

# Noise and Vibrations Protection

## Sound and Vibration Basics in Ventilation Installation

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**Environmental noise, noise pollution or noise disturbance is the excessive noise that disrupts the activity or may harm the activity or balance of human or animal life. The noise sources in buildings are often ventilation installations.**

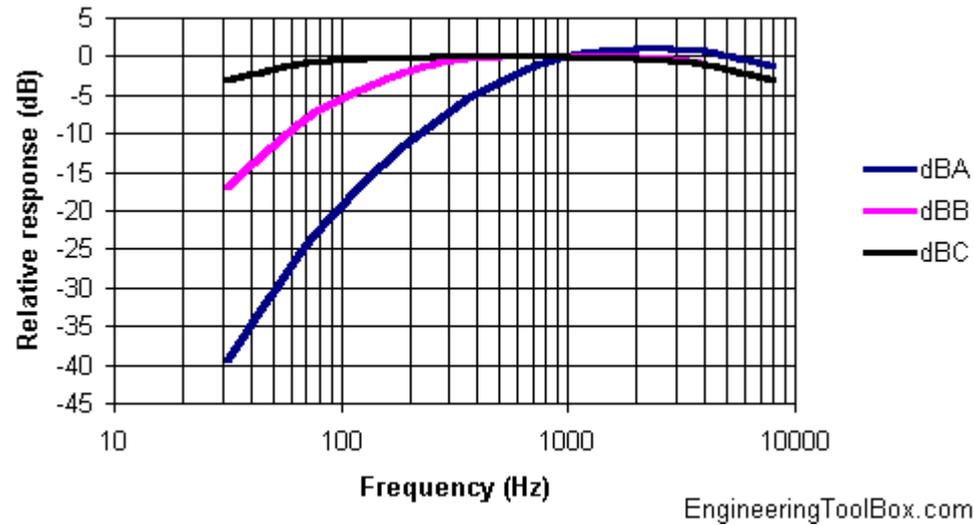


**The noise scale can be divided into the following parts:**

**A-weighting (db(A)) is the most commonly used of a family of curves defined in the International standard IEC 61672:2003 and various national standards relating to the measurement of sound pressure level. A-weighting is good for the human ear.**

**C-weighting (db(B)) is good for low frequency sounds. The C-weighting correlates better with the human response to high noise levels.**

**B-weighting (db(B)) is between C and A.**



**Figure 1. A, B and C weighting curves**

## Causes of noise in ventilation systems

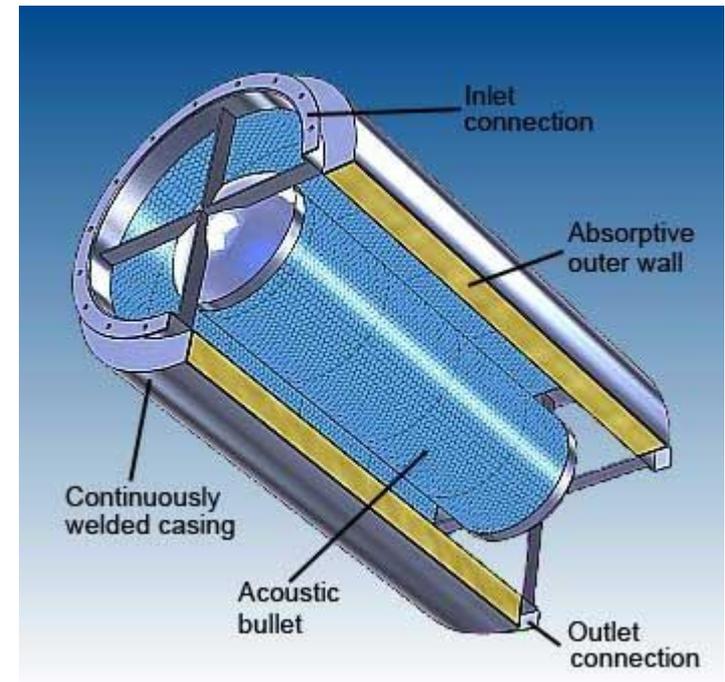
**The noise source may be too large or poor quality fan, too small ventilation ducts or diffusers through which too much air flows.**

## **Methods of noise reduction in the ventilation system**

**At the design stage, noise in the installation can be eliminated by ensuring proper airflow velocity in the ventilation ducts and diffusers.**

**The second option is to mount behind the silencer fan, and on duct connections with ducts flexible acoustic insulation ducts. If we use sheet metal ducts, it is important to attach them to shock absorbers to prevent vibration.**

## Methods of noise reduction in the ventilation system - silencer for ventilation noise



Silencer for ventilation noise the effect of which is that sound energy penetrates the interior of the sound-absorbing material and friction becomes heat.

## Methods of noise reduction in the ventilation system - vibration isolation systems



The principle of operation of vibration insulating materials:  
changing the vibration energy on the friction inside the material (resulting in heat).

## Questions:

1. **What can cause noise in mechanical ventilation installations?**
2. **What are the methods of reducing noise in the ventilation system?**
3. **What is the principle of vibro-insulation materials?**

## Task 1

**The purpose of this exercise is to investigate the influence of the fan operating parameters on the generated noise (A-weighting).**



## Task 1

**The basic characteristics of the fan operation is the flow characteristics (dependence of the static pressure on the flow). Using flow meter, gauge and noise meter data (file: data\_vent\_rpm.txt), the tachometer draws flow characteristics and noise at various rotational speeds of the fan impeller. Charts can be made in results\_vent.xls file.**



## Task 2

**Based on graphical charts, answer the following questions:**

- 1. What is the effect of the rotational speed of the fan impeller on the noise level of the fan?**
- 2. What is the effect of the fan flow on the noise emitted by the fan at constant rotor fan speed?**

## Task 2

**The purpose of the exercise is to investigate the effect of the airflow through the air damper on the noise emitted by the air damper for minimum (set: min) and maximum (set: max) opening.**



## Task 2

**Based on laboratory data (flow, hydraulic loss, noise level, file air\_damp.txt) draw the hydraulic characteristics and noise level. You can draw a chart in results\_air\_damper.xls. Graphs should be made for two air damper settings: maximum (maximum flow) and minimum (minimum flow).**



## Task 2

**Based on graphical charts, answer the following questions:**

- 1. What is the effect of opening the air damper to noise level ?**
- 2. What is the effect of flow through the air dampers on the noise level ?**

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