

SWEDISH APPROACH TO QUALITY AND COMPLIANCE

AMA

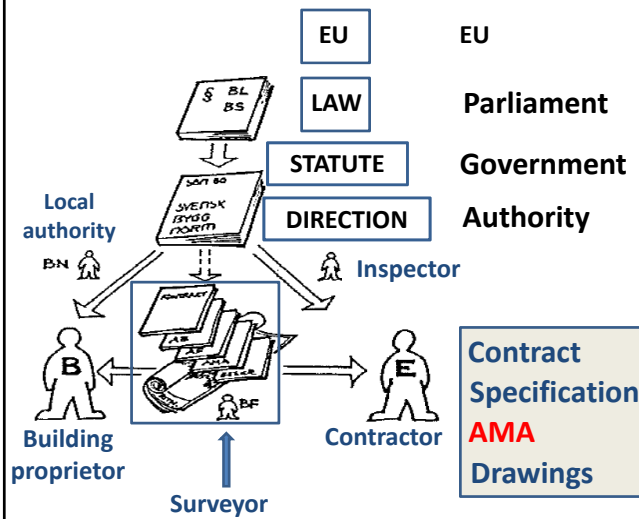
Allmän Material och Arbetsbeskrivning
“General Material and Workmanship Specifications”
Example: Ductwork airtightness

Certification of ventilation installers



JOHNNY ANDERSSON
RAMBÖLL
STOCKHOLM, SWEDEN
Johnny.andersson@ramboll.se

Vertical & Horizontal Demands



Where is AMA?



AMA vs. Authority regulations

- The AMA requirements are made valid when they are referred to in the contract between the owner and the contractor.
- 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 focussed on reducing the risk of injuries to people while
- AMA (not having to deal with that) is instead focussed on reducing property damages and LCC-costs.
- Common interest areas for both are achieve sustainability and low energy use.

AMA

General Material and Workmanship Specifications A SIXTYFIVE YEAR OLD SYSTEM FOR SPECIFYING QUALITY



- AMA is a tool for the employer (developer/future proprietor) to specify his demands on the new building and its installations
- The demands are specified in measurable units and in such a way that the tenderers and contractors understand them and are able to calculate a price.
- If the demands are not specified the normal rule is that the contractor has the right to choose an alternative that will fulfil the demands (e.g. material in heat exchangers) at (to him!) lowest cost.
- Thus – as an employer – you have to state what you want, check that you get it, and be prepared to pay the price for it!

AMA requirements

- Practically all buildings and their installations in Sweden are performed according to the quality requirements in AMA .
- A work of reference – you use the parts that are relevant for your project by referring to these parts in your building specification.
- The requirements shall be expressed in measurable terms combined with control methods with known (and possible low) measurement errors.
- They are based on a simple LCC calculations and are decided in cooperation between developers, contractors and consultants.
- It is based on accepted demands – these are regularly updated in accordance with technology development and (LCC-)costs. The demands are designed to be suitable for 80 % of all cases
– in 10 % they might be too high and in 10 % too low – and then you change it in your building specification.

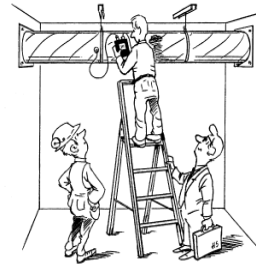
VVS(AMA (HVAC)

COVERS DUCTWORK AIRTIGHTNESS

- The need for tight ventilation ductwork systems was identified in Sweden already in the early sixties. Sweden has thus a long and unbroken tradition of demanding and controlling the tightness of ventilation ductwork as specified in the HVAC-part of AMA.
- During this long period, since 1966, we have raised the tightness requirements in tact with technology improvements (to a great extent influenced by the AMA requirements) and increased energy costs.
- The costs and risks for the contractor to fulfil the requirements in the contract shall be possible to calculate.

Require and control!

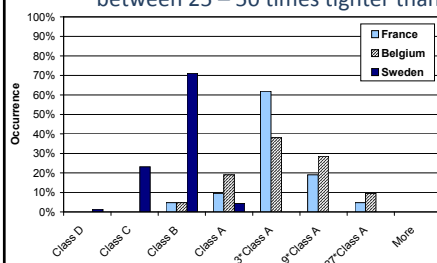
- Unless otherwise specified the tightness class has to follow AMA demands (Class C).
AMA also states the requirements for tightness testing. (Ductwork system is not specified to be tight – instead the permissible leakage rate at a specified test pressure is stated – that is possible to measure!)
- The 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 are tested. The result of the leakage test shall be reported on AMA standard protocols and handed over to the owner.
- 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 AMA requirements have led to high quality ductwork standard in Sweden:

- The duct manufacturers are competing in inventing and marketing tight duct systems that are easy to install. Both circular and rectangular duct connections are provided with rubber gaskets that are very tight compared to older (and foreign) systems. New types of duct joints have reduced earlier laborious installation works.
- The contractors do their best to avoid costly setbacks from inferior duct 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 4. 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 between the countries?

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

Certification of ventilation installers

Why?:

- The quality of ventilation systems must correspond to demands on air quality, thermal climate, low noise levels, low energy use and sustainability.
- The awareness of the importance of having a well-functioning ventilation system has increased due to information from authorities, researchers, trade organizations and companies.
- Well functioning ventilation is required e.g. by OVK, AMA, environment classification systems and can increase productivity, comfort and well-being and reduce sick-leave.

The Swedish Association of Contracting Companies found that:

- 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.
- Customers and authorities are going to require more competence requirements.
- The confidence of the customers when engaging companies with certified installers is increased and they will be more sure of the result of the installation work.
- 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.



Third Party Certification of Ventilation Installers



The Swedish Association of Contracting Companies
has commissioned

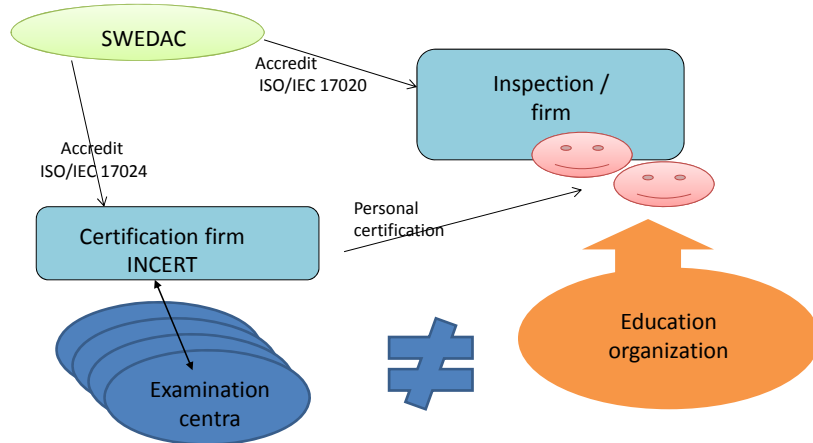
INCERT **The Certification Organization for Installations**
to certify their Ventilation Installers

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.

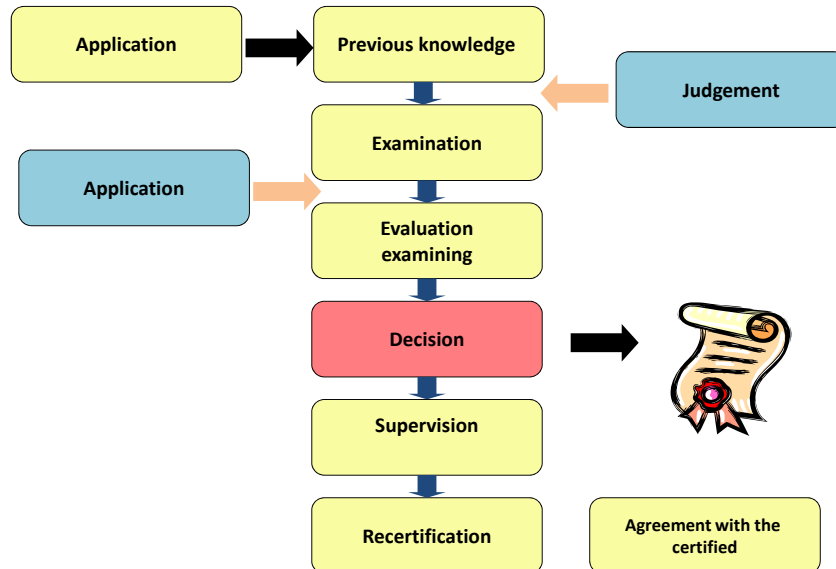


FÖRETAG
MED CERTIFIERADE
VENTILATIONSMONTÖRER

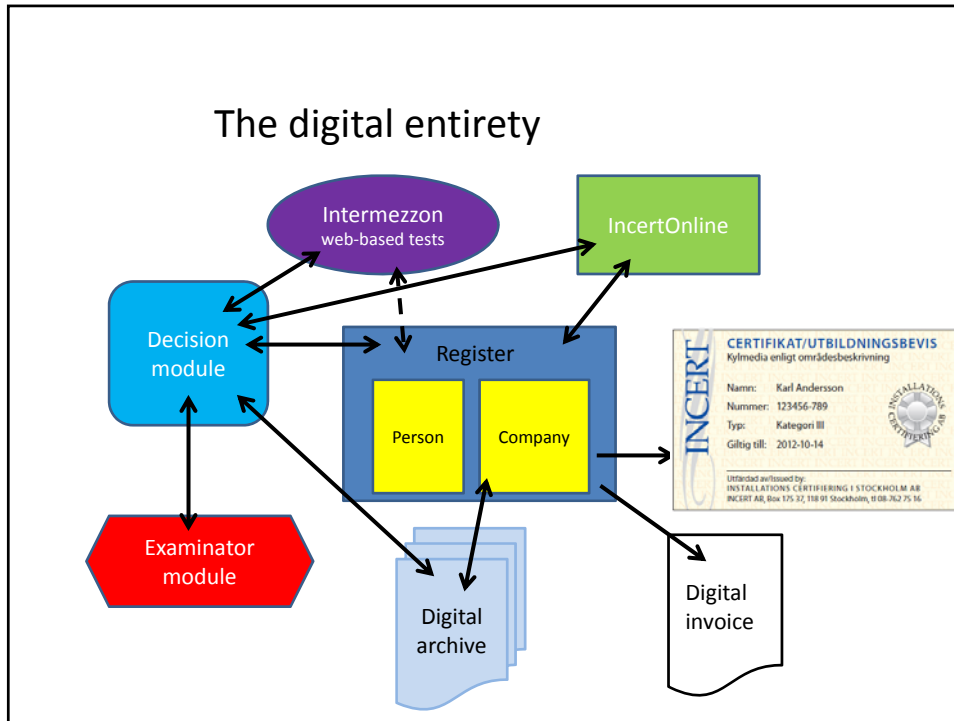
The Certification Process (ISO/IEC 17024:2012)



The Certification Process for Individuals



The digital entirety



Some of the areas included in the certification exam

#	Main chapters	Sub chapters - examples
1	General	1. What is ventilation, air and indoor climate? 3. Common ventilation systems 4. Laws and rules 6. Customer-relations and quality assurance -----
2	Before installation	1. Sustainability and energy efficiency 3. Ventilation mathematics 5. Ventilation principles 7. Drawings and specifications 8. Tools and work planning -----
3	During installation	2. Duct systems – dimensions and classes 4. Noise in ventilation systems 5. Fire safety
4	After installation
5	Environment	-----