Uses and Abuses of Testing Application Standard TAS 106

1st Edition

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The forensic engineering and roof consulting community is seeing a number of individuals recommending the use of the Florida Building Code's Test Application Standard TAS 106 *(Standard Procedure for Field Verification of The Bonding of Mortar or Adhesive Set Tile Systems and Mechanically Attached, Rigid, Discontinuous Roof Systems)* to determine the presence of wind related damage to roof tile. Therefore, in light of the intense post Hurricane Irma roof damage assessment activity and the apparent misunderstanding of TAS 106 with regards to roof tile systems, this bulletin is being issued to provide insight into the background and the proper use and application of TAS 106.

Background

Chapter 15 of the 2017 Florida Building Code – Building (6th Edition), or (FBC-B), provides specific requirements which "*govern the design, materials, construction and quality of roof assemblies, and rooftop structures.*" Within Sections 1512 through 1525, there exist additional requirements for structures specific to and located within the High-Velocity Hurricane Zone (HVHZ), which is limited to Dade and Broward Counties. Outside of Dade and Broward Counties, the HVHZ-specific requirements, which include TAS 106, are not required.

Code Discussion: 2017 Florida Building Code – Building (6th Edition), Chapter 2 Definitions, Section 202 General Definitions:

HIGH VELOCITY HURRICANE ZONE. This zone consists of Broward and Dade counties.

It should be noted that this testing standard (TAS 106) and its implications within the codes have not changed since its introduction in the 2001 FBC. Also found within the HVHZ requirements are a multitude of testing standards which are used to evaluate a newly-installed roofing system on structures in Dade and Broward Counties.

Proper Use

Within the *General* requirements for HVHZ found within FBC-B Chapter 15, testing in conformance with TAS 106 is required prior to final inspection by the building official for adhesive-set and mortar-set tile systems. The sections pertaining to "mortar or adhesive set roof tile systems", "mechanically fastened, rigid roofing systems", and "fiber cement shingle or tile panels" each reference TAS 106 as a product application quality control test to determine the general adhesion or uplift-resistance properties of the system as applicable.

The scope of this standard is as follows:

> *This Application Standard is a product application quality control test to confirm: 1) sufficient bonding by the mortar or adhesive to the tile and underlayment in a mortar or adhesive set tile system; or 2) effective mechanical attachment of components within a rigid discontinuous roof system.*

As stated, the standard is intended to be used as a "product application quality control test" on newly installed mortar, adhesive, or mechanically attached systems. The standard provides no indication that it can to be used as a test for an in-service roof system or for post-storm damage assessments. This is reinforced within Chapter 15's requirement that the test be performed "prior to" the final roof inspection during construction.

Proper Application

The standard has four specific *requirements* which must be met. The first of these requirements is as follows:

> *All field verification and testing shall be performed by a Dade County Approved Testing Agency. All reports, tests, and calculations shall be in compliance with TAS 301.*

Therefore, any testing conducted under the parameters of the standard is to be performed by a Dade County Approved Agency, with equipment conforming to the requirements of the standard. Any testing conducted by unapproved entities would not meet the standard and its findings would be considered illegitimate.

The second *requirement* of the standard involves the inspection of the roof as a whole, described as follows:

> A minimum of 97% of the roofing tile physically inspected shall be determined to be fully bonded.

It has been our experience that roof tiles are rarely found to be bonded after a few years of exposure to the elements. The majority, if not all the roofs that we inspect would not meet the requirement for 97% of the roof tiles to be fully bonded. If this requirement is not met, then the associated testing cannot be performed in conformance with this standard.

The third and fourth *requirements* of the standard involve the specific uplift test loads for mortar or adhesive set and mechanically attached roof systems, respectively. These loads are to be achieved using a specific apparatus further described within the standard.

Assessment of Storm-Damaged Tile Roof Systems

It is our firm's opinion that the assessment of tile roofing systems does not require that uplift testing be performed. Our assessments follow a protocol of visual observations and non-destructive tests, as necessary, to evaluate the condition of the roofing system and components in accordance with ASTM E2713 *Standard Guide to Forensic Engineering*. Our assessments incorporate logical and rational interpretation of the observed conditions based on the known physical properties and behaviors of the various roofing components, and their interaction with the environmental conditions to which they have been exposed. As no standardized procedures exist to evaluate storm-related damage to tile roof systems, we rely on our education, training, and experience to investigate the cause of reported damage.

Conclusions

TAS 106 is applicable only to roofing within high-velocity hurricane zones (Broward and Dade counties) or, in very limited cases, where the jurisdiction having authority has adopted its use. The standard is to be used as a product application quality control for newly constructed tile roof systems prior to final inspection as part of the permitting process. The validity of the testing is reliant upon it being performed by a Dade County Approved Testing Agency. The results of this test are indicative of whether a roof was installed correctly. Most important, this test has no bearing on the existence of damage nor does it indicate that unbonded tiles resulted from any particular wind event. In short, TAS 106 was not intended to be used as a test for post-storm related damage assessments of tile roof systems, and it is our opinion that this type of testing is inappropriate in the evaluation of an in-service roof system.

Acknowledgements

We thank our colleagues Geoffrey Chambers, PE, SI and Stephen Towne, RRC, CBC who provided insight and expertise that greatly assisted this research.