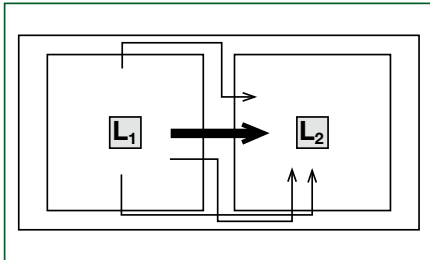


EXISTENT OCCUPIED BUILDINGS

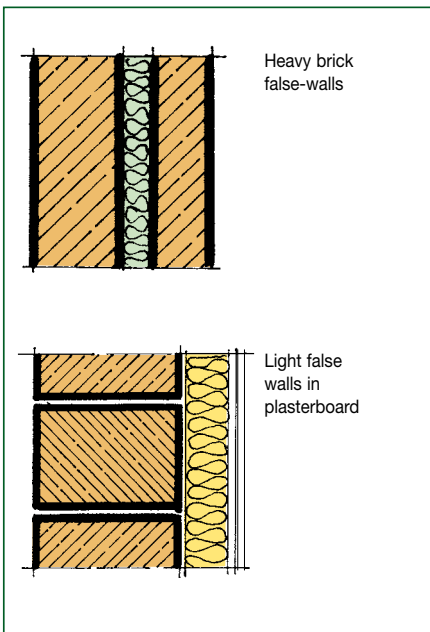
USER'S GUIDE ON ACOUSTIC INSULATION TECHNIQUES

The correct acoustic insulation of a building in the planning and building phase only affects the costs relatively, whereas the acoustic insulation of one that is already occupied is rather expensive and reduces the volumes of the rooms.

First and foremost, one must bear in mind that noise does not derive exclusively from **direct transmission** through walls or floor slabs that border with the adjacent dwellings or with the outside, but also from **indirect transmission** through walls or floor slabs that are not directly involved in the noise source but that are still affected by vibration because they are connected rigidly to the bordering dividing walls, consequently the insulation will often not concern just perimeter walls and floor slabs but also the internal dividing walls.

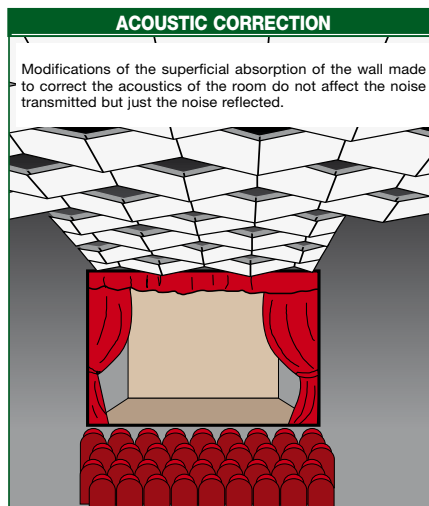
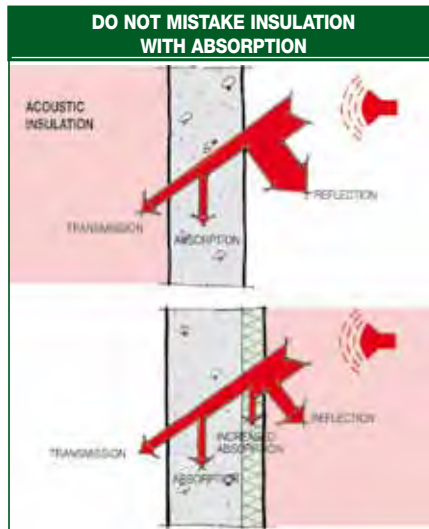


- The acoustic insulation of an occupied room is based on the creation of light false-walls and false-ceilings in dry plasterboard, with air space filled with fibrous insulation material, which are arranged next to the surfaces to be insulated without any rigid connections; this creates a dynamic spring-mass insulation system that dampens the vibrations of the air transmitted from walls and floor slabs involved in airborne noise generated from the outside or in the bordering dwellings, from foot traffic noise that the dwellers of the building cause on the floor slabs and from the noise of the utility systems installed in the building.



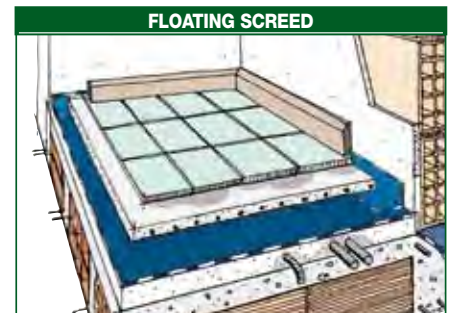
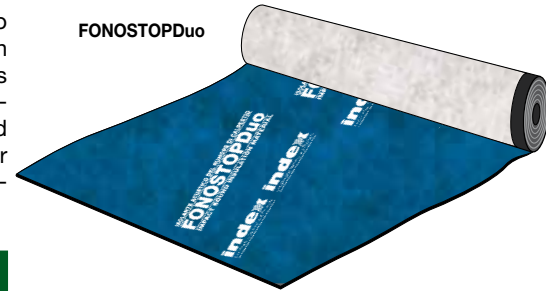
Compared to the old method based on the creation of heavy brick false-walls, the method based on plasterboard false-walls takes up less space, the wall is lighter and is built dry, which is an outstanding benefit in rooms that are already occupied, the installation of cables and pipes is simpler and, most important of all, the insulation levels obtained are much greater than those obtainable with a conventional wall.

- One must remember that there is no miraculous insulation material, which glued to the wall, resolves the problems of acoustic insulation and the thick cusp-shaped panels or perforated panels used to correct the acoustics in theatres or cinemas do not have any acoustic insulation functions.



- Rigid closed-cell cellular insulation panels are perfect for thermal insulation but have no acoustic insulation properties against noise.
- The insulation panels to be fitted in the air spaces of an acoustic insulation system are fibrous. Less common is the use of elastic and/or open-cell cellular insulation materials, whereas of no use and in some cases even detrimental is the use of rigid closed-cell cellular insulation.

- Fibrous insulation materials that are appropriately protected by an impermeable soundproof foil in the building phase are used successfully also to insulate against foot traffic noise under a floating screed, but they also offer excellent results when they are laid between the old floor and a new floating wood floor, without demolishing the existent flooring.

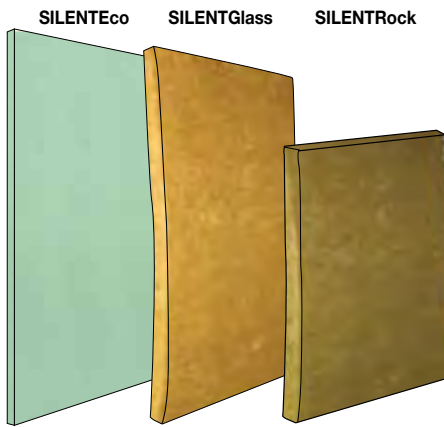


INSULATION OF WALLS AND CEILINGS

False-walls on metal framework. It is the most efficient insulation system available because the framework is self-bearing and enables the variation of the distance from the wall to be insulated and the installation of a number of panels, which in both cases, increases the soundproofing power of the system. The false-wall in plasterboard is fitted on metal uprights, secured to two tracks, of which one is screwed to the ceiling and the other to the floor and appropriately insulated with self-adhesive gaskets. The air space created by the metal uprights is filled with the fibrous insulation products SILENTEco, SILENTRock, TOPSILENTRock or SILENTGlass. We always recommend the installation of at least two overlapped panels, of which the first will be TOPSILENTGips, which is pre-coupled with a high density soundproof foil and the second will be a standard insulation panel that can be purchased from any builders' merchant. The minimum thick-

ness to be calculated for the above-described system, fitted on a frame of 50 mm, to be able to provide an efficient level of insulation, is approximately 85 mm.

TOPSILENTGips

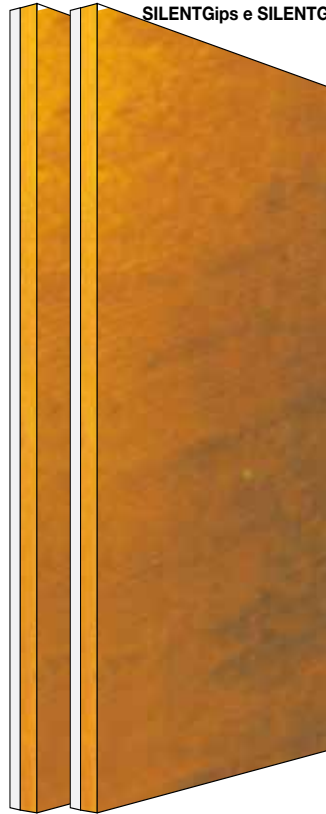


Glued false-walls. Glued false-walls such as SILENTGips and TOPSILENTDuogips provide a lower level of insulation and cannot generally be laid over other plasterboard panels to increase their insulation performance, but they take up less space than walls on metal framework; the first is more efficient while the second, which is thinner, is used just when the space available is minimal.

Both types consist of a plasterboard panel on the back of which, in the case of SILENTGips, a fibreglass panel is glued, while in the case of TOPSILENTDuogips, a soundproof foil coupled with non-woven polyester fabric with elastic needling is glued. Both are glued to the wall to be insulated using GIPSCOLL adhesive, which is applied on the fibrous face of the panel, thus creating an elastic bond and not a rigid bond between the plasterboard panel and the wall, because it is obtained via the fibreglass or polyester fabric that dampens acoustic vibrations. The minimum thickness to be calculated for SILENTGips, including the adhesive,

is approximately 35 mm for the panel of 29.5 mm and approximately 55 mm for the panel of 49.5 mm, whereas the thickness occupied by TOPSILENTDuogips is approximately 26 mm.

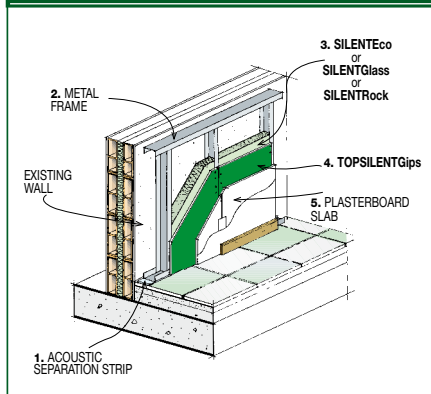
SILENTGips e SILENTGipsalu



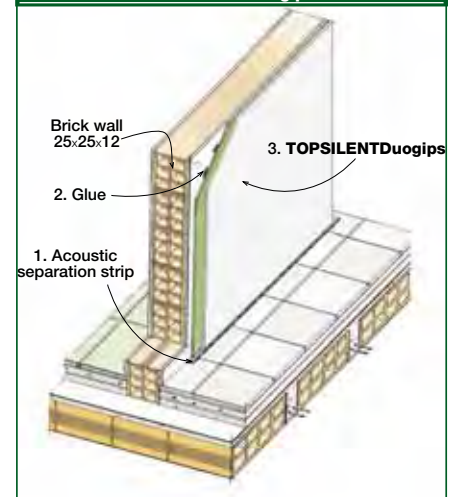
TOPSILENTDuogips



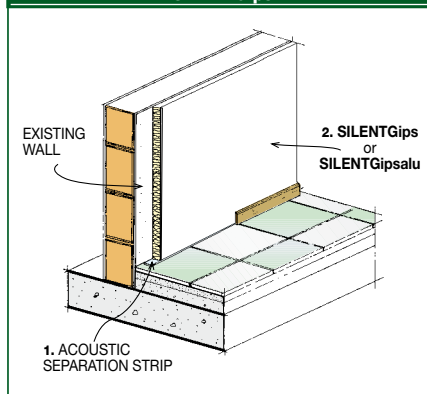
LIGHT FALSE-WALL ON METAL FRAME



LIGHT FALSE-WALL GLUED TOPSILENTDuogips

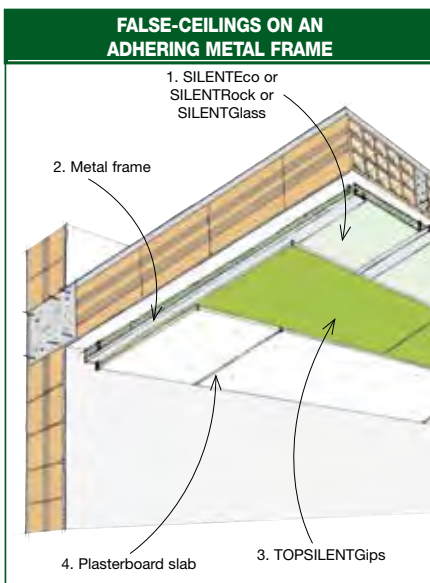
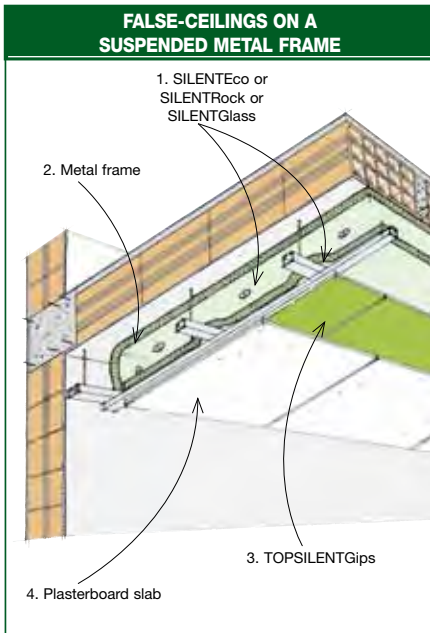


LIGHT FALSE-WALL GLUED SILENTGips



False-ceiling on metal framework. Ceilings are insulated in the same way as false-walls on metal framework with the difference being that the metal framework of the false-ceiling, on which the panel of TOPSILENTgips is screwed first and then a standard plasterboard panel, is borne elastically by some special metal hooks that hang the frame without screwing it rigidly to the ceiling, otherwise the foreseen insulation efficiency is lost completely. The minimum reduction in height to be assessed is around 100 mm for systems on metal framework in adherence with the insulation of the air space of at least 40 mm created with panels of SILENTeco, SILENTRock or SILENTGlass, up to 200

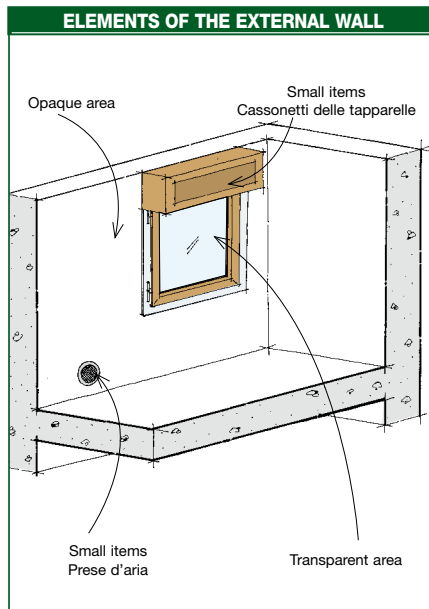
mm and more if the height of the room allows for it, for systems on a hanging frame with hangers and double layer of insulation obtained with the same panels, of which the first is secured to the ceiling.



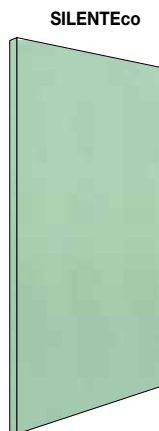
HOW TO PROTECT AGAINST NOISE FROM OUTSIDE THE BUILDING

In genere la parte muraria delle facciate. Generally speaking, the brick part of the external wall (opaque part) built correctly is heavy enough to protect against noise from the outside, consequently the main focus aims at the insulation of the part with windows (the transparent part) because this is where all the external noise, likewise for heat, comes from; if one lives in a rather noisy urban environment, one has to accept the idea of living with the windows closed and having to install air conditioning in summer.

- To improve the situation in existent dwellings, as already explained, the first thing to do is replace the old windows and install at least double-glazed windows; when possible, the best and most efficient solution is to install double-glazed and hermetically sealed windows.

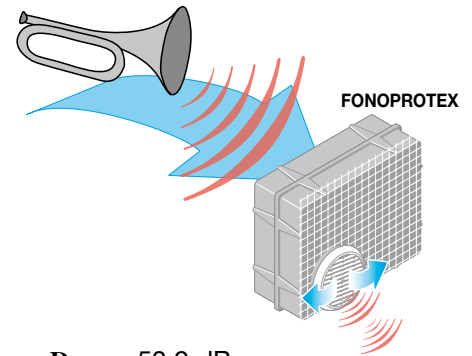


- The old wooden shutter boxes installed in old buildings are a major vehicle of noise and source of consistent thermal dispersion. The thermal-acoustic comfort of occupied rooms can be improved by gluing, on the inside of the old shutter boxes, on the wooden panels, the TOPSILENTBitex foil using FONOCOLL adhesive and subsequently lining the shutter box compartment with thermal-acoustic insulation panels SILENTeco, which can be glued using GIPSCOLL adhesive. SILENTeco is a polyester fibre based insulation product that does not contain mineral fibres, does not irritate skin and does not prick and therefore it can be easily handled, cut and shaped as required. If the space between the shutter box and the shutter roll is minimal, the compartment can be lined internally using the TOPSILENTDuo foil, with the face lined in non-woven white soundproof polyester fabric facing externally, using FONOCOLL adhesive on the wooden parts and GIPSCOLL adhesive on the bricked parts.



- Openings created in external walls by kitchens where gas hobs and ovens are installed may considerably reduce the soundproofing power of the wall. Bear in mind that an opening of 100 cm², which is the minimum legal

measurement, reduces the insulation of the wall by approximately 10 dB. FONOPROTEX is the silenced air intake distributed by INDEX with a net air flow cross section of 100 cm² complete with certified acoustic insulation of $D_{n,e,w} = 53,9$ dB. FONOPROTEX is compact (35×29×15cm) and has a modular extension that makes it easy and quick to install in most external perimeter brick walls.



$D_{n,e,w} = 53,9$ dB

- During seasons in which balcony doors are left open, protection against external noise can be fulfilled by fitting barriers and bushy plants, which should be as high as possible, arranged up against the balcony railings, possibly integrating them with heavy sunshades that cover the whole of the railings; an even more protective solution would be to install a veranda.
- Very rarely is it advisable to acoustically insulate perimeter external walls because they are alone normally sufficiently heavy to guarantee acoustic protection. In the case of effectively weak external walls, the necessity and convenience to do so should be assessed only after replacing the part with windows.
- It could be convenient if the thermal insulation of the external walls is to be integrated and in such case, insulation materials and laying techniques should be chosen that are able to guarantee both thermal and acoustic insulation efficiency. The outer insulation applied on the external part of the perimeter wall is the system that guarantees total coverage of the external wall and offers the advantage of eliminating all the thermal bridges; for this system to be able to guarantee also an efficient acoustic insulation, fibrous insulation panels of mineral nature must be used (fibreglass or rock wool), of at least 6 cm in thickness and complete with acoustic certification; not to be used are closed-cell cellular plastic insulation products, which offer good thermal performance but poor acoustic performance, if not for systems that are based on the use of composite panels created by coupling both materials, but for which it is always advisable to request certification of the acoustic performance.

- When just one dwelling of a block of flats is to be acoustically and thermally insulated, the external wall can be insulated from the inside using systems based on the installation of a light false-wall fitted on metal framework or on the application of the light glued false-wall, remembering for the latter, to replace the SILENTGips panel, being the only one of the systems described earlier without a vapour barrier, with the SILENTGipsalu panel, made of plasterboard coupled with glass wool with built-in vapour barrier in aluminium foil.

POSITION THE SEALING STRIP



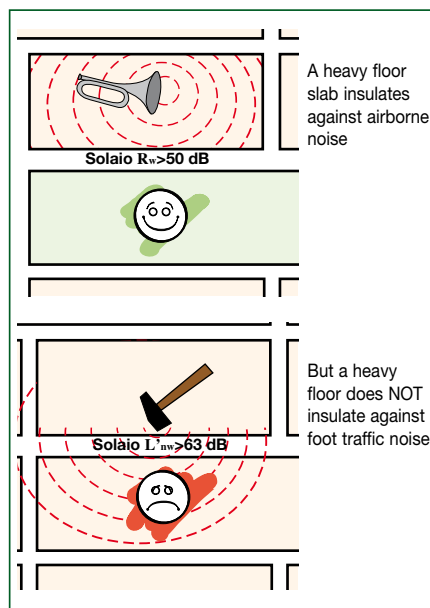
POSITION THE SILENTGips SLAB



- The precaution just explained is required in the thermal-acoustic insulation of the external wall because, being crossed by thermal dispersion combined with the migration of water vapour towards the outside, if it is not suitably protected by a vapour barrier, arranged on the warmest face of the brick wall, the water vapour could condensate in the coldest layers of the external wall.
- In some cases, the insulation against external noise, which directly crosses the external wall, could be insufficient if the noise that passes indirectly through the internal walls bound to the external wall is considerable, therefore it may be necessary also to insulate these too.

HOW TO PROTECT AGAINST NOISE FROM INSIDE THE BUILDING

- The boundary perimeter walls of buildings constructed when there was a boom in the building trade are often too light and easily transmit airborne noise created by voices, radios and televisions.
- The old plumbing and heating systems, lift wells and so on are often not sufficiently insulated.
- Cement-based floor slabs are generally heavy enough to reduce the transmission of airborne noise but do not insulate against impact or foot traffic noise caused by dragging chairs and furniture over the floor or by the dwellers walking around their home.



- More serious is the problem of old floors in wood, which being light and elastic, transmit airborne and foot traffic noise more easily.
- To protect against airborne noise from an apartment on the same floor, a false-wall is created on the wall bordering the other apartment, but this is sometimes not sufficient when the noise that passes indirectly is still considerable, consequently it may be necessary to insulate all the walls of the room to be insulated with the same technique. To avoid taking up living space, one can proceed in steps; first and foremost the boundary wall is insulated and then if this is still not sufficient, all the walls of the room will be insulated. Rarely is it necessary to insulate the ceiling too, because the indirect transmission of airborne noise through a heavy floor slab is very slight.

INSTALL THE METAL FRAME



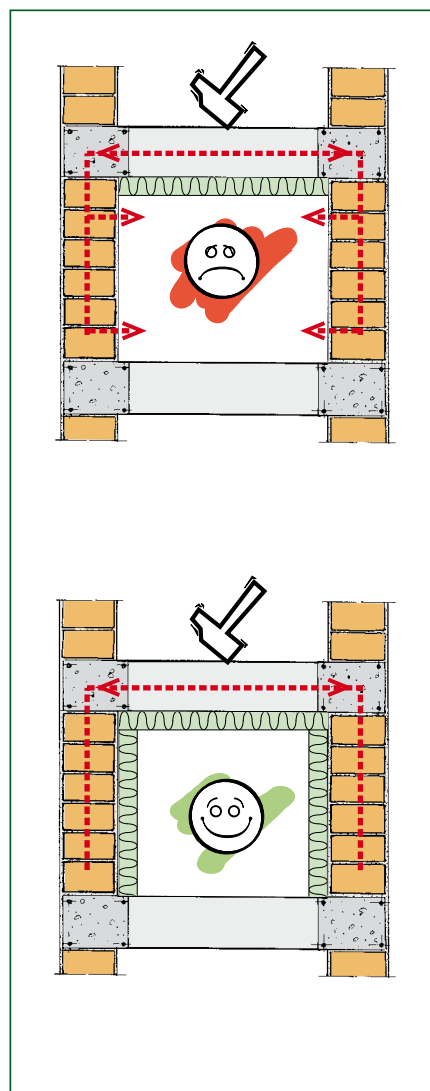
LAY SILENTeco



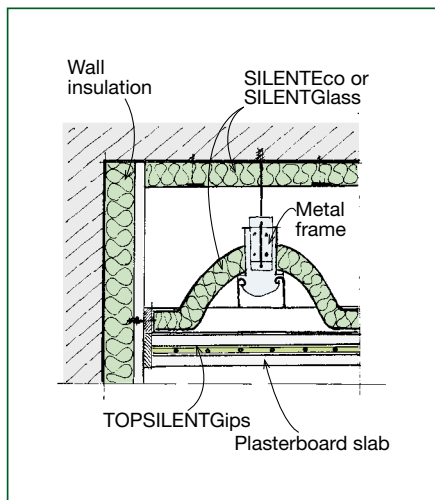
LAY THE PLASTERBOARD



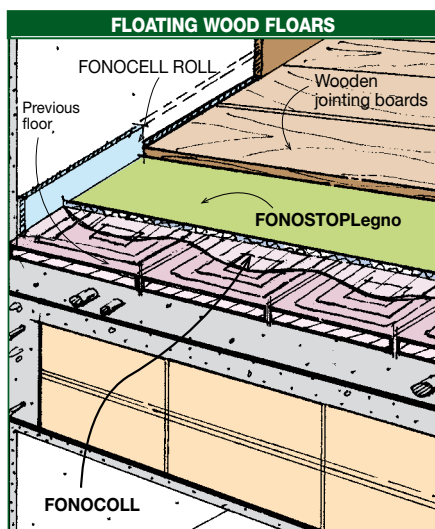
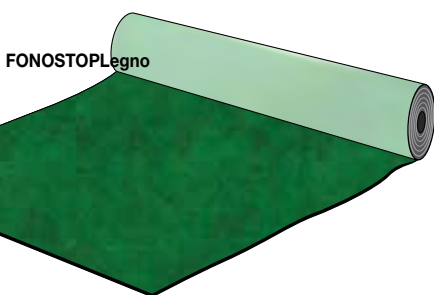
- To insulate against foot traffic noise and voices from the floor above, the false-ceiling must be installed, and seeing as foot traffic noise is much louder than airborne noise, the need to also insulate all the walls of the rooms on which the ceiling rests is more frequent; this however cannot be done in steps, as in the previous case, by just insulating the ceiling first and then subsequently creating the false-walls.



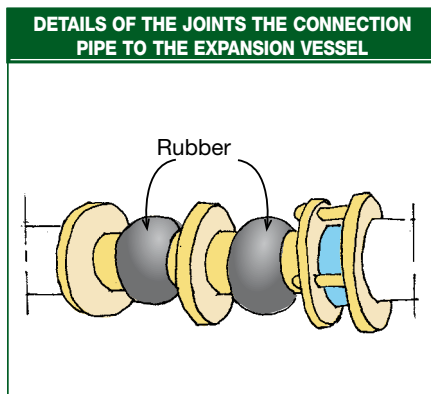
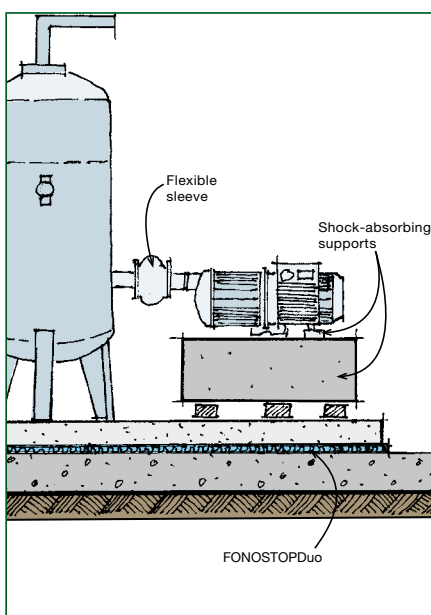
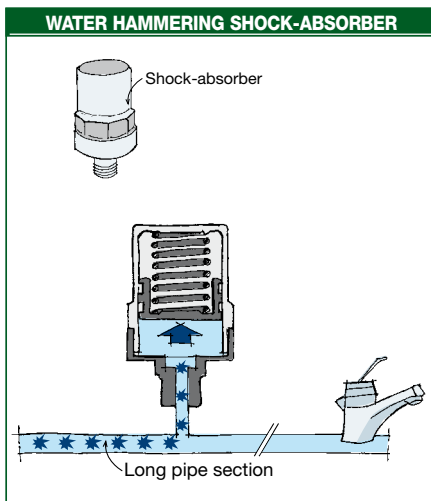
In this case, the decision must be made in advance, because to be able to install the insulation system correctly, the false-walls have to be installed first and then the false-ceiling and not vice versa, otherwise the false-ceiling is more restricted and insulates less.



- If you wish to install your own insulation against foot traffic noise that disturbs your neighbours, you can lay overlying resilient flooring such as carpet on the old stone or ceramic floor of your own home or lay a floating wood floor over it on a layer of FONOSTOPLegno. It is the specific insulation product against foot traffic noise for floating wood flooring, 5 mm thick and made up of a sound-resilient foil coupled with non-woven high density elastic polyester fabric and it takes up a total thickness of approximately 20 mm, flooring included.

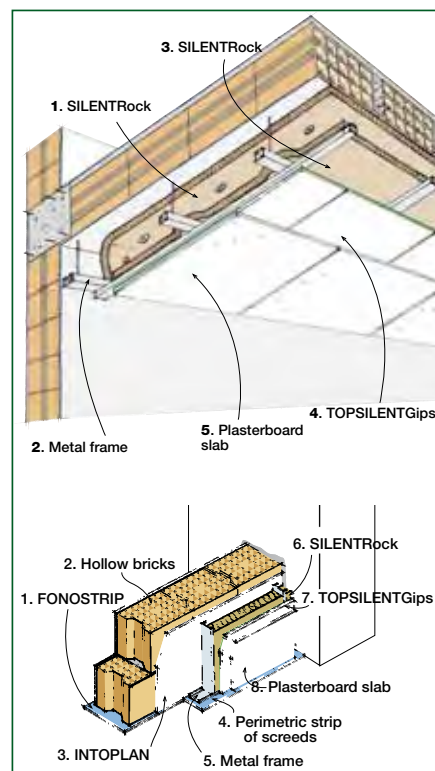


- Some noises of plumbing systems can be easily resolved by intervening directly at the source of the noise, which is often caused by the lack of flexible joints between pumps and surge tanks or water hammering shock-absorbers on the pipes, by the lack of shock-absorbing supports under moving machines, by poorly conformed taps, by the lack of pressure regulators, all of which are plant engineering problems that generate noise but that can be resolved at the source.



- The same can be done in compartments where the Heating, Conditioning and Aeration systems (HCA) are installed

or that house the motors of lifts, by insulating the housing compartments against airborne noise and also by installing false-walls and false-ceilings in plasterboard on metal framework on the inside, preferring the SILENTRock panel, which has a higher fireproof power, to fill the air space in the case of boiler rooms; you can also insulate the transmission of vibrations of moving parts to the building structure, by installing appropriate shock-absorbing supports under the machinery and also intercept the vibrations carried along the pipes by insulating them from the structure with flexible sleeves and equipping them with flexible joints.



- If it is impossible to intervene at the source of the noise caused by an old system or a machine by identifying the wall/s where most of the noise passes directly, one can intervene with the same criteria indicated previously, insulating first the wall involved and then insulating the other walls if the indirect transmission of noise is still considerable.

