TKH Technical Briefing Note 1

Open Time of Dispersion Adhesives

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Adhesive bond failures caused by incorrect timing

Experts from the adhesive industry attribute more than 50 % of all adhesive bond failures to exceeding of the open time*. In order to prevent processing errors and to minimize resulting subsequent faults, the Technische Kommission Holzklebstoffe (TKH) (Technical Committee on Wood Adhesives) of the Industrieverband Klebstoffe e.V., is urging users to put a higher emphasis on individual influencing factors when assessing the open time.

Generally, the open time primarily defines the time span between application of the adhesive and applying of the bonding pressure. The time spans indicated by adhesive manufacturers regarding open times are very general and refer to laboratory tests performed at standard conditions. However, open time must be divided into open and closed waiting time, where the closed waiting time defines the time span after joining until bonding pressure is applied. All uncommented indications regarding the open time are generally referring to the open waiting time, i.e. to the least favourable case. For this reason, the TKH experts stipulate that these values shall not be simply applied to all specific operating conditions. All individual influencing factors of the site must be taken into consideration. Under the least favourable circumstances, bond failures are not immediately visible but rather emerge only after loads are applied, which means when the object in question is being used. In most cases, this is too late for any corrective action and consequently, customers will complain.

To determine the maximum open assembly time of thermoplastic wood glues for non-loadbearing timber structures you can use the DIN EN 16556 which was published in January 2015.

In order to avoid this risk, three influencing factors must be taken into consideration when assessing the open time:

Adhesive:
An adhesive will only achieve optimum strength when wetting of both surfaces to be joined is performed perfectly. In case water content in the adhesive is reduced too quickly (to an order of approx. 50%), final strength is extremely reduced.

Substrate:
The crucial factor is the absorbency of the substrate. Relatively dry (wood moisture < 8 %) and soft and absorbent wood types reduce the open time of the adhesive. On the other hand, with hard, less absorbent wood types as well as many exotic woods where certain ingredients reduce the absorbency and also with very moist woods the open time is prolonged. On account of the reduced absorbency, in these cases the bonding pressure times must be prolonged accordingly.

Ambient temperature:
The higher the humidity, the longer the open time. An interdependence of bond and temperature is only crucial in as far as it is a known fact that with higher temperatures the absolute water absorptive capacity of the air increases. Dry ambient air and in particular draught, which constantly applies dry air to the bond surface, considerably reduce the open time.

*The term “Open time” which is used in this Technical Briefing Note is different from the definition of “open assembly time/ open time” as laid down in EN 923.

Influencing factors for open times	
Reducing	**Prolonging**
• Soft, very absorbent wood	• Hard wood with low absorbency
• Low wood moisture content	• High wood moisture content
• High wood, adhesive and room temperature	• Low wood, adhesive and room temperature
• Low ambient relative air humidity	• High ambient relative air humidity
• Low adhesive coat weight	• High adhesive coat weight
• Strong air circulation	• Low airflow
• Direct exposure to sunlight	• Quick joining of parts