

Studies on Characteristics of Air leakage and Continuous Ventilation Design in Detached Houses

Motoya HAYASHI

Research Managing Director, National Institute of Public Health

In order to keep indoor climate better and to save energy in detached houses, wooden houses have become insulated and airtightened since 1980's in Japan. The traditional structure was suitable for the humid weather and had complex leakage networks. Even in insulated and airtight houses, the leakage networks have a specific influence upon indoor air quality.

The influence of the leakage networks was investigated using structure cut models and computer simulations. These results show that chemical compounds and mold infiltrate from the concealed spaces as crawl space, ceiling space, and wall cavity to indoor spaces. And the infiltration rates depend on the emission rates in these concealed spaces and the pressure differences between inside and outside. Therefore the emission rates in the concealed spaces and the pressure difference must be controlled.

Indoor air quality in houses with various kinds of ventilation systems was investigated considering the characteristics of the leakage networks and the dwellers' living schedules. Hybrid ventilation systems which keep indoor air quality good through four seasons were devised.

These studies showed that the characteristics of structure, ventilation methods and dwellers' living styles must be considered to keep indoor air quality better and dwellers healthier.