GEBERIT

WHITE PAPER 2020

A SOUND **SOLUTION**

EMBEDDING ACOUSTICS INTO BUILDING DESIGN

THE CASE FOR DEFINING NEW UK STANDARDS

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GEBERIT'S ACOUSTICS LABORATORY

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NOISE MATTERS. MANY OF US HAVE COMPLAINED ABOUT BEING KEPT AWAKE AT NIGHT BY WASTE WATER DRAINAGE FROM ADJOINING ROOMS EITHER IN THE HOME OR A HOTEL. BUT DESPITE THIS, NOISE (AND SPECIFICALLY NOISE FROM THE BATHROOM) REMAINS LOW ON THE AGENDA WHEN IT COMES TO SETTING STANDARDS FOR THE QUALITY OF NEW BUILDINGS IN THE UK.

This white paper examines the current regulations which govern the selection and specification of acoustically-optimised product solutions, highlighting the flaws which are evident in British Standards and UK Building Regulations.

It also assesses the suitability of current testing procedures for sound insulation, challenging why the UK still lags behind our European counterparts when it comes to supporting designers and consultants in specifying the most appropriate solutions for each individual project and room.

For many people, home is the one true sanctuary away from the commotion of modern life. It is a place to escape, to truly unwind and to restore the senses. But too often, the built environment is contributing to the noise which blights our everyday lives.

The continued development of acoustically-optimised solutions provides an opportunity to support that notion, improving wellbeing and optimising environments. However, we need change in order to grasp that opportunity. Geberit presents the case for defining new UK standards.

WHAT IS **NOISE?**

No, you are not just imagining it; the world is getting noisier. More machines, more people, more technology and increased travel is contributing to unprecedented global noise pollution. Many believe noise could be the next major public health crisis, particularly with continuing urban sprawl.

Sensitivity to noise and noise perception are subjective

Different people respond to sound in different ways. Often, it is not the volume of noise that is the key factor in determining whether someone reacts positively or negatively, but the type of noise involved. The best example of this is that a dripping tap (extremely low sound level) can be more annoying than loud music (high sound level) at a rock concert. The difference between sound (pleasant) and noise (unpleasant) is that noise is always what someone else is making and not what I myself am doing (sound).

The World Health Organisation, which has been tracking noise levels for over a decade, describes noise pollution as an “underestimated threat” that contributes to everything from stress to high blood pressure, cardiovascular disease, dementia, diabetes, and of course, hearing loss.

And the issue is not restricted to the outside world. Rapidly increasing numbers of connected devices, poor end-user awareness and lack of clarification in UK standards and Building Regulations can leave many of us unable to shake off the effects of noise in the home too.

UNDERSTANDING **NOISE**

The science behind sound appears straightforward. Sound moves through the air in waves and when a sound wave reaches our ear, we perceive its pressure as a certain loudness and its frequency as a certain pitch. The higher the sound, the higher the frequency, and the louder the sound, the greater the acoustic pressure.

HOWEVER, MEASURING NOISE AND ITS IMPACT IS NOT SO SIMPLE.

From a physical standpoint, the acoustic noise which reaches our ears is a vibration of air molecules, which produces small pressure fluctuations in the ear. The intensity of acoustic noise is thus indicated by fluctuations in air pressure. Because these fluctuations cover a range of between one and one billion, we express the acoustic noise level on a logarithmic scale, called the decibel unit (dB).

Our hearing is at its most sensitive at a frequency of 1-5 kHz and, within this range, we are able to perceive sounds with a lower acoustic pressure level of 0 dB. In other frequency ranges, however, sounds do not become audible until they reach approximately 20 dB. Frequency filters are used to simulate this perception of loudness. In the case of measuring instruments, this normally takes the form of an A-weighting filter, which reduces the instrument's sensitivity at low sounds. The measured values are specified in dB(A).

Above 40 dB(A), a decrease or increase in the acoustic noise level of 10 dB(A) is perceived as the loudness doubling or halving. If multiple sound sources are present at the same time, something more than a simple addition calculation is required to calculate the total sound pressure level. In this instance, energetic addition must be used.

For example, let's say there is a ticking clock, the sound of noisy waste pipes and traffic noise all taking place at once during the night. In this case, we would carry out the following calculation:

- clock ticking: 20 dB(A)
- night-time quiescent level: 26 dB(A)
- sound of pipes in the building: 28 dB(A)
- traffic noise: 30 dB(A)

$$L=10\cdot\log(10^{20}+10^{26}+10^{30})=33.3\ dB(A)$$

0 dB + 0 dB = 3 dB

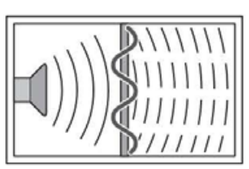
The total sound pressure level for two sound sources at 0 dB each is calculated as follows: A sound pressure level of 0 dB does not mean that no sound pressure is present. By definition, 0 dB correspond to 20 µPa.

$$L=10+10\lg 2=3dB$$

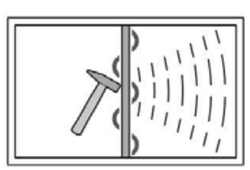
AIRBORNE AND STRUCTURE-BORNE SOUND

Another consideration is that sound is transmitted both through the air and by means of wall and ceiling vibrations. In the latter case, we refer to structure-borne sound. Encapsulation can reduce the extent to which airborne sound is transmitted; for example, by enclosing components in sound-insulating product materials. To prevent structure-borne sound propagation, the individual components must be kept apart from one another. Elastic connections or insulating layers may be used for sound insulation purposes, but structure-borne sound insulation must cover the entire area, as even a single sound bridge can negate its effect altogether.

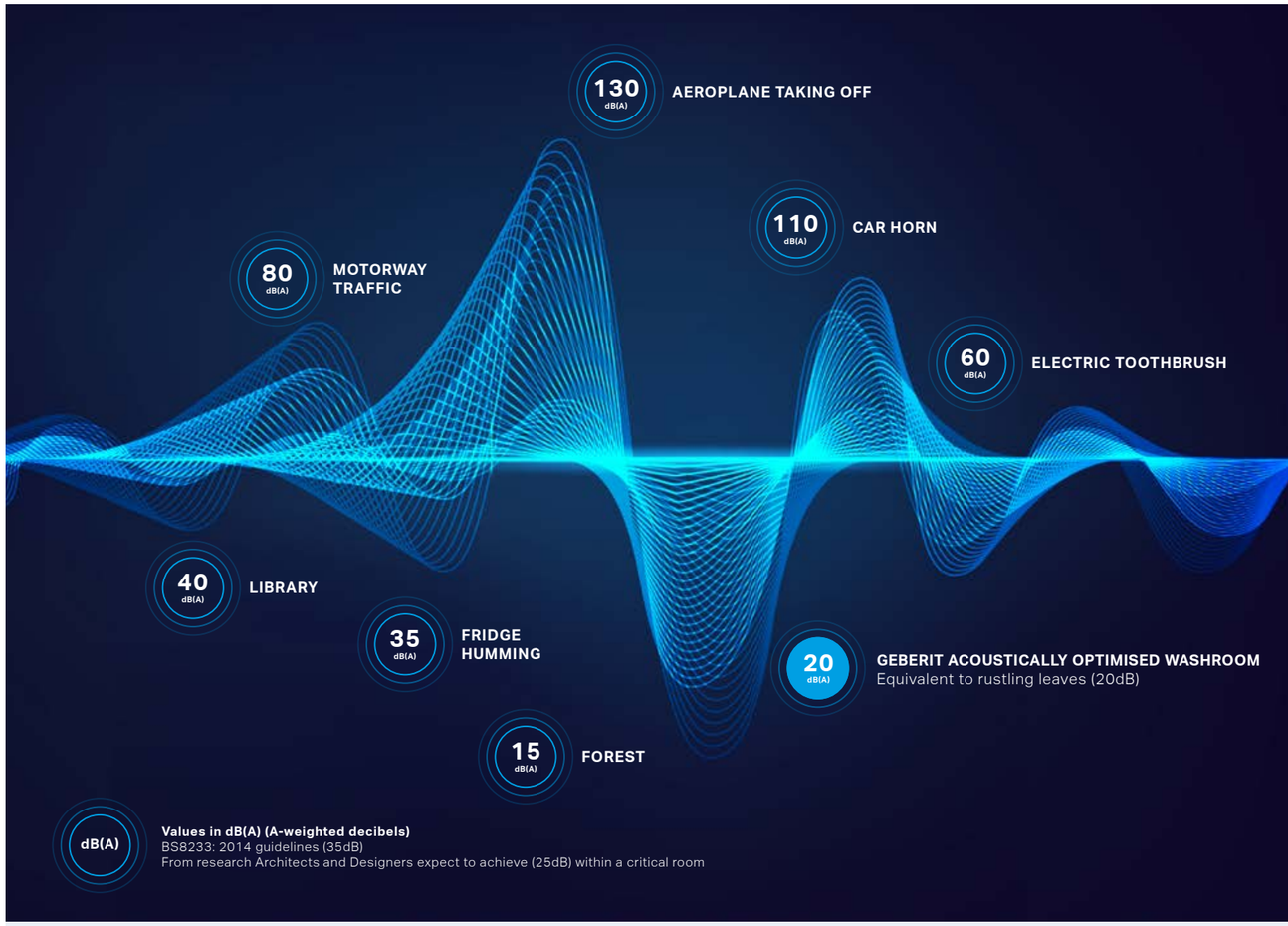
Airborne sound propagation



Structure-borne sound propagation



→ **THE SOUND OF SOCIETY** SOUND PRESSURE LEVELS OF DIFFERENT SOUND SOURCES:



DID YOU KNOW?

THE NOISE LEVEL ON TEN SEPARATE JOURNEYS IN ZONES 1 AND 2 OF THE LONDON UNDERGROUND GOES ABOVE 105 DECIBELS. THAT'S LOUDER THAN A HELICOPTER TAKING OFF NEARBY.

Dr Joe Sollini, of University College London's Ear Institute, said: "If someone was on a noisy Tube line every day for long journeys, it is perfectly possible this could increase the risk of hearing loss and potentially tinnitus."

Under health and safety law, employers must offer hearing protection if there are any sounds in a workplace at or above an average 85 decibels over an eight-hour period.

(Findings from BBC Inside Out London)

THE IMPACT OF **SOUND**

There is no escaping the fact that noise surrounds us. From the hum of the refrigerator to the prolonged sound of a nearby building site, we can't always escape unwanted noise completely. Especially when you consider that the impact of noise is not always directly related to volume or pitch. Consider emotions stirred by a continuously dripping tap or a leaking overflow pipe, for example.

HOWEVER, WE CAN MAKE BETTER-INFORMED DECISIONS TO REDUCE NOISE AND THEREFORE ITS SUBSEQUENT IMPACT ON WELLBEING, PARTICULARLY IN THE HOME.

In the fast-paced, 'always-on' society in which we live, the home is often the one true retreat away from noisy cars, coffee machines and construction plants. But how many of us are protected from acoustic interference even within our own homes? How many consumers are even aware of products and solutions to support in reducing noise?

A YOUGOV SURVEY COMMISSIONED BY GEBERIT IN JANUARY 2020 SHOWS THAT **70% OF HOMEOWNERS ARE NOT EVEN AWARE OF ANY LEGAL REQUIREMENT OR REGULATIONS SURROUNDING ACOUSTICS IN THE HOME**. IT SEEMS THE ONUS IS ON DESIGNERS AND CONSULTANTS TO PROVIDE BETTER OUTCOMES FOR CLIENTS, DEVELOPERS AND END-USERS.

→ Experts say your body does not adapt to noise. Large-scale studies show that if the din keeps up - over days, months, years - noise exposure increases your risk of high blood pressure, coronary heart disease, and heart attacks, as well as strokes, diabetes, dementia, and depression. Children suffer not only physically - 18 months after a new airport opened in Munich, the blood pressure and stress-hormone levels of neighbouring children soared - but also behaviourally and cognitively. A landmark study published in 1975 found that the reading scores of children whose classroom faced a clattering subway track lagged nearly a year behind those of students in quieter classrooms - a difference that disappeared once soundproofing materials were installed.

Source: *The Atlantic, November 2019.*

CURRENT **UK STANDARDS**

To compound the issue, current regulations surrounding the control of noise in UK buildings are both vague and insufficient.

Noise (defined as unwanted sound) within a new development can come from many sources including occupants of adjoining rooms or properties, extraction or ventilation units, water or drainage travelling through pipes, running taps and flushing toilets. This is evident within any dwelling, including houses and apartments, as well as rooms used for residential purposes such as hotels, student accommodation and care homes.

There are various acoustically optimised products available to building designers and architects to mitigate the impact of such noise, from plasterboard to pipes. However, there is very little clarification within the current UK regulations on what products should be used to achieve specific sound pressures, particularly in the case of water and sanitary noise.

For example, BSI's British Standard 8233:2014 Guidance for Sound Insulation and Noise Reduction in Buildings simply states that water systems including hot and cold water services and waste pipes "are not to cause disturbance in normal use".

This vague guideline is the document's only reference to reducing sanitary noise in buildings, even though research shows that more than a quarter of homeowners are regularly affected by bathroom noise and 19% blame water, including toilets and pipes (YouGov Survey, 2020).

The same document does offer 'desirable' indoor average noise levels, which vary according to the room. In the bedroom, this guideline is set at 35dB between 7am and 11pm and 30dB between 11pm and 7am. BS 8233:2014 states: "In general, for steady external noise sources, it is desirable that the internal ambient noise level does not exceed the guideline values."

"NOISE EMISSION FROM HYDRAULIC SYSTEMS, INCLUDING DOMESTIC HOT AND COLD WATER SERVICES, REFRIGERANT PIPEWORK, AND SOIL AND WASTE PIPES SERVING OTHER BEDROOMS, **IS NOT TO CAUSE DISTURBANCE IN NORMAL USE."**

SOURCE: BS 8233:2014

The UK Building Regulations are no more specific over how building design and product specification should be applied to reduce the noise from water systems.

Building Regulations (2010) Approved Document E 'Resistance to the passage of sound' consists of four parts and largely focuses on measures to control external sound (see table).

It stipulates that any wall or floor should reduce the noise transmitted to the next room by 45dB(A) or more, but fails to set a maximum noise level, nor does it mention the use of any acoustically optimised products.

The only specific guidance offered is that for pipes passing through floor penetration (e.g. bedrooms and living rooms), **wrapping with 25mm of unfaced mineral wool within a plasterboard duct (15 kg/sq.m) is deemed to be adequate.**

In contrast, Germany's **DIN 4109 acoustic standard** sets maximum limits for acoustics inside a building. DIN 4109 outlines sound insulation in buildings, including requirements and verifications – see page 11. It also outlines clear requirements on internal noise in buildings. In this standard, it is stated that the requirement for sanitary noise inside buildings is max. 30dB(A) in terms of LAFmax, n.

THERE IS NO BASELINE FIGURE FOR THE SOUND PRESSURE OF WATER AND DRAINAGE PASSING THROUGH PIPE SYSTEMS IN UK PROPERTIES; THUS NO MINIMUM STANDARD FOR ARCHITECTS AND CONSULTANTS TO MEET.

SOUND INSULATION

The level of sound insulation depends on various factors in front and behind the wall, which - as mentioned earlier - will affect the airborne and solid-borne sound levels and proportions.

With this in mind, a number of UK and international standards are used to translate the concept of sound insulation into something tangible and to make life easier for designers and specifiers working on projects.

OVERVIEW OF UK AND INTERNATIONAL SOUND INSULATION STANDARDS AND REGULATIONS

UK Building Regulations (2010) Approved Document E	'Resistance to the passage of sound' **E1** → Protection against sound from other parts of the building and adjoining buildings; **E2** → Protection against sound within a dwelling house; **E3** → Reverberation in common internal parts of a residential building; **E4** → Acoustic Conditions in Schools.
BSI's British Standard 8233:2014	Guidance for Sound Insulation and Noise Reduction in Buildings
European Standard EN 14366	Laboratory measurement tool for acoustical characterization of waste water systems
German Standard DIN 4109	Outlines minimum requirements for sound insulation in buildings, together with DIN 4109/A1 Sound insulation in buildings DIN 4109 supplement 2 – sound insulation in buildings (proposals for increased sound insulation)
German Standard VDI 4100	Supplementary to DIN 4109, this outlines increased insulation requirements. Defined as 'Sound Insulation between rooms in buildings – Dwellings – Assessment and proposals for enhanced sound insulation between rooms. It defines four classes of sound insulation for the planning and evaluation of enhanced sound insulation for multi-family buildings, terraced and semi-detached houses.

In practice, we are usually met with European Standard EN 14366 requirements, in the form of sound certification from the Fraunhofer Institute. However, this type of acoustic testing is unreliable, due to the various measured outcomes from the standard configuration. In the past, this type of testing has revealed some fantastic results because manufacturers are, unfortunately, allowed to set up their own conditions at the Fraunhofer Institute, enabling them to make optimisations that are not 'true to life'. Instead, DIN 4109 presents a complete system test including behind and in front of the wall product testing.

Example of EN 14366 standard configuration for sound certification

- → Four floors (inc. basement)
- → Basement is insulated against solid-borne sound
- → 25 cm transition section in basement
- → Two fastenings per floor
- → Wall: 220 kg/m²
- → Measurement in lower ground floor, behind/ in front of wall
- → Laminar flow 0.5, 1.0, 2.0, 4.0 l/s (continuous flow)

Example of DIN 4109 standard configuration for sound certification

- → 2 l/s conveyed through system when flush is actuated => no constant volumetric flow rate
- → Three floors
- → Basement not insulated
- → Potable water: Flow pressure 0.3 MPa, fill time approx. 45 s
- → Installation wall 180 kg/m²
- → Prewall system (insulating effect)
- → Floor: 220 mm thick
- → A structure for the real world

The DIN 4109 approach is based on system measurements. The Fraunhofer Institute testing is merely a document to show how manufacturers are installing – there is no responsibility on project teams to conform to these same standards on site.

Are sound values valid without the detailed documentation to back them up?

WHY IT MATTERS.
THE CHALLENGE

WHY EXACTLY DOES NOISE MATTER?

Firstly, it matters to our health. As we have already said, the World Health Organisation notes that noise pollution contributes to stress and high blood pressure, cardiovascular disease, dementia, diabetes, and of course, hearing loss. One study of aircraft noise around Heathrow Airport found that high levels of aircraft noise was associated with increased risks of hospital admission and death from stroke, coronary heart disease, and cardiovascular disease in the nearby area (BMJ, 2013).

It also matters to our mood and ultimately our wellbeing. Prolonged exposure to noise can create negative feelings such as irritation, dissatisfaction and nuisance, as well as a feeling of having one's privacy invaded. Noisy work and home settings have been proven to annoy people, with evidence of depression and anxiety resulting from noise annoyance (NCBI, 2015). Studies have also linked noise issues in work and school environments to reduced concentration, productivity and performance.

To quote the UK Green Building Council in its 2016 report 'Health and Wellbeing in Homes': **"Acoustic design and noise control is a key element for the design of stress-free restorative environments."**

"STILL THERE REMAINS A LACK OF STEWARDSHIP AND SPECIFIC REGULATIONS GOVERNING THE CONTROL OF NOISE INSIDE NEW BUILDINGS"

WHY IT MATTERS – THE CHALLENGE

OF COURSE, THE ISSUE OF NOISE IS NOT COMPLETELY UNRECOGNISED IN PLANNING AND BUILDING DESIGN.

There are clear planning guidelines relating to the acoustic impact of new developments to their environment, particularly for non-commercial developments, for example. Developers and building designers are also increasingly aware of the need to mitigate the impact of external noise such as road, rail and air traffic and aeroplanes. This can be achieved using a number of measures including acoustic plasterboard or acoustic insulation.

Yet despite the fact that installation elements have direct contact with walls and floors, there still remains a lack of stewardship and specific regulations governing the control of wastewater noise inside new buildings. In fact, there is an argument that increased sound insulation has amplified noise within the home, highlighting internal noises that were previously unheard.

One such example of this failure to address acoustic performance is the Living with Beauty report (January 2020) by The Building Better, Building Beautiful Commission. The Commission is an independent body that will advise government on how to promote and increase the use of high-quality design for new build homes and neighbourhoods. But its most recent publication, a 180-page document which proposes a new development and planning framework, makes no reference to noise or acoustic performance whatsoever. It seems noise remains at the bottom of both the environmental and wellbeing agenda.

→ **In a YouGov poll commissioned by Geberit:**

51%

OF HOMEOWNERS SAY THAT UNWANTED NOISE IN THEIR HOME HAS A NEGATIVE IMPACT ON THEIR WELLBEING

35%

OF PEOPLE ARE AFFECTED BY NOISES INSIDE THE HOME COMPARED TO 25% WHO SAY THEY ARE EFFECTED BY TRAFFIC

28%

SAY THEY ARE REGULARLY AFFECTED BY BATHROOM SOUNDS INCLUDING THE TOILET FLUSHING, DRAINAGE AND PIPES

30%

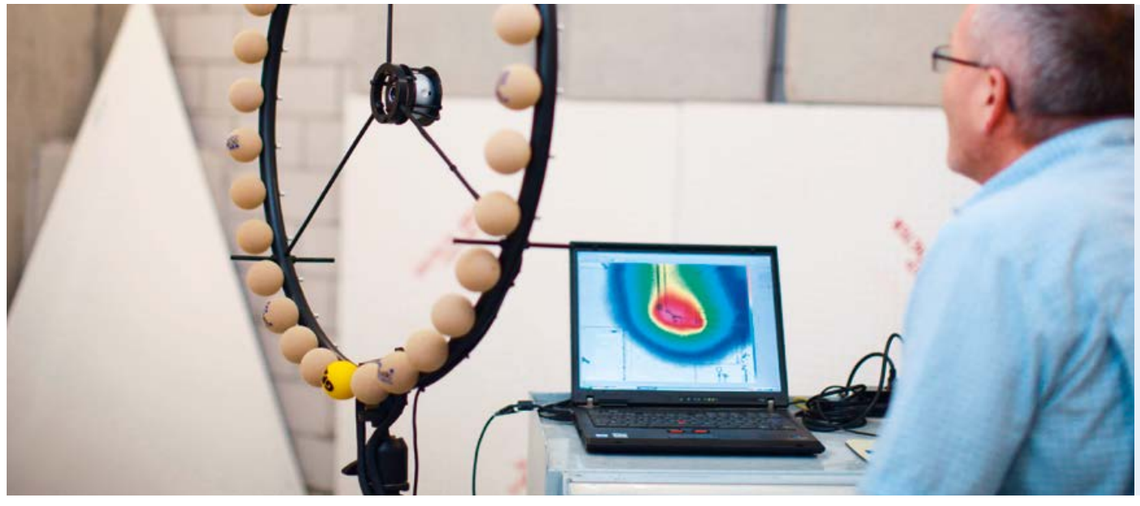
HAVE BEEN DISTURBED BY BATHROOM NOISE IN A HOTEL IN THE LAST 18 MONTHS

2054 respondents, January 2020

ADDRESSING **THE CHALLENGE**

Architects and consultants are aware that buildings not only need to be designed to be functional and aesthetically pleasing, but acoustically satisfying as well; whether this is to support wellbeing in the home, encourage productivity in the workplace or to enhance customer satisfaction in a hotel. But without recognised standards to work to, it is difficult to specify a well-informed, collaboratively-tested, whole-building solution.

THE UK MUST REVISIT STANDARDS AND OUTLINE MAXIMUM SOUND PRESSURE FIGURES, THUS ENABLING THE CONSTRUCTION INDUSTRY TO WORK TOGETHER AND ACHIEVE BETTER RESULTS FOR END USERS.



WHY IT MATTERS. **THE IMPACT**

The need to address the challenge of acoustic performance inside new developments and particularly of wastewater systems is highlighted by the results of a recent poll of 2,054 homeowners by YouGov, commissioned by Geberit (January 2020).

Noise is clearly an issue and particularly in the bathroom. More than a quarter (28%) of respondents say they are regularly affected by bathroom sounds and 19% blame water, which includes toilet flushing, drainage and pipes.

Despite these findings and the clear negative impact of noise, the survey also demonstrates that **homeowners are largely oblivious to acoustic performance**. Only 34% of respondents considered the acoustic performance of the property before purchasing, and seven in ten (70%) say they are not aware of any legal requirements or regulations on acoustics in the home.

More than half (51%) say that these unwanted noises at home have a **negative impact on their wellbeing** and 35% cite that it specifically affects sleep. The issue is not restricted to the home either; almost a third (30%) have been disturbed by bathroom noise in a hotel in the last 18 months.

It also highlights the fact that many are **unaware of the solutions available to them** which could help to reduce noise inside the home. Over a third (38%) of respondents say they spend more than two hours researching a mobile phone and 17% spend more than five hours doing so. This compares to just 16% of respondents who spend more than two hours researching acoustically optimised drainage and 20% on home acoustics in general.

- → **More than half of homeowners say unwanted noises have negative impact on wellbeing**
- → **Bathroom noises are the most common compliant, including water - toilet flushing, drainage, pipes**
- → **Almost one third disturbed by bathroom noise in a hotel in the last 18 months**
- → **But homeowners are still largely oblivious to acoustic performance**
- → **Most do not consider acoustic performance before purchasing a property**
- → **They are also unaware of acoustic solutions available, e.g. acoustically optimised drainage**

A MANIFESTO FOR **CHANGE**

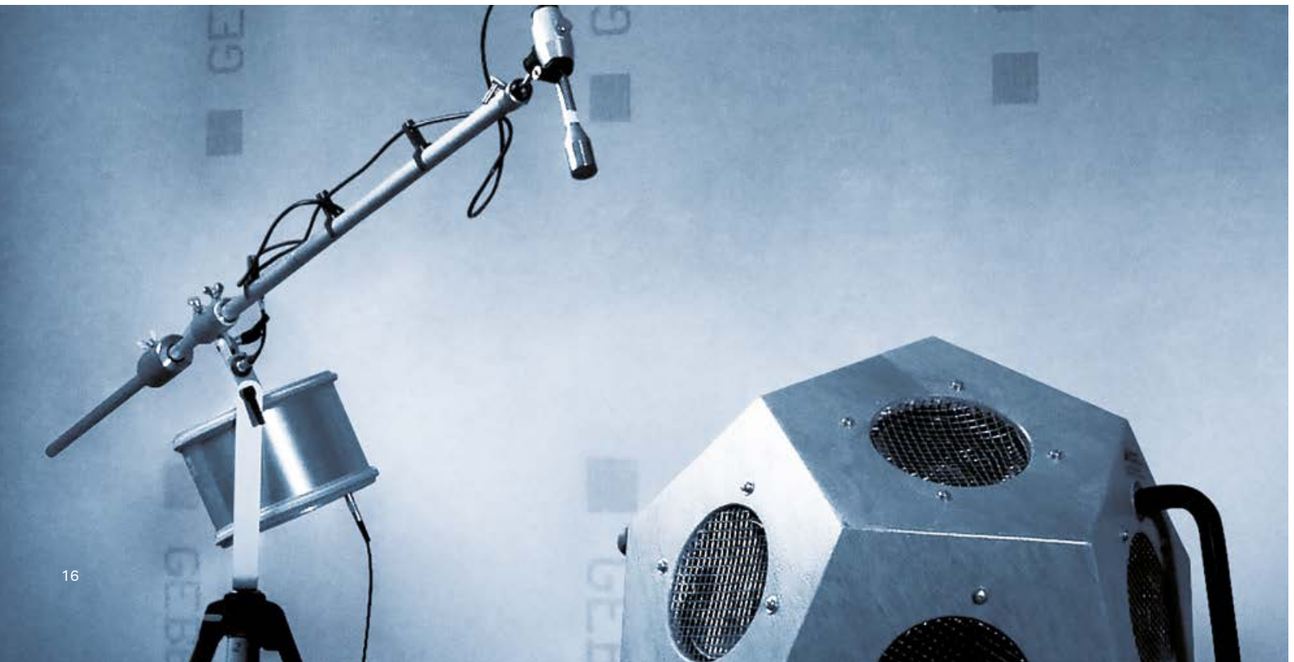
WE BELIEVE THAT CHANGES MUST BE MADE TO BOTH THE REGULATIONS AND TESTING STANDARDS WHICH DICTATE THE ACOUSTIC PROPERTIES OF SANITARY AND DRAINAGE INSTALLATIONS IN NEW UK BUILDINGS.

Firstly, the evidence presented so far within this document shows that **BS 8233:2014 is not fit for purpose**. Clearly the acoustic performance of buildings must be driven by the industry (not the consumer), but current standards offer vague recommendations and little guidance for designers. Language such as 'in general' and 'desirable' are insufficient.

Building Regulations Part E again offers vague guidance for drainage, but falls short of setting minimum standards on noise levels to work to and offers no mention of acoustically optimised products. Without specific UK standards on the noise pressure from water systems inside new buildings, there is no requirement to meet a baseline figure and no requirement to improve.

In addition, the current recognised testing method for acoustically optimised products measures drainage pipes without connection to appliances, in an artificial room layout. This is not realistic. **Geberit's recommendation is to use a complete certified acoustic solution**, in line with DIN 4109 to give a more accurate reflection of true acoustic performance in a comparative installation.

As demonstrated with other building services, more stringent standards result in a simplified process by room type and project type. Realistic, 'true-to-life' full system testing of products to identify fully certified acoustic solutions (i.e. a group of products) will result in accurate guidance for enhanced product selection and specification. It will improve simplicity of specification and performance, delivering benefits for designers, consultants, developers and end users alike.



DRIVING CHANGE **THE SOLUTIONS**

To reduce sanitary noise, we must think about the source, path and receiver. There are a number of ways to achieve better sound insulation through sanitary technology, either at the source, path and/or receiver.

In addition, it is important to design a building with acoustics in mind from the outset and this requires consideration of the different room types. There are critical rooms, such as living rooms and bedrooms, and uncritical rooms such as bathrooms and kitchens. It is best practice to try and build the same type of rooms on top of each and next to each other, meaning any noise transfer from the uncritical rooms will not be an annoyance in the critical rooms. Where this cannot be avoided, it is important to ensure additional acoustic insulation is installed to reduce the effect on the critical rooms.

With this approach in mind, and by following a few fundamental principles detailed below, architects and consultants can reduce the impact of noise from toilet flushing, drainage and pipes, delivering a better experience for the end user.

↑
Example of acoustically optimised bathroom

SOUND INSULATION IN **SANITARY TECHNOLOGY**

Wall-hung WC

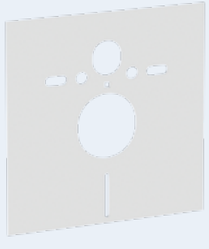
When choosing a WC always look to wall mount to decouple from the floor.

Optimised wall-hung frame

By designing in a Geberit Duofix frame you have already optimised your acoustic values. Integrated rubber tipped push rods to reduce noise from the flush plate when pressed for flushing, a polythene jacket insulating the cistern, circlips on threaded rods to eliminate movement and sound absorbing seals on drainage brackets - Geberit Duofix frames have it covered.

Insulation tape

Duofix insulation tape for structure-bourne sound minimisation between panels, system rails and building structures.



Sound insulation pad

When installing a WC, always use a sound insulation mat as well as sound insulation sleeves for the fastening screws.

SOUND MEASUREMENTS AT GEBERIT

As a progressive manufacturer, Geberit products adhere to the standards outlined in DIN 4109. Geberit has performed sound measurements under realistic conditions in a laboratory set up specifically for this purpose. These have produced reliable measurement results for specifiers, users and designers.
The measurement results can be found on the page that follow. Please note that the specified sound pressure levels apply to the construction situations mentioned in each case and may only be of limited relevance to other construction situations.

Pipe bracket with sound insulation

Always choose pipe brackets with a rubber lining and make sure they are not tightened too firmly. Never use cement for fastening components to the wall, as this could result in sound bridges.

By selecting Geberit pipe brackets with the appropriate diameter and tightening them fully, it is possible to achieve optimum fastening and sound insulation conditions.

Stack without direction change

Where possible, do not incorporate direction changes into stacks. Straight stacks have a lower effect on acoustic insulation.

If direction changes are unavoidable, however, take care to ensure that the angles of the resulting diversions are as small as possible.

Quiet pipes

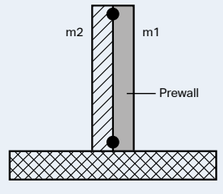
Geberit Silent-db20 is highly sound optimised with mineral reinforced polyethylene for a denser material and fittings to dissipate noise at impact zones. In addition, Geberit Silent-PP has mineral-reinforced three layer construction to ensure reduced sound from waste water. Geberit Silent-PP and Geberit Silent-db20 offer acoustic value to a wide range of applications.

Insulation mats

Wraps pipes and fittings to reduce airborne sound spreading.

Jointing method

Electrofusion couplings maintain a smooth internal bore thus reducing noise transfer.



Prewall protection

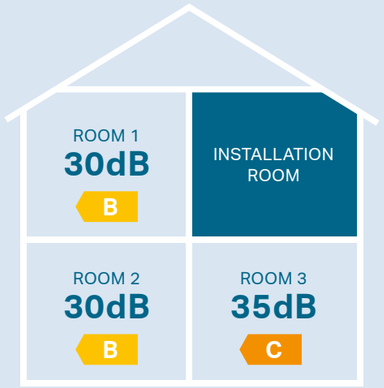
The larger the ratio in mass per unit area between the prewall (m1) and the wall (m2), the better the joint insulation will be.

UK **SOUND MEASUREMENTS**

All test installations were designed in the UK and the measurements conducted by Geberit in their own sound laboratories. By installing the complete Geberit system we are able to take test measurements from real UK scenarios and measure the results from three different adjoining rooms. The acoustics from a bathroom are not solely dependent on the drainage pipe, and as such testing the complete system inclusive of cistern, WC, wall structure and drainage is far more meaningful in the real world.

SOUND MEASUREMENT TESTING RESULTS

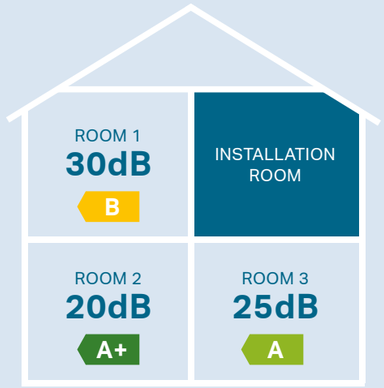
→ TEST 1



INSTALLATION ROOM CONDITIONS

- → Timber stud walls
- → 15mm plasterboard
- → Floor standing back to wall WC
- → Silent-db20

→ TEST 2



INSTALLATION ROOM CONDITIONS

- → Duofix metal stud walls
- → 18mm plasterboard
- → Wall-hung WC
- → Silent-db20

WHY **GEBERIT?**

A BRAND SYNONYMOUS WITH QUALITY AND DURABILITY, GEBERIT'S PORTFOLIO COVERS A WIDE RANGE OF BEHIND THE WALL AND IN FRONT OF THE WALL SANITARY SOLUTIONS.

For generations it has provided the building industry with the products and systems needed to meet project challenges and deliver complete bathroom solutions. With a focus on innovation and reliability, its systems cover every water path in commercial and non-commercial buildings, from the water supply and building-wide distribution, to drainage systems from rooftops and high-rise buildings. Geberit also offers a choice of frames, flush plates and ceramics, providing an entire bathroom or washroom package for any application.

Crucially, Geberit never stands still. In fact, it is a pioneer for innovation, leading the way for research and development across all areas of sanitary technology.

ACOUSTICS EXPERTISE

Acoustics is one of Geberit's ten core research areas, developed to ensure the quality and effectiveness of its research and development.

By combining cutting-edge technologies with comprehensive know-how and a strong focus on innovation, Geberit is committed to sustainably increasing quality of life. Always searching for new technologies and materials in order to improve products and processes, it brings global technical expertise, unrivalled testing capabilities and a wealth of experience in all development sectors.

For acoustics specifically, this includes locating and remedying the cause of sanitary noises to reduce disruption, whilst working with the industry to support more effective acoustic design. The long-term objective is to ensure that sanitary noises become a thing of the past.

At the heart of this is Geberit's unique building technology and acoustics laboratory - a four-storey building where virtually any construction situation can be acoustically recorded using state-of-the-art measurement technology. This truly global leading facility enables best-in-class experts to research products, technologies and also the impact that various installation techniques have on sound emissions, ensuring more effective solutions for all.

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