

G6 Interpretation – Facilitating a Consistent Approach

Malcolm Dunn ⁽¹⁾ and Tessa Phillips ⁽¹⁾

(1) Marshall Day Acoustics, 84 Symonds St, Auckland
malcolm.dunn@marshallday.co.nz and tessa.phillips@marshallday.co.nz

ABSTRACT

As part of their medium density housing (MDH) research program, BRANZ undertook a research project to better understand what can be done to help the New Zealand building industry address noise issues in multi-unit dwellings [1]. A summary of the research was published in Volume 31 of the New Zealand Acoustics journal [2].

One of the issues that was raised by the BRANZ research was the inconsistencies in the way in which the New Zealand Building Code Clause G6 requirements [3] are handled across the country. This brief paper highlights the concerns raised in the research and discusses ways in which the Acoustical Society of New Zealand may be able to play a role in promoting a consistent approach. It is intended that this paper provide an introduction to the issue and facilitate discussion amongst ASNZ members.

INTRODUCTION

The development of higher density housing in NZ has accelerated in recent times. Whilst there is growing awareness of the importance of incorporating protection from noise, skills in this area are still evolving within the wider New Zealand building industry.

BRANZ, New Zealand's independent building research organisation, began a research program in 2016 focused on how to help the building industry improve new medium-density housing, see www.branz.co.nz/mdh and [4]. The program included the research project "Acoustical Design of Medium Density Housing" [1]

An industry survey and other consultations undertaken as part of this project, highlighted the following general issues in relation to noise control for MDH:

- Lack of awareness and baseline understanding across the building industry in this area, and the need for increased resources, education and training for those involved at all stages of the building process, including developers, planners, designers, compliance and construction
- More consistency needed in compliance with regulatory requirements, to ensure actual outcomes meet standards designed to
- The need to ensure regulations evolve to meet the health, wellbeing and amenity needs of residents
- The need to better incorporate feedback systems during building projects and post occupancy, to better facilitate improvement to solutions and regulations
- Product range could usefully expand to include more fully tested, cost-effective, robust, compliant systems – both generic designs and proprietary systems are considered desirable, especially those that integrate the needs of multiple New Zealand Building Code requirements

- Cost concerns, both for general building and acoustic specific products, and the cost of specialised design advice and compliance requirements.

Many of these issues will take some time to address and will require a coordinated effort across a variety of sectors.

However, one area that could be improved relatively quickly is the consistency in the interpretation and enforcement of the G6 requirements. It is the opinion of the authors that the Acoustical Society is a suitable platform for developing and promoting a consistent approach.

CLAUSE G6 REQUIREMENTS

The core regulation relating to sound insulation for attached dwellings is Clause G6 "Airborne and Impact Sound" of the New Zealand Building Code [5]. This sets the relevant performance standards for new building work under the Building Act 2004 [6].

Building Code information

The Ministry of Business, Innovation and Employment (MBIE) is currently responsible for providing support for the Building Code. MBIE's Building Performance website, www.building.govt.nz, provides core information and handbooks on building code compliance as well as information on "Determinations" (legal clarifications that help with interpreting Code requirements).

The Building Code clauses each cover a specific topic and are broken down into 3 levels of requirements: 1) Objective, 2) Functional Requirements and 3) Performance. Supporting Compliance Documents are provided for each clause outlining definitions, references as well as optional "Acceptable Solutions" and "Verification Methods" which if used demonstrate compliance with the Clause and must be accepted by

Building Consent Authorities that process building consent applications and sign off finished constructions.

Clause G6 is repeated in full here:

Clause G6—Airborne and impact sound

Provisions

Objective

G6.1

The objective of this provision is to safeguard people from illness or loss of amenity as a result of undue noise being transmitted between abutting occupancies.

Functional requirement

G6.2

Building elements which are common between occupancies, shall be constructed to prevent undue noise transmission from other occupancies or common spaces, to the habitable spaces of household units.

Performance

G6.3.1

The Sound Transmission Class of walls, floors and ceilings, shall be no less than 55.

G6.3.2

The Impact Insulation Class of floors shall be no less than 55.

G6 utilises the ASTM standards Sound Transmission Class (STC) and Impact Insulation class (IIC). The companion “Verification Method”, included in [3], specifies “Field test results shall be within 5dB of the performance requirement”.

Various ‘determinations’ have confirmed interpretation of some aspects of the code, in terms of what areas are included or excluded.

In basic terms G6 requires:

- Airborne sound insulation performance of no less than STC 55 (field measurement no less than 50) must be achieved by common walls and common floor/ceiling assemblies between any room of an occupancy and habitable spaces of a separate household unit
- Impact sound insulation performance of no less than IIC 55 (field measurement no less than 50) must be achieved by common floor/ceiling assemblies between any room of an occupancy and a habitable space of a vertically separate household unit
- Multi-unit dwellings where there are no shared habitable spaces, regardless of unit title arrangement, are required to comply with the

Building Code Clause G6 (e.g. self-contained apartments in retirement complexes, but not hostels with shared facilities [Determination 2012/070, 2015/004]

- Apartment doors are not required to comply with the Building Code Clause G6 [Determination 2015/004]
- Horizontal transmitted impact sound and diagonally vertically transmitted impact sound across an inter-tenancy wall is not required to comply with the Building Code Clause G6 [Determination 2015/007]
- Diagonally vertical tests from one apartment directly to another from a bathroom to a living room or a deck to a bedroom are required to comply with the Building Code Clause G6.

AREAS REQUIRING CLARIFICATION

Although some of those industry members surveyed noted that the Building Code Clause G6 is nice and simple, others noted this simplicity comes at a cost in terms of being open to different interpretations.

There is confusion around the need for testing as well as the areas that are covered by the performance requirements. This lack of clarity results in significant differences in how the clause is interpreted by Building Consent Authorities (BCAs) and consultants around the country, as noted in MBIE Determination 2015/004 regarding building elements between occupancies and common spaces.

In some areas G6 compliance is checked simply by confirming the product information for an inter-tenancy (IT) wall / floor system meet the STC/IIC requirements. In others a broader approach is taken to acknowledge the effects of workmanship and flanking in addition to the anticipated individual building element performance.

In Auckland, it is common for the Council to require sign-off of the design (PS1), and on completion require production of a PS4, confirming construction inspections and on-site tests for a sample of units (PS = Producer Statement, see the Building Code Handbook for more [7])

There are many areas where the requirements of the code are still unclear. Practical examples of where there have been different interpretations are outlined below:

- Carparks to apartments
- Decks to apartments
- Building elements separating common spaces (e.g. Internal atriums, shared hallways / stairs) from household units
- External walkways
- Temporary and specialist accommodation
- Refurbishments
- Changes of use
- When to test and number of tests
- Should the effects of flanking be included

The individual issues can be grouped into general categories. It is likely that an interpretive framework could be developed that not only dealt with the existing issues but also provided a means by which a clear decision could be made on new situations that may not have yet been identified.

INTERPRETIVE FRAMEWORK

It is the authors' opinion that it would be helpful for the NZAS to have an agreed understanding and stance on key issues. These understandings could be formulated into a framework that could be used in interpreting G6.

This would not be legally binding and may have to be adjusted over time if aspects of the interpretation were challenged by subsequent determinations. However, it would provide a consistent approach for day-to-day operations and ensure a level playing field throughout the country.

It is reasonable that any interpretation is based, as far as practicable on current best practice. An interpretation that is generally consistent with current application is most likely to get buy-in from both the industry and territorial authorities. It is also important to avoid obvious 'loop holes' where two very similar situations are dealt with differently.

Table 1 outlines what the authors believe to be the key issues that would need to be addressed in the interpretive framework. A suggested response is provided, but this is only an initial suggestion provided by the authors to engage debate.

Table 1. Key issues to address in interpretive framework

Issue and e.g. <i>Areas of concern</i>	Suggested response
<p>What are 'building elements common between occupancies'</p> <p><i>Eg Horizontal impact sound transfer, impact from decks, external walkways</i></p>	<p>Building elements are considered to be 'common between occupancies' if they directly separate occupancies vertically or horizontally. Building elements that are common to both occupancies, but do not separate the occupancies such as common floor slabs (horizontally) or common riser shafts are not considered to be included. Diagonal transmission between apartments and decks is considered applicable where there is transmission between occupancies via a common separating element.</p>
<p>What is a 'common space'</p> <p><i>e.g. Basement carpark, external walkways, atria, shared access hallways and stairs</i></p>	<p>Areas are considered 'common' if they are freely accessible by multiple occupancies. This would include carpark or walkways – regardless of whether individual carpark were 'owned'.</p>

<p>What is a 'household unit'?</p> <p><i>e.g. understanding where G6 applies</i></p>	<p>Household unit includes: Apartments, including self-contained retirement units, terrace houses. Excluded are: Hotels, temporary accommodation (short term contracts), care facilities (not self-contained).</p>
<p>Does G6 apply to a change of use?</p> <p><i>e.g. Commercial building conversions, renovations to existing residential buildings</i></p>	<p>Conversions from non-residential buildings should comply with G6. Existing residential developments should not be reduced further below G6 as part of the refurbishment.</p>
<p>On-site compliance assessment</p> <p><i>e.g. Is on-site testing required? What level of testing is appropriate?</i></p>	<p>A representative sample of key elements should be tested. Approximately 10% of the total building/project is considered representative. The tested partitions should achieve no less than ASTC 50 and AIIC 50. Any remedial actions taken to failing elements should be applied to the whole building, or further testing undertaken, to provide confidence that compliance over the full building is achieved.</p>

NZAS INVOLVEMENT

It is recommended that a committee of experienced practitioners be formed to develop the framework and create a document suitable for distribution. A period of consultation with members following the development of the document would be appropriate.

ACKNOWLEDGMENTS

Thank you to BRANZ and the key researchers involved in the BRANZ research [1], and all those that participated in the industry consultations and survey undertaken during that research.

REFERENCES

- [1] M. Dunn, T. Phillips, G. Emms, A. Stocchero, B. Mace, M. Kingan, M. Newcombe, P. Fea and D. Fullbrook, "Acoustical Design of Medium-density Housing", BRANZ external research funded by the Building Research Levy, report in two parts ER30A and ER30B, March 2018 revision published April 2018, [Online Report]. Available: <https://www.branz.co.nz/shop> [accessed Oct. 15, 2018]
- [2] T. Phillips, "Acoustical Design of Medium-density Housing: New Zealand Research Summary", New Zealand Acoustics, vol 31, no. 1, pp. 18-22 and 34, 2018. Available: <https://www.acoustics.org.nz/journal/journal-articles> [accessed Oct. 20, 2018]

- [3] Department of Building and Housing, “*Compliance Document for New Zealand Building Code Clause G6: Airborne and Impact Sound*”, amendment 2 effective 1 December 1995, vicBooks 2006. [Online document]. Available: <https://www.building.govt.nz/building-code-compliance/g-services-and-facilities/g6-airborne-and-impact-sound/> [accessed Oct. 18, 2018]
- [4] BRANZ “*Building Research Levy Prospectus 2016/2017*”, 2016. [Online Document]. Available: <http://branz.co.nz> [accessed May 2, 2016]
- [5] New Zealand Government, “*New Zealand Building Code*”, *Schedule 1 of Building Regulations 1992*. Available: <http://www.legislation.govt.nz> [accessed Oct 20, 2018]
- [6] New Zealand Government, “*Building Act*”, 2004. Available: <http://www.legislation.govt.nz> [accessed Oct. 20, 2018]
- [7] Ministry of Business, Innovation and Employment (MBIE), “*New Zealand Building Code Handbook*”, 3rd edition, amendment 13, 14 February 2014. [Online] Available: Building Performance site <https://www.building.govt.nz/building-code-compliance/building-code-and-handbooks/> [accessed Oct. 20, 2018]