

## About consulting acoustic quality

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### Interest

The importance of the acoustic for example quality of dwellings is founded on the care of the government for the indoor air quality of our homes. After solving the problem of the housing shortage in the seventies nowadays, the attention is more and more fixed on quality aspects of dwellings. Indoor air quality, with a strong focus on health-effects is one of these quality aspects. This does not mean that the interest in the indoor air quality is new. Ventilation and daylight has been already an issue for a long time. In the Netherlands "licht en lucht" was a frequent used name for social housing companies. The importance of the indoor air quality follows for example from the time people spend their time inside, this is about 70%. The attention for acoustic quality aspects follows also from different surveys, see table 1.

Problem area	%
low temperature radiation	44
draight	42
moisture dampress	35
noise from outside	29
ventilation	21
temperature controle	21
noise from inside	11

**Table 1: Percentage existing dwellings with problems in the indicated area for the Netherlands**

### About quality?

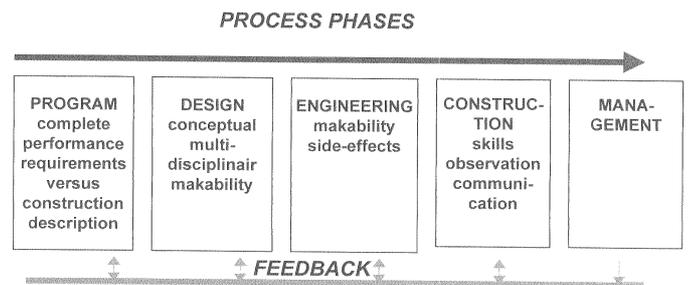
Comfort in dwellings, but also in offices and buildings in general, is an import condition for wellbeing. The feeling of (dis)comfort is determined by external physical stimuli which are weighted by our health status, expectations and vulnerability. This results in a comfort level or a predicted mean vote. To some extend the impact of one physical parameter on the predicted mean vote is influenced by the input of other parameters. If we use the level of indoor air quality in general and the acoustic climate specific as a starting point for the design of structural and architectural systems it is customary to accept a percentage of discomfort. For example see the design requirements for ventilation noise. Looking to each individual 20 dB(A) is the comfort level but for reason of economy a level of 30 dB(A) is indicated as a best practical solution and is given in the building code of several countries. However for 20% of the people this noise level is annoying. The result is that individuals interfere in the ventilation of the dwelling which results in a bad indoor air quality, mould growth etc. More and more this leads to the need to define different quality levels.

The bandwidth in acoustics quality is between the sound level whereby average population starts to get health effects based on epidemiological investigation and the individual comfort level. For non-residential buildings the quality level is strongly fixed by the balance between functional aspects and building and operational costs. In the whole, to set the quality level one must take into account the reaction of the exposed persons and the side-effects this causes. In Sweden there exists an "acoustic guide – selection of acoustic quality in building" by Leif Åkerlöf, in the Netherlands exists the national standard in NEN 1070 "Noise Control in buildings specification and rating of quality".

### Quality control

Originally ISO 9001 defines quality as the ability of an organisation to fulfill an agreement or contract. This is a narrow definition and contains no responsibility for the definition of the quality level. The new ISO 9001, (2000) expands this and centres on 'value added activities' of an organisation. In the Netherlands all the consulting companies which are members of the ONRI must have and ISO 9001 certificate before 2004.

The quality assurance during the design phase, the construction phase and the feedback of the user becomes important; from the viewpoint of the fulfillment of the contract as from the viewpoint of continuous improvement of the design or product. To do so one can make a link to the commissioning activity as described for example in ASHRAE: 1996-1 "The HVAC Commissioning Process". It describes the process of ensuring that systems are designed, installed, functionally tested and capable of being operated in conformity with the design intent. From ASHRAE 1996-1 one can deduced a general schedule of the consulting process of a building, see figure 1.



**Figure 1: Process Phases**

During the whole process there must be a continuous interaction between a great amount of sub-systems. Neglecting this interaction leads often to unsatisfactory acoustical results and to enormous financial damage. For example; flanking sound transmission, structural sound bridges are the results.

In the quality assurance approach product certification takes an important position. Most producers describe and guarantee the physical, chemical mechanical qualities of their products. For acoustical products such as sound absorption materials, partitions, vibration control elements this certification is no problem. But the development and use of new, innovative products goes fast. Hereby the attention for durability in time can stay behind.

Starting from well defined and considered acoustic requirements the design and construction phase of an architectural system starts. Without a quality control process it is not sure that the result will fulfill the requirements.

### Outlook

The need for defining and differentiation of acoustic quality of building system will grown in the future. Value for money and a healthy indoor air quality are the driving forces. This means that acoustic quality assurance measures must be implement in the design and construction process: a good starting point is the commissioning as use approach for HVAC-systems.