

TENSILE PROPERTIES OF CORK IN THE TANGENTIAL DIRECTION: VARIATION WITH QUALITY, POROSITY, DENSITY AND RADIAL POSITION IN THE CORK PLANK

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Summary

The behaviour of cork under tensile stress in the tangential direction was evaluated in relation with its structural characteristics. The study was made using raw cork planks of two commercial quality classes (class 1, good quality and class 4, poor quality) collected at one industrial mill after post-harvest six-month air stabilization. Cork samples were taken at three radial positions in the cork planks (outer, mid and inner part). The porosity of the samples was determined by image analysis on the surfaces parallel to the tensile stress.

The tensile test used a crosshead speed of 5 mm min^{-1} , corresponding to a strain rate of $1.7 \times 10^{-3} \text{ s}^{-1}$. Young's modulus was calculated from the average slope of the stress-strain curve between the loads of 10 N and 100 N, corresponding to strains between approximately 1% and 2.5%.

The cork samples presented densities ranging $0.129\text{-}0.186 \text{ g.cm}^{-3}$ and porosities ranging 2.9-10.7%. There was no significant difference in the tensile properties of cork samples obtained from cork planks of different quality classes. However, the radial position in the cork plank was a highly significant factor of variation in the tensile tests, with higher strength for the cork samples taken in the inner part.

The tensile properties (Young's modulus, fracture stress and fracture strain) showed a good correlation with cork density. The porosity had a good correlation, but in inverse order, only for the good quality (class1) cork planks.

Key words: Cork, tensile strength, Young modulus, cork quality, cork density