ACOUSTIC DESIGN GUIDE • VIDEO CONFERENCE ROOMS • 2020

Acoustic Video Design Conference Guide Rooms

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A SOUND EFFECT ON PEOPLE

THE GUIDE

This guide contains a quick and accessible introduction to the most important acoustic design aspects of video conferencing rooms – meaning rooms with integrated video and audio equipment. The primary function of video conference rooms is to provide optimal conditions for remote meetings. A video conference room with good acoustics will in this sense also be an ideal place for producing audiovisual content such as podcasts, video tutorials, webinars etc.

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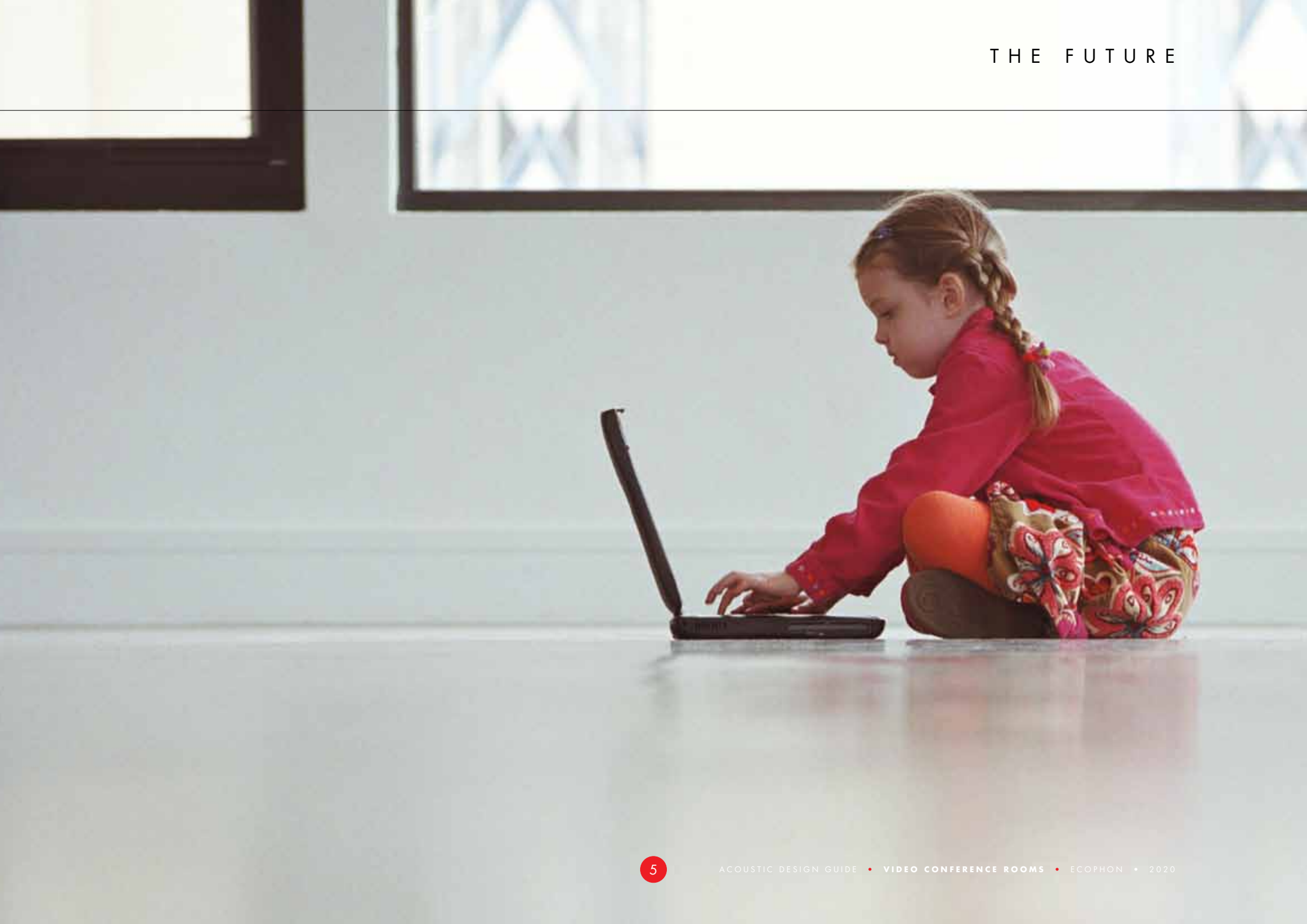
VIDEO CONFERENCING FOR AT BETTER FUTURE

2020 was the first time in history when more professional interactions took place digitally than face to face. It is clear that this type of communication has come to stay and will become a regular part of professional life. Luckily it holds great potential for business, sustainability and people in general. At the same time this technology also presents some challenges, as our workplaces now have to accommodate this new way of interacting.

The rise in video conferencing has finally revealed the many ways we can do our daily work remotely. Many businesses have experienced an uptick in productivity as a result and many workers have experienced increased flexibility and freedom. This has also led to new ways of doing business and marketing – all of which depend on high-quality video conferencing.

Handling more communication remotely not only helps people and businesses, but also the planet. By reducing time spent in transit, video conferencing can reduce CO_2 emissions, air pollution, the risk of traffic accidents, wear and tear on roads and cars, and in some cases simply reduce the need for traditional office space and owning a vehicle.



THE CHALLENGES OF VIDEO CONFERENCING

As in many other architectural domains, acoustics in rooms for video conferencing has a tendency to be overlooked. Despite being called "video conferencing,"' audio is actually the most important aspect of this technology. After all, clear communication is its main function. Unfortunately:

- Audio problems are the main issue reported from video conferences (1).
- 46% of video conference users report that audio quality detracts from interaction (2).
- Poor video conference quality is estimated to cost businesses billions worldwide (3).

In the following pages we will give you a quick and easy introduction to relevant issues concerning video conference rooms. It should be noted that acoustics is always best considered at the start of the design phase for any project, but especially in the case of rooms for video conferencing!

(1) Owl Labs: "State of Video Conferencing 2019." Report, Ogilvys Behavioural Science Practice.
(2) Erin Wolfe: "Video Conferencing Statistics for 2019." Web Article, Lifesize.
(3) Loopup: "Enterprise Conferencing: User Behaviour & Impact Report." Business Development & Digital Transformation Report.

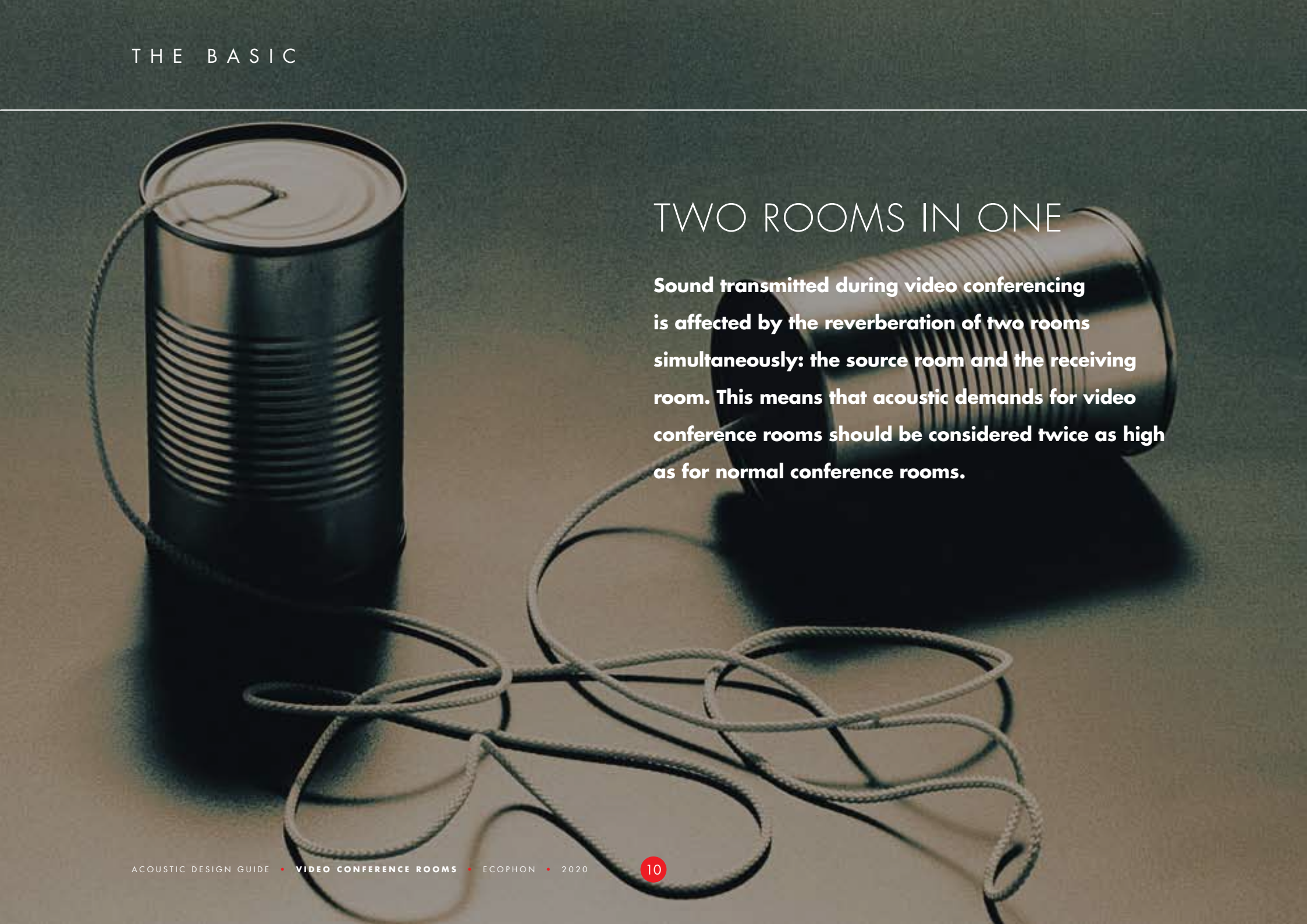
ACOUSTICS OF VIDEO CONFERENCE ROOMS

Reverberation is the phenomenon of sound waves being reflected between surfaces in a room. This generates noise and degrades clarity of speech. Reverberation is primarily mitigated by installing materials that absorb sound energy.

This is a waveform representing the words one, two and three with no reverberation. Notice the empty spaces between the waves.

This waveform represents the exact same words, but affected by reverberation. You can clearly see how their shape has changed and how the separation of the words is now blurred – software cuts the "tail" of the reverberation digitally, but the speech clarity is still heavily degraded.

THE EXAMPLES



TWO ROOMS IN ONE

Sound transmitted during video conferencing is affected by the reverberation of two rooms simultaneously: the source room and the receiving room. This means that acoustic demands for video conference rooms should be considered twice as high as for normal conference rooms.

DEMANDS

From an acoustic perspective, a video conference room must fulfil three purposes at the same time. It must be:

A good meeting room

A good recording room

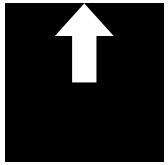
A good listening room

High acoustic demands are basically met by considering the acoustic characteristics of all surfaces in the room, to minimize reverberation and increase speech clarity.

ACOUSTIC CONSIDERATIONS

Video conference rooms have some of the highest acoustic demands of any room type found in normal office buildings. Every aspect of the room should therefore be considered as a part of the acoustic design. The guiding principle should be that all room surfaces should add to the acoustic treatment, if possible.

PLACEMENT OF ACOUSTIC MATERIALS

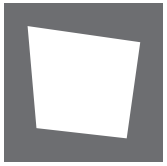


Ceiling

For the best results a fully covering suspended acoustic ceiling is recommended. This type of ceiling provides the highest degree of absorption over the entire frequency spectrum. Deep frequencies (deep sounds) are particularly problematic in small rooms such as normal video conference rooms. Suspended ceilings are also the ideal way of handling this issue. In cases where a suspended ceiling would be impractical or undesirable, other solutions can be implemented such as free-hanging units.

Walls

Roughly speaking, at least one of every pair of opposing walls should be treated with class-A acoustic material. Lesser absorbing materials, such as curtains, should also be considered.



Geometry

As a general rule of thumb, a more asymmetrical room geometry will provide better acoustic conditions if absorbing materials are already present. Slanted or curved surfaces affect the direction of sound waves and ensure they are not reflected back and forth between parallel surfaces.

PLACEMENT OF ACOUSTIC MATERIALS

Scattering

Much like an asymmetrical room shape, rough and uneven surfaces will also improve the acoustic conditions when used in conjunction with highly absorbing materials, as they scatter the sound and prevent reoccurring reflections between parallel surfaces.

Sound Insulation

Insulation from the ambient sound environment is important for both the audio/visual interaction and to ensure speech privacy for sensitive matters. It is recommended that only the most effective sound-insulating methods are utilised in the construction of video conference rooms.

In cases where walls only extend to the height of a suspended ceiling, special care should be taken to maximise sound insulation from adjacent spaces.

THE GEAR

AUDIOVISUAL EQUIPMENT

Microphone

The most commonly used microphone type in video conference rooms is an omni-directional microphone. This type of microphone picks up sound from all directions. This makes it very flexible in terms of speaker positions but also very susceptible to unwanted noise in or outside the room, as opposed to directional microphones and built-in laptop microphones, which primarily pick up sound generated in a narrower zone.

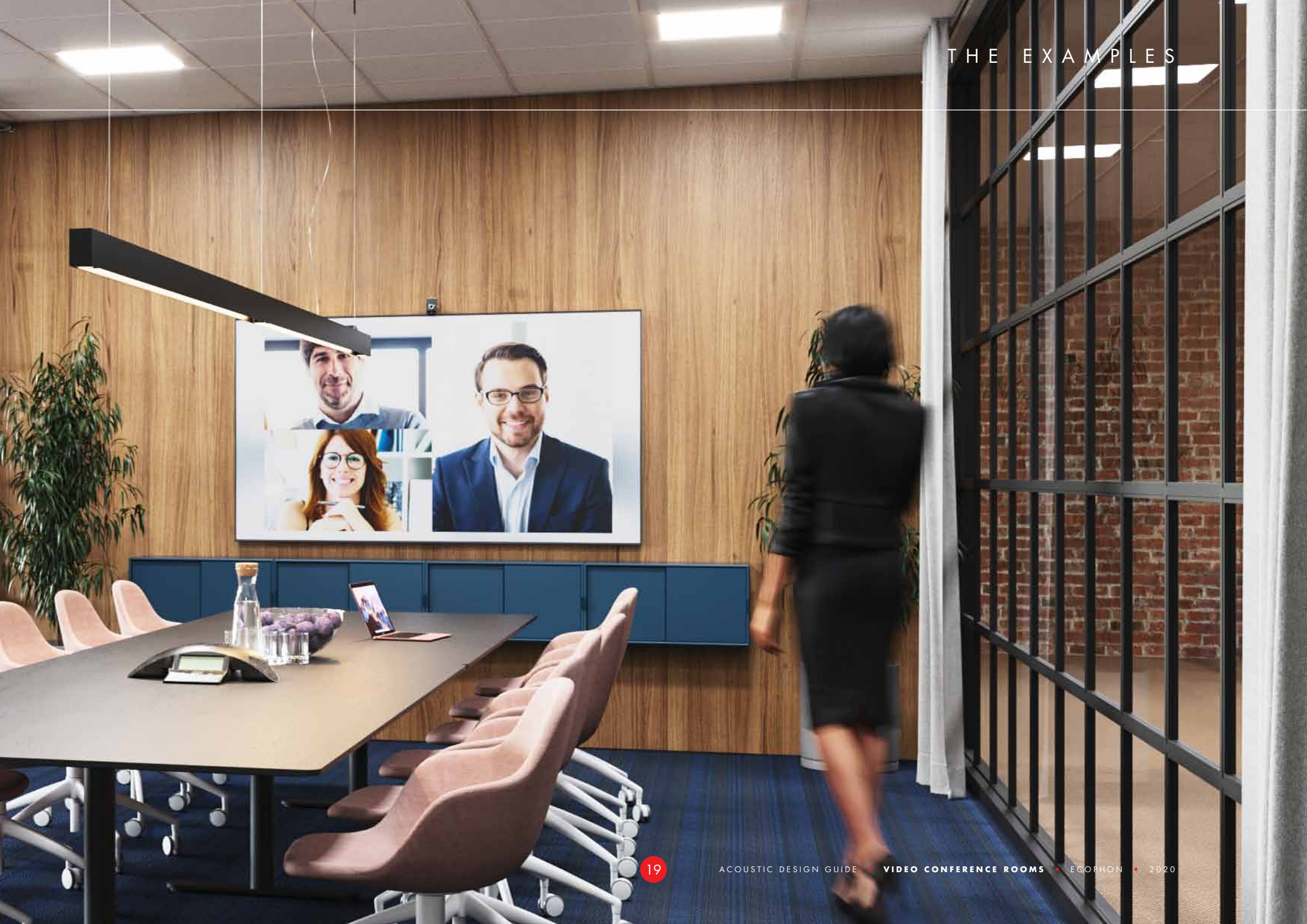
Speaker and microphone positions

As a rule of thumb, two metres is the maximum distance any speaker should be placed from a microphone. In rooms with substandard acoustic conditions, the speaker should preferably be right in front of the microphone. Any microphone placed on a table should preferably have a soft underlay to absorb vibrations from the table.

Always consult with your provider of audio/visual equipment about the needs for each specific room design you are working with.

Acoustic treatment in this room

Although not apparent to the untrained eye, many rooms with suspended ceilings like this one can present problems of sound insulation. The glass walls only extend to the height of the suspended ceiling. Sound can therefore travel over the walls and through the gap between the suspended ceiling and the soffit, causing sound pollution between rooms. In this specific case the specialised ceiling tile Ecophon Combison™ is installed to prevent this problem, ensuring both good sound insulation and room acoustics with just one product. Ecophon Combison™ Barrier can also be installed vertically above the walls to maximise sound insulation even further.



TERMS USED IN ACOUSTICS

Reverberation time (ISO 3382-1+2 & 12354-6)

Reverberation time is the most basic room acoustic parameter and specifies the time period it takes for sound energy to dissipate in an enclosed space. Roughly speaking, the longer reverberation time, the noisier a room will be and the less intelligible speech will be. Reverberation time is specified for several frequency bands as materials interact differently with sound at different frequencies. The reverberation time primarily depends on the room size relative to the amount of highly sound-absorbing material present, along with the shape of the room and interior design.

Speech Clarity (ISO 3382-1)

The primary function of a video conference room is to transmit speech from sender to receiver as clearly and seamlessly as possible. The acoustic descriptor Speech Clarity is a useful measure of ensuring this function.

High speech clarity ensures easy communication for both speaker and listener. The speaker should be able to use their natural vocal range, speech patterns, inflections, head movements etc. The listener should be able to pick up all cues from the speaker without having to concentrate excessively, compensating for delay, etc.

TERMS USED IN ACOUSTICS

Low frequencies and small rooms

Put simply, lower frequencies (deeper sounds) are more likely to reverberate in smaller rooms such as video conference rooms. Which frequencies are determined by the specific geometry and size of any given room. If not treated acoustically these frequencies can cause an unbalanced sound environment and affect speech clarity. It is therefore important to take this into account when choosing acoustic materials for video conference rooms. These materials should be as effective at absorbing low frequencies as possible relative to how much space they take up.

Flutter Echo

Flutter echo is a phenomenon caused by sound waves being reflected between parallel hard surfaces over a short time span. This can cause a very fast echo that can cause discomfort and fatigue in longer meetings while also degrading speech clarity. The possibility of flutter echoes will not be uncovered by many types of acoustic calculations or simulations.

Flutter echo is handled by making sure that all parallel surfaces of the room in question have a degree of acoustic absorption or scattering.

THE HELPING HAND

GET TO KNOW US

Saint-Gobain Ecophon develops, manufactures and markets acoustic products and systems that contribute to a good working environment by enhancing peoples' wellbeing and performance. Our promise »A sound effect on people« is the core backbone of everything we do.

Ecophon has been involved in international studies and gathering acoustic knowledge for more than 50 years. The most important information has a dedicated place on our website and is freely accessible to everybody. Here you can also meet our acoustic experts. Their objective – to spread knowledge and help anyone who requests assistance. We also have a global platform for fellow enthusiasts, Acoustic Bulletin, where we write posts and exchange knowledge.

Let's Connect

We are worldwide! Ecophon has business units in 14 countries, delegations in another 30 countries, and approximately 800 employees. Find your local contact here.

By following us on Social Media you stay abreast of all the latest acoustic findings, acoustic research and product development, and can also see inspirational new reference cases.

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Use our digital tools, for the different phases of the building process, from the inspiration phase to specific maintenance instructions for your Ecophon products.

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