RESIDENTIAL VENTILATION UNIT WITH THERMOELECTRIC HEAT EXCHANGER FOR CONTROL OF SUPPLY AIR TEMPERATURE

Daniel Adamovsky
Laboratory of Indoor Environment
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Ventilation of residential buildings is an important topic due to airtight envelope and non-negligible pollutants production.

Control of supply air temperature is in recent ventilation units mostly limited to heating; air cooling is very exceptional and technically complicated.

Strong requirements for energy performance of building and its systems.
TECHNICAL SOLUTION

- What new we have?
- New type of a ventilation unit with additional heat exchanger - active heat exchanger

- EC fans for air supply and exhaust
- Active heat exchanger
- By-pass dampers
- Proportional mixing dampers
- Heat recovery
- Preheating (using TEMs)
- Air filters
TECHNICAL SOLUTION

- Active heat exchanger
- Two aluminum heat exchangers with TEMs in between them.
- Counterflow arrangement of air flows.
- Dimensions 400 x 365 x 60 mm, 1,5 mm flanges.
- Two options:
  - 12 pc TEC1-12715 50 x 50 mm or
  - 36 pc TEC1-12703S 40 x 40 mm
• Air flow rate 25 to 150 m³/h.
• Slim dimensions for installation in limited space.
• XPS body
EXPERIMENTAL MEASUREMENTS

- Test bed for small ventilation units – experimental conditions
  - Summer operational state
  - 147 and 76 m³/h @ 23.5 and 30 °C
  - 30 minutes steady state conditions
    - Change in temperature < 0.2 K
    - Change in air flow rate < 5 %
    - Heat balance difference < 10 %
RESULTS

- Cooling regime of ventilation unit
PLANS FOR THE NEXT...

- Improve airtightness of the ventilation unit body – few modifications in XPS body components.
- Improve airflow configuration through active heat exchanger – better performance.
- Finish control system of entire unit.
- Even further development – replace aluminium HX by another construction – allow higher cooling output (bigger ventilation unit).
CONCLUSION

- Proven advancement of ventilation unit for residential buildings (mostly apartments).
- A ventilation unit with a TEM heat exchanger can expand its scope for the indoor environment of a ventilated room as a warm air ventilation and heating unit and at the same time a cooling unit, which is able to dissipate the heat load with ventilation air at least.
THANK YOU FOR YOUR ATTENTION!

Daniel Adamovsky; daniel.adamovsky@fsv.cvut.cz
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