Dubai Acoustic Research Laboratory
ISO Acoustic Physical & Mechanical Testing Laboratory L.L.C

ACOUSTIC TEST REPORT

Customer:	**Al Talal Board Manufacturing Company LTD (Desert Board)** Plot no: KHIA4-05, Taweelah-Kizad Abu Dhabi, UAE
Report Number:	**132T001**
Test Standard:	BS EN ISO 10140-2:2021
Classification Standard:	BS EN ISO 717-1:2020
Test Specimen:	44mm Thick Non Fire Rated Single Leaf Acoustic PSB Door System with HDF board finish
Test date:	16th October 2024

LB-TEST-162

REPORT REGISTER

The following report register documents the development and issue of this and any subsequent report as undertaken by our office, in accordance with the *Quality Assurance* policy of DARL.

Our Reference	Remarks	Issue Date
132T001	Sound Insulation Test Report	12th November 2024

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Prepared by	Sabu Mustafa Acoustic Testing Engineer	11.11.2024
Reviewed by	Paul Schwarz Laboratory Director	12.11.2024

Revision	Notes	Date
00		12.11.2024

1.0 INTRODUCTION

General

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Purpose of Report

DARL has undertaken laboratory airborne sound insulation testing of a 44mm Thick Non Fire Rated Single Leaf Acoustic Door System with HD board finish at the DARL testing facilities, Jebel Ali Industries 3, Dubai.

It is understood that samples are required to be tested according to the BS EN ISO 10140-2:2021.

To achieve that DARL has conducted a sound transmission test according to EIAC accredited BS EN ISO 10140:2021 "Laboratory measurement of sound insulation of building elements Part 2: Measurement of airborne sound insulation".

The Weighted Sound Reduction Index (R_w) was determined in accordance with the BS EN ISO 717-1:2020 "Acoustics – Rating of sound insulation in buildings and of building element – Part 1: Airborne sound insulation".

Construction/mounting of the 44mm Thick Non Fire Rated Single Leaf Acoustic PSB Door System with HDF board finish were carried out on the 15th October 2024 & 16th October 2024 and the measurements were undertaken on the 16th October 2024 under controlled conditions.

2.0 RESULTS SUMMARY

Fully tabulated measurement data and plotted results can be found towards the end of this report. In summary, the specimens submitted for sound insulation testing achieved the following result:

44mm Thick Non Fire Rated Single Leaf Acoustic PSB Door System with HDF board finish
Weighted Sound Reduction Index: **R_w (C; C_{tr}) = 35 (-2;-3) dB**

The result applies to the sample as received and is related only to the tested item and laboratory conditions as described in the report. The laboratory can make no judgment about the representativity of the tested sample. The test report ahead is valid as long as the tested constructions and/or materials are unchanged.

The laboratory certificate can be found in Appendix A.

The Weighted Sound Reduction Index (R_w) was determined in accordance with the BS EN ISO 717-1:2020 "Acoustics – Rating of sound insulation in buildings and of building element – Part 1: Airborne sound insulation" and is based on a result obtained by laboratory measurements.

3.0 MEASUREMENT & METHODOLOGY CRITERIA

Measurements were undertaken in accordance with BS EN ISO 10140-2:2021 "*Acoustics – Laboratory measurement of sound insulation of building elements – part 2: Measurement of airborne sound insulation*", and calculations undertaken and rated in accordance with BE EN ISO 717-1:2020 "*Rating of Sound Insulation in Buildings and Building Elements*", making full allowance for current acoustic industry discussions surrounding measurement methodology and accuracy concerning laboratory sound insulation testing and equipment configurations.

Laboratory conditions and construction details are presented in Appendix B.

4.0 TEST EQUIPMENT AND PROCEDURES

Measurements were undertaken with the following calibrated equipment –

Equipment	Type	DARL Ref	Serial No.	Calibration Due Date
Type 1 professional Sound Level Meter	NTi XL2 Analyzer	DARL – NTi – XL2 – S6i1	A2A-14135-E0	25-July-26
Microphone	Nti Audio M2211	DARL–NTiMA220-7458-S6i4	7458	30-July-26
Calibrator	Castle GA607	DARL–Castle GA607-S6i2	044739	30-July-26
Nti/Neutrik	Minirator MR Pro	DARL- MR-RAHSQ-S3i3	G2P- RAHSQ–G0	-
Loudspeaker	6 x Yamaha DSR115	-	n/a	-
Loudspeaker	Yamaha DSR118W	-	n/a	-

Table 1: Test equipment details.

Calibrations of the XL2 Type 1 sound level meters were undertaken before and after each measurement session. It was noted that no significant level of calibration drift have occurred (less than 0.1dB).

Testing Methodology

Sound insulation testing was undertaken in accordance with BS EN ISO 10140-2:2021 *"Acoustics – Laboratory measurement of sound insulation of building elements – part 2: Measurement of airborne sound insulation", the reverberation time measured, as described in BS EN ISO 10140-4:2021 "Acoustics - Laboratory measurement of sound insulation of building elements - Part 4: Measurement procedures and requirements"*. The testing and data collection procedures were arranged to satisfy the following requirements of the testing standard such as:

- the number of microphone positions
- the distance between source and microphone position
- the distance between source/microphone position and the room boundaries
- the distance between two sources/microphones positions
- the distance between the microphone position and the tested specimen.

The sections below provide a summary of the test procedure detailed within the standard.

Airborne Sound Insulation Testing - Summary of Test Procedure

- Pink noise is generated in the 'source' room that a diffuse sound field is created within the room. Spatially averaged noise levels in each one-third octave band (50 - 5000 Hz) are recorded in the 'source' and the 'receiving' room using the fixed microphone method. The spatially

averaged measurements are recorded for 7 microphone positions in the 'receiving' and the 'source' room over a sample period of 15 seconds for each microphone position.

- Reverberation time measurements are undertaken based on interrupted noise method as described in ISO 3382-2:2008 "Acoustics - Measurement of room acoustic parameters - Part 2: Reverberation time in ordinary rooms" within the 'receiving' room using an interrupted pink noise source. Seven measurements of reverberation time are undertaken within the room using the fixed microphone method.

- Spatially averaged measurements of background noise are made within the 'receiving' room using the fixed microphone method. The spatially averaged measurements are recorded for 7 microphone positions in the 'receiving' room over a sample period of 15 seconds for each microphone position.

Airborne Sound Insulation Testing - Analysis of Results

The measured noise levels in the 'receive' room are first corrected for background noise and then subtracted from the measured noise levels in the 'source' room to obtain the sound level difference in each one-third octave band.

The sound level differences are then corrected for reverberation time in the receive room, which is taking into consideration the equivalent sound absorption area of the receive room and the area of the free test opening in which the test specimen is installed.

Following the above, each one-third octave band R-value is compared against a standard curve, as defined in BS EN ISO 717-1:2020, and shifted in 1dB increments until a point is found where the value of deviations on the measured curve from the standard curve is as close to 32dB as possible, but does not exceed this value. The value of the shifted standard curve in the 500 Hz one-third octave band center frequency band is then taken to be the single figure of the weighted sound reduction index (R_w).

5.0 TEST SPECIMEN

It has been requested by Al Talal Board Manufacturing Company LTD (Desert Board) to undertake acoustic laboratory testing to acquire the acoustic rating for the proposed Single Leaf Wooden Door.

On the day of testing 16th October 2024, the laboratory conditions were measured and are presented in the table below.

Air Temperature (°C)	34.6
Relative Humidity (%)	38
Static Pressure (hPa)	1024.7

Table 2: Laboratory conditions on the day of the test.

Description of the test element according to the data supplied by the client

1. DOOR LEAF: 44mm THK. PSB PRIME DESIGN B/S HDF
   DIMENSION: 44 x 1000 x 2440mm
   DENSITY: 650 KG/M3

2. LIPPING: 6mm Minimum THK
   BEECH WOOD WITH APPROVED
   FINISH, DENSITY: 650 KG/M3

3. FRAME: 44mm THK BEECH
   WOOD WITH APPROVED FINISH,
   DENSITY: 650 KG/M3

4. ARCHITRAVE : 18x60mm THK.
   BEECH WOOD WITH APPROVED
   FINISH, FIXED BY RITVER PW1612
   PVA GLUE, DENSITY: 880 KG/M3

5. LIPPING: 6mm Minimum THK
   BEECH WOOD WITH APPROVED
   FINISH, DENSITY: 650 KG/M3

6. ATHMER, SCHALL-EX L-14/35
   EK DOOR DROP SEAL

7. ATHMER PS1212 P Flex
   PERIMETER SEAL, 12mmx12mm

8. ATHMER Perimeter Seal,
   PS 3665 P

9. 10mm THK. PU ADHESIVE
   FOAM

Table 3: Test System Description

The dimensions of the test element are as follow –

Width (mm)	1000
Height (mm)	2440

Table 4: Test specimen dimensions.

During and after the testing it has been noticed that the test sample has not suffered visible damage.

Pictures of test specimen – on the day of the test

Figure 1: Tested sample- Source Side

Figure 2: Tested sample- Receiver Side

Drawings – provided by the client

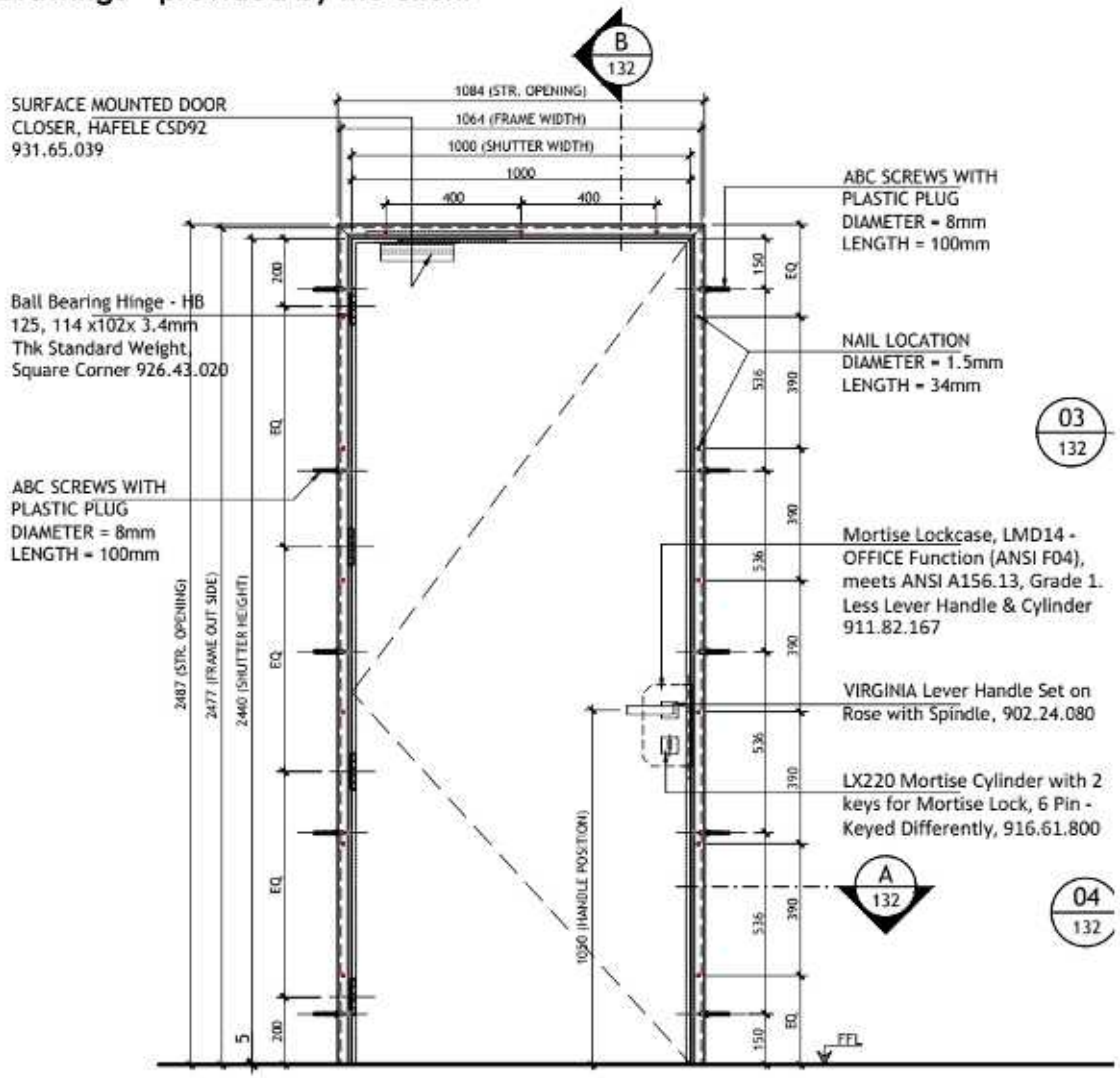


Figure 3: Elevation, Plan and Section of the Tested Specimen

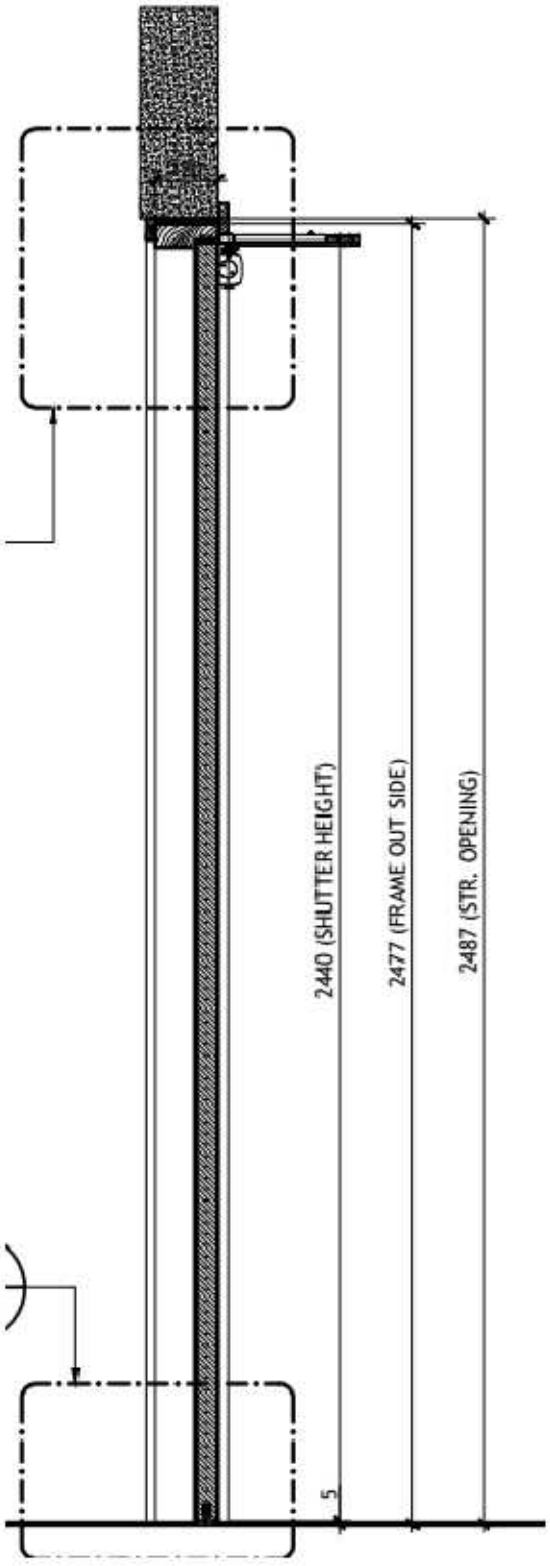


Figure 4: Section Detail

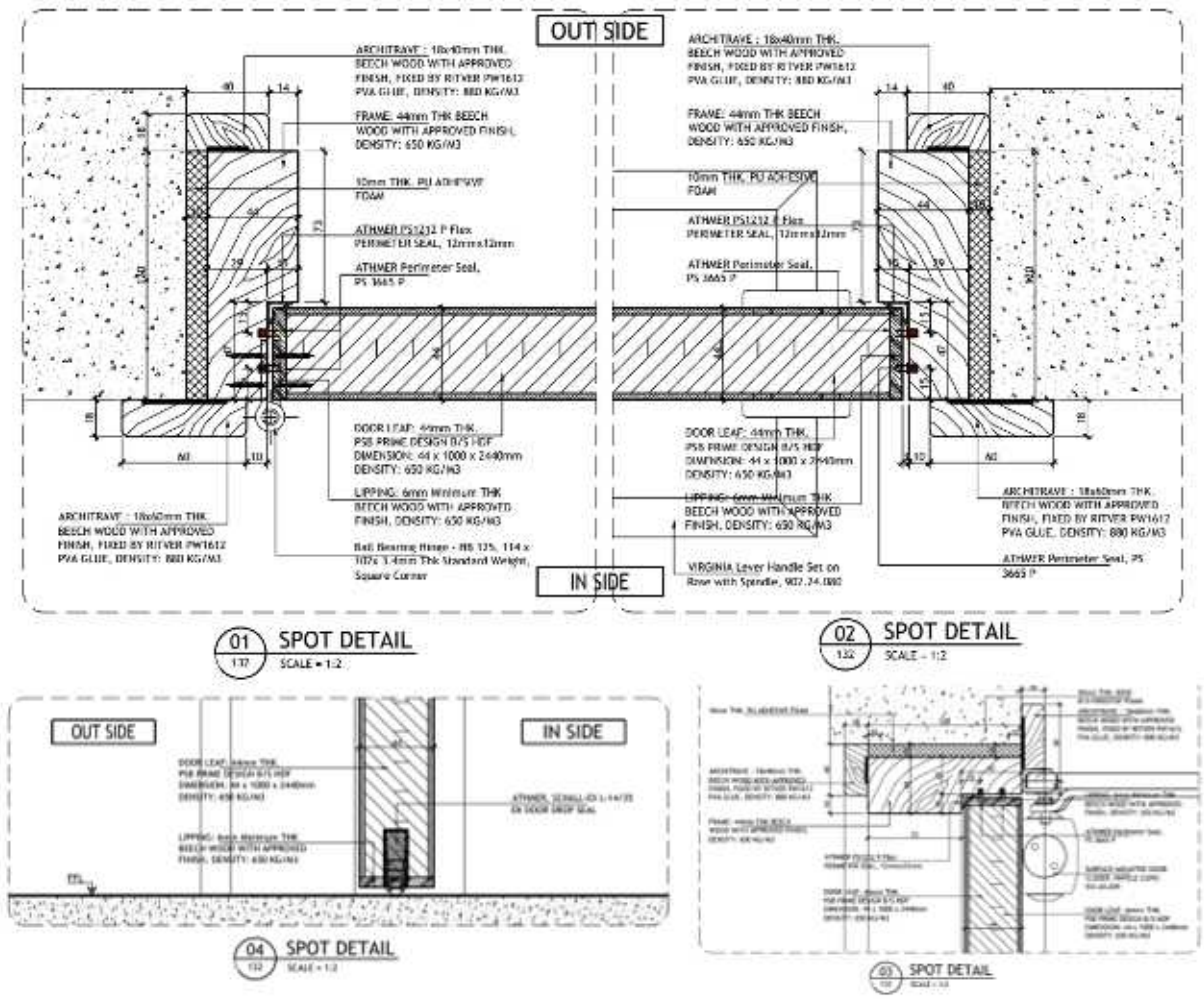


Figure 5: Door Other Details

6.0 MEASUREMENT DATA

Spatially-averaged measurement data is presented below –

Source SPL (dB)	Microphone position							
Frequency (Hz)	1	2	3	4	5	6	7	Average
50	108.7	108.3	107.3	108.9	106.6	106.8	103.1	107.4
63	114.2	112.1	109.1	116.0	111.3	110.9	109.1	112.5
80	108.8	109.6	108.5	117.1	108.3	109.6	115.4	112.5
100	113.2	111.7	103.7	112.9	110.5	110.5	112.3	111.4
125	116.8	115.3	113.6	116.0	112.8	113.1	114.5	114.8
160	113.8	109.2	111.0	112.7	110.6	112.3	113.1	112.1
200	110.3	107.5	107.0	107.5	108.3	107.6	109.7	108.4
250	110.2	110.2	109.9	109.5	109.9	108.2	109.5	109.7
315	110.5	110.1	109.7	111.8	109.1	110.3	110.0	110.3
400	108.6	109.9	107.8	109.6	108.6	109.5	109.9	109.2
500	107.6	107.0	106.3	107.0	107.3	106.9	106.9	107.0
630	106.9	105.5	106.2	105.7	106.7	106.1	105.2	106.1
800	104.8	104.4	103.9	104.3	104.3	104.8	104.0	104.4
1000	103.3	103.3	102.9	103.6	102.8	103.2	103.1	103.2
1250	99.4	99.6	100.0	100.5	100.0	100.1	99.2	99.8
1600	100.5	100.3	99.7	100.0	100.5	99.8	99.7	100.1
2000	102.1	102.9	102.1	102.1	102.8	102.7	101.8	102.4
2500	101.2	102.0	101.8	101.5	101.8	101.6	101.4	101.6
3150	100.7	101.0	100.8	100.4	101.0	101.3	100.1	100.8
4000	98.6	98.6	99.1	98.4	98.9	98.5	98.2	98.6
5000	99.0	98.8	99.5	99.1	98.9	99.3	98.3	99.0

Table 5: Measurement data - source room.

Receiver SPL (dB)	Microphone position							
Frequency (Hz)	1	2	3	4	5	6	7	Average
50	77.2	75.6	74.9	75.5	80.3	80.1	76.6	77.7
63	75.0	73.5	71.7	75.6	75.5	75.1	75.7	74.8
80	72.4	75.2	75.8	80.7	78.9	79.3	77.9	77.9
100	71.7	74.2	79.5	77.9	78.1	77.4	80.0	77.7
125	77.0	74.7	75.3	77.2	75.5	76.1	77.5	76.3
160	72.0	73.9	73.2	72.9	73.9	74.8	76.3	74.1
200	69.9	67.3	68.1	68.1	69.3	69.5	70.9	69.2
250	68.9	67.4	67.5	68.7	69.4	70.1	70.3	69.0
315	67.1	67.5	68.2	66.5	68.0	67.7	69.5	67.9
400	62.8	63.7	63.1	64.3	64.7	65.5	65.5	64.3
500	59.6	59.5	59.1	60.2	60.4	61.2	62.6	60.5
630	58.7	59.9	57.6	58.2	59.5	58.7	60.8	59.2
800	58.9	58.2	58.7	59.2	58.8	59.4	60.8	59.2
1000	60.1	59.1	59.7	60.0	61.3	61.3	62.0	60.6
1250	55.9	56.0	56.1	56.9	57.5	57.7	58.7	57.1
1600	55.6	55.6	55.8	56.2	57.2	56.7	57.2	56.4
2000	54.5	55.3	55.4	55.1	55.8	55.7	55.3	55.3
2500	51.5	51.9	51.8	52.6	53.0	52.3	52.5	52.3
3150	49.2	49.7	49.3	49.8	50.3	49.7	50.2	49.8
4000	44.6	45.3	45.3	45.3	45.9	45.3	46.0	45.4
5000	43.1	42.9	43.3	43.2	43.6	43.1	44.4	43.4

Table 6: Measurement data - receiver room.

Background SPL (dB)	Microphone position							
Frequency (Hz)	1	2	3	4	5	6	7	Average
50	37.5	43.5	46.5	43.2	42.0	46.0	49.0	45.1
63	39.5	41.7	40.4	43.6	44.6	44.0	47.5	43.8
80	34.3	31.6	35.6	36.3	38.1	39.8	35.8	36.6
100	32.0	28.9	30.4	30.7	33.5	34.4	40.1	34.5
125	24.7	30.2	28.1	27.8	25.4	27.8	32.3	28.7
160	21.7	28.6	25.9	23.6	23.1	24.6	24.4	25.1
200	12.6	14.8	13.2	14.3	14.7	15.5	15.9	14.6
250	11.2	11.2	12.0	10.6	13.9	12.1	12.4	12.0
315	7.8	8.3	9.4	8.2	11.0	9.5	10.2	9.3
400	6.8	7.1	7.5	7.1	8.3	7.0	7.6	7.4
500	6.5	7.0	6.7	6.8	7.7	7.1	7.7	7.1
630	6.8	7.1	7.1	6.7	7.6	7.0	7.5	7.1
800	7.0	7.2	7.3	7.0	7.7	7.4	7.7	7.3
1000	7.3	7.8	7.6	7.4	7.9	7.8	8.1	7.7
1250	8.2	9.2	8.4	8.3	9.2	8.5	9.5	8.8
1600	8.8	9.9	9.3	9.0	10.0	9.5	10.6	9.6
2000	9.3	10.2	9.4	9.3	10.0	9.7	10.3	9.8
2500	9.7	10.7	10.1	9.7	10.7	10.3	10.8	10.3
3150	10.3	10.7	10.4	10.1	10.8	10.5	10.7	10.5
4000	10.6	11.2	10.8	10.6	11.2	10.8	11.1	10.9
5000	11.0	11.2	11.0	11.0	11.2	11.0	11.3	11.1

Table 7: Measurement data - background noise in the receiver room.

Frequency (Hz)	Meas. RT60 (s)
50	1.15
63	1.33
80	1.43
100	1.50
125	1.54
160	1.61
200	1.37
250	1.40
315	1.35
400	1.23
500	1.19
630	1.11
800	1.08
1000	1.09
1250	1.12
1600	1.15
2000	1.17
2500	1.15
3150	1.19
4000	1.17
5000	1.12

Table 8: Reverberation time.

One-third octave band frequency (Hz)	R One-third octave band (dB)	R Octave band (dB)	Octave band frequency (Hz)
50	18.2		
63	26.8	21.5	63
80	24.0		
100	23.3		
125	28.2	25.8	125
160	27.9		
200	28.5		
250	29.9	29.8	250
315	31.6		
400	33.6		
500	35.1	34.6	500
630	35.2		
800	33.3		
1000	30.8	31.6	1000
1250	31.1		
1600	32.2		
2000	35.6	34.6	2000
2500	37.8		
3150	39.6		
4000	41.7	41.4	4000
5000	43.9		

Table 9: R-values in one-third and octave band 1.

Receive Room Volume (m²)	249
Test Sample surface area (m²)	2.44

Table 10: Receive room and test specimen specification.

End of Report

Author

Sabu Mustafa
Acoustic Testing Engineer
For DARL

Verified

Paul Schwarz
Laboratory Director
For DARL

APPENDIX A – LABORATORY CERTIFICATE

Sound Reduction Index, *R*, in accordance with ISO 10140-2

Product Name: 44mm Thick Non Fire Rated Single Leaf Acoustic PSB Door System with HDF board finish

Product identification:

Client: Al Talal Board Manufacturing Company LTD (Desert Board)

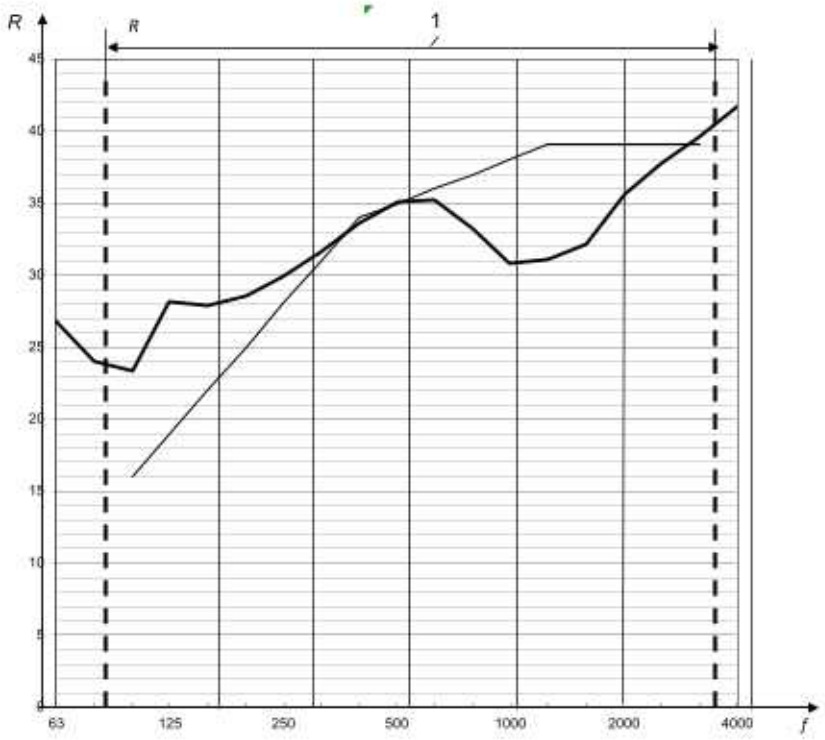
Date of test: 16/10/2024

Test room identification: DARL

Area, S, of test element: 2.44 m^2

Air temp. In the test rooms 34.6 °C
Relative humidity in the test rooms: 38 %
Static pressure: 1024.7 *hPa*
Receiving room volume: 249 m^3

Frequency f *Hz*	*R one-third octave* *dB*
50	18.2
63	26.8
80	24.0
100	23.3
125	28.2
160	27.9
200	28.5
250	29.9
315	31.6
400	33.6
500	35.1
630	35.2
800	33.3
1000	30.8
1250	31.1
1600	32.2
2000	35.6
2500	37.8
3150	39.6
4000	41.7
5000	43.9



Key
R sound reduction index, in dB
f frequency, in Hz
1 frequency range for rating in accordance with the curve of reference values (ISO 717-1)

Rating in accordance with ISO 717-1:
$R_w (C;C_{tr})$ = **35 (-2;-3) dB** $C_{50\text{-}3150}$ = (-1) dB; $C_{50\text{-}5000}$ = (-1) dB; $C_{100\text{-}5000}$ = (-1) dB

Evaluation based on laboratory measurements results obtained by an engineering method:
$C_{tr,50\text{-}3150}$ = (-4) dB; $C_{tr,50\text{-}5000}$ (-4) dB; $C_{tr,100\text{-}5000}$ = (-3) dB;

No. of test report : 132T001 *Name of test institute : ISO Acoustic P&MTL*

Date: 16/10/2024 *Signature :*

APPENDIX B – LABORATORY CONDITIONS

The source room and receive room comprise a fully-enclosed space. The reverberant rooms are having the following details:

Room	Size (m)	Shape	Volume (m^3)	Total surface area (m^2)
Source	8.44 x 6.22	Rectangular	233	234
Receive	8.45 x 6.45	Rhombus	249	246

Table 11: Laboratory chamber dimensions and details

The source room is entirely separated from the receive room as such vibration cannot be transferred and interfere with the receive measurements.

The Laboratory frame (surrounding construction) comprises of 2040 mm reinforced concrete structure with vibration isolation pads in between the source and receive room frames. Source and receive room structures comprise of 325 mm thick isolated floating concrete floor with 450 mm thick sound insulated walls and double-leaf doors. The aperture to place the test specimen has an area size of $10m^2$.

In the receive room 14 diffusive panels of a total surface area of $28m^2$ are installed on the ceiling. Each panel (size: 1.00m x 2.00m) is made of 6mm thick MDF board.

It is considered that any potential flanking noise paths were sufficiently reduced to comply with the requirements of the ISO testing methodologies.

The maximum measurable sound reduction index ($R`_{max}$) has been measured according to the guidance provided in the ISO 10140-5, Appendix A.2.2.1.1 utilizing Type A Lightweight wall.

Frequency (Hz)	R'max (dB)
50	33.8
63	40.9
80	48.3
100	50.7
125	59.9
160	61.3
200	66.9
250	71.6
315	71.5
400	75.1
500	76.6
630	80.7
800	81.6
1000	82.6
1250	83.8
1600	83.4
2000	84.8
2500	82.3
3150	84.2
4000	83.8
5000	84.0

Table 12: Maximum measurable sound reduction index in one-third octave band.

The weighted sound reduction index is:
$R`_{w,max}$ = 79 dB.