QUALITY OF VENTILATION SYSTEMS IN RESIDENTIAL BUILDINGS: STATUS AND PERSPECTIVES IN GERMANY

Market
Ventilation Systems
DIN 1946-6 core element of residential ventilation
Legislation
Product requirements
Training
Maintenance and cleaning

Mechanical Ventilation systems is still a developing market

In new dwellings (and also in refurbished buildings) a high tightness of the building envelope according the buildings regulations results in a higher focus on ventilation issues. The main aspects are:
- Preventing the construction from damage and moulding
- Indoor air quality
- Energy efficiency

Window airing is still seen as a reference in residential buildings

EnEv 2009 first time references to a demand controlled exhaust ventilation unit – Not mandatory

DIN 18017-3 mandatory ventilation systems für wet rooms without windows
- Including fire and smoke protection aspects
EnEV specifies in § 6 that a minimum hygienic air volume shall be realised. No further specifications are made.

In 2009 DIN 1946-6 was published specifying the way how minimum air volume flows can be realised including:
- Building leakage
- Natural Ventilation
- Fan assisted ventilation

DIN 1946-6 was essential for further development.

For high efficient buildings, Efficient ventilation systems are essential.
- KfW 40 House
- Passive house
There is no complete statistic available for German market.

For single dwelling units with heat recovery a statistic is available showing a constant raise of approx. 15 to 20% per year leading to 40,000 units per year now.

Single room units do play a significant role in the market.

The market of exhaust solutions is fragmented into different technologies which are also used in non residential applications.

For high efficient buildings (nearly zero energy, passive house) HR-ventilation is seen as a basic requirement.

Compared to the amount of new dwellings, we estimate that ~30% of new dwellings might have fan assisted ventilation system. The market of refurbishments still is low.
FGK BDH statistic on Residential Ventilation Units with HR for a dwelling

- Central Single Dwelling HR
- Central Single Dwelling with HP
- Total

EnEV German Energy Saving Ordinance 2009 and expected 2014

- § 6 Minimum Air volume flow must be guaranteed
  - Not specified and described how
  - DIN 1946-6 typically used for residential ventilation
- § 11 Inspection and Maintenance
  shall be done to keep the energy performance of the system
  - No specified interval
  - Up to 50,000 € fine in case of not fulfilled
  - The fine has never been paid (so far known)
- § 12 Energy Inspection
  - only for Air-Conditioning > 12 kK
Based on DIN 1946-6 (system requirements) different products and systems can be used.

There are 4 different levels of system qualities:
- Standard requirements
- "H" Hygiene qualified systems for a high IAQ-level
- "E" Energy qualified systems for high energy efficiency
- "S" Acoustic qualified systems for high acoustic requirements

Leading to minimum requirements for products according DIN 4719.
- Standard requirements
- H, E, S qualified products

Higher requirements H, E, S can only fulfilled with fan assisted ventilation systems.

There is no single certification, declaration or verification program in Germany. There is not even a single test method.

The main programs are:
- DIBt approval
  - since over 15 years according to its own rules considering energy, hygiene and fire safety aspects.
- DIN 4719 declaration based on EN 13141 test and will be revised by EN 13142
  - self declaration system for products based on EN tests and fully compatible with the European market.
- Passive house certification
  - standalone volunteering procedure for this style of buildings. The core aspect is energy efficiency.
DIN 1946-6 is a general accepted basis for residential ventilation for design, installation, commission, maintenance and inspections. The standard delivers many checklists for nearly every aspect.

The standard gives guidance for natural and fan assisted ventilation systems:

- Ventilation concept - Necessity of ventilating measures
- Selecting a ventilation system
- Designing of ventilation systems and components including ducting
- Documentation
- Handover and commissioning
- Maintenance and service including time schedules
Volunteering training programs. no general certification for persons nor for companies exist beside the established system of apprenticeship.

The professional organisations and the system providers (manufacturers) typically offer a two days further education and training including all the important aspects like:

- Basic requirements for residential ventilation and DIN 1946-6
- Technologies and Components
- Design aspects
- Installation
- Controls
- Service

In further developments of training schemes, skills on hygiene, health and acoustic aspects must be added in the training plans.
Hygiene aspects play an important role in Germany. Based on former „Declaration of Confidence“ FGK developed a Certification program for maintenance. This includes:

- Knowledge and standards
- References
- Insurances
- Quality
- Training of stuff
- Availability of specialised tools
- Laboratory equipment for hygiene tests
- Documentation
- Health and safety protection at the workplace
- Personal protection devices
- Social responsibility

AIVC - Quality of Ventilation Systems in Germany
Simplified Request for Tender – Cleaning Residential

- Type of the system
- Technical data
- Drawings
- Air distribution system
- Pictures

- List of specialised service supplier included