SAMiRA for newly produced materials

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| Superior | Advanced | Minimum |
| A material is modelled according to a full characterization of the properties from tables or obtained from the available technical datasheet. | To represent the material, the available properties are used to select a comparable material from a hygrothermal material database. Subsequently, the basic properties and moisture-dependent parameters, such as moisture retention, conductivity, and vapor permeability, are scaled. | After thorough consideration of the technical datasheet, a suitable representative or generic material is selected from the available hygrothermal database. This approach should be accompanied with a sensitivity analysis for the most dominant parameters. |

SAMiRA for undefined materials

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| Superior | Advanced | Minimum |
| The material undergoes a complete characterization for all properties listed in Table 14. Additionally, the effect of inherent material variability on the output is assessed with sensitivity analysis. | A partial characterization is performed, focusing on the most important material properties. To determine the significance of a parameter, either a sensitivity analysis is conducted, or similar cases described in literature are examined. By doing so, engineers and designers can identify and prioritize the critical material properties that have the most substantial impact on the performance of the material. | When no properties are available, insight on the impact of different properties on the response should be obtained. For each property, a range of values must be considered, including low, average, and high values. Specific quantities can be obtained from material databases or literature. By varying the values, the material’s behaviour can be observed under different conditions and the most critical properties that impact its performance can be defined. |

EN ISO 12572 provides a characterization test for the vapor transport coefficient. This standard distinguishes between two types of measurements: dry-cup and wet-cup. Dry-cup testing provides information on moisture transport dominated by vapor diffusion, whereas wet-cup testing measures material performance under higher humidity conditions. The latter test involves measuring a combination of vapor and liquid transport when the material pores may be partially filled with water. Liquid transport has a defined influence on the moisture behaviour of porous materials with high water content. This is described by liquid diffusivity or conductivity. These properties are highly dependent on the moisture content and can be determined by measuring water-content profiles using different techniques or approximated using the water absorption coefficient (according to EN ISO 15148) and drying behaviour. The storage function is determined by a combination of sorption test (EN 15271) and pressure plate measurements.

When determining material properties, a distinction is made between materials for which a technical datasheet is available and materials for which no properties have been determined. When a material is recently produced, usually a list of declared property values can be found in the technical datasheet. The adaptation to these values is explained according to the three ranking levels:

There are various cases for which the materials used are unidentified and technical datasheets are not available. A big part of those projects concern heritage renovations. There the buildings’ original material is mostly unknown and may have degraded or modified over time, making it challenging to determine its characteristics. Additionally, the variability within a single type of material may be very high, mainly due to the origin difference of the raw materials, natural variability of the constituent materials, and different fabrication methods. This material inherent variance makes it much harder to create a representative material for the renovation project. Therefore, in such cases, it is important to determine the impact of the different material properties on the assembly’s hygrothermal behaviour using modelling approaches.

The superior category requires a complete characterization of the material that incorporates a sampling of the material. The approach considers the minor defects in experimental measuring processes and the natural variability within a single material. The variation in each material property is set to the range of an addition and subtraction of the standard deviation to the measured value. For the advanced category an increased limit is considered, i.e., + 2 StDev and -2 StDev. To prevent convergence problems, it is recommended to fit the storage functions for moisture. The Van Genuchten (1980) bimodal and trimodal equations are commonly used for this purpose to fit the moisture retention functions.