Fletcher Insulation
Building Better, Together

WHITEPAPER

Insulation solutions for multi-residential buildings

A holistic approach to designing and specifying healthy and comfortable multi-residential living spaces, sustainably

Contents

Proper heating and cooling protection, indoor air quality and acoustics rank high on the list of the design priorities in apartments and townhouses—all of which can be improved with properly installed wall and ceiling insulation.

Introduction

More Australians, including families with children, are calling multi-residential style places home. Of the nearly 11 million private dwellings counted in the 2021 Census, over 30 percent were apartments and townhouses.[1] The 2021 Census also identified that over 2.5 million people (or 10.3 percent of us) now live in apartments.[2]

The demand for apartment and townhouse living has increased due to affordability and the desire to live close to work, transportation and other amenities. With urban populations growing rapidly, multi-residential buildings offer an affordable style of housing for many Australians.

However, multi-residential projects, whether a small townhouse complex or a multi-storey apartment building, present a significant design challenge. They must comfortably accommodate residents living in separate units within close proximity, generally being separated only by a shared wall, while providing an indoor environment that contributes to their health, wellbeing and quality of life. Aspects like thermal and acoustic comfort are high on the priority list, but other parameters, including air quality, building condensation, fire safety and energy efficiency, must all be considered.

To create environments that support healthy living, multi-residential developments need to take a holistic approach, which is why effective insulation is at the core of modern building design.

In this whitepaper, we investigate how building design impacts the health and wellbeing of residents in multi-residential buildings and discuss the role of insulation in raising the quality of indoor living spaces.

Influence of multi-residential building design on resident health and wellbeing

Studies that look into the impact of high-density housing on health and wellbeing consistently highlight the importance of natural ventilation, thermal comfort, sunlight access and acoustic privacy to a range of health and wellbeing outcomes.[3]

The distinct living conditions in multi-residential buildings expose residents to a variety of environmental stressors. Noise is a particular concern, as there are many potential sources of noise within multi-residential buildings, including sounds from adjacent units (next door, upstairs or downstairs); families with children playing; and internal building services, such as lifts, air-conditioning and plumbing. Without proper sound insulation in walls, ceilings and floors, these noises can become a constant source of irritation for residents.

The neighbourhood context in which the building is situated may create additional stressors. For instance, apartment blocks are frequently built alongside major roads, exposing residents to traffic noise and higher pollutant levels.[4]

Given the complexity of multi-residential structures, designing for thermal comfort and good indoor air quality can be challenging for designers as well. Factors, such as building orientation, proximity to the roof and the design of the building envelope, can all contribute to thermal issues.

Windows and glazing are typically used to help create comfortable indoor environments, but they are rarely sufficient on their own. Keeping a window closed may assist in reducing noise or maintaining thermal comfort, but it can also lead to CO_2 concentrations above 1,000 ppm, which has a significant impact on human health and cognition.[5] Conversely, in multi-storey buildings where residents keep their windows open to regulate air temperature and increase natural airflow, a fall hazard may be created, especially for young children.[6]

Multi-residential buildings without adequate insulation for their climate have high heating and cooling needs, which can lead to exorbitant energy costs per tenant, uncomfortably hot or cold conditions and issues with building condensation.

How does insulation contribute to healthier living spaces?

Multi-residential structures need to address a range of design parameters to ensure residents feel comfortable in their living space. Proper heating and cooling protection, indoor air quality and acoustics rank high on the list of the design priorities in apartments and townhouses—all of which can be improved with the suitable selection and proper installation of wall and ceiling insulation.

Residential buildings account for 24% of Australia's overall electricity use and 10% of total carbon emissions.[7] Multi-residential buildings without adequate insulation for their climate have high heating and cooling needs, which can lead to exorbitant energy costs per tenant, uncomfortably hot or cold conditions and issues with building condensation.

A well-insulated building can lower energy costs up to 45% on heating and cooling.[8] Under the Nationwide House Energy Rating Scheme (NatHERS), effective insulation is particularly important for supporting a higher energy efficient and thermal performance rating. A higher energy efficiency rating, in turn, increases property values and helps attract buyers, tenants, and investors.

As we will discuss below, insulation does more than increase the thermal performance of buildings. For example, insulation helps regulate indoor temperatures thus reducing the risk of indoor air quality problems, mould growth and building condensation. The existence of shared walls leads to more intrusive noise between apartments, but this can be dampened with acoustic wall and ceiling insulation.[9] Depending on the building type, non-combustible and/or fire resistant insulation should be used to slow the spread of fire between compartments.

A holistic approach to multi-residential building design

The importance of acoustic comfort

Whether the source is external or internal, noise leads to poor sound quality within the home. Numerous studies have linked noise pollution to elevated levels of anxiety, depression, high blood pressure, disturbed sleep patterns, heart disease and stroke.[10]

Noise annoyance caused by neighbours is a common issue in multi-residential buildings, with studies suggesting it can be the cause of various physical and mental health symptoms.[11] A lack of acoustic privacy can also lead to conflict between neighbours.

It is essential to engage with an acoustic consultant during the earliest stages of design of the project to assess the requirements of the numerous and adjacent living spaces within a multi-residential building. Each wall and ceiling assembly should be designed for noise reduction. In order to achieve the desired sound performance of the assembled system, it is necessary to choose the appropriate materials and consider factors like type, thickness and density of insulation.

For apartment dwellers, temperature is ranked as the second most important of the top four factors in indoor environment quality, with noise and air quality ranked equal third.

Controlling indoor thermal comfort, air quality and building condensation

For apartment dwellers, temperature is ranked as the second most important of the top four factors in indoor environment quality, with noise and air quality ranked equal third.[12] The thermal comfort of individual units varies considerably, with dwellings often described as "too cold in winter" and "too hot in summer".[13] Research indicates that the thermal comfort level in residential buildings has a significant impact on the emotional and physical wellbeing of residents.[14] The energy efficiency provisions in the National Construction Code (NCC) 2022 set out to address these issues, with an increase in the minimum energy rating for individual units in apartments.

Insulation is the most reliable long-term method of ensuring thermal comfort in buildings. As a result of better heat retention, an insulated building offers high-quality thermal comfort during the winter. In warmer months, insulation can keep interiors cooler by protecting against summertime heat.

Insulation should be used in conjunction with other design elements like ventilation, high-performance glazing, and passive heating and cooling measures to ensure ideal thermal conditions all year round.

Insulation helps keep the interior of the building at a constant temperature, which lessens the chance of moisture and humidity accumulation, particularly condensation on wall and ceiling surfaces. Accordingly, it can prevent the growth of mould and mildew, and protect moisture-sensitive materials within the building structure.

Protecting people and buildings from fire

Fire-safe homes protect both people and property. For designers of apartments and townhouses, it means selecting building materials that keep people safe.

Best practice passive fire protection strategies work by isolating a fire and protecting residents should a fire break out in an adjoining apartment. By limiting the spread of a fire to the room where it started, passive fire measures give firefighters time to enter the building and occupants time to safely leave. They also mitigate property and equipment damage.

Insulation installed in external and internal walls, floors, ceilings, roofs, and around HVAC applications, is an integral part of fire safety control within any residential building. Non-combustible insulation or low flammability material options help prevent the spread of fire, preserve structural integrity, and restrict the movement of smoke and fire from one area to another.

As well as NCC compliance, designers, developers and builders must also consider the standards and minimum requirements of insurers. Choosing insulation that fails to meet these specifications could mean higher insurance premiums.

For the good of the planet

As climate change continues to make an impact, people are looking for ways to conserve their energy usage and limit their energy costs. Sustainability Victoria describes insulation as the "cornerstone" of an energy-efficient home.[15]

For optimal performance, the right insulation product must be chosen for the home's climate. Depending on where the residence is located and other building features, the NCC mandates minimum insulation levels for roofs, walls, and floors. The insulation requirements for each climate zone are described in NCC Vol. 1 and 2.

However, the right product is often not enough. It is essential that you consider the environmental impacts over the whole lifecycle of the product. When specifying insulation, identify products with zero Ozone Depletion Potential; products that contain no harmful levels of Volatile Organic Compounds (VOCs); and products that incorporate recycled materials in the manufacturing process.

Insulation solutions and applications for multi-residential buildings

FLETCHER INSULATION

With a focus on people, Fletcher Insulation has designed a range of insulation solutions to support the wellbeing, comfort and productivity of residents, reduce energy costs and deliver sustainable buildings that will stand the test of time.

Below we consider various applications in multi-residential buildings for insulation products from Fletcher Insulation's comprehensive range.

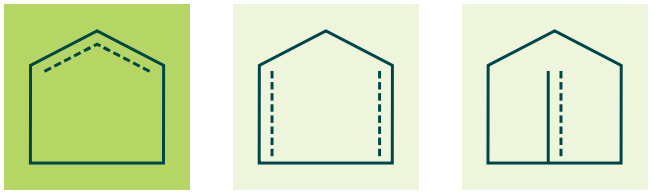
Roofing

The Permastop® range of building blankets are ideal for low-rise, metal roof multi-residential construction. Made from up to 80% recycled materials, Permastop® products offer outstanding thermal and acoustic properties, which means they reduce heat transfer, minimise distracting noise, and reduce the risk of condensation forming under metal roof cladding.

In tiled-roof buildings, Sisalation® Multipurpose EHD (456) works as a flexible, non-vapour permeable water barrier, which acts like a second skin for all wall and roof applications.

In apartments with four or more levels, concrete is commonly used as the primary roofing material. For these projects, your best choice is Pink® Thermal Slab, a high-performing thermal and acoustic insulation solution that drives energy efficiency and helps control noise and temperature fluctuations common to concrete roofs. This product is CodeMark certified providing confidence and certainty through the issue of a Certificate of Conformity, and achieves an AS 5637.1 Group 1 NCC fire classification.

In applications where visual appeal of the roof lining is not required and a ceiling lining is being applied, the Permastop® range is ideal for insulating buildings with a concrete roof. Permastop offers overall energy efficiency, keeping buildings cooler in summer and warmer in colder climates.



External walls

Townhouses and apartments with up to three storeys are commonly made with timber or steel stud frames. In these constructions, Australian-made Pink® Partition or Pink® Wall Batts may be specified. Made from bio-soluble glass wool, this proven insulation product is non-combustible and offers excellent thermal and acoustic performance. It also features a comprehensive range of R-values, densities, and thicknesses, and includes up to 80% recycled content. If you are looking for superior acoustic performance, Soundbreak® reduces sound transfer from both the external environment and between adjacent rooms, it also has excellent thermal qualities.

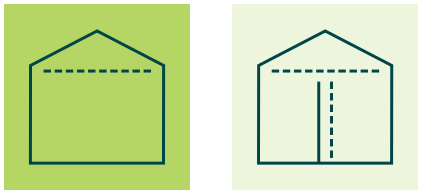
Apartments built with more than four storeys are typically made of concrete with a steel stud framing system. To provide effective thermal and acoustic insulation for these buildings, Pink® Partition is recommended. Designed for metal-framed partitions, Pink® Partition insulation is available in a range of dimensions to suit standard steel stud sizes. Architects and designers can be confident in specifying Pink® Partition which is CodeMark certified through the issue of a Certificate of Conformity.

Internal applications

Ceilings

In townhouses, Pink® Ceiling Batts are a popular choice to manage both sound and internal temperature. Lightweight, flexible, and resilient, they are a noncombustible glasswool insulation product made from up to 80% recycled content. Pink® Ceiling Batts maintain their firmness over time, ensuring they remain in place and maintain optimum thermal performance.

For apartments with four or more levels and depending on thermal requirements of your project, Pink® Ceiling Batts or Pink® Partition insulation is recommended. Pink® Partition insulation is specially designed for installation in multi-storey buildings with concrete floors and suspended ceilings.



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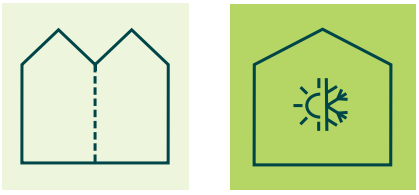

Walls

Fletcher Insulation's products are ideal for use within party and intertenancy walls. When building party walls for townhouses with a timber or steel stud frame construction, use Pink® Wall Batts.

For multi-story apartments of four or more floors and constructed with walls featuring a steel stud frame, specify Pink® Partition insulation, which is available in densities of 11, 14, 24 and 32kg/m^3 to fit standard steel stud spacings.

HVAC

Acting as both a noise barrier as well as a noise absorber, Soundlag 4525C is an excellent insulation product for reducing noise breakout from pipes, valves, fan housings, and ductwork in multi-residential buildings. With its external foil facing layer, Soundlag 4525C is also an excellent fire-resistant barrier.

Find out more online at
insulation.com.au

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