

## Microhardness measurements of paint coatings shorten weathering tests

Paint for architectural coatings is not only used to give surfaces an attractive appearance, but also plays a very important role in protecting facades against external damage and corrosion. To avoid waiting years to see if the coating really protects the surface, simulating and measuring weathering influences is necessary.

Paint coating systems are exposed to severe environmental influences like strong temperature variations, moisture and aggressive media such as acid rain, insect residue or strong cleaning agents. Facade coatings should withstand such influences and have quality characteristics such as light fastness, weathering resistance and easy cleaning.



Fig. 1: Facade of a building with polyester powder coating.

The characteristics of such coatings depend not only on the thickness, but also on hardness, elasticity, degree of polymerisation and resistance to UV radiation. These parameters can be determined using the instrumented indentation test.

To demonstrate weathering influences, measurements were performed on samples with original surfaces (reference), on samples after 400 hours of QUV

radiation (equipment weathering) and after 1 year Florida exposure test (outdoor weathering).

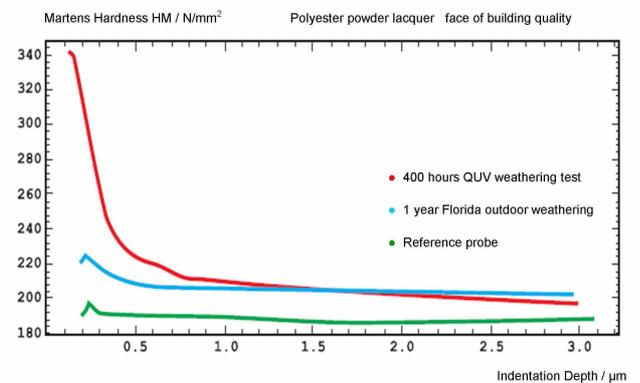


Fig. 2: Influence of weathering on the Martens Hardness of polyester powder coating.

The reference sample (green plot) without weathering does not show a hardness increase at the surface. The sample exposed to weathering outdoors for 1 year in Florida shows a slight increase of hardness near the surface. The sample exposed to QUV irradiation for 400 hours shows the largest hardness gradients. Reason therefore is a change in the molecular structure of the paint. Cross-linking of the paint molecules lead to an increase in hardness caused by the repeated alternation of drying, moistening and irradiation. As outdoor weathering often spans a number of years and involves very expensive sample holders and large standing areas, artificial weathering is used to simulate such outdoor weathering.

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