

# Mass transport in the material boundary layer during drying: experiments with sixteen paint coatings applied on dry or wet lime mortar substrate.

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## Abstract

While accessing the drying behaviour of sixteen (water borne) paint coatings applied on air lime mortar substrate, we found a surprisingly good (linear) correlation between the drying index (DI) and vapour permeability (expressed by the equivalent air layer thickness - Sd). We did not expect to find such a good correlation because drying involves not only vapour but also liquid transport. This result indicates that the liquid transport properties of coatings may have little or no effect on drying. Indeed, the capillary suction of the sixteen coatings is not equal and the results concern also uncoated mortar specimens. One major hypothesis is that the material boundary layer can remain dry even when the evaporation front is located at the surface.

We carried out similar experiments where the same coatings were applied and cured on a permanently damp substrate. In this case, the DI-Sd correlation is much weaker. This indicates that data obtained for coatings applied on a dry substrate may well not represent the behaviour of coatings applied on a wet substrate, which often happens in reality in the case of damp salt loaded walls.

These conclusions have implications in the study of moisture transport and decay mechanisms of porous building materials, namely salt decay (to which the depth of the evaporation front is a key-issue).

We will address the framework of the research, describe the methods and materials used, as well as present in detail and discuss the experimental results.