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SOUND INSULATION INVESTIGATION REPORT

Report 10741.SI.01

Prepared on 6th February 2014

For:

Faucet Inn Limited

88-90 George Street

London

W1U 8PA

Site Address	Test Date	Tested by
Sir Richard Steele Public House, 97 Haverstock Hill, London, NW3 4RL	08/01/2014	Dan Green TechIOA

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1.0 INTRODUCTION

KP Acoustics Ltd., Britannia House, 11 Glenthorne Road, London, W6 0LH has been commissioned by Faucet Inn Limited, 88-90 George Street, London, W1U 8PA, to undertake a sound insulation investigation between all floors at the Sir Richard Steele Pub, 97 Haverstock Hill, London, NW3 4RL, under the provisions of Building Regulations Approved Document E (2003 Edition).

This report records the results of the sound insulation tests and details the procedures used throughout the measurement and post-processing phases.

The sound insulation tests detailed in this report were undertaken by Dan Green Tech IOA in full accordance with BS EN ISO 140-4: 1998 *"Field measurements of airborne sound insulation between rooms"*, BS EN ISO 140-7: 1998 *"Field measurements of impact sound insulation between rooms"* and the procedures described in Annex B of the Approved Document.

Please note that, although the sound insulation performance of the floor tested is assessed against Approved Document E (2003 Edition) of the Building Regulations 2000, the results are for indicative purposes only and for the purpose of providing advice on improvement works as deemed necessary.

2.0 METHODOLOGY

2.1 Airborne Tests

High volume "pink" noise was generated from two loudspeakers in the source room, positioned to obtain a diffuse sound field. A spatial average of the resulting one-third octave band noise levels between 100 Hz and 3150 Hz was obtained by using a moving microphone technique over a minimum period of 15 seconds at each of two positions.

The same measurement procedure was used in the receiver room.

The results of the tests were rated in accordance with BS EN ISO 717-1: 1997 "Rating of sound insulation in buildings and of building elements. Part 1 Airborne sound insulation".

2.2 Impact Tests

A tapping machine complying with Annex A of BS EN ISO 140-7 was placed in four different positions in the source room. The resulting one-third octave band noise levels between 100 Hz and 3150 Hz were measured at eight evenly distributed positions, for a minimum of five seconds at each position. Two receiver measurements were conducted for two source positions.

The results of the tests were rated in accordance with BS EN ISO 717-2: 1997 "Rating of sound insulation in buildings and of building elements. Part 2 Impact sound insulation".

2.3 Reverberation Time

Reverberation time measurements were taken following the procedure described below in order to correct the receiver levels for room characteristics.

The source was moved to the receiver room and "white noise" was generated and stopped instantaneously in order to measure the reverberation time in each of the one-third octave bands between 100 Hz and 3150 Hz. The internal programme of the meter was used to measure the decay time of the sound in the room. This was repeated nine times in each room in order to obtain an average result.

2.4 Background Noise

The background noise levels in the receiver rooms were measured during the tests and the receiving room levels corrected in accordance with BS EN ISO 140 Part 4.

The dominant source of background noise observed during the tests was road traffic noise from adjacent roads.

3.0 INSTRUMENTATION

The instrumentation used during testing is shown in Table 3.1 below.

Instrument	Manufacturer and Type	Serial Number
Precision integrating sound level meter & analyser	01dB-Sell Blue Solo Calibration No: 01244/2 Calibration Date 20th March 2013	60065
Active Loudspeaker	RCF ART 310A	KLXF29324
Active Loudspeaker	RCF ART 310A	HAX20864
Pink Noise Source	ALBA	12108-87502938
Pink Noise Source	ALBA	120988-78600161
Calibrator	B&K Type 4231 Calibration No: 01221/1 Calibration Date 26th February 2013	1897774
Specialist Software	01dB-Metravib dBBati	V5.2
Tapping machine	Sound Solutions Series 2 Calibration No: 01244/1 Calibration Date 25th March 2013	TP02059

Table 3.1 - Instrumentation used during testing

4.0 REQUIREMENTS

The sound insulation requirements for this development, as prescribed by Approved Document E (2003 Edition) of the Building Regulations 2000, are shown in Table 6.1 where they are compared to the test results.

5.0 TEST ROOMS

Details of the rooms tested are shown in Table 5.1 below. All the rooms tested were in a finished state, with doors fitted, walls painted and all sockets installed.

Test Element	Room 1	Room 2	Approximate Test Area	Construction
Floor	First Floor Bar Area	Second Floor Lounge	30m^2	Unknown at time of test
Floor	First Floor Bar Area	Second Floor Bedroom	28m^2	
Floor	First Floor Bar Area	Ground Floor Bar Area	80m^2	

Table 5.1 - Room details

All the procedures described in Annex B of Approved Document E 2003 of the Building Regulations 2000 have been followed.

6.0 RESULTS

The results of testing are summarised in the tables below. For airborne tests, the higher the value, the better the performance. For impact tests, the lower the value, the better the performance.

6.1 Airborne Tests

The summarised results of the airborne tests are shown in Table 6.1.

Test Element	Source	Receiver	Criterion	Test Result	Pass/ Fail
Floor	First Floor Bar Area	Second Floor Lounge	$D_{nT,w} + C_{tr} \geq 43dB$	$D_{nT,w} + C_{tr}$ 40dB	Fail
Floor	First Floor Bar Area	Second Floor Bedroom	$D_{nT,w} + C_{tr} \geq 43dB$	$D_{nT,w} + C_{tr}$ 41dB	Fail
Floor	First Floor Bar Area	Ground Floor Bar Area	$D_{nT,w} + C_{tr} \geq 43dB$	$D_{nT,w} + C_{tr}$ 40dB	Fail

Table 6.1 - Airborne Test Results

6.2 Impact Tests

The summarised results of the impact tests are shown in Table 6.2.

Test Element	Source	Receiver	Criterion	Test Result	Pass/ Fail
Floor	Second Floor Lounge	First Floor Bar Area	$L'_{nT,w} \leq 64dB$	$L'_{nT,w}$ 52dB	Pass
Floor	Second Floor Bedroom	First Floor Bar Area	$L'_{nT,w} \leq 64dB$	$L'_{nT,w}$ 55dB	Pass

Table 6.2 - Impact Test Results

7.0 DISCUSSION

As shown in Table 6.1, the airborne tests present a “fail” rating when assessed against Approved Document E (2003 edition) of the Building Regulations.

As shown in Table 6.2, the impact tests present a “pass” rating when assessed against Approved Document E (2003 edition) of the Building Regulations.

Design Criteria

In order to satisfy the requirements of ADE 2003 of the 2000 Building Regulations, the minimum sound insulation performance criteria, as shown in Table 7.1, should be met by all floor constructions (i.e. separating elements between different residential dwellings). For this development, the lower requirement for conversions applies.

	Design Criteria	
Element	**Airborne**	**Impact**
Floor	$D_{nT,w} + C_{tr} \geq 45$ dB for new build $D_{nT,w} + C_{tr} \geq 43$ dB for conversions	$L'_{nT,w} \leq 62$ dB for new build $L'_{nT,w} \leq 64$ dB conversions
Wall	$D_{nT,w} + C_{tr} \geq 45$ dB for new build $D_{nT,w} + C_{tr} \geq 43$ dB for conversions	-

Table 7.1 ADE design criteria for party elements

Party Floor System Between Residential Floors

It is understood that the current floor system is comprised of approximately 9" timber joists with the original floorboards installed. In order for the floor system to achieve the sound insulation requirements of Approved Document E (2003 Edition) of the current Building Regulations, it is recommended that the following acoustic treatments are applied.

- Remove current walking surfaces
- Installation of 100-150mm of mineral wool insulation (density 45kg/m^3) between the joists

Option 1 - With Sub-decking

We would suggest a product such as ScreedBoard 28 or JCW Acoustic Deck 33. This would provide a good improvement to the airborne performance and a much greater improvement to the impact sound insulation performance of the floor parallel to the adoption of any of the options as described in the previous section. Both products can be directly applied on the retained floorboards in a 'floating floor' configuration. The layer should be first bonded to the floor using acrylic adhesive and the walking floor surface bonded to the top of the layer. Any gap between the perimeter of the floor and the walls can be filled with any perimeter sealer, resilient material or a perimeter flanking strip.

Option 2 - Without sub-decking

If the existing floorboards are to be completely removed, we would recommend a specialised flooring system such as Cellecta Deckfon Quattro, JCW Deck 37 or similar. All above composite systems are comprised of a moisture resistant layer bonded to a layer of acoustic foam bonded to a resilient layer. They can be directly applied on the existing joists in a 'floating floor' configuration. That means that no fixings should penetrate it into the joists, as this would reduce drastically the overall performance of the floor.

Party Floor System Between Ground Floor Pub and First Floor Residential

In order to address the airborne sound insulation for the single joist system, changes would need to be adopted to the underfloor soffit. However, this would not be possible. We would therefore recommend the following:

- Removal of all current floorboards within the First Floor
- Installation of dense mineral wool (thickness 100-150mm, density 60kg/m3) between the joists, not tightly packed as this would form an acoustic bridge.
- Installation of an intermediate mass element (19mm Gyproc Plank, or 15mm Fermacell) on timber noggins, or steel angles.
- Direct fixing of 1x19mm Lamaphon cementitious board on the joists
- 45mm resilient battens as a floating layer with 25mm mineral wool (60kg/m3 density) within the formed void
- Direct fixing of 1x19mm Lamaphon cementitious board on the battens as the end decking. This layer can then accommodate the end walking surface.

The above floor system would be expected to achieve airborne sound insulation performance values of approximately 50-55 dB $D_{nT,w} + _{Ctr}$, therefore comfortably satisfying Building Regulations requirements.

Wall Sound Insulation

For the case of the wall between the stairwell and the living spaces, the proposals should include 2 layers of 12.5mm FireLine board on each side of a 75-100mm timber stud frame with 75mm (min.) of mineral wool (45kg/m^3) between the two leaves. This system would be considered satisfactory for a good degree of isolation between the common and living spaces. A combination, however, of one layer of Fireline and one layer of SoundBloc would be ideal since it would provide a significant increase in the total mass per unit area. Small gaps should be packed with mineral wool. Larger gaps should be covered with single or double plasterboard pattress.

Should a more uniform design be desired, which could be used as the party wall system between flats and optimise for time, cost and performance, we would recommend the following:

- 2x12.5mm SoundBloc
- Two rows of 60mm Gypframe I-studs in 72mm floor and ceiling channel, staggered within the channel at 300mm centres
- 50mm mineral wool insulation (45kg/m^3 density)
- 2x12.5mm SoundBloc

General Advice

For airborne sound insulation, special attention should be given to workmanship regarding the proper sealing of junctions and penetration details. Where any gaps between external (flanking) walls and floors exist, they should be caulked with sealant or similar type material. It should be also noted that flanking strips (Yelofon ES5/100) should be installed around the perimeter of the floor to isolate the floor from walls and skirtings. The strip should be turned up so that the skirting boards rest on them and any excess cut away.

Ideally, a gap between the head of the wall and the underside of the soffit should not be greater than 10mm. A polyethylene backing rod could be inserted in the gap with tightly packed mineral wool while silicone caulk is used to seal the joint.

In the case of any new walls, isolation strips would need to be used, which would isolate the wall leaves from the sub-floor, therefore minimising any flanking paths. Please note that a material such as Monarfloor or Regupol Isolation Strip can be used to isolate any new walls built on any steel structure.

Chimney breasts which bridge two or more separate dwellings should be bricked up in order to stop any flanking of noise via the cavity. The section directly adjacent to the separating floor should be completely filled and any gaps sealed with non-setting mastic of packed with mineral wool. Should the use of bricks not be desired, we would recommend the pattressing of the fireplace by two layers of 15mm SoundBloc with proper sealing of the junctions with non-setting mastic. The installation of a blockage at right angles to the direction of the chimney shaft would also be recommended. We would suggest the installation of a layer of SuperLag Quietslab. This is a sandwich system which is comprised of two 50mm layers of compressed high-density mineral wool slabs (60kg/m^3) separated by a 10kg/m^2 heavy PVC film.

8.0 CONCLUSIONS

Sound Insulation tests were undertaken at 97 Haverstock Hill, London, under the requirement of Building Regulations 2000 Approved Document E (2003 Edition).

Rating of the airborne sound insulation of the floor tested has been calculated in accordance with the measurement and rating procedures defined in BS EN ISO 140 Part 4 and BS EN ISO 717 Part 1, respectively.

Rating of the impact sound insulation of the floor has been derived in accordance with the measurement and rating procedures defined in BS EN ISO 140 Part 7 and BS EN ISO 717 Part 2, respectively.

Guidelines for the improvement of the floor's sound insulation performance have been proposed which, should they be followed, would provide an additional psychoacoustic and pragmatic benefit for the tenants of both Flats 2 and 1 by means of a significant reduction in airborne and impact noise transmission.

Report by

Dan Green TechIOA

KP Acoustics Ltd

Checked by

Kyriakos Papanagiotou MIOA

KP Acoustics Ltd

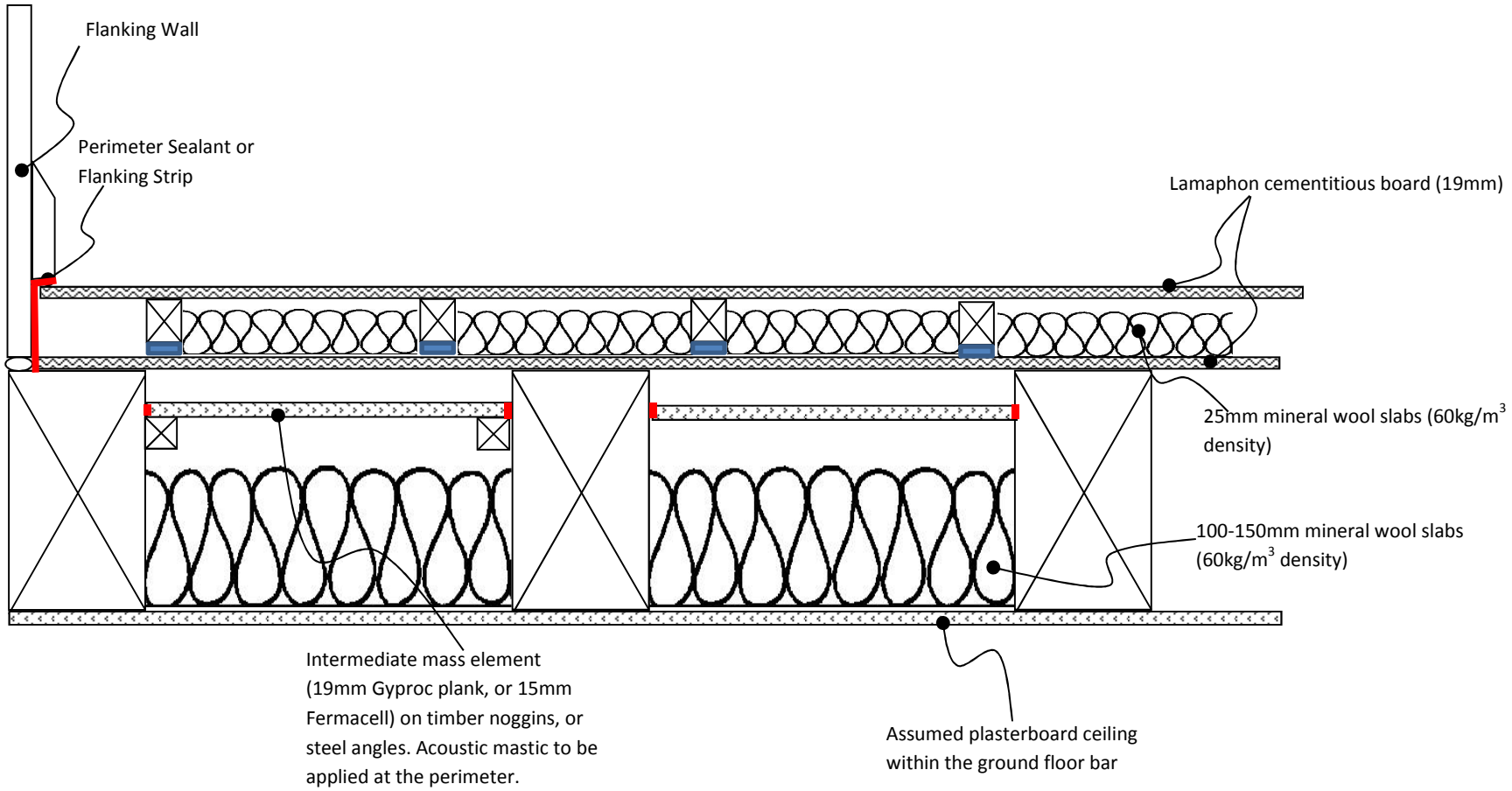
Manufacturer and contact details for specialised materials

Fireline/SoundBloc plasterboard, resilient bars/hangers, Gyproc Plank
British Gypsum
Sales Tel: 0800 225225

Lamaphon Cementitious board
Siderise
Ask for Mike Carrick
T: 0208 391 3650

JCW Acoustic Deck 33 / JCW Deck 37
JCW
Ask for John Cook
M: 07833 433 335

Cellecta Deckfon Quattro / Screedboard 28 / Flanking Strip
Cellecta
Ask for Lee Baxter
M: 07780 74 88 44



Title:

Floor Sound Insulation between first floor flats and ground floor bar - NTS

Date: 7 February 2014
Revision: A

FIGURE 10741.DWG1

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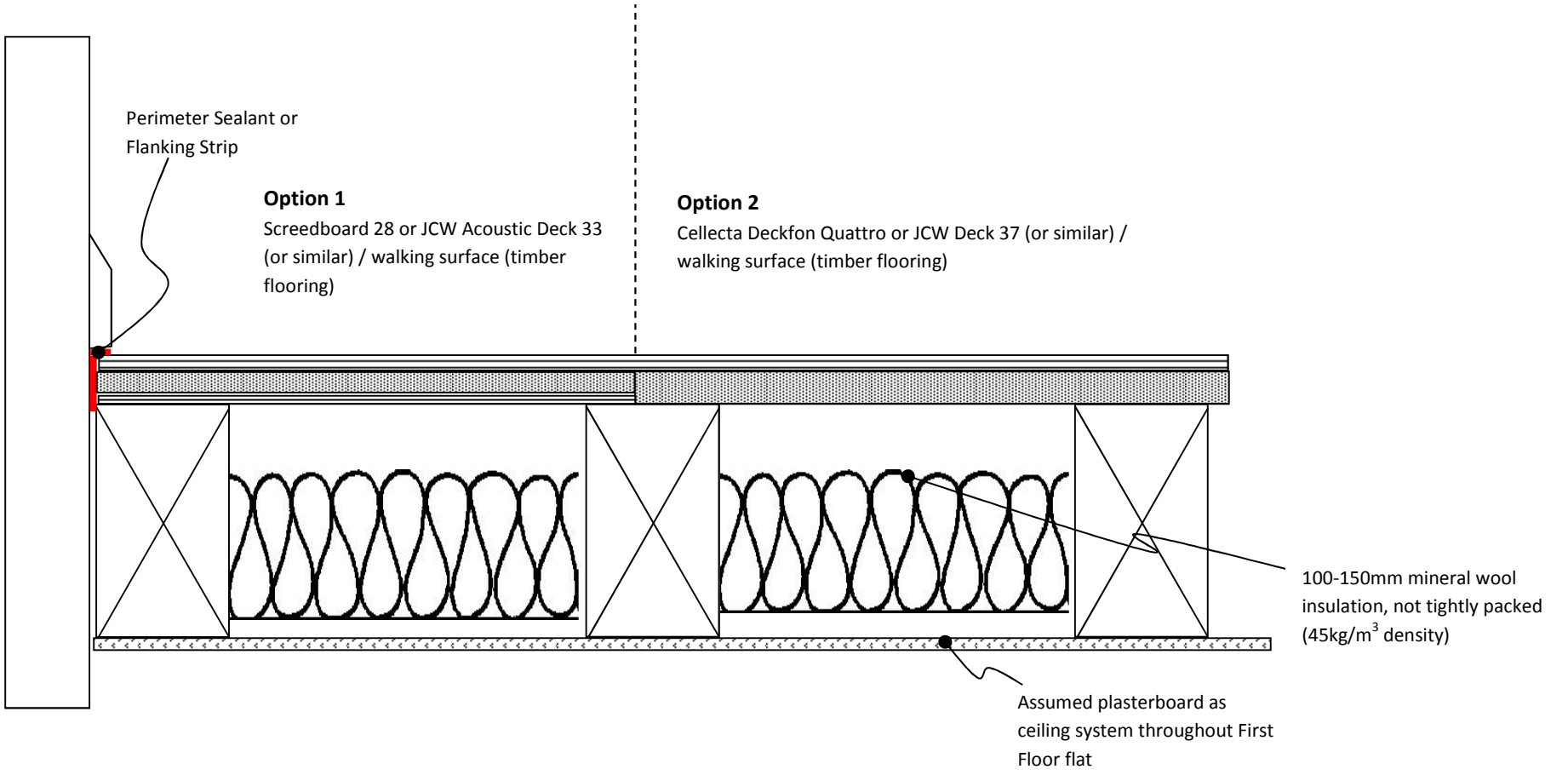

Title:

Proposed Floor Upgrade Measures Between Residential Flats (NTS)

Date: 7 February 2014
Revision: A

FIGURE 10741.DWG2

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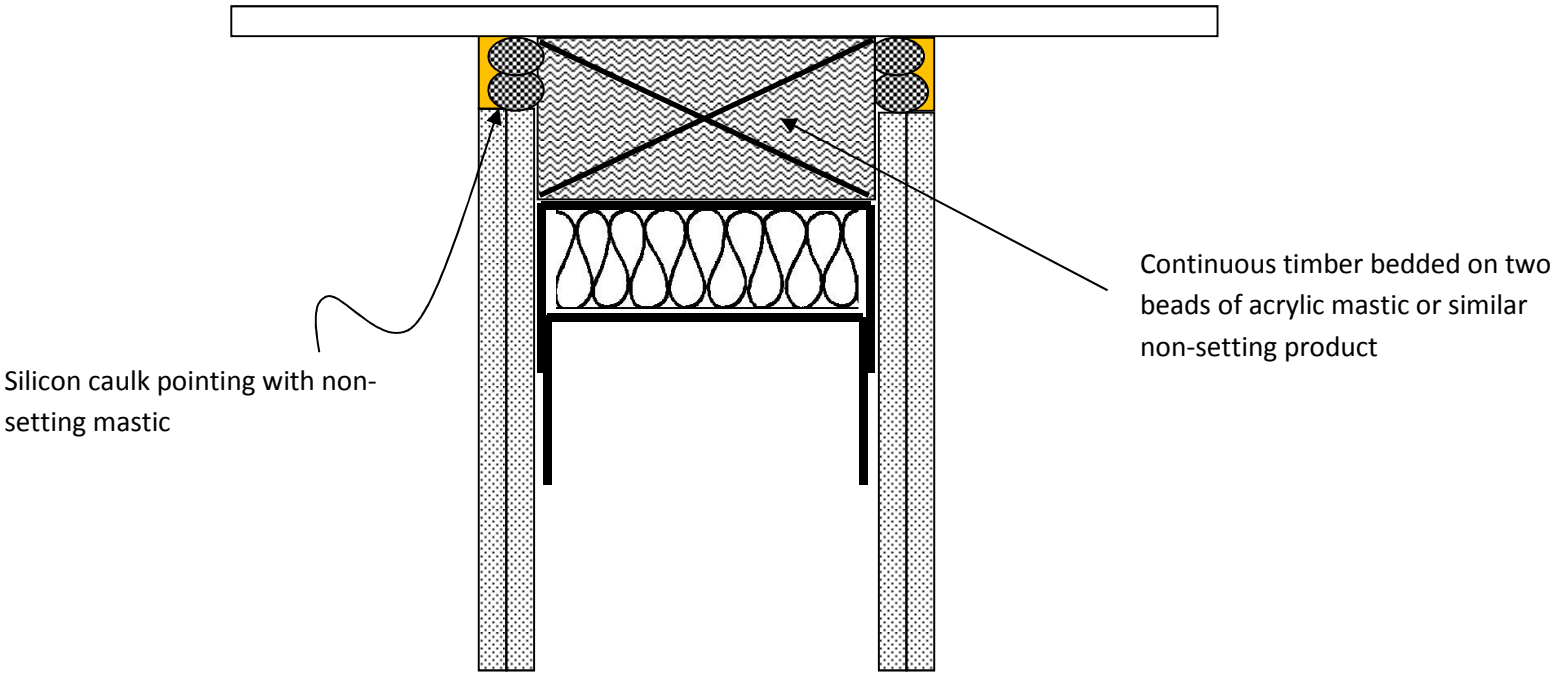

Title:

Deflection Head Detail

Date: 7 February 2014
Revision: A

FIGURE 10741.DWG3

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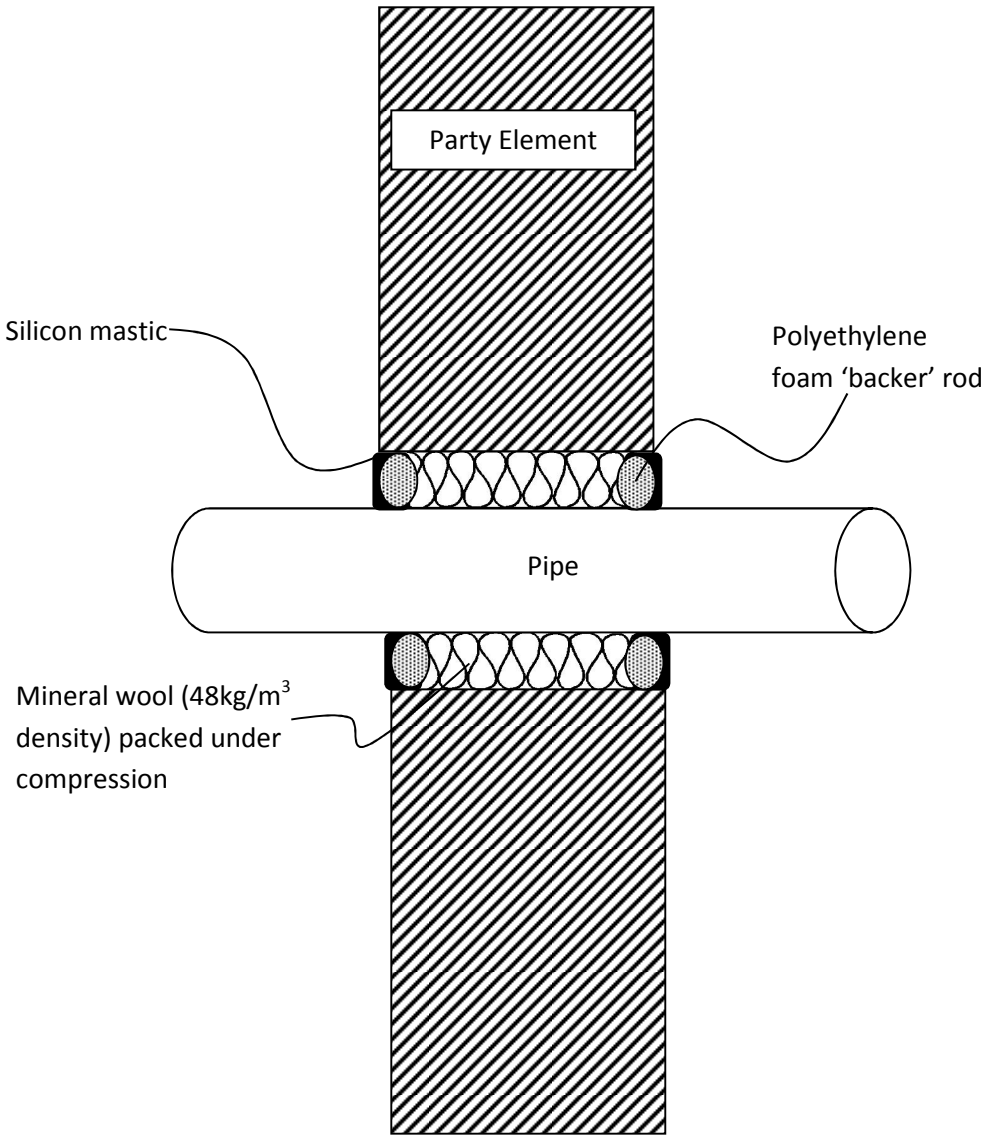

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	FIGURE10741.DWG4	