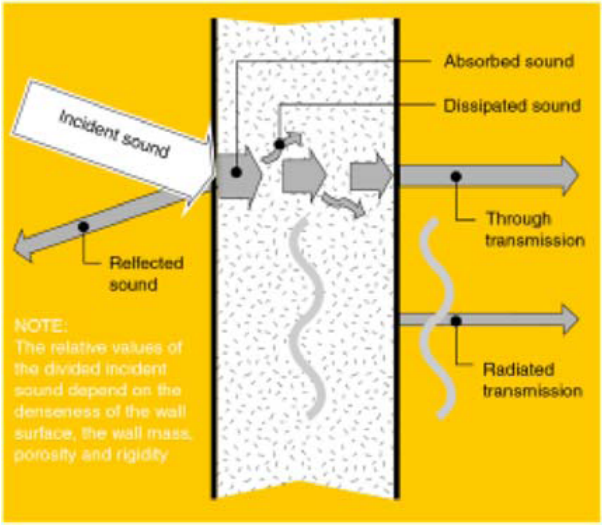
BCA & ACOUSTIC PERFORMANCE

When sound impinges on a wall, it may be reflected or absorbed.

- Reflected sound may manifest in a room as undesirable echoes, and may be controlled by a variety of techniques, including surface treatment and masonry unit design.
- Absorbed sound may be dissipated within the wall, transmitted through or radiated through wall vibration.



There are three distinct modes of sound transmission through walls:

1. Below the resonant frequency, the stiffness of the wall is of greatest importance, and the mass and damping have little effect. As the frequency increases, the mass of the wall becomes more important and the wall begins to resonate.
2. Beyond resonance, the mass of the wall provides a damping effect, and “high mass” systems have an advantage over lightweight alternatives. The resistance to sound transmission, increases by approximately 6 dB for each doubling of the frequency or for each doubling of the mass.
3. Above the critical frequency, the coincidence of the sound waves control the behaviour. The critical frequency for heavy wall systems is relatively low. A coincidence dip immediately above the critical frequency indicates a loss in airborne sound resistance.

Impact Sound Resistance

When bedrooms or other quiet areas are adjacent to bathrooms, kitchens and the like, it is important to reduce the sound transmitted through the wall as a result of a blow to the other side of the wall or attached furniture The impact sound resistance of a wall is measured by generating noise with a machine having multiple steel hammers, which impact on a steel plate placed in contact with the wall.

The sound passing through the wall may be measured in a manner similar to that used for airborne sound resistance.

Resistance to impact sound requires properties different from those for resistance to airborne sound. A dense stiff material will vibrate when it is struck, while a soft material will simply absorb the blow without transmitting it. For example, hard dense plaster or render has a lower impact sound resistance than the softer commercially available plasterboards. Soft or resilient connections between the external skin and the body of the wall will also reduce the amount of impact that is transmitted.

The impact sound resistance of a wall can generally be improved over a bare wall by the use cladding fixed directly to steel furring channels. The use of resilient impact clips can improve

the impact insulation performance over a bare wall by typically 3 dB. The use of free-standing cladding without any attachment to the masonry will provide better results.

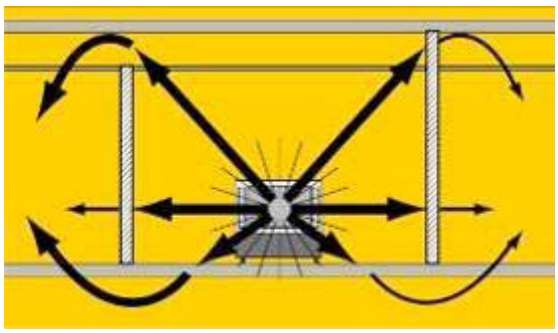
BCA Vol 1 Clause F5.5 Requirements

- Walls that separate sole occupancy units in a Class 2 or 3 building or between two Class 1 buildings Rw + Ctr (airborne) not less than 50, and Impact sound resistance, if the wall separates a habitable room in one sole occupancy unit from a bathroom, sanitary compartment, laundry or kitchen of another unit or plant room or lift shaft).
- Walls that separate a sole occupancy unit from a plant room, lift shaft, stairway, public corridor, public lobby or the like in a Class 2 or 3 building: Rw (airborne) not less than 50, and Impact sound resistance, if the wall separates a habitable room in one sole occupancy unit from a plant room, or lift shaft.
- Walls that separates two sole occupancy units or separates a sole occupancy unit from a kitchen, bathroom, sanitary compartment (not en-suite), laundry, plant room or utilities room in a Class 9c aged-care building Rw (airborne) not less than 45, and Impact sound resistance if the wall separates a habitable room in one sole occupancy unit from a kitchen or laundry.
- A door incorporated in a wall that separates a sole occupancy unit from stairway, public corridor, public lobby or the like in a Class 2 or 3 building and a door incorporated in a wall that separates a sole occupancy unit from a kitchen or laundry in a Class 9c aged care building. Rw (airborne) not less than 30. Walls requiring impact sound resistance shall consist of two leaves separated by a gap of at least 20 mm (and in Class 2 or 3 where required, connected by resilient ties).

BCA Vol 2 Clauses 3.8.6.1 to 3.8.6.4 Requirements

- Walls that separate a bathroom, sanitary compartment, laundry or kitchen of one Class 1 building from a habitable room (other than a kitchen) in an adjoining Class 1 building (dwelling) shall have:
- Rw + Ctr (airborne) not less than 50 and Discontinuous construction. For cavity walls, a minimum of 20 mm cavity between two separate leaves, which may be connected, if required for structural purposes, with resilient ties. Northern Territory, Queensland and Western Australia have varied this requirement to Rw not less than 50 and Impact Sound Resistance.
- Walls are required to be detailed in accordance with BCA Vol 2 Clause 3.8.6.3, which make provision for the sealing of sound insulated walls at junctions with perimeter wall and roof cladding. This clause also requires that masonry joints be filled and provides for sound insulated articulation joints. BCA Vol 2 Clause 3.8.6.4 makes provision for services in sound insulated walls.
- Walls required to have a sound insulation shall be constructed to the underside of:
    - a floor above
    - a ceiling with the same acoustic rating
    - a roof above.

Effect of Joints and Gaps



Gaps reduce the sound attenuation of a wall. Laboratory tested walls have full joints. Site construction must also have full joints to ensure similar sound attenuation. Gaps around the vertical edges of a wall and at the ceiling will diminish the sound resistance of a wall.

A gap 0.l% of wall area (corresponding to a 3 mm gap along the length of a 3 m high wall) can reduce the sound transmission resistance by typically 10-20 dB. Gaps around the periphery of walls should be sealed using a high-density acoustically-rated mastic or similar sealant. Sealants should have a typical density of 1600 kg/m3. Sealants should be applied to both faces of the wall and should be applied to a depth equal to the width of the gap. Typical penetrations in walls include mechanical services ducts, refrigerant pipes, hydraulic reticulation lines, waste pipes and fire sprinklers and electrical cables. It is essential to provide an acoustically rated seal around the penetration.

Surface Treatment

Cladding or render may be applied to masonry walls to assist in achieving required sound attenuation, but should be applied full-height, from floor slab to soffit.

Chases

Chases in walls diminish the sound attenuation. Chases should not extend deeper than 25mm into the wall. All chases should be rendered over after the pipes or cables are installed.

Airborne Sound Transmission of Benex

The following values for Weighted Sound Index and Spectrum Adaption Term may be used for the determination of the performance of Benex Masonry against the criteria of the Building Code of Australia.

In particular, 200 mm core-filled Benex Wall System is suitable for BCA Volume 1 Part F5 or BCA Volume 2 Clause 3.8.6, applications that require Rw 50.