Understanding asphalt shingle standards

Knowledge of applicable standards can help you differentiate asphalt shingle products

by Mark S. Graham

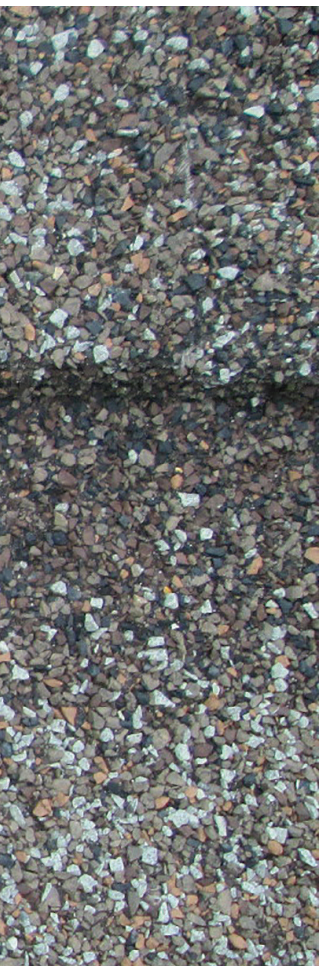
Although asphalt shingle products often are marketed and specified based on warranty durations, product and performance attribute standards also provide a useful way to differentiate among these products. Following is a brief overview of the standards applicable to asphalt shingle products.

Shingle standards

The U.S. product standard for asphalt shingles is ASTM D3462, "Standard Specification for Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules." The standard establishes prescriptive minimum and maximum values for asphalt shingles' masses and physical property values. It also establishes a shingle's minimum Class A fire resistance and Class A (60-mph) wind resistance.

ASTM D3462 is referenced in the International Building Code® and International Residential Code® as a minimum code requirement for asphalt shingles.

ASTM D3018, "Standard Specification for Class A Asphalt Shingles Surfaced with Mineral Granules," is a second, less frequently used product standard for asphalt shingles. ASTM D3018 provides for a Class



A fire resistance, testing and reporting wind resistance per ASTM D3161, "Standard Test Method for Wind Resistance of Steep Slope Roofing Products (Fan-Induced Method)," and testing of loss and behavior when heated per ASTM D228, "Standard Test Methods for Sampling, Testing, and Analysis of Asphalt Roll Roofing, Cap Sheets, and Shingles Used in Roofing and Waterproofing." ASTM D3018 further classifies asphalt shingles as being Type I (self-sealing) or Type II (non-self-sealing).

A third product standard, ASTM D225, "Standard Specification for Asphalt Shingles (Organic Felt) Surfaced with Mineral Granules," previously applied to organic felt-reinforced asphalt shingles. Because organic felt-reinforced asphalt shingles no longer are being manufactured in North America, ASTM D225 was withdrawn in 2012.

A test method, ASTM D7158, "Standard Test Method for Wind Resistance of Asphalt Shingles (Uplift Force/Uplift Resistance Method)" addresses the wind resistance of asphalt shingles with factory-applied, self-sealing strips beyond that established in ASTM D3462 and ASTM D3161. ASTM D7158 classifies shingles as being Class D, Class G or Class H and having resistances to basic wind speeds (V_{ULT}) of 115 mph, 150 mph or 190 mph, respectively.

The testing and calculation procedures in ASTM D7158's classifications assume asphalt shingles are applied to buildings located in Exposure Categories B or C, having mean roof heights not exceeding 60 feet and no topographic wind speed-up effects. Additional engineering consideration is necessary to verify the appropriateness of ASTM D7158's wind-resistance classifications if these assumed parameters are exceeded.

An alternative wind-resistance classification procedure, ASTM D3161, a fan-induced test method, classifies asphalt shingles as being Class A, Class D or Class F and having resistances to wind speeds (V_{ASD}) of 60 mph, 90 mph or 110 mph, respectively.

The International Building Code and International Residential Code require asphalt shingles with factory-applied, self-sealing strips be classified for wind resistance using ASTM D7158. Exceptions in the code permit asphalt shingles without self-sealing strips to use ASTM D3161's classifications.

Another test method, UL 2218, "Impact Resistance of Prepared Roof Covering Materials," classifies asphalt shingles on their relative resistances to steel-ball-simulated hail impacts. UL 2218's Class I, Class II, Class III and Class IV represent tested resistances to impact energies of 3.53 ft-lbs., 7.35 ft-lbs., 13.56 ft-lbs. and 23.71 ft-lbs., respectively.

NRCA's recommendations

Use of product and performance attribute standards applicable to asphalt shingles provide a useful, credible means of differentiating among asphalt shingle products.

I encourage roof system designers to use these product and performance attribute standards when specifying asphalt shingle products. Designers should reference specific standards and, if applicable, select the types and classes of asphalt shingle products based on code and project requirements that are applicable to specific buildings.

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Also, I encourage contractors to include specified standards in any contracts and purchase orders for procuring asphalt shingle products.

Additional information about asphalt shingle products and roof systems is provided in *The NRCA Roofing Manual: Steep-slope Roof Systems—2021*, which is available from shop.nrca.net.

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Research could allow drone flight in icy conditions

According to forconstructionpros.com, engineers at Mississippi State University's Raspet Flight Research Laboratory, Starkville, are working on research that could allow unmanned aircraft systems, including drones, to be operational by the U.S. government and civilian aviation in icy conditions.

MSU is leading an icing system development and technology team in what the Department of Defense hopes will result in lightweight anti-icing systems, leading to certification for unmanned aircraft systems to operate in forecasted icing conditions. The DOD recently awarded $5 million for the research, which also includes the university's aerospace engineering department and several industry partners.

The team is evaluating the use of a new carbon-nanotube coating, part of an intelligently controlled ice-protection system. Flight testing includes 3D printed ice shapes designed by Raspet Flight Research Laboratory to mimic frozen formations affixed to an aircraft's wings; results from the tests help inform the development of the ice-protection system.

NASA-designed sophisticated software models predict the shapes, and test flights are conducted, assessing the shapes' effects on aerodynamic performance. Icing increases drag, reduces lift and adds weight to aircraft. The newly developed coating for unmanned aircraft systems has extremely high heat conductivity, allowing it to transfer warmth from small heat strips on the wings' leading edges to counter ice formation.

If successful, the system also would be of interest in the civilian aviation industry.

ASTM International standard supports architectural mockups

ASTM International's Committee E06 on Performance of Buildings has developed a standard to help architects design mockup structures used for new construction. At press time, the new standard was set to be approved as E3223.

ASTM International member Eric Peterson notes when new buildings are constructed, especially large, complex buildings with intricate façades, architects build a mockup that simulates a portion of the new building's façade and components.

"This mockup not only permits the architect to visualize what the final building façade will look like [but it also] permits an opportunity to work through challenging details, evaluate interfacing conditions and perform testing on the building façade before it is constructed on the building," says Peterson, a principal at WDP & Associates Consulting Engineers, Manassas, Va. "This standard provides valuable information to the specifier for the development of the mockup program including best practices for the design, construction and testing of these systems."

According to Peterson, the new standard will be primarily useful to architects but also contains information that will be valuable for construction teams, including owners, construction firms and testing agencies.

In addition, the standard helps in the creation of energy-efficient and high-performing building envelopes that can reduce energy consumption and greenhouse gases.

Peterson says the committee invites interested parties to participate in the development of future revisions to the new standard because there is a wide variety of experiences with mockup construction.

To learn more about Mississippi State University's Raspet Flight Research Laboratory, go to professionalroofing.net.