

Arizona State University

Box 870204
Tempe, AZ 85287-0204
602/965-3615

Date: October 5, 1993

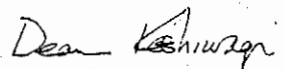
FROM: Dean Kashiwagi, PhD, PE
Performance Based Studies
Del E. Webb School of Construction
Arizona State University
Tempe AZ 85287-0204

SUBJECT: Performance of Arizona Foam and Spray Installed Polyurethane Foam (PUF) Roofing System

TO: Facility Managers, Architects, Engineers, Roof Specifiers

1. Over the past ten years, I have been inspecting and rating roof systems on performance. I have inspected over 900 roofs, many of them two or three times. I have inspected roofs across the United States, Europe, and Saudi Arabia. The results have been compiled into the only nonbiased database of roof system performance at the Del E. Webb School of Construction.
2. The data has shown that there are two major factors in the performance of the roof system: the contractor that installs the roof system, and the roof system that is installed. Either factor can cause premature roof system replacement.
3. In the last five years at Arizona State University, I have developed a method to "fingerprint" or quantify the performance of a contractor and his roof system. The method can also competitively compare the performance of any contractor and his roof system based on proven performance. To "fingerprint" or identify the performance of the contractor and his roof system requires the contractor to either provide an 100 samples of previous installations or his entire job file. The inspection provides a performance rating based on actual installations. Utilizing a large number of applications gives a representative sample of the roof system performance.
4. The following process is then performed:
 - a. The listing provided by the contractor is doublechecked at random against the records of the contractor on site to verify that it is a complete listing.
 - b. Fifty roofs are selected at random and inspected. Performance data is collected on the fifty roofs.
5. Due to the potential economical risk of such a survey, very few contractors or manufacturers have been willing to have their systems randomly inspected. Evidently premature roof system replacement is a common practice in the roofing industry. In 1993, Arizona Foam and Spray with the SWD PUF roof system, submitted to a performance inspection. The following data was collected on their roof system:

| | | |
|----|---|-----------|
| A | Proven service period: | 11 years |
| B. | Area per roof installation: | 20,105 SF |
| C. | Customer satisfaction: | 93% |
| D. | Percent of roofs with less than 1% deterioration: | 98% |
6. The performance data shows the Arizona Foam and Spray installed SWD PUF roof system to be an outstanding, performing roof system. The customer satisfaction with the system and the physical performance of the system are outstanding. It is not the intent of these results to represent that all PUF roof systems installed by other contractors will perform in like manner. It is my opinion that a less qualified contractor may install a lesser performing roof system. The PUF roof system has a proven service period of over 20 years. A performing PUF roof system requires both a qualified applicator and performing materials. Many facility owners are unaware that may be receiving a lower quality system when they award the work to a low bidder. The performance of the Arizona Foam and Spray PUF roof system has not been matched by any verified performance of installed BUR or single ply roofing system in the Southwest United States.
7. If any other contractor/roof system is being used, I encourage you to determine the performance of that system to ensure that it is providing you with better performance. This can be performed by data collection and the use of an artificially intelligent system developed at Arizona State University's Del E. Webb School of Construction.



DEAN KASHIWAGI, PhD, PE
Performance Based Studies