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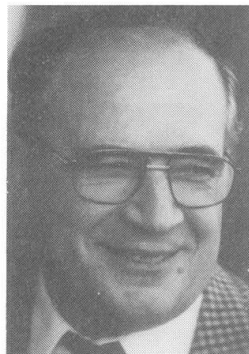
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Mold Fungus Formation in Large Panel Buildings with Subsequent Applied Thermal Insulation

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Study of Civil Engineering.
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Summary

Thermal insulation of large panel buildings which are erected in the 60's up to the 80's is from the present point of view, insufficient. Major thermal bridges are also present in a large number of these buildings. Furthermore, the window constructions are untight and mostly partially damaged. For these reasons the exterior walls of such buildings are subsequently thermally insulated and new windows are installed. In connection with these rehabilitation works it is frequently claimed, that the new airtight windows to an air exchange lead, which is much less than that of the old untight windows, with the consequence of mold fungus formation in the dwellings. Furthermore, it is claimed, that due to the application of the thermal insulation, the exterior walls cannot "breathe" anymore. These claims are wrong! Through sensible heating and functional ventilation mold fungus can be prevented.

1. Problem

Thermal insulation of large panel buildings which are erected in the 60's up to the 80's is from the present point of view, insufficient. Major thermal bridges are also present in a large number of these buildings. Furthermore, the window constructions are untight and mostly partially damaged. Today, in order to save heating energy, the exterior walls of such buildings are subsequently thermally insulated and the old windows are replaced through new tight windows which have better thermal insulation properties. Within the rehabilitation measures, the following two claims are made:

- Due to the new airtight windows, the air exchange in the dwelling is majorly reduced in comparision to the old windows with the result, that the formation of mold fungus can take place.
- The application of a thermal insulation - especially an external thermal insulation composite system - leads to a lasting disturbance of the "breathing activity" of exterior walls. Health consequences cannot be excluded.

Both arguments are not correct!

2. Conditions for the growth of mold fungus

Mold fungus can grow and spread only in the presence of suitable living conditions (fig 1). Based on the spurs, fungus layers begin to grow on the walls. These layers may be green, black or red. In order to prevent the growth of mold fungus, no condensed water or moisture should form on the inner surfaces of rooms. For this, the minimum surface temperature in rooms should never be less than $+14^{\circ}\text{C}$.



Fig. 1: Mold fungus

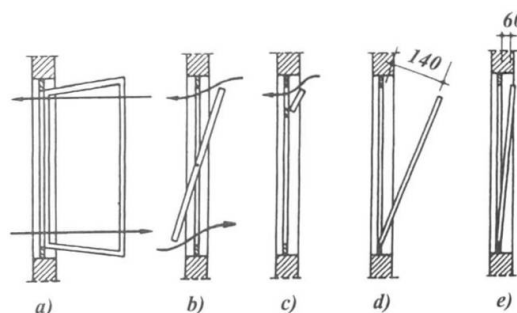


Fig. 2: Types of Window ventilation

Thermal bridges can be excluded as a reason for the formation of mold fungus as long as a thermal insulation system is applied on the outer walls beside the renewal of the windows within the rehabilitation measure.

The ventilation of dwelling due to air exchange through the new tight window joints is not enough in order to prevent the formation of condensed water. Window ventilation leads on the other hand to an extreme unnecessary air exchange between the interior and exterior and consequently to high energy losses. A cleave ventilation according to fig. 2e is enough to prevent a harmful humidity formation in dwellings.

3. “Breathing” of the exterior walls

Now a days, frequently the “breathing” of exterior walls is related to the permeability of walls to water vapour. It can be numerically proved, that the draw off of water vapour from a room through diffusion is much less than that through ventilation.

4. Summary

Thermal insulation measures and tight windows which have good thermal insulation properties do not influence the humidity budget of a dwelling in a harmful manner. On the other hand, thermal insulation measures are meaningful measures in order to save heat energy and to improve other properties of the walls.