Quality control for built-up roofing

by **Mark S. Graham**

Q: *We are negotiating a contract to install a new built-up membrane roof system over a large roof area. The building owner wants to stipulate that test cuts be taken at the completion of our work as a quality-control measure. Is laboratory analysis of test cuts an accurate measure of built-up membrane quality and performance?*

A: The NRCA/ARMA (Asphalt Roofing Manufacturers Association) document, "Quality Control Guidelines for the Application of Built-Up Roofing," provides specific, industry-recognized guidelines for quality control during built-up membrane application. It states that test cuts generally are not considered part of routine quality control or assurance.



The most effective way to evaluate the quality of a roof system installation is by thorough, continuous, visual examination and evaluation at the time of application. Visual examination should be performed by a person who is knowledgeable of roofing technology and good workmanship practices.

Quality control is essential to built-up roof (BUR) system construction and is performed by the roofing contractor. The person designated by the roofing contractor, typically the job foreman or superintendent, is on-site during the entire application process. He is knowledgeable of the system being installed and has the authority to immediately bring any noncomplying work back into compliance.

On the other hand, when quality assurance is performed, it usually is the responsibility of the building owner's representative (e.g., architect, engineer, roof consultant) or a representative of the membrane manufacturer. The person who performs quality assurance must be qualified and knowledgeable of the system being installed and methods of application. He also must notify the roofing contractor immediately if noncomplying work is observed so appropriate corrective action can be taken.

Test cuts generally are not considered part of quality control or assurance because the findings of one or several small cuts may not accurately represent the entire roof area. Some variances in the application of BUR systems are common, so a small, random sample from the roof system, such as a test cut, may not adequately account for these variances. Limited application variances are acknowledged by the roofing industry so they don't adversely affect the overall quality and performance of BUR systems.

To derive statistically accurate results from test cuts, a large number of samples, far in excess of what is reasonable, would have to be taken to account for the acknowledged, acceptable application variances.

In addition, laboratory analysis of test cuts focuses on quantitative values, such as interply bitumen mopping weights, and ignores critical aspects that affect the roof system's overall quality and performance.

Unlike visual examination, test cuts are a destructive means of evaluation. They involve the disassembly of completed roofing components and repairing of a new, otherwise continuous membrane system with membrane patches.

In situations where problems are detected during application, making limited test cuts may assist the evaluation of the observed problems' extent and magnitude. Specific guidelines for taking and evaluating test cuts under these circumstances are described in the aforementioned document.

Q: *Is it appropriate to perform a field wind-uplift test as a quality-control measure?*

A: ASTM E 907 and Factory Mutual (FM) Loss Prevention Data Sheet 1-52 are similar field-test procedures sometimes used to evaluate the uplift resistance of adhered-membrane roof systems. These tests' limitations are discussed in "Limitations of field testing for wind-uplift resistance," November 1995, page 46.

Like test cuts, field uplift tests should not be considered part of quality control or assurance for roof system application.

Field uplift tests generally are performed over a small area, typically 5 by 5 feet (1.5 by 1.5 m). This small size is not necessarily representative of the roof system because of acknowledged variances in roof system application parameters. Because of these variances, there is not necessarily a correlation between the failure of an uplift test and the eventual wind-uplift performance of the roof system during high winds.

The precision and accuracy of these test procedures have not been established by third-party testing. In some instances, the results of these field uplift tests have been found to be nonrepeatable and highly variable. (Repeatability and low variability are critical factors in a test method's statistical accuracy.)

In addition, field uplift tests tend to be a destructive evaluation means in many instances. FM 1-52 indicates that upon test completion, the roof system at the test area should be removed and replaced with new material. ASTM E 907 indicates that the test area should be cut out and repaired if the test fails.

The most effective way to evaluate the uplift-resistance quality of a roof system installation is by thorough, continuous, visual examination and evaluation at the time of the roof system's application. PR

Each month in this column, one of NRCA's deputy directors of technology and research will answer readers' technical questions. If you have a specific question that you would like answered in this column, send it to Professional Roofing, *10255 W. Higgins Road, Suite 600, Rosemont, Ill. 60018-5607; or fax (847) 299-1183.*