



THE ADHESIVE AND SEALANT COUNCIL, INC.

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Office of Policy Development and Research, Room 8134  
451 Seventh Street, SW  
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SUBJECT: Progress Report – December 2006

Contract No. H-21521CA, Investigation of Adhesive Applications for Strong and More Disaster-Resistant Roof Assemblies – Phase 1

Period of Performance: 4/7/06 – 10/7/07

Contractor: The Adhesive and Sealant Council, Inc.  
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Email Attachments which Accompany this Report:

- None

## **SECTION I – INTRODUCTION**

The HUD Office of Policy Development and Research has been extensively involved in supporting research and development on building technology innovations, construction systems, products, standards, regulations, and code issues which affect the affordability, safety and livability of the nation's housing. As the interrelationships of these topics become more complex, the continued need to conduct research and demonstrations becomes even more critical.

In addition to the research and demonstration efforts administered directly by the Office of Policy Development and Research, HUD administers the Partnership for Advancing Technology in Housing (PATH) program. PATH provides private and public sectors for the U.S. housing industry an unprecedented opportunity to advance state of the art practices in the design and construction of affordable housing for the public by accelerating the process of developing and introducing new and innovative technologies and new materials through demonstrations and pilot projects throughout the nation.

This cooperative agreement with the PATH program will investigate and characterize the use of adhesives to fasten roof sheathing materials to underlying roof structures in residential buildings. This application of adhesives holds the potential for improvements in roof system durability and disaster resistance, and applies to both new and existing construction.

## **SECTION II – PROGRESS AND SCHEDULE**

Phase 1 of this project consists of 4 tasks. The status of each task is presented below.

This monthly report reflects a period of performance of 18 months as noted in the previous monthly report. Dates for several task deliverables now reflect this period of performance.

### **Task 1. Assess Performance Requirements and Develop Criteria for Adhesive Consideration**

Start Date: 04/15/06

Deliverable & Due Date: Summary of adhesive-based roofing attachment systems, relevant building code, relevant product standards, and related research programs. Submitted to GTR 8/22/06.

Progress and Deliverables:

Task 1 called for ASC and its subcontractor Newport Partners (NP) to better understand the performance requirements needed from adhesives used in roof assemblies by a) canvassing building code and product standards, and b) investigating related research and product testing. Together ASC and NP have completed this task by engaging dozens of industry stakeholders, including ASC members and non-member adhesive manufacturers, researchers from academia and private firms, industry associations, building code bodies, and international groups involved in research and testing. Findings can be grouped into the following categories:

- Similar research and product development efforts
- Findings on the most suitable applications for similar systems (e.g. retrofit of existing roofs)
- Relevant building code issues that affect the application (e.g. issues with fire blocking for foam plastics)
- Relevant building performance and installation issues which have been raised (e.g. restricting ability of sheathing panels to expand/contract with ambient humidity changes)

The results of these research efforts are presented in the Task 1 summary report submitted to HUD in August 2006.

We are also attempting to gain access to the recent PATH-funded research conducted by Virginia Tech on use of acrylic tapes in wall construction. We have discussed this possibility with both Virginia Tech and the GTR, and will continue to monitor the availability of the research findings.

## **Task 2: Assessment of Industry and Market Factors**

Complete by March 1, 2007

The objectives of this task are to:

- Conduct assessment of jobsite factors which are involved when using adhesive-based systems (especially in new construction). More information is needed on these issues to understand the magnitude of potential barriers.
- Investigate and characterize insurance industry programs focused on encouraging improved water resistance and uplift resistance for roof systems (new and existing) to mitigate future damages. This will improve our understanding of industry interest in applications involving adhesives.
- Determine the most feasible application(s) moving forward based on performance, building code, “constructability”, and market factors. This effort involved a roundtable discussion of adhesive manufacturers at the ASC Fall Convention to get their input.

Task 2 Deliverables:

- Summary report of jobsite factors, including assessments of different application strategies
- Summary report on insurance industry initiatives which could impact adoption of adhesive-based systems

Task 2 Progress:

In December we continued to dialogue with staff from the Texas Department of Insurance (TDI). TDI oversees regulation of insurers in the state of Texas and works with the Texas Windstorm Insurance Association, which is the “insurer of last resort” for windstorm and hail insurance coverage for structures located in designated catastrophe areas along the Texas Gulf Coast. In this role TDI evaluates building specifications for new and existing structures, and plays a role in the adoption of mitigation measures that could result in an insurance premium discount for homeowners. Our goals in engaging TDI are to:

- provide them with background on the use of adhesives to strengthen residential roof systems
- explore opportunities to introduce adhesive-based applications to Texas code provisions that provide an insurance discount to homeowners.

Thus far TDI has expressed strong interest in our research on adhesive-based systems to strengthen residential roof systems, especially for existing homes. In the context of new houses, TDI saw some value in using adhesives plus traditional nailing because: 1) hand nailing often results in wider-than-permitted spacing of nails because the roofer gets tired, 2) nail misses and overdriving often occurs, 3) it represents a belt-and-suspenders approach which would increase roof strength. TDI has also related that insurers in Texas are generally becoming more proactive. That is, instead of simply pulling out of the state, they are taking a harder look at measures they can take to still insure homeowners but mitigate their risk. The TWIA building specifications are one resource insurers are looking at to mitigate risk, by either requiring that policy holders

incorporate measures of the TWIA specs or offering incentives for them to undertake certain measures

We are currently focusing the dialogue with TDI on these topics:

- What is the process to incorporate a measure into TWIA building specifications and is this something they would consider for adhesive applications for roofs?
- Are there specific information needs or gaps that they would want to see addressed before considering this type of application in the TWIA building specifications?

In a similar way we have also engaged insurance officials from the state of Florida to investigate these same questions as well as the Institute for Business and Home Safety (IBHS).

IBHS has provided very clear guidance on additional needs to develop and understand this application more thoroughly. Their view of testing and information needs is listed in the topics below:

- Methodologies for replacing sheathing if it decays or becomes damaged. What application methodologies enhance strength but allow easy replacement of sheathing without damage to the structural members? If adhesives are placed directly between the roof structural members and the sheathing, how can you replace sheathing without damaging the structural members and having to also replace all or part of trusses or rafters?
- The utility of spray adhesives in resisting water intrusion when sprayed over seams between roof panels from inside the attic. Do they separate from the sheathing if the deck becomes saturated? Do they increase the likelihood that the sheathing will decay above the adhesive?
- Do the adhesives lose strength or effectiveness over time in the hot attic environment? Are they really a long-term way to improve uplift resistance that is suitable for new construction or should they only be considered stop-gap measures for retrofitting until it is time to re-roof? If the product durability is temperature dependent, how dependent is it on attic temperatures? Will they last longer under tile roof covers than under shingles? Under light colored shingles as opposed to dark ones?
- For retrofit installations, is it feasible to develop tools that will allow installation of adhesives all the way out to the edges of the roof? What are the practical limitations on roof slope and accessibility for the different products? Can pressure sensitive adhesives be applied to blocks of wood or pieces of corner round to facilitate installation against the junction between the deck and the structural members?
- For new construction, is there a minimum roof deck thickness required to eliminate concerns for deck warping as the relative moisture contents of the sheathing and framing reach equilibrium?
- How dangerous are the volatiles that are given off as the products cure? A review of AFG-01 approved products in a typical home improvement store included adhesives that gave off volatiles that were different by a factor of 3 or more.
- Do some of the multi-part spray adhesives have a spontaneous combustion problem if too large a mass of the material is sprayed in one spot?

- How effective are the retrofit solutions, or new construction installations, in reducing the uplift resistance reductions associated with missing mechanical fasteners. Work by APA has showed that in a 6 and 12 fastener spacing, one missing fasteners in the field (12” spacing area) could reduce the uplift resistance of the panel by 25 percent.

Over the next 2 months we will review these issues and add to them as we can obtain further input from Florida and TDI. Specifically we will prioritize these research needs and categorize them as:

- near-term items, which can be done under this phase of the project given time and funding resources
- mid-term priorities which are critical to the technology development and its adoption, which can be conducted under phase 2 of the project
- long-term research initiatives which are of interest but not critical to the technology development and implementation in the industry

### **Task 3: Code Evaluation and Preliminary Tests**

Complete by June 1, 2007

The objectives of this task are to:

- Explore solutions to code issues for the chosen applications: including the fire protection issue and the pathway for meeting performance-based suction load requirements. Work under this task would include interacting with adhesive manufacturers to develop potential approaches, such as making an adhesive less flammable per ASTM testing.
- Conduct preliminary testing (in conjunction with ASC members or other manufacturers) to evaluate system performance and assess potential solutions to constructability issues. For example, testing of mocked-up new construction roof systems might employ a pre-applied adhesive tape applied to the top surface of the truss.

Task 3 Deliverables:

- Summary of relevant code issues and strategies for compliance
- Summary of preliminary testing – including test design, findings, and recommendations

This task depends on the output of Task 2 and is not yet underway.

### **Task 4**

Complete by October 30, 2007

The objectives of this task are to:

- Summarize, based on results of Task 3, current “gaps” in adhesive-based roof sheathing attachment systems in three core areas: 1) performance testing, 2) codes, and 3) solutions to constructability issues.
- Develop a primer on using adhesives to strengthen roof systems. Guidance document would be aimed at the appropriate audience, e.g. if the application is new construction the audience would be builders and contractors; for retrofit applications the audience would be contractors, roofers, and DIY homeowners. The short (~ 2 page) primer will explain the benefits of using an adhesive-based system, the intended application, and recommendations for materials.

Deliverables:

- Report on findings and remaining information gaps
- Primer on using adhesives to strengthen roof systems

Task 4 Progress:

While the main outreach primer for this project will not be developed for several months, our project team has picked up interest in this work from the industry publication Adhesive and Sealant Industry (ASI). We have shared the goals of the program with them and updated them on our work plan and current findings, and have prepared a press release on the project which will appear in the January 2007 issue. A longer article on the project and its findings is also being planned.

Additionally we will be presenting the project and its current findings at the ASC Spring Convention on April 15-18 in Savannah, Georgia.

Both of these efforts will increase the visibility of the project within the adhesives industry and potentially enhance the contributions of manufacturers to the research.

### **SECTION III – PLANNED EFFORT**

Activity for January 2007 will focus primarily on researching and prioritizing the information gaps and needs based on our dialogue with insurance industry groups.