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To whom it may concern

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Statement on time-scheduling for the substitution of wood preservatives

Dear ladies and gentlemen,

the assessment of wood durability is a longsome process. Numerous abiotic and biotic factors are affecting the biological durability of wooden components in outdoor applications. Hence, the relationships between material-intrinsic properties defined through wood extractives, active ingredients of preservatives, or cell wall modification on the one hand, and the resulting performance under the influence of site-specific and design-induced exposure conditions on the other hand, are exceedingly complex.

Today, European standards provide a set of instruments for screening the effectiveness of wood preservatives and alternative non-biocidal treatments aiming at the enhancement of wood durability. Within a few months, results from laboratory tests can be generated under ideally favorable conditions for growth, infestation, and decay of wood by degrading fungi and other wood-destroying organisms. However, their predictive power for real life performance scenarios is rather limited. Hence, only preliminary efficacy assessments can be obtained from such accelerated tests. As numerous studies and long-term projects showed before, they can barely reflect the wide range of exposure conditions, that occur outdoors, especially when wood is exposed above ground, weathered, but sheltered to varying degrees. The situation is getting even more complex, when wooden components are assembled using glue and protected against moisture by coatings, as it is common practice for window joinery. Durability classification, for instance according to EN 350:2016, as well as the approval of wood preservatives does therefore require positive data from field tests which ran for a period of at least five years under climatically favorable conditions, e.g. in warm-humid regions, preferably in the tropics. Alternatively to the use of tropical test sites, exposure times can be prolonged in regions with less favorable growth conditions.

Accelerated test methods can produce valuable data, but always need to be set into perspective. The latter is explicitly requested according to ISO 15686-2:2012, where the general methodology for service life planning is described in detail. Results from short-term and long-term exposure tests shall be compared, and the crucial question is whether similar degradation patterns can be observed - independently from the severity of the respective test. In other words, an accelerated test method can only be considered powerful when the decay mechanisms are very similar or even equal to the real case. This implies the consideration of potential decay organisms, weather and material climatic conditions, the occurrence of so-called non-target organisms that can have antagonistic or synergistic effects, and realistic ageing scenarios including abiotic physical-chemical processes. Importantly, unforeseeable factors, their time-dependent occurrence and their long-term effect on the material-inherent biological durability can be adequately addressed only during periods of several years, partly exceeding a full decade.

The use of organic preservatives is common in different so-called 'use class 3 scenarios'. Use class 3 (UC 3, EN 335:2013) is subdivided into UC 3.1 and UC 3.2, where the latter is characterized by frequent wetting with a potential for moisture accumulation. However, the range of exposure situation within UC 3 is much broader than two sub-classes can reflect. For instance, windows and doors, especially roof windows are usually designed to avoid water trapping and moisture accumulation via constructive protective measures and efficient drainage. In contrast, it is a sensitive building element serving as a bridge between the indoor and outdoor climate and thus interrupting the building envelope. Hygrothermal processes can become critical and need to be carefully considered to quantify the exposure-related dosage affecting the window as well as its specific decay risk. Consequently, complicated and time-consuming adaptations of existing test protocols are needed to utilize accelerated test methods for this particular application.

In the recent years, new wood modification technologies have been developed. The approach of wood modification is to chemically modify the wooden cell wall instead of using biocides. By these changes, the substrate is not recognized by the fungi anymore as food substrate. As a consequence, the modified material is more durable than untreated wood. Some of these new technologies are commercialized in the last years (Accoya, Kebony, TMT), others are under development. From own experience in upscaling processes and supporting in the commercialization it can be stated, that the step from promising laboratory results to a well-functioning full scale, commercial process, it normally takes 5-10 years (at least). Further, the behavior of these new substrates in existing products (like windows, claddings, deckings etc.) is only proved for the long existing technologies, but time consuming tests (see above) will have to be performed for material from new technologies.

We hope to have answered your questions. If you are interested in any further discussion, please do not hesitate to contact us.

Yours sincerely,

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Head of Department

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Researcher and lecturer

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ISO 15686-2:2012. Buildings and constructed assets - Service life planning - Part 2: Service life prediction procedures. International Organization for Standardization. Geneve, Switzerland.