

► Moisture Intrusion Into Stucco Walls

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Moisture intrusion into building walls in wetter climates has become a growing concern. The results can be damage to framing components, either wood or steel, and potential of mold forming in the walls or the batt insulation. Many of these buildings have stucco cladding, and stucco has been scrutinized as to its contribution to the problem.

Although it was found that stucco could exacerbate the water problems, through poor stucco application or cracking, the general findings were:

- Source of moisture was rainwater and poor management of the rainwater, rather than interior moisture or condensation.
- Design of walls and buildings has evolved with time to reduce drying potential of walls. This is due to increased levels of insulation and increased air tightness – both of which reduce the drying potential.
- Change in materials that are less durable – use of OSB sheathing rather than plywood, use of spruce pine-fir as compared to Douglas fir.
- Poor detailing and flashing allowing more incidental moisture to ingress behind the stucco cladding.
- Growing use of plastic housewraps as compared to asphalt building paper. It has been found that stucco adheres to the housewraps and does not permit unrestricted drainage.

A number of solutions and better practices have evolved in recent years to overcome these shortcomings. These generally consist of:

- Introduction of drainage mats or rain screen cavities in high rainfall regions. These methods create unrestricted drainage as well as enhanced drying.
- Better understanding and practices of flashing and sealing at critical locations such as penetrations (window, doors, vents, etc), balconies and decks, parapets.
- Use of double weather resistant barriers (WRB) to provide bond break between stucco and second layer of WRB. This practice is now stipulated in some building codes.

However, there are other stucco construction details that are still thought that may contribute to potential moisture entry into walls. One of these questions is the potential that moisture can penetrate the WRB around fasteners utilized for lath attachment.

With open framing, this potential is certainly possible. If a fastener misses the framing, water intrusion around that fastener is then possible. This can occur with staple fastening, where the lather doesn't have a direct feel for exactly where the framing member is, and possibly one leg of the staple misses.

(Continued-2)

Lathers and inspectors inspect the interior and look for these "shiners" (daylight shining through the wall). These locations are caulked and sealed to prevent possible moisture ingress at some point after building is finished. To prevent "shiners" from being created in the first place, some specifiers and designers require hand nailing of the lath. This provides higher assurance that the lather will not miss the framing, and reduces the number of penetrations in half as compared to staples. Others specify the use of furring nails where the furring wad is felt to create a compressive seal at the fastener location.

Structa Wire Corp has undertaken extensive water testing of stucco panels constructed with various methods to evaluate potential to water intrusion at fastener locations. The various combinations that were evaluated were wood and steel framing; open framing and sheathed construction; OSB and Densglas sheathing; asphalt paper (30 min and 60 min), Tyvek, and trowel on WRBs; welded wire laths, expanded metal lath, woven wire lath; staples, roofing nails, screws, and furring nail fastener types.

The test methodologies started with ASTM E-1105 "Standard Test Method for Field Determination of Water Penetration by Uniform or Cyclic Static Air Pressure Difference" protocols. Initial tests were conducted with spray racks applying water to front surface of the stucco panels. However, it was found that very little moisture penetrated the stucco and indication of moisture was not observed on back face of the panels. A more severe test methodology was developed whereby measured quantities and rates of water were introduced at the top of the panels between the stucco and the WRB. Moisture indicator paper had been applied under the WRB and the framing was enclosed with Plexiglas so that negative pressure could be applied. With the Plexiglas, it was possible to observe the back side of the wall for indication of moisture.

Summary of findings:

The tests were run for one half hour. When 30 minute asphalt building paper was utilized, some indication of moisture was observed in the areas between framing. In all of the combinations, there was no evidence of water penetration at the fastener locations.

When the sheathed test panels were examined, no moisture was seen at the backside at the framing or between framing members. When walls were taken apart and examined, it was found that furring wads had absorbed moisture. With continued exposure, these wads would deteriorate and the lath would no longer be securely held in place.

Therefore, we have concluded that properly applied fasteners into framing, even staples, are not the likely cause of moisture penetration through the WRB. Under severe test conditions, it was found that the hold out resistance of the WRB itself would most likely be exceeded and be the failure mode.

Structa Wire Corp. concludes that the risk of water entry can be minimized with proper flashing and sealing details as well as the utilization of a bond breaker to provide a drainage plane.