Leviat®
A CRH COMPANY

PLAKA

Plaka dBreak

Improving the acoustic properties of concrete and brickwork structures

Leviat®
A CRH COMPANY

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We are Leviat.

Leviat is the new name of CRH's construction accessories companies worldwide.

Under the Leviat brand, we are uniting the expertise, skills and resources of Plaka and its sister companies to create a world leader in fixing, connecting and anchoring technology.

The products you know and trust, including Plaka, will remain an integral part of Leviat's comprehensive brand and product portfolio. As Leviat, we can offer you an extended range of specialist products and services, greater technical expertise, a larger and more agile supply chain and better, faster innovation.

By bringing together CRH's construction accessories family as one global organisation, we are **better equipped to meet the needs of our customers, and the demands of construction projects, of any scale, anywhere in the world.**

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Ancon

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PLAKA

60 locations

sales in **30+** countries

3000 people worldwide

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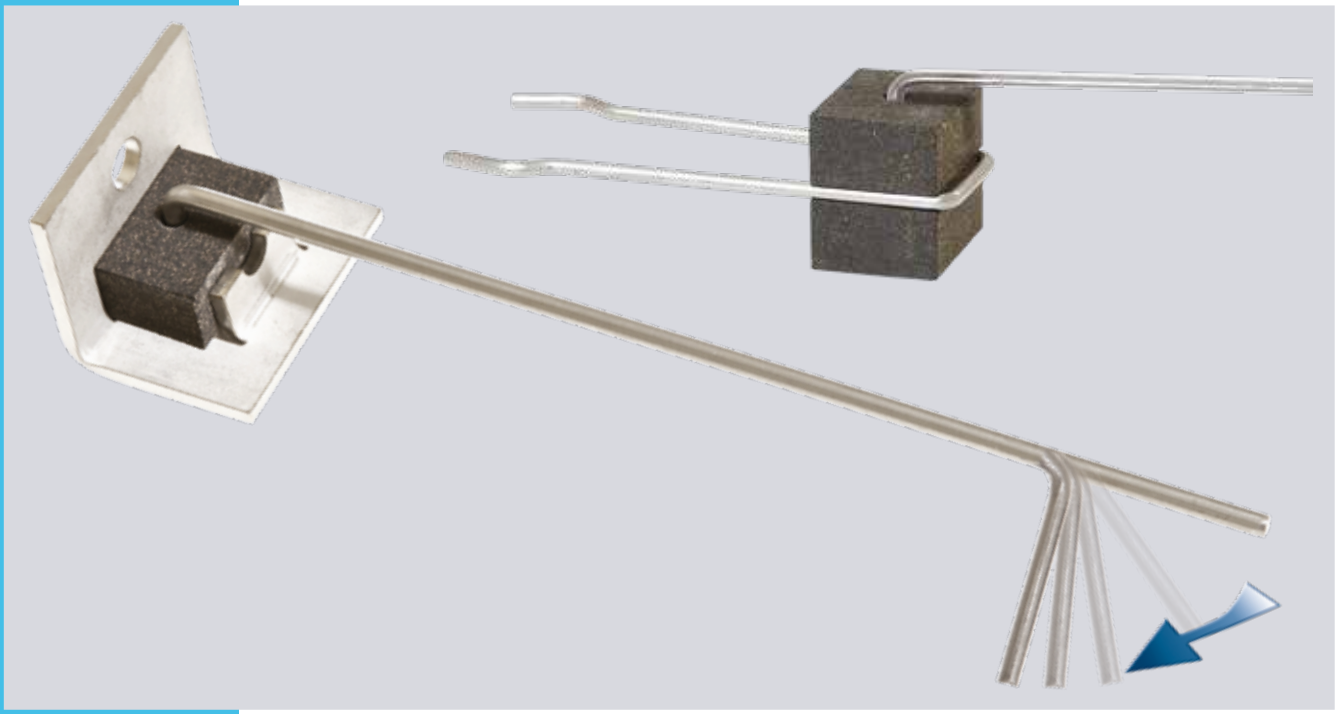
Plaka dBreak Acoustic cavity ties

These acoustic cavity ties have been designed for situations where connections between building elements are necessary for the strength of the structure and where sound and/or vibration insulation are required.



Sound and vibrations from outside (traffic, wind ...) affect the outer walls. They are transferred to the inner structure via the cavity ties. The energy that enters the inner walls and floor slabs spreads throughout the building in the form of air-transmitted sound.
Just replacing the metallic cavity ties with sound-damping ties is enough to obtain acoustic separation. The mass-spring-damper principle can be met much better by replacing the classic cavity ties with acoustic cavity ties.
The natural frequency of our cavity ties is about approx. 15 Hz. This therefore means that they can provide acoustic insulation for frequencies from 21 Hz (15Hz x √2) corresponding to the lower limit of audible sound.

Uses

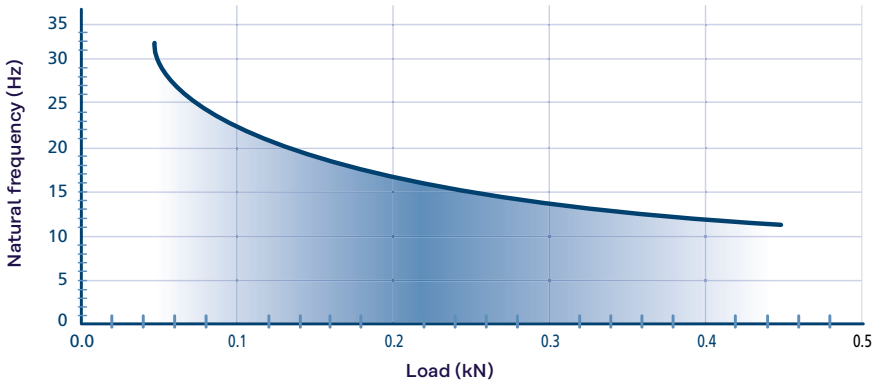
- Decoupling of outer façades when outside noise is significant
- Party walls on terraced houses
- Cavity walls in apartments
- Decoupling from noisy inner rooms

Minimum cavity width = 45 mm for the L-shaped holder
= 35 mm for the U-shaped holder

Plaka dBreak Acoustic cavity ties

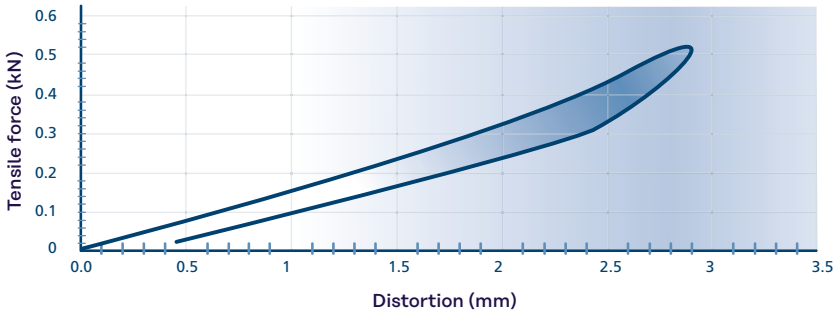
Characteristics

Resonance frequency



- Maximum working load: 500 N
- Breaking strain: 1920 N

Charge

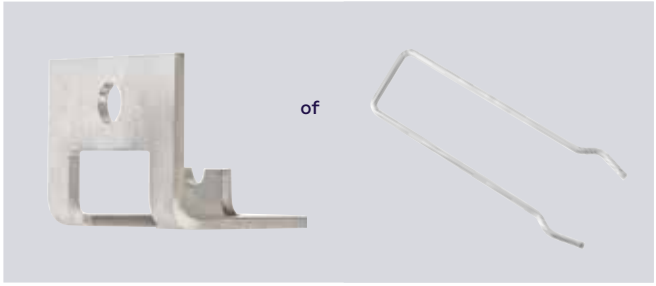


- Distortion as a result of an axial tensile or pressure force: see graph

Installation

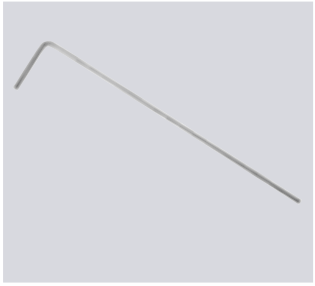
The acoustic block, the steel holder and the cavity tie will be delivered to the site separately.

Dimensions of acoustic block
30 x 30 x 25 mm.
Material: cork and elastomer reinforced with Kevlar fibres.
Code: HUCACD 3030254



Stainless steel L-shaped holder
3 mm thick.
Code: HUCALI 240403

Steel U-shaped holder
Ø 3 mm.
Code: HUCAUI 2003

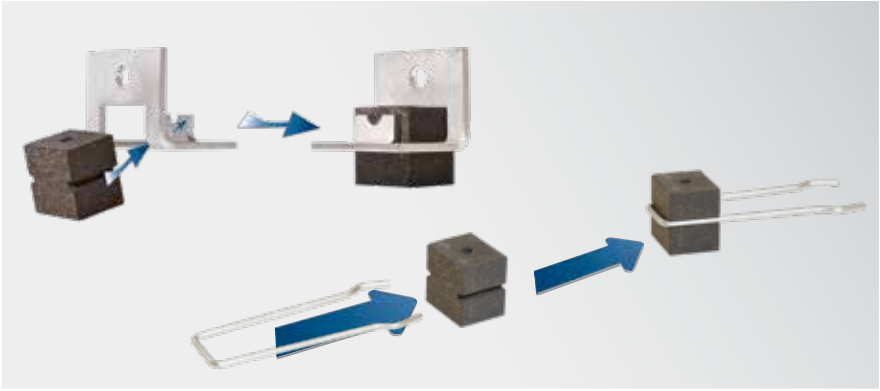


Cavity tie Ø 4 mm in stainless steel bent at one end. The length of the cavity tie is adjusted in relation to the building situation.
Code: HUCACI 2420040
or HUCACI 2425040

Plaka dBreak Acoustic cavity anchors

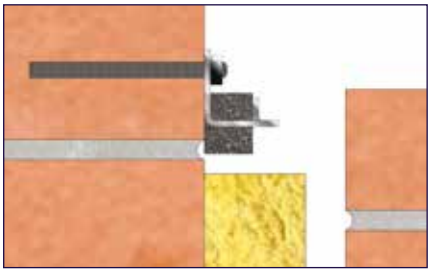
Installation step 1

Slide the acoustic block up to the upright lip on the steel L-shaped holder.
Or push the block into the U-shaped holder up to the end.

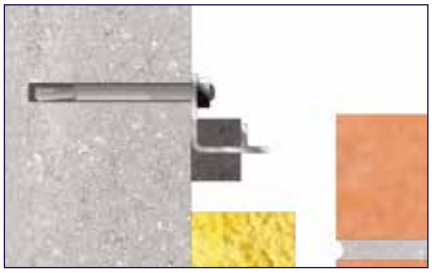


Installation step 2

Fix the L-shaped holder with the acoustic block to the wall or floor slab or brick in the U-shaped holder.



Attaching with M8 threaded rod
+ chemical anchoring



Attaching with FSA bolt M8

Attaching with wood screw

Incorporating U-shaped holder in brickwork joints

Installation step 3

Slide the bent end of the cavity tie into the acoustic block opening. The other end of the cavity tie is placed in the brick work joint and bent at the appropriate point to form a good bond.

The end of the cavity tie must be visible along the underside of the acoustic block

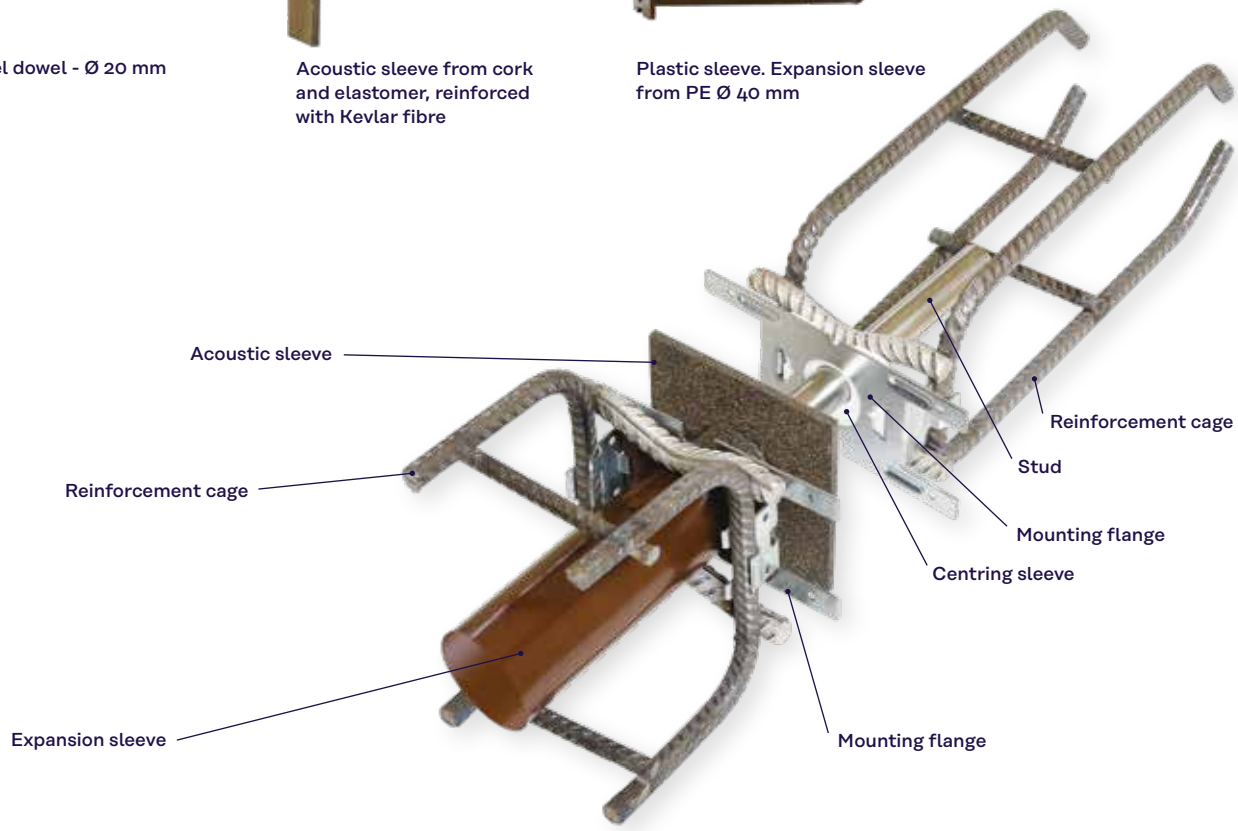
Plaka dBreak Acoustic Titan dowels

Dowels for the absorption of shear force with acoustic insulation ΔL_w = 34 tot 36 dB

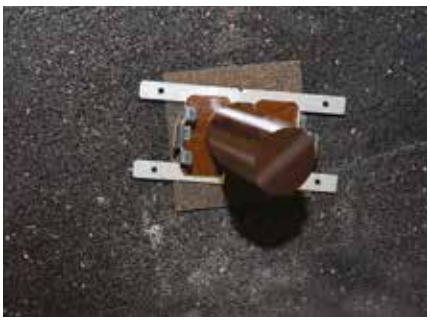
Stainless steel dowel - Ø 20 mm

Acoustic sleeve from cork and elastomer, reinforced with Kevlar fibre

Plastic sleeve. Expansion sleeve from PE Ø 40 mm



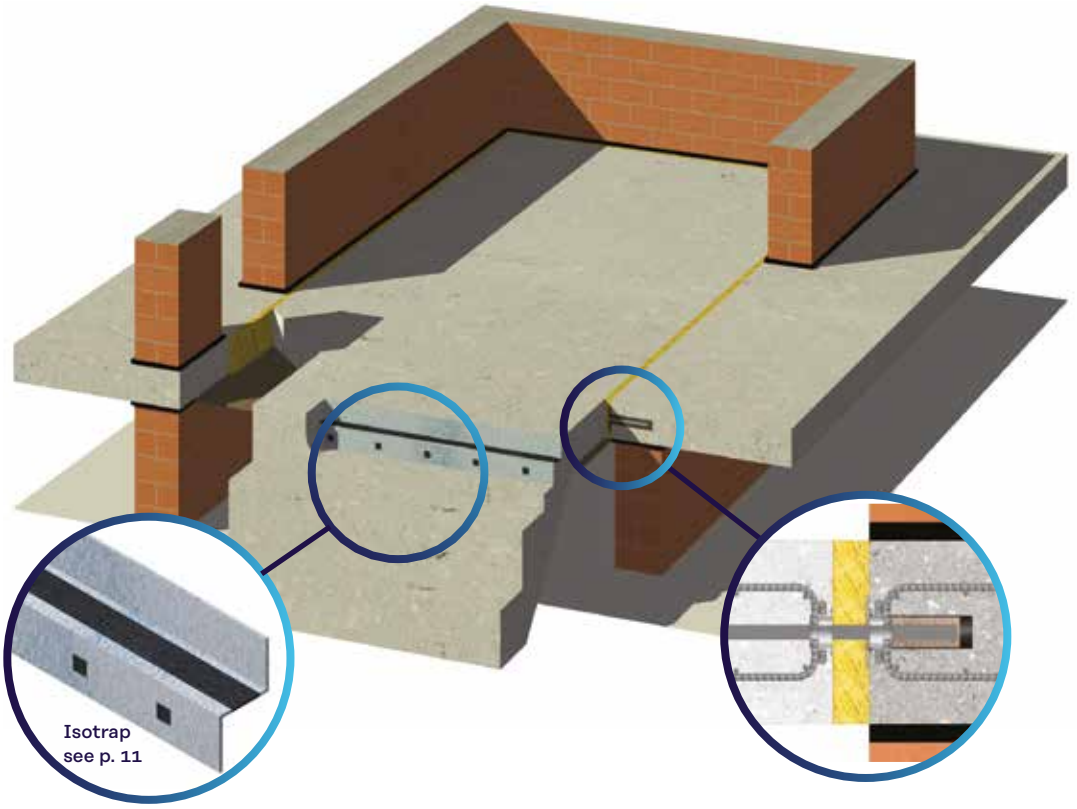
Use



Acoustic separation of stairways and lift shafts

Vibrations caused by stairs and in lift shafts will unavoidably spread to adjacent structures, for want of elastic decoupling. In order to combat this vibration transfer, stairways and lift shafts can be separated from the adjacent structure by means of a joint filled with a sound-absorbing material (mineral wool, ...)
The joint has acoustic Titan dowels to make load transfer around the joint possible. This way the shear forces are absorbed and the acoustic decoupling remains safeguarded. A PE expansion sleeve is placed in the concrete during the first concreting phase which allows a metal rod – called a dowel – to be introduced. An acoustic insulation bushing can be found in the PE expansion sleeve. This sleeve is manufactured from 10 mm thick vibration-damping Kevlar-reinforced cork-rubber elastomer material. The sound waves transferred via the concrete in the stairways and lift shafts are systematically dampened. This way an important reduction in the transfer of contact noise can be obtained. The forces absorbed by the dowel are transferred to the concrete via the integrated Titan reinforcement cage. Several shear forces can be absorbed.
The shape of the reinforcement cage is adjusted according to the construction situation (floor slab-wall or floor slab-floor slab; see Titan dowels brochure).

Plaka dBreak Acoustic Titan dowels

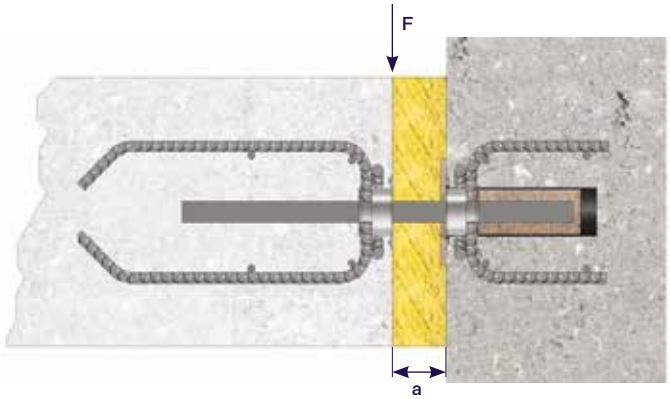


Other uses

- External galleries: acoustic and thermal separation from the building
- Floors: Isolate the whole floor for special applications i.e. theatres, party rooms ...

Dimensioning

Permissible load on the acoustic dowel
= 20 kN for joint openings a ≤ 2 cm
= 10 kN for 2 < a < 4 cm



Plaka dBreak Acoustic Titan dowels

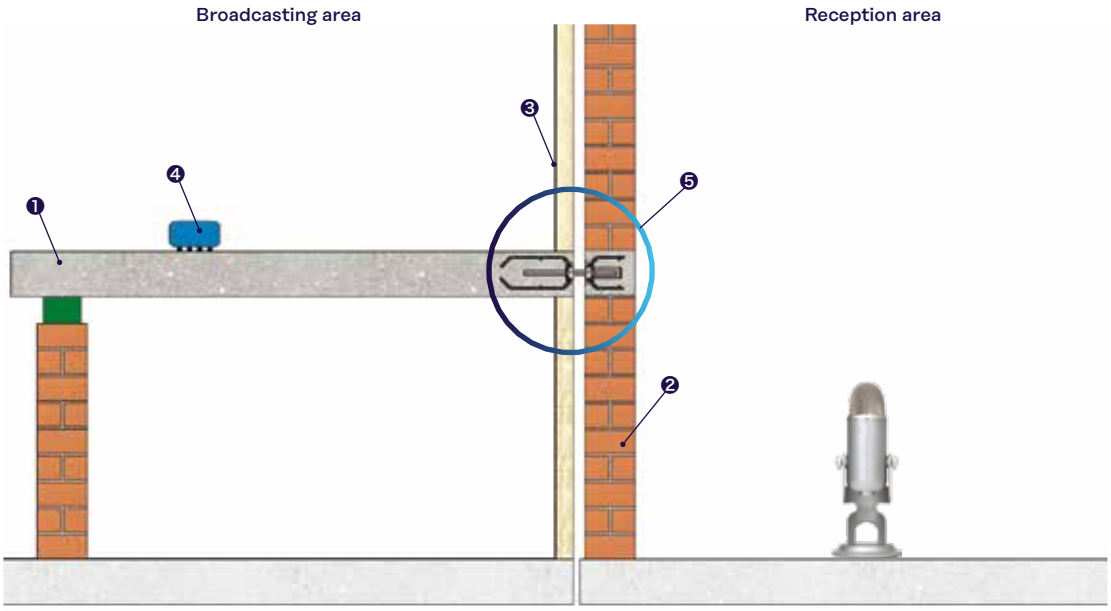
Implemented tests

1) Specification of the reduction in the lateral contact noise insulation ΔL_w

The contact noise reduction due to the use of the dowels is evaluated by means of calculating the difference between the contact noise level transferred through a rigid reference connection ($L_{n,w,o}$) and the contact noise level through the dowels ($L_{n,w}$):

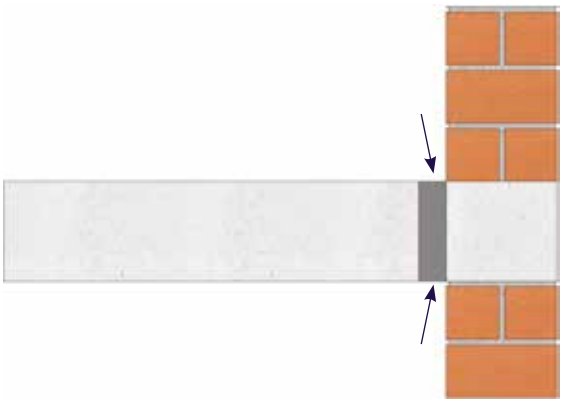
$$\Delta L_w = L_{n,w,o} - L_{n,w}$$

Test set-up for determining $L_{n,w}$



❶ Reinforced concrete floor slab d = 18 cm.
❷ Brick wall d = 19 cm.
❸ Wall lining.
❹ Standard rotary hammer drill.
❺ Acoustic Titan dowel.

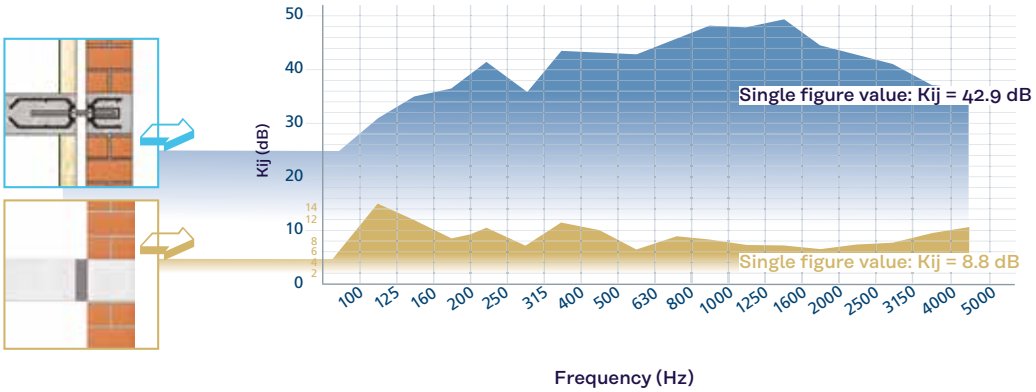
Test set-up for determining $L_{n,w,o}$
The joint is filled with mortar to make a rigid connection.



Plaka dBreak Acoustic Titan dowels

2) Measuring the vibration reducing index Kij

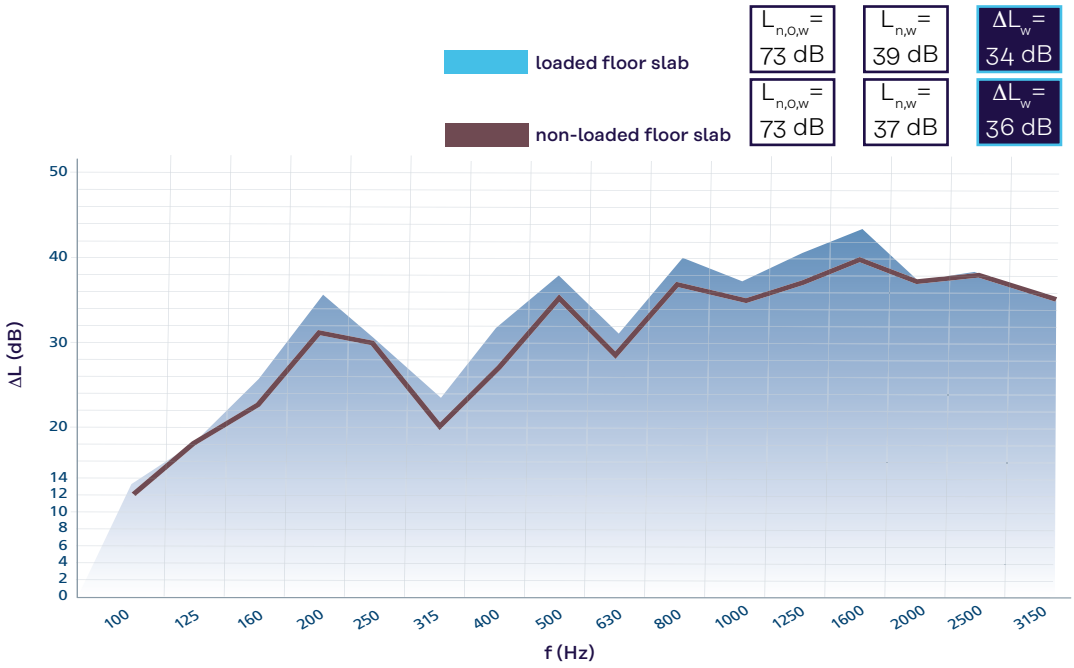
Tested connection
A T-connection made from a horizontally loaded reinforced concrete slab attached to a vertical brick wall by Titan acoustic dowels.



Reference connection
A rigid T-connection made from a horizontal reinforced concrete slab clamped into a vertical brick wall.

Result

The vibration reduction for a T-connection with Titan acoustic dowels is at least 34 dB more than for a rigid T-connection.



In the graph above we can see that the low frequency contact noise level reduction is 20 to 30 dB, this is very exceptional. Values of even more than 40 dB are achieved for the high frequencies. The weighted contact noise level reduction ΔL_w is between 34 and 36 dB. Contact noise reduction for the loaded floor slab is slightly more because the elastomer is working in its optimal load zone (where its natural frequency is the lowest).

Plaka dBreak Isotrap

Acoustic inlay for stairs

Characteristics

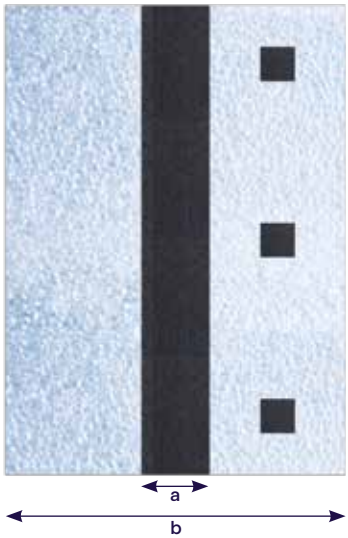
- Thickness: 10, 15 or 23 mm
- Central strip from recycled rubber granules
- PE foam

Types

TL-Z

TL-L

TL-F



Standard types (on 10 m rolls):

- TL-Z-1 - a = 75 mm, b = 475 mm
  - maximal load = 22,5 kN/lm
- TL-Z-2 - a = 100 mm, b = 500 mm
  - maximal load = 30,0 kN/lm

To size:

- TL-Z
- TL-L
- TL-F

Plaka dBreak Isotrap with Titan

Installation

The Isotrap is easy to bend and cut on site to construction requirements.

Additional fastening when there are horizontal loads

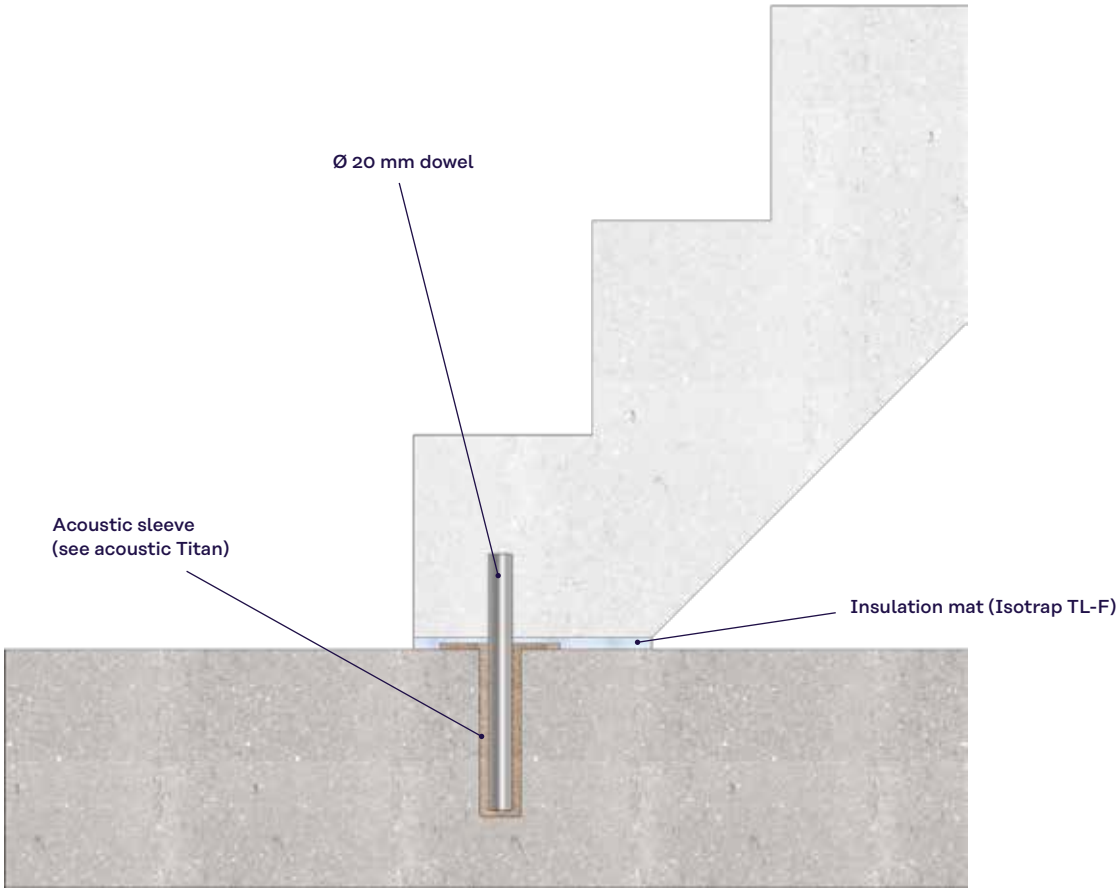
The acoustic separation is guaranteed by the cork-rubber sleeve.

Type A: stainless steel dowel

Type B: galvanised steel dowel

Max. permissible horizontal load:

- 37 kN with 10 mm joint
- 32 kN with 15 mm joint
- 28 kN with 23 mm joint

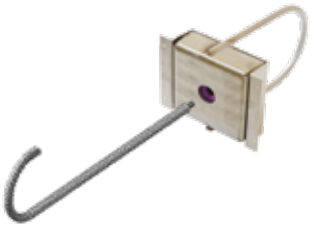


Plaka dBreak Riba Silent

Acoustic anchorage for absorption of tensile and pressure forces: ΔL_w = 39 dB

The Riba Silent elements ensure the transfer of uniaxial tensile and pressure forces without transfering sound waves (vibrations). The product has a contact noise improvement index ΔL_w = 39 dB. It is used where acoustic anchoring between 2 concrete structures is required.

Model A



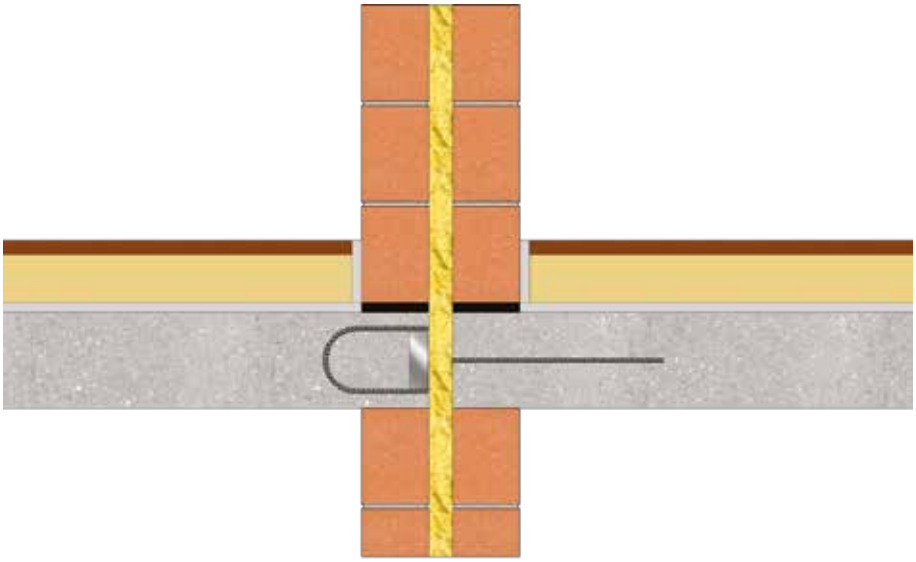
Model B

Model C

Other models upon request

Example

Connection floor slab – floor slab



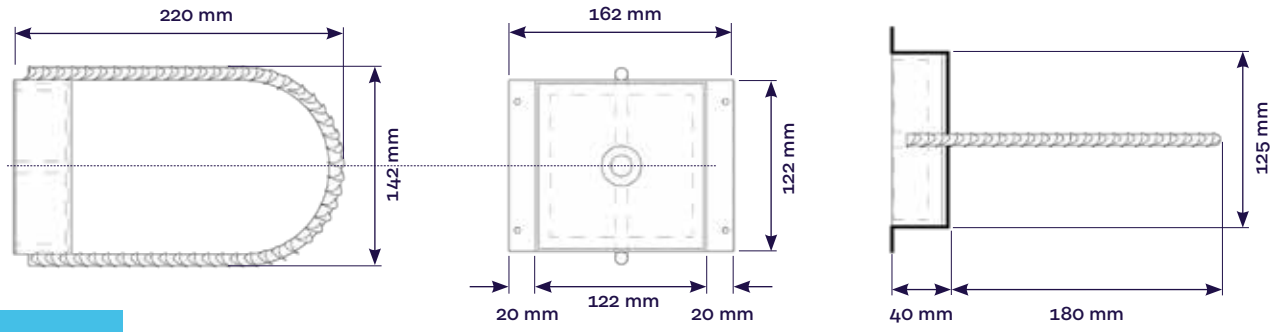
Double walls and interrupted floors are necessary to obtain optimal acoustic insulation between apartments or terraced houses.
Such structures are however less rigid than structures with continuous floor slabs. The Riba Silent elements ensure that the tensile and pressure forces can still be transferred without the acoustic performance being effected.
This also prevents the horizontal movement becoming too large.

Plaka dBreak Riba Silent

Other uses

Acoustic anchoring for construction parts such as: double walls, balconies, galleries ...

Standard dimensions



Working principle

The system consists of a steel box fitted with a stirrup and filled with an acoustic insulation material. The box is nailed to the formwork in the first phase. The anchoring rod is screwed into the relevant opening after casting and the formwork from the first phase has been removed. The steel anchoring rod is now acoustically separated.
The length and shape of the anchoring rod can be adjusted to the construction requirements.

Calculation

Tensile force

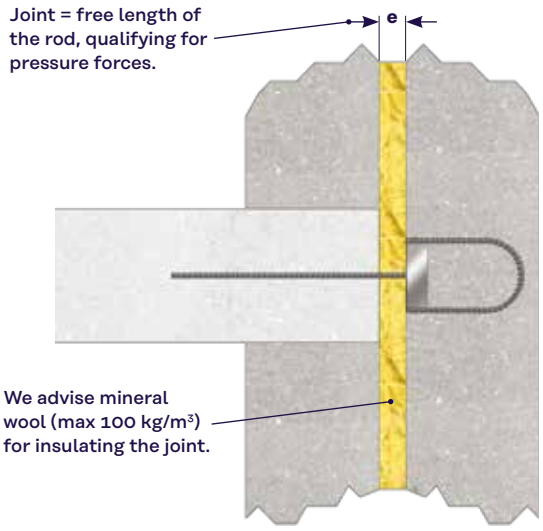
$$N_d \leq N_{Rd,t}$$

N_d = Arithmetical value of the force
$N_{Rd,t}$ = Arithmetical value of the tensile resistance of the anchoring

Pressure force

$$N_d \leq N_{Rd,c}$$

N_d = Arithmetical value of the force
$N_{Rd,c}$ = Arithmetical value of the pressure resistance of the anchoring (taking the buckling resistance into account)



Plaka dBreak Riba Silent

Tensile resistance		
	Riba Silent-912	Riba Silent-914
$N_{rd,t}$	21,8 kN	21,8 kN

Pressure resistance

a) The following values apply to structures that are stabilised at the sides

Type	Free length				
	e = 40 mm	e = 80 mm	e = 120 mm	e = 160 mm	e = 200 mm
	$N_{Rd,c}$	$N_{Rd,c}$	$N_{Rd,c}$	$N_{Rd,c}$	$N_{Rd,c}$
RIBA-912	21,8 kN	21,8 kN	21,8 kN	21,8 kN	21,8 kN
RIBA-914	21,8 kN	21,8 kN	21,8 kN	21,8 kN	21,8 kN

b) The following values apply to structures that are not stabilised at the sides

Type	Free length				
	e = 40 mm	e = 80 mm	e = 120 mm	e = 160 mm	e = 200 mm
	$N_{Rd,c}$	$N_{Rd,c}$	$N_{Rd,c}$	$N_{Rd,c}$	$N_{Rd,c}$
RIBA-912	21,8 kN	21,8 kN	21,8 kN	14,3 kN	9,7 kN
RIBA-914	21,8 kN	21,8 kN	21,8 kN	21,8 kN	17,0 kN

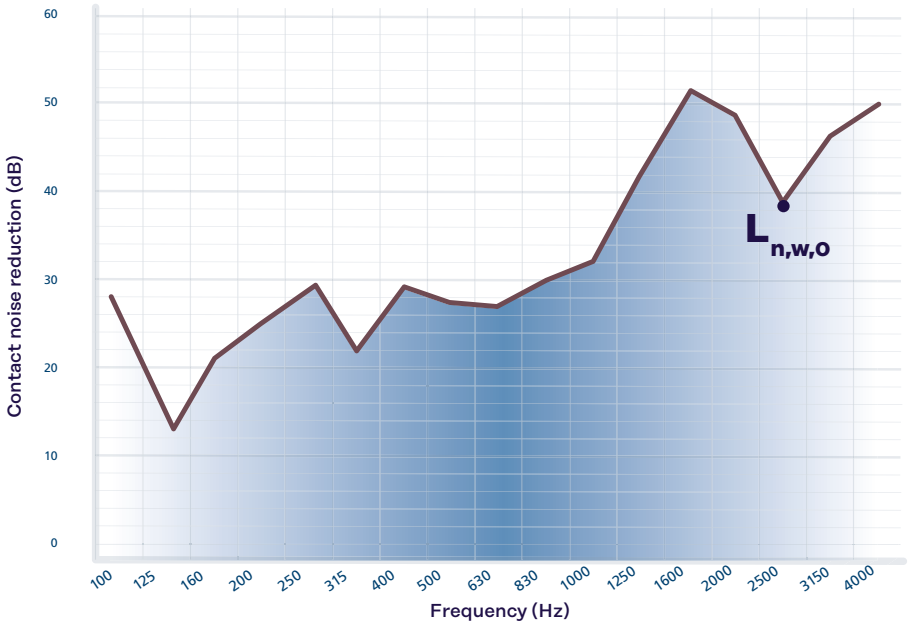
Tests implemented

Contact noise reduction index ΔL_w
The contact noise reduction index was tested analogously, the same as for the acoustic Titan dowels (page 9).
The sound level in the receiving area is measured in every third octave band in this fashion for:

- a continuous floor slab (reference measurement $L_{n,w,O}$)
- an interrupted floor slab with the Riba Silent acoustic anchoring ($L_{n,w}$)

The sound insulation for every third octave band is therefore given as:

$$\Delta L_w = L_{n,w,o} - L_{n,w}$$



From the graph, it can be seen that the reduction of low frequency contact noise is between 20 and 30 dB. This is in contrast to traditional anchoring. Values of 50 dB were even reached with high frequencies.

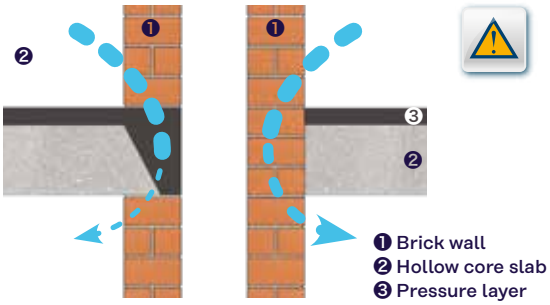
The weighted sound improvement index:

ΔL_w = 39 dB

Plaka dBreak Isomur

Acoustic inlay for walls

Lateral sound transfer via the walls is prevented by the use of acoustic insulating inlays under brick or sand-lime brick walls. The inlays are a means of complying to the standard for increased acoustic comfort (NBN S 01-400-1: 2008) without the need to use heavier and/or thicker walls since the lateral sound has now been greatly reduced by the supple inlays under the walls.

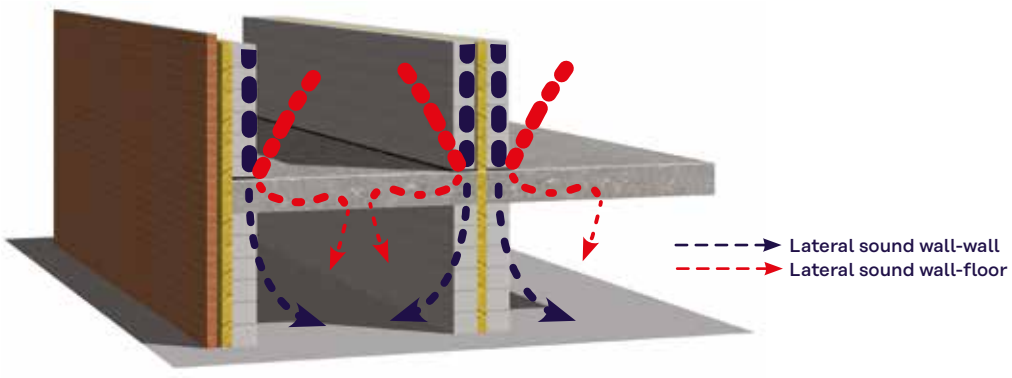


To be avoided: wall without acoustic inlay
Definitely to be avoided: continuous free wall
Sound vibrations spread up the full height of the wall without any obstruction.

Applications

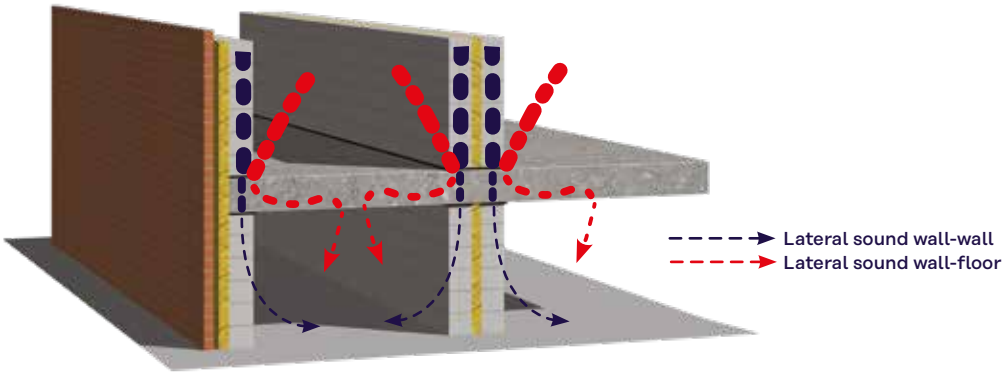
1) Apartments or terraced houses with interrupted floor slabs

Implementation detail for increased acoustic comfort
To achieve increased acoustic comfort it is necessary to separate the walls at the bottom by means of supple Isomur inlays.
The thickness of the concrete floor and the type of floating floor will be specified by the architect or by the design team.



2) Apartments with continuous floor slabs

Implementation detail for increased acoustic comfort
To achieve increased acoustic comfort with continuous floor slabs it is necessary to separate the walls at the top and bottom by means of supple Isomur inlays. The thickness of the concrete floor and the type of floating floor will be specified by the architect or by the design team..



Plaka dBreak Isomur

Choosing the Isomur type

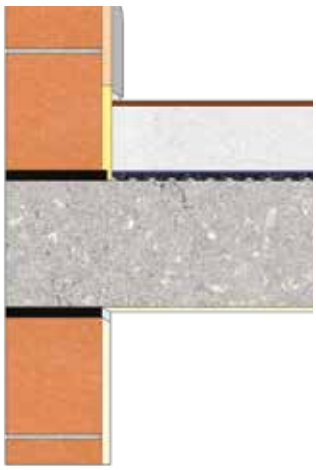
The Isomur type depends on the loads to be absorbed and the required acoustic performance.
The standard type is Isomur PK which is suitable for use under both bearing and non-bearing walls.
Isomur PK consists of high quality recycled rubber granules bound together by a PU adhesive.

Dimensions of inlay

Standard thickness = 10 mm
Standard width = 100, 150 and 200 mm, on rolls of 6 m
Other dimensions available upon request.
Graphs showing the resonance frequency for the occurring load are available for all our materials.

Installation instructions

The strips can be placed under and /or above the wall. The consecutive strips are placed seamlessly to avoid acoustic leakage.
The strips are placed directly onto the floor slab when installed under the wall.
Mortar is then applied on the strip. It is important to ensure that the mortar does not come into contact with the underlying floor (avoid acoustic leakage!). Therefore strips are used that are always at least 1 cm wider than the wall thickness.
When the strip is placed at the top of the wall, mortar should not be applied between the wall and the floor slab if the wall is run up smooth and horizontal. The plaster work between ceiling and wall should be cut in, so that the wall stands completely free from the ceiling (could be filled in afterwards with elastic sealer).
It is advisable to use strips of Isomur on all the walls in the same storey and not just on one wall so that settling differences are avoided. Two 8 mm diameter reinforcing bars should be put in the concrete under the strips to distribute the existing forces in the rubber (flow behaviour) if there is no upper reinforcing in the floor slab.

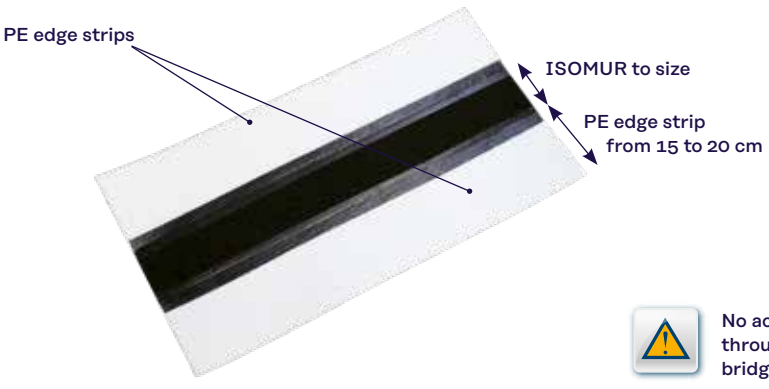


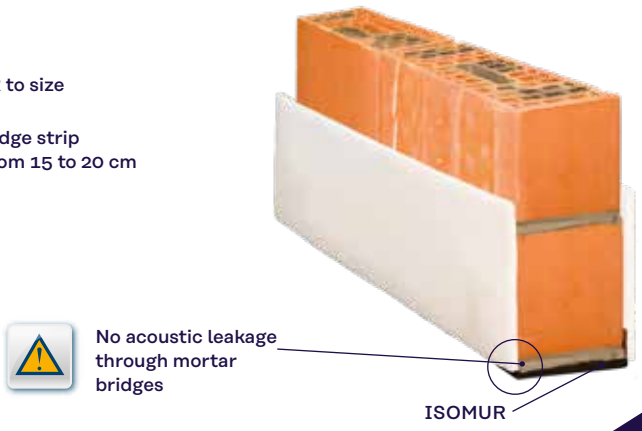
Isomur-P

Isomur with lateral edge strips. The Isomur-P was developed to prevent any chance of acoustic leakage resulting from mortar bridges. This element consists of the rubber Isomur strip with a PE edge strip on one of the two sides. This system is a patented concept.

Advantages

- No mortar bridges
- 2-in-1: acoustic inlay + perimeter strip floor
- Simple installation

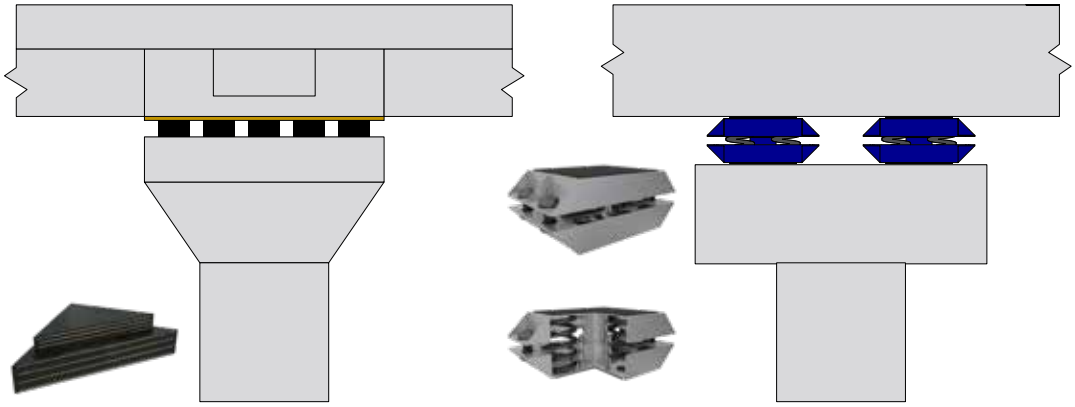




Plaka dBreak Isostruct

Acoustic insulation of building structures

Plaka dBreak Isostruct is an acoustic isolation system and insulates concrete and steel structures, often at foundation level. The Isostruct solution is used to insulate the building from outside noise and vibrations and to prevent noise and vibrations transferring through the structure of the building.



Use

Buildings in the vicinity of busy roads, concert halls, discotheques, theatres, cinemas,...

Characteristics

The Isostruct solution relates to the particular situation and is specifically calculated for each project. The factors influencing the solution are:

- required resonance frequency
- existing loads
- permissible settling
- any horizontal loads present
- accessibility of the building component to be insulated

An Isostruct solution with rubber pads could be chosen (reinforced or not) or an Isostruct-Box solution with prestressed spring boxes (possibly in combination with viscous dampers).

Resonance frequencies up to 3Hz are possible according to the type of solution.
Long lifespan of the materials whilst retaining their acoustic properties.

Dimensioning

A custom solution is calculated and proposed for every project. Data required for the calculations:

- existing permanent and variable loads (load drop – without safety coefficients on the loads)
- required resonance frequency
- maximum permissible warping
- construction of the structure (concrete structure, steel structure,...)
- plan (and cross-section) of the bearing structure
- lateral stability requirements

Plaka dBreak Isofloat

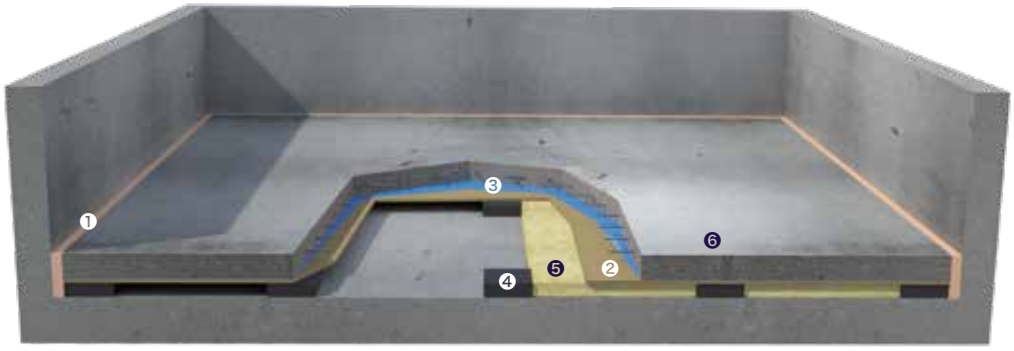
High performance acoustic floating floors

The Plaka dBreak Isofloat is a floating underfloor with high quality rubber pads for use in situations where high demands are made on the acoustic insulation of air and contact sounds in order to prevent the transfer of vibrations through the structure.

Use

It is mainly used in spaces where a certain degree of 'quiet' is required and which are adjacent to a source of noise and vibration.
The main uses are in: cinemas, theatres, discotheques, recording studios, sport halls, bowling alleys, technical areas, ...

Isofloat construction



❶ Edge insulation
❷ Permanent formwork
❸ PE foil
❹ Rubber pads
❺ Mineral wool
❻ Floating concrete floor

Characteristics

The Isofloat type (type of material and dimensions of pads) depends upon the particular situation and is therefore calculated separately for each specific project.
Resonance frequencies up to 6 Hz are possible.
Acoustic air cavity can be modified according to the project requirements. Floating concrete floor between 50 and 2000mm possible.
Simple, fast and flexible installation.
Long lifespan of the materials while still retaining their acoustic properties.

Dimensioning

A custom solution is calculated and proposed for every project. Data required for the calculations:

- existing permanent and variable loads
- floor construction (concrete thickness, any finish,...)
- required resonance frequency
- permissible height of the cavity
- any point loads on the floor
- any line loads (from walls) on the floor
- plan (and cross-section) of the space

Plaka dBreak Isoblok

Sound and vibration damping arrangement of machines

Plaka dBreak Isoblok is a solution for the vibration-free arrangement of machines which are annoying due to the vibrations and contact noises they cause. The comfort of a building is considerably increased when these sources of vibrations are isolated.

Vibration-free arrangement on rubber mats (Isomat), rubber blocks (Isoblok) or spring boxes

Use

Cooling installations, compressors, ventilators, pumps, electrogenic groups and many other groups.

Characteristics

The best solution is calculated and proposed for each project and specifically relates to the existing peripheral factors and the requirements in respect to performance. The best choice is an arrangement on rubber blocks or on strips when high levels of vibrations are generated by these machines and/or low resonance frequencies are the objective.
An arrangement on spring boxes could sometimes also be necessary. An arrangement on rubber mats can suffice for machines that generate less high vibration levels and for which the required resonance frequency is less critical.
If the horizontal forces generated by the machine are inclined to stay small, acoustic separation is possible by placing the machine directly on blocks or on strips.
With large horizontal movements, it is recommended that the machine be fixed to an acoustic inertia mass, in this case a reinforced concrete plinth. This inertia mass could also be sunken into the floor.

Dimensioning

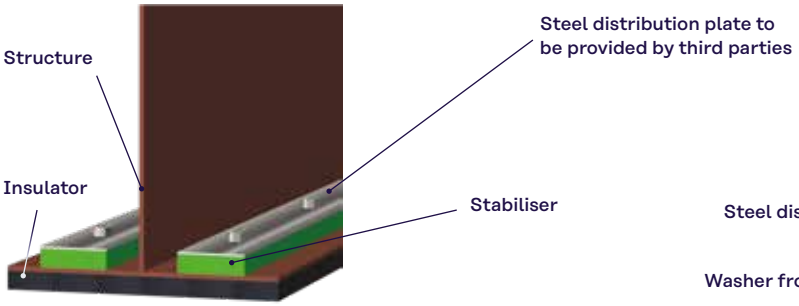
The following data is necessary for the calculations so that a good solution can be offered:

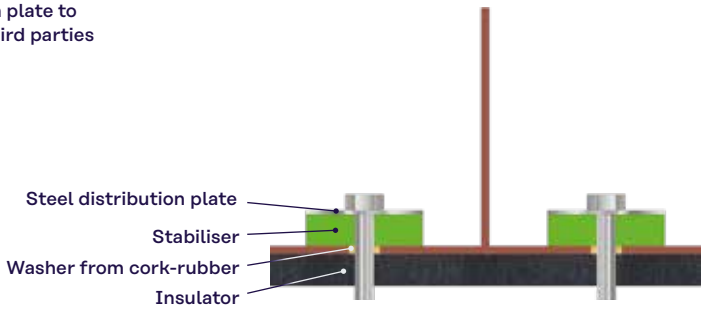
- existing permanent and variable loads (weight of machine,...)
- dimensions of machine and/or bearing structure for machine (a plan if available)
- machine's rotational speed or the required resonance frequency
- with or without concrete plinth
- existing horizontal force
- special factors such as extraordinary temperatures, any nearby chemicals, acids, oils,...

Plaka dBreak Isoblok-fix

Sound and vibration damping arrangement of machines which generate relatively small horizontal forces

This arrangement can be used when fixed to the ground or when when fixed to wall or ceiling. The system consists of 3 elements: an insulator, a stabiliser and a washer. The materials used and the various measurements of the different elements are specific to each application.





Plaka dBreak Isomat

Continuous acoustic floors

Plaka dBreak Isomat is a continuous rubber mat for the formation of acoustic floating floors.

Use

Apartments, supermarkets, loading zones, sport halls, ...

Characteristics

Solid or wavy mats will be used depending on the application. Several layers of Isomat can be laid on top of each other to obtain the desired resonance frequency. The mats are made from recycled rubber granules bound together by PU adhesive and are fully rot-resistant and moisture-proof.

Dimensioning

The thickness of the mat depends on the required resonance frequency, the thickness of the concrete floor or screed and on the weight to be taken on.
The mats are available on rolls, the length depends on the type selected.

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