

What Is Salt Killed Wood?

What do cured-meat producers, departments of transportation, Northern homeowners, and Southern marina operators have in common? All use wood for its natural durability and chemical resistance, and all deal with high concentrations of salt. Over time, high salt concentrations can degrade wood under certain conditions. Wood deteriorated by salt is sometimes called “salt killed.”

Wood can be degraded in a variety of ways. These include

- biological factors, such as decay and insects
- mechanical factors, such as foot traffic, wind-blown sand, fire, and sunlight
- chemical factors, such as those used in pulp and paper manufacturing

Biological factors cause the greatest financial impact and are the most discussed. These include wood rot, termites, carpenter ants and bees, wood-boring beetles, and marine borers. Preservative treatments and techniques usually target these organisms and try to minimize their harm to wood.

Chemical deterioration is much less common and at times is misdiagnosed. Chemical deterioration generally occurs when high concentrations of chemicals touch wood. Over time, these chemicals can collect on the surface, soak into the wood, and ultimately weaken the wood from the outside in.

An example of controlled chemical degradation is soaking wood chips in strong chemicals that soften and dissolve the lignin (the glue that holds wood together). The result of this process is a mass of delig-



Figure 1. The chlorine in salt can, in certain circumstances, slowly degrade wood. High salt concentrations, high moisture levels, and warm temperatures can accelerate the process.



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Figure 2. Salt killed piers, pilings, seawalls, and other marine structures are common.



Figure 3. Salt kill occurs as intertidal salt from the water is deposited on the wood structures or wicks upward in the wood.

nified wood pulp. This pulp, which is a collection of individual wood cells, can be made into paper.

Under certain in-service conditions, salt can degrade wood. Table salt is a combination of chlorine (commonly used in bleach and in water treatment) and sodium. In certain circumstances, the chlorine in salt can slowly degrade wood. High salt concentrations, high moisture levels, and high temperatures can accelerate the process. Exposure to mechanical abrasion (foot traffic on decks), sunlight (south-facing structures), pressure washing, and wave action can accelerate deterioration.

Chlorine is a natural pulping agent of wood. As salt is deposited on or in wood, it often leaves a whitish, powdery residue on the surface. Under certain circumstances, the chlorine can be absorbed into the wood and soften the lignin. The result is a wood surface that looks fuzzy or stringy. This is because the individual cells that make up the wood retain their individual structure, but they are no longer stuck to each other. In addition to a fuzzy or stringy wood surface, a pile of wood dust, or pulp, may result.

This type of deterioration is **not** related to the preservative treatment process. Preservative treatments primarily protect wood from biological organisms. Some wood-protection chemicals also act as water repellents. This water repellency helps protect wood from both biological and chemical deterioration by limiting how much of a chemical can absorb into the wood.

Differences in the natural permeability (absorbency) of wood can cause differences in salt deposition in the wood. Among other things, permeability is affected by inherent differences among wood samples,

species, and processing treatments (such as incising). Permeability also differs between earlywood and latewood, heartwood and sapwood, and kiln-dried and air-dried wood.

Occurrence of Salt-Killed Wood

There are a few common instances where salt-killed wood occurs. Salt-killed wood can occur in meat-curing houses, warehouses, and pantries where salt and fertilizers are stored. Saltwater dripping from curing meat or salt leaking from broken containers can cause wood deterioration. Over time, the floor under the pantry, warehouse, or meat hanging racks chemically degrades and needs to be replaced. Careful house-keeping and wood surface coatings can often lengthen the life of wood in this situation.

Salt storage sheds used by highway departments are another instance. Water from snow mixed with salt has been a source of deterioration for some salt storage sheds. This type of deterioration can be minimized by using different salt formulations for road salt and by adding creosote or oil-borne preservative treatments to the wood. These treatments are water repellent. Despite this type of deterioration, wood is generally considered far more chemically resistant than are other structural materials, such as steel and concrete.

Another instance of this type of wood deterioration is on wood decks or walkways that receive periodic icing. Homeowners sometimes spread table salt or water softener salt on wood decks and walkways, which can cause chemical degradation. In more northern climates, safer types of de-icer salts are available.

Another example of chemical deterioration is cleaning with a strong bleach solution. Sometimes

diluted household bleach is used to remove mold and mildew from the surface of wood structures. If the solution is too concentrated and not rinsed off well, the chlorine in the bleach can begin to pulp the surface of the wood. This causes fuzziness as the wood cells are loosened. Harsh concrete cleaners can also cause chemical degradation.

Sometimes these types of cleaners are used with pressure washers. The high-pressure water from a pressure washer is often enough to cause some of the wood surface fibers to lift up or break off. When pressure washing is combined with diluted bleach or other harsh chemicals, the result is very often a fuzzy or partially pulped surface. Thus, it is usually best not to pressure-wash wood surfaces.

Finally, salt-killed piers, pilings (Figure 1 and 2), seawalls (Figure 3), and other marine structures are common. This phenomenon occurs as intertidal salt from the water is deposited on the wood structures or wicks upward in the wood (similar to water wicking up a paper towel). In untreated wood or wood treated with water-borne preservatives, this chemical change is not uncommon, especially after many years of service.

Generally, only the outer shell of the wood is degraded, as this is the portion with the highest concentration of both salt and sunlight. A more permeable piece of wood will degrade faster than less a permeable piece of wood, even if both pieces are exposed to identical conditions.

Surface coatings are not considered very effective at slowing salt kill for two reasons. First, it is difficult or impossible to get a quality, lasting bond between a surface coating and a partially pulped wood surface. Second, saltwater will continue to wick upward in the wood structure, so the wood will continue to deteriorate underneath the coating.

In some cases, high-temperature kiln drying can help prevent salt kill by closing or aspirating the pits in the wood, leaving it less permeable. However, this process is not very effective.

In any case, during project engineering and material specification, it is important to consider the environment in which the wood product will be used. Additionally, in the case of remedial work, it is important to identify salt killed timber accurately and to know the differences between it and wood that is biologically attacked.

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