

Working From the Outside In

High Rise Residents Look Out on Mold Remediation

By Peter Sierck, an industrial hygienist and the director of Environmental Testing & Technology Inc. He participated in the development of the IICRC standards S500 for professional water restoration and the S520 for professional mold remediation. Peter can be reached by e-mail at PSierck@IAQsurveys.com.

The mild climate in Southern California invites retirees from all over the United States and Canada to spend their golden years under the warm and ever-present sunshine of the Pacific coast. Upscale retirement communities can be found embracing their own golf course or as high rise condominiums with an ocean view.

This particular high-end, 21-story condominium had chronic water intrusions, which triggered a lawsuit with an extensive discovery phase. The investigation identified water intrusions through the exterior wall assembly, windows, sliding doors and decks. The building envelope consisted of an exterior insulation and finish system (EIFS). An EIFS is made up of sheets of polystyrene foam (styrofoam) glued to exterior drywall sheathing and then sealed

with co-polymer coating on the outside. No building paper or interior drainage plane is present in this type of assembly.

Once a monetary settlement was reached, the repair process began. The remediation plan required the removal and replacement of the entire building envelope, all windows and glass sliding doors, the deck membranes and flashings. However, the relocation costs for the residents were estimated at about \$9 million. To save the cost of relocation, an innovative approach to allow the residents to stay in the units while work was developed. We termed this process “working from the outside in.”

Containing the Building

The work plan consisted of building an exterior containment around the structure that was negative pressurized in relationship to the interior residential units. This allowed removal of the exterior sheathing and the inspection of interior drywall from the outside (exterior containment). Local interior containments were built where interior drywall needed to be removed. The containment was tested upon completion of the local remediation. However, a number of engineering challenges had to be solved.

The project was divided into seven phases with three floors per phase beginning at the penthouse level. “Trigger points” as to when interior materials need to be removed and what constituted successful post remediation verification were determined.

First, the structurally-engineered scaffold system around the building was erected. Steel beams and columns were installed to transfer the structural loads through administrative offices and two levels of park-



To save the cost of relocating residents, the remediation crew created a negative-pressurized containment around the exterior of this condo.

ing garages down to the bottom slab.

The scaffolding was shrink-wrapped and 24 HEPA-filtered negative air machines were put in the exterior containment under negative pressure, creating between 30 and 40 air exchanges per hour. This assured a managed airflow from inside the residential condominiums to the exterior containment and dilution ventilation for the exterior containment.

Workers then started to cut and remove the EIFS paneling 450 feet above ground level. Initially, a pressure differential of minus 12 to 18 Pascal was achieved. However, once large sections of exterior sheeting were removed, the negative pressure dropped significantly. The negative pressure was monitored 24/7 and recorded with a digital manometer with an alarm feature that announced any critical pressure drop below 5 Pascal.

After initial debris clean-up, the interior drywall was inspected for visible mold growth. Astonishingly, very little damage was detected on the interior drywall. That was good news because unique built-in bookshelves, hand-milled baseboards and expensive wallpaper complicated remediation of the interior.

Up and Out

The new doors and windows arrived next and were installed on the penthouse level. The units were inspected and water tested—and we found that they did not fit properly and were leaking. They went back to the manufacturer for design changes. Meanwhile, the mold remediation work continued into the next phases, making its way down the high-rise.

Scaffoldings were constructed to bear a specific load. The top of the scaffold was scheduled to be dismantled upon completion of the installation of the windows and reconstruction of the exterior building envelope. However, at phase 4, the scaffolding reached its maximum approved load capacity and the entire mold remediation project came to a full stop.

By then it was late summer, with the winter and the possibility of rain storms was fast approaching. The recently-remediated elevations of the building that did not have a repaired exterior wall assembly and were protected by the shrink-wrapped scaffold only would be very vulnerable to further water intrusions. Everybody was waiting for the arrival of the new refitted windows. Two month went by before they finally arrived.




The remediation of this condo offered several challenges, including construction of an exterior containment system upon 21 story scaffolding.

Modifying the System

Engineers concluded that an EIFS cladding system needed to be reinstalled, as a stucco system would exceed the structural load capacity of the structure. To prevent future mold growth, a modified drainage plane EIFS system was designed. This new “waterproof” assembly consisted of:

- use of exterior glass-mat gypsum sheeting to eliminate the mold growth-supporting cellulose nutrient source (paper);
- application of a primer to provide an adhesive coating for the bitumen membrane;
- application of a self-adhering bitumen membrane to provide a drainage plane;
- installation of an expanded metal lath system to provide drainage channels; and
- foam board, taping, a base coat and color finish coat.

Finally, the scaffolding was removed from the top levels and hope rose that the project would conclude before the year's end. Three months later, eighteen months after the project began, the last interior containment was cleared and in early spring, all repairs were completed.

Overall, only relatively small amounts of mold damaged interior drywall were detected and removed. The project cost stayed within its \$11 million budget using the innovative exterior containment concept. The new modified drainage plane EIFS building envelope is now a very reliable cladding and rain water management system. 

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