to you [I have attached it]. [I can't read the drawing; I don't have AutoCAD].

If considering a patterned frit, read the part in the attached Viracon piece about moire patterns.

I was at Architectural Testing in York, PA a couple of years ago and they were doing this huge test of about 50 or more different shadow box designs. Research type testing. I have maintained contact with the person that I met there, but have not been able to obtain any of their results.

The current edition of Architectural Graphic Standards says the following (an excerpt): As opposed to spandrel areas, the cavity inside the shadow box is typically vented and weeped, but there are differences of opinion among experts and manufacturers regarding venting of the cavity. Vented airspaces shift the thermal enclosure to the back of the curtain wall and may result in thermal short circuits and uncontrolled condensation; and, in time, the inside surface may get dirty. Un-vented shadowboxes may overheat, especially with clear glass. Note that heat within the shadow box cavity can cause off-gassing of sealants and plastics...and may deform composite materials and insulation.

In summary, I recommend that you avoid shadow boxes if at all possible. If you must use them, obtain the advice of a consultant who specializes in curtain walls and of the manufacturers of the glass and of the curtain wall. Even spandrel panels with the spandrel glass as shown in the attached detail maybe subject to some of the same concerns. If risk-averse, just use insulating glass with spandrel glass on the inside an low-e glass on the outside. You won't get the energy-savings that you get with the attached detail. I'm afraid that I can't give any more concrete advice than that.

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Richard



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