

AMA and Certification of Ventilation Installers

Two Swedish ways of improving the quality of HVAC-systems



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To reduce the problem with inferior HVAC-systems Sweden is using several quite unique quality assurance systems: AMA (that has been in use for more than sixty years), OVK (compulsory ventilation system inspection that started 1991) and a new system for certification of ventilation installers.

Keywords: AMA, HVAC, Certification, Installer, Third-party, Incert, Quality, Tightness.

AMA (short for Allmän Material och Arbetsbeskrivning) meaning “General Material and Workmanship Specifications” has been in use in Sweden since 1950, i.e. for sixty-five years! The AMA family covers today demands on all types of building and infrastructure projects, such as Buildings, HVAC, Refrigeration, Electrical installations, Roads, Bridges and Tunnels to mention some.

AMA is a tool for the employer (developer/future proprietor) and the designers to specify the demands on the new building and its installations in the building specification.



The AMA Family.

The AMA requirements are based on accepted demands – these are regularly updated in accordance with technology development and (LCC)-costs. Experience from the more than 60 year old use of AMA has shown that it has led to substantially raised quality levels. The demands in AMA are specified in measurable units and in such a way that the tenderers and contractors understand them and are able to calculate a price for their commitments. The demands are – whenever possible – combined with prescribed systems for measuring and reporting the results.

Practically all buildings and their installations in Sweden are performed according to the quality requirements in the AMA specification guidelines. These requirements are made valid when they are referred to in the contract between the owner and the contractor.

AMA vs. Authority regulations

The AMA requirements cannot change but are complementary to statutory rules, regulations and specified building standards laid down by the authorities. There is a difference between the two: Authorities are mostly focused on reducing the risk of injuries to people while AMA (not having to deal with that) is instead focusing on reducing property damages and LCC-costs. Common interest areas for both are to achieve sustainability and low energy use.

Statutory demands, that have to be followed by the building proprietor and the contractor, are based on EU requirements, laws, statutes and directions. The observance of these is normally controlled by the central or local authorities.

In addition to these compulsory demands both parties also have to follow the requirements in the contract once it is signed. The contract documents include a building specification referring, by codes and headings, to specified AMA demands. The fulfilling of the contract conditions is controlled by tests and measurements during the contract works and finally by a specialized surveyors.

Commissioning

Before a new ventilation installation is taken into operation it is controlled in two separate ways:

By the OVK inspection (compulsory ventilation control) which has to be done before start-up and then at prescribed intervals in the future. These are done by certified inspectors on behalf of the authorities to control that the system is working according to statutory requirements.

The additional AMA-requirements are controlled at the commissioning to establish that the installation is performed according to the contract requirements and that the two contract partners, the contractor and the owner, have lived up to the contract conditions. The commissioning includes e.g. control of measured airflows, testing of ductwork tightness and measuring of noise levels as well as checking that the system and component quality fulfils AMA requirements and that the installation operates as prescribed. Another book in the AMA family, AF AMA, covers administrative requirements covering e.g. guarantee periods and commissioning.

Tight ductwork – an example of AMA requirements and practical results

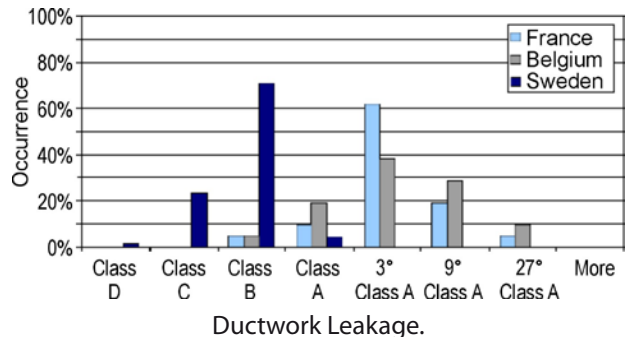
Tightness of ductwork can serve as an example of how AMA has raised the quality of HVAC-systems and components during the years. The first demand on this came already in the 1966 HVAC AMA and was followed by raised demands along with technology improvements (to a great extent influenced by raised AMA requirements) and increased energy costs.

The duct system leakage has to be verified; normally by the contractor as part of the contract (i.e. the cost for this first test is normally included in the contract lump sum). This test is undertaken as a spot check where the parts to be checked are chosen by the owner's consultant. For round duct systems 10% and for rectangular ducts 20% of the total duct surface normally is tested.

In case the system is then found to be leakier than required, that part of the tested system shall be tightened and tested. Additionally, another equally sized part of the system shall be verified in the same manner. Should this part also be found to leak more than accepted the complete duct installation has to be leak tested and tightened until the requirements are fulfilled. The costs for the contractor can be quite considerable if the tests have to be repeated due to bad test results.

Proven quality

The EU-project SAVE-DUCT found that duct systems in Belgium and in France were typically 3 times leakier than EUROVENT Class A, see Figure below. Typical duct systems in Sweden fulfilled the requirements for EUROVENT Class B and C and were thus between 25 – 50 times tighter than those in Belgium and France.



Why this large difference?

Most probably because Sweden has required tight ducts since the early sixties whereas in the two other countries tightness of ductwork was normally neither required nor tested.

Certification of Ventilation Installers

The quality of ventilation systems is vital for a well-functioning building. They must correspond to demands on air quality, thermal climate, low noise levels, low energy use and sustainability. The awareness of the importance of this has increased due to information from authorities, trade organizations and companies.

Well-functioning ventilation is required e.g. by OVK, AMA and environment classification systems. Several studies have shown that inferior systems can cause discomfort, irritation and even result in SBS (Sick Building Syndrome) while high quality systems can increase productivity, comfort and well-being and reduce sick-leave. The conclusion of the latter (REHVA and others) is that the additional investment and running costs for a system with good air quality, providing an acceptable thermal climate at low noise levels and low energy use are low when compared to the benefits achieved by higher productivity and well-being and reduced sick-leave.

The Swedish Association of Contracting Companies (The Employers' Association of Swedish Plate Works) have found that:

- An increasing number of the customers are aware of the risks attached to inferior ventilation systems and the benefits of good ones.
- They often want to have systems that fulfill high

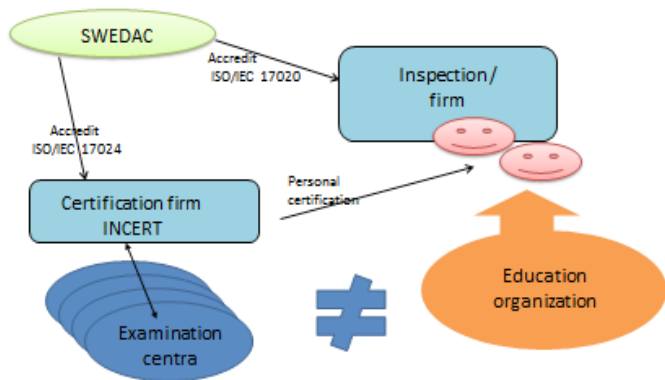
requirements in environment classification systems (Miljöbyggnad, BREEAM, LEED, etc.)

- Customers and authorities are going to require more competence by ventilation installers.
- The confidence of the customers when engaging companies with certified installers is increased and he will be surer of the result of the installation work.
- Certification of their ventilation installers is one way for a company to guarantee the quality of deliveries, workmanship and installations.
- It could be used as a natural and long-term development scheme for the employees.
- For the installer himself it means that he has proven to have a good knowledge of his job, both in theory and practice and has got a proof to show this.

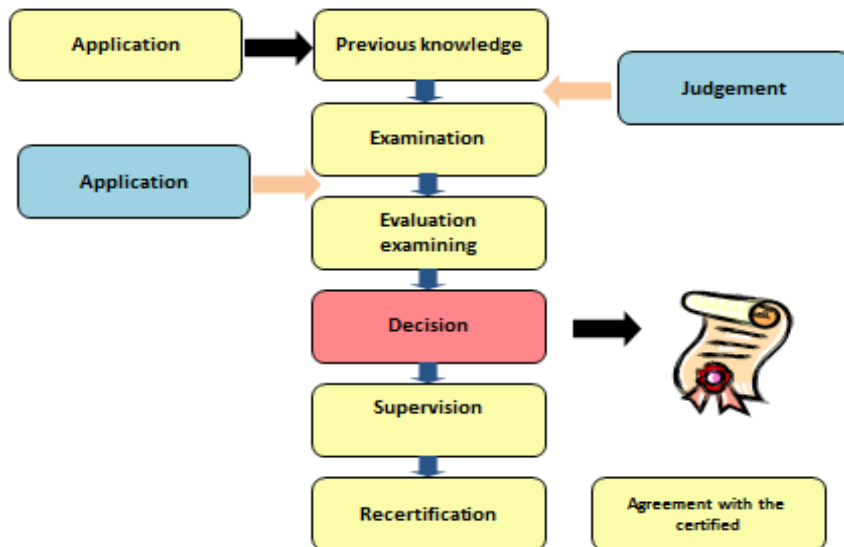
The Association has therefore commissioned INCERT (The Certification Organization for Installations) to certify their Ventilation Installers.

This means that the certification is done as a Third party certification which means that it is an independent judgment and assurance that specified demands related to a product, person, process or management process has complied with requirements.

INCERT is accredited by SWEDAC (Swedish Board for Accreditation and Conformity Assessment, a government authority for quality and safety) as one of totally 13 Certification firms in Sweden approved to issue personal certificates according to ISO/IEC 17024.



The Certification Process.



The Certification Process for Individuals.

INCERT is the only one of these companies certifying ventilation installers. The upper right hand part of the figure referring to ISO/IEC 17020 has not been used and will be replaced by company certificates issued by INCERT or other companies accredited for personal certification.

INCERT controls the examination centers and provides them with examination documents and issues the personal certification certificates for those who have passed. The not equal sign shows that an education organization providing courses for the applicants must not be affiliated with the examination centers.

The examination requirements cover a wide area, e.g. manufacturing installation methods, measuring and adjusting airflows, noise attenuation, reducing energy use, contract conditions and AMA, etc. as well as proof from his employer of experience as installer of different types of ventilation systems.

As preparation for the exam the applicant can study an extensive data-based education material produced by an expert group and financed by the association. This study is not compulsory but could be helpful.

The certification procedure starts with an application stating previous knowledge and experience. After examination and evaluation INCERT decides whether the requirements for certification are fulfilled. If accepted, the certification proof valid for a period of five years, is issued. This process follows the same data-based procedure used by INCERT for certifying other occupational groups. ■