



SOUND TRANSMISSION CLASS RATINGS



INTRODUCTION

The increasing level of noise generated in modern societies poses a challenge to building designers. Intrusive noise from outside or through a wall separating adjoining tenancies (inter-tenancy wall) can ruin the peace and quiet of one's home. Based on

worldwide experience and testing, the New Zealand Building Code requires a Sound Transmission Class (STC) rating of at least 55 for inter-tenancy walls in multi-family dwellings. This ensures the occupants enjoy a reasonable degree of noise privacy.

SO WHAT IS SOUND TRANSMISSION CLASS (STC)?

The STC rating is a singular number value, which along with Impact Noise rating, describes the overall acoustic performance of a construction system. It is a measure of the degree of acoustic separation or noise reduction from airborne sound that can be expected of a wall, floor or roof. The higher the rating the greater the degree of noise reduction. A STC rating of 55 is required for inter-tenancy walls. Within a dwelling an internal wall with a STC rating of 45 will usually "muffle" television, telephone ringing and conversation in an adjoining room.

STC ratings are determined by laboratory tests of a specimen of the construction system, which is fixed within a frame to form the wall between two test chambers. A high noise level is generated in one room and the difference in sound level between the source room and the receiver room is used to calculate the transmission loss through the test specimen.

WHAT DETERMINES THE STC RATING?

The physical properties of the component materials and the method of assembly determine the STC rating.

The most important physical property is mass per unit area with greater mass being more effective in reducing sound transmission. This means that masonry walls have an inherently high STC rating without the need to resort to expensive construction techniques. Masonry wall performance at low frequencies is good because of their high mass per unit area.

The method and quality of assembly is particularly important to light weight wall systems, which rely upon air gaps and insulating material. In an improperly designed or constructed system, the air gap can act as a resonator, increasing the transmission of sound. This can also happen on a strapped and lined masonry

wall, but to a lesser extent. However all masonry construction must comply with NZS4210: Masonry Construction: Material and workmanship.

Small gaps that can allow air to pass will also allow noise to pass, reducing the actual STC rating of the wall assembly. To maximise the acoustic performance in any wall it is important to avoid the following:

- Gaps and cracks through which sound can pass.
- Gaps around service penetrations.
- Poorly sealed doorways.
- Poorly tooled mortar joints.
- Back-to-back power outlets and cupboards.

STC RATINGS FOR FIRTH MASONRY WALLS

Marshall Day Acoustics have used modelling and test data to predict the STC rating for a range of Firth masonry wall thicknesses and lining options. The most commonly used options are presented below.

Note the values are based upon fully grouted masonry

using Firth masonry manufactured in the North Island. Firth masonry manufactured in the South Island is heavier, increasing the STC rating by 1 point. Partial filling produces a lighter wall reducing the STC performance.

| STC RATING | | | |
|---|------------------------|--------------------|--------------------|
| LINING | MASONRY WALL THICKNESS | | |
| | 140mm 15 series | 190mm 20 series | 240mm 25 series |
| No Lining | 50 | 55 | 58 |
| Painted | No effect | | |
| Plastered one side | 51 | 56 | 59 |
| Plastered both sides | 52 | 57 | 60 |
| Direct Fixed (Glued) 10mm GIB® Standard plasterboard | | | |
| One side only | 50 | 55 | 58 |
| Both sides | 49 | 54 | 57 |
| 25mm Strap and Line | | | |
| One side with 10mm GIB® Standard plasterboard | 52 | 54 | 56 |
| with acoustic insulation | 56 | 56 | 58 |
| Both sides with 10mm GIB® Standard plasterboard | 47 | 47 | 48 |
| with acoustic insulation | 51 | 51 | 52 |
| One side with 13mm GIB Fyreline® | 54 | 57 | 56 |
| with acoustic insulation | 57 | 57 | 58 |
| 40mm Strap and Line | | | |
| One side with 10mm GIB® Standard plasterboard | 53 | 56 | 58 |
| with acoustic insulation | 57 | 60 | 60 |
| Both sides with 10mm GIB® Standard plasterboard | 51 | 52 | 51 |
| with acoustic insulation | 55 | 56 | 55 |
| One side with 13mm GIB Fyreline® | 53 | 58 | 61 |
| with acoustic insulation | 57 | 61 | 65 |
| Both sides with 13mm GIB Fyreline® | 54 | 59 | 61 |
| with acoustic insulation | 63 | 67 | 70 |

NOTES:

- The masonry walls are fully grouted
- Firth masonry produced in the South Island is heavier, increasing the STC rating by 1 point
- The estimated accuracy of the ratings with strapping and lining is +/- 3 STC points
- The direct fixed GIB® Standard plasterboard needs to be in intimate contact with masonry wall to minimise the air gap

- Plastering has an additive effect to the wall system of 1 STC point per side
- Acoustic rated insulation is used

Some key conclusions from the above results are as follows.

FOR STRAPPING AND LINING ON BOTH SIDES:

- Generally decreases performance compared to bare masonry or strapping on one side alone
- Adding insulation improves performance
- A 40mm air gap with heavy GIB Fyrelite® and insulation gives the best performance

FOR STRAPPING AND LINING ON ONE SIDE:

- The effect of the air gap is small but can reduce performance for a small uninsulated air gap
- Larger air gaps perform better than smaller air gaps
- Acoustic insulation improves performance
- Plaster finishing the other side increases the STC rating by 1 point

Overall where linings are required on both sides it would appear the most generally suitable practice is to strap and line one side to a suitable standard and then either direct fix GIB® Standard plasterboard or plaster the other.

If you have any queries please contact Firth Information Service on 0800 800 576.

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- All products manufactured according to ISO9001
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- Masonry products manufactured according to Lean principles
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