

Securing the Quality of Ventilation Systems in Residential Buildings: status and perspectives
Brussels on 18-19.3.2013

Quality of ventilation systems in residential buildings - Status and perspectives in Finland

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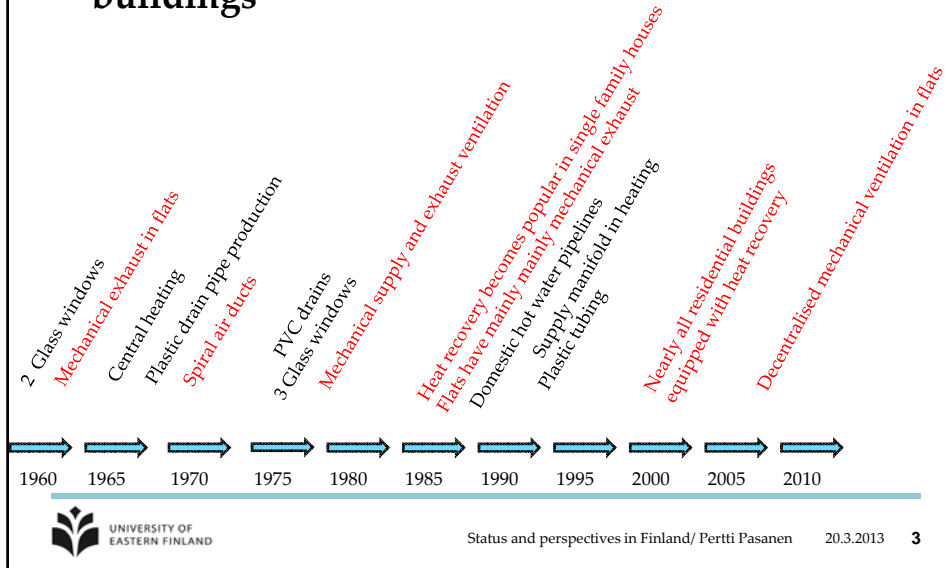
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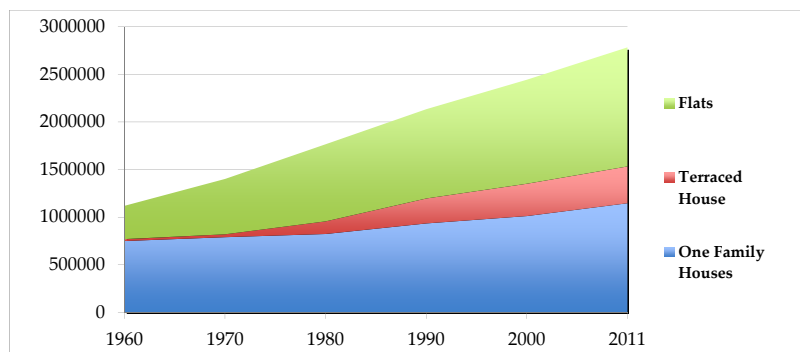
Background and cornerstones



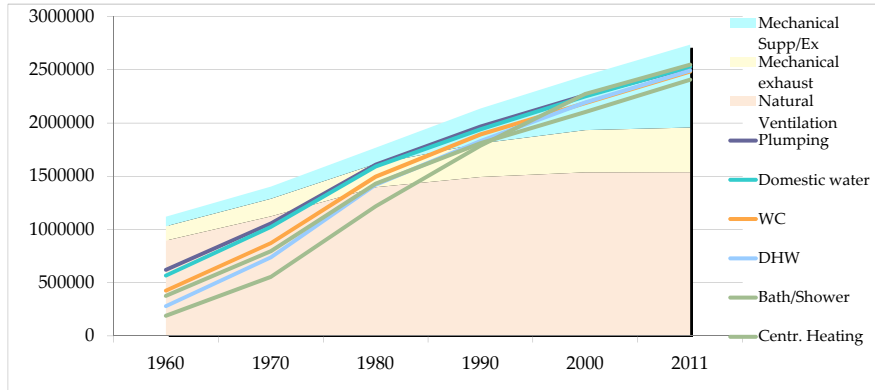
Development of markets in residential buildings



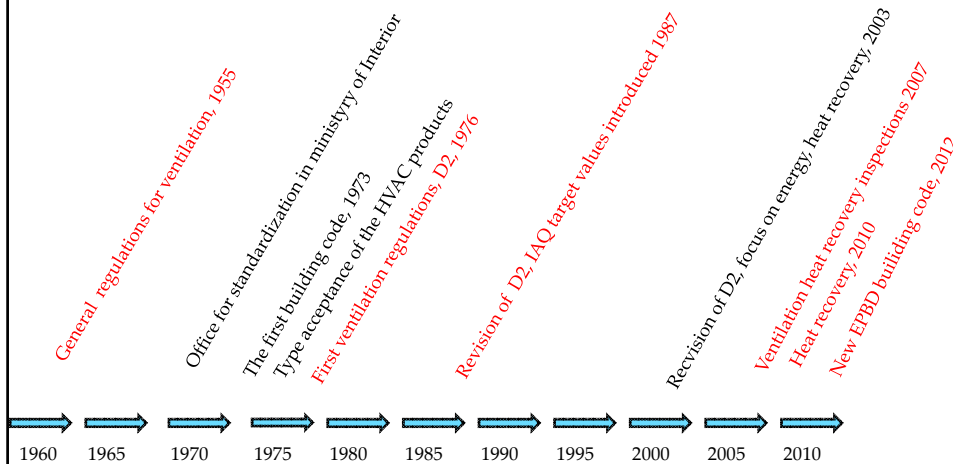
Distribution of residencies in Finland



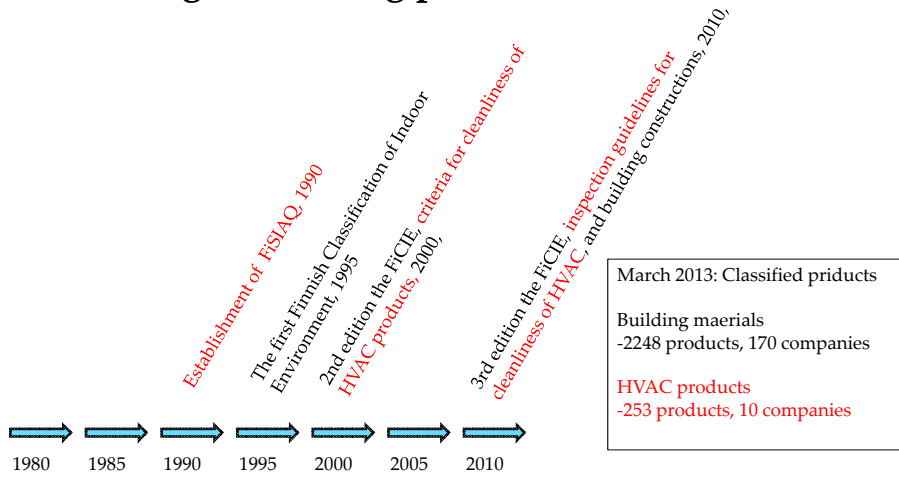
Distribution of ventilation systems in Finland



Regulations & building code



FiSIAQ, Classification of indoor Environment, labeling of building products



Products and design

Demands for the products

- Demands for HVAC system products for residential buildings are the same than in general: tightness, physical properties, standardized dimensions
- Cleanliness: Finnish classification of indoor environment
 - Oil residues:
 - 50 mg/m² for products manufactured without lubrication
 - 300 mg/m² for products that need lubrication in manufacture
 - Dustiness
 - > 0,5 g/m² delivered new components
 - > 0,7 g/m² for installed ventilation systems
 - The products should not release odour or fibres
 - Testing once with every 6 years, new application every 3 years



Design

- No specific demands for designers of ventilation in residential buildings: Demand C for designer (ref. A2, building code)
 - Degree in HVAC engineering
- Design features of the systems are described in the building code, D2
 - Air flow rates, cleanliness demands, cleanability, maintenance aspects, energy efficiency/recovery
- Designers are familiar with building code and demands
 - Design of ventilation systems is checked by the authorities who gives the permission to built
 - In some cases changes are done during installation, leading to poor performance of the system (smaller ventilation unit, lack of sound attenuation)
 - Too small dimensions of ducts (balancing problems, noise)

Installation and commissioning

Installation

- HVAC installers has an education for degree, specialization in installation or the installation can be chosen as a minor subject
 - Duct cleaners have their own degree
- No special certification is needed for residential building,
 - Building owner may install the system by himself
- If cleanliness class P1 is selected to follow, only the classified products need to use
 - This is rare for residential buildings
- Installation company need to balance the system and show the balancing notes with air flow to the authorities in commissioning

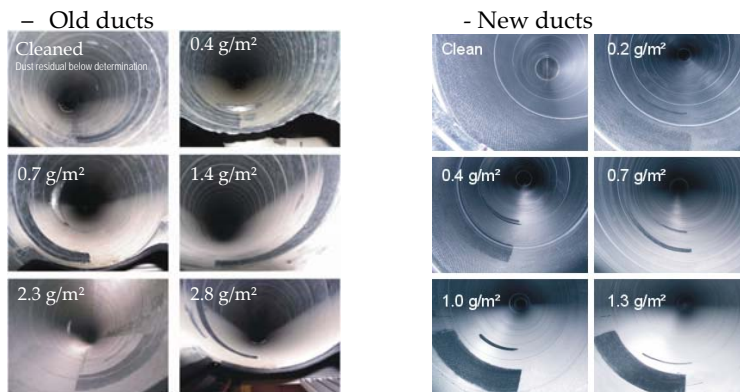


Commissioning

- According to the building code the new building needs to fulfil the criteria
 - Commissioning focuses on building structures, dimensions, safety in installation of electrical network, and less closely to ventilation performance (is done less professionally)
- For ventilation systems, the air flow measurements are demanded, those are done by the installation company, or his consultant
 - Usually not checked by authorities. Are they real, or correct?
- Cleanliness criteria are set
 - Visual inspection
 - Measurements seldom done in residential buildings

Evaluation of the cleanliness

- Visual scale aids to estimate the mass deposited in the ducts (g/m^2)



Maintenance and inspections

Maintenance

- In flats the building maintenance personnel usually takes care of the maintenance of the ventilation system
 - Yearly change of filters, usually ok
 - Inspection of the cleanliness usually once in 10 years
 - Kitchen extract filters cleaned 1-2 times per year by occupants
 - In old houses with exhaust air only, the cleanliness of ducts checked once in ten years, < 50% of buidings follows
 - Sufficiency of supply air is problem
- In terraced and single family houses the occupant take care of the maintenance
 - Change of filters 1-2 times per year, usually ok
 - Cleaning of kitchen extract 1-2 times / year
 - Cleaning once in 10 years, <50% of the houses/apartments



Inspection

- Inspection of performance is done by professional maintenance persons in flats
- In terraced and single family houses by owners, depends on the activity of the owner
 - Consulting companies, duct cleaning companies
 - About 50% of the houses orders a cleaning once in 10 years
 - Air flow rates are checked and the systems are balanced after the cleaning
 - For comparison, the duct work in hospitals is cleaned > 90% every five years, and schools and daycare centers >70 % in every 5 years
- According to field studies the real ventilation rate is usually less than the criteria 0,5 ach/h. **ACH 0,4 1/h is common average**

Summary of problems observed regarding the quality of residential systems

Topic	Major causes of quality problems	Existing quality schemes or incentives
Product	Classified products are ok	Classification of HVAC products
Design	Sound attenuation, dimensions	More attention to noise control
Installation	Cleanliness, thermal insulation	Systematic use P1 installation instructions, better control
Commissioning	As a part of building commissioning	Integration to building commissioning
Maintenance	Change of filters; cleaning Air flow rates	Maintenance instructions, rebalancing when cleaned
Inspections	Not regularly done?	Increase in knowledge

Thank you!



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