Professional tip

Spalling and formation of bubbles at weathered painted surfaces outside Effect of humidity and water on wood and wood finishes

Treatment suggestions

The water sensitivity of the wood plays a very important role in the coating technology. An open-pore paint, that meets the requirements, such as durability, aesthetic, easy and efficient processing, is therefore a technical masterpiece among paint professionals.

Wood primarily consists of cellulose, hemicellulose and lignin. The cellulosics are able to absorb large quantities of water, whereas Lignin acts hydrophobic, that means water repellent.
Even from dry desert air a varnished piece of wood may still absorb so much water that the humidity of the wood may reach 5%, although the wood is coated by layer of varnish.

Dependency between wood moisture and relative air humidity

Relative air humidity in % at 20 °C	Wood moisture in %
20	4,5
30	6,5
40	8,0
50	10,0
60	11,5
70	13,5
80	17,0
90	22,0
100	ca.30,0

At 30%, the so-called saturation humidity is reached, because the cell walls can not bind more water molecules. They do not swell any further. The water storage will from that point on take place in the cell cavities, which do not expand.

The water is absorbed in the form of water vapor in a given speed. Since the water vapor passes through the timber, a paint system always needs to be symmetrical, that means that, in the ideal case, the coatings on the inside and on the outside need to be equal. If, by renovating, the thickness of the paint outside increases, the same must be done indoors. If the steam has problems with passing the coating of the wood, a considerable pressure is formed against the lacquer layer.

Example:
DUBNO Priming Oil N° 261 applied indoors doesn't hardly impede the steam entering the timber. It allows large quantities of water vapor to pass unhindered through the woods. The timber, for example of a window frame, can therefore arbitrarily absorb and release water vapor from the air, whereas a coating with a water vapor impermeable lacquer does not let the vapor escape. An ongoing moisture content of over 30% caused by such a vapor barrier leads to rot. Furthermore, it leads to a high water vapor pressure in the form of bubbles and spalling on the topcoat layer.

In summer, the air stream flows from the outside to the inside. Assuming that the temperature is 25 ° C and the relative humidity is 75% in the outside area: 25 ° C warm air can absorb maximum 23 g water / m^3 of air, air with 75% relative humidity then contains 17.25 g water / m^3 of air (this amount represents the water vapor saturation level at 20 °C).

When this air quality flows through a wooden frame, which is adjacent to a temperature-controlled housing, the air flow will slowly cool down in the wood until the formation of dew, that means 100% relative humidity,

where the air reaches the 20 °C. If the interior painting is sufficiently permeable to water vapor, the wood may dry the airflow, so that the window frame inside will show no damage caused by dew formation in the wood.

In winter, the air stream flows from the inside to the outside. Lets take an example of a room air + 20 ° C and 40% relative humidity. In this case, the room air contains 6.9 g of water / m^3 of air, if it is centrally heated rooms.

If this humidity passes a wooden window frame, it slowly cools down on the way to the outside. Dew is formed (= 100% relative humidity) at the site in the wooden frame where the air reaches a temperature of exactly + 5 ° C, because + 5 ° C warm air can absorb only 8 grams of water vapor. The result is the formation of dew.

The LIVOS coating system shall be the same inside and outside, so that the humidity may pass freely without leaving any damage.

Please refer to the technical data sheets on our website: www.livos.de

Order N° 1210-3-7E, October 2010

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