MARSHALL DAY Acoustics

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2 December 2013

Terra Lana Products Ltd
PO Box 19 755
Christchurch 8241

Attention: James Gallagher

Dear James

FLOW RESISTANCE TESTS – DECEMBER 2013

We have measured the airflow resistance (Rayls) of three products. From this, the airflow resistivity (Rayls/m) has been calculated for each product. These parameters are useful in determining its acoustic properties.

Three samples were supplied for each product type (9 samples total). All the samples were labelled 1 – 3 to identify the position it originated from in the production width:

1. Right side of the oven
2. Middle of oven
3. Left hand side of oven

Each sample was trimmed to a 300mm by 300mm square and placed in our test rig. The pressure drop across the sample was measured with a known air velocity through the sample. The test method was generally in accordance with ASTM:C522.

The average result of the three samples for each product is presented in Table 1. Note the results have been rounded to the nearest Rayl and 10 Rayls/m.

Table 1: Airflow Resistance and Resistivity Results

Supplied Description	Measured Thickness (mm)	Measured Airflow Resistance (Rayls)	Calculated Airflow Resistivity (Rayls/m)
R1.4 88mm underfloor, 890gsm	75	54	740
R2.2 90mm wall, 1960gsm	100	167	1610
R3.2 friction fit 140mm ceiling, 2580gsm	150	177	1190

Sound absorptive blankets will generally improve the sound insulation of stud walls. The magnitude of improvement depends on several factors, including the airflow resistivity of the blanket and the structural isolation between the two sides of the wall. Absorptive blankets will give greater benefit in walls with good isolation, for instance double stud walls.

We generally recommend a flow resistance of greater than 140 – 200 Rayls for a product to be used in double stud or similar construction walls. The R2.2 wall and R3.2 ceiling products meet this requirement. However, the R1.4 product is significantly below this level of flow resistance.

We trust that this information is satisfactory. If you have any further queries please do not hesitate to contact me.

Yours faithfully

MARSHALL DAY ACOUSTICS LTD

Craig Fitzgerald

Acoustician

Figure 1: Product Types

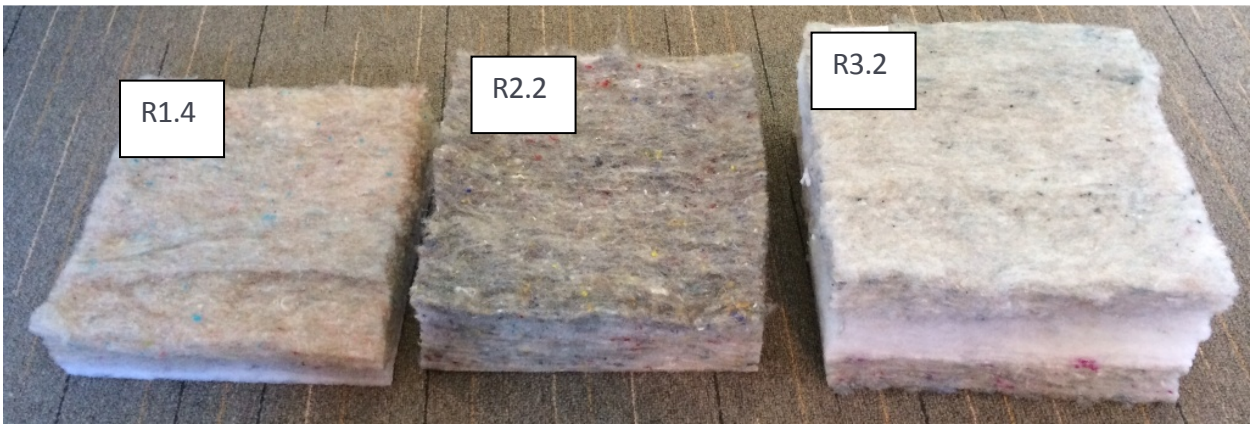
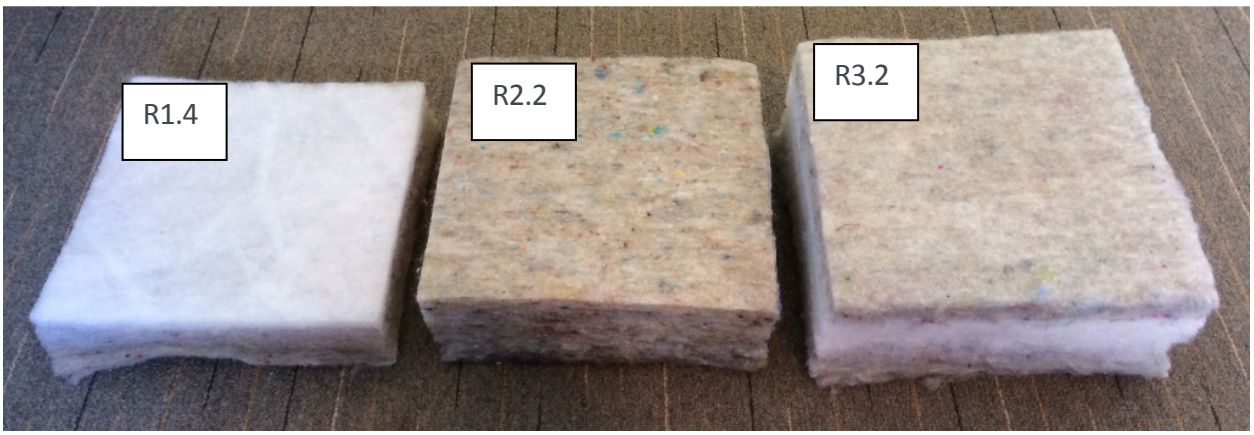


Figure 2: Product Types (reverse side)



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7 May 2020

Terra Lana Products Ltd
PO Box 19755
Christchurch 8241

Attention: Brad Stuart

Dear Brad

TERRA LANA 90MM INSULATION - SOUND INSULATION OPINION

Introduction

Marshall Day Acoustics has been engaged by Terra Lana to predict the sound insulation performance of inter-tenancy wall and floor/ceiling constructions contained in the GIB Noise Control Systems Specification and Installation Manual (CBI5113), dated September 2017, (GIB Manual), with the cavity insulation replaced with Terra Lana's R2.2 90mm fibrous insulation product. Note that the actual thickness of the product as measured by Marshall Day Acoustics was 100 mm. The product density was measured to be 2.0 kg/m^2.

Summary

- The sound insulation performance of most inter-tenancy partitions in the GIB Manual are equivalent with the selected Terra Lana insulation product (i.e. results within 1 point).
- However, a notable reduction in performance is predicted for double timber frame walls and some single timber frame walls (2-3 point reduction).

Sound Insulation Performance Comparison

A comparison of the sound insulation performance is provided in Table 1 below. The predictions are made using Marshall Day Acoustics' Insul 9.0 software, which is used by over 400 firms in 30 countries and in Universities worldwide. The predicted sound insulation ratings for systems with the Terra Lana product are based on the predicted difference in performance between the partition systems with the selected Terra Lana insulation and the relevant Pink Batts fibrous insulation (generally 75mm thick R1.8 Pink Batts).

Table 1: Performance comparison of inter-tenancy partitions with Terra Lana insulation product

GIB Manual specification reference	Sound insulation rating as stated in GIB Manual, STC	Predicted sound insulation rating when insulation is substituted for Terra Lana product*, STC	Performance comparison
Central barrier walls			
Timber frame walls – with GIB Barrierline central barrier			
GBTLAB 60a	68	68	Equivalent
GBTLAB 60b	64	64	Equivalent
GBTLAB 60c	67	67	Equivalent
GBTLAB 60d	61	61	Equivalent
Steel frame walls – with GIB Barrierline central barrier			
GBSAB 60a	63	63	Equivalent
GBSAB 60b	67	67	Equivalent
GBSAB 60c	68	68	Equivalent
Staggered stud steel frame walls – with 13mm GIB Fyreline central barrier			
GBSAB 60d	56	56	Equivalent

GIB Manual specification reference	Sound insulation rating as stated in GIB Manual, STC	Predicted sound insulation rating when insulation is substituted for Terra Lana product*, STC	Performance comparison
GBSAB 60e	57	57	Equivalent
Double frame walls			
Double timber frame walls			
GBTLA 30a	58	56	2 points poorer
GBTLA 30b	58	56	2 points poorer
GBTLA 60	60	58	2 points poorer
GBTLA 90c	63	60	3 points poorer
GBTLA 90d	67	64	3 points poorer
Double steel frame walls			
GBSA 30b	55	54	Within 1 point
GBSA 60c	59	58	Within 1 point
GBSA 45	60	59	Within 1 point
GBSA 90c	61	60	Within 1 point
GBSA 90d	65	64	Within 1 point
Single frame walls			
Timber frame walls – GIB Rail and acoustic resilient mount			
GBTLA 45r	55		Within 1 point
GBTLA 60r	55		Within 1 point
GBTLA 90r	55		Within 1 point
GBTLIC 45	61		2 points poorer
GBTLIC 60	62		2 points poorer
GBTLIC 60a	57		2 points poorer
Steel frame walls – GIB Rail and acoustic resilient mount			
GBSA 30r	55		Within 1 point
GBSA 60r	55		Within 1 point
GBSA 90r	57		Within 1 point
GBSIC 45a	55		Within 1 point
Staggered steel stud walls			
GBSA 30s	55		Within 1 point
GBSA 90s	60		Within 1 point
GIB Rondo Quiet Stud			
GBQSA 45	56		Within 1 point
GBQSA 60a	55		Within 1 point
GBQSA 90	58		Within 1 point
Floor/ceiling and suspended grid			
Floor/ceiling systems			
GBDFA 60b	57		Equivalent
GBDFA 60d	67		Equivalent
GBDFA 60e	65		Equivalent
GBSJA 45	55		Equivalent
GBSJA 60	56		Equivalent
Suspended grid systems			
GBSCA 45	56		Equivalent
GBSCA 60a	56		Equivalent

* Terra Lana R2.2 “90mm” 2.0 kg/m^2 product. Note actual thickness measured to be 100 mm.

The results in Table 1 show that the sound insulation performance is equivalent for most inter-tenancy partitions with the selected Terra Lana insulation product (i.e. results within 1 point). However, a notable reduction in performance is predicted for double timber frame walls and some single timber frame walls (2-3 point reduction).

Limitations

The above opinion is a prediction of the laboratory performance, not the field performance. The predictions are based on the material properties of flow resistivity, product thickness and density determined by Marshall Day Acoustics in accordance with ASTM Standard C522-03 "*Standard Test Method for Airflow Resistance of Acoustic Materials"*. Refer to test report Lt 001 2013576A, dated 2 December 2013 for further information.

Readers are advised to check that this opinion has not been revised by a later issue. The prediction is expected to be in error by ± 1 STC points. This opinion may be reproduced in full but not in part without the written consent of Marshall Day Acoustics Ltd.

We trust this information is satisfactory. If you have any further questions, please do not hesitate to contact us.

Yours faithfully

MARSHALL DAY ACOUSTICS LTD

Aaron Staples
Senior Acoustic Engineer

MEMO

MARSHALL DAY Acoustics

Project:	Terra Lana Flow Tests 2019	**Document No.:**	Mm 001
To:	Terra Lana	**Date:**	25 October 2019
Attention:	Brad Stuart	**Cross Reference:**	
Email:	brad@terralana.co.nz	**Project No.:**	20190975
From:	Adrien Cazaubon	**No. Pages:**	3 **Attachments:** No
Subject:	Flow Resistivity Testing Results		

Introduction

Marshall Day Acoustics (MDA) has been engaged by Terra Lana to perform flow resistivity tests on two building insulation products in accordance with ASTM Standard C522-03 *Standard Test Method for Airflow Resistance of Acoustic Materials*. Tests were carried out in accordance with this Standard using our flow resistivity apparatus.

Measurement

Terra Lana provided two products, each with three different samples from different parts of the production width. Each sample had a dimension of 310mm x 310mm.

Each sample was weighed. The sample was installed in the flow resistivity apparatus, with care taken to prevent any airflow around the sample edges. Each sample was adjusted as far as practicable to the nominal thickness of the product, then the thickness was measured and is quoted as 'tested thickness'. Note it is difficult to ensure uniform thickness across the entire sample, so the tested thickness may vary from the quoted thickness.

During the test an air pump pulled air through the sample, and the corresponding pressure drop across the sample and air flow-rate were simultaneously measured. From these results, the flow resistivity for each sample has been calculated.

We note that for the first product tested (*2.5kg/m^2, 90mm thick*), the three samples showed considerable variability in density (from 26 kg/m^3 to 34kg/m^3). This variability is higher than we would expect and we recommend that this is investigated. This variability in density led to significant variability in measured flow resistance. For reference, all three samples of the other product (*2.6 kg/m^2 60mm thick*), showed the exact same density of 47kg/m^3

Results

The average flow resistivity result for each product is presented in Table 1 below and Figure 1 overleaf. The results have been rounded to the nearest 100 Rayls/m. The accuracy of the testing is estimated to be +/- 10%.

Table 1: Flow Resistivity Results

Product Description	Density as tested (kg/m^3)	Flow Resistance (Rayls)	Flow Resistivity (Rayls/m)
2.5kgsm 90mm thick	30	190	1900
2.6kgsm 60mm thick	47	250	4100

We understand that the intention of the testing was to determine if the two products were equivalent when used in a construction. Because the products are different thicknesses, the flow resistance is a more appropriate parameter to assess this.

There is a significant difference in the flow resistance of the two products. Therefore, we cannot confirm if they would be suitably interchangeable without further investigation of the specific construction.

Figure 1: Flow Resistivity Results