



ACOUSTIC INSULATION

ArmaComfort - the Comfort of quiet equipment

 **armacell**[®]



Every third European is bothered by noise

THE SOUND OF SILENCE

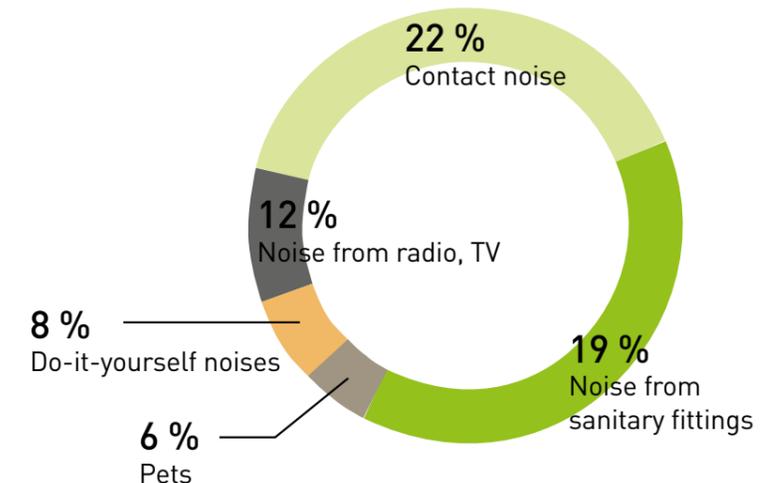
Noise has become one of the greatest environmental problems of our times. Whether at work, in public buildings or in the home – hardly anything disturbs us as much as noise. Although the acoustic insulation on external structural elements may be good, annoying noises inside the building can greatly impair the quality of life. It is therefore essential that noise protection measures are consistently planned and properly carried out, both when constructing new buildings and when modernizing existing ones.

Noise control is becoming more and more important

According to the World Health Organization (WHO), every third European is bothered by noise. The WHO has identified a considerable number of specific adverse health effects caused by environmental noise. Neighbour noise is listed as the second most frequent source of annoyance, topped only by traffic noise. Based on statistics on populations and findings from noise annoyance surveys it can be assumed that more than 50 million Europeans are exposed to neighbour noise that adversely affects their quality of life. The effects can be medical conditions, but also sleep disturbance, stress, etc. Nowadays,

occupants are much more sensitive. Sounds that were not perceived as annoying, but simply accepted in multi-family houses twenty or thirty years ago, are today regarded as 'unacceptable disturbance' and lead to problems amongst the residents.

In a study carried out in the Netherlands, respondents were least tolerant of noise from their neighbours that was audible in the bedroom at night. Almost 20 % of respondents perceived noise from the building service equipment as being especially annoying.



CREATING A QUIET ENVIRONMENT

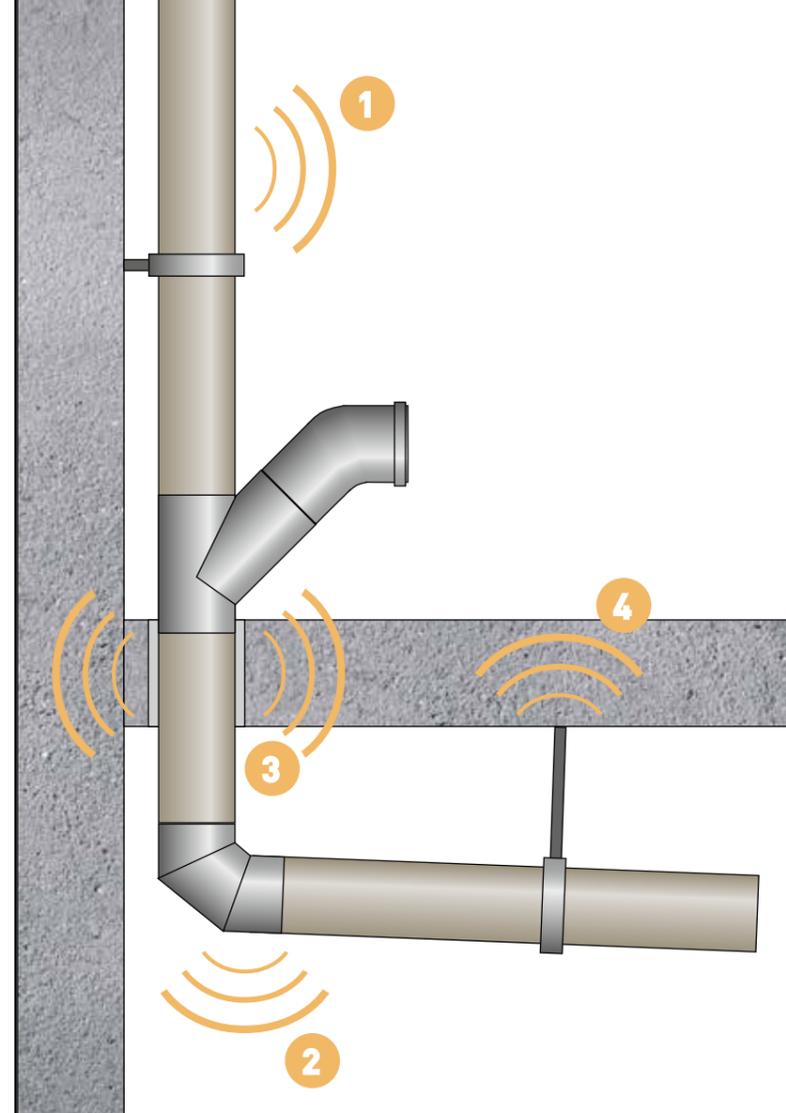
Acoustic insulation in buildings means ease and comfort, but also privacy, intimacy and a sense of security. The increased appreciation of private living space is reflected in higher expectations. Nowadays, tenants and buyers expect enhanced noise control. If it only complies with the legal requirements these expectations are disappointed. Unlike many other planning errors or construction defects, noise disturbance is usually not accepted.

Factors influencing the sound insulation

Building acoustics and noise control are extremely complex issues. They depend on so

many parameters that it is difficult to predict the acoustic behaviour of building services. There are multiple sources of noise and many factors which influence whether and to what extent noise is propagated from these sources. They include:

- how the building or flat is laid out,
- how the building is designed and what construction materials were used,
- how the pipes are arranged,
- what materials the water system is made of,
- how the pipes are mounted, and
- how the equipment is operated by the occupant.



WATER SYSTEM SOUNDS

Two main types of noise for pipes can be distinguished:

- the airborne sound
- and the structural borne sound

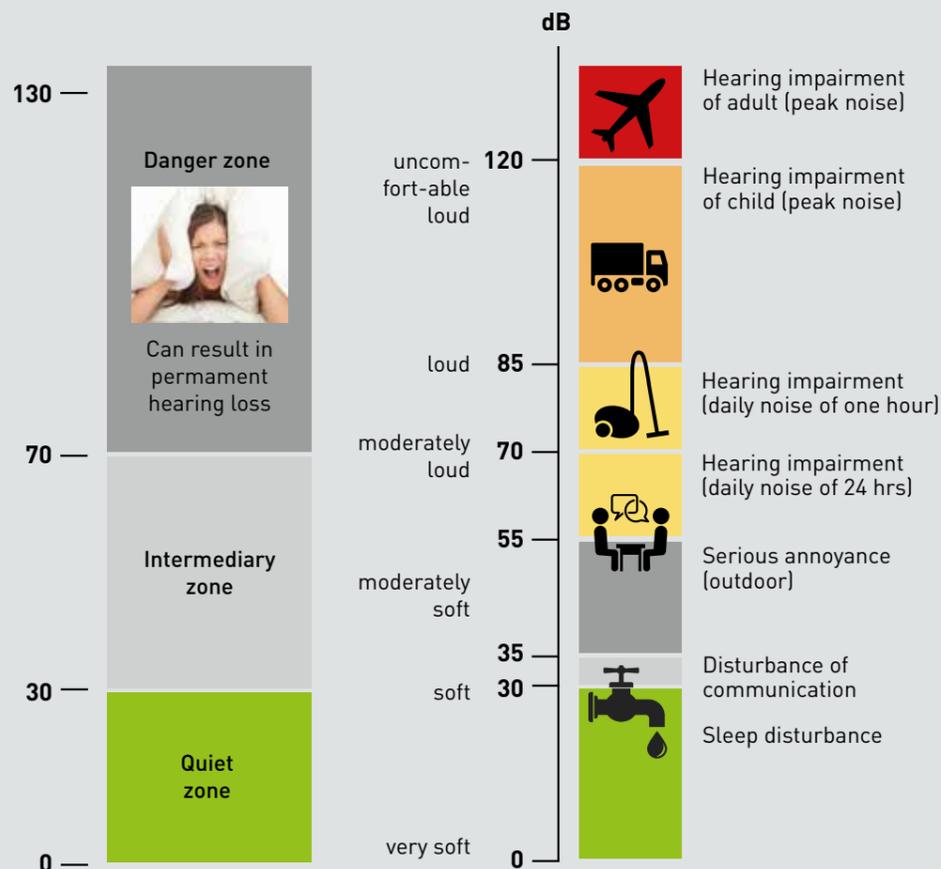
Airborne sound: sound transmission through the air. In piping the sound is due to the flow of water in the pipe and it's disseminated in the room (noise from the pipe, see examples 1 and 2). Air borne noise level examples for sanitary or rainwater pipes (Ø110 mm) in vertical position without insulation at 2l/s water flow:

- PVC pipe: 55 dB(A)
- Friaphon: 50 dB(A)
- Iron Cast: 48 dB(A)

Structure-borne sound: transmission through building structure. It can come from the support of the pipe or from the connection between the pipe and the building frame (see examples 3 and 4)

In water systems the airborne sounds are often more important (for a 110 mm Ø PVC pipe = around 61 -55 dB(A) at 2 l/s water flow)) that the structural sounds (around 22 dB(A)). In buildings, the structural noises have to be corrected because the building frame often amplifies them.

Other sounds such as reflected sounds can appear in technical duct around the pipes. To avoid them or to reduce them it's important to catch the noises at the source by insulating the pipes or decoupling the pipes directly from the support or from their connections to the frame.



KEY TERMS

Sound is a mechanical vibration which is perceived by the human ear in the frequency range 16 Hz to 16.000 Hz.

Frequency is the number of vibrations per second. The pitch rises as frequency increases. The most important range for building acoustics lies between 100 Hz and 3150 Hz.

Bel (B) and decibel (dB) are relative units and represent the ratio between two acoustic quantities on a logarithmic scale.

Decibel (A), dB (A) weights the volume according to frequencies. In this way it is possible to achieve a measurable representation of noise as it is perceived. Depending on the frequency, the human ear perceives tones of the same sound pressure as being of different loudness.

Sound Insertion loss is the difference in sound levels measured between the bare pipe and the pipe with insulation. Such a measurement of sound reduction in dB(A) provides a direct indication of the improvement due to an acoustic solution.

HIGH PERFORMANCE ACOUSTIC SOLUTION

ArmaComfort products are highly effective, easy-to-install noise control products especially for insulating rainwater and wastewater pipes. In comparison to traditional products, the multi-layer acoustic insulation materials achieve greater noise reduction with thinner wall thicknesses.

Sounds from wastewater pipes and internal rainwater pipes are experienced as being particularly annoying. The noise of falling water is transferred via unprotected pipes to wall and ceiling elements and from there to adjoining rooms. ArmaComfort provides highly efficient noise control solutions specially developed for this area of application. As a closed-cell insulation construction on the basis of Armaflex, ArmaComfort reliably prevents condensation on the pipes.

Greater noise reduction with thinner wall thicknesses

In comparison to traditional acoustic insulation products, ArmaComfort achieves a much greater reduction in the sound level with a thinner wall thickness. The new materials have very good acoustic damping and acoustic isolation properties across the frequency range relevant for building acoustics – no matter whether they are installed on cast iron or plastic pipes.



Low smoke density in a fire

The products display very good fire behaviour: with B-s1,d0 ArmaComfort AB Alu and ArmaComfort AB Alu Plus achieves the best fire class for organic products in the European SBI test. Furthermore, the attractive silver-coloured aluminium covering fits in well with metal-clad installations in areas where the pipes are visible.

DESTINATIONS



Residential



Hotels / Hospitality



Offices



ACOUSTIC PERFORMANCE OF ARMACOMFORT

Tests by the French certification organization Centre Scientifique et Technique du Bâtiment (CSTB) in accordance with EN14-366 show that with ArmaComfort AB the airborne sound pressure level of a Geberit PE-HD pipe can be reduced by 16 dB (A) at 2 l/s water flow on a vertical pipe. On a horizontal Geberit Silent 20dB pipe, where the vibrations caused by flowing water are strong-

er due to impact noise, a noise reduction of 18 dB (A) was achieved. The human ear perceives a reduction of 10 dB (A) as halving the volume. In comparison to traditional acoustic insulation products, ArmaComfort solutions achieve a much greater reduction in the sound level with a thinner wall thickness.



SOLUTION EXAMPLES TO BE IN A QUIET ZONE

| | | | | |
|------------------------------|---|---|---|-----------------------------|
| Vertical Pipe | + | Acoustic Insulation | = | Quiet zone |
| Ø 100 mm Water flow: 2l/s | | ArmaComfort AB, AB Plus, AB Alu | | <30 dB (A) In main rooms |
| 55 dB (A) | + | -16 dB (A) + 1 plasterboard 13 mm | = | 24 dB (A) |

| | | | | |
|------------------------------|---|---|---|-----------------------------|
| Horizontal Pipe | + | Acoustic Insulation | = | Quiet zone |
| Ø 100 mm Water flow: 2l/s | | ArmaComfort AB, AB Plus, AB Alu | | <30 dB (A) In main rooms |
| 61 dB (A) | + | -18 dB (A) + 2 plasterboard 18 mm | = | 26 dB (A) |

FLEXIBLE AND ROBUST

ArmaComfort products are flexible and are installed in a similar way to elastomeric insulation materials and do not require any special tools. To glue the ArmaComfort products the tried-and-tested Armaflex adhesives are used. In addition, the longitudinal seams are secured with the appropriate self-adhesive tapes. The thin wall thickness of the material is an advantage during the installation process because especially in these application areas space is often at a premium. Armacell provides application manual, templates for elbows and technical advisory to ensure excellent practices.



All details about the application of ArmaComfort you can find in the application manual under www.armacell.eu

ARMACOMFORT - A SOLUTION TO EVERY CHALLENGE

Depending on special requested features a board range of product is available:



| Product | ArmaComfort AB | ArmaComfort AB Plus | ArmaComfort AB Alu | ArmaComfort AB Alu Plus |
|----------------------|--|---|---|---|
| Short description | Armaflex elastomeric foam with flexible acoustic barrier | Armaflex elastomeric foam with flexible acoustic barrier Available as self-adhesive sheets | Polyurethane foam with acoustic epdm-eva barrier and aluminium foil | Armaflex elastomeric foam with acoustic barrier epdm-eva barrier and aluminium foil |
| Special features | Very good against corrosion | Very good against corrosion | Halogen-free | Very good against corrosion |
| Colour | Black | Black | Silver | Silver |
| Acoustic performance | Excellent | Excellent | Good | Excellent |
| Fire class | D-s2,d0 | C-s2,d0 | B-s1,d0 | B-s1,d0 |

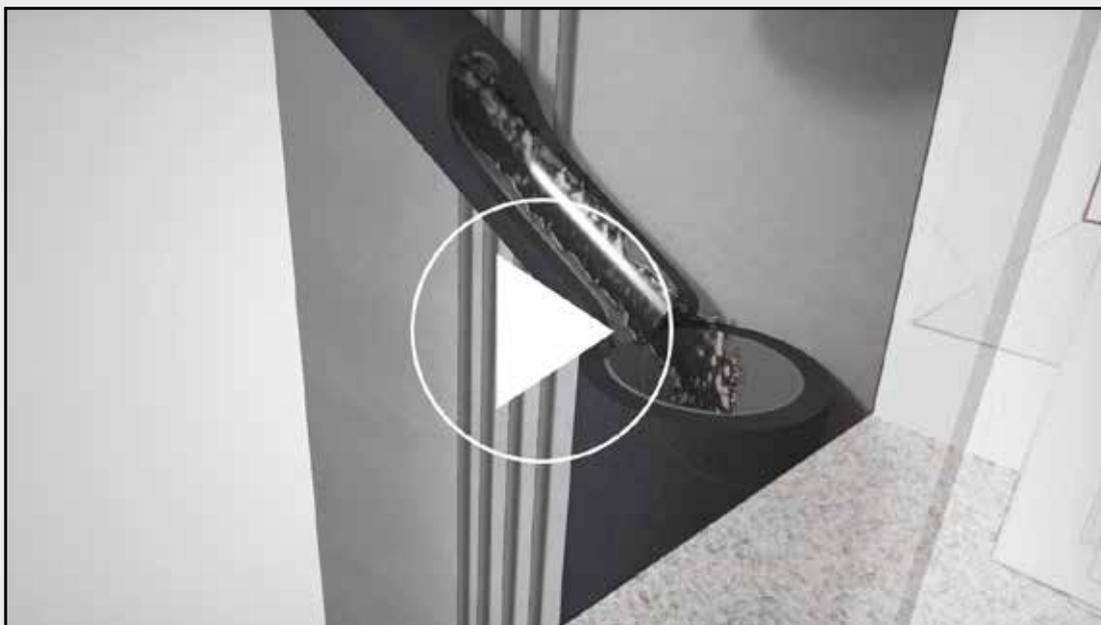
ArmaComfort products are available in 2m² rolls (1m*2m). 40 rolls per pallet. Tailor-made solutions are possible on demand.



ArmaComfort Tape

Armaflex 520

VIDEO



The acoustic insulation materials are also presented in a video which can be viewed on YouTube and at www.armacell.eu.



Would you like to know more about Armacell's acoustic solutions? Information on all aspects of technical information can be found on www.armacell.eu

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