

Nail Pops on Asphalt Roofs

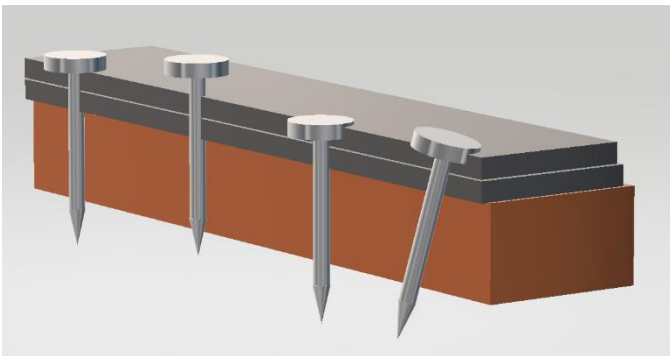
Introduction

A protruding nail is a common problem found on residential roofs with asphalt shingles. The roofing industry refers to these as Nail Pops. The image below shows a typical Nail Pop.



The nail actually pops up and out of the wood deck causing the shingle to be lifted. The nail backs out of the wood deck where it once had been adequately inserted to the correct depth.

This should not be mistaken for nails that are incorrectly installed, which does happen. Nails that are incorrectly installed would be nails that are under-driven, over-driven, or driven at an angle to the surface.



Misdiagnosis as Wind Damage

Do not be fooled. It is common for people to view their roof from the ground and incorrectly come to a false conclusion of wind damage. The following image shows

several lifted shingles as seen from the ground. Wind does lift shingles, but this roof has nail pops.



A Closer Look

When viewing the distortion from the roof, a shingle may be found to be in an upward position due to a nail head. The image below shows a shingle tab being pushed upward by a nail. It cannot lay flat.



The Sealant Strip

A correctly installed nail will be located just below the sealant strip. The image below shows a nail within the sealant strip. The shingle tab was no longer sealed. The nail had stepped out approximately ¼-inch.



The Cause of Nail Pops

Nail pops are common in the roofing industry. Nail pops on roofs usually coincide where there are roof deck moisture problems.

Roof sheathing naturally cycles through wet and dry periods along with extreme changes in temperature. Moisture and temperature cycles create volume changes in the wood. Wood is like a sponge. It expands when wet and shrinks when dry. Over a period of times the volume changes in the roof deck can cause a nail to back out of the roof deck. Why one nail will hold while another backs out is still a mystery. However, there are many imperfections in plywood that cause local variation.

Humidity and Temperature Relationships

The outside environment has a certain amount of water vapor in the air. The temperature is forever changing. It is either warming up or getting cooler. The changes in humidity and temperature cycle daily and seasonally.

Wood members and wood deck in a building are forever responding to the changes in the air temperature and the humidity of the atmosphere. Wood is absorbing and releasing moisture based on the environment.

In winter, it is not uncommon to find frost or condensation on the underside of roof decks. Based on many different situations that may bring moisture to the wood within the attic, the wood deck can be very dry or even saturated.

Nail Head Rupture

When the nail head protrudes upward the nail head pushes on the underside of the shingle. As the shingles cycle through extreme heat, the nail head cuts into the asphalt shingle. Eventually, the nail head pops out of the outer surface of the shingle and a hole is created where water can enter the roof. As water continues to enter the roof, the wood deck warps and rots with time. The problem will worsen over time.

A Symptom of a Bigger Problem

The localized problem is a wet wood nailing substrate with cycling of drying and rewetting leading to a single nail backing out of place.

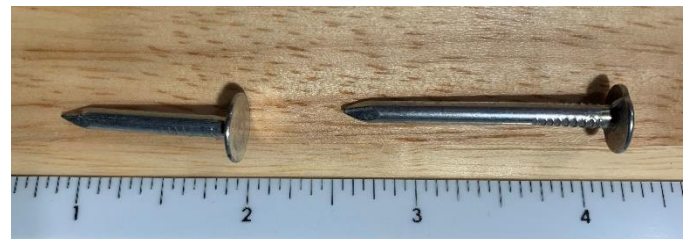
One or two nails on a roof is not the end of the world. Local imperfections at those nails may be the leading cause.

If there are numerous nail pops on the roof and there is evidence of a moisture problem in the attic, further investigation may lead to a conclusion that the nail pop mechanism was related to a bigger problem.

Inadequate ventilation or an unwanted source of water may be significantly contributing to the problem.

Nail Length

Often the problem occurs when the nail is not adequately installed. Nails are required to fully penetrate a roof deck. If a roof has two layers of shingles, longer nails must be used to have the nail fully penetrate the deck.



Attic Moisture

Attic spaces are required to be ventilated and insulated. Warm moist air within the house escapes into the attic. If too much moisture is in the attic and the air is not adequately vented to the outside, moisture will condense on the underside of the roof deck. Over time, the roof deck can degrade due to moisture.

By Richard T. Abbott, PE, SE
Abbott Consulting Forensics and Design
www.abbottforensics.com