HYDROPHOBICITY CHANGES OF WOODEN SHINGLE DUE TO ARTIFICIAL WEATHERING

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INTRODUCTION

A major utilization of wooden shingles (WS) is for the restoration to preserve the traditional character of folk architecture. The utility of WS on historical buildings is thus underlined by continuous effect of abiotic degradation. The abiotic degradation includes two modes, which are chemical pathways and mechanical action. The commonly recognized modes of abiotic degradation involve weathering, mechano-sorptive relationships, and friction / erosion / mechanical-related damage. Just a few years of outdoor exposure to sunlight and the direct "weathering" effects of rain can drastically change the "quality" of this roof covering, so regular maintenance is required to ensure its longevity. Under the influence of sunlight photodegradation, and subsequent decomposition of lignin occurs. As degradation of lignin develops, fiber-to-fiber bonding is reduced, this develops deeper surface checking. This checking allows deeper penetration of UV light and enhances deeper moisture absorption / desorption and change the hydrophobicity of the wood surface..

The aim of our experiment is to further extend the current knowledge of hydrophobicity changes of wood surface coated by various types of preservative exposed to artificial weathering, and artificial rain on wood construction.

MATERIALS AND METHODS

The experiment was performed with cut and split spruce (*Picea abies* L.) samples. The cross-sections of all samples were covered by epoxy resin to prevent water absorption in the longitudinal direction. The specimens were coated by a three preservatives according to the manufacturer requirement's.

- **Wood tar** (by-product through destructive distillation of pine wood in the manufacture of charcoal at high temperatures without access to air)
- **Carbolineum DETECHA** (distillation residues of benzoic acid + biocides)
- **Luxol** (thin-layer stain with biocidal effect made from a mixture of petroleum distillates)

Figure 1 Different types of used coatings, from the left – Wood Tar, Carbolineum EXTRA and Luxol

After application of the preservatives the samples were air-conditioned at the relative humidity of 65 % and the temperature of 20 °C. The samples were stored on wooden construction (Fig. 2) and exposed to artificial rain that correspond to annual rainfall in Czech Republic. The change of hydrophobicity of coated samples was measured gravimetrically.

After the first measurement the samples were exposed for 100h to artificial weathering with specified conditions (Tab. 1). After the end of the first cycle of artificial weathering, the samples will be again exposed to artificial rain and the change in hydrophobicity will be calculated. A total of 10 cycles will be performed.

Table 1 Specified conditions of artificial weathering

Filter	Irradiance	Wavelength	Exposure Cycle
Daylight	180 W/m^2 (at 300-400 nm)	300-400 nm	102 min light at 63°C Black Panel Temperature, 18 min dark and water spray

Figure 2 Wooden construction made for artificial rain.

The first part of artificial weathering test of cut and split groups was performed. The samples were stored on wooden construction and exposed to artificial rain. The first hydrophobicity change of the treated samples was measured gravimetrically. Other parts of the experiment are running.

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