
REGUPOL® IMPACT SOUND ACOUSTIC UNDERLAYS TIMBER FRAMED CONSTRUCTION

Any wall or floor (together with its associated structure) that separates one unit or dwelling from another must provide adequate insulation against sound transmission.

Two sources of sound that are heard in a neighbouring unit or dwelling are – airborne sources such as speech, musical instruments and loudspeakers and impact sources, such as footsteps, vibrating equipment and the moving of furniture.

Sound Transmission Class (STC Rating): The Sound Transmission Class is a rating of the acoustic transmission of airborne sound through a partition system for a select range of frequencies between 100 Hertz and 4000 Hertz inclusive. The higher the STC rating the better is the partition with reducing airborne noise transmission. The mass of the barrier i.e. the higher the mass, the harder to vibrate, causing less transmission of sound.

Impact Isolation Class (IIC Rating): The Impact Isolation Class is a rating of the acoustic transmission of impact sound through a partition system for a select range of frequencies between 100 Hertz and 4000 Hertz inclusive. The higher the IIC rating the better is the partition with reducing impact noise transmission. **Isolation** i.e. to isolate the barrier surface from each other so that no direct sound vibration is transferred.

When lightweight floors are walked on they are easily set into vibration and resonate at low frequencies and therefore require specific construction techniques to reduce the transmission of this sound to adjoining units.

Though not a BCA requirement, lightweight floors/ceiling separation units should be designed for impact sound.

TIMBER/RAFTER FLOORS

Creaking old timber floorboards are another source of noise. Over a long period of time timber floorboards can shrink, and become loose when a force is periodically applied to a specific point.

Carpet on timber floors provides a significant reduction to high frequency bands. Carpet does not provide significant improvement at low frequencies below 100 Hertz.

The most practical means of obtaining high impact sound insulation from timber floors when carpet cannot be used is to use a floating floor construction. This type of floor can also improve airborne sound insulation. Resilient layers such as mineral wool, glass, fibre, rubber etc are used to achieve isolation. The floating floors are normally made of concrete, asphalt and wooden floorboards.

Timber floors are much lighter than concrete floors and therefore, it is very difficult to reduce the impact sound for frequencies below 100 Hertz as this effect is in accordance with the “mass law”.

Australian Building Code: There is not an Australian Building Code that provides recommended ratings for Impact Isolation Class (IIC) between sole-occupancy units. The New Zealand Building Code recommends an Impact Isolation rating of 55 for floors. This would be equivalent to a Field Impact Isolation Class (FIIC) of 53. Field Impact Isolation is normally less than the Impact Isolation Class, as the later is determined in laboratory conditions. The sample under laboratory conditions would yield a higher performance rating, as all flanking noise paths would have been minimised.

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Existing Floor/Ceiling System: The sub-base for which most tests were undertaken at the Regupol® premises consisted of the following building materials:

- 19mm thick Yellow Tongue particleboard on metal joists.
- 245mm cavity between the underside of the floorboards and ceiling (note: there was **no** insulation in the cavity)
- 13mm thick Gyprock plasterboard ceiling.

Sound measurements for this sub-base were taken in order to ascertain the magnitude of improvement of sound insulation with the addition of different layers of Regupol materials – one (1) square metre samples were used.

The Test results indicate that the thickness of the impact isolation sample, the ability to deform and retain its shape (elasticity), and the absorption of sound through porous materials determine the attenuation of the transmitted energy from one material to another.

The 5mm Regupol® K225 Impact Sound Acoustic Underlay provided less impact isolation compared to Regupol® 6015 5mm and 8mm, 6010 10mm and 6010BA 17/8mm Impact Sound Acoustic Underlay rubber mats, Yet its characteristics impedance was estimated to be similar to that of the Regupol® 6010BA 17/8mm dimple Impact Sound Acoustic Underlay mat rubber compound.

The anomaly could be accounted for by the fact that the Regupol® K225 Impact Sound Acoustic Underlay does not display as good elastic properties as for example a homogeneous rubber or in particular Regupol® 6010BA 17/8mm dimple Impact Sound Acoustic Underlay rubber under low loads. The Regupol® K225 Impact Sound Acoustic Underlay would most likely perform much better for vibration isolation under large loads. For domestic type loads and applications, softer rubber compounds would be more satisfactory such as Regupol® 6010 10mm and 6010BA 17/8mm dimple Impact Sound Acoustic Underlay's.

Samples pieces of the Regupol® 5mm K225 Impact Sound Acoustic Underlay or 6010BA 17/8mm Impact Sound Acoustic Underlay rubber compound places on top of joists also provided good improvement to impact noise. The mass loading at these points deforms the rubber more than if the surface area of the rubber was larger.

It is more practical however, to 'float' a floor above a structural sub-base. The advantages are that both the impact noise and airborne sound transmission loss of the composite floor would be improved.

CARPETED FLOORS

The Regupol® Rubber underlays placed directly beneath the carpet and underlay provides good impact isolation. For timber floor/cavity/plasterboard ceilings sub-base system which do not provide as high impact isolation as for concrete slabs, a further improvement could be achieved by placing a layer of 25mm thick 120-160kg/m³ of fibreglass batts over the top of the sub-base, followed by a layer of 12mm thick ply board or fibrous cement panels, followed by one of the Regupol® Impact Sound Acoustic Underlay (Regupol® K225 5mm, 6015 8mm, 6010 10mm, 6010BA 17/8mm Impact Sound Acoustic Underlay's) and finally a layer of carpet (still using the standard carpet underlay).

Arithmetic Average reduction based on above testing Regupol products under carpet tested from 100 Hertz to 5000 Hertz.

- 5mm thick Regupol® K225 Impact Sound Acoustic Underlay – 19dB
- 8mm thick Regupol® 6015 8mm Impact Sound Acoustic Underlay – 26dB
- 10mm thick Regupol® 6010 10mm Impact Sound Acoustic Underlay – 28dB
- 17/8mm thick Regupol® 6010BA 17/8mm Impact Sound Acoustic Underlay – 34dB



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TIMBER FLOORS

Higher impact isolation for timber floors could be achieved with softer rubber compounds (providing greater deformation, but also displaying elastic properties). These rubbers should be dimpled as this appears to allow greater deformation to occur at points where impact force is applied. Similarly as for the above-carpeted floors, floating floor systems would provide additional impact isolation particularly at lower frequencies. Regupol products used for this application are Regupol® K225 5mm, 6015 8mm, 6010 15mm and 6010BA 17/8mm Impact Sound Acoustic Underlays.

Arithmetic Average reduction based on above testing Regupol products under timber flooring tested from 100 Hertz to 5000 Hertz.

- 5mm thick Regupol® K225 Impact Sound Acoustic Underlay – 6dB
- 8mm thick Regupol® 6015 8mm Impact Sound Acoustic Underlay – 9B
- 10mm thick Regupol® 6010 10mm Impact Sound Acoustic Underlay – 10dB
- 17/8mm thick Regupol® 6010BA Impact Sound Acoustic Underlay – 13dB
- 5mm Regupol® K225 Impact Sound Acoustic Underlay under timber, over 4.5mm compressed fibre/25mm thick fibreglass as recommended above – 17dB
- 8mm Regupol® 6015 Impact Sound Acoustic Underlay under timber, over 4.5mm compressed fibre/25mm thick fibreglass as recommended above – 18dB

TILED FLOORS

The same principal would apply for ceramic floors as for timber floors. The ceramic tiles would require that they be fixed on a flat and inflexible layer of cross-ply compressed fibrous cement panels. The rubber compounds beneath the ceramic floor would also need to be quiet soft and elastic.

Arithmetic Average reduction based on above testing Regupol® products under tiled flooring tested from 100 Hertz to 5000 Hertz.

- 10mm thick ceramic tiles adhered to a 19mm thick ply board (not fixed) over 17/8mm thick Regupol® 6010BA Impact Sound Acoustic Underlay – 16dB.

Disclaimer: *Regupol® Impact Sound Acoustic Underlay's are specifically designed for the reduction of impact sound (footfall). The measured impact noise reduction of these products taken in various field and laboratory environment sites in Australia, Europe and America are displayed on our specification charts. The product results should not be read as a guarantee for any specific application, they are only indicative of their expected performance. Products should be tested insitu to establish suitability of purpose by a registered Acoustic Engineer.*