

# Basics of speaker installation

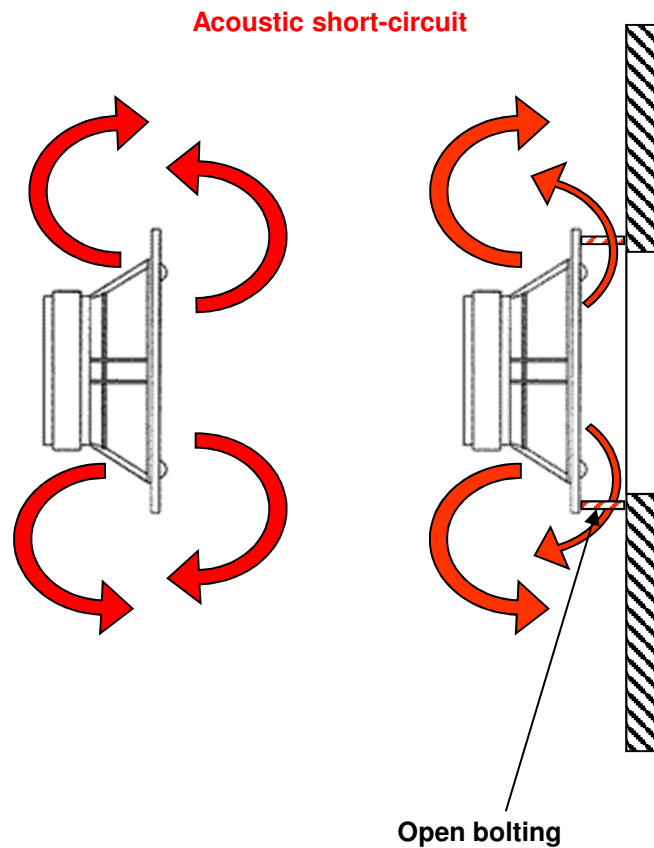
## Acoustic short-circuit

### Acoustic short-circuit:

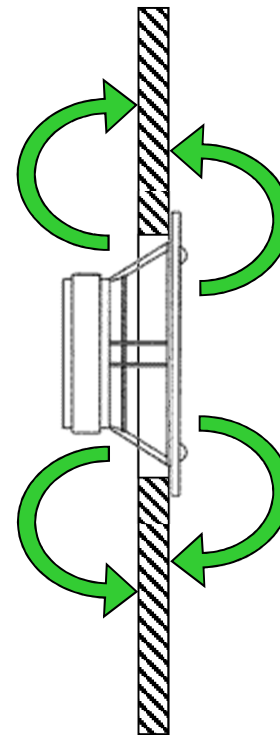
Erasure between front and rear sound of the speaker cone. Result: Depending of cone area "deep" frequencies cannot be produced.

### Supporting measures:

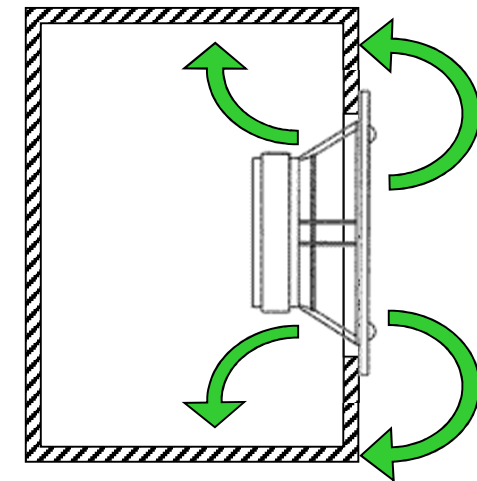
- Speaker must be flush with baffle
- Baffle
- Closed cabinet



### Stop of acoustic short-circuit with baffle



### Stop of acoustic short-circuit with closed cabinet

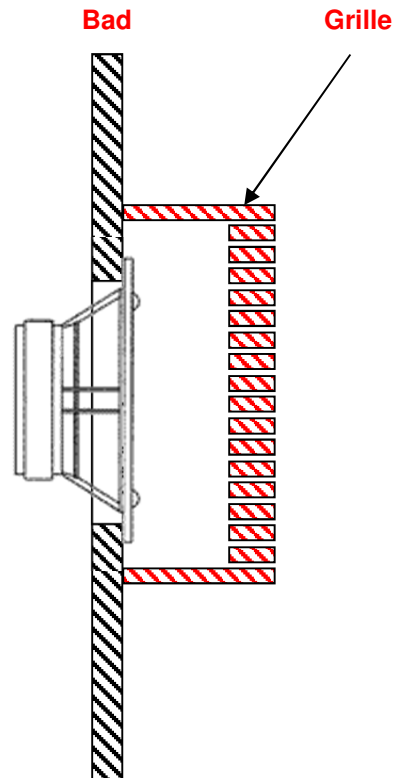


# Basics of speaker installation

## Grille

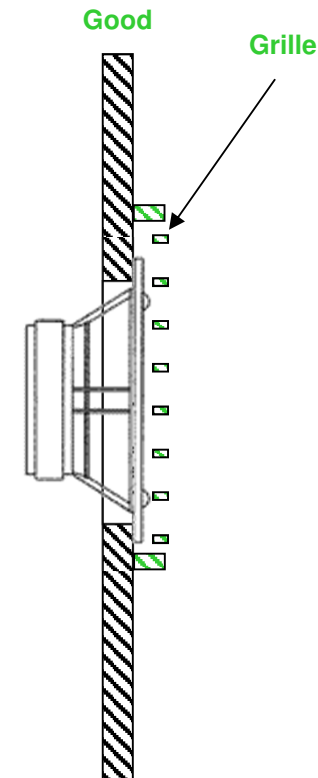
### Important points regarding grille:

- Opening area must be large enough
- Distance between speaker and grille must be as small as possible (Contact at max. cone excursion must be avoided)
- Grille must be stable (e.g. to avoid noises by vibrating grille)
- Thickness of the grille material should be not too large



### Bad example:

- Grille is too closed
- Distance between grille and speaker is too large -> a pre-chamber in form of a resonator is formed
- Thickness of material is too large -> Several small resonators are formed



### Good example:

- Grille is not too closed
- Distance between grille and speaker is good, no resonators regarding a pre-chamber
- Thickness of material is not too large

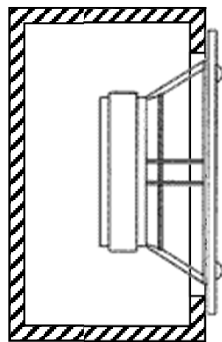
# Basics of speaker installation

## Volume

### Important points regarding volume:

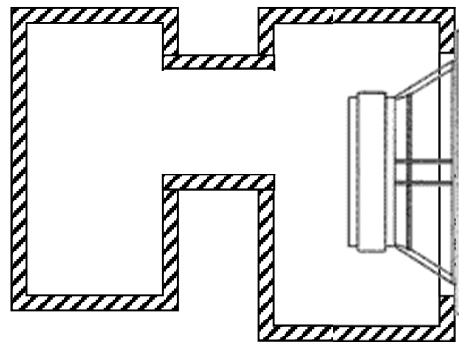
- The volume must be chosen large enough. The calculation runs by using the tech. parameters of the speaker, so-called Thiele / Small Parameters (TSP). With too little volume an annoying resonance in frequency response is formed and low frequencies can not be reproduced. It's a pleasure for us to assist you to optimize the volume size.
- Design of the volume should be possibly without cross section jumps, because, otherwise, a silencer effect appears (alike of the silencer in vehicle).

**Bad**



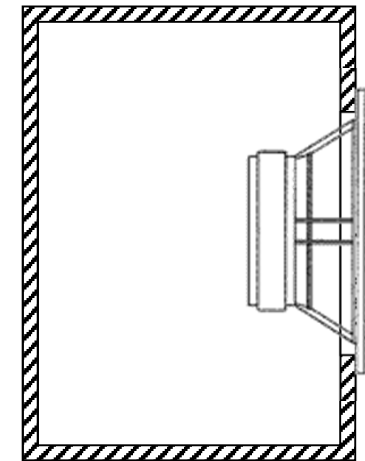
Volume is too small

**Bad**

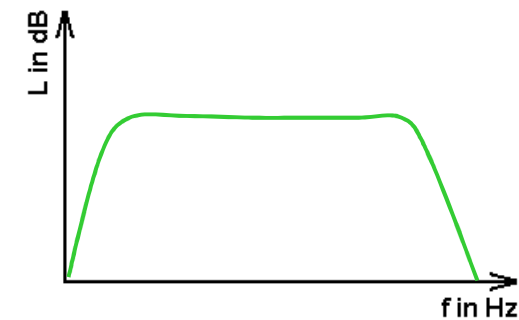
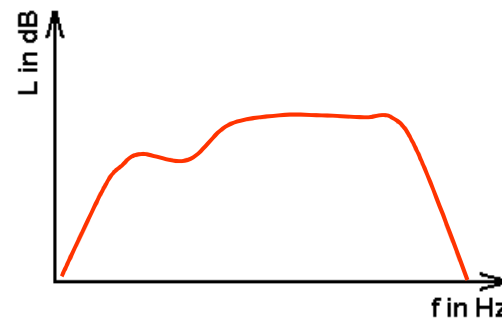
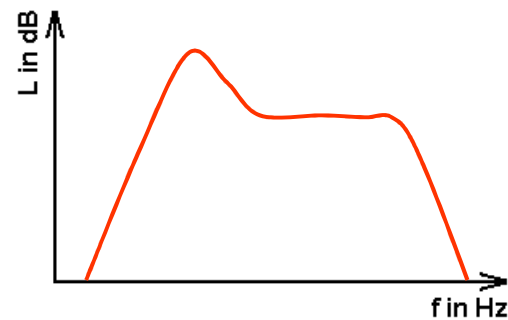


Cross-sectional jump in cabinet

**Good**



### Frequency response



f = frequency, L = Soundpressurelevel

# Basics of speaker installation

## Standing waves

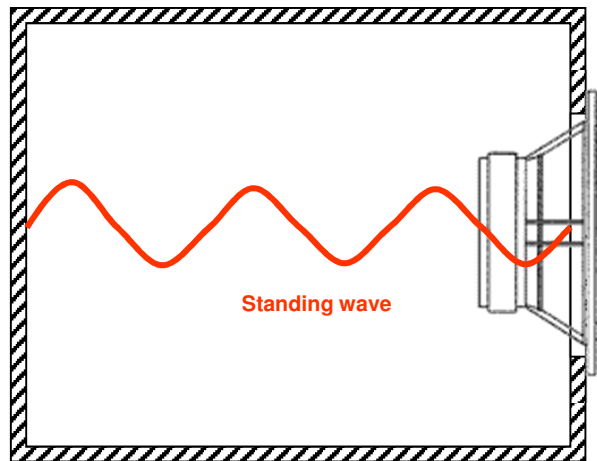
### Important points regarding standing waves:

Between two walls standing waves can be formed, which have a negative effect to the acoustic.

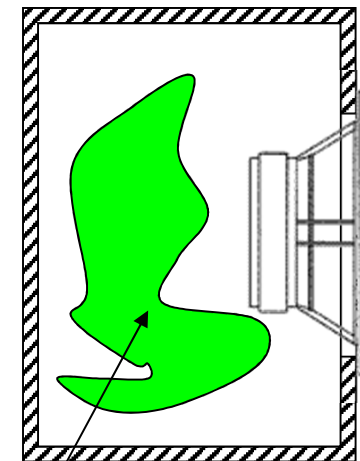
### Relief:

Dampingmaterial or an optimized cabinet. It's a pleasure for us to assist you.

**Bad**

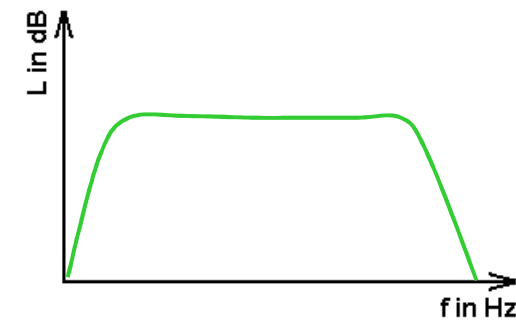
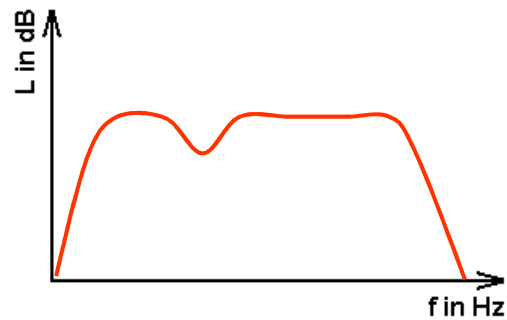


**Good**



Damping material

Frequency response



f = frequency, L = Soundpressurelevel

# Basics of speaker installation

## Bassreflex

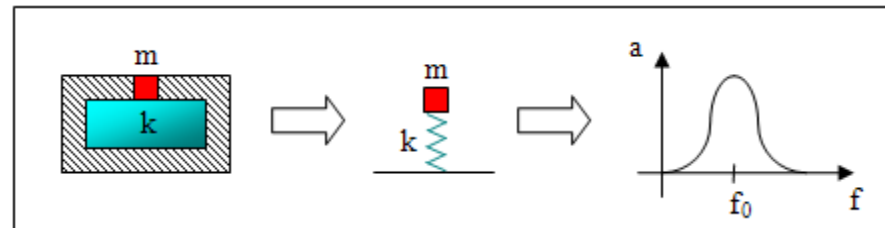
### Important points regarding bassreflex:

This principle works regarding the so-called Helmholtz resonator, which is a typical mass-spring system. It can be easily explained by a drink bottle in whose opening one blows. It produces sound.

The bassreflex cabinet (also called ventilated speaker) has theoretically two points of sound sources, the speaker driver and the Helmholtz resonator (bassreflex tube / channel / opening). By this principle one reaches a sound pressure addition in deep frequency area according the bassreflex dimensions and the speaker driver.

This mass-spring system have a certain resonance frequency depending on the aerial volume in the resonator ( $m = \text{mass}$ ) and the cabinet volume which operates as a spring ( $k = \text{spring rate}$ ). The excitation of the resonator occurs through the back radiated sound from the speaker chassis which influences the phase and adds itself to the front sound of the speaker chassis.

Please notice: The bassreflex principle does not function with every loudspeaker. Besides more cabinet volume is required than with an easy closed box. We can help you with our knowledge regarding this principle.



### Negative effects of the bassreflex principle:

An unintentional resonator in form of an opening in the cabinet can cause an unintentional resonance which affects negatively the acoustic result. Therefore a closed case should be built as closed as possible.