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10 March 2022
Refer: 5152-2.1L

Attention: Mr Charles Baker
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SOUND INSULATION PERFORMANCE

ENVIRO WALL 40

Airborne sound insulation testing has been conducted to measure the level of sound insulation performance achieved by the Enviro Wall 40 material manufactured by Protecta Group. The product is typically utilised for the construction of temporary walls and partitions.

Measurements were carried out in accordance with Australian Standards AS/NZS ISO 140.4:2006 *Measurement of sound insulation in buildings and of building elements – Field measurements of airborne sound insulation between rooms.*

The sound insulation of the tested partitions were rated in accordance with Australian Standard AS/NZS ISO 717.1:2004 *Rating of sound insulation in buildings and of building elements – Airborne sound insulation.*

1.0 SOUND INSULATION DESCRIPTORS

Airborne Noise

The weighted sound reduction index (R_w) provides an acoustic rating for the sound insulation of partitions subject to airborne sounds having a spectrum similar to that of the human voice, which is typically of a mid-to-high frequency character.

Sound insulation varies with frequency and is dependent on the type of material and construction. However, the R_w provides a convenient method of rating sound insulation using a single number. The higher the R_w rating the better the sound insulation provided by the partition.

The spectrum adaptation term C_{tr} is applied to the sound reduction index to account for the sound insulation performance in the lower frequencies. The C_{tr} factor is added to the R_w rating to get an overall $R_w + C_{tr}$ airborne rating. Thick partitions that are lightweight can perform well at mid to high frequencies, but perform poorly in the low frequencies, resulting in a high C_{tr} correction. For masonry walls, the C_{tr} factor is typically between -5 and -3 while for plasterboard walls the factor may often be as low as -12, depending on the construction type.

The R_w descriptor is used when the measurements are performed in a laboratory while $D_{nT,w}$ descriptor is used when these measurements are carried out in-situ to account for deficiencies in construction such as gaps and penetrations. Additional losses in sound insulation performance from flanking transmission is also taken in to consideration. Flanking transmission can occur in situations where noise can propagate around the partition under test such as through ceiling cavities and through door or window frames.

1.1 Building Code of Australia (BCA)

Although the Enviro Wall 40 was not designed to be a wall for permanent sound insulation of partition walls, for comparative purposes the following excerpt from Building Code of Australia has been replicated below for comparison with the measured sound insulation performance of the product and minimum requirements for a party wall within a residential dwelling

Airborne Sound Insulation of Walls

Verification Method FV5.2 of the BCA NSWs that compliance with Parts FP5.2 (a) and FP5.3 to avoid the transmission of airborne sound through walls is verified when it is measured in-situ that:

(a) a wall separating *sole-occupancy units* has a weighted standardised level difference with spectrum adaptation term ($D_{nT,w} + C_{tr}$) not less than 45 when determined under AS/NZS 1276.1 or ISO 717.1

2.0 ACOUSTICAL SURVEY

Acoustical inspections and measurements were conducted by the author and Mr Sean Julius of Day Design on 18 February 2022 at the Protecta Group office located at 13 Rachael Close, Silverwater, NSW.

The test area comprised of a temporary room constructed within an empty open plan office area. The floor of the test room was carpeted and the ceiling was comprised of acoustic ceiling tiles installed within a suspended ceiling grid.

The temporary room dimensions were measured to be approximately:

- Width: 2.8 metres
- Length: 5.4 metres
- Height: 2.7 metres

Two sides of the temporary room were constructed of the Enviro Wall 40 product with a hollow-core door installed within the long side with rubber bulb seals installed in the door frame. The total surface area of Enviro Wall 40 was approximately 20m^2. The remaining wall surfaces were the external glazing and an internal building wall. The Enviro Wall 40 wall sections extended to the underside of the ceiling of the office area approximately 2.7 metres high.

The general layout of the test area is shown in Figure 1.

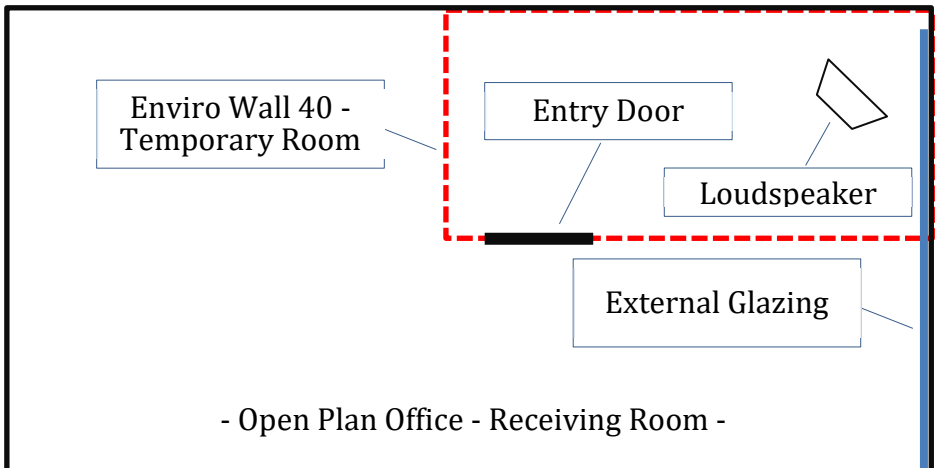


Figure 1 General Test Room Layout

2.1 Measurement of Airborne Sound Insulation

The measurements of airborne sound insulation for the common walls were carried out in accordance with the Australian Standard AS/NZS ISO 140.4:2006 *Measurement of sound insulation in buildings and of building elements – Field measurements of airborne sound insulation between rooms.*

Pink noise was played through an amplifier and loudspeaker in the source room. The sound power was sufficiently high for the sound pressure level in the receiving room to be at least 10 dB higher than the background noise level in any frequency band. The loudspeaker faced the corner of the source room away from the Enviro Wall 40 material and hollow core entry door so as to give as diffuse a sound field as possible.

The average sound pressure level was obtained in both the source and receiving rooms by using a continuously moving microphone. The averaging time was 30 seconds, which covered a number of traverses. The sound pressure levels were measured using one-third octave band pass filters from 100 Hz to 3150 Hz.

The results from the site survey are shown in Table 1 below and on the attached Test Certificates 5152-2 B002.

Table 1 Measured Airborne Sound Insulation

Test Room	Measured Sound Insulation $D_{nT,w}$ (C_{tr})
Temporary room constructed from: • Enviro Wall 40 walls (approx. 20m²) • Hollow core door w/rubber bulb seals • Acoustic ceiling tile ceiling	27 (-3)

It should be noted that the resultant sound reduction performance measured during the acoustic survey is likely influenced by flanking transmission over the Enviro Wall 40 walls into the ceiling cavity and through the hollow core door. As such, sound insulation performance specified in Table 1 should be considered indicative of that achievable in a comparable installation scenario. The absolute level of sound insulation performance, as an R_w value, from the Enviro Wall 40 product can only be ascertained via a laboratory test under controlled conditions.

Alexander Mendoza, MDesSc (Audio & Acoustics), MAAS
Acoustic Consultant
for and on behalf of Day Design Pty Ltd

AAAC MEMBERSHIP

Day Design Pty Ltd is a member company of the Association of Australasian Acoustical Consultants, and the work herein reported has been performed in accordance with the terms of membership.

Attachments:

- Appendix A – Noise Survey Instrumentation
- Airborne Test Certificate: 5152-2 B002

APPENDIX A NOISE SURVEY INSTRUMENTATION

Noise level measurements and analysis were made with instrumentation as follows below in Table A:

Table A Noise Instrumentation

Description	Model No.	Serial No.
Modular Precision Sound Analyser	B&K 2270	2644584
Condenser Microphone 0.5” diameter	B&K 4189	2638722
Acoustical Calibrator	B&K 4231	3025591
JBL Loudspeaker with in-built amplifier	PRX712	P1312-17182

All instrument systems had been laboratory calibrated using instrumentation traceable to Australian National Standards and certified within the last two years thus conforming to Australian Standards. The measurement system was also field calibrated prior to and after noise surveys. Calibration drift was found to be less than 0.3 dB during attended measurements. No adjustments for instrument drift during the measurement period were warranted.

Standardized Level Difference according to ISO 140-4

Field measurements of airborne sound insulation between rooms

Client: Protecta Group Pty Ltd

Date of test: 16/02/2022

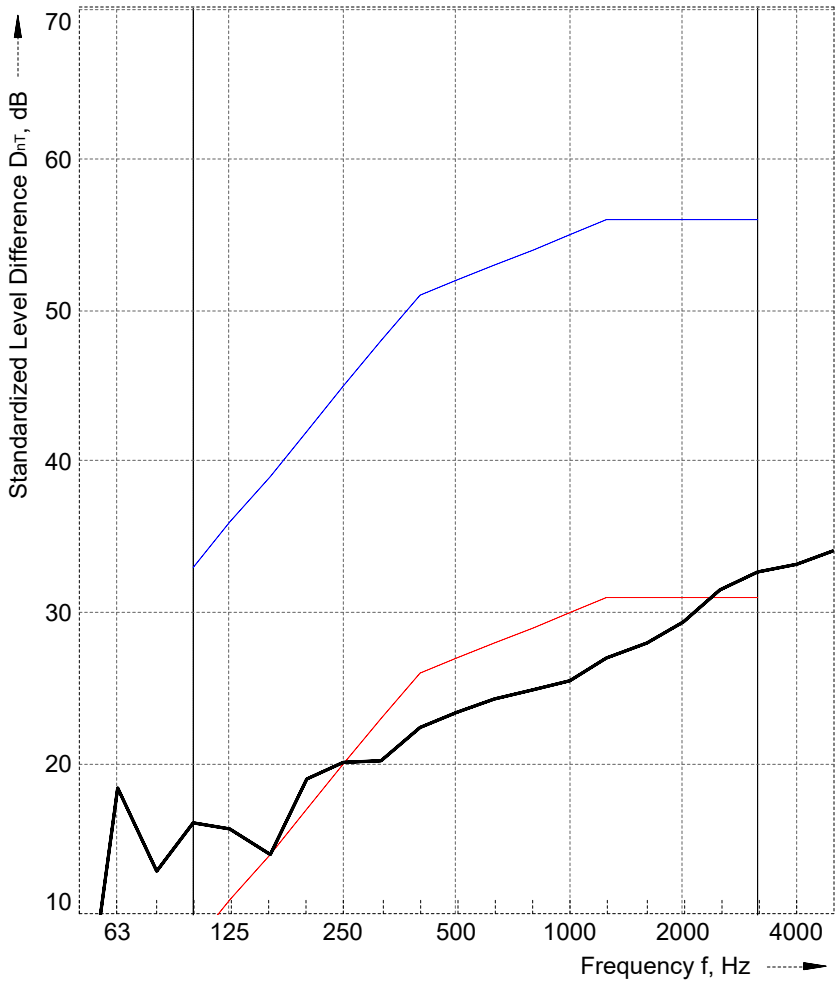
Description and identification of the building construction and test arrangement, direction of measurement:

Airborne sound insulation performance of temporary room constructed from Enviro Wall 40 material and a hollow core door w/rubber bulb seals.

Source room volume: 40.824 m³

Receiving room volume V: 471.53 m³

Frequency f Hz	D_{nT} 1/3 Octave dB
50	0.0
63	18.4
80	12.9
100	16.1
125	15.7
160	14.0
200	19.0
250	20.1
315	20.2
400	22.4
500	23.4
630	24.3
800	24.9
1000	25.5
1250	27.0
1600	28.0
2000	29.4
2500	31.5
3150	32.7
4000	33.2
5000	34.1



Rating according to ISO 717-1

$D_{nT,w}(C;C_{tr})$ = 27 (-1; -3) dB

$C_{50\text{-}3150}$ = N/AdB; $C_{50\text{-}5000}$ = N/AdB; $C_{100\text{-}5000}$ = 0dB;

Evaluation based on field measurement results obtained in one-third-octave bands by an engineering method

$C_{tr,50\text{-}3150}$ = N/AdB; $C_{tr,50\text{-}5000}$ = N/AdB; $C_{tr,100\text{-}5000}$ = -3dB;

No. of test report: 5152-2 B002

Name of test institute: Day Design Pty Ltd

Date: 28/02/2022

Signature: