MOISTURE TESTING GUIDE
FOR WOOD FRAME CONSTRUCTION
CLAD WITH EXTERIOR INSULATION AND FINISH SYSTEMS
(EIFS)

Version 3.01

Prepared for

EIFS Review Committee

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This document was developed by New Hanover County to provide a testing protocol fo assessing moisture and subsequent damage in the substrate of EIFS clad exterior walls of wood frame buildings. Deviations and interpretation of the testing protocol for assessing any particular building may be required depending on the experience of the inspector and the condition of the building. When this guide is cited in a moisture assessment report, the report shall include a statement that lists deviations from the protocol.

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BACKGROUND

This document is intended as a guideline for discovering moisture and assessing related damage in wood frame structures clad with Exterior Insulation and Finish Systems (EIFS). The difficult nature of identifying concealed water damage, and the experience of many experts led to the development of this document. It is intended to provide guidance on where and how to inspect for moisture and moisture related damage; and provide a uniform protocol for reporting observations and moisture test results.

EIFS is a non-load bearing exterior wall cladding designed to be attached to wall sheathing with an adhesive or mechanical fastener. Sometimes referred to as *synthetic stucco*, EIFS is designed to provide a weather barrier and thermal insulation.

For the purpose of this document, EIFS are classified into two categories, *drainable* and *non-drainable*. Drainable EIFS use a system of weeps integrated with a weather resistive barrier (building paper), and channels or some type of furring lathe that provides an air gap between the insulating foam and the weather resistive barrier to allow drainage. Non-drainable EIFS typically do not have a weather resistive barrier behind them and the insulating foam is applied directly to the wall sheathing with adhesive or mechanically fastened with wind-locks and screws. The outer surface of the EIFS functions as a weatherproof barrier. Non-drainable EIFS are not designed to accommodate water infiltration behind the lamina (the exterior coating).

Water intrusion is a normal occurrence in construction. Prolonged moisture buildup can cause damage to wood sheathing, framing and other materials subject to microbial growth or corrosion. Experience has shown that damage often occurs at areas of transition between EIFS and other materials like window frames, door sills and roof flashing. Extensive structural damage can occur when water intrusion is large in volume, frequent and undetected.

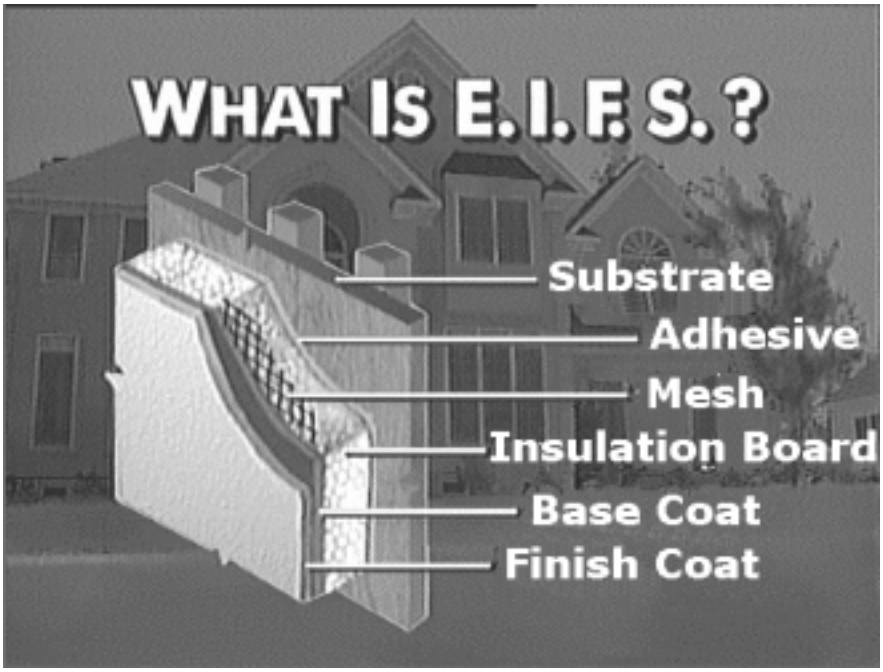
Water intrusion problems may not be apparent from a visual inspection of the exterior. Use of a moisture meter to detect excessive moisture levels and probing into the substrate to determine if it is firm or soft is required. Experience has shown that the non-invasive scanning type moisture meter can be effective in identifying areas of elevated moisture. An electric resistance moisture meter with a deep-wall-probe is most effective in assessing actual moisture content and rot damage where the probe penetrates the sheathing.

Experience has also shown that there are highly susceptible areas for moisture damage, such as below windows, below roof rake (kick-out) flashing, below decks, chimney chases, etc. This document provides diagrams and photographs that identify susceptible "wet-spots" to guide the intrusion specialist or EIFS inspector and establishes a uniform protocol for reporting information.

WHAT ARE EIFS?

EIFS are synthetic stucco cladding systems typically consisting of five layers: adhesive, insulation board (attached to the sheathing with adhesive), a base coat into which a fiberglass reinforcing mesh is imbedded, and a finish coat in the desired color. This type o EIFS is non-drainable and will be referred to as simply EIFS. It differs from other types o stucco systems in that it resists water penetration through its outer surface, whereas, conventional stucco has a secondary moisture barrier behind the stucco to resist water intrusion.

Figure 1
Non-Drainabale EIFS



Substrate - Serves as a structural component for resistance to lateral forces and provides a surface for mounting the insulation board. Substrates may be made of oriented strand board (OSB), plywood or gypsum. Some EIFS designs attach the insulating boards directly to the studs, in lieu of wood or gypsum substrates. This type of EIFS is no covered by this guide.

Insulation Board - Typically expanded polystyrene that is attached to the substrate with adhesive or mechanical fasteners.

Base Coat and Fiberglass Mesh - Serves as the moister barrier. Applied directly to the surface of the insulation board. The mesh should be fully embedded in the base coat.

Finish Coat - Provides color and texture to the wall surface. Applied directly over the base coat and fiberglass mesh. In combination, the base and finish coats are referred to as the EIFS lamina.

WATER INTRUSION AND EIFS

Although EIFS are designed to prevent water intrusion through the lamina, rain water may get behind the cladding through construction details and other components of construction and accumulate in the substrate and other materials. It should be understood that EIFS are designed to be applied to vertical surfaces. "Typical" water intrusion problems are associated with building components and their transition to EIFS. Examples of areas susceptible to water intrusion are listed below:

- Windows
- Door Frame and Sills
- Roof Flashing at Wa -Diverter Flashing and Step Flashing
- Deck Connections
- Decorative Tr -Face Applied and Nailed Through the Lamina
- Wide Wood Decorative Trim Applied to Sheathing Butted to Lamina
- Fireplace Chimney Chase
- Rake (Kick-Out) Flashing, Cap Flashing and Cricket Flashing
- Penetrations:
    - Utility Lines & Pipes
    - Hose bibbs
    - Screws & Nails Driven Through the EIFS
    - Refrigerant Lines for A/C Units
    - Exterior Light Fixtures and Receptacles etc.
- Joints Between Floors
- Horizontal Surfaces Retaining Water
- Cracks or Damage in the Lamina

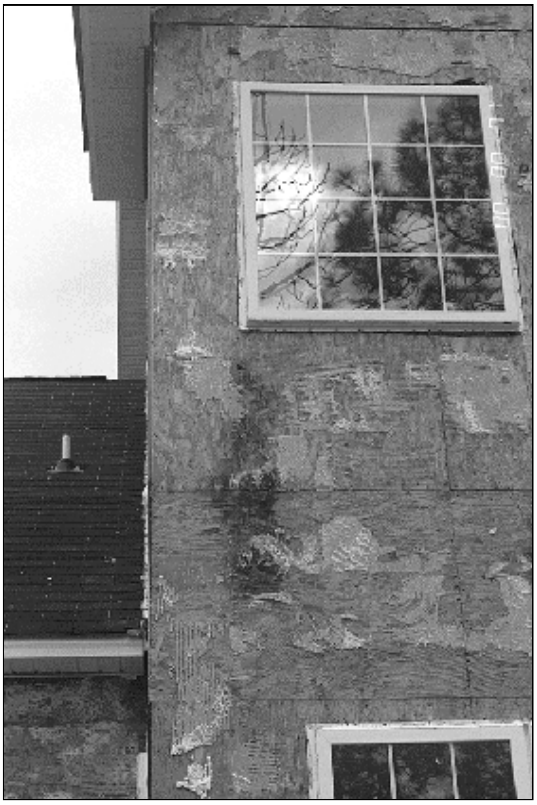
Little evidence supports that water directly penetrates a properly applied and undamaged EIFS lamina on vertical surfaces.

A PICTORIAL GUIDE OF PROBLEMS ASSOCIATED WITH EIFS

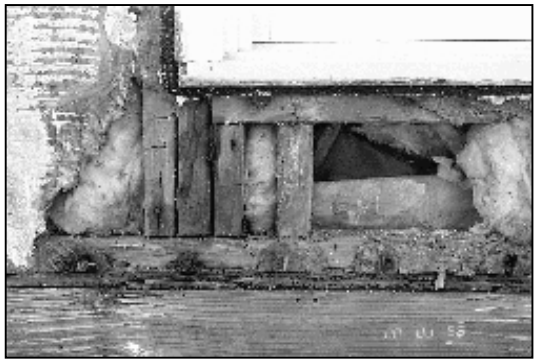
The following photographs illustrate the damage that can occur when water intrudes into EIFS and goes undetected. The photographs are intended to show the extent that water can spread and the areas usually affected by water intrusion. The white or grayish substance on the substrate is adhesive. The ages of these homes ranged from still under construction to three years old.

Window frame leaks at the corner of sill and jamb connections are "typical" of some windows.

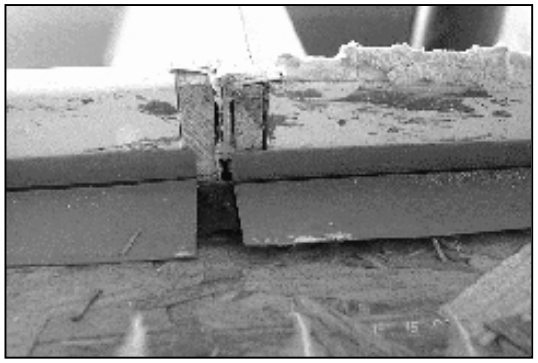
Small opening in window construction allowed a large quantity of water to enter a wall resulting in rot.



"Typical" pattern of water migrating down beneath a window.



Extent of decay in studs can be assessed with an awl.

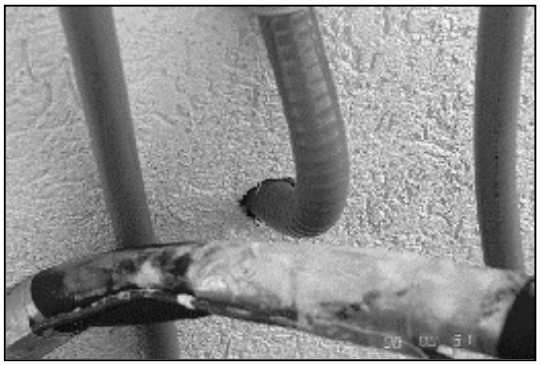


Directly beneath two widows looking up, you can see mulled window joints provide leakage paths into a wall.

Decay discovered in a wall and floor band below a rake (kick out) flashing area.

Pattern of water damage below a rake (kick out) flashing.

Decay of a 2x10 band from a hose bib penetration.



Electrical conduit penetrates without sealant.

NOTE The white substance on the substrate is the adhesive that once held the insulation board in place. You can clearly see some horizontal trowel marks in the adhesive. These marks can channel water away from the point of entry. In the photo at the top right, you can see that the vertical joint in the substrate directly below the kick -out flashing channeled the water straight down. The result of water being guided from one point to another is referred to as "Water Migration."

REQUIRED TEST EQUIPMENT

1. Moisture Test Equipment

Two types of moisture meters are required for assessing the condition of substrate materials behind an EIFS clad structure. In combination they provide the best availabl testing tools known t date. With only a moisture probe meter an inspector could be missing "wet or decaying areas" without probing many holes. This is also labor intensive. When using a moisture scanner, only relative moisture levels can be detected. Areas o decay and da age will not be discovered by the scanner in the absence of moisture. The scanner's advantage is its ability to assess large areas quickly without penetrating the lamina. The probe moisture meter's function is to measure actual moisture content and assess structural integrity through tactile response (damaged substrate is soft and does no resist insertion of the probes as does undamaged substrate).

- **Moisture Scanner:** Used to locate general areas of high moisture in walls, provides relative indication of moisture and is not designed to quantify moisture percentages. commercially available device is manufactured by Tramex. It frequently gives false positive indications of moisture being present and depending on the wall detail, it can also give false ne gative indications of no elevated moisture when moisture is present, especially to the untrained or inexperienced inspector. Follow-up any high moisture indications by a scanner with a probe meter to get an accurate moisture level and to get a physical feel for the condition of the substrate. Is it soft or firm

- **Moisture Probe Meter:** Used to probe substrates and framing members for indications of extremely soft or rotted materials as well as obtain accurate moisture content measurements. These meters u se hand held deep wall probes, typically up to five inches long that have insulated electrodes. The probes are electrically conductive at the tip for measuring resistance of the material into which the tips are embedded. The meter displays moisture as a percentage by weight for wood and gypsum. The probe also gives an indication of the structural integrity of the substrate, whether it i soft or firm.

Suppliers of Scanners & Moisture Meters:

- Delmhorst Instrument Co. (973) 334-2557, or (800) 222-0638
- Model number BD-8 or BD-9 (with 3 1/4" probes)
- Ligomat USA, LTD (800) 227-2105
- Tramex - called the "We -Wall-Detector"
  - Professional Equipment, Inc. (800) 334-9291
  - Black Hawk Sales, Colorado (303) 972-7926

MOISTURE SCANNERS

Moisture scanners are non-invasive devices that are simply placed against the exterior surface of the EIFS and passed over the wall area being tested while remaining in contac with the surface. Scanners are used for detecting excessive moisture present under relatively large wall areas. The surface must be dry to obtain accurate measurements. Changes in substrate material or lamina thickness can also affect the scanner's accuracy, as will metal such as flashing, metal lathe or metal studs. Moisture in the lamina or insulation board will also be detected by the scanner. Much practice and repeated use is necessary to gain competency interpreting scanner readings. For these reasons, a deep-wall-probe type moisture meter is necessary to confir and quantify high "relative" scanner readings.

Figure 2
Moisture Scanner

Tramex "Wet Wall Detector"
(photo courtesy of Tramex LTD)

MOISTURE PROBE METERS

Moisture meters are equipped with probes that contain two electrodes that are pushed through the exterior surface of the EIFS to measure the moisture content of the interior portions of a wall. To insure that interior portions of the wall are reached, use a probe with (minimum) 3-inch long electrodes. Apply firm pressure when in contact with the substrate and taking a reading. Electrodes can be purchased with an electrically insulated covering such that only the tips are exposed. Insulating the probes minimizes false readings that may occur due to the presence of moisture on the outside of, or within the EIFS. To maximize the reliability of the moisture readings, be sure to follow the manufacturer's recommendations for changing the battery and calibrating the meter.

Figure 3
Moisture Meter and Probe

2. Ice Pick or Awl

Use an ice pick or awl to punch holes into the EIFS for the moisture meter probes. Pre-punching the holes will prolong the life of the insulating material on the electrodes. It will also reduce trauma to the inspector's palm as it takes some effort to pierce the lamina. Hand held probes are also available with an integral sliding hammer mounted on the probe handle. This style of probe drives the electrodes into the wall by sliding a weight in the direction of the wall.

3. Sealant for Probe Holes

After the test has been completed, an approved sealant mu st be used to fill holes created by the probes. Sealant that approximates the color of the wall finish is desirable. Never leave the holes unfilled as this will provide entry sites for water. Neutral cure silicone sealants, acrylic latex sealants or a s ealant specified by the EIFS manufacturer should be used. Do not use sealant materials which contain solvents that are detrimental to the foam insulation board or the lamina.

4. Water Intrusion Report (see appendix of this document)

An example of a water intrusion report is provided in the Appendix of this document. The report should include all moisture measurements, photographs and drawings of the building exterior. Worksheets in the Appendix list areas where moisture readings should be taken. A step by step guide for testing is also in the Appendix. Finally, before testing, make certain that the structure to be tested is clad with ***non-drainable*** EIFS. Using this protocol on drainable EIFS could damage the weather resistant membrane underlying the drainable system by probing holes through it.

TEST PROCEDURE AND LOCATIONS

Techniques

Scanning - After calibrating the scanner, move it over the wall in a motion that traverses all of the areas in question as well as random testing of each wall elevation away from any window, flashing, penetration or other source of water intrusion. Re -calibration of the scanner must be performed frequently (see Appendix). The field of the wall away fro flashing or windows need not be 100 percent scanned. It is recommended that those areas be scanned if unusual conditions are present, such as cracks in the lamina. The scanner must remain in contact with the exterior finish while in operation. The scanner has two thickness settings, one for 1-inch foam board insulati and one for 2-inch foam board insulation. Follow up all "high moisture" indications by a scanner with a probe type moisture meter to quantify moisture readings and evaluate firmness of the substrate.

Probing - Probing is done in limited areas as described in this document under components like windows and doors, flashing details and penetrations. Where possible, insert the probes upward on a forty -five degree angle making firm contact with the substrate. Fill all probe holes with an approved sealant mat erial. Probing also gives a good indication as to the structural condition of the substrate. If it is in good conditi the substrate will be firm, preventing complete penetration with the probes or awl. Decaying or severely damaged substrates will be s oft and allow almost complete penetration with the probes provided firm framing materials are not directly behind the substrate at this point.

The procedure for testing the structure includes:

1. Using, for example, a Polaroid 660 camera, photograph the f ont, rear, right and left building elevations of the structure as well as all other building elevations beyond a simple rectangle as used here. (see appendix for example)

2. Label each building elevation and affix the photograph on a page under the acetate containing the grid locations. The grid on the acetate should be the same size as the Polaroid 660 photograph. Be sure you have photographed every area you are

going to test.

3. Begin testing each building elevation by first measuring the acclimated ("norma ") moisture content of the substrate using a probe type moisture meter. The acclimated reading should be taken in an area of the wall where there are no penetrations, flashing or components like windows or doors in the immediate area. You are trying to test an assumed dry area of the building elevation to establish the "normal" moisture content for this particular wall. Acclimated moisture measurements in wood frame construction typically range from 8 to 15 percent.

4. Calibrate the scanner for each elevation. It is important to re-calibrate the scanner frequently. Scan and probe every penetration, component (window, door, gable vent, etc.), flashing (rake, deck, cap flashing, etc.), seam, expansion joint or crack in the lamina, as directed later in this d ocument, writing down every measuremen on the form. Correlate each measurement with the appropriate grid location (see appendix for example).

5. Probe elevated moisture areas identified by the scanning moisture meter to determine the exact moisture conten and to discover whether the substrate is sof or firm. This is done by feeling the resistance of the material when inserting the probe into it. If scanning does not indicate any elevated moisture levels below a window, penetration or flashing detail, use an awl to probe a single hole in the areas depicted in Figures 5-7. This is to check the substrate for firmness. Be sure to indicate whether the substrate was soft or firm for every probe reading taken. Probe beneath every penetration, component and flashing as directed later in this document. Be sure to indicate whether the substrate was soft or firm with ever probe reading.

6. Complete all fields of information on your reporting form. Make sure you have tested every area described in this document i such a way that anyone will be able to understand the information that you are compiling. It is important to be able to easily locate each moisture reading on the acetate grid and the photograph. Using these techniques will make it easy to visually locae any single moisture reading or problem area on the structure.

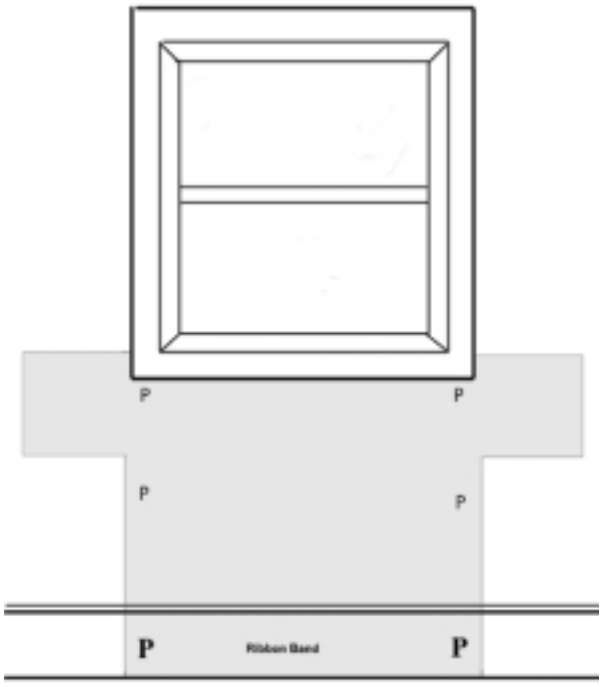
8. Where possible, provide detailed information on the report about window or door type, size and manufacturer in all areas where excessive moisture or damage is discovered. This is extremely important in areas of rot or decay. Use additiona photographs or drawings if necessary. Provide detailed information about the type and construction of flashing, expansion joints and other penetrations where excessive moisture and or rot is discovered. U se additional photographs or drawings if necessary.

TESTING METHODOLOGY FOR COMPONENTS - FLASHING - PENETRATIONS

Windows

Simple Window - Wall areas immediately to either side and below windows are susceptible to water damage. The number and location of measurements depend on the type of window. When scanning meter measurements are elevated, follow up with a probe type moisture meter. If no elevated moisture levels are indicated by the scanner then use an awl. Probe at least six areas (as illustrated by the letter "P" in Figure 5 below), under a single window. Scan the entire shaded area as illustrated in Figure 5. Upper leve windows require scanning in the same manner but you must scan and probe all the wa down to the first floor rim or ribbon ban d (see Figure 7). Additional probing may also be required beyond the shaded area to determine the size of deteriorated areas.

Figure 4
Measurement Locations



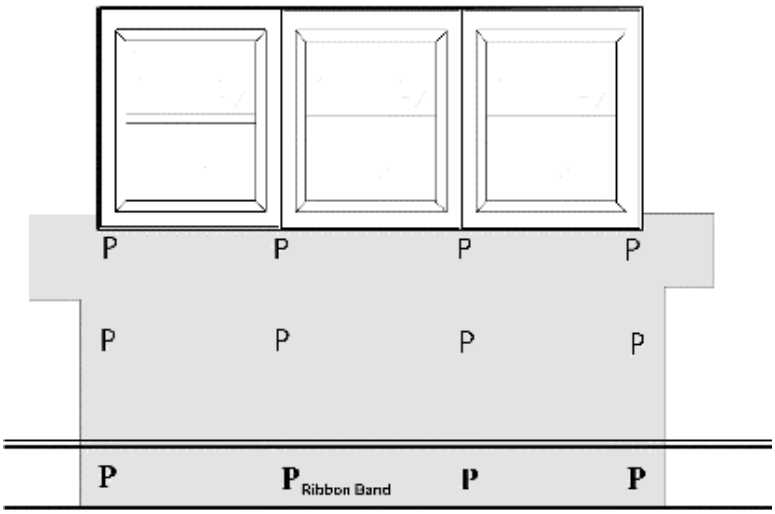
Amendment No 1-A

Measurement locations:

- Shaded Area = Scanned Area
- "P" = Probed Area (directly below each corner & halfway between the window sill and the rim or ribbon band, and at the rim or ribbon band, but not to exceed 24-inches)

Ganged Window - Ganged windows are tested in a similar manner. Scan the entire shaded area as illustrated in Figure 6 below. Probe each area as illustrated by the letter "P" in Figure 6. Remember to also probe any area that was determined to be of high moisture content by the scanner. If no elevated moisture levels are indicated by the scanner then use an awl or moisture probe to test areas for firmness as indicated by the letter "P" in Figure 6 below.

Figure 5
Measurement Locations



Amendment No 1-A

Important Notes Regarding Window Test:

- For windows on upper floors, test at the locations shown in Figures 5 - 7. Scan and probe all the way down to the rim or ribbon band on the first floor.

- Experience has shown that windows frequently leak through their frames. Consequently, windows that appear to be properly caulked and sealed can still leak water into the walls.

- The path of water migration under the EIFS can be influenced by the direction of adhesive trowel marks and seams or joints in the substrate or insulation board. Adhesive trowel marks applied horizontally can channel the water horizontally, moving it away rom the point of origin. Joints in the substrate or insulation board can do the same thing. Consequently, it is important to check the moisture content o areas to either side of windows to determine if horizontal water migration and decay has occurred. This phenomenon is true for any potential point of water intrusion.

- Scan the shaded area illustrated in Figures 5 and 6. If the scanner indicates elevated moisture levels probe those areas with a probe moisture meter. If the scanner found no elevated m isture levels then use an awl to probe the areas in Figures 5 and 6, illustrated by the letter "P", for firmness. Additional probing may also be required beyond the shaded area to determine the scope of deteriorated areas.

Figure 6
Upper Level Windows

Figure 7
Kick-Out Flashing

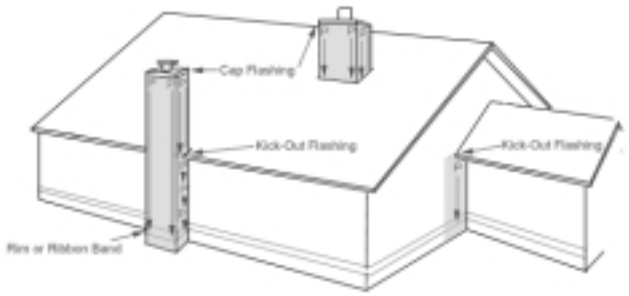
Doors

Check the moisture content in the walls on both sides of doors on different heights. Also measure the moisture content 18 to 24 inches to either side of the lower left and righ corners of the door to check for horizontal water migration. Damage usually occurs below the door, not along the sides.

Flashing

Improperly installed flashing is a major potential source of water intrusion. The most important areas to check are all areas directly below rake flashing and cap flashing as shown in Figure 9.

Figure 8
Measurement Locations



- **Kick-Out Flashing -** Scan for moisture in the wall directly below the lower end of the rake flashing all the way down as illustrated by the shaded areas in Figure 9. If the scanner indicates elevated moisture levels use a probe moisture meter to obtai accurate readings. If no elevated moisture levels were detected by the scanner use an awl and probe the wall for firmness on 24-inch centers vertically as illustrated in Figure 9 by the letter "P".

- **Cap Flashing -** Scan for moisture in the wall on each corner immediately under the cap flashing all the way down to the rim or ribbon band as illustrated by the shaded areas in Figure 9. If the scanner indicates elevated moisture levels use a probe moisture meter to obtain accurate readings. If no elevated moisture levels were detected by the scanner use an awl and probe the wall for firmness on 24-inch centers vertically as illustrated in Figure 9 by the letter "P".

- **Other Flashing -** Scan for moisture in the wall directly below porch or deck flashing. Probe directly below the flashing, and at -inch intervals down to the rim or ribbon band on the lowest level

Penetrations

Scan for moisture to either side and below the following penetrations through the EIFS. If the scanner indicates elevated moisture levels (moisture level above the acclimated reading), use a probe moisture meter to confirm and quantify readings. If no elevated moisture levels were detected by the scanner use an awl or moisture probe to test the wa for firmness on 24-inch centers vertically. Examples of these penetrations are:

- Hose bibs
- Exterior light fixtures attached to the wa
- Telephone / cable television wire penetrations
- Mail boxes attached to the wall
- Connections for decks and awnings
- Clothes dryer vents
- Range hood wall vents
- Vents for direc -vent furnaces and water heaters
- Air conditioning refrigerant lines and electrical penetrations
- Nails and screws through the surface of EIFS

Joints

Test below horizontal joints and vertical joints with a scanner. Random probing is not recommended here. Probe with a moisture meter only if elevated moisture levels are indicated by the scanner.

Water Intrusion Inspection Report (see Appendix in this document)

Remediation Report (see Appendix in this document)

Advanced Testing Techniques (see Appendix of this document)

GLOSSARY

Kick-Out Flashing - Metal flashing occurring at the end of the roof rake at a point where the roof intersects a perpen-dicular wall surface.

Cap Flashing - Metal flashing sealing the top of hollow framed chases typically used to conceal pre-fabricated metal fireplace chimneys. The chase can be located on an exterior wall extending from the ground up or, it may be located on the interior with only that portion of the chase extending above the roof visible.

Window Mullion - A slender vertical member placed between two or more windows for aesthetics only. Not for sealing windows.

Rim or Ribbon Band - An architectural detail for aesthetic effect only, typically comprised of an additiona 1-inch layer of insulation board 10 to 12 inches high extending the perimeter of the structure at each floor level.

Substrate - Sometimes referred to as sheathing, typically made of oriented strand board (OSB), plywood or exterior gypsum. The substrate s attached directly to the building framing and frequently adds to the structural stability of a building. The substrate is directly behind the exterior veneer.

Backer Rod - A round strip of foam typically ½ to 3/4 inch in diameter used to set the depth and shape of a sealant joint. By not adhering to the back side of a sealan joint, and by forming a concaved shape to the back of the sealant joint, the sealant is finished by forming a concave shape to the front. In cross section, a properly formed sea ant joint using a backer rod will be shaped like an hour glass.

Acetate - For our purposes, a clear plastic film or shee containing a grid pattern for ease of locating specific points on a structure when placed over a photograph or drawing. Typically the grid pattern is made up of two axis, one horizontal (alphabetical) and one vertical (numerical).

Building Elevation - The geometrical projection of a building on a vertical plane. Typically, the most simple structure will have at least four building elevations, front, rear, right side and left side.

Front Elevation

Rear Elevation

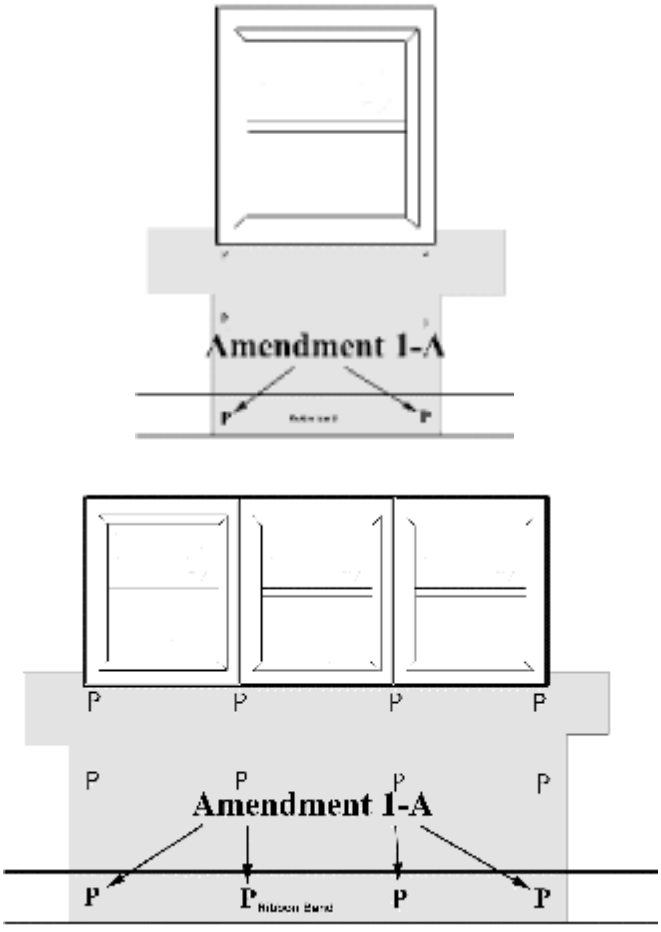
AMENDMENTS

The ERC reserves the right to make changes and amendments to this protocol when, in the majority opinions, such changes or amendments contribute to the overall effectiveness of the protocol. All amendments become effective on the date of their adoption and are to be considered mandatory requirements of the main body of the protocol

AMENDMENT No 1-A (Additional Probing At The Rim or Ribbon Band) 8/04/98

Additional probing at lower elevations below *all suspect areas* such as windows, doors, decks, flashing and penetrations will be done with either an awl or probe type moisture meter in order to determine the condition of the substrate or framing materials. The additional locations to be probed are at the rim or ribbon band directly below the probe locations previously required by this protocol. (See Figure 10) for an example.

Figure 9
Additional Probing Required



FURTHER READING AND RESOURCES

Resource documents on building science related to design and performance of EIFS and other cladding materials can be found in the following compendium. The documents are not arranged in any particular order.

Idiot's Guide to Water Testing Windows, Daniel Urroz, Builder's Book, Inc., Canoga Park, CA, (818) 887-7828

Getting The Best From EIFS, R. Thomas, Jr., *The Construction Specifier* (February): 19-28, 1995.

Exterior Insulation Finish Systems, ASTM STP-1187, eds. Mark F. Williams, FAIA & Richard G. Lampo, Philadelphia, PA, American Society for Testing and Materials, (610) 832-9500.

Exterior Insulation and Finish System Design Handbook, Robert G. Thomas, Jr., 1992, CMD Associates, Inc., (206) 463-9840

Exterior Insulation and Finish Systems ASTM Manual Series M NL 16, Current Practices and Future Considerations, Mark F. Williams, FAIA and Barbara Lamp Williams, AIA, 1994, American Society for Testing and Materials, (610) 832-9500.

Exterior Insulation and Finish Systems - STP 1269, Peter Nelson and Richard Kroll, 1996, American Society for Testing and Materials, (508) 705-8400.

Water Leakage Through Building Facades - ASTM STP-1314, Robert J. Kudder and Jeffrey L. Erdly, (610) 832-9500

Troubleshooters Target EIFS, *Builder* (March 1996): 168-171, Rick Schwolsky

J. B. (Jay) Graham, AIA, New Hanover County Inspection Department (910) 341-7175

J. Allen Golden, CEO, New Hanover County Inspection Department (910) 341-7456

Home Base Hotline, NAHB Research Center, Inc. (800) 898-2842

Mark F. Williams, FAIA, Williams Building Diagnostics, Inc. (215) 628-8210

Web Sites:

http://www.sfstucco.com/html/problems.html
http://www.co.new-hanover.nc.us/ins/eifs001.ht
http://builder.hw.net/news/1997/eifs/eifs.htx
http://www.eifs.com/default.htm
http://www.wagatv.com/I-Team/stucco.html
http://www.gahi.com/

Appendix "A"

Water Intrusion Inspection Report

For Wood Frame Construction
Clad With Exterior Insulation and Finish Systems
(EIFS)

August 4, 1998

Appendix “A”

Background Information

A complete water intrusion report is a do cument containing the following pages and fields of information:

General Informatio

Testing Company Name:
Company Address:
Company Phone / Fax Number:
Project File Number:
Date of Report:
Name of Inspector:

Client Name:
Address:
Phone Number:

Homeowner / Structure Owner Name:
Address:
Phone Number:

Age of Structure:
Property Address:

Design Professional / Architect:
Project Specifications / Drawings:

Builder / General Contractor:
Address:
Phone Number:

EIFS / Stucco Applicator:
Address:
Phone Number:

Appendix "A"

General Informatio (cont.)

EIFS Manufacturer:
System Name:
Product Specifications:
System Type: (EIFS, PB/PM, Hard Coat, etc.):
Warranty Documentation:

People Present (list all):
Date of Inspection:
Time of Inspection:
Weather Conditions:
Last Rain Date:

Appendix “A”

Technical Informatio

Construction Completion Date:

Window Manufacturer:
- Window Type:
- Window Material:

Door Manufacturer:
- Door Type:
- Door Material:

Sheathing Type / Material:

Description of Exterior Chases:

Description of Flashing:
- Kick Out or Rake Flashing:
- Chimney Chase Flashing or Cap Flashing:
- Cricket Flashing:
- Deck or Porch Flashing:

Caulking and Joints:
- Description of Caulk Joints Overall Condition: [Excellent, Good, Fair or Poor]
- Materials:

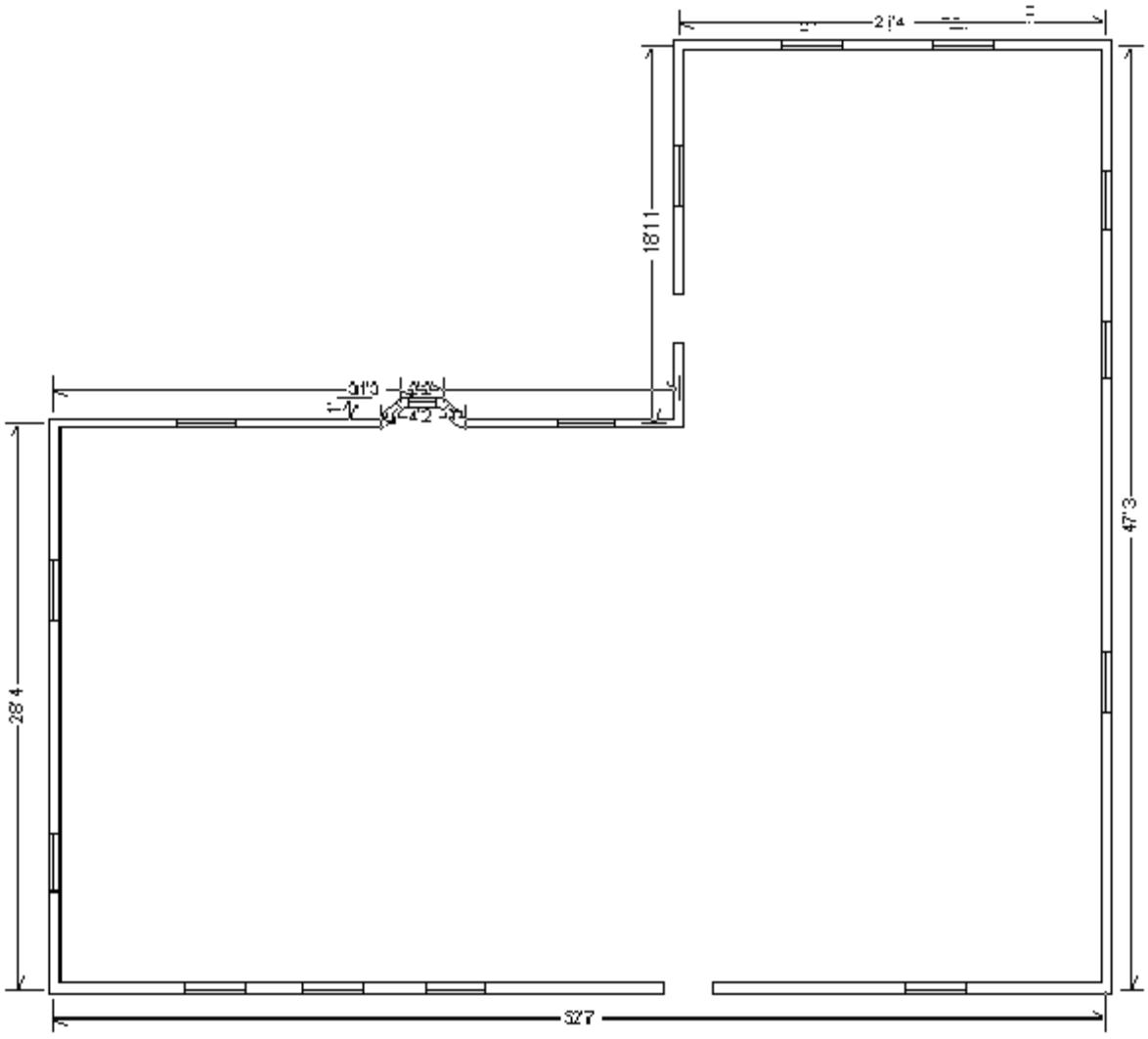
Other Field Observations:

Owner Comments:

Appendix "A"

Site Sketch

Provide a sketch of the outside perimeter of the struc ture showing dimensions and orientation. Locating windows and doors is optional.



Front / East Side

Appendix "A"

Photographic Log

Provide a log of all photographs giving an identification number for each photograph, a description of the subject contained in the photograph, and elevation or wall section on which the photograph was taken.

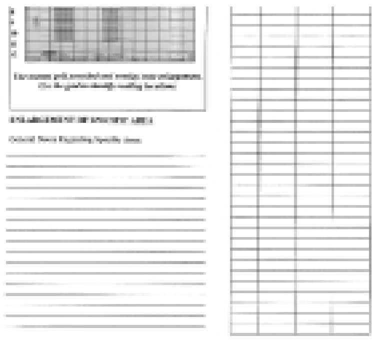
Photograph Log

Photograph Number	Description of Photograph	Elevation

Appendix "A"

Field Data Sheet (as many as needed)

Please provide enlargement Polaroid photographs of each EIFS area which will be surveyed.



Use acetate grid provided and overlay onto enlargement.
Use the grid to identify reading locations.

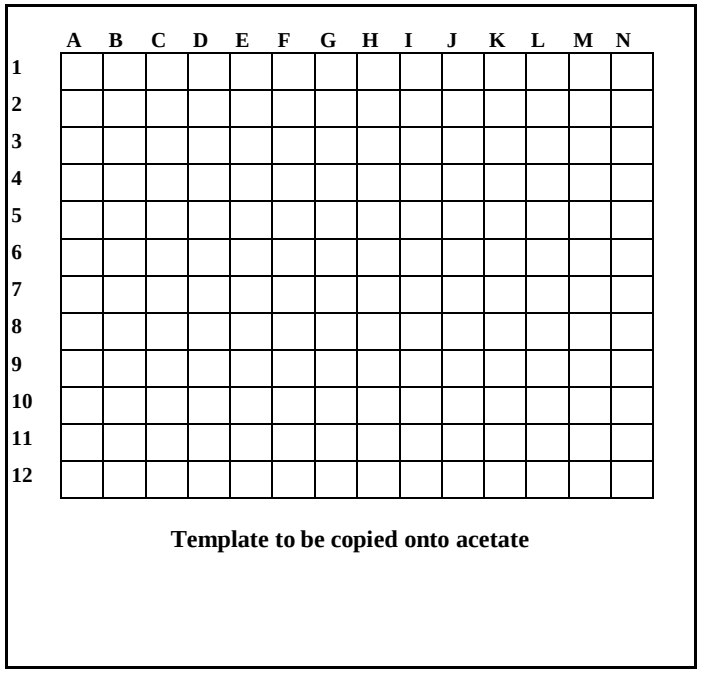
ENLARGEMENT OF SPECIFIC AREA

General Note Regarding Specific Area:

Grid #	Non Intrusive Readin	Intrusive Readin	Base Condition

Appendix "A"

Templet Grid For A Polaroid 600 Series Photograph



Template Grid For A 3x5 35 mm Photograph

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	a
2																											
3																											
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Appendix "B"
Step-by-Step Testing Procedure

Step 1. **Collecting Background Information ~** Obtain all of the general and technica information as listed in Appendix A. This requires asking questions of the property owner(s), and it is recommended that they prepare for the questions by locating written documentation when it is available. When possible, provide the background data sheet in advance of the inspections.

Step 2. **Documenting The Property ~** Written and photographic documentation is necessary to convey information to other parties. Appendix A provides formats for organizing the data, including written description of observations, a sketch of the building, and grid system to overlay onto photographs to correlate written observations to the physical location on the structure. The formats provided in this guide are optional; however, they have been found to be convenient and effective.

Step 3. **Taking Photographs ~** The objective of the photograph is to document the moisture assessment survey and to record existing conditions. There should be enough information that allows anyone unfamiliar with the building to locate a problem area by simply reading the report. There should be photographs of each side of the building to provide orientation. There should be close -up photographs to provide detail (It is recommended that each box in the gri overlay should be no more th an 4 to 6 square feet of wall area).

Step 4. **Data Collection, Coordination and Equipment ~** The inspector's responsibility is to collect moisture data and discoverable damage, then accurately record the location where the data was taken. Appendix A provide data sheets to organize the data. Instant photographs provide an immediate means of documenting the location. With an acetate grid, (shown in the example in Appendix A) the coordinates of a location can be identified and recorded. Be sure to bring an ad equate number of forms to collect data. Typically 20 forms are enough. Another method to identify locations is by marking the photograph with an indelible marker and using a numbering scheme. Some inspectors use electronic scanning and digital cameras to photo document properties. Whichever method is used, you should keep in mind that there is less chance for error when data is written once, so develop a method that does not require transcribing data from one sheet to another.

A. Calibrate the scanner and te st the probe on each wall section. It may be necessary to re -calibrate the scanner frequently in order to achieve an acceptable level of accuracy.

B. After calibrating the test instruments, check the exterior wall surface for moisture. Take necessary precautions to insure that exterior surface

moisture does not interfere with moisture readings behind the lamina. If such moisture is present, the test cannot continue.

C. If no excess surface moisture is detected move to an area on the wall tha has no penetrations or components like windows or flashing. It is in thi area that you will establish the acclimated moisture level in this particular wall. Be sure to note the acclimated reading on the report. This reading is taken with a probe type meter. You must al so "zero" or calibrate the scanner in this same area.

D. Scan and probe the wall as directed in the testing protocol and enter the information into the report. Enter the reading on the report corresponding to the grid location on the photograph. When probin g, be sure to not whether the substrate is firm or soft with each probe reading.

E. If a high reading or soft substrate is discovered, expand your investigation in the immediate area until you are able to define the affected area and locate the source of wa er intrusion.

F. Be sure to describe the window material and type. Give a complete description of the wall section at areas where damage is discovered.

G. When probing try to enter the EIFS at an upward 45 degree angle to hel prevent the probe holes from becom ing a source of water intrusion. Be sure to caulk the probe holes as you go with a color matched material otherwise it is easy to overlook them.

Appendix "C"
Special Calibration Techniques for Scanners

The scanner is unable to detect moisture under some circumstances. One being a double layer of foam board insulation and base coat that typically occurs at each floor level, around windows and frequently at corners or quions. One way of dealing with this is to place the scanner on the surface of the double layer at an area least likely to have moisture behind it and re-calibrate the scanner by turning the sensitivity up until the relative reading on the scale is between 15 to 25. This number now becomes your acclimated moisture reading in areas of double layer foam insulation. To give meaning to relative readings, verification of moisture content is recommended by using a moisture probe meter. This adjustment raises the scanner's sensitivity to moisture. Readings should only be taken in areas that have double foam board insulation and base coat. Otherwise you will get inaccurate readings should you scan a normal one-inch layer using this calibration. This procedure will take some practice and much field experience before it can be effectively applied. Under normal conditions the Tramex scanner should zero at a setting of 3 to 6 on the adjustment dial. Field experience has shown the "deep wall" selector switch option, designed to be used over 2 inch thick insulation board, inconsistent. There are too many variables such as the number of layers of base coat, finish coat, mesh, and the thickness of these materials when used with 2 inch insulati board that make it almost impossible to use only one standard or setting when evaluating these types of systems.

Minimal Destructive Testing

When the substrate is discovered soft during a probe reading, you can use several instruments for the purpose of recovering a small sample of the substrate to verify the presence of decay. One such device is a hand auger with fairly large threads, found in most kitchen supply stores. This hand auger was made to screw into frozen meat and pu out a plug for the insertion of a microwave heat sensing probe. This device works nicely at pulling out a small plug (5/16 inch in diameter) that is easily caulked. All you need to do is extract enough of a sample to determine the condition of the substrate. Organic substrates are the easiest to evaluate, particularly due to color. Gypsum substrates, on the other hand can be the most difficult to evaluate. Much practice and field experience is needed here.

Preserving Test Samples

Immediately upon removing any test sample material or plugs, place the test sample in a small "zip-lock" plastic bag; seal the bag, and record th e sample location, date, and project address on the bag. The sample can be used later to evaluate the condition o the material the test sample was taken from if the condition is unclear.