



**ACHIEVING FIRE  
& ACOUSTIC  
COMPLIANCE  
IN MULTI-  
RESIDENTIAL  
CONSTRUCTION**

## INTRODUCTION

The Australian residential landscape is changing. Early 2015 saw the first time ever approvals to build new apartments exceeded approvals for free-standing houses, with one in four of these new approvals being for apartment blocks of four storeys or more<sup>1</sup>.

An increasing desire for inner-city living has spurred this sharp spike in multi-residential approvals, with the major cities continuing to be a hot-spot for multi-res construction.

With this trend towards multi-residential construction showing no signs of slowing, the need for a better use of space and increased functionality is required to accommodate the higher and denser population.

For the architects, contractors and workers involved in the design and construction of these projects it brings unique challenges where the stakes are higher, regulations are tighter and specifying the best-performing products and systems is critical to success.

An understanding of the requirements of fire protection and acoustic performance, and the available solutions to ensure compliance throughout is necessary to ensuring this success.





## FIRE PROTECTION

Fire safety is a critical aspect of multi-residential design. With more storeys and higher occupancy, these constructions require higher fire resistance than stand-alone residences.

Passive fire protection (PFP) is an integral component of the structural fire protection and fire safety of these residences. Passive fire protection attempts to contain fires or slow the spread through the use of fire resistant materials (such as Firestop plasterboard) in walls, floors and ceiling systems.

The passive fire protection provided by a system is represented by its Fire Resistance Level (FRL). FRL is a grading period, represented by the time in minutes without any failures, for three fire test failure criteria of Australian Standards 1530-4<sup>2</sup>.

The three criteria are:

- **Structural adequacy** – Failure occurs when the specimen collapses under load
- **Integrity** – Failure occurs when the specimen develops cracks or openings through which flames or hot gases can pass
- **Insulation** – Failure occurs when the temperature of the unexposed surface of the specimen reaches a certain level

The FRL is expressed as structural adequacy/integrity/insulation. Therefore a system tested to an FRL of 90/60/30 would mean that the wall must maintain structural adequacy for 90 minutes, integrity for 60 minutes and insulation for 30 minutes<sup>3</sup>.

For multi-residential construction, the BCA has Deemed to Satisfy provisions for various internal walls and shafts, external walls, floor and roofs.

The consequences of non-compliance in regards to fire protection have been felt across a number of projects throughout Australia in recent years.

### Notably:

- A June 2013 fire The Cathedral Place that triggered the evacuation of more than 1200 people and a damage bill of almost \$9 million. The plasterboard used on the top floors were not fire-rated sheets<sup>4</sup>. In occurrence the ceilings should have provided an FRL of 60/60/60, but did not meet BCA requirements<sup>5</sup>.
- The November 2014 fire at the Lacrosse Apartments in Melbourne's Docklands precinct that saw 300 people evacuated and caused more than \$2 million worth of damages. It took fewer than 15 minutes for 13 storeys to go up in flames with the rapid spreading of the fire caused by cheap building panels which didn't comply with regulations in relation to combustibility<sup>6</sup>.



## ACOUSTICS

Noise is the fastest growing area of complaint and disputes in urban Australia<sup>7</sup>, with apartment living exacerbating the reach and impact of sounds. Reducing noise travelling between apartments is critical to the comfort of residents, making acoustic performance a key focus in multi-residential project design.

There are two ways in which sound can transfer in apartment buildings, airborne noise and structure-borne noise.

- **Airborne noise:** The most common noise occurrence, a result of sound transmitted through the air including voices, television, stereo, musical instruments. It can pass from one room to another along a variety of paths (commonly known as flanking paths) such as open doors and windows, openings in walls separating rooms, stairwells, or heating and air-conditioning ducts.

It can also pass directly through walls, floors and ceilings into other rooms and adjacent apartments.

- **Structure borne (impact) noise:** Where a structure is directly vibrated and the vibration is transmitted through the structure in all directions including railway vibration, plant vibration, impact noise including foot fall on floors, movement of furniture, dropping of cutlery, and pipe noise

The Building Code of Australia (BCA) provides specific minimum construction requirements related to the reduction of transmitted noise between adjoining dwellings in multi-unit and multi-level residential construction.

Acoustic performance is measured by:

- **Rw** – Weighted Sound Reduction Index: A single-number rating used to compare the sound isolating ability typically of walls, floors, ceilings, windows or doors. The higher the Rw, the better the sound isolating ability of the building element.
- **Rw + Ctr** – Ctr is used to account for low frequency noise – generally the biggest issue in sound insulation. Ctr is a negative number which will be added to Rw.

There are requirements for a minimum  $Rw + Ctr$  50 that applies to floors above dwellings, walls between a bathroom, laundry or kitchen, as well as a habitable room in an adjoining dwelling<sup>8</sup>.

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## ACHIEVING COMPLIANCE

Achieving effective fire protection and acoustic performance in multi-residential buildings requires every element meeting or exceeding Deemed to Satisfy Provisions from the BCA. Careful consideration and product referencing is required to ensure these requirements are met.

Perhaps the greatest challenge in ensuring compliance are the pressures and challenges which come with multi-residential construction, where tight deadlines means specification and installation times are restricted, and budget restrictions means cost effectiveness is a necessity.





### USG BORAL

USG Boral design and manufacture high-performance interior and exterior lightweight building products and systems for residential and commercial environments which include solutions for walls, ceilings, floors, and roof assemblies.

With a commitment to innovation, and a desire to enable architects, contractors and workers to improve the way we live by changing the ways buildings are designed and built.

USG Boral provide many acoustic and fire rated systems for timber framed multi-residential projects, meaning less time spent specifying, and guaranteeing the products will work together, offering more design freedom to architects and simplifying construction.

The USG Boral Systems + publication offers a wide range of systems, including:

**SHEETROCK®** – A wall board 15% lighter than traditional plasterboard products making them easier to transport, easier to score and snap, and provides superior sag resistance.

**Multiframe** – lightweight timber framed construction system for low rise apartment buildings – a cost effective alternative to traditional concrete and masonry construction that satisfies BCA fire and acoustic requirements.

**FIBEROCK®** – A high-performance panel that resists moisture, mould and fire as well as dents and penetration, ideal for bathrooms and kitchens. FIBEROCK is 95% recycled material, GECA certified and may contribute to Green Star points.

**Plasterboard Ceiling Systems** – Fire-rated ceiling systems that have been designed to provide fire resistance rating of up to the highest 120/120/120.

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USG Boral provides many acoustic and fire-rated systems for timber framed multi-residential projects

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## SPECIFYING MADE SIMPLE WITH SYSTEMS+

Systems+ provides cost-effective solutions for specifying plasterboard wall and ceiling systems in any development, and addresses the unique requirements of different projects.

Systems+ allows specifiers to select and compare the entire range of USG Boral products, providing systems names and ratings for quick and simple specification that help guarantee performance and compliance.

To find out more visit  
[www.usgboral.com/systems+](http://www.usgboral.com/systems+)



## REFERENCES

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