



Plywood or OSB?

Moisture-related concerns exist with wood structural panels

by Mark S. Graham

NRCA's technical services staff continues to hear from roofing contractors experiencing moisture-related dimensional stability problems with plywood and oriented strand board structural panel sheathing used with steep-slope roof systems. Following is a brief discussion of moisture mechanics, linear expansion and thickness swell testing, and NRCA's recommendations for plywood and OSB structural panel sheathing roof decks.

Moisture mechanics

Plywood and OSB sheathing, similar to all wood products, are hygroscopic, meaning they tend to absorb and release moisture from their surroundings.

When not exposed to direct wetting, structural panel sheathing's moisture content is a function of its environment's relative humidity and temperature. During construction and its service life, panels may be exposed to direct moisture. When exposed to direct wetting, structural panel sheathing's moisture content is influenced by wetting time and panel variables that affect capillarity, such as veneer species of plywood and wax additives in OSB.



APA—The Engineered Wood Association reports the approximate moisture content for wood structural panels after manufacturing is 5% to 8% for plywood and 2% to 4% for OSB. Some acclimation to ambient humidity conditions likely will occur during transit and storage.

Research conducted by APA shows the equilibrium moisture content for plywood and OSB is lower than that of solid wood. For example, at 70 F and 50% relative humidity, solid wood has an equilibrium moisture content of 9.2% whereas plywood has an equilibrium

moisture content of 7% and OSB has an equilibrium moisture content of 5.2%. In comparison, solid wood has a higher capacity to hold moisture than plywood, which has a higher capacity to hold moisture than OSB.

APA research

APA recently completed and published research about moisture-related dimensional stability of wood structural panel sheathing.

Linear expansion of plywood and OSB specimens was tested from oven dry to vacuum soak. Average tested results for 1/2-inch-thick plywood compared with 7/16-inch-thick OSB showed similar linear expansion—about 0.23%—in the “along direction” (a panel’s strength direction). However, in the “across direction” (a panel’s perpendicular-to-strength direction), the average tested linear

expansion was 0.3% for plywood compared to 0.38% for OSB. It is worth noting linear expansion in the across direction is about 30% greater than that in the along direction and OSB’s linear expansion in the across direction is about 28% greater than that of plywood.

APA indicates the effect of linear expansion of wood structural panels may lead to buckling after panels are nailed to framing.

Thickness swell was similarly evaluated. APA indicates thickness swell primarily is related to the radial expansion of the wood fibers

with some increase expected from the release of compression that occurs during sheathing’s manufacturing process. The thickness swell of OSB generally is greater than solid wood (and plywood) because of the release of compaction stress created during sheathing’s manufacturing process.

The average tested thickness swell from oven dry to vacuum soak for 1/2-inch-thick plywood was 9.4% compared with 32.9% for 7/16-inch-thick OSB; the average tested thickness swell for OSB is 3.5 times greater than that of plywood.

APA notes thickness swell is especially sensitive to one-sided wetting, such as that occurring during construction.

APA also notes thickness swell from total water immersion after 24 hours is about the same as three days of one-sided wetting.

Additional information about APA’s research is provided in APA Technical Topics Form No. TT-028D, “Moisture-related Dimensional Stability,” which is accessible at apawood.org.

NRCA’s guidelines

NRCA recommends structural panel roof sheathing for steep-slope roof assemblies comply with PS 1, “Structural Plywood”; PS 2, “Performance Standard for Wood-based Structural-Use Panels”; or APA PRP-108,

“Performance Standards and Qualification Policy for Wood Structural Panels.”

NRCA has concerns about the long-term performance of OSB panels, including those addressed by PS 2 and PRP-108. Although NRCA acknowledges the widespread use of OSB panels for constructing roof deck substrates, experience has shown OSB panels are subject to dimensional changes, ridging and fastener backout resulting from changing

moisture conditions. If given a choice between an OSB panel roof deck substrate or a plywood roof deck substrate, NRCA prefers roof deck substrates constructed of

plywood panels complying with PS 1.

Additional information about structural panel sheathing roof decks for steep-slope roof assemblies is provided in *The NRCA Roofing Manual: Steep-slope Roof Systems—2021*. 📖🔗

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Businesses to spend more to combat cybersecurity threats in 2021

A recent Canalys study predicting cybersecurity trends for 2021 anticipates businesses will spend 10% more to boost security, according to forconstructionpros.com. Cybersecurity will remain a high priority as the range of threats broadens and new vulnerabilities emerge.

Statista.com reports there has been a sharp increase in data breaches and exposed records during the past 15 years. In 2005, there were 157 data breaches, and in 2019, there were 1,506 data breaches—an 859% increase.

The overall cybersecurity market value is expected to reach \$60.2 billion in 2021. Even in Canalys' worst-case scenario, the outlook for annual growth is 6.6%.

Despite continued growth in cybersecurity investment, the number of data breaches and records being compromised, as well as ransomware attacks, reached an all-time high in 2020.

Key factors were misconfigurations of cloud-based databases

and phishing campaigns targeting the vulnerabilities of unsecured and poorly trained remote workers.

Canalys forecasts web and email security will grow 12.5% this year as technologies converge to secure persistent connections between users and cloud services. Vulnerability and security analytics will increase 11%, expanding beyond logging and monitoring to threat intelligence, behavior analysis and automated response. Data security will increase 6.6%, focusing on protection, backup and recovery, as well as consistent policies across multicloud and hybrid-IT environments.



To learn five cybersecurity tips for small businesses in 2021, go to professionalroofing.net.

Wearable stickers could help detect COVID-19

Researchers at the University of California San Diego are developing a color-changing test strip that can be stuck on a mask and used to detect COVID-19 in a user's breath or saliva, according to constructiondive.com.

The project received \$1.3 million from the National Institutes of Health and is aimed at providing simple, affordable and reliable surveillance for COVID-19 infections that can be used daily and easily implemented in settings such as construction sites.

The test strips, or stickers, will be designed to adhere to any type of mask and will detect the presence of protein-cleaving molecules—called proteases—produced from COVID-19 infection. As a user breathes through the mask, particles will accumulate in the test strip. At the end of the day or during a mask change, the user can conduct the test by squeezing a blister pack to release nanoparticles that change color in the presence of COVID-19 proteases. A control line on the test strip will show what a positive result should look like.

“In many ways, masks are the perfect ‘wearable’ sensor for our current world,” says Jesse Jokerst, professor of nanoengineering at the University of California San Diego Jacobs School of Engineering and lead principal investigator of the project. “We’re taking what many people are already wearing and repurposing them, so we can quickly and easily identify new infections and protect vulnerable communities.”

However, Jokerst says the strips are not meant to replace other COVID-19 testing protocols and should be viewed as “a surveillance approach, similar to having a smoke detector in your house.”

The test strips easily can be mass produced via roll-to-roll processing and, if approved, reportedly could be ready for distribution by the end of 2021. The price for the strips would be about \$1 each.

Once the COVID-19 pandemic ends, Jokerst says the tests could be used to detect other coronavirus outbreaks, including MERS and SARS.



ASTM International approves barrier face coverings standard

ASTM International has approved a new standard for barrier face coverings that will help establish minimum design, performance, labeling and care requirements for reusable barrier face coverings, according to astm.org. The standard was developed by ASTM International Committee F23 on Personal Protective Clothing and Equipment.

F3502, "Standard Specification for Barrier Face Coverings," is intended to apply to the general public and workers and includes specific requirements for barrier face coverings, including design and general construction criteria; particle filtration efficiency levels; sizing and fit testing criteria; labeling instructions; and guidance regarding cleaning and recommended periods of use.

Numerous ASTM personal protective equipment standards have been recognized internationally by the World Health Organization and by U.S. health agencies such as the Centers for Disease Control

and Prevention, National Institute for Occupational Health and Safety and the Food and Drug Administration.

ASTM International also released a technical white paper, "Global Collaboration to Advance Personal Protective Equipment (PPE) Safety, Quality, and Innovation," which identifies the current landscape of standards development for PPE.



Want to read additional ASTM International standards regarding COVID-19? Visit professionalroofing.net.

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