5. CONCLUSION

The air leakage rate for newly constructed apartments in South Korea were measured and analyzed to improve the airtightness on building envelopes. The airtighteness measurements were conducted using the blower door test in accordance with ASTM E-779 and tracer gas method in accordance with ASTM E-741. To confirm the air leakage area, four parts, electric, mechanic-1, mechanic-2, and windows, were divided in the test unit.

The key findings are summarized as follows,

(1) The air leakage rate using a blower door was 0.7~1.0(ACH50) when all parts were sealed. On the other hand, the value was 1.6~2.7(ACH50) under unsealed condition and it can be considered that the unit is generally quite tight. The difference of the ACH50 in each unit between sealed and unsealed was about 1.0~1.7.

(2) To compare the results obtained by the blower door test and the tracer gas method was conducted. When all parts were unsealed, the infiltration rate was less than 0.1(ACH). Because air infiltration depends on the building envelope's airtightness and the pressure differential across the envelope, these differentials were caused by wind, stack effect, and operation of the building's mechanical equipment. It is necessary to study the effect of climatic conditions on these infiltration measurements.

(3) To find the most effective parts related to air leakage, the fan pressurization tests were also carried out. Gaps in the window frames and a mechanical parts 2(air system – ventilation for rooms, hood for kitchen, and exhaust duct line for the restroom) mainly affected the airtightness of the units. The entrance door was also largely influenced the air leakage rate.

(4) Generally, the airtightness of newly constructed apartments was quite tight. The air leakage rate was mainly affected in order by, *the entrance door, windows, mechanic 2 (air system), mechanic 1 (water system), and electric*.
By improving these parts, building energy can be saved and produce more comfortable environments.

In order to understand the influence of the airtightness in buildings, a scrutinization of the building elements and a large number of experiments are generally required. For the present study, the air leakage parts in residential buildings were analyzed and quantitative values related to the airtightness were obtained through the measurements. The data through the sudy can be used to develop the technology for materials and construction methods for improving the airtightness in buildings.

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