

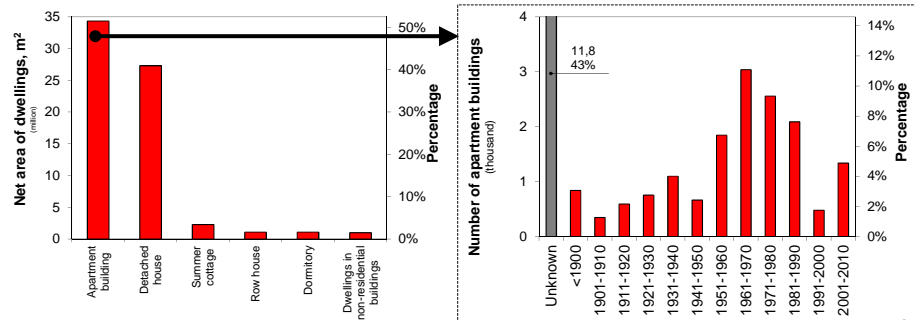
Quality of ventilation systems in residential buildings: status and perspectives in **Estonia**

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Workshop: "Securing the quality of ventilation systems in residential buildings: status and perspectives" Brussels, March 18-19 2013

Residential ventilation market

Type of ventilation system	Type of dwelling and construction period									
	Detached houses					Apartment buildings				
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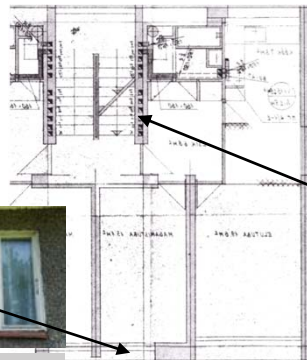


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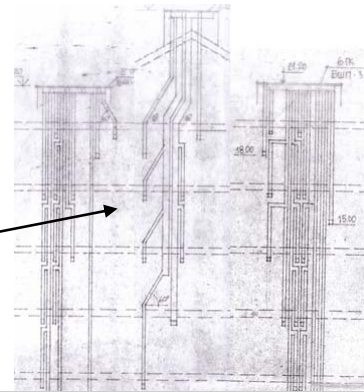
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Leaky windows



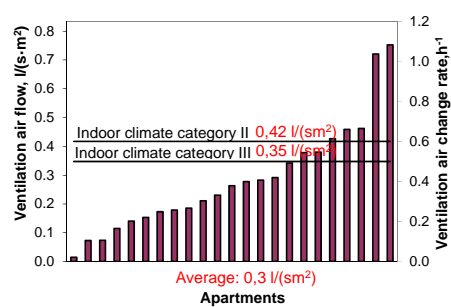
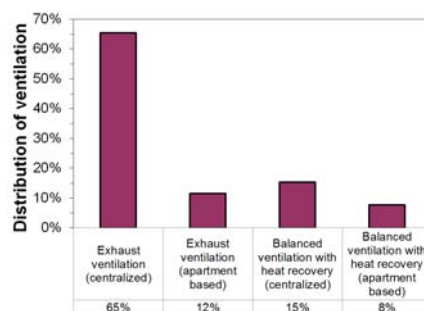
Often the stack is blocked by waste, Not airtight / straight



Stack for ventilation beside stack for stove's chimney

Residential ventilation market: new apartments

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Natural supply and exhaust (passive stack ventilation)										
Natural supply and mechanical exhaust										
Mechanical supply and exhaust with heat recovery										



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Products

Requirements for products

Estonian Building Law:

products of residential ventilation should meet the requirements of **European Harmonised standards**;

if no HS: **technical approval** of:

- specific building product,
- member country of EU or
- European Free Trade Association (EFTA)

Certification Mark (CE):

demand if required by standards

Eurovent certification is sometimes required by the customer (products are tested similarly)

Declaration of conformity must be provided:

all construction products, for which there is a valid:

- harmonized standard for product,
- technical approval or
- which have been provided for safety



European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung



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Products

▪ **The main problems of products**

- high noise level of products
 - absence or too less silencers
 - automation system of products
 - installation manuals in Estonian language (required in regulation)
- solving these problems is commonly the task of designers or installers.
- Manufacturers of products usually do not take any measurements
 - Problems during the warranty time, are solved usually by manufacturers

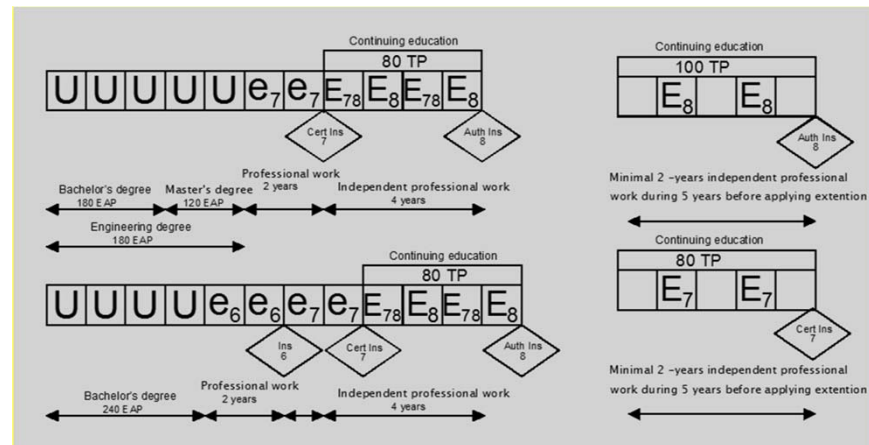
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Design

▪ **HVAC engineer's** professional standard:

- HVAC engineer (EKR Level 6);
- Certified HVAC engineer (EKR Level 7);
- Authorized HVAC engineer (EKR Level 8).



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Design

- The design of ventilation system is done according to **design standards** (prescriptive rules and performance requirements)

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Installation

- **Profession:** „*ventilation duct fitter*“:
 - professional qualification in 3 levels;
 - can be acquired in 5 Vocational Schools
 - ~75 % of ventilation installers do not have any professional preparation at all.



Ventilation can be built by everyone!

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Installation

- Profession
- **Requirements, quality regulation:**
 - Good building traditions are based on valid standards and quality regulations.
 - Constructional information catalogue
 - Finnish HVAC quality regulation (LVI RYL)
 - Electrical installation: by Directive 71/305/EEC.
 - Building Law: installer must provide the customer the following documentation:
 - Design (and its changes);
 - Works diary;
 - Acts of covered works;
 - Protocols of working meetings;
 - Other documentation like as-built drawings and certifications of conformities.

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Commissioning

- **Building Law:** it is not possible to get the certificate of occupancy before providing the measurements of airflows: **commissioning and measurements are mandatory:**
 - Does the building meet the requirements;
 - Does the building project and measuring protocol meet the requirements;
 - Does the technical documentation meet the requirements.
- **Who can?**
 - a certified company,
 - detached houses: owner has also the rights for commissioning.

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Comissioning

- **Measurements** of airflows and sound levels generated by the ventilation:
 - Ventilation airflows must follow the design values ($\pm 20 \dots 10\%$)
 - The level of sound pressure from service systems in living spaces can not exceed $L_{pA,eq,T} 30 (25)dB$.
- **No educational or training schemes** for commissioning of residential ventilation systems.
- Commissioning specialists are often **not competent** and might accept lower quality and extensive replacements in comparison to the initial design.

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Maintenance

- **Suggestion from standard:** maintenance works:
 - Everyday maintenance (or short period maintenance);
 - Regular maintenance to find out the problems;
 - Main maintenance (yearly maintenance);
 - Maintenance based on official regulations.
- **Requirement:** ventilation systems should not be cleaned less than once a year (rarely done).
- **Recommendation** to change the filters 2 times a year
- **Who can?**
 - apartment buildings: a special company,
 - detached houses: owner has also the rights.

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Maintenance

▪ **Common solution:**

- maintenance is not done at all or
- done only in case the problem has already taken place
- ventilation systems do not operate properly or
- are switched off

▪ **Main problems:**

- filters are not changed
- ventilation ducts are not cleaned
- ducts are without cleaning and access panels



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Perspectives

Today, it is basically impossible to fulfill energy performance requirements without ventilation HR

Regulations

Detached houses:

- Genral airflow
 - $0.42 \text{ l}/(\text{s}\cdot\text{m}^2)$
- Heat recovery:
 - Efficiency: 80%
 - SFP $< 2,0 \text{ W}/(\text{l}/\text{s})$
- Noise level
 - $L_{pA,eq,T} 25\text{dB}$.

Apartment buildings:

- Genral airflow:
 - apartment based control $0.42 \text{ l}/(\text{s}\cdot\text{m}^2)$
 - centralized control: $0.50 \text{ l}/(\text{s}\cdot\text{m}^2)$
- Heat recovery:
 - Plate HR
 - Wheel HR (apartment)
 - Exhaust air heat pump

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Conclusions

■ The major quality problems

Topic	Major causes of quality problems	Existing quality schemes or incentives
Product	Products control systems are not working properly, product documentation is not translated into Estonian	yes: EU regulation No 305/2011, Governmental orders and laws
Design	no consideration of noise levels, no ventilation sound attenuators between the apartments, ventilation units are designed on max speed	yes: residential ventilation standards, Governmental orders and laws
Installation	The quality of installation is bad, installations are not made by the ventilation project	yes: Finnish LVI RYL, by EVS-EN 60947-1:2001/A2:2002, Directive 71/305/EEC
Commissioning	Commissioning specialist is not specialist in a field of ventilation,	yes: Estonian Building Law, Governmental ordinance nr 11
Maintenance	Maintenance is not done by the regulations and product guidelines	yes: EVS 830:2003, Governmental ordinance nr 55
Inspections	No regulations	no:

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