Evaluating Stucco

David Tamny, ASHI Certified Inspector

The problems with stucco have been well-documented for years. Lawsuits involving Exterior Insulation and Finish Systems (EIFS) have been common knowledge among the home inspection community for years. Here in the Columbus, Ohio, area many homes are traditional three-coat plaster stucco or one-coat stucco.

Most home inspectors are ignorant of the problems that are occurring in high-priced subdivisions here in our market. I used to believe that we simply didn't have problems with traditional three-coat exterior plaster stucco until I saw a video by Ram Builders in Utah titled "What's Happening Behind Your Stucco." Now, I believe that the amount of homes with extensive rot and mold concealed within the walls is substantial. When problems occur, they are generally undiscovered until they become so extensive it is no simple matter to repair them.

Traditional three-coat stucco is a mixture of Portland cement, lime and sand. It is generally applied over some type of sheathing material such as plywood in older applications. More recently, foam sheathings are used as well as OSB (oriented strand board) or waferboard. OSB is an engineered wood product formed by layering flakes of wood in different orientations. A water resistive barrier is applied over the sheathing. Traditionally, this has been 15-lb asphalt-saturated building paper, but now products such as Tyvek® are being used. Corrosion-resistant wire lath is attached to the structure. This is then coated with three coats of stucco called the scratch coat, brown coat and finish coat. The total thickness should be 7/8 inches in a traditional stucco application. One-coat stuccos are thinner (3/8 inch to 5/8 inch) and have polymers in the mixture to add strength. Either also may be applied over insulation boards. EIFS are composed of a synthetic coating over fiberglass mesh applied directly on Extruded Polystyrene Insulation. EIFS are beyond the scope of this article.

Stucco is actually a porous material and is designed to allow the absorption of water. The building paper or Tyvek (water-resistive barrier) acts as a drainage plane, and as the stucco dries, water flows down the building paper and weeps out the bottom of the stucco. As long as the wood sheathing stays dry and water does not get trapped in the wall cavity, problems will be rare.

Generally, few problems are observed in older applications. The use of plywood for the sheathing and the heavier building felt help eliminate problems. Generous overhangs, which keep water off the windows, also serve to prevent leakage behind the water-resistive barrier. There is certainly merit to using tried-and-true building methods and materials that have withstood the test of time. Due to innovations in construction technology, different materials that do not have the same time-tested performance characteristics are now being used. Changes in the building codes have been slow and, in the case of stucco, are a response to apparent failures. These new designs require strict attention to detail and are far less forgiving when water enters the system.

The use of oriented strand board

One noteworthy change is the use of OSB (oriented strand board) for the sheathing rather than traditional plywood. OSB has very poor moisture resistance qualities and tends to easily delaminate when wet. While plywood will also degrade when exposed to moisture, OSB ▸▸▸

swells and rots at a much faster rate. Many homes are being constructed in the greater Columbus area with this type of sheathing.

The problem with house wraps

Another change is the use of Tyvek® HomeWrap®, rather than the older 15-lb. asphalt building paper. Tyvek is a synthetic product known as spun-bonded polyolefin.

The product is primarily an air barrier with water-resistive qualities. It will stop air and water in the form of liquid from moving through an assembly, but will allow vapor to pass through due to its permeability.

Joseph Lstiburek, Ph.D., P.Eng., of the Building Science Corporation in his research report titled "Rainwater Management Performance of Newly Constructed Residential Building Enclosures During August and September 2004" shows how Tyvek HomeWrap actually will chemically bond with the stucco.

On page 13, he states, "*There appear to be significant performance issues with WRBs (water-resistive barriers) relating to manufacture, testing and approval. All plastic house wraps and some building papers tend to bond to stucco renderings, thereby negating drainage. Additionally, many plastic house wraps loose their water repellency when in contact with sheathing and stucco renderings.*"

The 2006 Ohio Residential Code, which is based on the 2003 International Residential Code, allows Tyvek HomeWrap to be used as a water-resistant barrier. The International Residential Code's 2006 version has updated its requirements for exterior plaster. One layer of Tyvek HomeWrap is no longer sufficient in municipalities that have adopted this standard. The current requirement would be to use either Tyvek® StuccoWrap® or Tyvek HomeWrap with one layer of class D building paper as a bond break between the Tyvek and the plaster itself. This change was made due to the fact that the Tyvek HomeWrap can bond to the stucco, causing water to migrate through the Tyvek and thus wetting the OSB panel sheathing. This condition could potentially cause rot and mold. DuPont, the manufacturer of Tyvek, makes the following statement in its Architect's Frequently Asked Questions:

"19. Can I use DuPont™ Tyvek® HomeWrap® under stucco?

"DuPont™ Tyvek® StuccoWrap® is recommended under stucco because it has been specially designed to work with both traditional and synthetic stucco applications. The engineered surface with special grooves is designed to assist in drainage of incidental moisture that may penetrate the primary cladding in synthetic stucco systems. DuPont™ Tyvek® HomeWrap® will also provide the weather barrier characteristics in an EIFS wall system, but its drainage properties will differ. Therefore, in synthetic EIFS stucco systems, DuPont™ Tyvek® HomeWrap® can be used as the secondary weather barrier but in conjunction with an additional drainage medium (either matte or grooved foam) to achieve the desired drainage characteristics.

"In traditional stucco systems, DuPont™ Tyvek® StuccoWrap® has been shown to aid in curing, helping reduce scratch coat cracking and promoting flexural strength for improved stucco integrity."

The following is also stated in the DuPont Tyvek Water-Resistive Barrier Installation Guidelines:

"Façade Considerations

"Water-resistive barrier performance is dependent on the ability of the façade to drain. You must consider the following for specific façades.

"Stucco

"When stucco is installed over wood-based sheathing, the 2006 International Building Code (Section 2510.6) and the 2006 International Residential Code (Section R703.6.3) require "a water-resistive, vapor-permeable barrier with a performance at least equivalent to two layers of Grade D paper" or a layer of water-resistive barrier which is separated from the stucco by an 'intervening layer.' When DuPont™ Tyvek® water-resistive barriers are used behind stucco they should be separated from the stucco by a second layer of DuPont™ Tyvek® water-resistive barrier, a layer of Grade D

Bits & Pieces About Stucco

The ASHI Technical Committee provided the following interesting facts about stucco applications and suggested sources for additional information:

- At one time, stucco applications were installed over shiplap sheathing.
- Waferboard was the precursor to oriented strand board (OSB). The change occurred in 1978.
- In Western states, older stucco was applied over line-wire lath – there was no sheathing.
- On the West Coast, poor-quality OSB is mostly a thing of the past. The modern OSB products now in use — Structurewood Gold, for example — perform as well as plywood with regard to decay resistance and delamination. OSB products from the '80s and early '90s were clearly inferior products.
- Some small cracks and stains are a problem; some are not. It's up to the inspector to determine the difference.

For additional information about stucco, visit the following Web sites:

www.cement.org/stucco/MIP_splash.asp
www.nocsa.org/
www.parex.com/Stucco/One_Coat_Overview.html
www.stuccomfgassoc.com/industry/tech.shtml
www.4specs.com/s/09/09-2400.htm