MARSHALL DAY Acoustics

LOXO CLADDING SOUND INSULATION PERFORMANCE

Opinion on Acoustic Performance of

Loxo Cladding Systems Utilising Aerated Concrete

Rp001 2012195C

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Project: **LOXO CLADDING SOUND INSULATION PERFORMANCE**

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1.0 INTRODUCTION

Marshall Day Acoustics has been asked to provide an opinion on the Sound Transmission Class (STC) and Weighted Sound Reduction Index (R_w) ratings that would be achieved by five wall systems (three constructed using Loxo product and two reference systems) and two floor systems (one with Loxo product and a reference system).

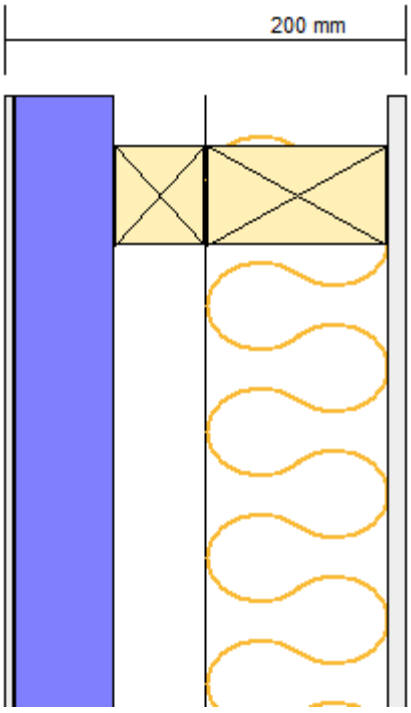
An estimate of the Impact Isolation Class (IIC) and weighted normalised impact sound pressure level ($L_{n,w}$) of the floor system has also been requested

Our opinion is based on theoretical models for the sound transmission properties of double panel walls and of floor/ceiling systems.

2.0 CONSTRUCTION

A summary of our opinion regarding performance of the various constructions is provided in Section 4 (Table 1). The partitions for which the opinions are provided are constructed as follows:

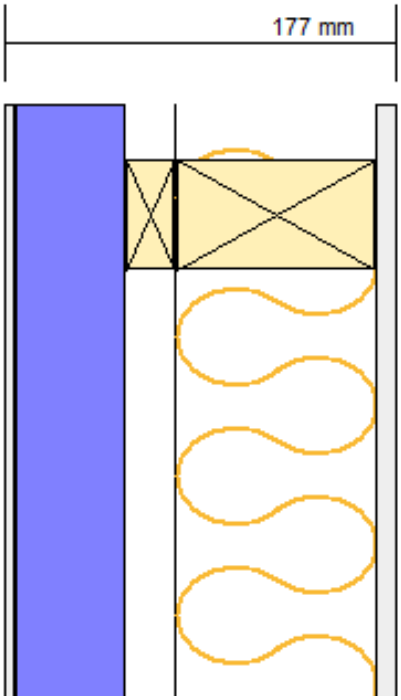
2.1 Loxo Wall System A



- Loxo aerated concrete panel 50 mm thick overlaid with 5 mm thick plaster; with
- 45 mm thick timber battens; fixed to
- A row of 90x45mm timber studs at 600mm centres on 90x45mm timber top and bottom plates and building wrap; with
- A layer of R2.2 fibreglass batts (or approved equivalent) in the wall; with
- Standard density Gib plasterboard 10 mm thick on one side of the partition.

This partition will perform at STC 52 and R_w 51.

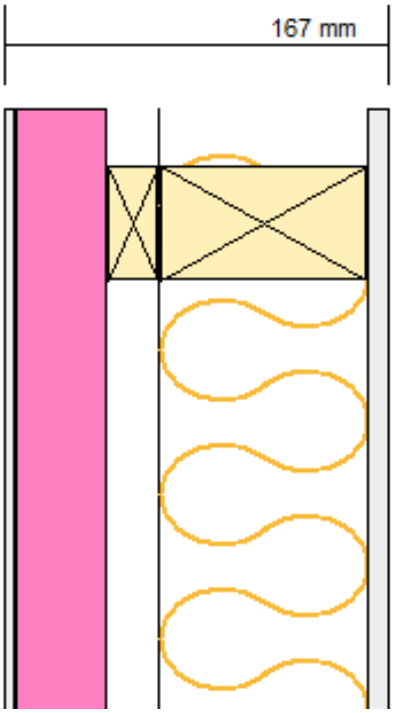
2.2 Loxo Wall System B



- Loxo aerated concrete panel 50 mm thick overlaid with 5 mm thick plaster; with
- 22 mm thick polystyrene battens; fixed to
- A row of 90x45mm timber studs at 600mm centres on 90x45mm timber top and bottom plates and building wrap; with
- A layer of R2.2 fibreglass batts (or approved equivalent) in the wall; with
- Standard density Gib plasterboard 10 mm thick on one side of the partition.

This partition will perform at STC 52 and R_w 51.

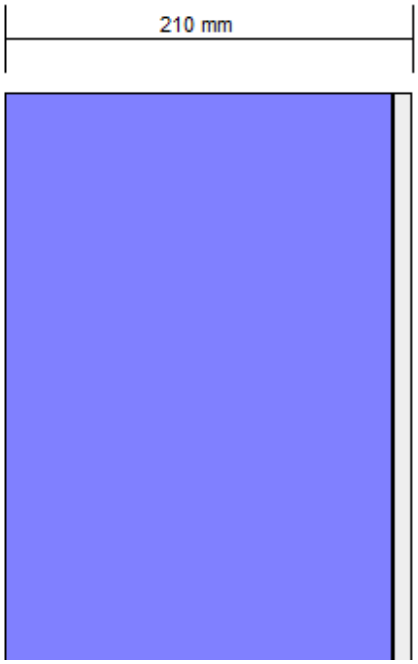
2.3 Reference Wall System A



- Polystyrene panel 40 mm thick overlaid with 5 mm thick plaster; with
- 22 mm thick polystyrene battens; fixed to
- A row of 90x45mm timber studs at 600mm centres on 90x45mm timber top and bottom plates and building wrap; with
- A layer of R2.2 fibreglass batts (or approved equivalent) in the wall; with
- Standard density Gib plasterboard 10 mm thick on one side of the partition.

This partition will perform at STC 49 and R_w 48.

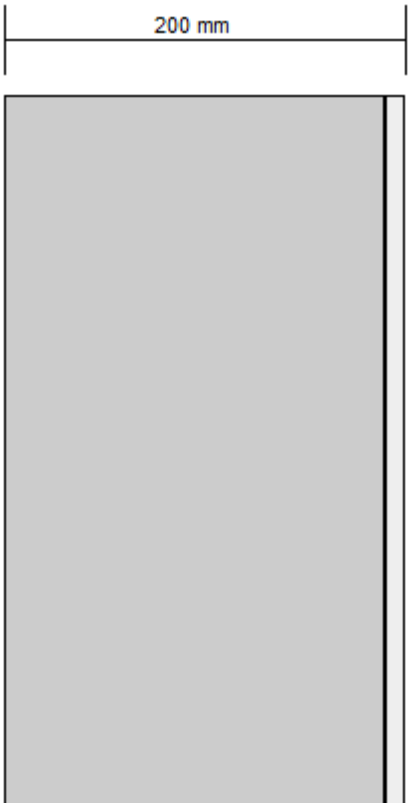
2.4 Loxo Wall System C



- Loxo block 200 mm thick installed as per manufacturer's instructions; with
- Glue fixed lining of 10 mm standard density Gib Plasterboard.

This partition will perform at STC 43 and R_w 43.

2.5 Reference Wall System B



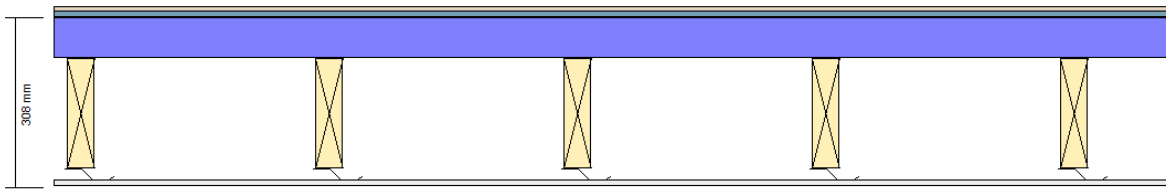
- Concrete block 200 mm thick solid filled; with
- Glue fixed lining of 10 mm standard density Gib Plasterboard.

This partition will perform at STC 56 and R_w 56.

It is important to note that where plasterboard is glued directly to masonry/concrete the manner of gluing has been shown to have some impact on acoustic performance. The opinion we have provided assumes a thin, even layer of glue with no cavity present. Use of small dabs of glue may result in a dip in performance at a critical frequency, and therefore a reduction in STC/R_w. Other gluing techniques may produce similar losses (or gains) in performance).

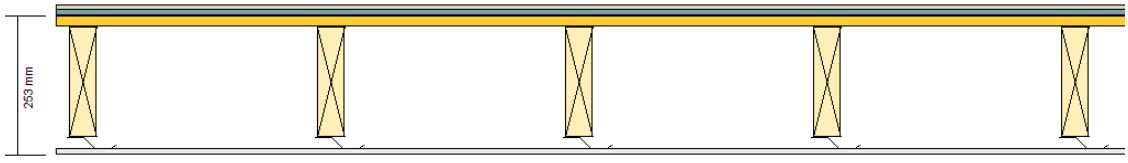
2.6 Loxo Floor System

- Medium weight carpet on rebond pad laid over;
- Loxo aerated concrete floor panel 75 mm thick; fixed to
- 200 mm deep floor joists at 450mm centres; with
- Resilient rail and channel; fixed to
- Standard density Gib plasterboard 13 mm thick forming the ceiling.



2.7 Reference Floor System

- Medium weight carpet on rebond pad laid over;
- Flooring grade particle board 20 mm thick; fixed to
- 200 mm deep floor joists at 450mm centres; with
- Resilient rail and channel; fixed to
- Standard density Gib plasterboard 13 mm thick forming the ceiling.



3.0 DISCUSSION

Although Loxo Cladding NZ Ltd have not, to our knowledge, commissioned laboratory testing of the specific systems described above, Marshall Day Acoustics has considerable expertise in the modeling of the performance of construction systems based on theoretical models. These models have been validated against a wide range of construction types, tested in laboratories over an extended period of time.

The sound transmission loss of a double panel wall is determined by the surface mass of the linings on each side, the stiffness and hence critical frequency of the linings, the air gap between linings, and the type of acoustic absorption within the cavity. In this case theoretical models have been used to predict the effect of the junction details that would be used in wall and floor systems described.

Details of these models are available from Marshall Day Acoustics on request.

4.0 OPINION

The estimated laboratory performance of the wall systems described in Sections 2.1, 2.2 and 2.3 are given in Table 1.

Table 1: Estimated Sound Transmission Loss

Description	STC	$R_{w\,(C,\,Ctr)}$ (dB)
Loxo Wall System A	52	51 $_{(-2,\,-8)}$
Loxo Wall System B	52	51 $_{(-3,\,-10)}$
Reference Wall System A	49	48 $_{(-3,\,-10)}$
Loxo Wall System C	43	43 $_{(-1,\,-4)}$
Reference Wall System B	56	56 $_{(-1,\,-6)}$

The estimated laboratory performances of the floor system described in Section 2.4 and the reference floor system described in Section 2.5 are given in Table 2. Please note that for IIC values *higher* numbers provide greater sound reduction. For $L_{n,w}$ *lower* numbers provide greater sound reduction.

Table 2: Estimated Impact Isolation Performance

Description	IIC	$L_{n,\,w}$ (dB)
Floor System A	57	53
Standard Floor System	60	50

5.0 LIMITATIONS

The above opinions are an estimate of the laboratory performance not the field performance. In field installations, flanking may determine the sound reduction between spaces rather than the partition. The estimates are based on the materials as currently manufactured and the construction details set out above. Readers are advised to check that this opinion has not been revised by a later issue. The estimates are expected to be in error by less than ± 2 STC/dB or IIC/dB as applicable.

APPENDIX A GLOSSARY OF TERMINOLOGY

Sound Insulation	When sound hits a surface, some of the sound energy travels through the material. 'Sound insulation' refers to ability of a material to stop sound travelling through it.
Transmission Loss (TL)	The attenuation of sound pressure brought about by a building construction. Transmission loss is specified at each octave or third octave frequency band.
Impact sound	Sound produced by an object impacting directly on a building structure, such as footfall noise or chairs scrapping on a floor.
Flanking Transmission	Transmission of sound energy through paths adjacent to the building element being considered. For example, sound may be transmitted around a wall by travelling up into the ceiling space and then down into the adjacent room.
Structure-Borne Transmission	The transmission of sound from one space to another through the structure of a building.
STC	Sound Transmission Class A single number system for quantifying the transmission loss through a building element. STC is based upon typical speech and domestic noises, and thus is most applicable to these areas. STC of a building element is measured in approved testing laboratories under ideal conditions.
FSTC	The 'field' or in situ measurement of Sound Transmission Class. Building tolerances and flanking noise have an effect on the performance of a partition when it is actually installed, which result in FSTC values lower than the laboratory derived STC values, typically 5 dB less.
IIC	Impact Insulation Class A single number system for quantifying the transmission loss due to impact noise produced by a standard "Tapper Machine" through a building element.
FIIC	The 'field' or in situ measurement of Impact Insulation Class. Building tolerances and flanking noise have an effect on the performance of a partition when it is actually installed, which result in FIIC values lower than the laboratory derived IIC values, typically 5 dB less.
R_w	Weighted Sound Reduction Index A single number rating of the sound insulation performance of a specific building element. Rw is measured in a laboratory. Rw is commonly used by manufacturers to describe the sound insulation performance of building elements such as plasterboard and concrete.
R'_w	Apparent Weighted Sound Reduction Index Similar to the Rw value except that measurements are conducted in the field.

Building tolerances and flanking noise have an effect on the performance of a partition when it is actually installed, which result in R'w values lower than the laboratory derived Rw values.

$L_{n,w}$

Weighted, Normalized Impact Sound Pressure Level

A single number rating of the impact sound insulation of a floor/ceiling when impacted on by a standard 'tapper' machine. $L_{n,w}$ is measured in a laboratory. The lower the $L_{n,w}$, the better the acoustic performance.

C

A sound insulation adjustment, commonly used with Rw and $D_{nT,w}$.

C adjusts for sources of mid-high frequency noise sources generated by typical living activities such as talking, music, radio, TV, children playing, etc. This term is used to provide information about the acoustic performance at different frequencies, as part of a single number rating system.

C_{tr}

A sound insulation adjustment, commonly used with Rw and $D_{nT,w}$.

C_{tr} adjusts for low frequency noise, like noise from trucks and subwoofers. C_{tr} values typically range from about -4 to about -12. This term is used to provide information about the acoustic performance at different frequencies, as part of a single number rating system.