

E-94/8

F 2007

# Fraunhofer-Institut für Bauphysik

Institutsleiter: Univ.-Prof. Dr.-Ing. habil. Dr. h.c. Dr. E.h. Karl A. Gertis

Amtlich anerkannte Prüfstelle für die Zulassung neuer Baustoffe, Bauteile und Bauarten · Forschung, Prüfung und Beratung auf dem Gebiet der Bauphysik

IBP-Report FB-47/1993

## Requirements of coatings on exposed wooden building elements which may show shrinkage cracks

by

Dr.-Ing. H. Künzel

### Summary

The moisture transport in wood is considerably smaller perpendicular to the fibre than along the fibre. Additionally, changes in water content provoke changes in volume. These are the characteristic properties of wood in relation to water.

Since water absorption leads to expansion, especially perpendicular to the fibre, impeding the expansion results in a reduction of the water uptake. Such an impediment of expansion can be caused by external or internal stresses. The internal stresses depend on the dimensions of the wood sample; the larger the size, the higher the internal stresses. Thus the water absorption of wood is not only anisotropic but depends also on the dimensions (size of the sample).

As long as water absorption and drying take place through the same surfaces - perpendicular to, or along the fibre - there is in general no danger of excessive water contents in the long run. Since the water absorption perpendicular to the fibre is rather small (water absorption coefficient ca.  $0,1 \text{ kg/m}^2\text{h}^{0,5}$ ) protective coats or cracks due to shrinkage hardly affect the water content of wood. If, however, water absorption mainly takes place along the fibre and drying is only possible perpendicular to the fibre then excessive wood moisture over long periods can result which leads to damages.

This is for example the case, if wood is in contact with the soil or if rain water penetrates into the joints of frame work constructions. Since tight paint coats reduce the drying process, a coat for wood should be rather vapour open (equivalent thickness of an air layer  $\leq 0,5 \text{ m}$ ). Due to the characteristic properties of wood an effective moisture protection is better done by constructive measures than by surface treatment, which is demonstrated by examples. The paint coat serves mainly as esthetic measure.

Fraunhofer-Institut für Bauphysik

Nobelstr. 12 · Postfach 80 04 69 · D-7000 Stuttgart 80 · Telefon (07 11) 9 70 - 00 · Telefax (07 11) 9 70 - 33 95  
Miesbacher Str. 10 · Postfach 11 52 · D-8150 Holzkirchen 1 · Telefon (0 80 24) 643 - 0 · Telefax (0 80 24) 6 43 - 66  
Plauener Straße 163-165 · O-1092 Berlin · Telefon (030) 97 83 - 31 15 · Telefax (030) 97 83 - 20 90