BY TED CUSHMAN

Insulating Parapets and Balconies

Effective high-performance building envelopes are challenging enough in spread-out suburban areas where low-rise wood-frame construction is the norm. But designing and building a high-performance building shell is even tougher in the context of dense urban infill, where projects commonly stand shoulder to shoulder and strict fire codes are in force. Builders working in older urban areas can learn a lot from the experience of New York City's Passive House community.

As it turns out, builders in New York City will have to step up their building-performance game this year as the city implements its 2020 building energy code, which takes effect in May. In a bid to hit toughening carbon standards, New York City is making its code stricter. Two noteworthy aspects of the new code are tougher insulation standards for balconies and for parapets (elements that are common in low-rise and mid-rise buildings in the city). The new code specifies that both balconies and parapets have to be continuously insulated.

What does that mean in practice? To find out, *JLC* got in touch with architect and Passive House consultant Ed May of bldgtyp in Brooklyn, N.Y. May has extensive experience with Passive House projects in the city, many of which have involved insulated parapets and balconies. May was also involved in the code development process, helping city code officials figure out what sort of requirement would be feasible in the field.

The significance of parapets and balconies "changes dramatically as you move towards higher-performance construction," May explains. "In a low-performance concrete building with no insulation, a concrete balcony or a concrete parapet doesn't have much effect. Because the whole building is not very good, those isolated disruptions don't make much difference. But as the building code has started to improve things like insulation levels, airtightness, and the rest, all of a sudden these weak spots become really impactful."

Photo: Ted Cushman/JLC

Parapet walls for low-slope roofs can be insulated with a rigid-foam wrap that integrates into the wall insulation and the roof insulation of the building, as shown here in a Passive House project from 2016.

"We find that they matter in two different places," May says. "They certainly matter on the energy side. If you have a really well-insulated building, but you have a bunch of uninsulated slab edges or parapets, all of a sudden those matter a great deal. But much more importantly, we have found that if you don't pay attention to them, you end up with cold spots on the interior of the building. And anywhere that you have a cold spot, you have moisture. And so you have mold, and you have discomfort, and you have potential condensation issues."

Downsizing the heating equipment—part and parcel of creating high performance—affects the equation, May explains. "We don't put giant radiators in buildings any more. As we

The Isokorb thermal break from Schöck creates an insulated structural connection between a balcony and the main floor slab of the building. The engineered connection is installed before concrete is poured, and it's integrated into the rebar mat of the slab.

minimize the heating system, we have to be careful about passively insuring against any mold or moisture damage in the envelope of the building, because we don't have these gigantic, oversized heating systems anymore in these buildings to combat those problems."

Insulating parapets. For parapets, says May, the go-to solution is a relatively straightforward insulation wrap. "In New York, you've mostly got concrete-masonry-unit construction, and so you're going to have a parapet that in most of our projects is going to be built of three or four courses of CMU," says May. "And if you're doing an exterior insulated building, you just take that insulation and run it right to the top of the parapet, over the top of the parapet, and then down the inside face of that parapet, so that it connects to the roof insulation. (We try to do exterior roof insulation on every project that we can.)"

It's simple enough, says May, "but the complexity comes in things like 'OK, how do I mount a handrail bracket, or how do I mount my parapet cap? How do I mount a satellite dish?' So often we're doing a layer of either plywood or some sort of topping board in order to cover that insulation, and that gives you something to attach to." The plywood is adhesively applied to the exterior insulation, which is itself adhesively applied to the CMU wall, May says.

Heavier items such as satellite dishes may require pre-positioned blocking, says May. "It's like doing kitchens," he says, "where you build with an eye towards hanging cabinets. You put blocking where you need it. You build out the structure in a way that you can fasten those components later on. But you need to plan for it ahead of time."

Isolating balconies. Decks in a low-rise wood-frame building are simple enough to isolate from the main building, simply by constructing a freestanding self-supported platform. But cantilevered balconies in typical urban concrete buildings are a more difficult problem. In theory, you could wrap insulation out over the balcony, down the front, and under the underside, but May says that approach is problematic. "There are huge waterproofing issues with that, never mind the basic threshold issues." Instead, May prefers the approach of isolating the balcony from the main structural slab using a premanufactured insulating component such as Shöck's Isokorb or Halfen's HIT. These components are designed to be installed at the floor slab edge before concrete is poured. They consist of an insulating foam core, stainless steel rebar, and a concrete or steel bearing surface. "The companies make many lines of product," says May. "You just have to find the right one. The different prices and capacities will depend on the situation."

"The stainless steel rebar is still a thermal bridge, but it's much less conductive than mild steel," says May. "It's not perfect. It doesn't eliminate the thermal bridge entirely. But it does a good job—certainly good enough that we don't worry about things like surface temperature or condensation or mold growth."

The technique is far from a no-brainer, says May. "It has to be done by a structural engineer. It has to be specified carefully, and the team has to understand the install details, to tie in the stainless steel to the rebar mat of the main building. So it's certainly not something you would slide into the plan five minutes before you build. But it's definitely doable, and we've done it on quite a few projects."

Evolving codes. Going forward, May expects to see the city's code sharpen its focus on thermal bridges. "I think in the next couple of code cycles, they'll start to introduce limits on it. I think first they will be loose limits, and then the code cycle after that, they'll start to be really intense limits. I think that's the trajectory that we're on."

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Photo courtesy Schöck North America