APPLICATION REFERENCE: 23/00207

PLANNING CONDITION APPROVAL REPORT

18 Castle Street
Dover
Kent
CT16 1PW

Version 2
(19th October 2023)

INTRODUCTION

A recent Planning Approval notice for application number 23/00207 contained several conditions.

The following report provides additional information to satisfy conditions as noted.

Condition 4:

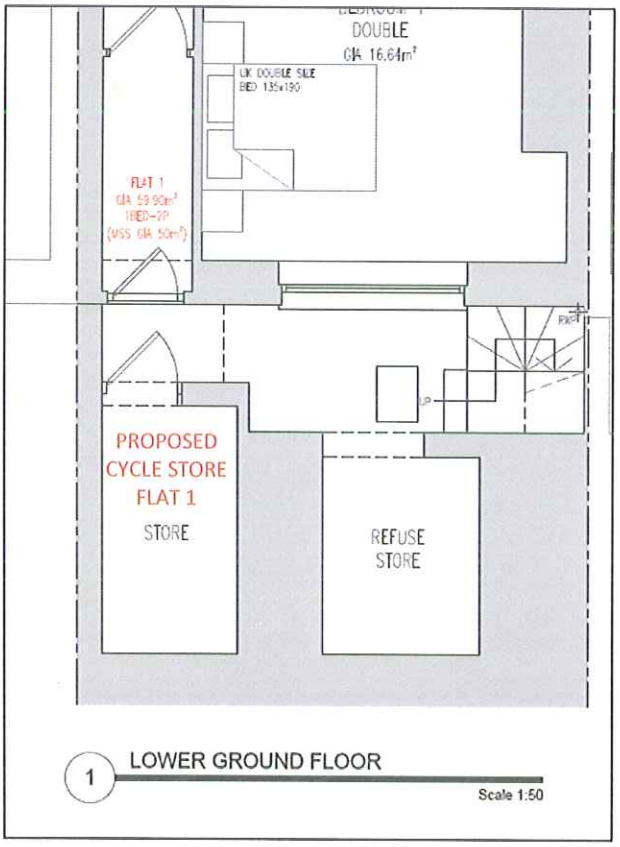
Prior to the first occupation of the development hereby approved, details of bicycle storage facilities shall be submitted to an approved in writing by the local planning authority. The approved bicycle storage shall be completed prior to the first occupation of the development and shall thereafter be retained solely for that purpose.

Reason: To ensure the provision and retention of adequate off-street parking facilities for bicycles in the interests of highway safety.

CONDITION 4: BICYCLE STORAGE

This section has been prepared to provide confirmation of the proposals and details in relation to planning condition 4 only

Discussions were held during the planning appraisal stages and it was confirmed that Flat 1 would have secure storage provided within the below-pavement store



The remaining flats would be provided with in-flat wall mounted bike storage solutions.

The proposed storage solution for Flats 2-4 are to provide 1nr wall-mounted storage bracket to the following manufacturers details:

a) **Details of in-flat bicycle storage solution**

Product: Peruzzo Indoor Bike Rack Wall Mount Storage
Supplier: Bankrupt Bike Parts
W: https://bankruptbikeparts.co.uk/

Product Description

- *A Real Quality, Stylish Indoor Bike Wall Mount Hanger from Italian Rack And Carrier Brand 'Peruzzo'*
- *The Wall Hanger Grip Rotates 360 Degrees So You Can Hang Your Bike At Almost Any Angle!*
- *Universal Grip Will Attach to Any Part Of Your Bikes Frame*
- *Keeps The Bike Horizontal At All Times*
- *Maximum Weight This Hanger Will Hold Is 20kg*
- *Very Convenient For Storing Your Bike Indoors And Out Of The Way Especially If You Live In A Flat Or Do Not Have Access To Traditional Storing Methods*
- *Includes Fittings To Attach To Your Wall*
- *Length: 320mm*
- *Weight: 1.2kg (Approx)*

Condition 5:

Prior to the first occupation of the development hereby approved, a scheme for internal sound insulation in situations where there is bedroom accommodation above or below kitchen/dining/living rooms in different units of accommodation, has been submitted to and approved in writing by the local planning authority. Such a scheme shall be at least 5dB greater than the levels required in Approved Document E of the Building Regulations, where this can be achieved without detriment to the historic fabric of the buildings. The approved details shall be fully implemented prior to the first occupation of the dwelling units to which they relate.

Reason: To protect the amenities of the future occupiers of the accommodation.

CONDITION 5: ACOUSTIC REQUIREMENTS

See Appendix A

APPENDIX A
ACCOUSTIC REPORT

MRL ACOUSTICS

NO. 18 CASTLE STREET

DOVER, KENT CT16 1PW

PART E : SOUND INSULATION DESIGN ADVICE

Report No. MRL/100/2037.1v1
October 2023

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October 2023

NO. 18 CASTLE STREET

DOVER, KENT CT16 1PW

PART E : SOUND INSULATION DESIGN ADVICE

Report prepared by:
MRL Acoustics Ltd
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TN24 0FU

On behalf of:
LTD Services Ltd

Report prepared by: Matthew Lawrence MSc MIOA – Principal Consultant	[redacted]

CONTENTS

1.0 INTRODUCTION

1.1 MRL Acoustics was commissioned by LTD Services Ltd to provide sound insulation design advice in relation to a proposed residential conversion scheme at No. 18 Castle Street, Dover, Kent CT16 1PW.

1.2 The development involves the conversion of an existing 4-storey former office building with basement level, to form 5 no. self-contained flats.

1.3 The Local Authority has granted planning permission for the development, subject to the following condition relating to noise:-

> 5 Prior to the first occupation of the development hereby approved, a scheme for internal sound insulation in situations where there is bedroom accommodation above or below kitchen/dining/living rooms in different units of accommodation, has been submitted to and approved in writing by the local planning authority. Such a scheme shall be at least 5dB greater than the levels required in Approved Document E of the Building Regulations, where this can be achieved without detriment to the historic fabric of the buildings. The approved details shall be fully implemented prior to the first occupation of the dwelling units to which they relate.
> Reason: To protect the amenities of the future occupiers of the accommodation.

1.4 The aim of this assessment was to review and assess the proposed party floor construction between the basement level and the ground floor level (as this is the only area where the above condition is applicable) to ensure compliance with the requirements of Part E of the Building Regulations (2003), along with general flanking sound transmission paths.

1.5 Our brief was to:

i) Visit site to inspect the existing separating floor construction and general building envelope;

ii) Review and assess the general construction in terms of flanking noise issues up and down any common walls;

iii) Provide design advice for the party floor construction to ensure that both the sound insulation performance requirements stated within Approved Document E (2003

Edition) of the Building Regulations and the Council planning condition are achieved.

1.6 This report outlines our findings and our recommendations.

1.7 All recommendations are given for acoustic reasons only and compliance with other requirements (e.g. fire protection/structural integrity, etc.) must be checked by other specialist members of the design team.

1.8 The noise assessment report was carried out and prepared by Matthew Lawrence who has over 29 years' experience in the acoustic industry and an MSc and Diploma in Acoustics & Noise Control, and who is a Member of the Institute of Acoustics (IOA).

1.9 MRL Acoustics Ltd is also a member of the Association of Noise Consultants (ANC).

1.10 Noise levels referred to in the text have been rounded to the nearest whole decibel (dB), as fractions of decibels are imperceptible.

1.11 An explanation of the various noise units, indices, acoustical and sound insulation terms used in this report is provided in Appendix I.

2.0 SOUND INSULATION PERFORMANCE REQUIREMENTS

2.1 The acoustic performance requirements for party walls and party floors in dwellings formed by material change of use and also for purpose-built dwellings are stated within Requirement E1 of Approved Document E (2003 Edition) of the Building Regulations.

Party Walls

2.2 For *airborne* sound insulation of party walls (i.e. resistance to the transmission of speech, music noise, television noise etc) the minimum acceptable level of sound insulation performance in terms of the Weighted Standardised Level Difference plus spectrum adaptation term ($D_{nT,w} + C_{tr}$) is **43 dB $D_{nT,w} + C_{tr}$ for dwellings formed by material change of use** and **45 dB $D_{nT,w} + C_{tr}$ for purpose-built dwellings.** Higher values of $D_{nT,w} + C_{tr}$ indicate better airborne sound insulation performance.

Party Floors

2.3 The required minimum acceptable level of *airborne* sound insulation for party floors in buildings is the same as for party walls, i.e. **43 dB ($D_{nT,w} + C_{tr}$) for dwellings formed by material change of use** and **45 dB ($D_{nT,w} + C_{tr}$) for purpose-built dwellings**.

2.4 Higher values of $D_{nT,w} + C_{tr}$ indicate better airborne sound insulation performance.

2.5 The required level of *impact* sound insulation performance for party floors in terms of the Weighted Standardised Impact Sound Pressure Level ($L'_{nT,w}$) is a value of no higher than **64 dB $L'_{nT,w}$ for dwellings formed by material change of use** and **62 dB $L'_{nT,w}$ for purpose-built dwellings.**

2.6 Lower values of $L'_{nT,w}$ indicate better impact sound insulation performance.

2.7 For situations where there are residential units above commercial premises, there is no requirement for impact sound insulation under Part E of the Building Regulations – it is only airborne sound that needs to be considered in these cases.

Reverberation in Communal Areas

2.8 Requirement E3 of Approved Document E states that for common parts of the building, i.e. corridors, stairwells, hallways and entrance halls **which provide direct access to the flats**, the design should ensure the prevention of more reverberant sound than is reasonable; there is no actual specified design reverberation time to achieve.

Party Walls to Corridors & Common Areas

2.9 Party walls between the flats and corridors, hallways, stairwells, etc. are required to achieve the same standard for airborne sound insulation as for party walls between flats.

2.10 However, these walls are not testable under Part E testing requirements and therefore any acoustic upgrading measures/construction details just need to be agreed with the Building Control Officer in advance and are not suitable for testing upon completion.

2.11 In most situations, where space is limited in stairwells and hallways, it is usually acceptable to line any existing masonry walls with either 1 or 2 layers of 15mm thick SoundBloc plasterboard (or similar dense plasterboard) on both sides of the wall, ideally on British Gypsum resilient bars.

2.12 For existing 100mm thick (i.e. single brick) masonry walls and single timber stud walls between flats and common areas, a new independent metal or timber frame stud wall set at least 25mm away from the existing wall and lined with 2 layers of 15mm thick SoundBloc plasterboard is the most effective method of improving the airborne sound insulation of these walls.

2.13 However, in most situations where space is limited, fitting the new plasterboard linings on resilient bars each side of the existing walls should ensure a sufficient level of airborne sound insulation to achieve Part E requirements.

3.0 SOUND INSULATION OF PARTY FLOORS

3.1 The Local Authority planning condition requires that the minimum level of airborne sound insulation of 43 dB $D_{nT,w} + C_{tr}$ outlined in Part E should be improved by +5 dB, i.e. a minimum level of 48 dB $D_{nT,w} + C_{tr}$ should be achieved.

3.2 In terms of impact sound insulation, the condition requires that the maximum permitted level of 64 dB $L'_{nT,w}$ outlined in Part E should also be improved by +5 dB, i.e. a maximum level of 59 dB $L'_{nT,w}$ should be achieved.

3.3 Based on our site inspection dated Thursday 12th October 2023, the existing separating floor consists of a timber joist floor construction comprising:-

- 4mm thick hardboard overlay;
- 20mm thick solid timber floorboards;
- 220mm deep timber joists with no insulation fitted;
- Exposed floor joists in the basement level and lath & plaster ceilings elsewhere.

3.4 Our recommendations for a scheme of upgrading measures to ensure both Part E compliance and demonstrate compliance with the planning condition for sound insulation are detailed in Section 4.0.

4.0 RECOMMENDED SCHEME OF UPGRADING MEASURES

4.1 We understand that as the building is historic Grade II listed, it is preferred that the majority of the sound insulation upgrading measures are applied to the underside of the separating floors.

4.2 We would therefore recommend the following scheme of upgrading measures:-

- Bond 6mm thick Isorubber onto the entire existing hardboard finish over the entire ground floor level (Thermal Economics), or;
- Bond 4.5mm thick Isocheck Re-Mat 5 onto the existing hardboard (Isomass), or;
- Bond 6mm thick Acoustilay onto the existing hardboard (Sound Solution Consultants), or;
- Bond 5mm thick Impacta Rubber onto the existing hardboard (JCW Acoustic Supplies), or;
- Bond 5mm thick Regupol Sonus Core 5 rubber mat onto the existing hardboard (Regupol), or;
- Bond 5mm thick FFR Acoustic Rubber mat onto the existing hardboard (Hush Acoustics), or;
- Install any other similar performing minimum 4 – 6mm thick rubber or foam resilient layer over the ground floor area;
- Fit a minimum of 100mm thick dense mineral wool insulation with a minimum density of at least 40 kg/m^3 in between the floor joists;
- Throughout the basement level, provide suspended MF ceilings fitted on resilient acoustic fixings, e.g. Genie Clips, Mute Clips, Gypframe Acoustic Hangers, etc. to provide the maximum air gap possible;

- The new suspended ceilings should be lined with 1 layer of 15mm SoundBloc plasterboard and 1 layer of 15mm Fireline board with the joints staggered and the edges taped and sealed.

4.3 Using our INSUL software, we have predicted that the party floor construction outlined above, if constructed properly with a high level of workmanship and attention to detail, should provide an airborne sound reduction level of approximately 64 dB R_w – 6 dB C_{tr}.

4.4 This would equate to an airborne sound insulation level of around 58 dB R_w which in turn can be approximated to 53 dB $D_{nT,w} + C_{tr}$. This approximate level of airborne sound insulation demonstrates compliance with the minimum levels required under both Part E and the Local Authority planning condition.

4.5 In terms of impact sound insulation, with the bonded resilient layer and the suspended MF ceilings below, it is considered that the proposed party floor upgrading measures should also comfortably achieve the maximum permitted levels required under Part E and the Local Authority planning condition.

4.6 The INSUL airborne sound calculation for the party floor scheme is shown in Appendix II at the end of this report.

General Guidance For Party Floors

4.7 However, for general good practice guidance for party floors, we would recommend the following:-

- Any common masonry walls that are continuous up the building and which connect the flats should have an inner leaf of masonry of 100mm minimum thickness with a **minimum density of at least 1200 kg/m³** to avoid flanking sound transmission up and down these common walls;

- Where the inner leaf of the common walls outlined above are less than 1200 kg/m³, then these walls should be lined with 2 x 15mm thick plasterboard as a minimum measure to minimise any flanking noise up and down these walls;

- Any acoustic wall linings **should be fitted after the new independent suspended acoustic ceilings** are fitted to avoid any flanking sound transmission paths up behind the new suspended ceilings;

- Any suspended plasterboard ceilings should not contain recessed down-lighters in them if possible; if they are fitted then there should be a maximum of 1 no. light per $2m^2$ of ceiling area and they must be acoustically rated units;

- All cavities around the perimeters of the party floors at junctions with the external walls must be filled with a suitable proprietary cavity wall barriers, if possible;

- Any service penetrations through the party floors will affect sound insulation. All voids around any pipes should be well sealed;

- Pipes should be wrapped with at least 25mm thick mineral wool quilt (minimum density 10 kg/m^3) to isolate them from the floor/ceiling and boxed in with 2 layers of 15mm thick SoundBloc plasterboard (or similar dense plasterboard with a combined nominal mass per unit area of at least 20 kg/m^2) fitted on an independent timber or metal stud frame, i.e. the plasterboard linings and framework should not touch the pipework;

- Any exposed steel beams or columns should be wrapped in at least 50mm thick mineral wool insulation and boxed-in using 2 layers of 15mm thick SoundBloc plasterboard (or similar dense plasterboard with a combined nominal mass per unit area of at least 20 kg/m^2) fitted on an independent timber or metal stud frame, i.e. the plasterboard linings and framework should not touch the steelwork.

5.0 REVERBERATION IN COMMON AREAS

5.1 Requirement E3 of Approved Document E states that the common internal parts of buildings that **provide access to flats or rooms for residential purposes** should be designed to prevent more reverberation than is reasonable. However, Requirement E3 only applies to communal areas and stairwells that provide **direct access** to the entrance doors of the flats.

5.2 Reverberation time of a space is a measure of the rate at which the sound decays and is defined as the time taken for the reverberant sound energy to decay corresponding to a 60 dB reduction in the sound level.

5.3 Reverberation is controlled by adding more acoustically absorbent material thus reducing the build-up of reflected sound energy. Rooms with excessive reverberation times result in higher general noise levels and poor speech intelligibility.

General Guidance for Reverberation Control

5.4 Section 7 of Approved Document E outlines two methods to determine the amount of acoustic absorption required in corridors, hallways and stairwells that give direct access to flats and rooms for residential purposes:-

Method A:

5.5 For entrance halls, corridors or hallways, cover an area equal to or greater than the floor area, with a Class C absorber or better. It will normally be convenient to cover the ceiling area with the additional absorption.

5.6 The most common approach is to line the entire celling areas in these spaces with a proprietary Class C sound absorbing ceiling tile or board fitted either directly to the plasterboard soffit or laid within a suspended metal grid system.

5.7 For stairwells or a stair enclosure, calculate the combined area of the stair treads, the upper surface of the intermediate landings, the upper surface of the landings (excluding ground floor) and the ceiling area on the top floor. Either; cover at least an area equal to this

calculated area with a Class D absorber; or cover an area equal to at least 50% of this calculated area with a Class C absorber or better. The absorptive material should be equally distributed between all floor levels.

5.8 It will normally be convenient to cover the underside of intermediate landings, the underside of the other landings, and the ceiling area on the top floor.

5.9 Method A can generally be satisfied by the use of proprietary acoustic ceilings. However, the absorptive material can be applied to any surface that faces into the space.

Method B:

5.10 Determine the minimum amount of absorptive material using a calculation procedure in octave bands.

5.11 For an absorptive material of surface area, S in m², and sound absorption coefficient, α, the absorption area A is equal to the product of S and α. The total absorption area, A_T, in square metres is defined as the hypothetical area of a totally absorbing surface, which if it were the only absorbing element in the space would give the same reverberation time as the space under consideration.

5.12 For n surfaces in a space, the total absorption area, A_T, can be found using the following equation:- $A_T = \alpha_1 S_1 + \alpha_2 S_2 + ... + \alpha_n S_n$.

5.13 For entrance halls, provide a minimum of 0.20m² total absorption area per cubic metre of the volume. The additional absorptive material should be distributed over the available surfaces.

5.14 For corridors or hallways, provide a minimum of 0.25m² total absorption area per cubic metre of the volume. The additional absorptive material should be distributed over one or more of the surfaces.

5.15 Absorption areas should be calculated for each octave band. Requirement E3 will be satisfied when the appropriate amount of absorption area is provided for each octave band between 250 Hz and 4000 Hz inclusively.

6.0 SUMMARY & CONCLUSIONS

6.1 An assessment has been undertaken on behalf of LTD Services Ltd of the sound insulation for the proposed residential development conversion scheme at No. 18 Castle Street, Dover, Kent CT16 1PW.

6.2 A design scheme for the party floor between the proposed flats at basement level and ground floor level has been provided that is capable of achieving the standards for both airborne sound insulation and impact sound insulation outlined under Requirement E1 of Approved Document E of the Building Regulations for flats formed by material change of use.

6.3 The Local Authority planning condition requiring a +5 dB improvement over and above the airborne and impact sound insulation requirements of Part E should also be achieved.

6.4 Measures to minimise flanking sound transmission have also been recommended for any common walls of the building, where applicable.

6.5 However, the potential sound reduction performance of the scheme will only be achieved if the building works are carried out with the greatest care and attention to detail in relation to the party walls and floors and flanking sound transmission paths along any common walls.

6.6 Pre-completion sound insulation testing is likely to be required for Building Control purposes at the end of the project to demonstrate compliance with Part E. Only practices with UKAS accreditation or those who are members of the Association of Noise Consultants' Registration Scheme are currently deemed qualified to carry out compliance tests required by Regulations 12A and 20A of Part E of the Building Regulations.

6.7 MRL Acoustics Ltd is a member of the Association of Noise Consultants' Registration Scheme and is therefore qualified to undertake such testing.

APPENDIX I – NOISE UNITS & INDICES

a) Sound Pressure Level and the decibel (dB)

A sound wave is a small fluctuation of atmospheric pressure. The human ear responds to these variations in pressure, producing the sensation of hearing. The ear can detect a very wide range of pressure variations. In order to cope with this wide range of pressure variations, a logarithmic scale is used to convert the values into manageable numbers. Although it might seem unusual to use a logarithmic scale to measure a physical phenomenon, it has been found that human hearing also responds to sound in an approximately logarithmic fashion. The dB (decibel) is the logarithmic unit used to describe sound (or noise) levels. The usual range of sound pressure levels is from 0 dB (threshold of hearing) to 120 dB (threshold of pain).

Due to the logarithmic nature of decibels, when two noises of the same level are combined together, the total noise level is (under normal circumstances) 3 dB(A) higher than each of the individual noise levels e.g. 60 dB(A) plus 60 dB(A) = 63 dB(A). In terms of perceived 'loudness', a 3 dB(A) variation in noise level is a relatively small (but nevertheless just noticeable) change. An increase in noise level of 10 dB(A) generally corresponds to a doubling of perceived loudness. Likewise, a reduction in noise level of 10 dB(A) generally corresponds to a halving of perceived loudness.

b) Frequency and Hertz (Hz)

As well as the loudness of a sound, the frequency content of a sound is also very important. Frequency is a measure of the rate of fluctuation of a sound wave. The unit used is cycles per second, or hertz (Hz). Sometimes large frequency values are written as kilohertz (kHz), where 1 kHz = 1000 Hz.

Young people with normal hearing can hear frequencies in the range 20 Hz to 20,000 Hz. However, the upper frequency limit gradually reduces as a person gets older.

c) A-weighting

The ear is not equally sensitive to sound at all frequencies. It is less sensitive to sound at low and very high frequencies, compared with the frequencies in between. Therefore, when measuring a sound made up of different frequencies, it is often useful to 'weight' each frequency appropriately, so that the measurement correlates better with what a person would actually hear. This is usually achieved by using an electronic filter called the 'A' weighting, which is built into sound level meters. Noise levels measured using the 'A' weighting are denoted dB(A) or dBLA.

d) Glossary of Terms

When a noise level is constant and does not fluctuate over time, it can be described adequately by measuring the dB(A) level. However, when the noise level varies with time, the measured dB(A) level will vary as well. In this case it is therefore not possible to represent the noise climate with a simple dB(A) value. In order to describe noise where the level is continuously varying, a number of other indices, including statistical parameters, are used. The indices used in this report are described below together with a glossary of terms.

Reverberation Time

The reverberation time (RT60) is the time taken for the sound pressure level (SPL) to reduce by 60 dB when the sound source is instantaneously cut off. Rooms with many hard surfaces are very reverberant and have long reverberation times.

Rooms with many acoustically absorbent finishes tend to have short reverberation times because the sound decays rapidly. T_{mf} is the RT60 within a space averaged across the 500 Hz, 1 kHz and 2 kHz octave bands.

These are the frequencies used for speech and by controlling reverberation at these frequencies, speech intelligibility can be improved.

L_{eq} This is the 'equivalent continuous noise level' which is an average of the total sound energy measured over a specified time period. In other words, L_{eq} is the level of a continuous noise which has the same total energy as the real fluctuating noise, measured over the same time period.

Bg The receiver room background noise level, L_{eq}

RT Measured reverberation time in receiver room in seconds.

RT_0 Standard reverberation time of 0.5 seconds.

R_w The weighted laboratory measured sound reduction of an element describing the sound transmitted through that element.

D Level difference, effectively D = source level - (receiver level corrected for Bg)

D_{nT} Standardised level difference, standardised to a receiver room reverberation time of 0.5 seconds, $D_{nT} = D + 10 \log (RT/RT_0)$

$D_{nT,w}$ Weighted standardised level difference, a single figure generated by comparing the D_{nT} with a reference curve. The reference curve is shifted in 1 dB steps until the sum of adverse deviation of the test curve, compared to the reference curve, is as large as possible, but no more than 32.0 dB. The value of the shifted reference curve at 500 Hz is taken as the $D_{nT,w}$. N.B. As $D_{nT,w}$ for airborne transmission represents a level difference, an improvement generates a larger figure.

$D_{nT(Tmf,max)}$

Standardised level difference, standardised to the maximum permitted receiver room T_{mf}.

$D_{nT(Tmf\ max),\ w}$

Weighted standardised level difference, a single figure generated by comparing the $D_{nT(Tmf,max)}$ with a reference curve. The reference curve is shifted in 1 dB steps until the sum of adverse deviation of the test curve, compared to the reference curve, is as large as possible, but no more than 32.0 dB. The value of the shifted reference curve at 500 Hz is taken as the $D_{nT(Tmf\ max),w}$. N.B. As $D_{nT(Tmf\ max),\ w}$ represents a level difference, an improvement generates a larger figure.

$L'_{nT,\ w}$

Weighted standardised impact sound pressure level, a single figure index used to describe the in-situ impact sound insulation performance of a floor. $L'_{nT,\ w}$ is determined by first measuring the amount of sound energy resulting beneath a floor (in one-third octave bands) produced by a specialised piece of equipment called a tapping machine. The tapping machine (as used in the UK) comprises of five hammers which are lifted and dropped at a precise frequency by a rotating camshaft. The one-third octave band levels measured beneath the floor are termed the impact sound pressure level, Li. A correction for the acoustic character of the receiving room is then applied yielding the standardised impact sound pressure level, L'_{nT}. The one-third octave band L'_{nT} values are then plotted on a graph and a reference curve fitted. $L'_{nT,\ w}$ is the L'_{nT} value on the reference curve corresponding to 500 Hz.

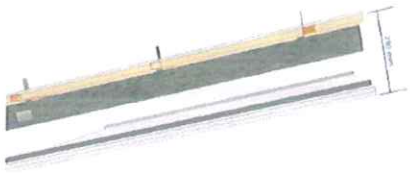
APPENDIX II – INSUL CALCULATION

Sound Insulation Prediction (v9.0.24)

INSUL

Program copyright Marshall Day Acoustics 2017
Margin of error is generally within Rw ±3 dB
MRL Acoustics Ltd - Key No. 1561
Job Name:
Job No.: Initials:mattl
Date:13/10/2023
File Name:No. 18 Castle Street, Dover Party Floor.ixl

Notes:



Rw 64 dB
C -1 dB
Ctr -6 dB

Mass-air-mass resonant frequency = =33 Hz
Panel Size = 2.7 m x 4.0 m
Partition surface mass = 47.5 kg/m²

System description

Panel 1 : 1 x 6 mm Rubber + 1 x 4 mm HardBoard
+ 1 x 20 mm Pine (ρ 490 kg/m3,E:4.9GPa,η:0.04, ρs 9.8 kg/m², fc:1020 Hz)

Frame: Solid Joist with Gyproc acoustic hanger (-23 mm x 45 mm). Stud spacing 600 mm ; Cavity Width 220 mm , 1 x Rockwool (40kg/m3) Thickness 100 mm ...
Panel 2 : 1 x 15 mm Gyproc SoundBloc 15mm + 1 x 15 mm Gyproc Fireline 15mm

freq.(Hz)	R(dB)	R(dB)
50	23	
63	30	27
80	36	
100	42	
125	46	45
160	50	
200	53	
250	56	55
315	58	
400	61	
500	63	62
630	64	
800	66	
1000	66	66
1250	65	
1600	67	
2000	70	67
2500	66	
3150	71	
4000	75	73
5000	79