Two recent sound insulation test results

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Abstract

A minimum level of inter-tenancy sound insulation is specified in Clause G6 of the current New Zealand Building Code. The clause was first introduced in July 1992, and despite a number of proposed revisions, has not been significantly revised since its introduction. A paper published in 2011 noted that Clause G6 had the lowest "estimated equivalent R'_w" rating amongst the 26 (predominantly European) countries considered. This brief paper discusses two recent sound insulation test results in light of a recent determination regarding the applicability of Clause G6, and in light of a proposed.

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1. Introduction

In 2014 Design Acoustics Auckland Ltd (DAAL) carried out airborne and impact sound insulation tests between two recently completed adjoining terrace houses. The internal layouts were the same for both residences:

- Ground floor; entry, open plan kitchen/dining/living area, bedroom, bathroom.
- First floor; two bedrooms, one bathroom.

The separating inter-tenancy wall was full height double timber frame construction, with a published rating of STC 63. The mid-floors were timber frame construction. The ground floor was slab on grade construction and ground floor was finished in polished concrete. There was a 300 mm deep ground floor slab thickening centered under the inter-tenancy wall.

Two tests were carried out between the adjacent ground floor kitchen/dining/living areas. The test arrangement is shown in Figure 1.

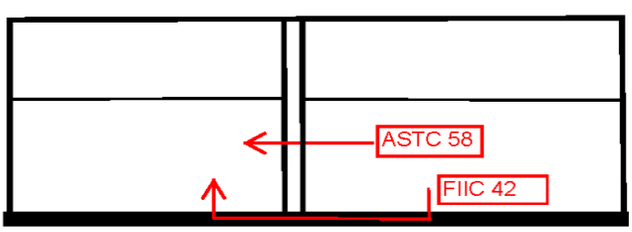

Figure 1: Test arrangement

The calculated test results are shown in Table 1.

Table 1: Test results

Test type	Result
Airborne	ASTC 58
Impact	FIIC 42

The following ISO stndard metrics were calculated from the test measurements: R'_w 57, $L_{n,w}$ 67.

Clause G6 of the New Zealand Bulding Code [1] has minimum on-site allowable results of ASTC 50 and FIIC 50. The test result of ASTC 58 is comfortably above the minimum requirement and shows there were no significant airborne flanking paths between the rooms. However, the impact test result of FIIC 42 is significantly less than the minimum requirement – if the test is required as part of compliance testing.

2. Determination of 2015/007

The impact test described above is an example of "horizontal impact noise", that is, the source room and the receive room are on the same floor level and are not vertically separated.

The applicability of horizontal impact testing has been the subject of some debate over recent years, and '*Determination 2015/007*' [2] was intended to provide direction in this regard. 'Determination 2015/007' was principally concerned with applicability of the general building code sound insulation requirements to apartment-style accommodation within a retirement home complex. Within this determination, the consideration of horizontal impact noise was an "extra" and was not limited to a retirement home context. In reaching a conclusion, the author of '*Determination 2015/007*' took the wording of Clause G6 into account, but also considered invited submissions.

The text of Clause G6 is silent on the "directionality" of testing, however the clause applies to "building elements which are common between occupancies", and the testing standard cited for calculation of IIC applies to "floor-ceiling assemblies". The author of '*Determination 2015/007*' also acknowledged a submission that pointed out "there is currently no known acoustic laboratories world-wide where any horizontal impact testing has been carried out on concrete structures".

'Determination 2015/007' found that compliance with the impact noise requirements of Clause G6 is required vertically, but is not required horizontally. Therefore, the

impact test described above need not be carried out, nor reported on, as part of compliance testing. Provided other test results were satisfactory, the building would meet the requirements of Clause G6.

3. Proposed code revision

Despite there having been no substantial changes to Clause G6 since its introduction, there have been a number of proposed revisions over the years.

In 2014 a revision to Clause G6 was developed and submitted that proposed: ISO stndard airborne and impact sound insulation requirements; consideration of noise from building services; and consideration of environmental sound.

At the time of writing (July 2016), this revision is still "live" but has not been made public. By the time of the ACOUSTICS 2016 conference in November, it may or may not have been formerly accepted for review and progressed to the public consultation phase. As at July 2016 this proposed code revision does specify that impact noise in a horizontal direction be assessed as part of code requirements.

4. Conclusion

The test results given above, '*Determination 2015/007*', and the proposed revision to Clause G6, raise a number of questions:

1. If the technical issues regarding the assessment of horizontal impact noise were considered in New Zealand as recently as 2015, and if the assessment of such noise is not the standard or accepted practice overseas, is there a sound basis for including the assessment of horizontal impact noise in future Clause G6 code revisions? Should the New Zealand Building Code "lead the world" in this regard?
2. Putting aside technical arguments and justifications, is the on-site test result of FIIC 42 described above, measured between what are two high-traffic ground floor areas of abutting dwellings, adequate and acceptable to residents in practice?

Consideration of these questions could help inform and shape the development of the next Clause G6.

References

1. Compliance Document for New Zealand Building Code, Clause G6, Airborne and Impact Sound, Department of Building and Housing, 2006
2. Gardiner, J, 2015, Determination 2015/007, Ministry of Business, Innovation & Employment.
3. Mahn, J, Davy, J & Pearse J, 2011, The Acoustic Requirements of Dwellings in New Zealand, Forum Acusticum.