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DATE: April 22, 2014

TO: Tom Whittelsey, President

FROM: Dr. Steve A. Hodges, Technical Manager

SUBJECT: ***Test Hang of Sanfoot Wood Veneer Sheets (WoodWall™)***

Dear Tom,

We have completed your test hang request for the Sanfoot Wood Veneer Sheets (WoodWall™), Rc Birch Standard Finish and Qc Makore 70% Sheen Finish. Your test hang requirements are outlined below:

- **Determine best Primer / Adhesive system(s) for adhesion / strip-ability to walls and ceilings**
- **Recommendations for eliminating seam lifting and air pockets**
- **Recommended clean up procedures (fresh & dried)**
- **Specifications for optimum installation**

Test Design:

Primers Tested were:

- PRO-977 Only – Wall installation test (90° vertical)
- PRO-977 / PRO-935 (R-35) - Ceiling installation test (inverted horizontal).

Adhesives tested were:

- Roman PRO-880 Ultra Clear Adhesive
- Roman PRO-838 Heavy Duty Clear Adhesive
- Roman PRO-732 Extra Strength Clay Adhesive

Test panels were prepared using new 3/8" drywall[1] panels separately primed with PRO-977 Ultra Primer only, and a combination of PRO-977 Ultra Primer and PRO-935 (R-35) Adhesion Promoting Primer. Primers were allowed to dry 24 hours prior to installation of wood veneer sheets.

[1]*plasterboard*

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Test Design: (cont.)

A nine (9") inch roller with 3/8' nap was used to apply the adhesives. Adhesives were applied to the substrate. Wood veneer sheets were visually inspected 72 hours after installation for any changes in appearance (i.e., lifting, curling, air pockets, etc…). Additionally, wood veneer samples were allowed to dry for fourteen (14) days before being tested for adhesion and strip-ability.

Test Results:

All test panels were evaluated per the customer's request. All results were documented using the rating system listed below:

Adhesion / Strip-ability Key	
Rating	**Results**
1 - 3	**Poor**
4 - 6	**Fair**
7 - 8	**Good**
9 - 10	**Excellent**

WALL INSTALLATION TEST (90° Vertical)					
Primer(s)	Adhesives	72 Hour Appearance	Adhesion	Strip-ability	Clean-Up
PRO-977	PRO-880	Slight lifting & curling at edges. No air pockets	10	0	Excellent
PRO-977	PRO-838	Slight lifting & curling at edges. No air pockets	10	0	Excellent
PRO-977	PRO-732	Slight lifting & curling at edges. No air pockets	4	10	Excellent

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Test Results: (cont.)

CEILING INSTALLATION TEST (Inverted - Horizontal)					
Primer(s)	Adhesives	72 Hour Appearance	Adhesion	Strip-ability	Clean-Up
PRO-977 & PRO-935 (R-35)	PRO-880	No lifting or curling at edges. No air pockets	10	0	Excellent
PRO-977 & PRO-935 (R-35)	PRO-838	No lifting or curling at edges. No air pockets	10	0	Excellent
PRO-977 & PRO-935 (R-35)	PRO-732	No lifting or curling at edges. No air pockets	8	10	Excellent

Observations:

The adhesives tested with Roman PRO-977 primer only provided insufficient adhesion as all exhibited some degree of edge curling. We attribute these results to the porosity of the PRO-977 primer reducing the adhesion coefficient of the adhesives below the level required to accommodate the dynamic structure and movement of the wood veneers.

The use of Roman PRO-935 (R-35) primer directly on bare dry wall[1] is not recommended for the same reason as the porosity of the bare dry wall[1] diminishes the level of adhesion needed to adequately hang the wood veneers. Also, past test results have shown Roman PRO-935 (R-35) applied directly to bare dry wall[1] exhibits very poor strip-ability performance. In most cases it resulted in extreme damage to the dry wall[1] surface to the point of it being non-repairable with replacement of the dry wall[1] as the only viable option.

The best overall performance was exhibited by the Roman PRO-977 + PRO-935 (R-35) Primer combination. The Roman PRO-977 and PRO-935 (R-35) primers are designed to synergistically provide optimum substrate seal-ability and foundation anchoring for the adhesive to accommodate all Type II / III specialty wall coverings. This primer combination, used in conjunction with the Roman PRO-732 Extra Strength Clay Adhesive, provided excellent adhesion with both the Birch and Makore Wood Veneer Sheets. This was especially apparent in the ceiling testing, which was the most severe evaluation due to the heavy weight of the wood veneers.

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Recommendations: (cont.)

Additionally, the Roman PRO-977 + PRO-935 (R-35) Primer / PRO-732 Extra Strength Clay Adhesive system exhibited excellent strip-ability properties with both wood veneers. This is very interesting as the PRO-732 is not designed to be a strip-able adhesive. We believe the very low water content of the PRO-732 coupled with the high density of the wood veneers provided optimum conditions for strip-ability.

While the Roman PRO-880 Ultra Clear Adhesive and PRO-838 heavy Duty Clear Adhesive also exhibited excellent adhesion when used in conjunction with the PRO-977 + PRO-935 Primer combination, neither offered any strip-ability properties.

Finally, all of the adhesives provided good work-ability and ease of clean up.

Specification for Optimum Installation – New Dry-Wall[1]:

- Prime new dry wall[1] with two (2) coats of Roman PRO-977 Ultra Primer applied @ recommended spread rate. Allow each coat to dry overnight.
- Apply one (1) coat of Roman PRO-935 (R-35) Adhesion Promoting Primer @ recommended spread rate. Allow to dry overnight.
- Apply Roman PRO-732 Extra Strength Clay Adhesive @ recommended spread rate to the back of the wood veneer sheet / panel. Book for 5 minutes then hang and smooth using a plastic smoothing tool.

Specification for Optimum Installation – Existing Dry-Wall[1]:*

- Remove existing wall covering using Roman Piranha Wall Paper Stripper. Follow directions on container.
- Seal existing dry wall[1] with one (1) coat of Roman Rx-35 (PRO-999) applied @ recommended spread rate. Allow to dry over night.
- Apply two (2) coats of Roman PRO-977 Ultra Primer applied @ recommended spread rate. Allow each coat to dry overnight.
- Finally, apply one (1) coat of Roman PRO-935 (R-35) Adhesion Promoting Primer @ recommended spread rate. Allow to dry overnight.
- Apply Roman PRO-732 Extra Strength Clay Adhesive @ recommended spread rate to the back of the wood veneer sheet / panel. Book for 5 minutes then hang and smooth using a plastic smoothing tool.

***** The combination of the Roman Rx-35 Sealing Primer and PRO-977 Primer will adequately seal the dry wall[1] surface and provide a minimum Level 4 surface smoothness needed for optimum installation of the wood veneers (i.e., eliminate bubbling, edge curling, seam lifting, telegraphing of substrate imperfections, etc…). The inclusion of the Roman PRO-935 (R-35) Primer is to provide the added anchoring for the adhesive.

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Recommendations: (cont.)

Recommended Clean-Up Procedure: (Fresh / Wet Adhesive)

- Wipe off immediately from wood veneer surface using clean warm water and a clean sponge or cloth.
- Repeat, if necessary until all adhesive is removed.
- Wipe dry with a dry clean soft cloth.

Recommended Clean-Up Procedure: (Dried Adhesive)

- See separately attached cleaning procedure for wood veneer.

We thank you for the opportunity to work with you on this project and look forward to receiving the confirmation of being a specified system for installation for the Sanfoot Line of Wood Veneer Wall Coverings (WoodWall™).

Please let us know if you have any questions.

Kind regards,

Steve

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