MARSHALL DAY Acoustics

TRAY-DEC
AIRBORNE SOUND OPINION

Rp 001 20181024 | 17 September 2018

84 Symonds Street
PO Box 5811 Wellesley Street
Auckland 1141 New Zealand
T: +64 9 379 7822 F: +64 9 309 3540
www.marshallday.com

Project: **TRAY-DEC**

Prepared for: **Tray-dec NZ Ltd**
Patiki Road
Avondale
Auckland 1026

Attention: **Jerry Miller**

Report No.: **Rp 001 20181024**

Document Control

Status:	Rev:	Comments	Date:	Author:	Reviewer:
Approved	-	-	14/09/2018	Shaun King	Malcolm Dunn

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1.0 INTRODUCTION

Marshall Day Acoustics were asked to provide an opinion on the airborne sound insulation performances that would be achieved by Tray-dec flooring profiles Tray-dec 300, Concrete Saver 60 and Ultra Span 80.

This opinion is based on a combination of the theoretical performance of the different profiles and previous tests of floor and ceiling combinations.

2.0 CONSTRUCTIONS

2.1 Floor Slab Constructions

The dimensions of each profile are detailed below:

Figure 1: Ultra Span 80

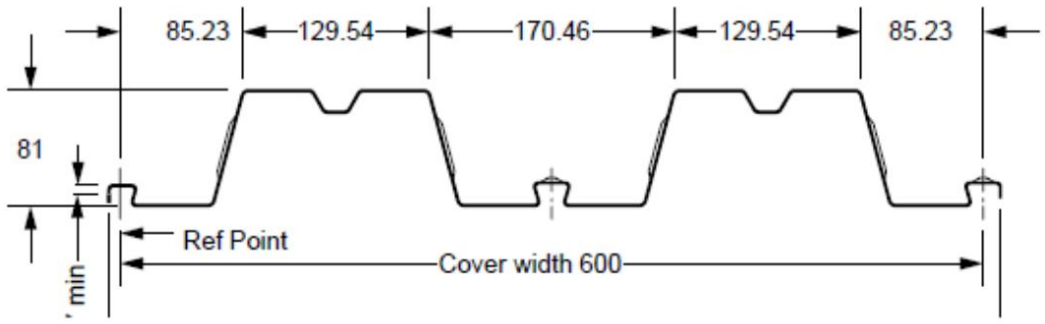


Figure 2: Concrete Saver 60

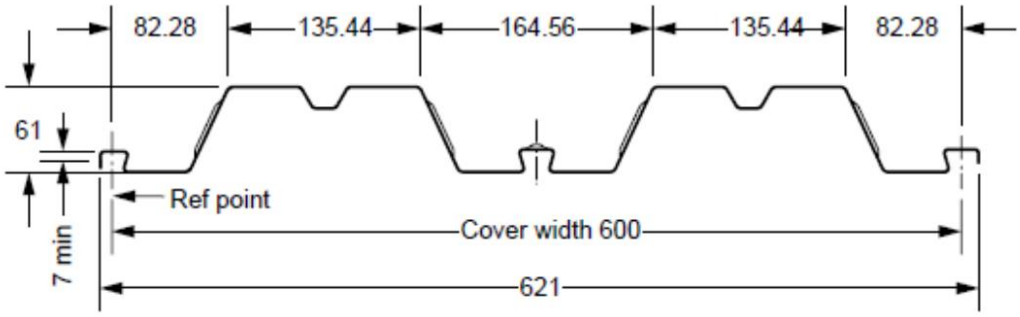
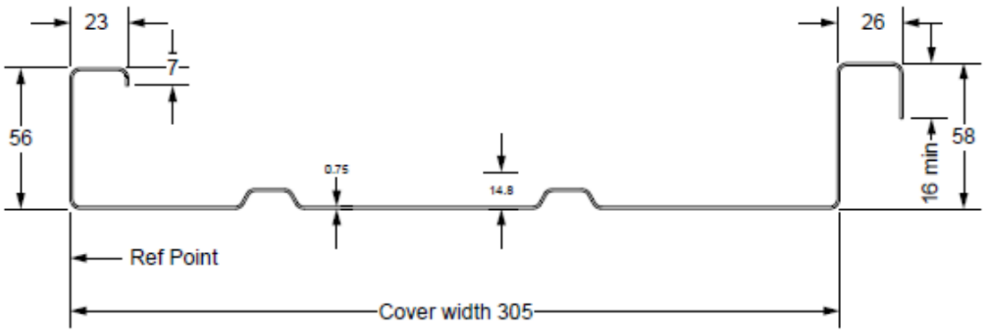


Figure 3: Tray-dec 300



2.2 Cavity Absorption

The cavity absorption referred to in Tables 1, 2 and 3 is as follows:

- R1.8 Pink Batts, Autex Greenstuff or approved equivalent such as 75 mm thick fibreglass of minimum density 9.6 kg/m^3.

2.3 Ceiling Construction

The plasterboard ceiling referred to in Tables 1,2 and 3 is as follows:

- 10 mm standard Gib®, 13 mm standard Gib® or 2 layers of 13 mm standard Gib® as specified, installed in accordance with manufacturers recommendations, with a minimum 200 mm cavity.
- Supported on one of the following ceiling suspension systems:
    - USG DONN® ScrewFix™ steel frame suspension system comprising 2.5 mm wire hangers at 1200 mm centres supporting DJ38 strongback channels spaces at 1200 mm centres and FC37 furring channels spaced at 600 mm centres maximum.
    - Rondo KEY-LOCK® system comprising wire hangers at 1200 mm supporting 127 Top Cross Rails at 1200mm centres and 129 Furring Channels and **STSU Furring Channel Clips** at 600mm centres
    - Rondo KEY-LOCK® system: comprising wire hangers incorporating **WHI Green Resilient Hanger** Element at 1200 mm supporting 127 Top Cross Rails at 1200mm centres and 129 Furring Channels at 600mm centres
- The perimeter of the ceiling is sealed with flexible acoustic sealant such as Gib® Soundseal.

3.0 NZ BUILDING CODE

The Sound Transmission Class (STC) of a floor/ceiling system reflects its ability to prevent sound on its surface from being transmitted as structure-borne vibration and radiating as air-borne noise. The Impact Insulation Class (IIC) of a floor/ceiling system reflects its ability to prevent impact on its surface from being transmitted as structure-borne vibration and radiating as air-borne noise.

Higher STC and IIC ratings indicate that less noise is transmitted to the room below. The NZ Building Code requires that new floors have a laboratory rating of STC 55 and IIC 55 or higher.

4.0 OPINION

4.1 Airborne Sound Insulation

Tables 1, 2 and 3 detail the expected airborne sound insulation performance of the flooring systems as described in Section 2.1 for a range of ceiling and floor slab combinations, including whether cavity absorption is installed.

Table 1: Ultra Span-80 STC Ratings for Varying Slab Depths and Ceiling Constructions

	Sound Transmission Class (STC)						
Ceiling	**No plasterboard**	**1 x 10 mm plasterboard (200 mm cavity)**		**1 x 13 mm plasterboard (200 mm cavity)**		**2 x 13 mm plasterboard (200 mm cavity)**	
Cavity Absorption?	**N/A**	**No**	**Yes**	**No**	**Yes**	**No**	**Yes**
Slab Depth							
130mm	STC 44	STC 52	STC 63	STC 54	STC 64	STC 58	STC 64
140mm	STC 46	STC 52	STC 64	STC 54	STC 65	STC 59	STC 65
150mm	STC 46	STC 53	STC 65	STC 55	STC 66	STC 59	STC 66
160mm	STC 47	STC 54	STC 66	STC 56	STC 67	STC 61	STC 67
170mm	STC 49	STC 55	STC 67	STC 57	STC 67	STC 62	STC 68
180mm	STC 50	STC 57	STC 67	STC 59	STC 68	STC 63	STC 69
190mm	STC 50	STC 58	STC 68	STC 60	STC 69	STC 64	STC 69
200mm	STC 51	STC 59	STC 69	STC 61	STC 69	STC 65	STC 70
210mm	STC 52	STC 60	STC 70	STC 62	STC 70	STC 66	STC 71
220mm	STC 53	STC 61	STC 70	STC 63	STC 71	STC 66	STC 71
230mm	STC 54	STC 62	STC 71	STC 63	STC 71	STC 67	STC 72
240mm	STC 54	STC 63	STC 72	STC 64	STC 72	STC 68	STC 72
250mm	STC 55	STC 63	STC 72	STC 65	STC 72	STC 68	STC 73
260mm	STC 56	STC 64	STC 73	STC 66	STC 73	STC 69	STC 73
265mm	STC 56	STC 64	STC 73	STC 66	STC 73	STC 69	STC 74

1 Where the New Zealand Building Code sound insulation requirements are achieved, the results are highlighted in blue.

2 Performances have been calculated using INSUL version 9.0.12

Table 2: Concrete Saver-60 STC Ratings for Varying Slab Depths and Ceiling Constructions

Ceiling	Sound Transmission Class (STC)						
	No plasterboard	1 x 10 mm plasterboard (200 mm cavity)		1 x 13 mm plasterboard (200 mm cavity)		2 x 13 mm plasterboard (200 mm cavity)	
Cavity Absorption?	N/A	No	Yes	No	Yes	No	Yes
Slab Depth							
110mm	STC 43	STC 50	STC 62	STC 52	STC 62	STC 56	STC 63
120mm	STC 44	STC 51	STC 63	STC 53	STC 63	STC 57	STC 64
130mm	STC 45	STC 52	STC 64	STC 53	STC 65	STC 58	STC 66
140mm	STC 46	STC 53	STC 65	STC 55	STC 66	STC 59	STC 66
150mm	STC 47	STC 54	STC 66	STC 56	STC 66	STC 60	STC 67
160mm	STC 48	STC 56	STC 67	STC 57	STC 67	STC 62	STC 68
170mm	STC 49	STC 57	STC 67	STC 59	STC 68	STC 63	STC 69
180mm	STC 50	STC 58	STC 68	STC 60	STC 69	STC 64	STC 69
190mm	STC 51	STC 59	STC 69	STC 61	STC 70	STC 65	STC 70
200mm	STC 52	STC 60	STC 70	STC 62	STC 70	STC 66	STC 71

1 Where the New Zealand Building Code sound insulation requirements are achieved, the results are highlighted in blue.

2 Performances have been calculated using INSUL version 9.0.12

Table 3: Tray-dec 300 STC Ratings for Varying Slab Depths and Ceiling Constructions

Ceiling	Sound Transmission Class (STC)						
	No plasterboard	1 x 10 mm plasterboard (200 mm cavity)		1 x 13 mm plasterboard (200 mm cavity)		2 x 13 mm plasterboard (200 mm cavity)	
Cavity Absorption?	N/A	No	Yes	No	Yes	No	Yes
Slab Depth							
100mm	STC 44	STC 51	STC 64	STC 53	STC 65	STC 58	STC 66
110mm	STC 46	STC 53	STC 65	STC 54	STC 66	STC 59	STC 67
120mm	STC 47	STC 54	STC 66	STC 56	STC 67	STC 60	STC 67
130mm	STC 47	STC 55	STC 67	STC 57	STC 67	STC 61	STC 68
140mm	STC 49	STC 56	STC 68	STC 58	STC 68	STC 62	STC 69
150mm	STC 50	STC 58	STC 69	STC 59	STC 69	STC 64	STC 70
160mm	STC 50	STC 59	STC 69	STC 60	STC 70	STC 65	STC 70
170mm	STC 51	STC 59	STC 70	STC 61	STC 70	STC 65	STC 71
180mm	STC 52	STC 60	STC 70	STC 62	STC 71	STC 66	STC 71
190mm	STC 53	STC 61	STC 71	STC 63	STC 71	STC 67	STC 72
200mm	STC 54	STC 62	STC 71	STC 64	STC 72	STC 68	STC 72

1 Where the New Zealand Building Code sound insulation requirements are achieved, the results are highlighted in blue.

2 Performances have been calculated using INSUL version 9.0.12

4.2 Impact Sound Insulation

The impact sound insulation performance of a system is highly depended on the chosen floor covering. Generally, systems which achieve STC 55 (in combination with a ceiling) can achieve IIC 55 with a suitable floor covering and acoustic underlay. It is recommended than an acoustic engineer be engaged to assist with the selection of a suitable floor covering.

5.0 LIMITATIONS

The above opinion is an estimate of the laboratory performance not the field performance. The estimate is based on the theoretical performance of the profiles and the construction details set out above. Readers are advised to check that this opinion has not been revised by a later issue. The estimate is expected to be in error by less than 3 STC points.

It is noted that flanking sound may degrade the overall performance of the system. For performance critical systems it is recommended that an acoustic engineer be engaged to undertake a review of the proposed constructions.

APPENDIX A GLOSSARY OF TERMINOLOGY

Sound Insulation	Provision of a degree of acoustical separation between two spaces such that sound is reduced in travelling between the two spaces.
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.
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.
$L_{n,w}$	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.
$L'_{nT,w}$	Weighted, Standardised 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. $L'_{nT,w}$ is measured on site. The lower the $L'_{nT,w}$, the better the acoustic performance.