



# ALL ACOUSTICS IN ONE PLACE



# ACOUSTICS FOR ALL OFFICE ENVIRONMENTS



In today's workplace, several generations of people are working and spending many hours together every day. People who have experienced

different eras of technology, and have been taught and trained to think and act differently in their professional roles. In a working environment this means there are many different expectations, needs and ways of working. **Office acoustics is a factor in the modern workplace and has a big impact on productivity – both directly and indirectly.** This is why taking long-term acoustic measures, and creating a healthy sound environment in your office, suitable for all generations, will always be a winning strategy.

## FOCUS ON A LONG-TERM GOAL



Pontus Thorsson  
Researcher, Dept. of Technical  
Acoustics, Chalmers University

**Unlike technology which is constantly evolving, our hearing has remained unchanged for 50,000 years. It is a warning system that complements other senses such as sight – eyes can only look forward, but we can hear in all directions. The brain analyzes continuously what we hear.**

disturbed in their duties. Having irrelevant speech around, when working on a concentration task, can result in up to 40% in errors. This means that 2-3 hours disappear from an 8-hour working day, due to disturbances.

A problem today is that many offices are designed with clean and minimalist aesthetics in mind – it looks great – but it is easy to forget the acoustic aspect. In open offices there is nothing that dampens the sound of speech. It penetrates your brain's built-in filters and you lose focus.

**"2-3 hours disappear from an 8-hour working day, due to disturbances."**

In a medium-sized office landscape, as much as 1/3 of employees consider themselves severely

We rarely need to hear each other, and absorbents or screens can be used to screen off and absorb sound. However there is no standard solution, therefore it is important to make a long-term plan, that supports the tasks that need to be performed, and the organization's long-term goals. Also, employee involvement is very important when making improvements. Knowing that we have control makes us significantly more resistant.

14 years ago Pontus Thorsson started his consultancy career by calculating acoustics. What he focused on was calculations, and he relied on the numbers to do the job. Over the years numbers have become

less central, and the people have started to come in focus. He believes that the humanitarian side to an acoustics project is where the challenge is. And that's where we will find the solution.

# NOISE – good or bad?

Disturbances and unwanted noise in the workplace will negatively affect concentration and make tasks more tiring. It is proven in scientific studies that this leads to lower performance and for the quality of output to decrease.

The number one disturbance in the office is human speech (often well-meaning...) – people interrupting, and talking around us when we are trying to concentrate. Our brains are simply programmed to take it in, and we cannot close or turn our ears off. Hearing is also dynamic, which means that we are more likely to be interrupted by people talking in the same

room if the topic is interesting to us, or potentially, concerns us. This is why reducing disturbing speech is a strong focus for office acoustics.

Background noise such as ventilation, the clicking of keyboards, or traffic from outside, contributes to sound levels, but usually does not affect us in the same negative way as speech. In many offices, background noise, such as music and white noise, is even added to dampen other disturbances. In the world of acoustics, this is called "sound enrichment".

*"Sound disturbance decreases your ability to perform by 30%."*

– Christina Bodin Danielsson, arcitech at Brunnberg & Forshed, researcher specializing in offices, KTH Architectural School.

## WHAT IS DECIBEL?

Sound is commonly measured in decibel (dB).  
Below are some examples of decibel levels.



**30 DB**  
Whisper



**40 DB**  
Refrigerator humming



**50-60 DB**  
Quiet office



**50-65 DB**  
Normal conversation, laughter



**70 DB**  
Vacuum cleaner



**75 DB**  
Dishwasher



**110 DB**  
Power saw



**110-140 DB**  
Rock concert



**130 DB**  
Jet takeoff



**145 DB**  
Fireworks



## 360°, 24/7

Eyesight is 180°, but hearing is 360°. Eyes can be closed, but ears can never close or shut off. Also the quieter it is around us, the more sound we will notice, which is why silencing all noise in the office is actually not the most effective way to create a productive environment. A completely quiet room is not comfortable for most people.

## How "bad noise" affects us

According to a survey of 824 people working in offices, done by Novus Opinion/KOLLEGA, disturbances due to unwelcome noise are very common in the workplace. As many as 17 % of the interviewees stated that they were often bothered or disturbed by noise in the workplace. Also they claimed to be affected with loss of concentration, fatigue and even sleep deprivation.

Source: Novus Opinion/Kollega

## 60 h of distraction per month

"1/3 of employees in open offices are distracted at work for up to three hours a day. Adding up to 60 hours a month"

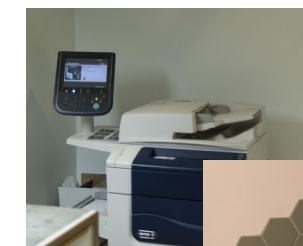
## 40 %

Irrelevant speech has been shown to cause up to 40 % inaccuracy in performance.



### ARE YOU BOTHERED BY NOISE IN YOUR WORKING ENVIRONMENT?

- Often – 17 %
- Sometimes – 37 %
- Rarely – 35 %
- Never – 11 %



### HOW ARE YOU AFFECTED BY NOISE?

- Loss of concentration – 49 %
- Fatigue – 49 %
- Anger/irritation – 27 %
- Headache – 24 %
- Sleep deprivation – 15 %
- Other – 2 %

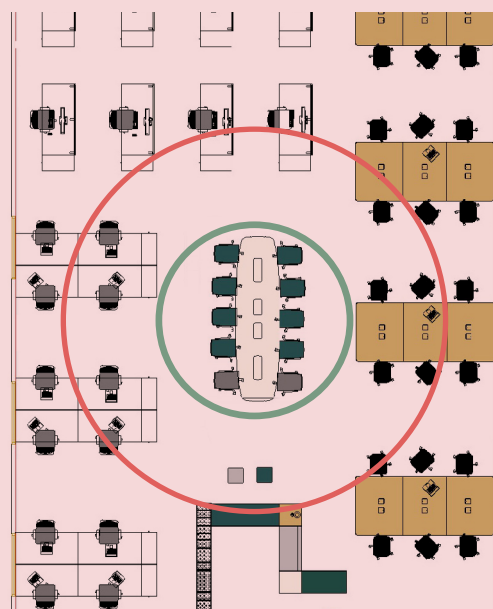


## Speech transmission – open offices

Speech transmission is a way of measuring how far the sound of normal speech travels in open offices. Since irrelevant speech is the main disturbance factor causing loss of productivity, reducing speech transmission is an important part of improving acoustics. Speech transmission can help in identifying problems and following up the effects of improvements.

**How far away can you hear a conversation or overhear a phone call in your office? That is your speech transmission rating.**

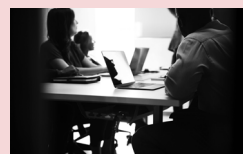
**< 5 M – EXCELLENT**  
**5-8 M – GOOD**  
**8-11 M – OKAY**  
**11 M < – BAD**



## Reverberation time – closed offices



**Church:**  
**≈ 3 sec**

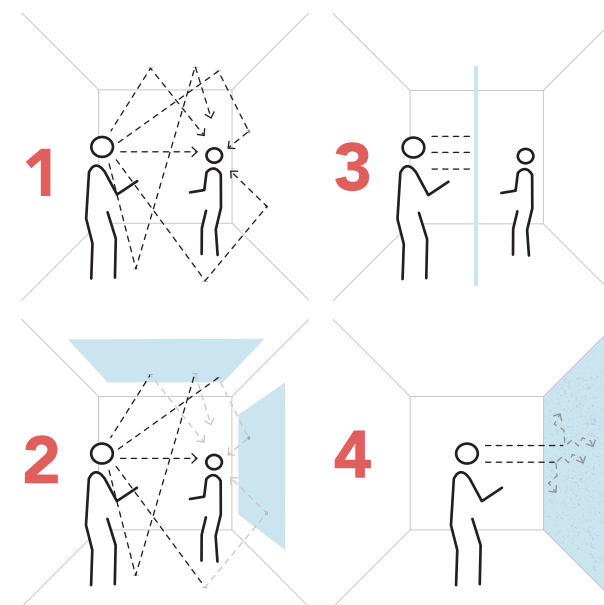


**Classroom:**  
**≈ 0,5 sec**

Reverberation time tells us for how long a sound lingers in a room. It is a measure that is most relevant in smaller offices and meeting rooms where groups of people come together to talk and converse. If sound and echo lingers for a long time in a meeting room, the environment will become noisy and tiring, and meeting participants may experience difficulties focusing or hearing each other properly.

**Ideal reverberation time:**  
**Meeting room 12 people ≈ 0,7 sec**

## How sound behaves



### 1. REFLECTION

Sound is made up of pressure waves in the air. The behavior of sound is similar to that of light. In a room with hard and smooth surfaces, sound is

reflected and bounces off the surfaces, and around the room, just as light is reflected by a mirror or a hard, glossy surface.

### 2. ABSORPTION

When sound waves hit a soft or porous surface, part of the sound is absorbed by the material, and does not bounce back. Absorbing qualities are important in acoustic products, such as wall absorbers. When choosing surface materials for any type of office furniture, keep in mind that all matte and soft surfaces (such as fabric) absorb some degree of sound.

### 3. BLOCKING

Sound blocking simply means blocking the sound waves from passing through material. Blocking sound keeps it maintained within a space, or keeps it from entering a space. Acoustic products, such as screens and pods, need to both absorb sound and block it.

### 4. DIFFUSION

Diffusion is the action by which sound is scattered (and dampened) from hitting uneven surfaces or various objects. All objects in a room contribute to this, like for example shelves with books along walls. The more different objects a room contains, the more diffusion.

## N10 acoustics quality measure

The N10 value is a relatively new way of measuring the acoustics qualities of primarily floor- and desk screens and wall absorbers used in offices. It describes how many units of a screen that are needed to create an ideal level of absorption of speech on a 10 m<sup>2</sup> surface.

Examples of N10 values on EFG Tab S floor and desk screens (see page 10)

- EFG Tab S 1000 x 600 x 40 mm – N10 = 17
- EFG Tab S 1800 x 600 x 40 mm – N10 = 7.7
- EFG Tab S 1600 x 1600 x 40 mm – N10 = 3.6
- EFG Tab S 1600 x 1600 x 80 mm – N10 = 2.7

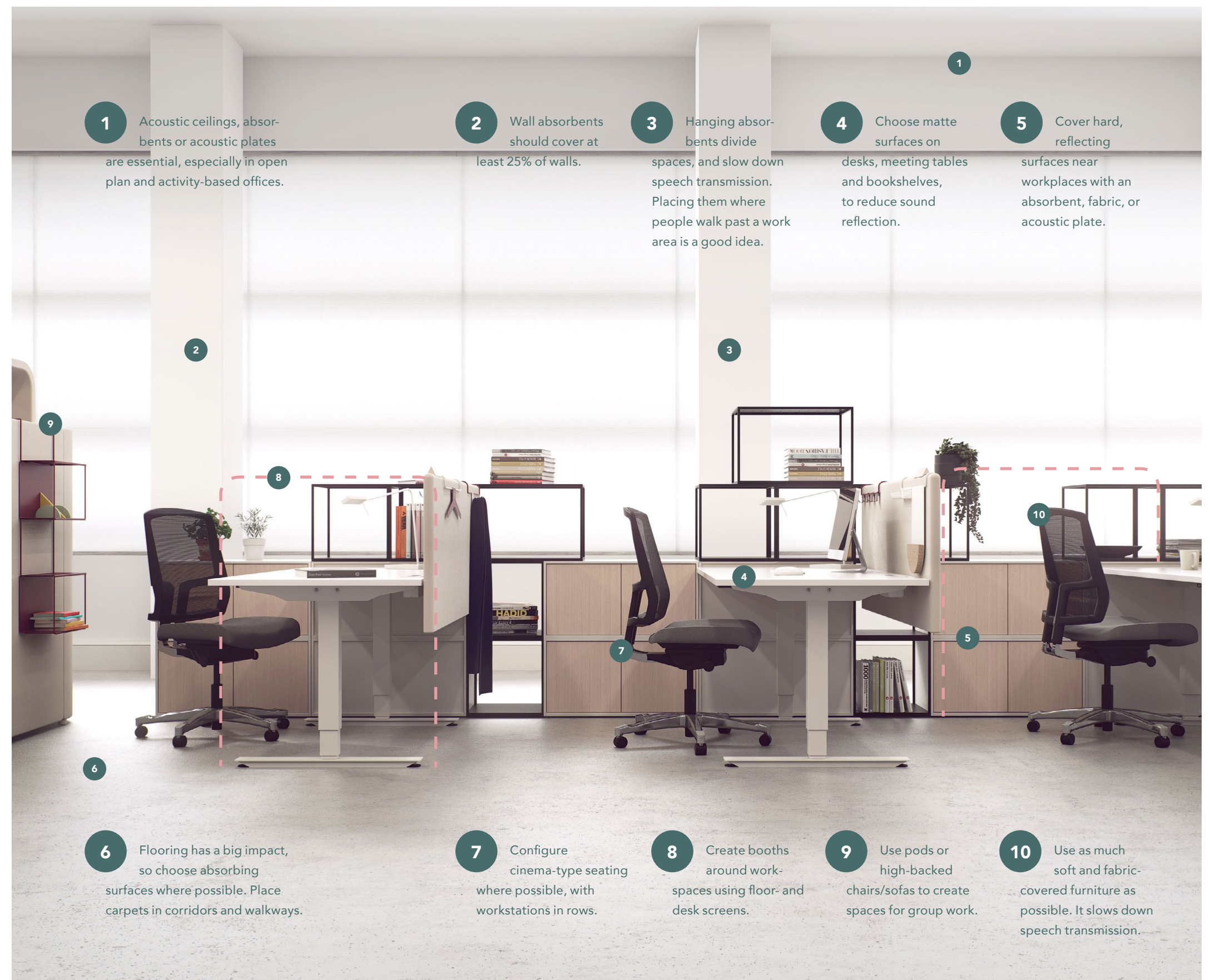
## Office noise often neglected

In many instances, acoustics is not prioritized when planning an office environment, because the dominating perception is that esthetics is above all else. This leads to problems with acoustics in the working environment. On the following pages are some suggestions on how to improve acoustics in your office, and how easy it is to use simple methods to make your office environment more comfortable.

## From floor to ceiling

Reaching the optimal result for your unique space means taking a step back and reviewing everything – from the ceiling down to the office floor.

Creating an acoustic environment that supports the organization's long-term goals of productivity and staff well-being, means understanding that every office is different. There is no single solution or product that works equally well in every office, and various factors, that are unique to your company or team, may have an impact on what the best solution is for you. Investing in curtains along a naked wall can definitely help with sound absorption, but maybe screens are a better choice to meet your needs?





Absorb, block, create privacy

## EFG TAB S



EFG Tab S are acoustic screens with excellent sound-absorbing qualities. Suitable for all office spaces as dividers and sound absorbents. EFG Tab S is available as desk screen EFG Tab S Table, floor screen EFG Tab S Floor and wall screen EFG Tab S Wall.

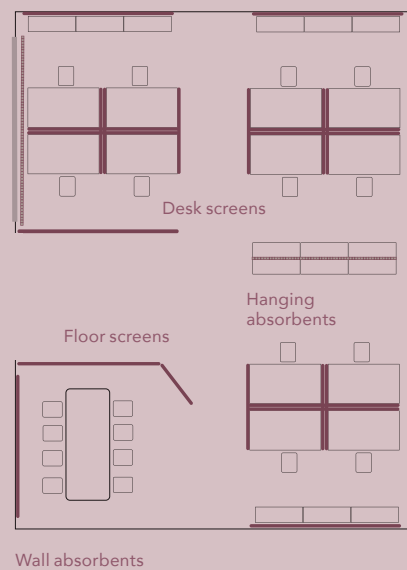
### OPEN PLAN

Screens and absorbents effectively improve acoustics in this open plan office.

Without screens and absorbents, RT 1,7 ≈ sec

With screens and absorbents, RT ≈ 0,7 sec

Reduction of reverberation by about 60 %



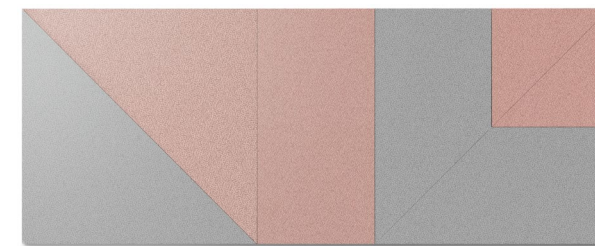
### N10 VALUES FOR EFG TAB S

- EFG Tab S 1000 x 600 x 40 mm – N10 = 17
- EFG Tab S 1800 x 600 x 40 mm – N10 = 7.7
- EFG Tab S 1600 x 1600 x 40 mm – N10 = 3.6
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Absorb

## EFG KITE



EFG Kite is a sound-absorbing wall panel combining functionality with playfulness. The panels can be mounted in any direction or combination for different patterns, expressions and sizes.

### GENERAL TIPS

- Wall absorbents on at least 25 % of the wall surface
- Place absorbents near the sound sources



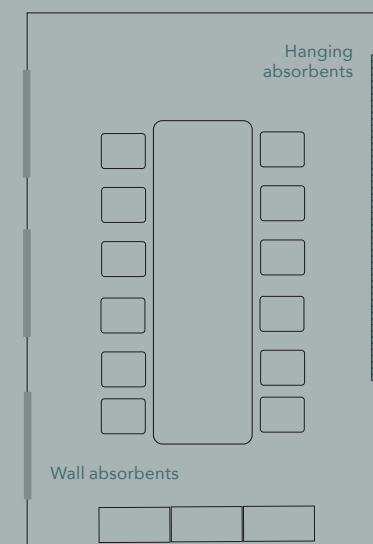
### MEETING ROOM

Wall absorbents as well as hanging absorbents are used here.

Without absorbents, RT 1,7 ≈ sec

With absorbents, RT ≈ 0,7 sec →

Reduction of reverberation  
by about 60 %







**Absorb, block, create privacy**

## EFG SURROUND

EFG Surround offers endless opportunities for room-in-room solutions, and can be used as separators as well as noise reducers in open office environments. EFG Surround is available in different variants and sizes, and in a variety of fabrics and materials.

### GENERAL TIPS

- Create rooms for talks and meetings in open offices.
- Use space effectively by creating mobile rooms.







Absorb, block, create privacy

## EFG TAB

EFG Tab is a sound-absorbing table screen in a clean design, available in many fabrics. The functional toolbar with accessories helps you create a workplace for both performance and appearance.

### GENERAL TIPS

- Create booths around workplaces in open landscapes, to block and absorb sound near the source.
- Place screens as close to the sound source as possible.
- Make screens high enough to block and absorb effectively (ear-and-mouth height).







Absorb, block, create privacy

## EFG ROOM

EFG Room is an acoustic floor screen system for room-in-room solutions. EFG Room has both absorbing and sound blocking properties, which makes it perfect for creating screened-off work places.

### GENERAL TIPS

- Place screens as close to the sound source as possible.
- Create booths around desks in open offices.
- Make screens high enough to block and absorb effectively (ear-and-mouth-height).







Absorb, diffuse, create privacy

## EFG CREATE AND EFG CREATE SEATING



EFG Create is a multifunctional and modular storage system designed to enhance its surroundings and inspire creative expressions. With unlimited possibilities for configuration, EFG Create can be built to suit your needs.

EFG Create Seating is a modular seating system offering modules for seating, tables and accessories. EFG Create can be used to create a flexible and modern seating area, in combination with EFG Create, or on it's own.

### GENERAL TIPS

- Fabric-covered and matte surfaces absorb more sound than hard surfaces.
- Storage units can be used to divide space and create a room-in-room solution.
- Choose fabric-covered units for better sound absorption.





Absorb, create privacy

## EFG MINGLE

EFG Mingle is a modular sofa system designed to allow for flexible and comfortable seating solutions on a small surface. With straight or curved modules for seats and tables, EFG Mingle offers many possibilities for modern and scalable lounge and seating areas or meeting places.

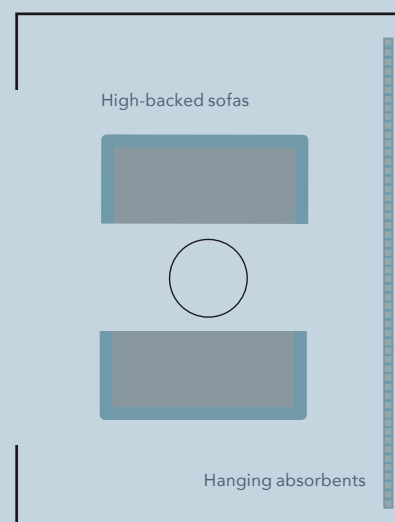
### LOUNGE

High-backed sofas as well as hanging absorbents are used in this small lounge.

Chairs and table only, RT 1,6 ≈ sec

With soft seating and absorbents, RT ≈ 0,6 sec

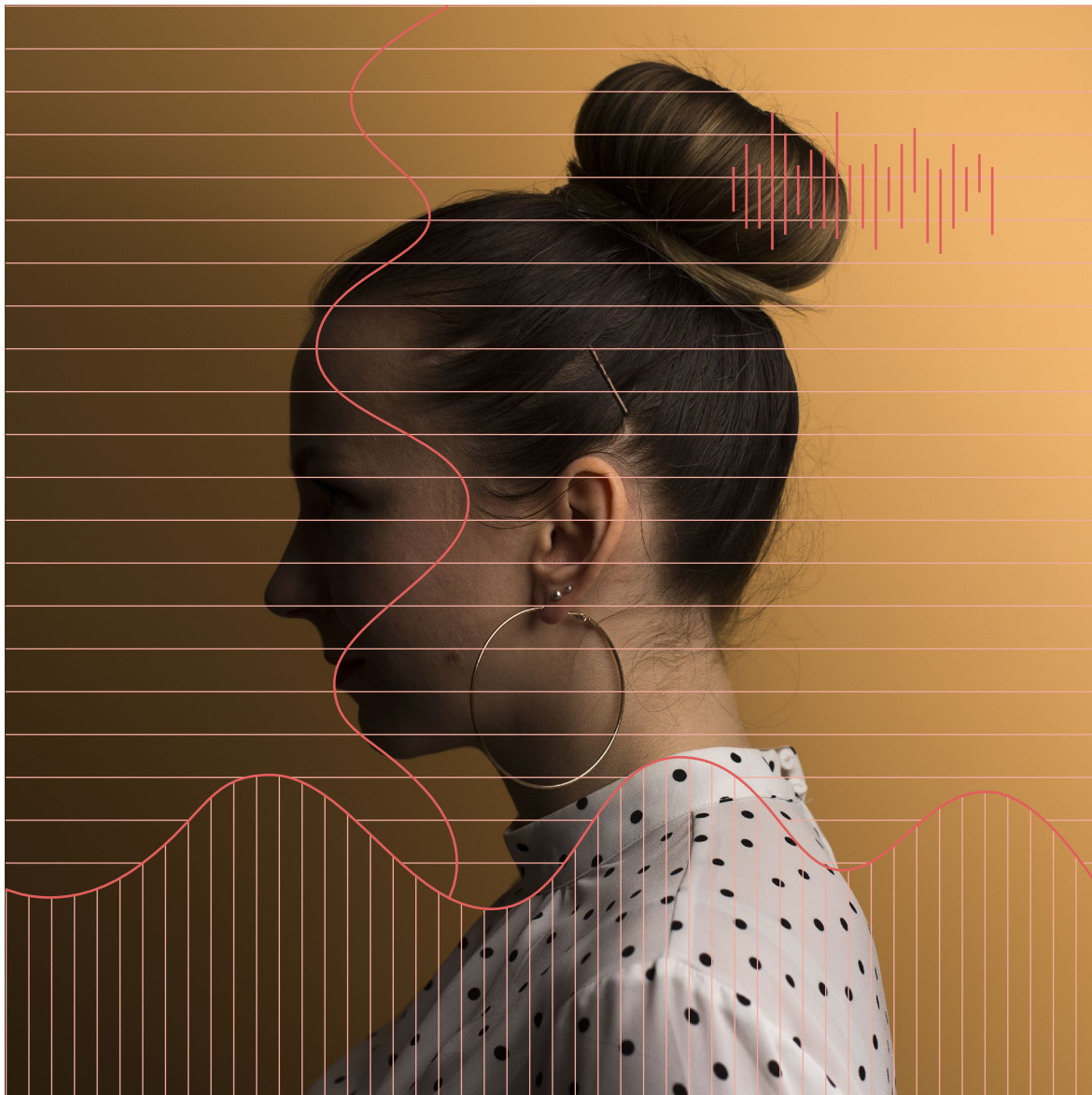
Reduction of reverberation by about 65 %



### GENERAL TIPS

- Use high-backed units to create private spaces
- Choose fabric covered seating for simple seating solutions; cantine chairs, benches.





EFG (European Furniture Group) is a leading European supplier of flexible interior solutions for offices and public environments with added values that build image and increase performance. EFG meets unique demands and needs by offering a complete range of furniture with design, sustainability and flexibility in focus. EFG is represented all over Scandinavia and in major parts of Europe.

At EFG we are ready to help you find the best acoustics solutions for your office, and for your unique needs. We can perform acoustics measurements on site, as well as offer tips and advise. Contact your nearest EFG sales office. Welcome to EFG.

**[www.efg.info](http://www.efg.info)**