



POLE PRINCIPLES

Guidance for specifying and using preservative-treated wood poles

Checks and splits in wood poles

Wood utility poles do not differ much from their original form, a tree. The key differences between the two are that wood poles do not have bark and they've been pressure treated to extend their life in service to decades.

Since wood poles are similar to the tree they come from, they also share in the natural changes that come when the tree is no longer a living, growing object. Most of these changes come from the variations in the moisture within the wood.

Checks and splits in the wood are the most common – and most misunderstood – occurrence of these natural changes. A check is a separation of the wood fiber on the surface of a pole. A split is a deeper, wider separation extending toward the center pith of the tree.

The appearance of checks and splits in a wood utility pole are often seen as an indicator that the pole is weakening and will not perform as expected. However, the reality is that checks and splits typically have little impact on the performance of the wood pole.

Water and wood

Wood is a hygroscopic material, which means it takes in and releases water depending on the environment where it is used. Wood naturally dries as the water in the wood cells evaporates. The speed of this process depends on the temperature and moisture conditions of the environment; the warmer and drier the conditions, the faster the drying.

The outside of a wood pole dries faster than the inside. Also, some sections may dry faster than other parts based on exposure to the sun and heat. Since this drying is uneven, wood cells in one portion may shrink faster than those nearby. This can lead to a separation of the wood fiber, which results in checks or splits along the length of a pole.

Wood shrinks more tangentially, or across the grain, than radially or from the center out. This is due to the presence of rays, which are wood cells oriented perpendicular to the trunk of the tree. Douglas fir has more rays within the wood, which makes it more susceptible to checks and splits compared to other species such as Southern Yellow Pine.

Issues with uneven drying can be minimized by drying the wood under controlled conditions using a dry kiln. However, the larger the wood product, the more difficult it is to kiln dry the wood. For a wood pole, the largest wood product made, it's impractical and costly to fully dry the wood in a way that eliminates checks and splits.

Controlling the impacts

Checks and splits have been common in utility poles for more than a century. Over that time, experience has shown the impacts of these on the structural capabilities of poles have been minimal.

Before treating, poles may be seasoned, or air dried, by stacking them outdoors. The length of time depends on the climate conditions where the poles are stored. Even under the best of circumstances, all wood poles will eventually have checks or splits.



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Wood treaters over the decades have recognized this and they work to utilize such separations in the wood as part of the treating process. Checks in wood provide a path for the preservative to move deeper into the wood. Pole manufacturers work to ensure that most of the checking and splitting takes place prior to pressure treating.

Poles that show no checks or splits, particularly Douglas fir poles, may indicate most of the moisture in the pole was not removed prior to treatment. Once in service, the pole will continue to dry and check, breaking the protective preservative barrier and creating a path for decay to move into the wood.

Also, the lack of checking may indicate the pole has not been properly sterilized with heat during the drying process and there may be active decay within the pole.

Impact on strength

Checks and splits typically have little impact on the structural capabilities of the pole. National ANSI standards for wood poles only limit checks and splits in the butt and the top of the pole, where split butts or tops can impact the pole's performance in service.

Much of the strength of wood is related to the orientation of the wood cells. Under a microscope, wood fiber looks like a series of straws which carry water and nutrients along the length of the tree. This configuration in the wood fiber effectively resists compression loads, or the downward forces, as well as bending loads, or forces moving side to side.

Wood poles are classed under ANSI standards in a green, or unseasoned, condition to ensure the fiber is there to provide the strength. As the wood dries, the fiber gains strength, so checks and splits are not considered as a defect in ANSI standards as all the fiber is still present.

Pole tops, ends

Pole tops, in particular, take the brunt of exposure conditions that can lead to excessive checks and splits. To combat this, wood pole producers offer anti-splitting devices for poles. These include plates or shaped metal brackets that are pounded into the pole ends. These devices control the movement of the wood as it shrinks and swells over time.

Many utilities also apply covers or coat pole tops with tar to protect against splitting. Research indicates these measures offer good protection when installed in the early years of a pole's service life.

Checks and splits are natural characteristics that develop as wood poles dry. The appearance of checks and splits is beneficial prior to pressure treatment in maintaining the protective envelope in the outer layer of the pole. In nearly all instances, checks do not impact the structural capabilities of the pole.

