Düker

DRAINAGE TECHNOLOGY

Acoustic Protection for Building Installations

with cast iron drainage pipe systems
by Düker

Acoustic Protection Requirements

Human sound perception is subjective. The difference between a pleasant and an unpleasant noise depends not only on its volume, but in particular on its origin and content.

Noises from building installations which infiltrate from a neighbouring apartment into your own living area are perceived as extremely annoying.

Numerous consultants and plumbers have been taken to court for such issues.

Two Problems, Three Solutions

Two issues can make the plumber and/or design planner vulnerable:

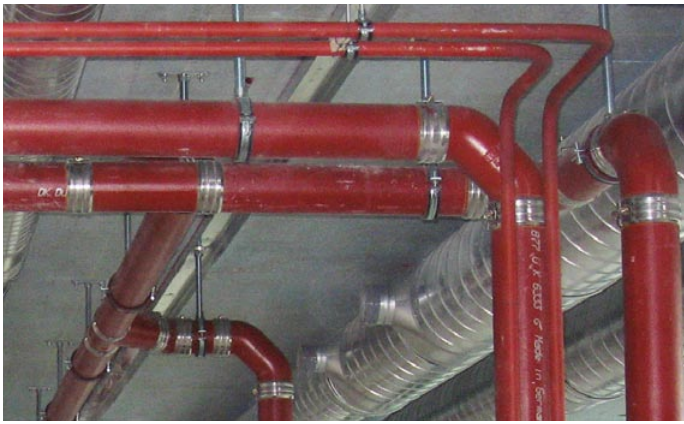
1. The requirements regarding acoustic protection are often not clearly stated.

In many countries there are building codes which give guidelines for acceptable noise levels in living rooms. Most of these codes define various acoustic protection levels depending on the use of the rooms or the general quality level of the building. In case of a law suit, courts may have a tendency to base the judgement not on the minimum code requirements, but on superior requirements, as most new buildings are supposed to have a certain level of comfort and sophistication.

Depending on the local building codes, minimum noise protection allows in general a noise level of approx. 30 dB(A) coming from installation systems in a neighbouring apartment; superior requirements may be around 25 dB(A).

2. The actual noise level to be expected in the building cannot be calculated.

Test certificates as per EN 14366 for drainage pipes only allow comparing the performance of various materials. The test installation is more or less realistic, but hardly any real drainage installation will be identical. Furthermore, other simultaneous noises from the building installation networks have to be added to those of the drainage system.



The Solution:

1. Clearly define the acoustic protection objectives in the contract!

2. All parties contributing to the building must consider the acoustic protection in their work, from the floor plan design down to the detail execution.

3. The installation material selected should offer the maximum safety margin!

Maximum Safety Margins for Acoustic Protection

Three factors are significant for superior acoustic protection in a drainage system:

1. The material of the pipe system and its capacity for sound absorption

On principle, a high mass absorbs sound. **The weight of cast iron drainage pipelines alone is a considerable contribution to acoustic protection.**

Furthermore, the structure of a pipe material can assist sound protection. Disruptions in the material and material changes make it difficult for sound waves to proceed. In grey cast iron, this function is fulfilled by graphite lamellae.

2. The execution of wall and ceiling penetrations

Between the pipeline and the masonry, acoustic bridges which transfer structural sound must be avoided. **All penetrations must be equipped with suitable material**, e.g. mineral wool or PE insulations. Acoustic bridges may not be formed either when installing fire protection collars.

3. The type of fixing

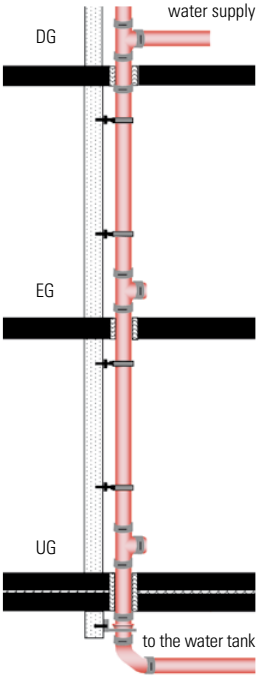
Normally acoustic protection is measured behind the installation wall. A nonprofessional fixing without acoustic decoupling would transform the wall into a resonating body. **Standard pipe brackets with rubber insert** already provide good results with SML.

As an alternative, an acoustic decoupler can be used. In this case, the decoupling is carried out reliably in the fixing rod, so the bracket itself can do without a rubber insert.

Test at the Fraunhofer Institute in Stuttgart

With certificate No. P-BA 214/2010 of November 2011, the Fraunhofer Institute in Stuttgart tested the Düker SML drainage pipe system with various pipe bracket systems. The test assembly was in accordance with EN 14366.

The measurements in front of and behind the wall can be evaluated against two different standards. While in Germany the installation sound level L_{In} measured in the rear of the lower storey as per DIN 4109 is the only value that is of any real interest, the European standard EN 14366 gives two separate values for airborne sound and structure-born sound.



Test results

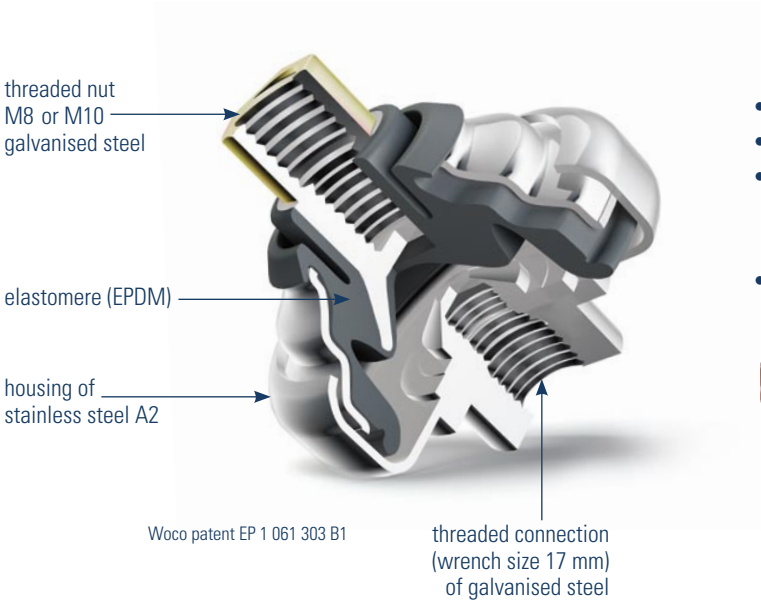
	Airborne sound pressure level		Structure-born sound characteristic level	
Flow rate	2.0 l/s	4.0 l/s	2.0 l/s	4.0 l/s
pipe brackets with rubber insert	45 dB(A)	48 dB(A)	19 dB(A)	24 dB(A)
pipe brackets with acoustic decoupler	44 dB(A)	48 dB(A)	<10 dB(A)	11 dB(A)

At 2.0 l/s - this corresponds more or less to a toilet flush - Düker SML with optimum fixing technology is below 10 dB(A), that is **quieter than falling snow!**

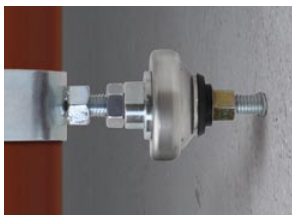
Optimum Fixing with the Acoustic Decoupler

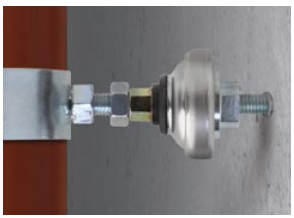
Functioning

The acoustic decoupler is inserted between two short threaded rods M8 or M10 between the bracket and the ceiling or wall. Thanks to its construction it ensures an efficient sound decoupling.



The acoustic decoupler can face the bracket with any of its two sides.





Vertical Installation

- pipelines DN 40 up to DN 150
- on a length of 3 m you require 2 acoustic decouplers
- the maximum charge F_{vert} per decoupler is 400 N

Horizontal Installation

- pipelines DN 40 up to DN 150
- on a length of 3m you require 2 acoustic decouplers
- the pipelines must be suspended either from the ceiling or from a console. A fixing direct to a wall is not admissible
- the maximum charge F_{hor} per decoupler is 1,000 N

Furthermore, the general instructions on fixing, fixed points, down pipe supports and couplings with axial restraint as per the Düker laying instructions are to be observed.

Inadmissible Installation

A horizontal fixing to the wall is not admissible, as the elastomere would be twisted and damaged.

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