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RENOWAVE
DECARBONIZATION OF THE BUILDINGSTOCK

Analysis and studies from the inventory (SP 2.2/ SP 2.4), A preview of practical solutions for the use of insulating bricks

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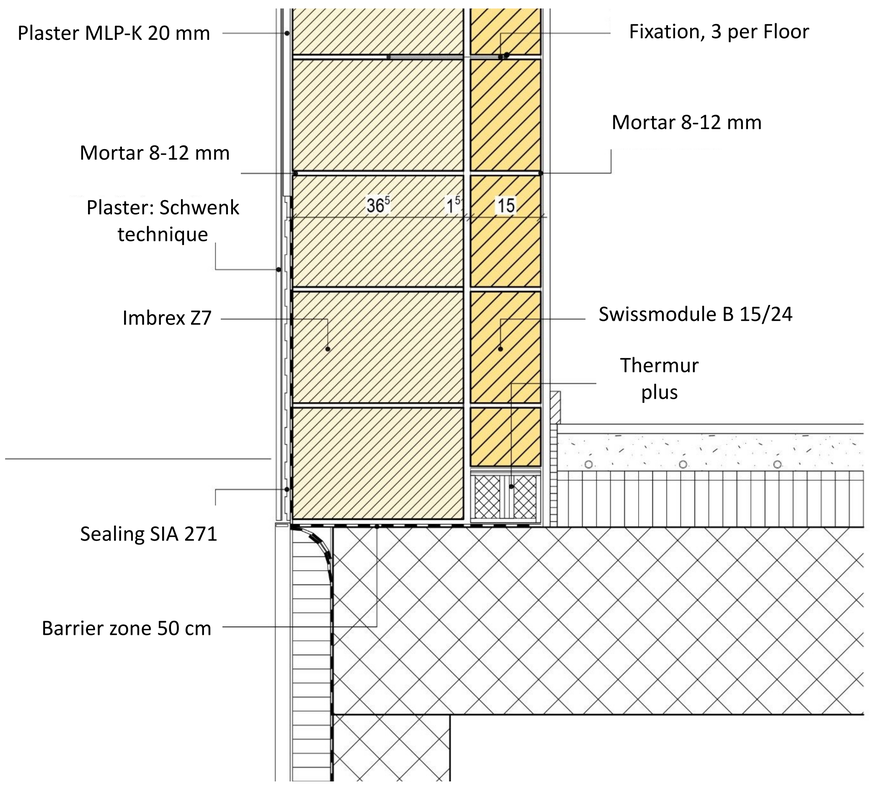
Description

Context

In order to enhance the renovation rate of buildings in Switzerland, there is a growing demand for innovative, comprehensive, and sustainable renovation concepts. One such concept is the KISmur façade system, which has been jointly developed by the HSLU and Keller AG Ziegeleien in a collaborative Innosuisse project. The KISmur system comprises both an internal load-bearing layer and an external insulating layer constructed from bricks. The objective of this subproject is to extend the application of the KISmur system to encompass the renovation of residential buildings, in addition to its current implementation in new construction projects

Method

In collaboration with Keller AG Ziegeleien, this study aims to establish appropriate building typologies suitable for refurbishment using the KISmur system. The primary objectives are to evaluate the potential of the existing building stock in Switzerland for renovation, extension and doubling up utilizing KISmur and to elucidate future market prospects for Keller AG Ziegeleien.
The subsequent phase of the research involves the implementation of the KISmur system within the identified building typologies, for example eREN Type 4, with a specific focus on the application of the insulating Z7 brick. Collaboration with industry partners such as PohlCon AG enables the development of detailed construction plans, encompassing essential aspects of building physics, such as secure fixation and specific solutions for window and roof connections. Ultimately, the study endeavors to produce a comprehensive guideline for building owners, providing detailed instructions on how to effectively renovate buildings using the KISmur system, incorporating the findings and practical insights derived from this research endeavor.



Results

In the current project status, possible façade typologies are being analyzed. Resilient exterior walls, including single-skin or double-skin masonry and concrete constructions, are appropriate for refurbishment. Other criteria are for example the complexity of the façade, the development potential or the given room around the building, as the Z7 brick itself has minimum strength of 30 to 36.5 cm.
Regarding the total quantity of buildings in need of a renovation and the described key factors, multi family buildings from the area 1940 until 1980 are the most promising typologies for a refurbishment with KISmur. In exchange with residential housing cooperatives, some possible example buildings with accessible detailed construction plans have been identified that can be used for further work.

Next steps

- Involve further project partners from the building sector of window production, sealants and plasters to support the detailed planning of the relevant connection between the inside and the outside or from the base to the end of the attic.
- Determine the representative example building and clarify legal aspects with the building owner.
- Work out concrete refurbishment propositions including the KISmur Z7 brick for the chosen example building.

Added-Value

Identification of suitable building typologies

- It has been identified, that buildings in the are between 1940 and 1980 are in generally well suited to refurbish with the KISmur system due to the big quantity of buildings in need of a renovation.
- Because of construction of Z7, the shape and appearance of the façade to be renovated must not be too complex
- In narrow built housing areas, especially in towns and next to streets, the use of the Z7 brick can be more complicated due to its thickness.

Identification of concrete example buildings

- Examples of buildings as for elemental construction, identified, selected according to the requirements for renovation, extension or addition.
- Access to relevant detailed construction plans of the building envelope is given and contact to the building ownership has been built.

Identification of concrete example buildings

- The hygrothermal simulations show that the wall constructions with exterior brick insulation (Imbrex Z7) meet all tested criteria with regard to freedom from damage and exhibit comparable structural-physical behavior to building components with conventional exterior EPS or rock wool insulation.

Challenges

- The acquisition of comprehensive construction plans for building envelopes, particularly from the specified era of 1940 to 1980, has posed significant challenges in terms of time and effort. Moreover, the identification and communication with owners of suitable residential buildings have proven to be difficult, primarily due to the lack of available information on the effective renovation status of the Swiss building stock.

- Incorporating an appropriate project partner from the window construction sector has proven to be difficult, which can be attributed to the absence of a direct benefit, such as the development of a marketable product, within the scope of this subproject.

- In general, incorporating cooperation partners is difficult due to the lack of time and resources of the requested companies. Therefore, we are looking for mixed cooperations with shared financial and time resources in the future.

- The overall target for the wall structure is a U-value of ≤ 0.2 W/m2K.