OTTOKIND
ZUKUNFT EINRICHTEN

WHITEPAPER ACOUSTICS

NOISE POLLUTION AT THE WORKPLACE

Health prevention through effective sound insulation systems

Employees exposed to workplace noise face an increased health risk. The employer is responsible for minimising this risk as much as possible. In the following pages, you can find the necessary steps and understand why early prevention is worthwhile.

CONSEQUENCES OF ACOUSTIC POLLUTION

According to the World Health Organization (WHO), noise is the second most significant environmental health risk. The most noticeable effects of noise include hearing damage—ranging from acute to chronic or, in severe cases, irreparable forms. Individuals constantly exposed to noise also face a higher risk of heart attacks. Stress, sleep disorders, and depression can also result from prolonged exposure.

Hearing damage in figures

14 m.

Approximately 14 million people in Germany suffer from hearing disorders. Alongside type 2 diabetes mellitus and hypertension (high blood pressure), hearing disorders are among the most widespread health conditions.

156 m. €

In 2008, €156 million worth of production was lost due to work incapacity caused by hearing impairment.

962 m. €

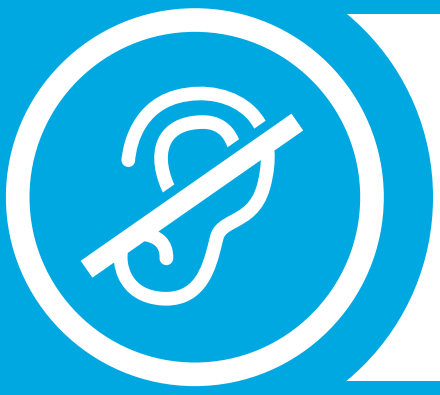
Direct treatment and care costs (including outpatient or inpatient care, hearing aids, and fittings) totalled €962 million in 2008.

1.5 bn. €

1.5 billion in indirect costs were incurred in 2008 for the treatment of secondary illnesses (such as depression, dementia and injuries, especially falls).

Source: The economic significance of hearing impairment and ways to reduce its consequential costs.
Study by the Institute for Health Economics Munich 2011

HEALTH EFFECTS OF NOISE



Hearing damage

Both gradual and chronic or irreparable noise-induced hearing loss and acute hearing damage caused by exposure to high sound impulses can occur.

Increased risk of accidents

Signals or warning calls can be overheard. Fatigue caused by constant noise can lead to incorrect behaviour. Unexpected noises can cause startled reactions.

Reduced work performance

The body is under excessive strain, especially during activities requiring concentration or attention.

Stress and cardiovascular strain

Noise, whole-body vibrations, heat, cold, hazardous substances, time pressure, and complex work activities can cause increased stress hormone levels and constrict peripheral blood vessels. This, in turn, increases the risk of cardiovascular disease.

Source: Federal Institute for Occupational Safety and Health (baua), https://www.baua.de/DE/Themen/Arbeitsgestaltung-im-Betrieb/Physikaiische-Faktoren-und-Arbeitsumgebung/Laerm/Schaeden.html

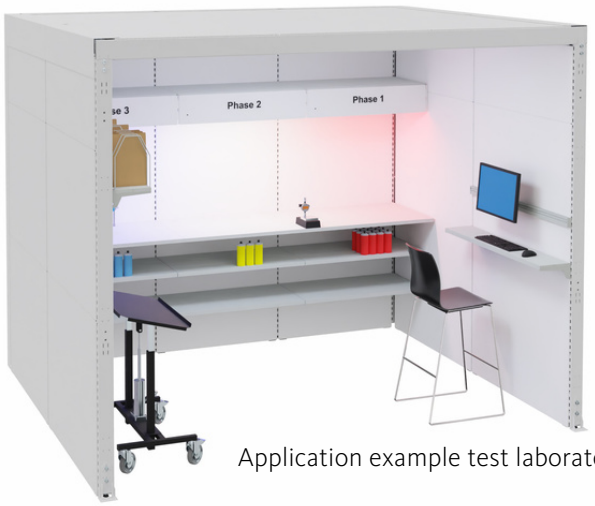
OPEN ACOUSTIC BOOTHS

Islands of tranquillity with a wide range of applications

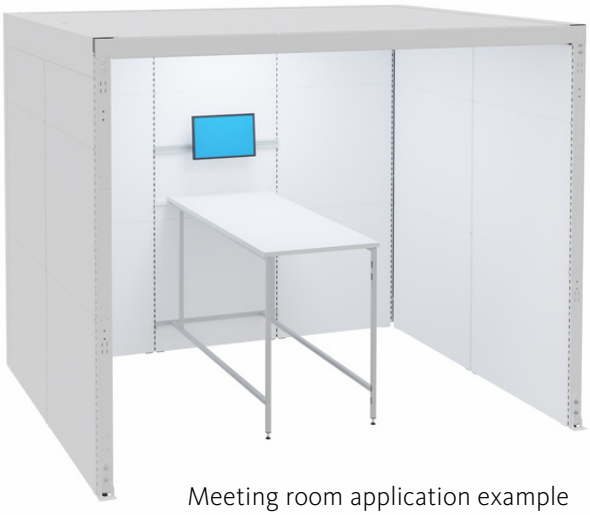
Acoustic booths with one open side

Example configuration: Open cabin

- Width 3,230 mm x depth 2,730 mm x height 2,620 mm
- 8 x support incl., complete fixing material
- 7 x acoustic partition walls, plug-in sheet metal modules, of which 3 x module width 1,000 mm and 4 x module width 1,250 mm, depth 105 mm, height 2,500 mm
- 2 x acoustic ceiling elements with cross beams, width 1,250 mm, depth 3,000 mm
- One side perforated acoustic sheet, one side smooth sheet, absorber made of polyester fleece
- Paintwork outside RAL 7035 light grey, inside RAL 9010 pure white
- 2 x ceiling light



Application example test laboratory



Meeting room application example

First Aid Point application example

NOISE REDUCTION ACCORDING TO THE STOP PRINCIPLE

The so-called STOP principle defines the order of priority of protective measures. Companies are bound by this legally prescribed order when defining and applying protective measures.

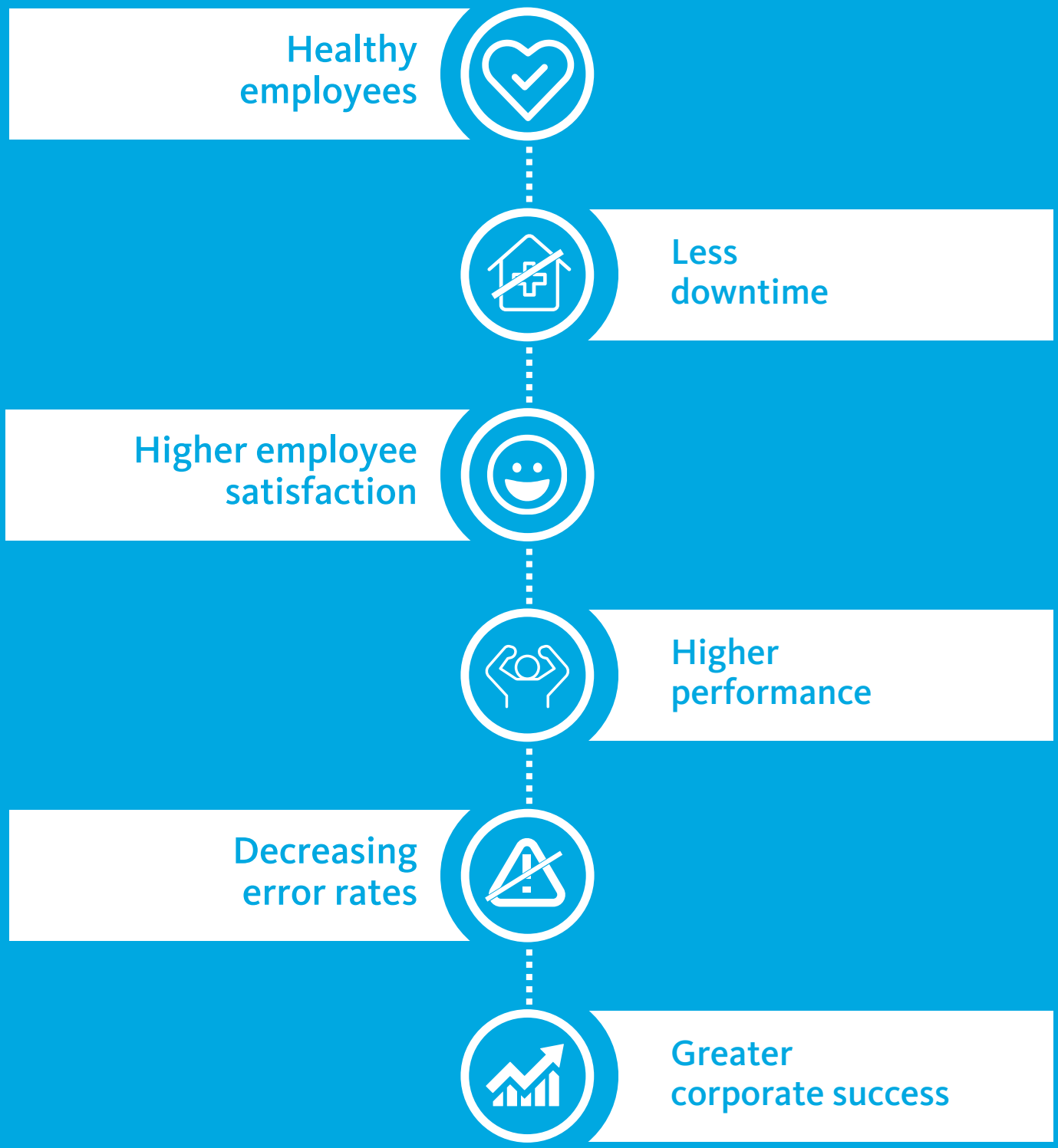
S	Substitution	Top priority: preventing or replacing sources of danger, e.g. by using hazardous substances or processes with an overall lower risk
T	Technical measures	Use of modern, state-of-the-art machines and processes with high safety standards, e.g. encapsulation of machines to reduce noise pollution
O	Organi-sational measures	Safety-oriented behavioural changes among employees and the spatial or temporal separation of a source of danger from employees in the company, e.g. through specific instructions to reduce noise exposure
P	Personal measures	Personal protective measures should be considered secondary to all other measures. Nevertheless, effective personal protective equipment (PPE), e.g., noise protection headphones, is indispensable to modern and preventive occupational safety.

DO MORE VOLUNTARILY

Even low levels of noise can cause stress. To promote their employees' health, satisfaction and motivation, more and more companies are taking acoustic measures that start even before the legal requirements are met.

Because in times of a cross-industry shortage of skilled labour, acoustic comfort is a valuable attraction factor in employee recruitment and retention!

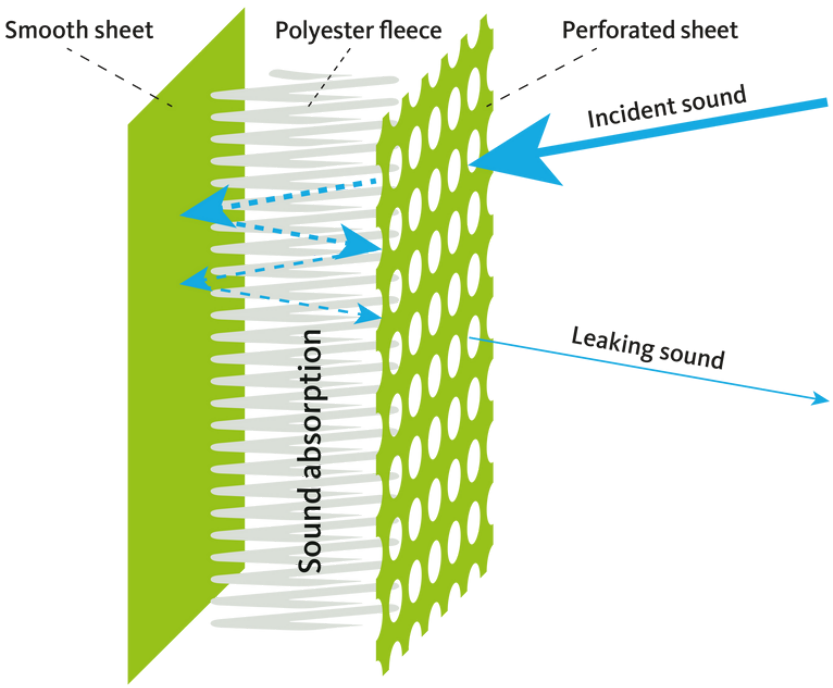
ADVANTAGES OF EFFECTIVE SOUND INSULATION MEASURES



ACOUSTIC SOLUTIONS FOR EFFECTIVE SOUND INSULATION

Acoustic solutions such as the modular acoustic systems from OTTOKIND significantly reduce noise pollution in craft and industrial businesses. Whether closed cabin, noise barrier or mobile partition wall - there is a solution for almost every room situation. Different module widths and heights enable flexible use in the operational environment. Customised configurations can be configured with a wide range of accessories such as doors, windows or shelves.

How the OTTOKIND acoustic system works



- The acoustic elements are a stable sheet steel construction with smooth and perforated sheet steel panels.
- The perforated side breaks up the sound.
- The smooth side reflects the sound and prevents it from being transmitted.
- A polyester fleece with a sound absorption rating of "A" - currently the best rating in the standard - sits between the smooth sheet and perforated sheet.
- OTTOKIND acoustic elements achieve their best effect at a frequency range between 200 and 4000 Hz.

TÜV-TESTED EFFECTIVENESS

OTTOKIND acoustic products delivered convincing results in the latest measurements in the reverberation chamber in Nuremberg (October 2023). The complete test certificate (TÜV) is available on request at info@otto-kind.de.

Messung des Schallabsorptionsgrades nach DIN EN ISO 354

Messprotokoll

FUCHS RAUMINGENIEURE

Allgemeine Prüfkörperbeschreibung:

Metallstellwand mit 105 mm Dicke
Oberseite 1,25 mm Stahlblech perforiert, Lochung Rv 1,6-3
80mm Mittellage aus Polyesterfaservlies (Produktdaten sind Hersteller bekannt)
Tragende Stützen mit Melamin Schaum gefüllt (Produktdaten sind Hersteller bekannt)
Prüfung ohne Abhang
Prüfsituation: flächiger Absorber

Nr. Kurve: Kurve (19)
Bezeichnung: Akustik Stellwand 100 mm
Hersteller: Otto Kind GmbH & Co. KG

Quelle: Messung Hallraum TRL

Beschreibung des Prüfaufbaus:

Anzahl:	6	Stück
Länge:	1993	(mm)
Breite:	1030	(mm)
Tiefe:	105	(mm)
Höhe Abhang:	0	(mm)
Abstand (Prüflinge):	0	(mm)

Anforderungen an Prüfnorm

Schallabsorptionsgrad	α_w	
Messung entspricht ISO 354:	ja	
Prüffläche gesamt im Hallraum:	12,32	(m²)
Weitere Info:		

Abbildung/Foto - Messaufbau

Hallraum und Messmethode:

Messmethode:	Abgeschaltetes Rauschen				
Vol. Hallraum:	391,6	(m³)	Raumoberfläche Hallraum:	322,2	(m²)
Temp. Messung leer:	20,1	(°C)	Temp. Messung mit Prüfling:	20,3	(°C)
Rel. LF Messung leer	58,5	(%)	Rel. LF Messung mit Prüfling:	59,8	(%)
Luftdruck leer:	98,1	(kPa)	Luftdruck mit Prüfling:	98,1	(kPa)

Anzeige:

Kurve Terzen:	ja
Kurve Oktaven:	ja
Bezugskurve:	ja

Frequenz f (Hz)	Terzen α_s (-)	Oktaven α_p (-)
50	0,07	
63	0,14	0,15
80	0,18	
100	0,19	
125	0,30	0,30
160	0,45	
200	0,61	
250	0,80	0,75
315	0,91	
400	0,98	
500	1,03	1,00
630	0,98	
800	0,98	
1000	0,93	0,95
1250	0,92	
1600	0,97	
2000	0,97	0,95
2500	0,98	
3150	0,95	
4000	0,93	0,95
5000	0,91	

Bewertung nach DIN EN ISO 11654

α_w	0,95
Absorberklasse	A

()

Prüfkurve oder Messbericht: Auszug aus der Prüfreihe des TRL
Prüfer/Institut: TÜV Rheinland - Herr Daniel Richter
Erstellung Messprotokoll: Fuchs - Raumingenieure GmbH

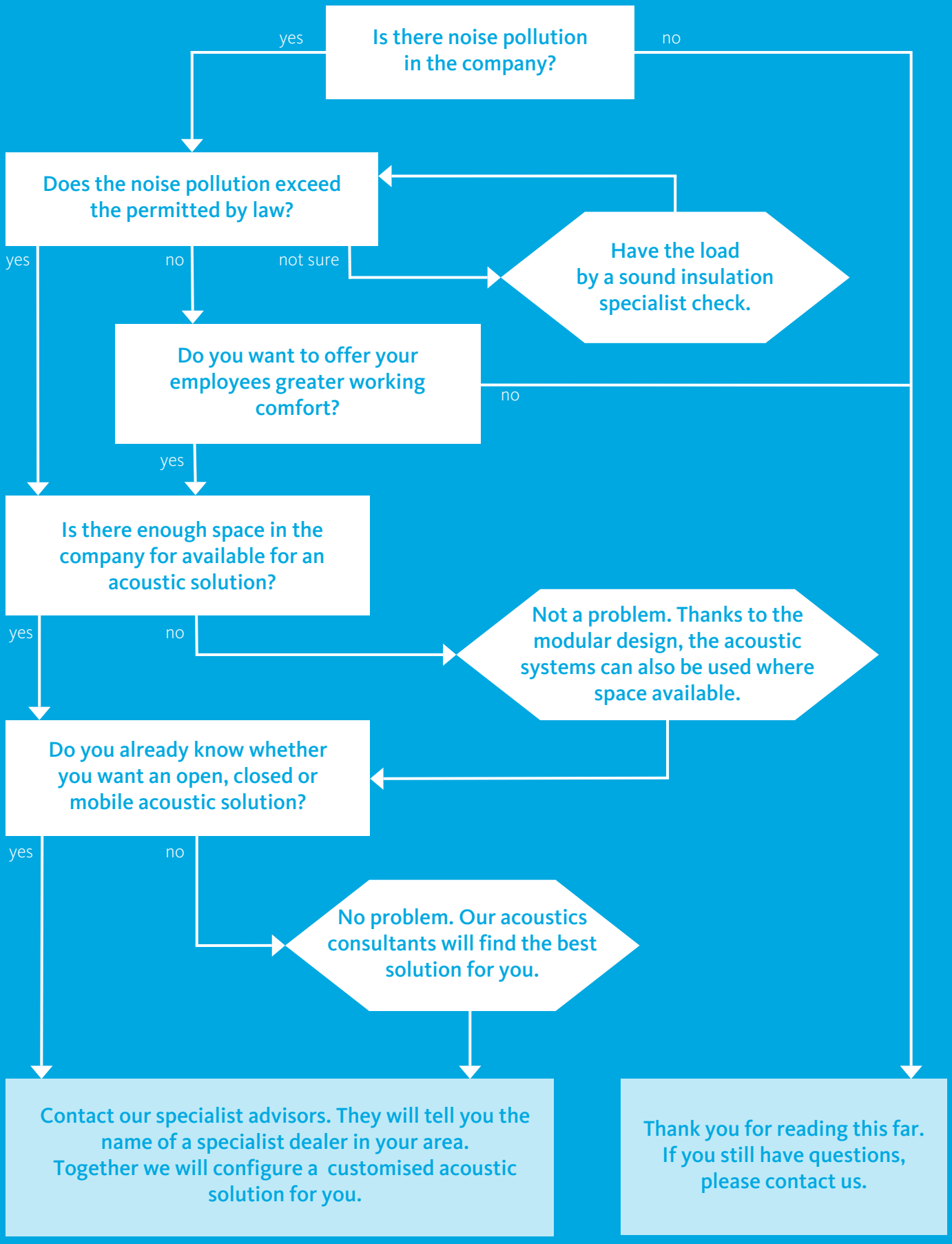
Prüfdatum: 11.10.2023
Erstellung Datenblatt: Dipl.-Ing.(FH) Michael Fuchs; M.BP.

WELL ADVISED

Operational sound insulation is a complex issue. With our specialist retail partners, we would like to support you in this endeavour.

Our trained acoustic consultants develop a solution that provides the best possible sound insulation, fits precisely into your premises and optimally supports your work processes. The acoustic system is configured according to your needs and visualised in 3D so that you and your employees will soon be on the safe, quiet side.

YOUR WAY TO MORE SOUND INSULATION



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