



Technical Bulletin

May 2021

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Deck Movement – Causes & Concerns

Roof decking (substrate) movement is common and similar to other building materials that shrink and expand with temperatures and moisture content changes. There are many factors that contribute to excessive deck movement that can lead to shingle concerns that include but not limited to:

1. Improper Installation
2. Moisture
3. Inadequate Ventilation

Installation: When decking is installed, gaps are left between boards, as the gaps are where the clips/fasteners will need to be installed. These clips/fasteners allow the deck to move with temperature. Improper spacing of roof sheathing may cause the appearance of buckled shingles due to expansion/contraction.

- **Recommendation:**
 - For proper spacing of plywood and Oriented Strand Board (OSB), the Engineered Wood Association (APA)1 recommends minimum 1/8-inch and maximum 1/4-inch space between panel edge and end joints.

Moisture: Roof deck materials are similar as other building materials, except that the decking materials are more affected by moisture than temperature. It's important for these materials also have and maintain balanced moisture content.

When new decking is installed or the old roof is torn off, the wood deck is exposed to weather. When the deck is exposed, gets wet, or if there is a high percentage of humidity in the air, the wood can absorb some of this moisture. As the moisture content in the wood increases, it can cause the deck to shift and move (expand and/or contract).

A substrate with too much moisture or improper installation will cause the deck to move resulting in shingle failure. This typically results in the shingles to either split as it dries or buckle as the board

edges push against each other. In either case, the results will likely be visible from the ground and could compromise the roof's overall performance. As a result, newly installed shingles may appear wavy or wrinkled because asphalt shingles will conform to imperfections in the underlayment and the roof sheathing, causing irregular shapes to transfer through the surface of the roof covering.

- **Recommendation:**

- It's critically important to install the roof sheathing/deck correctly and allow the deck to completely dry before asphalt shingles are installed.
- Allow moisture to escape the roofing system. Once the roofing system reaches the proper moisture content the roof should lie flat and the buckling problem should not return.

Inadequate ventilation: Inadequate ventilation of the roof deck is also a contributing factor of deck movement and shingle buckling. Inadequate ventilation may reduce drying and may cause condensation and/or accumulation of moisture in the roof sheathing leading to the appearance of buckling.

- **Recommendation:**

- Provide adequate roof ventilation to allow moisture to escape from the roof system.
- Consult local building code requirements for guidance on the correct levels of air exchange, intake balance and exhaust venting.
- The U.S. Federal Housing authority recommends a minimum of at least 1 square foot of attic ventilation (evenly split between intake and exhaust) for every 300 square feet of attic floor space. Always have a balanced ventilation system.

The appearance of buckling of asphalt shingles is generally due to an uneven roof deck, movement of roof sheathing, and/or inadequate ventilation. Wrinkled underlayment can also contribute to buckled shingles.

- Asphalt felt underlayment's (Organic Felts, Engineered Felt and Ice & Water) may wrinkle when exposed to rain prior to the installation of asphalt shingles. When the felt underlayment and asphalt shingles are installed wet and/or over wet roof deck moisture may be trapped below the roof covering for a period of time and may result in the movement of the deck materials and/or wrinkling of the underlayment leading to the appearance of buckling of asphalt shingles.
- Self-adhered underlayments may also wrinkle if there is poor adhesion to the decking materials, especially in cold temperatures, dust conditions, dirt/debris and wet conditions.
- Compressible underlayment materials such as foil faced reflective insulation blankets, may also be the cause of buckling of asphalt shingles.

- **Recommendation:**

- The shingle underlayment should be completely dry and should have a relatively flat and smooth surface before shingling. DO NOT shingle over wet underlayment.
- Remove the shingles from the affected area.
- Cut out the wrinkled felt and replace with new underlayment and install new asphalt shingles.
- Consult the services of a licensed/certified roofing professional.