System Development

Laboratory Sound Transmission Test Report

Sample type: 55mm thick, single leaf, palm strand board (PSB) door

Test sponsor: Abanos Furniture & Decoration Industry LLC

Report number: DLR2341

Date: 9 February 2023 Revision: 0

UKAS TESTING
4559

Al Futtaim Element Materials Technology Dubai L.L.C
Façade Testing & Advisory Services Division

Quality management

Version	Date	Information about the document		
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			Prepared by	Reviewed & authorised by
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		Designation	Senior Test Engineer	Acoustics Manager
		Signature		
Signed and issued on behalf of Al Futtaim Element Materials Technology Dubai L.L.C				

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1. Introduction

This report describes the sound insulation tests performed at the Al Futtaim Element Materials Technology Dubai L.L.C (AFE) laboratory at Plot 597-451, Dubai Investments Park, Dubai, at the request of the test sponsor listed in Table 1.

Table 1 Test sponsor details

Test sponsor	Address
Abanos Furniture & Decoration Industry LLC	P. O. Box 114480 Dubai United Arab Emirates Tel: 04 885 1885

AFE is accredited to ISO/IEC 17025:2017 by the United Kingdom Accreditation Service (UKAS), which assesses the technical competence of the laboratory, as well as its quality management systems.

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1.1 Purpose of testing

The tests were conducted on 3 February 2023 to determine the acoustic performance of a door sample installed in the laboratory with respect to its ability to reduce the transmission of sound from one space or room to an adjacent room.

The test method was in accordance with the AFE method statement DMA4387 Rev.0 and the following standards.

- ASTM E90-09 (reapproved 2016)
- ASTM E2235-04 (reapproved 2020)
- ASTM E413-16

This test report relates only to the actual sample as tested and described herein.

The test was witnessed wholly or in part by the test witnesses listed in Table 2.

Table 2 Test witnesses

Test witness	Company
Anselmo Tabadero	Abanos Furniture & Decoration Industry LLC

The test was conducted by Shibu Varghese of AFE.

2. Summary of test results

The sample was tested in accordance with ASTM E90-09 (Reapproved 2016) and classified in accordance with ASTM E413-16 to give the Sound Transmission Class (STC).

The test measurements were also used to classify the sample in accordance with BS EN ISO 717-1:2013 to give the Sound Reduction Index (R_w) & correction factors of the sample.

Two tests were conducted on the sample, one with the door in an operable condition and one in an inoperable condition (fully caulked).

The results are shown in the table below.

Sample no.	Sample description	Test result	
		STC, in dB	R_w, in dB
DA4387B.1	Operable condition. 55 mm thick, single leaf, side hinged, palm strand board (PSB) door, with an automatic bottom drop seal, batwing seal and intumescent strips, fixed in a wooden door frame.	33	33

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Sample no.	Sample description	Test result	
		STC, in dB	R_w, in dB
DA4387B.2	Inoperable condition. 55 mm thick, single leaf, side hinged, palm strand board (PSB) door, with an automatic bottom drop seal, batwing seal and intumescent strips, fixed in a wooden door frame.	37	37

Graphical & tabular representations of the test results are given in Section 6.

The above results are valid only for the tested sample as received, detailed and constructed as per the drawings with any marked variations as attached in Appendix A of this report, and the conditions under which the tests were conducted. Details of the controlled dismantle of the sample are included in Section 7.

Measurements performed in accordance with this standard on nominally identical constructions and acoustical conditions may produce different results.

3. Test apparatus

3.1 Acoustic test chamber

The acoustic test facility comprises an adjacent pair of acoustically sealed semi-reverberant chambers. Access to both chambers is via acoustic access doors. Both chambers have been installed on separate, isolated acoustic floor systems to limit sound and vibrational energy transference (flanking) between the chambers and from the immediate surroundings.

The walls of the test facility are formed from sound absorbent acoustic panelling that has been specially designed to provide a high sound transmission loss capability whilst producing the desired reverberant levels for the semi-reverberant acoustic test chamber.

The sample was installed into the opening between the test chambers, provided by the separate, isolated sample holder.

The inside dimensions of the test chambers are as detailed in the table below.

Chamber	Length (mm)	Width (mm)	Height (mm)	Volume (m^3)
Source Room	7,080	5,753	4,425	180
Receiving Room	7,360	5,980	4,600	202

3.2 Instrumentation & equipment

Noise levels & reverberation times were measured using a Level 1 Sound Analyser compliant with BS EN 61672-1:2013 Type 1 and a sound calibrator compliant with BS EN 60942:2018.

The following instrumentation and test equipment was used during the testing.

Item	Description	Manufacturer	Model	Serial number	AFE Ref. no.	Calibration due date
Sound level meter	Dynamic signal analyser	Bruel & Kjaer	Type 2250	2600451	CLD617	24/08/24
Preamplifier	½" preamplifier	Bruel & Kjaer	Type 4189	7337	CLD617A	24/08/24
Microphone	½" pressure type, condenser microphone	Bruel & Kjaer	Type 4189	3130870	CLD617B	24/08/24
Calibrator	Sound calibrator	Bruel & Kjaer	Type 4231	2606005	CLD617C	18/08/23
Sound source	Loudspeaker	Bruel & Kjaer	Type 4292	027015	CLD602	N/A
Rotating boom	Rotating boom	Bruel & Kjaer	3923	2664263	CLD603	N/A
Pink noise source	Pink noise signal	Bruel & Kjaer	Type 2250	2600451	CLD617	24/08/24

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All measuring instruments and relevant test equipment with appropriate indication have been calibrated and copies of the calibration certificates are available upon request.

4. Test sample

4.1 Installation

The sample was installed in the acoustically separated test aperture between the acoustic chambers, without bridging the two chambers. The surrounding structure was solely the test laboratory structural wall elements.

A filler wall reducing element was used to reduce the test opening to the size of the sample. It consisted of a 350 mm thick, double metal stud (36 mm by 73.5 mm) wall construction with two layers of 12.7 mm standard plasterboard & two layers of 15.9 mm fire-rated plasterboard on both sides. The cavity between the inner layers of plasterboard was filled with high density rockwool insulation. The filler wall had an R_w rating of 67 dB.

The test specimen was intended to be readily opened, and so was installed so that it could be opened and closed in the normal manner. Prior to the operable condition test it was opened and closed five times.

To restrict the passage of any flanking noise between the chambers, any instances of bridging between the acoustic chambers were investigated and cleared following the installation of the sample.

The sample was installed in the test chamber, by representatives of Abanos Furniture & Decoration Industry LLC, on 2 February 2023. The sample was dismantled by Abanos Furniture & Decoration Industry LLC on 6 February 2023.

4.2 Description

The sample was a 55 mm thick, single leaf, side hinged, palm strand board (PSB) door, with an automatic bottom drop seal, batwing seal and intumescent strips, fixed in a wooden door frame. The sample was approximately 1.17 m wide by 2.4 m high. The AFE sample reference number for the sample is DA4387B. The photograph below shows an external view of the test sample.

الفطيم Al-Futtaim اليمنت element
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See drawing no. AB/STD/FR-PSB/001 Rev. 0 in Appendix A for further details.

5. Test procedure

The sound insulation testing was carried out in accordance with ASTM E90-09 (reapproved 2016), which was followed in every respect. The tests were carried out to ascertain the airborne sound insulation capabilities of the sample in laboratory conditions where transmission of sound on flanking paths is suppressed, from the source room to the receiving room, in one direction only.

The testing was carried out in the one-third octave band of frequencies ranging from 100 Hz – 5,000 Hz as per ASTM E90-09 (reapproved 2016) requirements.

5.1 Methodology

The loudspeaker was set up in the corner of the sound source chamber – 2 positions were used.

The microphone, pre-amplifier and sound level meter were calibrated prior to and after testing using the Bruel & Kjaer Type 4231 calibrator.

Two measurements were taken in the source room, using the rotating boom, at each loudspeaker position.

Two measurements were taken in the receiving room, using the rotating boom, at each loudspeaker position.

One background measurement was taken in the receiving room, using the rotating boom.

Two reverberation time measurements were taken in the receiving room, using the rotating boom, at each loudspeaker position – 2 positions were used. The reverberation time testing was in accordance with ASTM E2235-04 (reapproved 2020).

The receiving room readings were corrected for the ambient and reverberation time factors. To evaluate the sound reduction index of the sample, the differences between the source and receiving room readings were obtained and subsequently compared with a set of reference curves following the procedure detailed in ASTM E413-16 to derive a single number rating (the Sound Transmission Class denoted as 'STC'), which represents the sound insulation of the building element subjected to the test.

Detailed test procedures, data for flanking limit tests, repeatability measurements and reference specimen tests are available on request.

5.2 Controlled dismantle

AFE witnessed the dismantling of the test sample and compared the as-built (and therefore as-tested) installation against the drawings supplied. See Section 7 for details.

6. Test results

The test results for the sample are presented in graphical & tabular representations below.

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Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements In Accordance With ASTM E90-09 (reapproved 2016)

Client: Abanos Furniture & Decoration Industry LLC Date of Test: 3 February 2023

Sample: Operable condition. 55 mm thick, single leaf, side hinged, palm strand board (PSB) door, with an automatic bottom drop seal, batwing seal and intumescent strips, fixed in a wooden door frame.

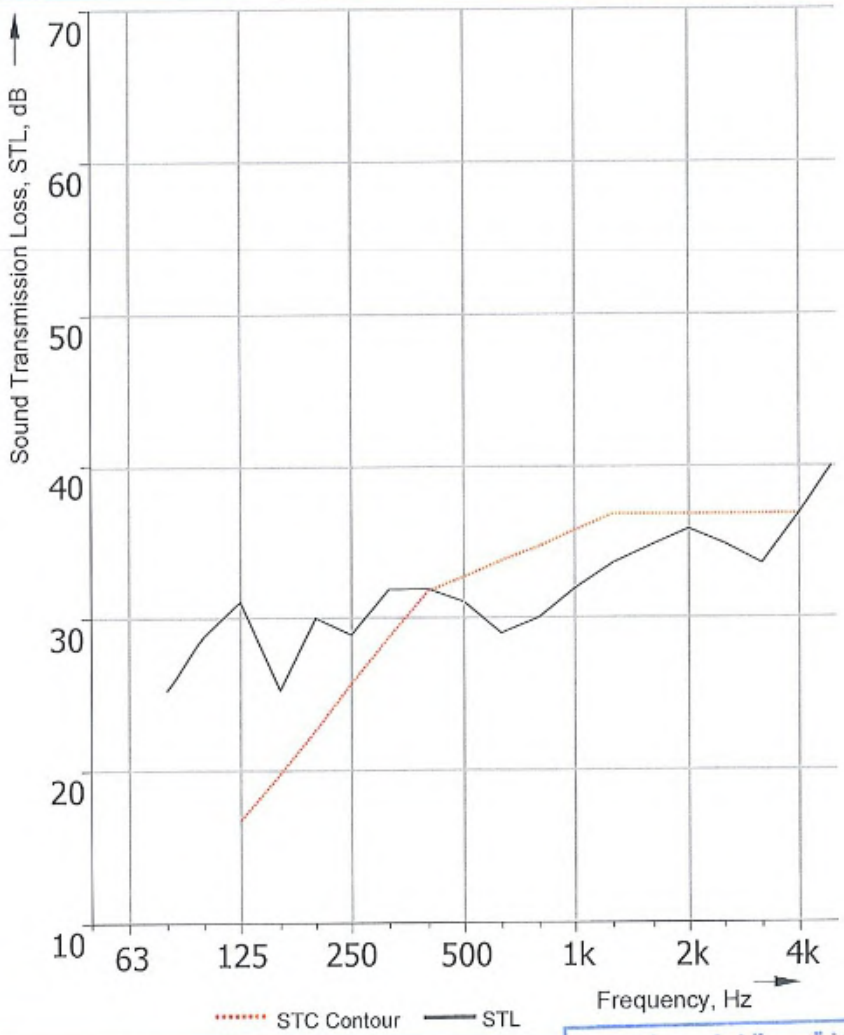
Sample Size: 1.176 m wide x 2.4 m high. Sample Area, S 2.82 m^2

Source Room Volume: 180.0 m^3

Receiving Room Volume: 202.0 m^3

Test Conditions:	Temp. (°C)	RH (%)	Atm (mbar)
Source Room:	23	49	1001
Receiving Room:	22	47	999

Frequency f Hz	STL 1/3 Octave dB
50	
63	
80	25.0
100	29.0
125	31.0
160	25.0
200	30.0
250	29.0
315	32.0
400	32.0
500	31.0
630	29.0
800	30.0
1000	32.0
1250	34.0
1600	35.0
2000	36.0
2500	35.0
3150	34.0
4000	37.0
5000	40.0



Rating according to ASTM E413-16, over the frequency range 125 Hz – 4000 Hz:

STC = 33 dB Sum of unfavourable deviations = 27 dB

Rating according to BS EN ISO 717-1:2020, over the frequency range 100 Hz – 3150 Hz:

Rw (C;Ctr) = 33 (-0; -2) dB $C_{100\text{-}5000}$ = -0 dB $C_{tr100\text{-}5000}$ = -2 dB Sum of unfavourable deviations = 28.0 dB

Evaluation based on laboratory measurement

Al Futtaim Element Materials Technology Dubai L.L.C
Façade Testing & Advisory Services Division

AFE Sample Reference: DA4387B.1 Name of Test Institute: Al Futtaim Element MTD L.L.C

Tested by: Shibu Varghese

Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements In Accordance With ASTM E90-09 (reapproved 2016)

Client: Abanos Furniture & Decoration Industry LLC Date of Test: 3 February 2023

Sample: Inoperable condition. 55 mm thick, single leaf, side hinged, palm strand board (PSB) door, with an automatic bottom drop seal, batwing seal and intumescent strips, fixed is a wooden door frame.

Sample Size: 1.176 m wide x 2.4 m high. Sample Area, S 2.82 m^2
Source Room Volume: 180.0 m^3
Receiving Room Volume: 202.0 m^3

Test Conditions:	Temp. (°C)	RH (%)	Atm (mbar)
Source Room:	24	51	997
Receiving Room:	24	51	997

Frequency f Hz	STL 1/3 Octave dB
50	
63	
80	25.0
100	29.0
125	32.0
160	26.0
200	31.0
250	31.0
315	33.0
400	33.0
500	33.0
630	32.0
800	33.0
1000	35.0
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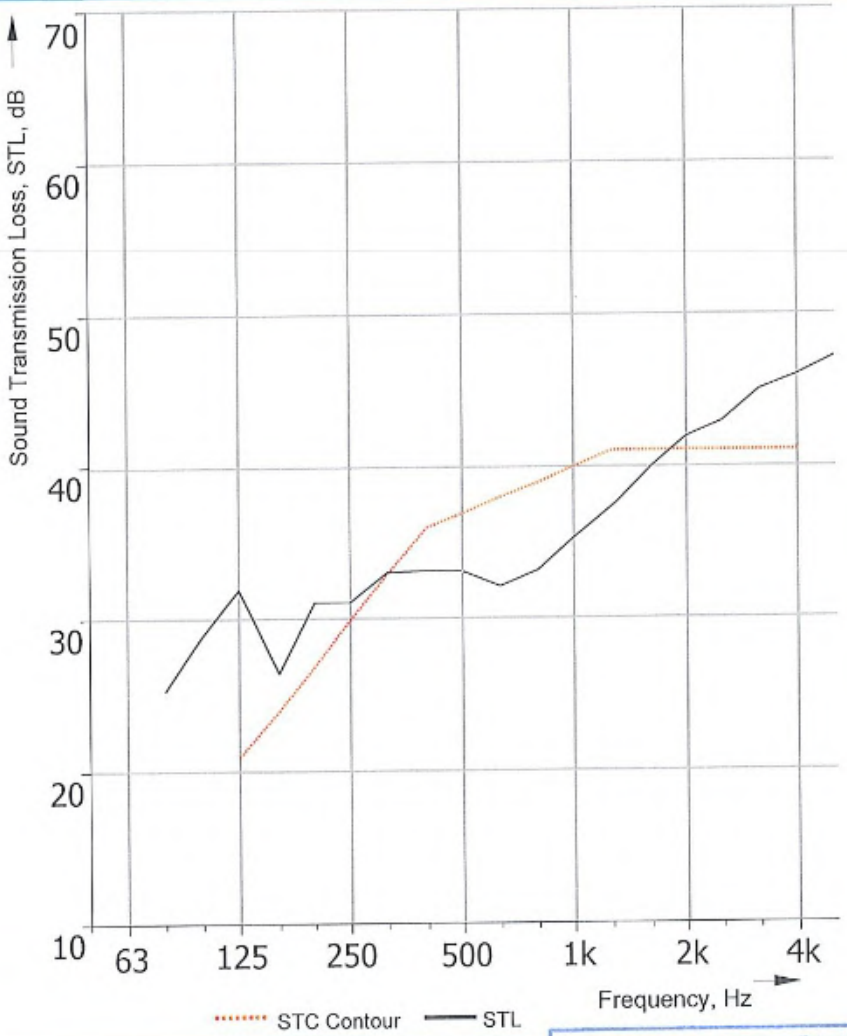
1600	40.0
2000	42.0
2500	43.0
3150	45.0
4000	46.0
5000	47.0



Rating according to ASTM E413-16, over the frequency range 125 Hz – 4000 Hz:
STC = 37 dB Sum of unfavourable deviations = 28 dB

Rating according to BS EN ISO 717-1:2020, over the frequency range 100 Hz – 3150 Hz:
Rw (C;Ctr) = 37 (-1; -3) dB $C_{100\text{-}5000}$ = -0 dB $C_{tr100\text{-}5000}$ = -3 dB Sum of unfavourable deviations = 28.1 dB

Evaluation based on laboratory measurement

Al Futtaim Element Materials Technology Dubai L.L.C
Façade Testing & Advisory Services Division

AFE Sample Reference: DA4387B.2 Name of Test Institute: Al Futtaim Element MTD L.L.C

Tested by: Shibu Varghese

7. Controlled dismantle

AFE witnessed the controlled dismantle of the sample, performed visual & dimensional checks on the components, where possible, and compared them against the supplied information. Refer to the drawings in Appendix B - variation numbers are labelled thereon.

Any material properties, classifications, item no. / catalogue no. / brand references detailed in the drawings, if applicable, were not verified by AFE.

Date of dismantle: 6 February 2023

No variations were observed.

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Appendix A Drawings

The following one un-paginated sheet is a copy of Abanos Furniture & Decoration Industry LLC drawing numbered:

- AB/STD/FR-PSB/001 Rev. 0

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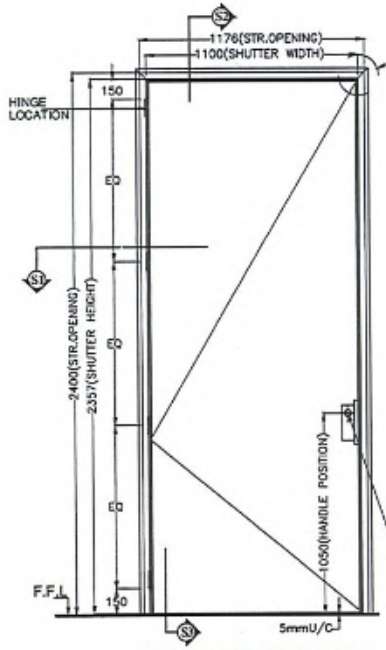
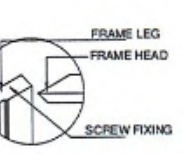
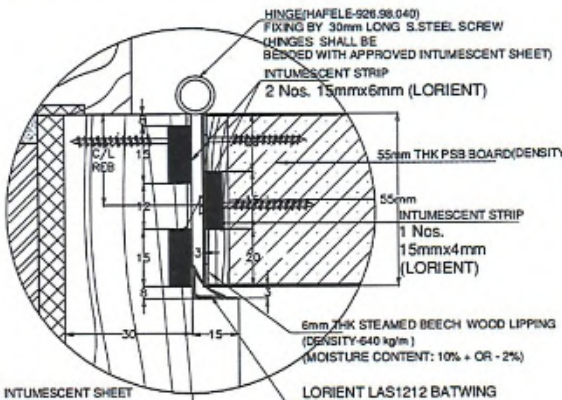
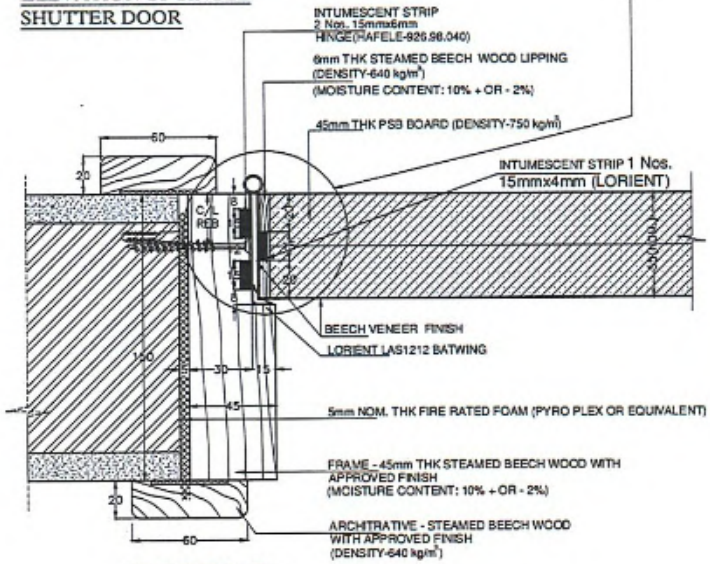


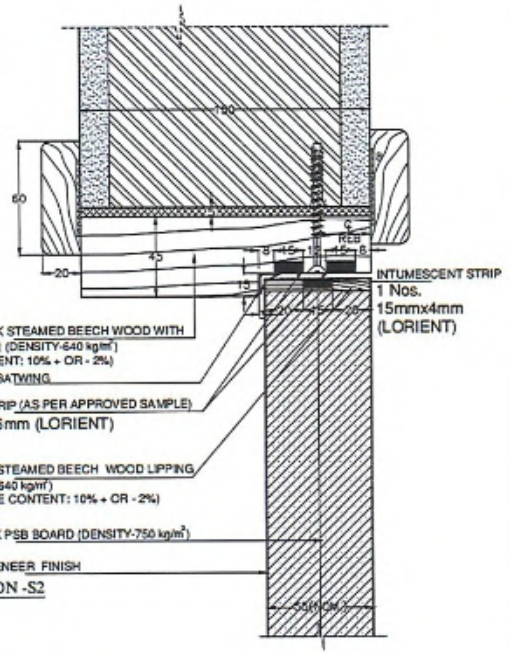
ELEVATION OF SINGLE SHUTTER DOOR







SECTION -S1



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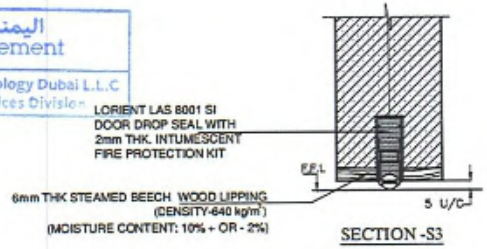

SECTION -S3

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PROJECT

ABANOS
FURNITURE & DECORATION INDUSTRY L.L.C

DRAWING TITLE

PROPOSED DETAILS FOR TIMBER FRAME AND PSB BOARD SHUTTER SINGLE DOOR (FOR TEST) (60MIN. FIRE RATED) OPTION-1

DRAWN BY	CHK.	APPD.	DATE
G.V.M		ASHRAF	22/01/23

SCALE | DRAWING NO. | REV.

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