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In connection with energy saving proceedings, like intensifying the insulation of outside walls and exchanging the windows, humidity damages develop more and more in dwellings. As a result to this problem more often conflicts arise and are finally dealt with at court of justice; the question in these matters is, whether the residents or perhaps the architects and engineers are responsible for building damages caused by too high atmospheric moisture (dew water damages).

In this essay the following statements concerning the above mentioned problem are made:

- Dew water damages in residential dwellings originate from those situations, in which the surface temperature of walls, which are dealing to the outside climate, or windows is lower than the dew point temperature of the room air. So the important and determining parameters are:
  a) surface temperature of the building section
  b) the dew point temperature of the air in the room
  Both are influenced by the building engineers and architects as well as the inhabitants.

- The surface temperature of a building section is under influence of
  a) the effective k-value of the building section; this effective k - value depends on given facts concerning both constructive and geometric data. Only the designers/engineers are responsible for this k - value;

b) the heat transmission coefficient α_i of the inside surface of the building section, which is mainly determined by geometric realities on the surface of this building section and the designer as well as the inhabitants (by the way of furnishing for example) may influence it;

c) the temperature of the room air which in most cases the inhabitants have an effect on.

- The dew point temperature of any condition of the room air only depends on the absolute humidity in the room. So this temperature is a measure for the moisture contented in the room air. It is influenced by

  a) the production of moisture going directly into the room - in case there is no more humidity left from the time of the building construction, the moisture is caused by the occupants (by people staying in the rooms and by all processes caused by them like washing and cooking for example, and by animals and plants as well).

  b) the ability of the room to absorb water steam, which is influenced partially by the designer (contruction of walls, floors and ceilings), but in the meantime by the furnishing of the room, which the inhabitants have chosen;

  c) the air change rate of the room, which the designer may have taken into consideration by the fact that the windows are not airtight or that an air ventilating system has been installed; the inhabitant, however, can influence the air change rate in the room essentially by his habit of ventilating the room.

- Experts are still discussing uncertainties concerning the quantitative load consisting of intern humidity emissions into occupied apartments. Furthermore the influence of the absorption of water steam by both furniture as well as building ist not sufficiently examined so far.

- The demand for saving of energy, especially in the field of heating buildings, has brought up two negative effects, which increase intensive damages because of air humidity condensing:

  a) Insulating outside walls more intensively in order to reduce the part of the heating energy getting lost by thermal transmission has caused problems, which originate in those critical sections, whose role is not so essential energetically, but causes increasing value, as a damage point because of not sufficent insulation. Those "heat transmission bridges" resulting from constructive mistake - not according to the standards - have to be avoided in future.

  b) Another effort in research was concentrated on windows and their construction. One aspect is, that their role in the building construction has changed: Having been the weakest spot in the building, where condensation took place in a controlled and dangerless way (small drainage channels for the condensing water), they now show extremly reduced k - values and on the other hand, however, as a result of this change, they cannot guarantee a sufficient natural ventialtion any more, since they have got too high grade of airtightness (overfilled regulations). Efforts have to be made to guarant ee at least a minimum of ventilation again through the window.

- These theoretical statements can be approved by practical experience. Damages are often found in new buildings with new airtight windows and in those, where the "heat transmission bridges" of constructive or geometric origin appear in critical spots of the outside walls.

- Relative values of air humidity are easily measurable; but they give little information about the real load of atmospheric moisture in a apartment. In this project the measurements have been experessed in therms of abolute humidity (gramm H_2O per kg dry air)

  It is also possible to find out and interpret the ventilation and heating habits of the occupants by describing the difference values between the absolute humidity inside and outside the building as well as describing those between an unoccupied reference apartment and an inhabited one. Further information results from the comparison of room temperature and dew point temperature in several inhabited rooms.

- In apartments with tight windows and without any mechanical ventilation the highest values of atmospheric moisture are found. In addition the room temperature in these apartments is relatively small, so that dew water damages are expectable, since the surface temperature ist even lower than the room temperature.

- In dwellings with mechanical ventilation the average values of atmospheric moisture are lower.

  The danger of damages because of condensing atmospheric humidity ist obviously extremly reduced in those dwellings with mechanical ventilating.

- The highest values of atmospheric moisture are measured in kitchens. It is proved that there the inhabitants are used to intensive ventilation by opening windows (odours from cooking). Although the room temperatures in bedrooms are found to be on a low average level, the danger of arising of dew water is nevertheless relatively harmless, because also bedrooms are ventilated regularly and the measured moistures varie in the normal standard. Danger of condensing air humidity often arises in living rooms, since here, in spite of sometimes even great emissions of moisture, the ventilation is neglected by the inhabitants and the room temperature here is changing more often, than in other rooms of the apartment. Inside lying bathrooms are safe (regarding dew water damages) in most cases, because there are no outside walls and ventilation is predicted.

- The behaviour of the inhabitants concerning ventilation (by opening windows) depends obviously on the outdoor temperature. If the outside temperatures are winterlike, the apartments are ventilated rarely in order to reduce the energy consumption and safe money. If the outdoor temperatures are reaching values above + 10 degress C, the windows are opened sufficiently. Efforts to reduce the heat energy consumption have to regard possible damages because of condensing atmospheric moisture in the rooms. Constructive "heat transmission bridges" must be avoided, especially at geometric "heat transmission bridges" (corners of outdoor walls).

- Sice today's airtight windows cannot guarantee a sufficient air exchange through the joints, appropriate proceedings have to be made to provide at least a partial ventilation of the additional atmospheric humidity, which devolops in the rooms. Inhabitants must be informed about rigth behaviour in order to avoid damages of the building construction and correct and sufficient ventilation of apartments. Nevertheless it seems impossible to set up standards about air exchange factors for apartments - even it ist not possible for room temperatures.

- Comparing the results of measurements in dwellings, which are mechanically ventilated, with those, which are naturally ventilated, one finds out, that there is no danger of arising damages of moisture in those, which are continuously mechanically ventilated.

Wasserdampfabgabe des Menschen bei geringer Aktivität und normen Raumlufttemperaturen (20 - 22 Grad C) (Angaben aus verschiedenen Literaturstellen) in g/h

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