silensis

01

CTE DB HR:
New acoustic building regulations

HISPALYT
CERÁMICA PARA CONSTRUIR

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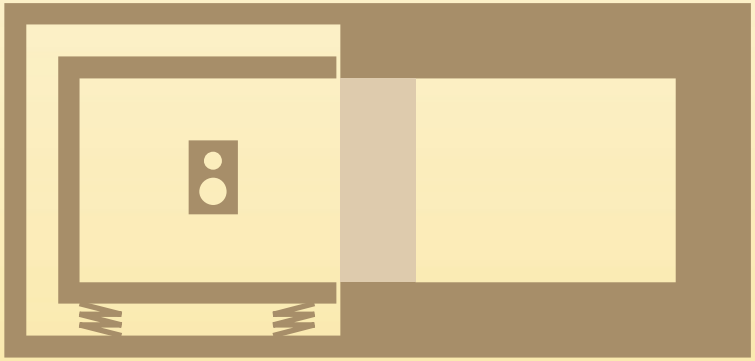
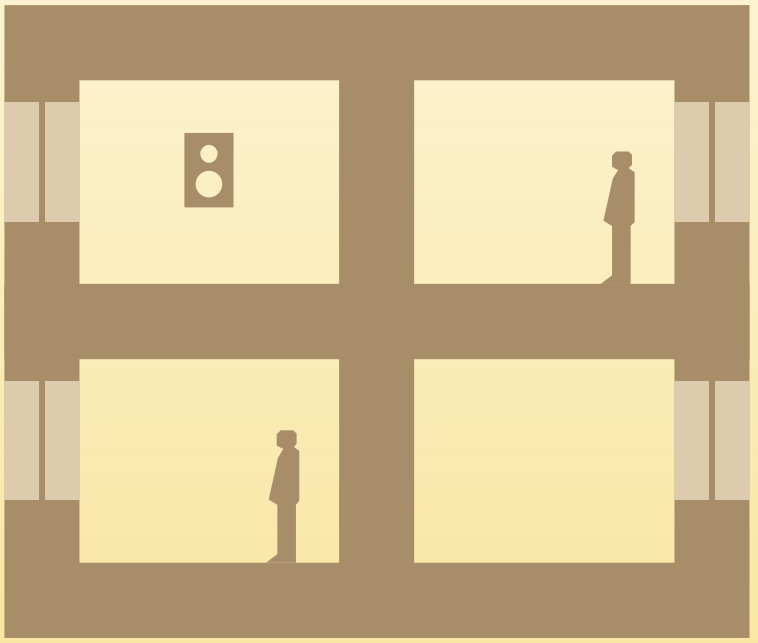
01 CTE DB HR: New acoustic building regulations
01.1 Higher standards of sound insulation

Until now	**Airborne sound insulation between dwellings**	From now on
NBE CA 88	Regulations	CTE DB HR
Laboratory	Type of measurement	On site
Separation element	Object to control	Finished building
$R_A \geq 45$ dBA	Acoustic insulation requirement	$D_{nT,A} \geq 50$ dBA





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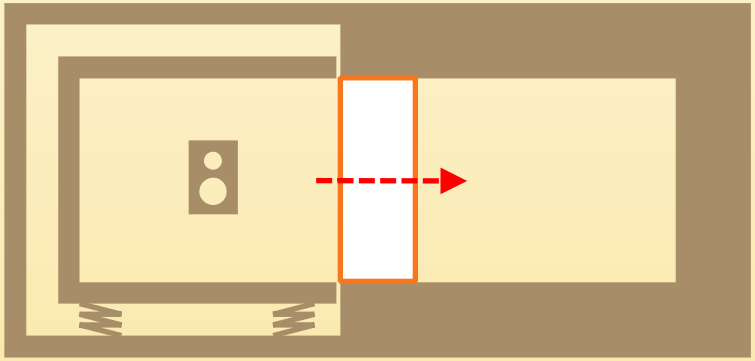

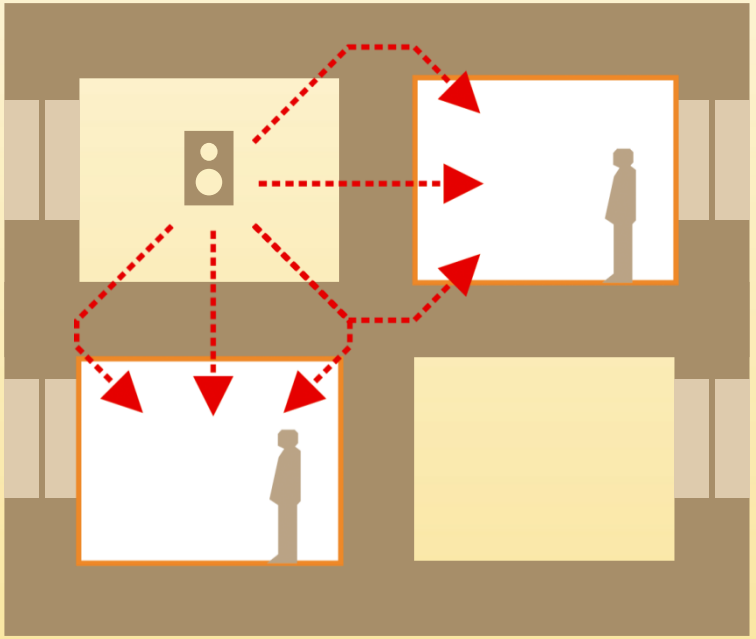

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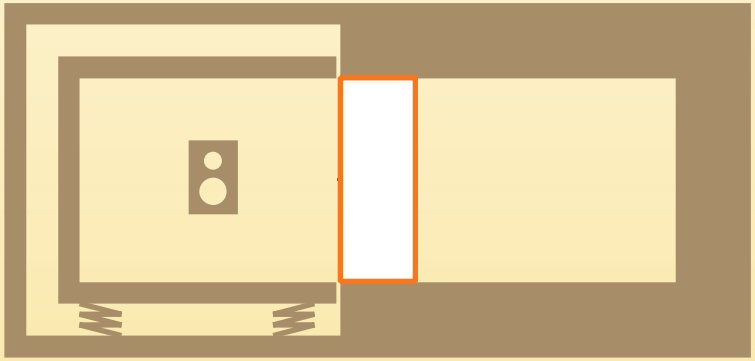

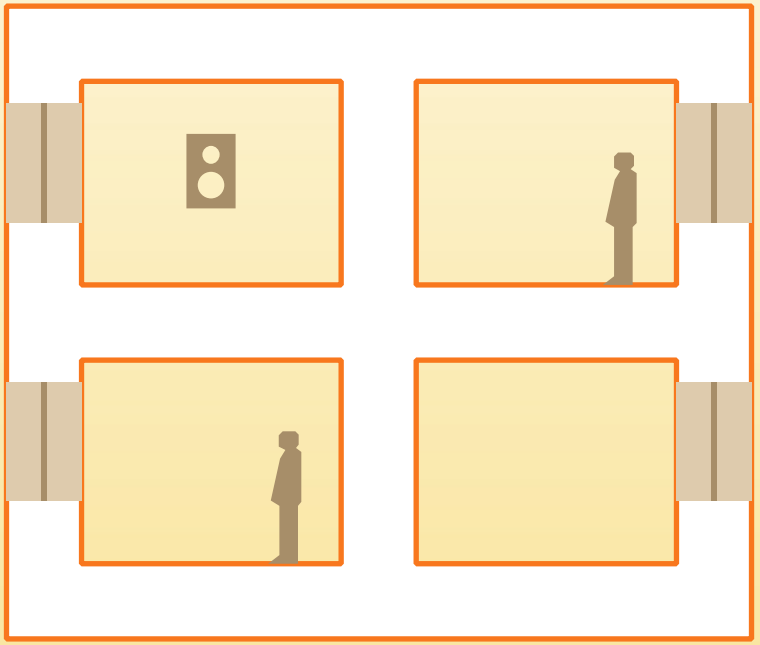

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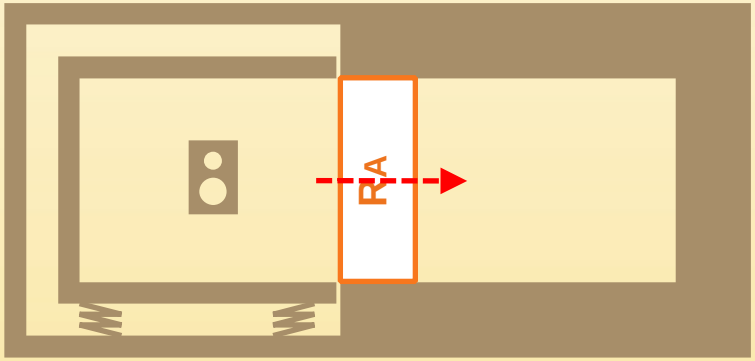

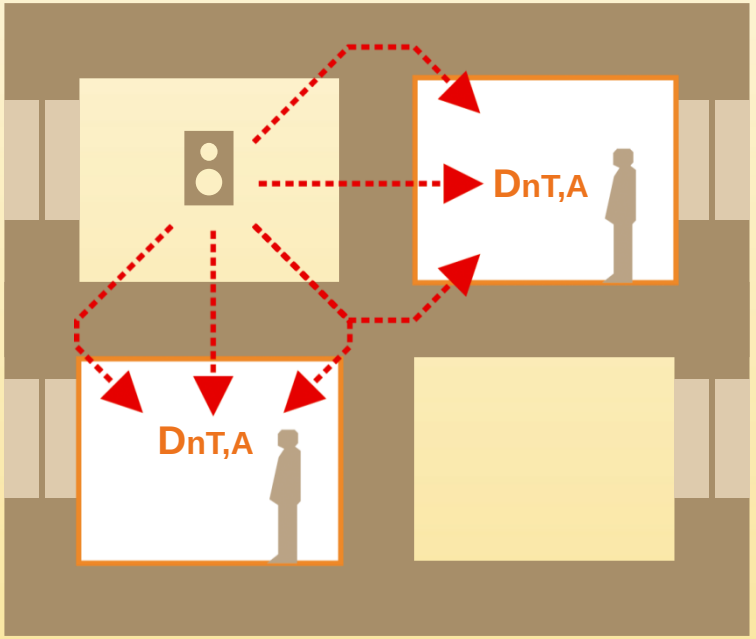

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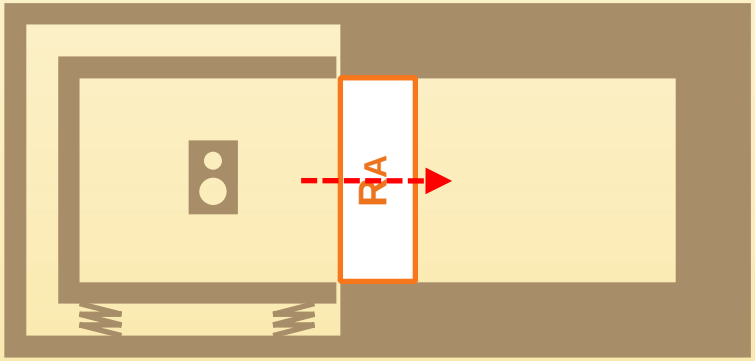
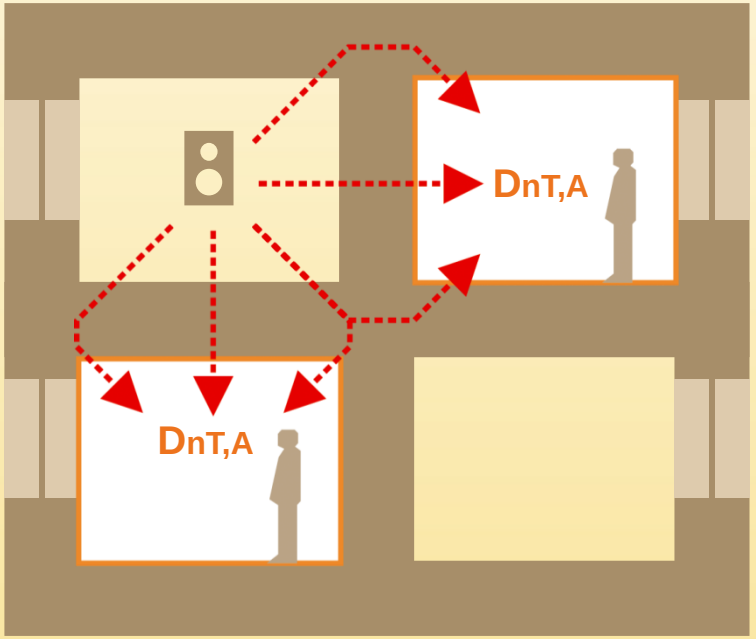
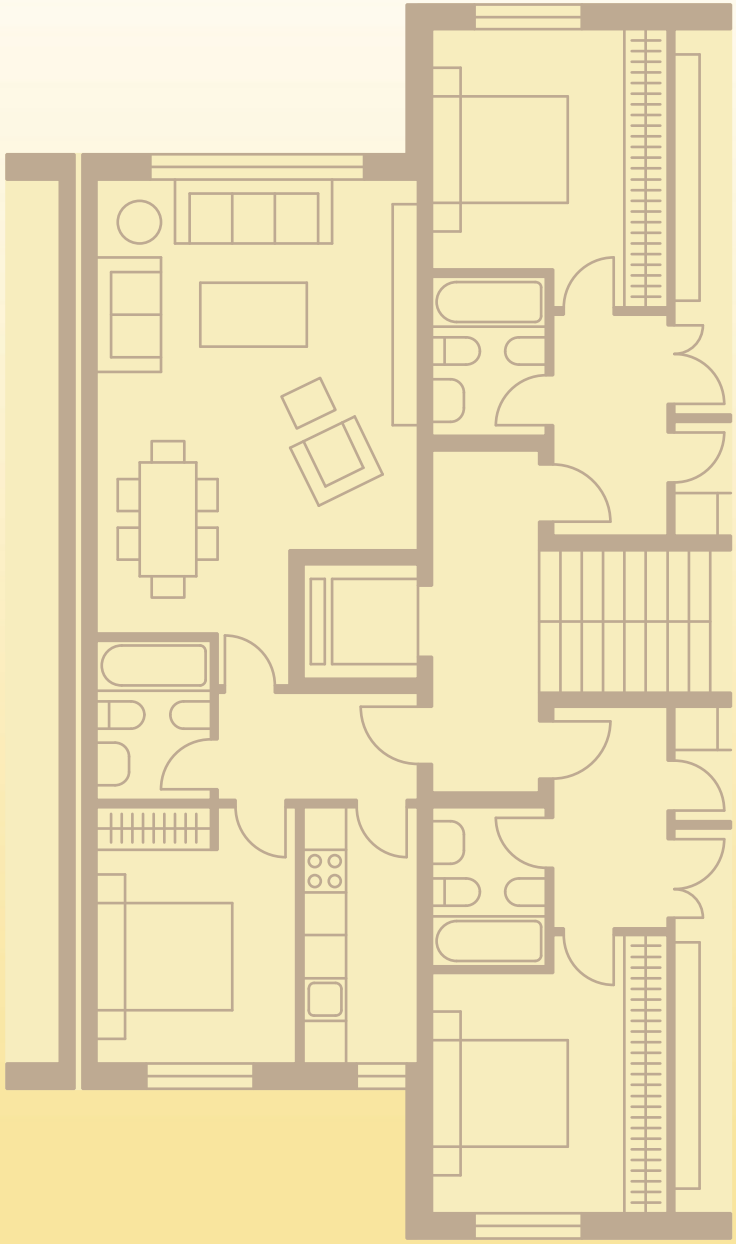




The aim of the DB HR is to guarantee acoustic comfort inside dwellings by establishing acoustic requirements on site, as well as a higher level of insulation

01 CTE DB HR: New acoustic building regulations
01.1 Higher standards of sound insulation

Airborne sound insulation between horizontally or vertically adjacent enclosures



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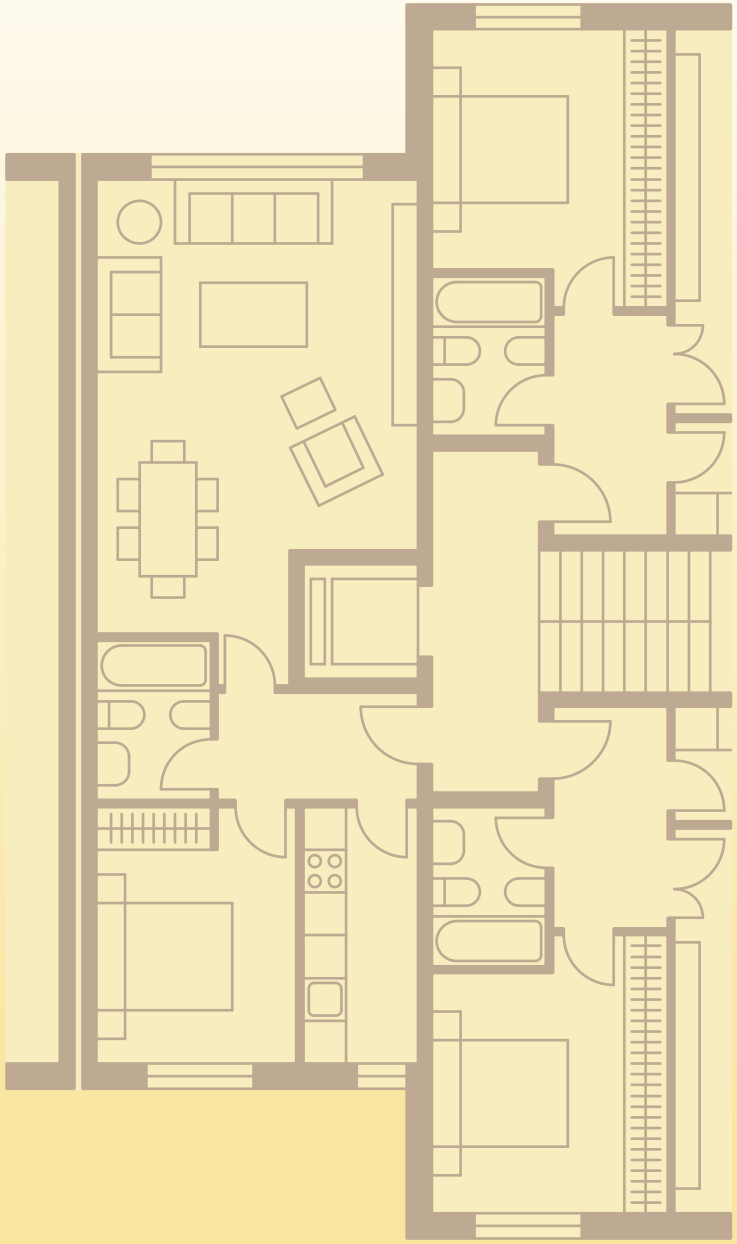

The DB HR of the CTE provides different limit values depending on the type of enclosure:

Habitable space: *enclosure used for human dwelling, where occupation density and duration require some acoustic, thermal and health conditions. The following areas are considered living spaces:*

a) rooms (bedrooms, dining rooms, libraries, lounges, etc.) in residential buildings;

b) classrooms, conference rooms, libraries, offices, in educational buildings;

c) surgeries, rooms, waiting rooms, in buildings such as clinics or hospitals;

d) offices, meeting rooms in administrative buildings;

e) kitchens, bathrooms, toilets, corridors, halls and stairs in buildings of any use;

f) Any other use which is similar to the above.

If the enclosure is formed by various of the above areas, and one of them is a protected enclosure, for the purposes of the DB HR, the whole area shall be considered a protected enclosure.

Areas that are not intended for permanent human use, where occupation is occasional or infrequent, intended for use in short periods, are considered uninhabited and only require proper health conditions. This category of uninhabited enclosures includes storage rooms, technical chambers and unconditioned attics, and common areas.

Protected enclosure: *Habitable enclosures with better acoustic conditions. Cases a), b), c) and d) of the above are considered protected enclosures.*

Activity enclosure: *Enclosure in residential buildings (public and private), hospitals or administrative buildings, in which an activity different from those developed in the rest of the buildings' enclosures is performed; as long as the average standardized sound pressure level, weighted, in the enclosure is higher than 70 dBA. For example, commercial, public assembly, etc.*

When the average standardized sound pressure level, weighted, is higher than 80dBA the enclosure is considered noisy.

All car parks are considered activity enclosures regarding any use except for private use in a family home.

Facilities enclosure*: enclosure which contains the building' collective equipments and facilities, defined as all equipment or facility capable of altering the environmental conditions of the site. For the purposes of the DB HR, the enclosure of the elevator is not considered a facility enclosure, except if the machinery is inside.*

Noisy enclosure: *Enclosure, normally industrial, where activities produce an average standardized sound pressure level inside the enclosure, weighted, higher than 80 dBA.*

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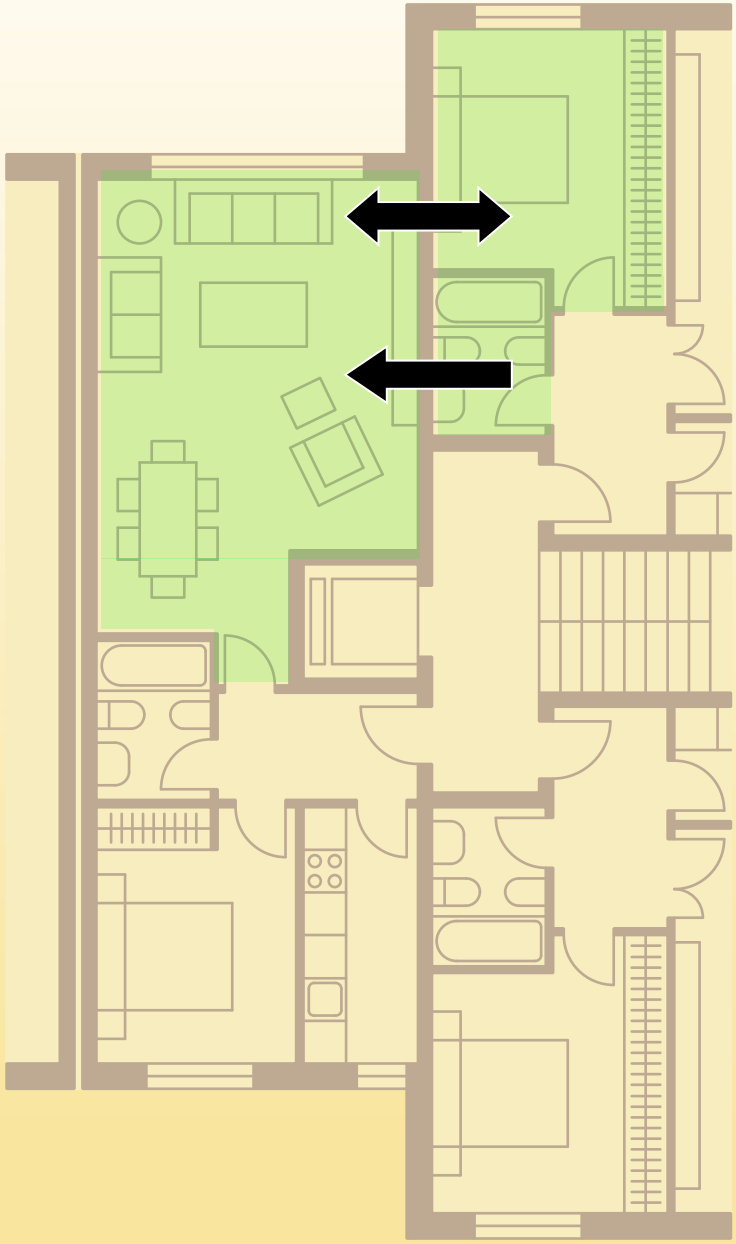
Airborne sound insulation between horizontally or vertically adjacent enclosures



Protected enclosure	◁—▷	Any other enclosure of another unit

$D_{nT,A}$ > 50 dBA

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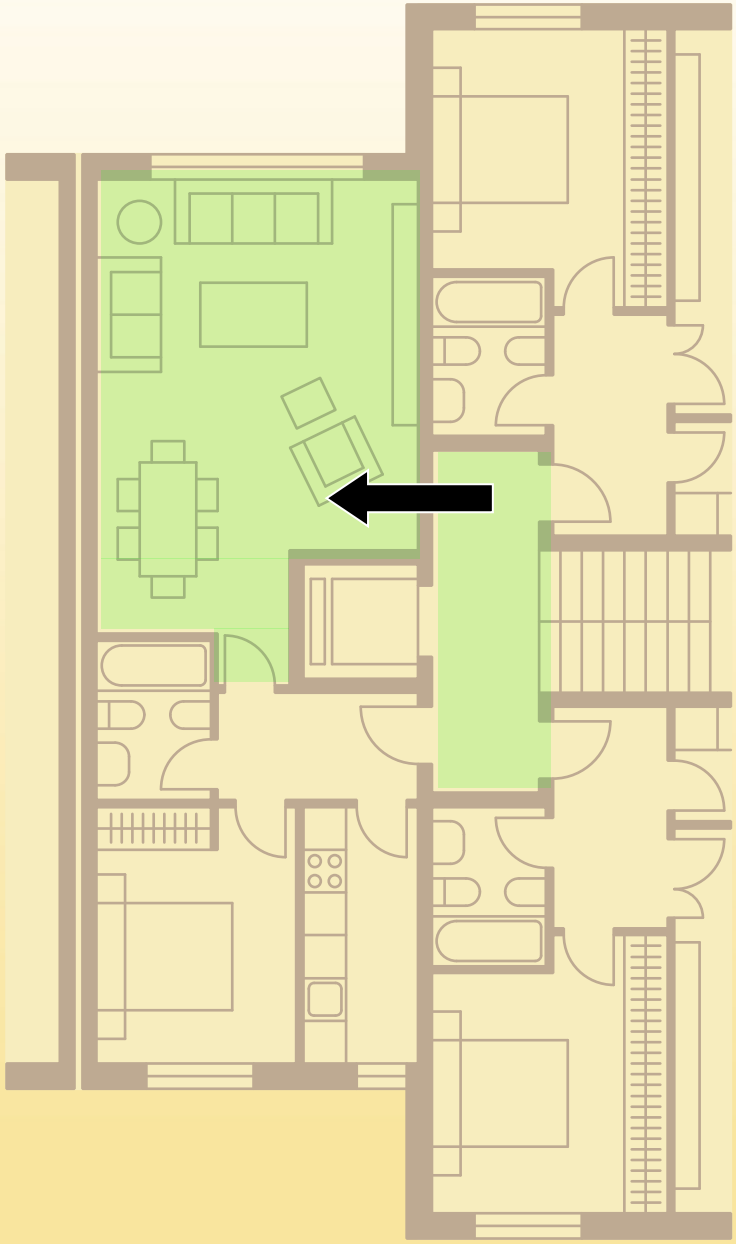

Protected enclosure ◁▷	Any other enclosure of another unit	$D_{nT,A}$ > 50 dBA
Protected enclosure ◁▷	Common areas	$D_{nT,A}$ > 50 dBA

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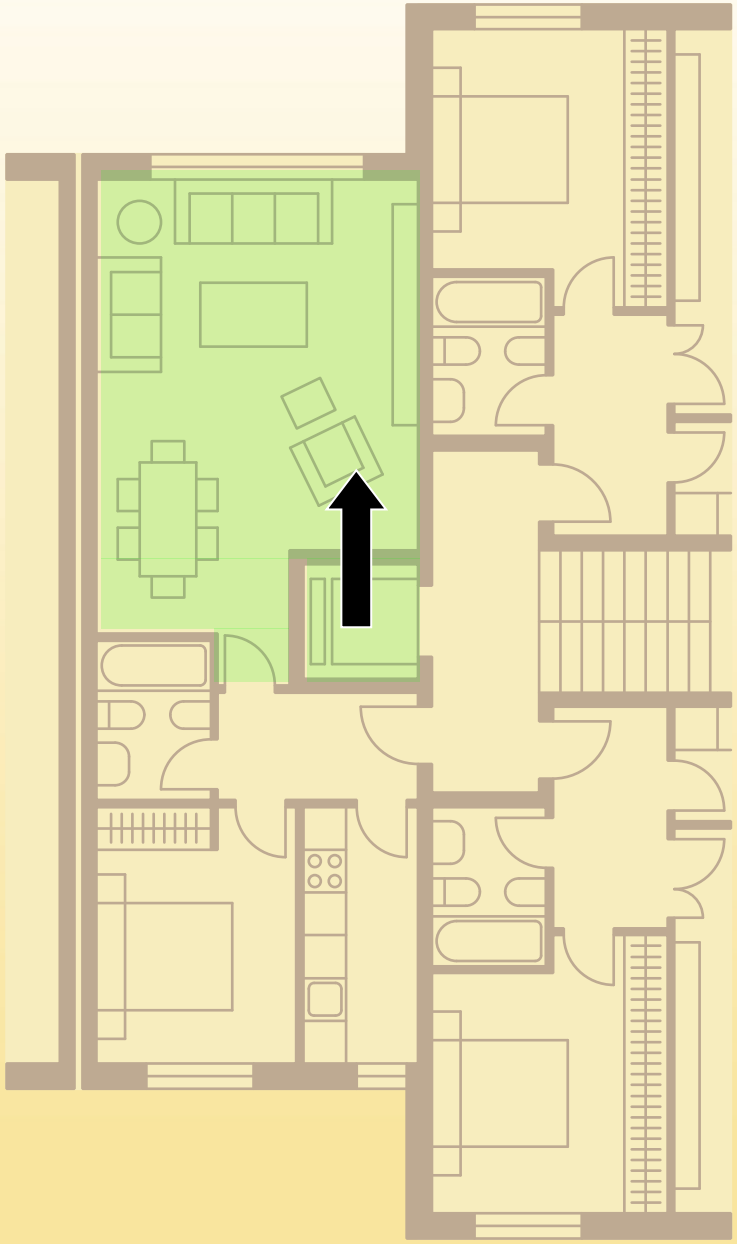

Protected enclosure ⟷	Any other enclosure of another unit	$D_{nT,A}$ > 50 dBA
Protected enclosure ⟷	Common areas	$D_{nT,A}$ > 50 dBA
Protected enclosure ⟷	Facility enclosure or activity enclosure	$D_{nT,A}$ > 55 dBA

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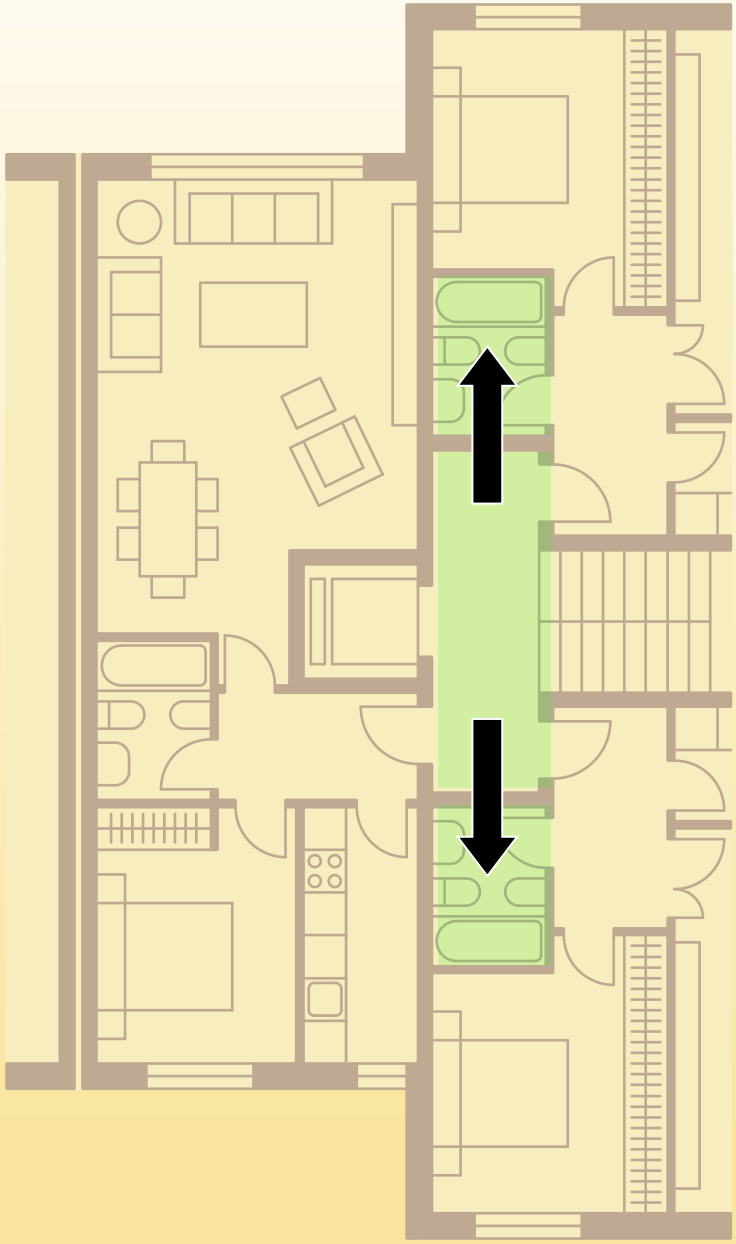

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Protected enclosure ⟷	Common areas	$D_{nT,A}$ > 50 dBA
Protected enclosure ⟷	Facility enclosure or activity enclosure	$D_{nT,A}$ > 55 dBA
Habitable enclosure ⟷	Common areas	$D_{nT,A}$ > 45 dBA

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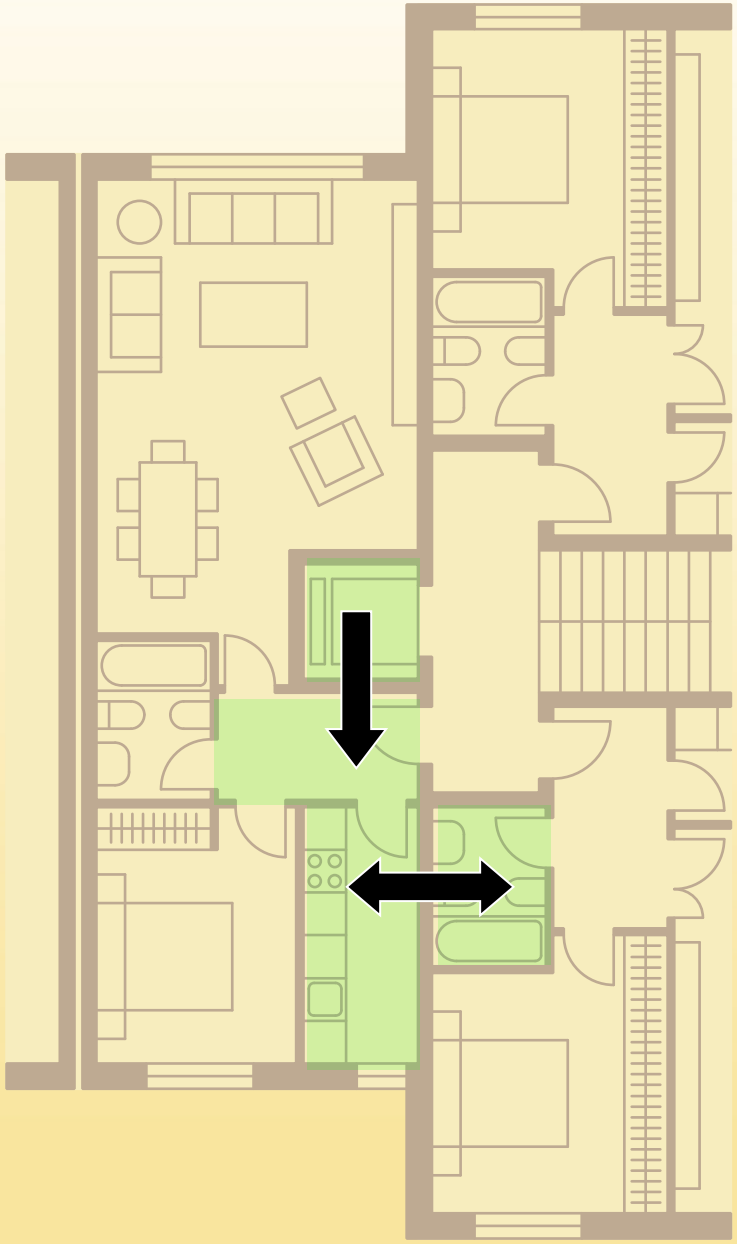

Protected enclosure ⟷	Any other enclosure of another unit	$D_{nT,A}$ > 50 dBA
Protected enclosure ⟷	Common areas	$D_{nT,A}$ > 50 dBA
Protected enclosure ⟷	Facility enclosure or activity enclosure	$D_{nT,A}$ > 55 dBA
Habitable enclosure ⟷	Common areas	$D_{nT,A}$ > 45 dBA
Habitable enclosure ⟷	Any other habitable enclosure, facility enclosure or activity enclosure	$D_{nT,A}$ > 45 dBA

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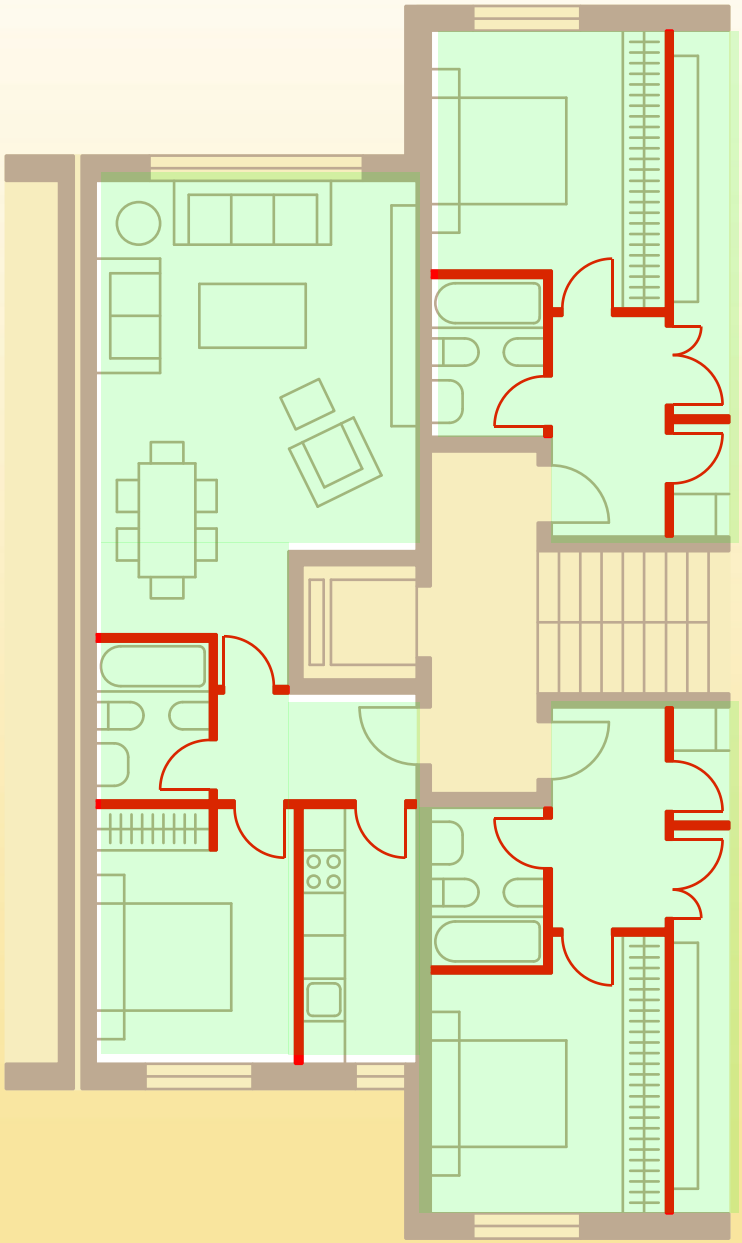

Protected enclosure ⟷	Any other enclosure of another unit	$D_{nT,A}$ > 50 dBA
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Habitable enclosure ⟷	Common areas	$D_{nT,A}$ > 45 dBA
Habitable enclosure ⟷	Any other habitable enclosure, facility enclosure or activity enclosure	$D_{nT,A}$ > 45 dBA
Interior walls		R_A > 33 dBA

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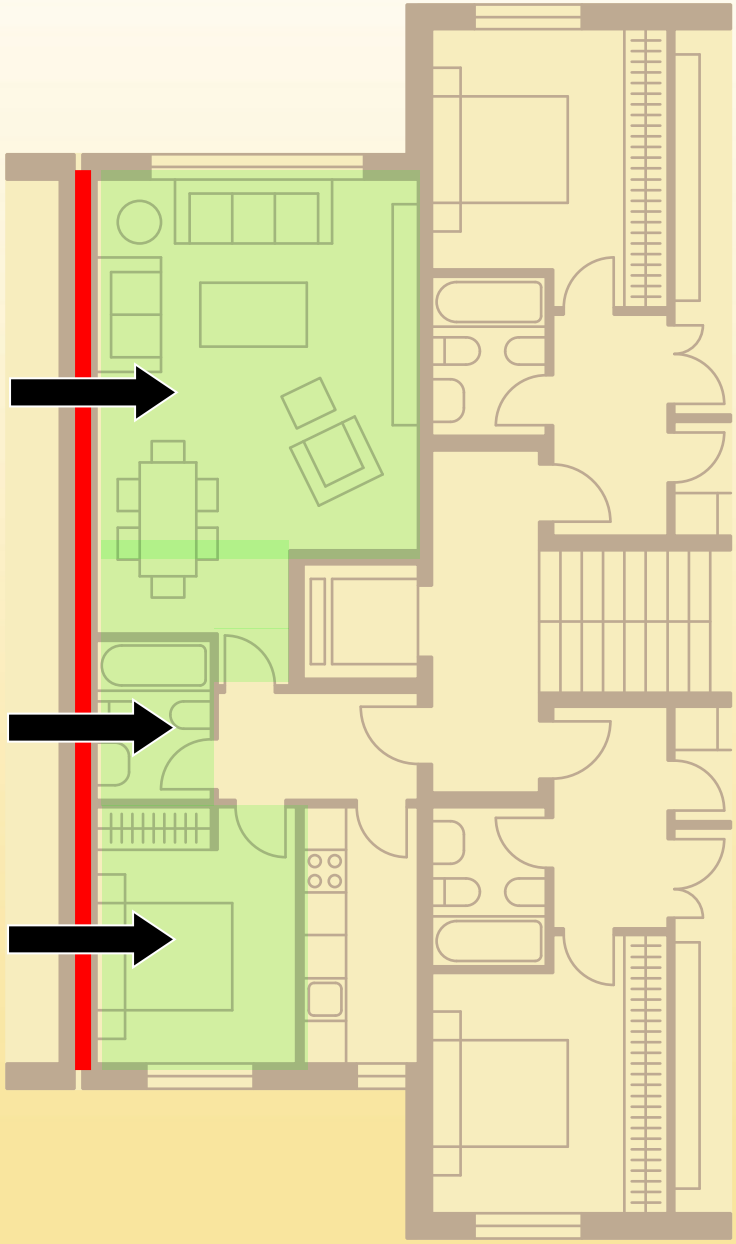

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Habitable enclosure ↔	Common areas	$D_{nT,A}$ > 45 dBA
Habitable enclosure ↔	Any other habitable enclosure, facility enclosure or activity enclosure	$D_{nT,A}$ > 45 dBA
Interior walls		R_A > 33 dBA
Wall between two adjacent buildings that separates protected enclosures and habitable enclosures (each wall)		$D_{2m,nT,Atr}$ > 40 dBA

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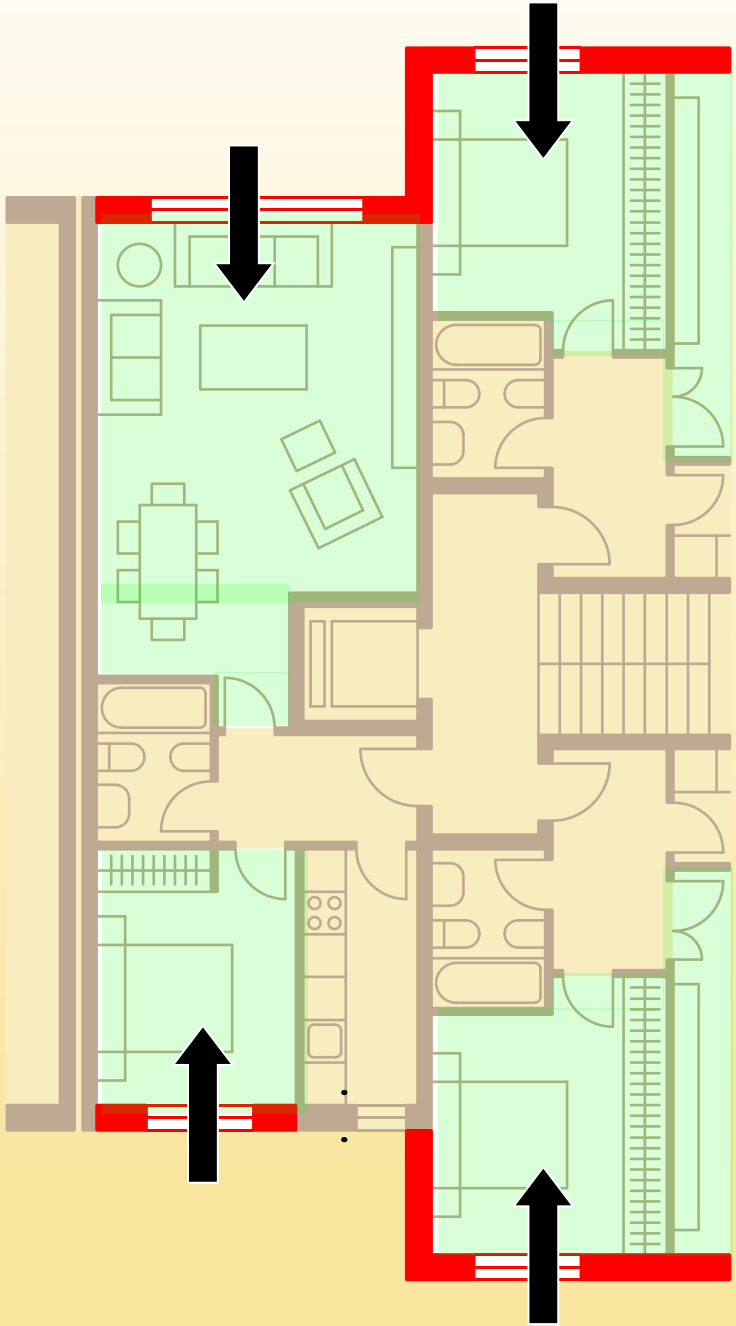
Airborne sound insulation between horizontally or vertically adjacent enclosures



Protected enclosure ⟷	Any other enclosure of another unit	$D_{nT,A}$ > 50 dBA
Protected enclosure ⟷	Common areas	$D_{nT,A}$ > 50 dBA
Protected enclosure ⟷	Facility enclosure or activity enclosure	$D_{nT,A}$ > 55 dBA
Habitable enclosure ⟷	Common areas	$D_{nT,A}$ > 45 dBA
Habitable enclosure ⟷	Any other habitable enclosure, facility enclosure or activity enclosure	$D_{nT,A}$ > 45 dBA
Interior walls		R_A > 33 dBA
Wall between two adjacent buildings that separates protected enclosures and habitable enclosures (each wall)		$D_{2m,nT,Atr}$ > 40 dBA
External noise (depending on the predominating type of noise, the Ld and the type of building)		$D_{2m,nT,Atr}$ > (30-47) dBA

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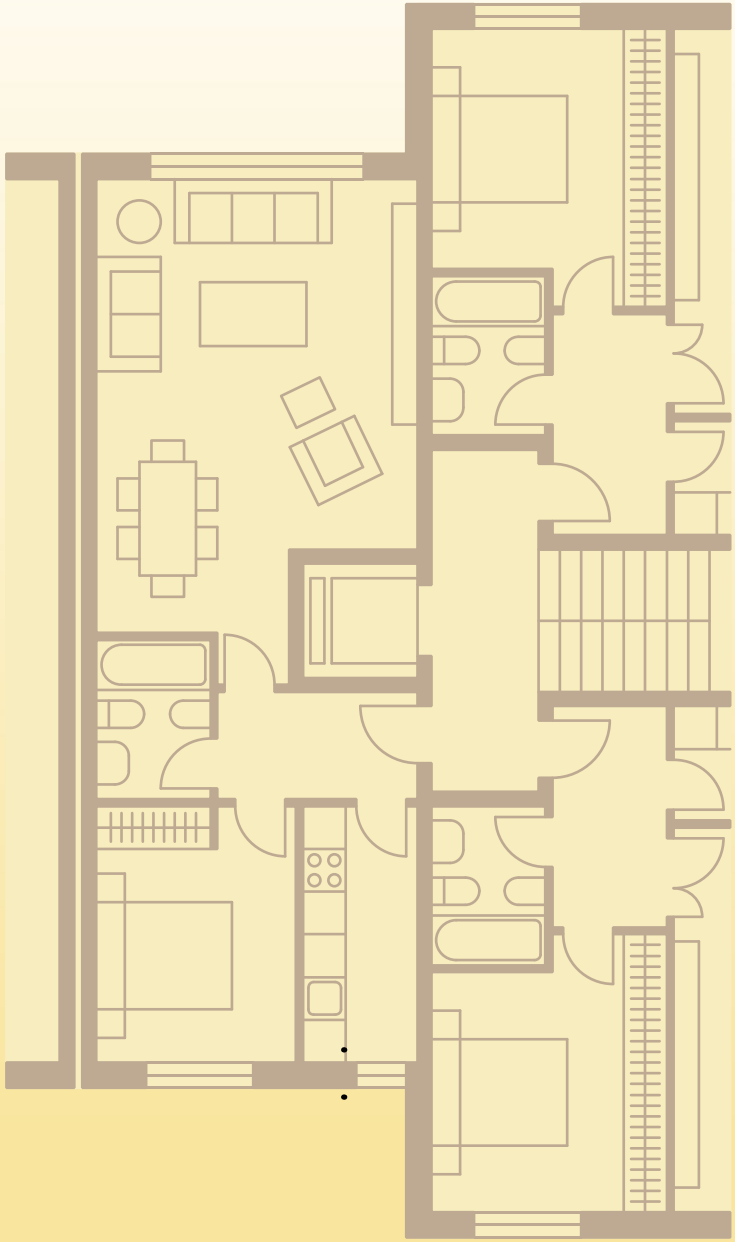

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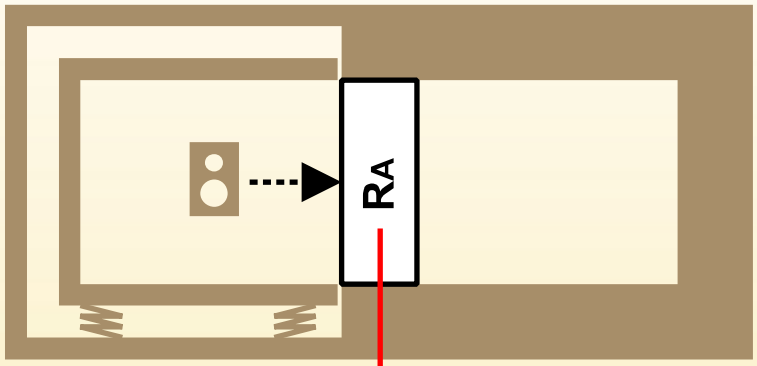
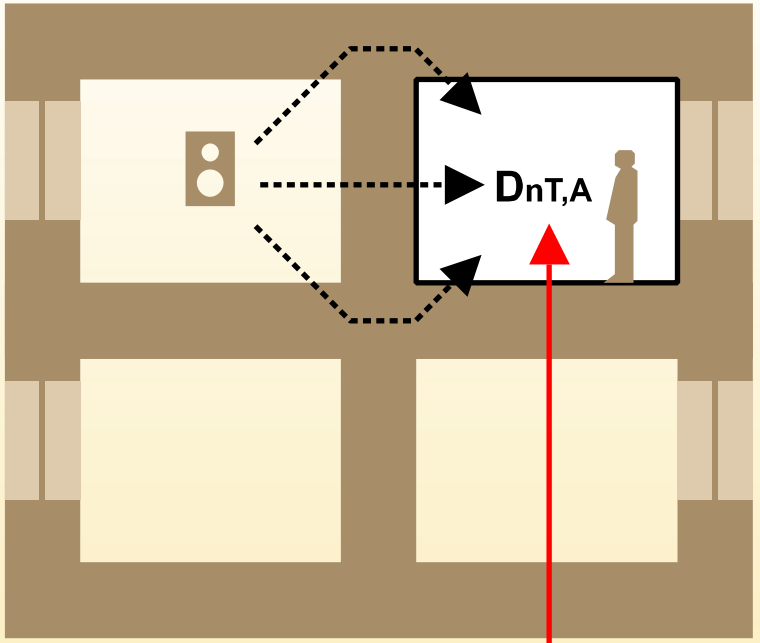
RECEPTOR ENCLOSURE	TRANSMITTER ENCLOSURE	**Airborne sound** insulation between horizontally or vertically adjacent enclosures	**Impact sound** insulation between horizontally or vertically adjacent enclosures , or enclosures that share an edge
Protected enclosures	Any other enclosure of another unit	**D_{nTA} > 50 dBA** (1) If the enclosure share doors or windows (R_A door or window > 30 dBA y R_A wall > 50 dBA)	**L'_{nTw} < 65 dB**
	Common areas	**D_{nTA} > 50 dBA** (1) If the enclosure share doors or windows (R_A door or window > 30 dBA y R_A wall > 50 dBA)	**L'_{nTw} < 65 dB** (Not applicable between protected enclosure and a staircase in a common area)
	Facility enclosure or activity enclosure	**D_{nTA} > 55 dBA**	**L'_{nTw} < 60 dB**
	External noise	Table 2.1 **$D_{2m,nT,Atr} \geq$ (30 - 47) dBA** Depending on the predominating type of noise Ld and the type of building)	
Habitable enclosures	Any other habitable enclosure	**D_{nTA} > 45 dBA** (1) If the enclosure share doors or windows (R_A door or window > 20 dBA y R_A wall > 50 dBA)	**No requeriment**
	Common areas	**D_{nTA} > 45 dBA** (1) If the enclosure share doors or windows (R_A door or window > 20 dBA y R_A wall > 50 dBA)	**No requeriment**
	Facility enclosure or activity enclosure	**D_{nTA} > 45 dBA** (1) If the enclosure share doors or windows (R_A door or window > 20 dBA y R_A wall > 50 dBA)	**L'_{nTw} < 60 dB**
Protected enclosures and habitable enclosures adjacent to another building	Adjacent enclosures of another building	**$D_{2m,nT,Atr}$ > 40 dBA** (Each wall)	
Interior walls		**R_A > 33 dBA**	

01.2.A Influencial factors. Party wall insulation





Does R_A > 50 dBA ensure the compliance of $D_{nT,A}$ > 50 dBA?

NO

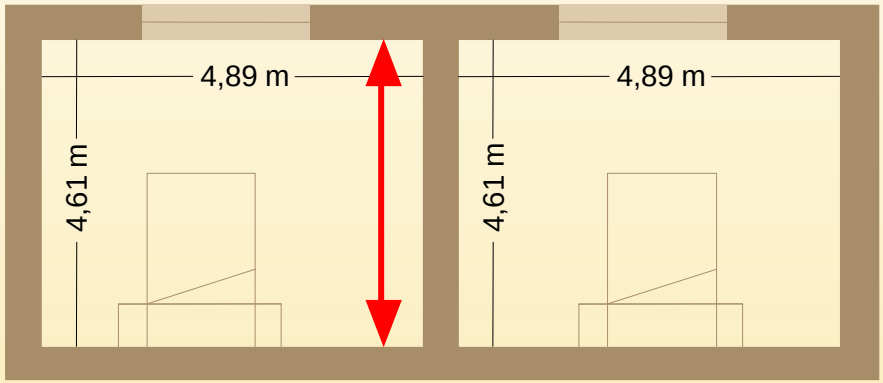
Airborne sound insulation on site depends on other factors:

Geometry of the enclosures
Acoustic performance of the elements
Design of the joints between elements
Correct execution

Good sound insulation of the separating wall measured in a laboratory is necessary but not sufficient to ensure the on site requirements of the CTE

01.2.B Influencial factors. Geometry of the enclosures

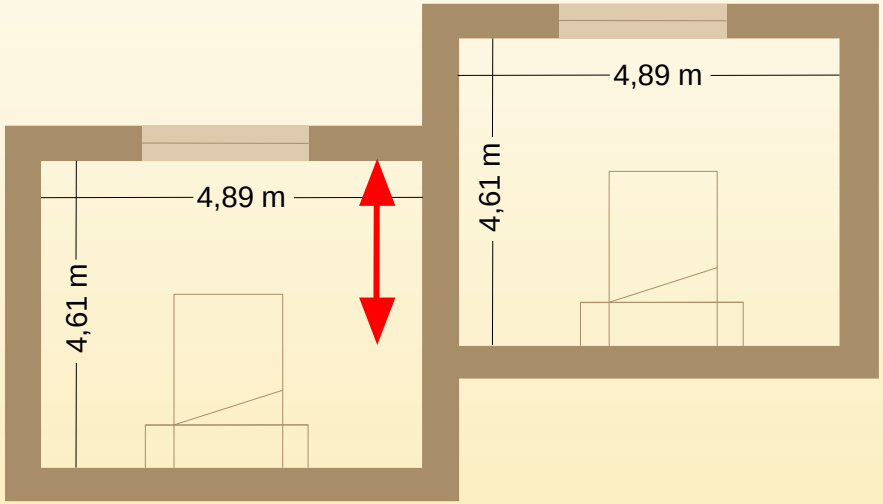
Surface of the party wall shared by the enclosures



Rooms with all the party wall shared

$D_{nT,A}$: 53 dBA

Worst acoustic behavior

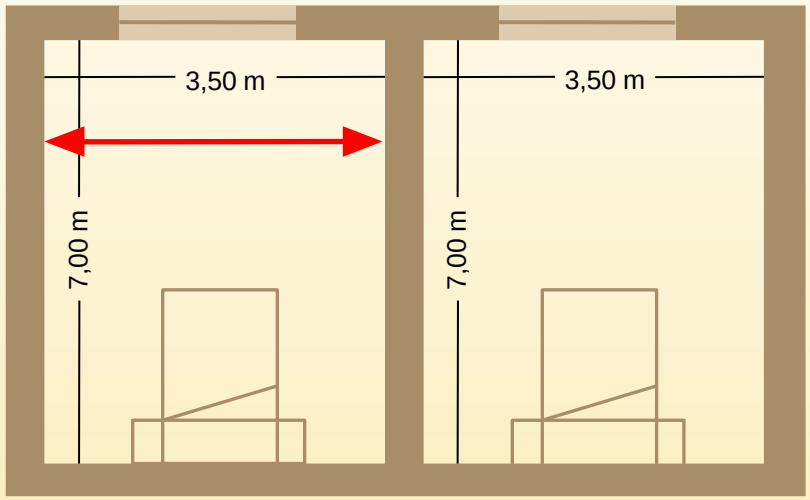


Rooms with only a portion of the party wall shared

$D_{nT,A}$: 56 dBA

The same volumes with the same constructive elements offer different acoustic behavior depending on the surface of the party wall shared.

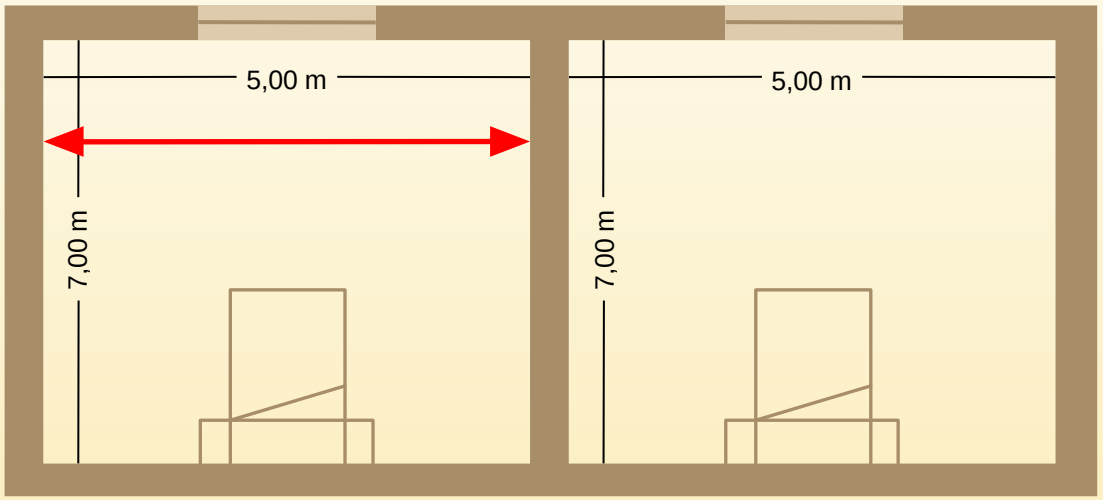
Volumes of the enclosures



Rooms with small volumes

DnT,A: 51 dBA

Worse acoustic behaviour



Rooms with big volumes

DnT,A: 54 dBA

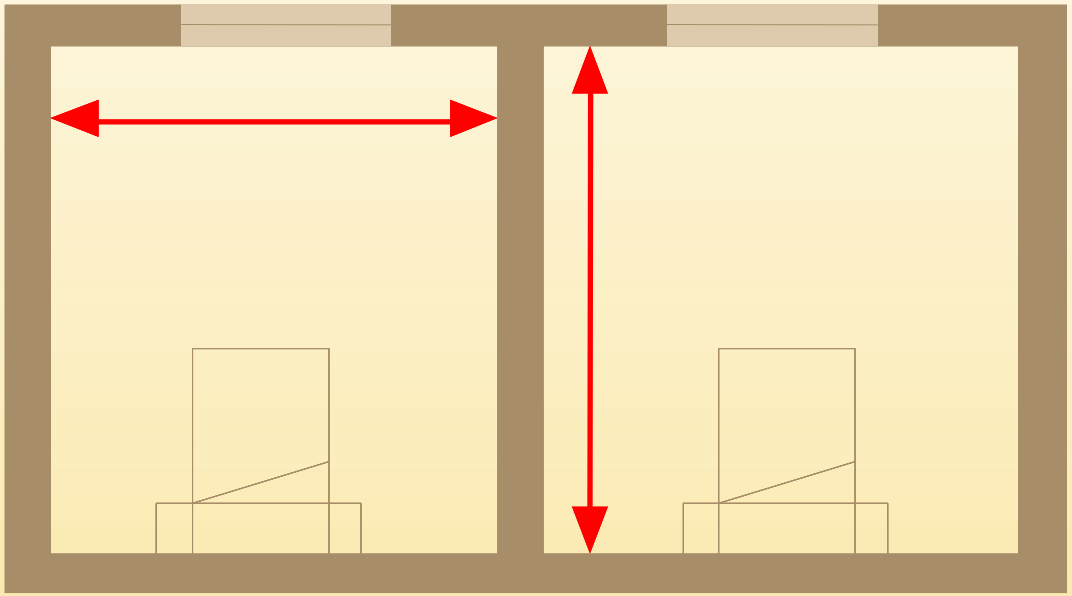
The same constructive elements and the same area of the party wall shared lead to different acoustic behaviour depending on the enclosure's volume.

Conclusion

Geometrically unfavourable enclosures :

Lower ratio (volume of the receptor enclosure / surface of the party wall shared)

Small volume of the enclosure



Big surface of the party wall shared

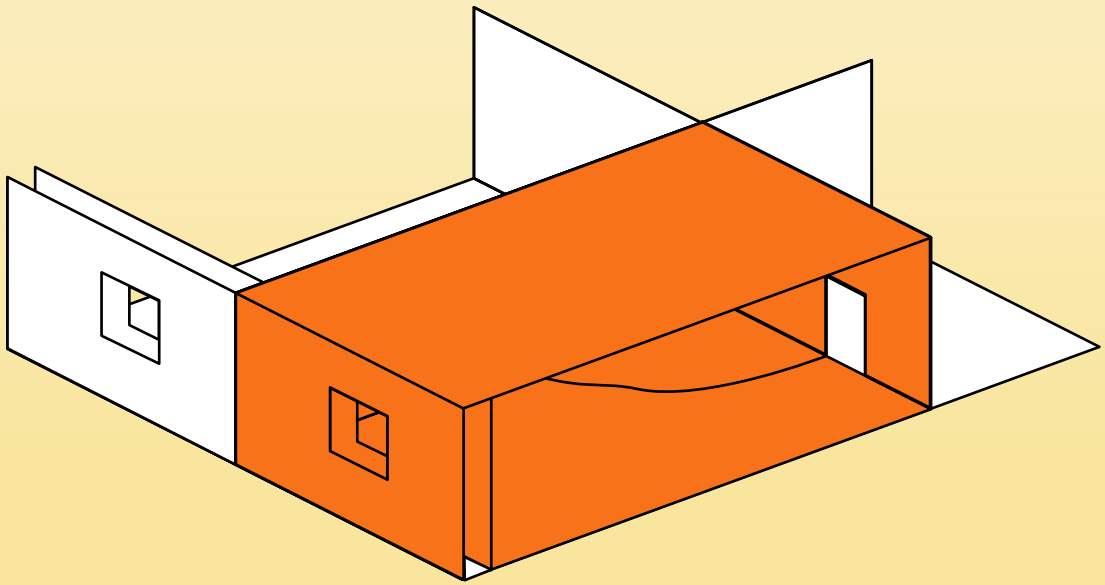
To be on the safe side, we should acoustically study the enclosures with the most unfavorable geometry: rooms with the lower ratio (volume of the receptor enclosure / party wall shared)

01.2.C Influencial factors. Acoustic performance of the elements

The acoustic performance of all the constructive elements of the building has an influence on the level of acoustic insulation on site

It is necessary to know the acoustic parameters of all the constructive elements of the building to carry out an appropriate acoustic design and size the elements properly

Floor structure	m (kg/m^2) y R_A (dBA)
Facade of one wall	m (kg/m^2) y R_A (dBA)
Facade of two walls. Inner wall	m (kg/m^2) y R_A (dBA)
Party wall	m (kg/m^2) y R_A (dBA)
Interior wall	m (kg/m^2) y R_A (dBA)
Floating floor	ΔL_W (dB) y ΔR_A (dBA)
False ceiling	ΔL_W (dB) y ΔR_A (dBA)



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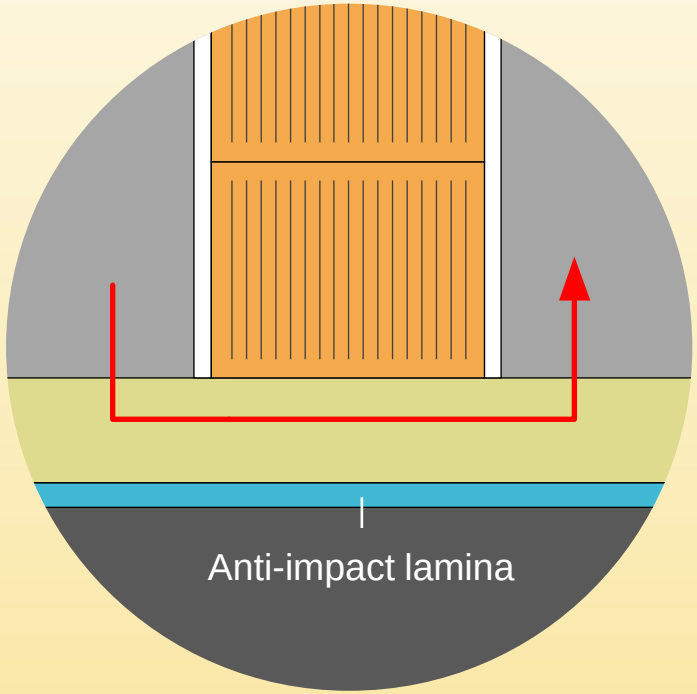
Interior wall	m (kg/m^2) y R_A (dBA)
Floating floor	ΔL_w (dB) y ΔR_A (dBA)
False ceiling	ΔL_w (dB) y ΔR_A (dBA)

A party wall may result in very high or very low acoustic insulation depending on which elements are combined with it

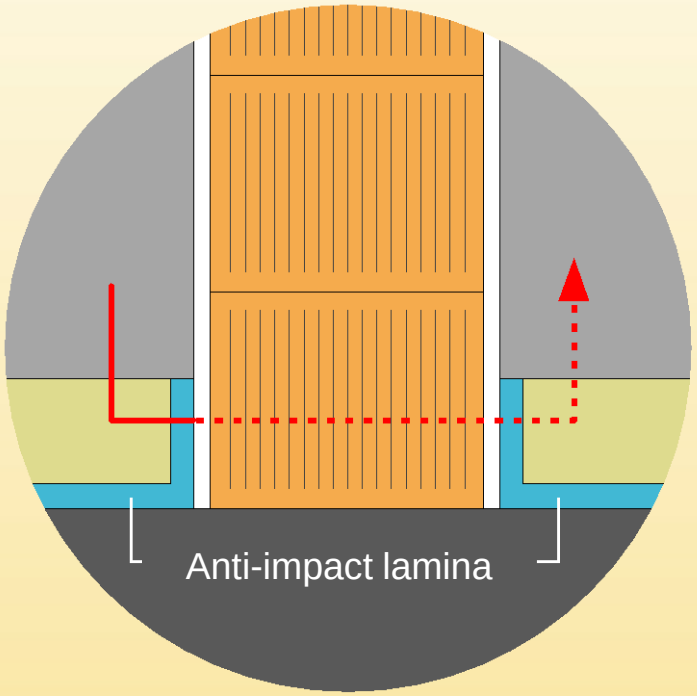
It is necessary develop an acoustic design to define the constructive elements combinations that ensure required acoustic insulation in each case

The type of joint of the building's constructive elements has an influence on the level of acoustic insulation on site

It is necessary to make a proper design of the joints of the elements
to ensure that insulation need are fulfilled



INCORRECT JUNCTION
Noise is transmitted through the floating floor

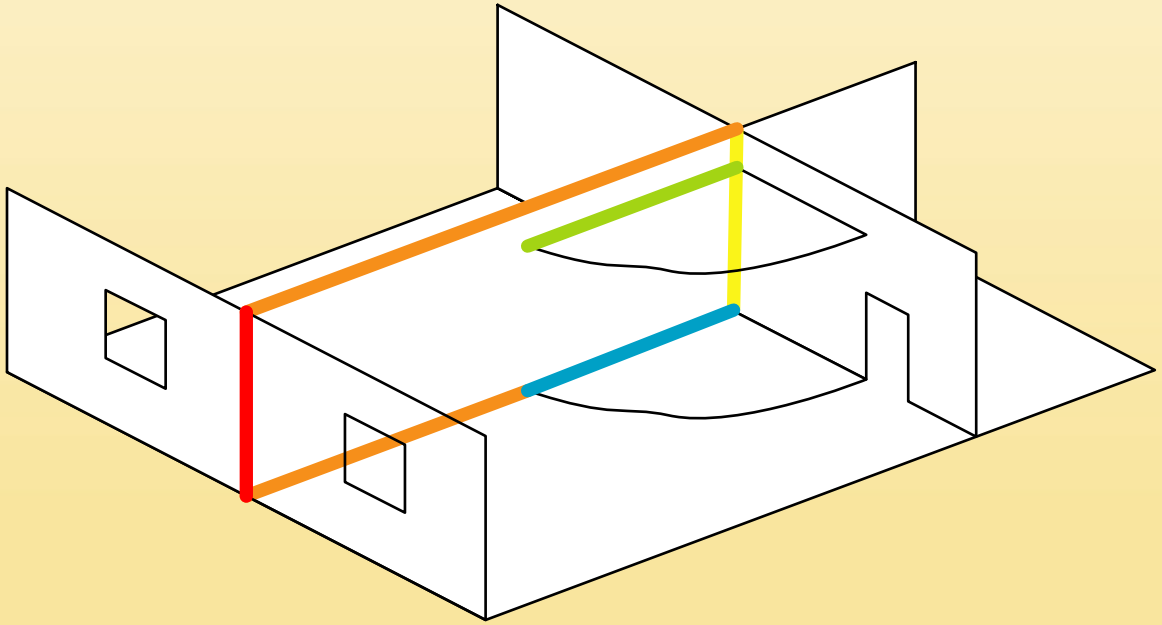


CORRECT JUNCTION
Noise transmission is interrupted

The type of joint of the building's constructive elements has an influence on the level of acoustic insulation on site

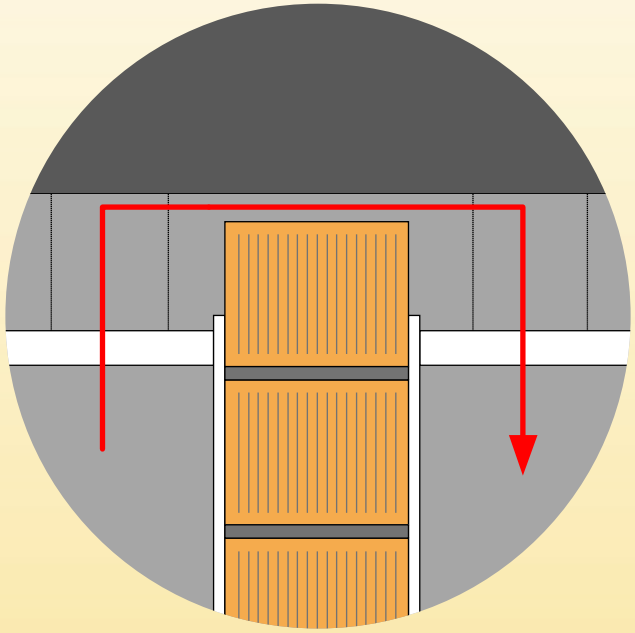
It is necessary to make a proper design of the joints of the elements to ensure that insulation need are fulfilled

- Joint between party wall and facade
- Joint between party wall and interior walls
- Joint between party wall and floor structure
- Joint between party wall and false ceiling
- Joint between party wall and floating floor

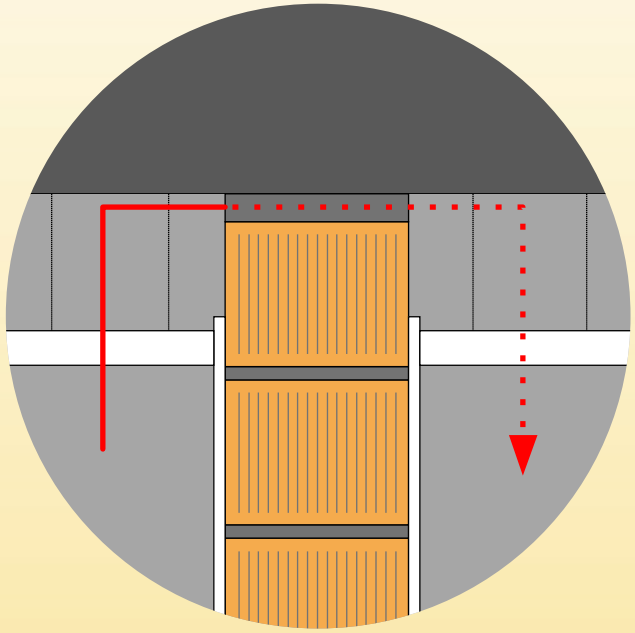


Work execution has an influence on the level of acoustic insulation on site

Even if we have made a suitable acoustic design, it is necessary to ensure a proper execution of the constructive solution defined in the project to ensure compliance of the insulation levels required



INCORRECT EXECUTION
Noise is transmitted through the spaces of the joint between the wall and the upper structural floor that are not sealed with plaster



CORRECT EXECUTION
Noise transmission is interrupted if the joint between the wall and the upper structural floor is correctly sealed with plaster

A constructive solution designed to obtain an acoustic insulation on site of DnT, A > 50 dBA can obtain DnT, A << 50 dBA because of an incorrect execution

The CTE DB HR is much more demanding than the NBE CA-88

It increases requirements regarding airborne and impact sound insulation

It is necessary to ensure a minimum level of acoustic insulation between enclosures

The designer can ensure compliance with the CTE DB HR if:

The constructive elements have good acoustic performances

A correct acoustic design has been developed
(combination of constructive elements and joints of the constructive elements)

Constructive solutions are correctly executed