0444

# Technical Report

80464-SRL-RP-XT-001-P1

## Project

The Laboratory Measurement of the Sound Reduction Index of Stud Wall Systems

## Prepared for

Hadley Group

## By

Richard Calvert

## Published

21 February 2022

Template Ref: Lab Edition 5 – Mar 2021

UKAS TESTING
0444

| Quality Assurance | |
|---|---|
| Project Title | The Laboratory Measurement of the Sound Reduction Index of Stud Wall Systems |
| Document Title | Laboratory Test Report |
| Client | Hadley Group |
| Client Address | Downing Street<br>Smethwick<br>West Midlands<br>B66 2PA |
| Author | Richard Calvert |
| Checker | Allen Smalls |
| Report Number | 80464-SRL-RP-XT-001-P1 |

Report Version History

| Version | Date | Comments |
|---|---|---|
| **P1** | 21/02/2022 | |
| | | |
| | | |

**Richard Calvert**
Tester
For and on behalf of
SRL Technical Services Limited
Tel: 01787 247595
Email: rcalvert@srltsl.com

**Allen Smalls**
Quality Manager

## Contents

## 1.0 Description of Test

Tests have been done in SRL's Laboratory at Holbrook House, Sudbury, Suffolk, to determine the sound reduction index of stud wall systems in accordance with BS EN ISO 10140-2:2010.

The results are given in 1/3rd octave bands over the frequency range 50Hz to 10kHz, which is beyond that required by the test standard. Measurements outside the standard frequency range are not UKAS accredited.

### 1.1 Description of Sample

Various stud wall systems were tested – see Section 2.0, Data Sheets 1 to 7 and Drawings 1 to 7 for details.

| | |
|---|---|
| Sampling plan: | Enough for test only |
| Sample condition: | New |
| Details supplied by: | Hadley Group |
| Sample installed by: | SRL Technical Services Ltd |

### 1.2 Sample Delivery Date

14 February 2021

### 1.3 Test Procedures

The sample was mounted/located and tested in accordance with the relevant standard. The details of measurements are given in Appendix A. The method and procedure are described in Appendix B. The measurement uncertainty is given in Appendix C.

## 2.0 Results

The results of the measurements and subsequent analysis are given in Data Sheets 1 to 7 and summarised below.

Results relate only to the items as received and tested.

| SRL Test No. | Description in Brief | $R_w$ ($C;C_{tr}$) |
|---|---|---|
| 1 | 2x15mm Gtec Fire Board, twin 50mm C studs @ 600mm centres, studs braced @ 1200mm centres with Hadley flat strap on each stud, 2x50mm APR, 2x15mm Gtec Fire Board. Overall width 200mm. | 61 (-3;-8) dB |
| 2 | 2x12.5mm Gyproc SoundBloc, twin 50mm C studs @ 600mm centres, studs braced @ 1200mm centres with Hadley flat strap on each stud, 2x50mm APR, 2x12.5mm Gyproc SoundBloc. Overall width 250mm. | 63 (-2;-8) dB |
| 3 | 2x12.5mm Gyproc SoundBloc, twin 50mm Hadley I studs @ 600mm centres, 2x50mm APR, 2x12.5mm Gyproc SoundBloc. Overall width 250mm. | 65 (-2;-7) dB |
| 4 | 2x15mm Gtec Fire Board, twin 50mm Hadley I studs @ 600mm centres, 2x50mm APR, 2x15mm Gtec Fire Board. Overall width 200mm. | 63 (-1;-6) dB |
| 5 | 2x15mm Gyproc SoundBloc, 60mm Hadley I studs @ 300mm centres staggered in 72mm channel, 50mm APR, 2x15mm Gyproc SoundBloc. Overall width 132mm. | 60 (-2;-6) dB |
| 6 | 2x15mm Knauf Soundshield Plus, 60mm Hadley I studs @ 300mm centres staggered in 72mm channel, 50mm APR, 2x15mm Knauf Soundshield Plus. Overall width 132mm. | 58 (-3;-7) dB |
| 7 | 2x15mm Gtec dB, 60mm Hadley I studs @ 300mm centres staggered in 72mm channel, 50mm APR, 2x15mm Gtec dB. Overall width 132mm. | 56 (-2;-6) dB |

0444

## Data Sheet 1

Laboratory Measurement of Sound Reduction Index to BS EN ISO 10140-2:2010

| | | | | |
|---|---|---|---|---|
| **Test Number:** | 1 | **Test Room:** | **Source** | **Receiving** |
| **Client:** | Hadley Group | **Air Temperature:** | 9.7 °C | 9.8 °C |
| **Test Date:** | 15/02/2022 | **Air Humidity:** | 72 % | 75 % |
| **Sample Height:** | 2.62 m | **Volume:** | 60.9 m³ | 57.4 m³ |
| **Sample Width:** | 4.18 m | **Air Pressure:** | 996 mbar | |
| **Sample Weight:** | 51.6 kg/m² | | | |

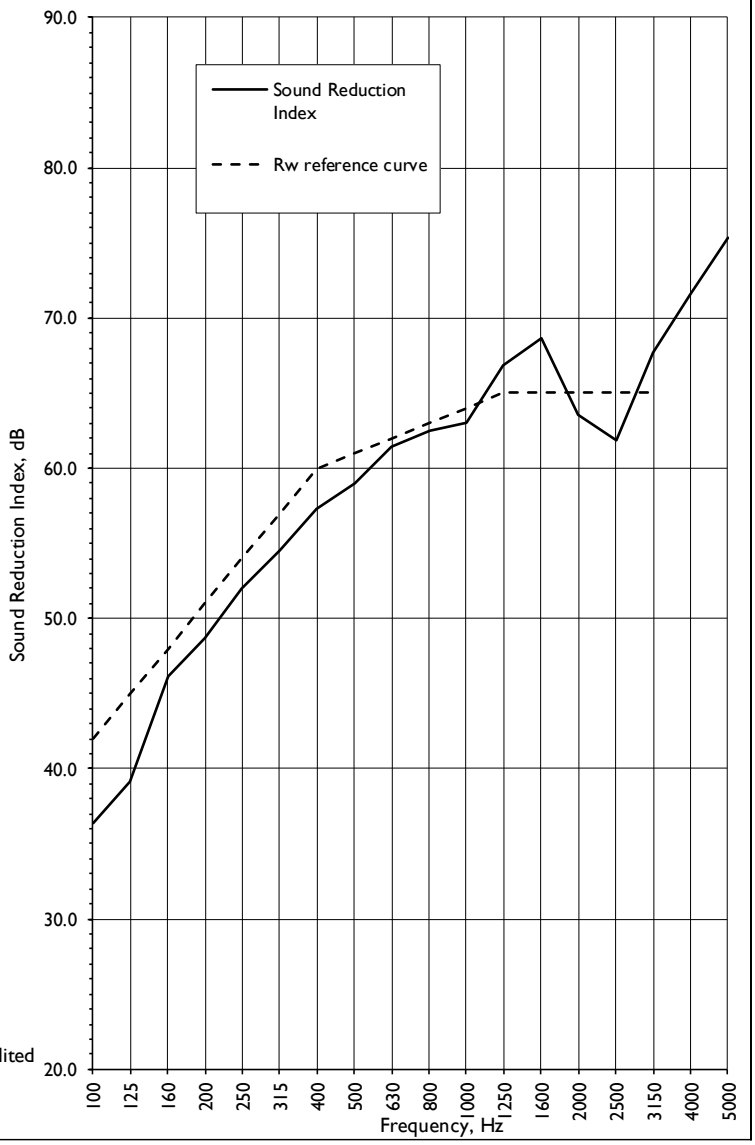
**Product Identification:** **2x15mm Gtec Fire Board, twin 50mm C studs @ 600mm centres, studs braced @ 1200mm centres with Hadley flat strap on each stud, 2x50mm APR, 2x15mm Gtec Fire Board. Overall width 200mm.**

| Frequency Hz | Sound Reduction Index, dB | | |
|---|---|---|---|
| | ⅓ Oct | | Octave |
| 50+ | 21.0 | | 24.7 |
| 63+ | 29.6 | | |
| 80+ | 29.9 | | |
| 100 | 36.4 | | 39.0 |
| 125 | 39.1 | | |
| 160 | 46.2 | | |
| 200 | 48.7 | | 51.1 |
| 250 | 52.0 | | |
| 315 | 54.5 | | |
| 400 | 57.3 | | 58.9 |
| 500 | 59.0 | | |
| 630 | 61.4 | | |
| 800 | 62.5 | | 63.7 |
| 1000 | 63.0 | | |
| 1250 | 66.8 | | |
| 1600 | 68.7 | | 63.9 |
| 2000 | 63.6 | | |
| 2500 | 61.9 | | |
| 3150 | 67.7 | | 70.5 |
| 4000 | 71.5 | | |
| 5000 | 75.3 | | |
| 6300+ | 78.8 | * | 78.7 |
| 8000+ | 80.5 | > | |
| 10000+ | 77.4 | > | |
| Average 100-3150 | 56.8 | | SRL Version 20.1124.15.09 |

* shows measurement corrected for background

> shows measurement limited by background

\+ shows Frequency beyond standard and not UKAS accredited




Rating according to BS EN ISO 717-1:2013

**$R_w(C;C_{tr})$= 61 (-3;-8) dB**

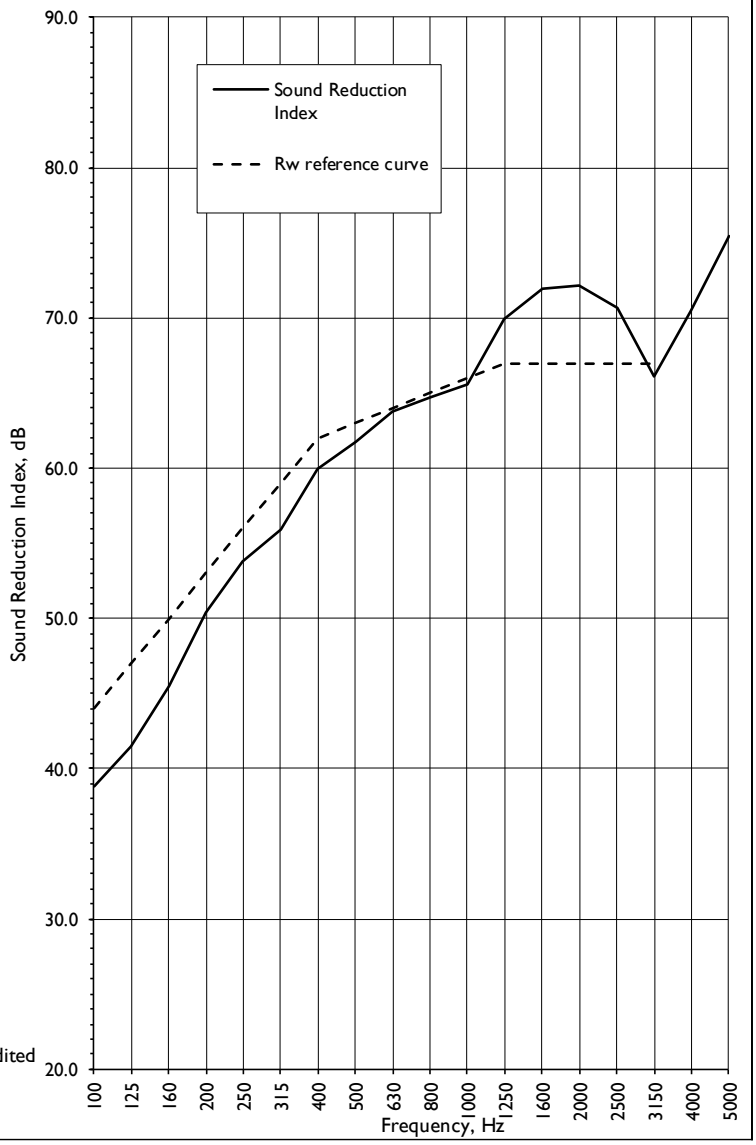
## Data Sheet 2

Laboratory Measurement of Sound Reduction Index to BS EN ISO 10140-2:2010

| | | | Test Room: | Source | Receiving |
|---|---|---|---|---|---|
| **Test Number:** | 2 | | **Air Temperature:** | 9.8 °C | 9.9 °C |
| **Client:** | Hadley Group | | **Air Humidity:** | 73 % | 76 % |
| **Test Date:** | 15/02/2022 | | **Volume:** | 60.9 m³ | 57 m³ |
| **Sample Height:** | 2.62 m | | **Air Pressure:** | 995 mbar | |
| **Sample Width:** | 4.18 m | | | | |
| **Sample Weight:** | 47.2 kg/m² | | | | |

**Product Identification:** **2x12.5mm Gyproc SoundBloc, twin 50mm C studs @ 600mm centres, studs braced @ 1200mm centres with Hadley flat strap on each stud, 2x50mm APR, 2x12.5mm Gyproc SoundBloc. Overall width 250mm.**

| Frequency Hz | Sound Reduction Index, dB | | |
|---|---|---|---|
| | ⅓ Oct | Octave | |
| 50+ | 22.1 | | 26.0 |
| 63+ | 30.1 | | |
| 80+ | 33.9 | | |
| 100 | 38.8 | | 41.1 |
| 125 | 41.5 | | |
| 160 | 45.5 | | |
| 200 | 50.4 | | 52.8 |
| 250 | 53.8 | | |
| 315 | 55.9 | | |
| 400 | 59.9 | | 61.5 |
| 500 | 61.8 | | |
| 630 | 63.8 | | |
| 800 | 64.7 | | 66.2 |
| 1000 | 65.6 | | |
| 1250 | 69.9 | | |
| 1600 | 71.9 | | 71.6 |
| 2000 | 72.2 | | |
| 2500 | 70.7 | | |
| 3150 | 66.1 | | 69.2 |
| 4000 | 70.5 | | |
| 5000 | 75.4 | | |
| 6300+ | 79.4 | * | 79.1 |
| 8000+ | 81.1 | > | |
| 10000+ | 77.5 | > | |
| Average 100-3150 | 59.5 | | SRL Version 20.1124.15.09 |




* shows measurement corrected for background

> shows measurement limited by background

\+ shows Frequency beyond standard and not UKAS accredited

Rating according to BS EN ISO 717-1:2013

**$R_w(C;C_{tr})$= 63 (-2;-8) dB**

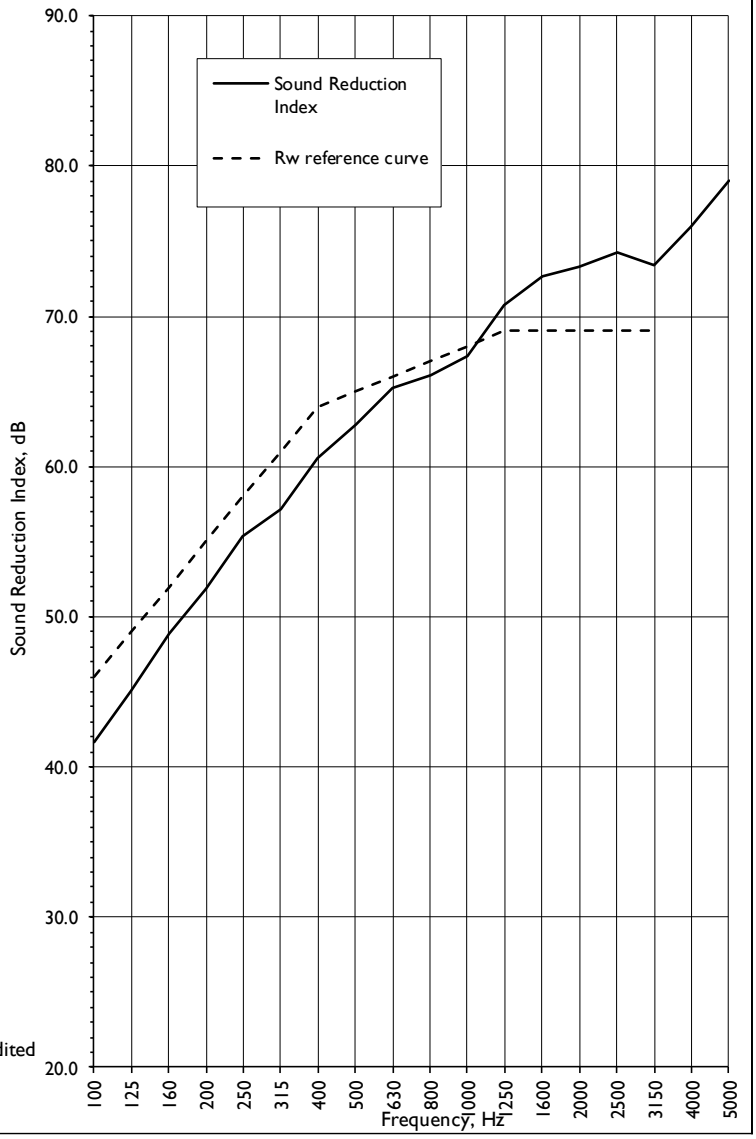
## Data Sheet 3

Laboratory Measurement of Sound Reduction Index to BS EN ISO 10140-2:2010

| | | | Source | Receiving |
|---|---|---|---|---|
| **Test Number:** | 3 | **Test Room:** | | |
| **Client:** | Hadley Group | **Air Temperature:** | 10 °C | 9.9 °C |
| **Test Date:** | 15/02/2022 | **Air Humidity:** | 74 % | 77 % |
| **Sample Height:** | 2.62 m | **Volume:** | 60.9 m³ | 57 m³ |
| **Sample Width:** | 4.18 m | **Air Pressure:** | 994 mbar | |
| **Sample Weight:** | 47.2 kg/m² | | | |

**Product Identification:** **2x12.5mm Gyproc SoundBloc, twin 50mm Hadley I studs @ 600mm centres, 2x50mm APR, 2x12.5mm Gyproc SoundBloc. Overall width 250mm.**

| Frequency Hz | Sound Reduction Index, dB | | |
|---|---|---|---|
| | ⅓ Oct | | Octave |
| 50+ | 25.7 | | 29.4 |
| 63+ | 33.5 | | |
| 80+ | 35.7 | | |
| 100 | 41.7 | | 44.3 |
| 125 | 45.1 | | |
| 160 | 48.9 | | |
| 200 | 51.8 | | 54.2 |
| 250 | 55.3 | | |
| 315 | 57.2 | | |
| 400 | 60.6 | | 62.5 |
| 500 | 62.8 | | |
| 630 | 65.2 | | |
| 800 | 66.1 | | 67.6 |
| 1000 | 67.3 | | |
| 1250 | 70.7 | | |
| 1600 | 72.7 | | 73.4 |
| 2000 | 73.3 | | |
| 2500 | 74.2 | | |
| 3150 | 73.4 | | 75.5 |
| 4000 | 75.9 | | |
| 5000 | 79.0 | * | |
| 6300+ | 81.6 | * | 80.0 |
| 8000+ | 81.8 | > | |
| 10000+ | 77.8 | > | |
| Average 100-3150 | 61.6 | | SRL Version 20.1124.15.09 |




* shows measurement corrected for background

> shows measurement limited by background

\+ shows Frequency beyond standard and not UKAS accredited

Rating according to BS EN ISO 717-1:2013

**$R_w(C;C_{tr})$= 65 (-2;-7) dB**

## Data Sheet 4

Laboratory Measurement of Sound Reduction Index to BS EN ISO 10140-2:2010

| | | | Test Room: | Source | Receiving |
|---|---|---|---|---|---|
| **Test Number:** | 4 | | **Air Temperature:** | 10.1 °C | 10.1 °C |
| **Client:** | Hadley Group | | **Air Humidity:** | 79 % | 82 % |
| **Test Date:** | 16/02/2022 | | **Volume:** | 60.9 m³ | 57.4 m³ |
| **Sample Height:** | 2.62 m | | **Air Pressure:** | 987 mbar | |
| **Sample Width:** | 4.18 m | | | | |
| **Sample Weight:** | 51.6 kg/m² | | | | |

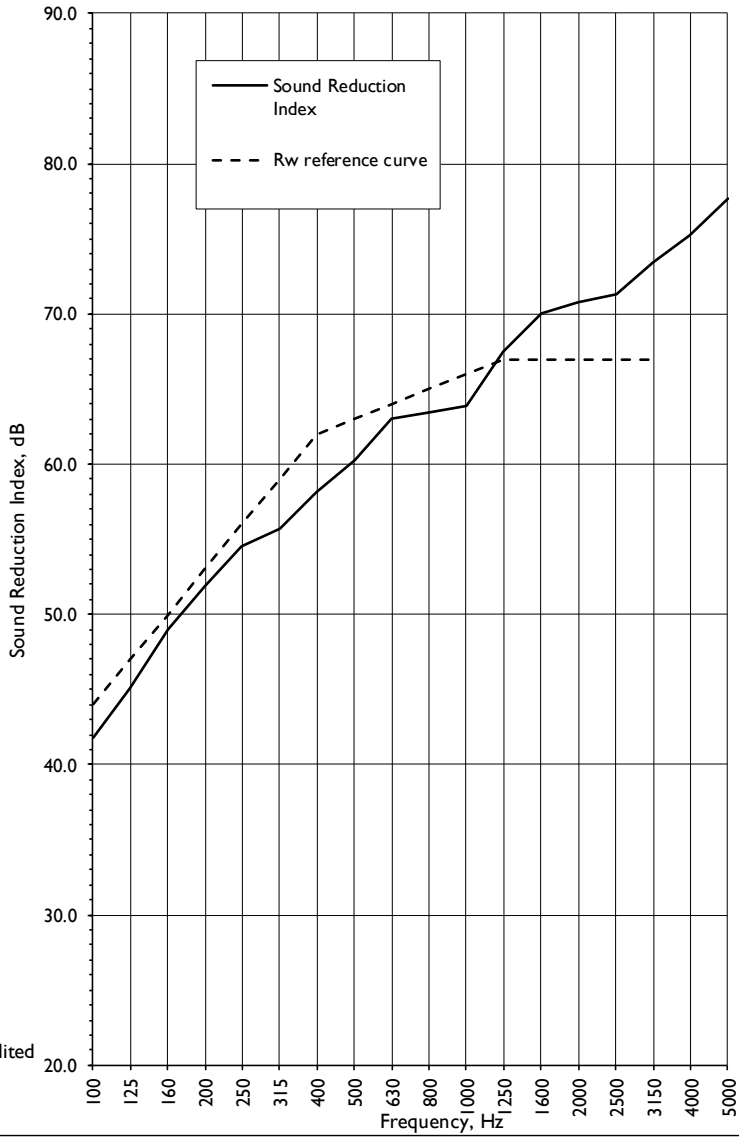
**Product Identification:** **2x15mm Gtec Fire Board, twin 50mm Hadley I studs @ 600mm centres, 2x50mm APR, 2x15mm Gtec Fire Board. Overall width 200mm.**

| Frequency Hz | Sound Reduction Index, dB | |
|---|---|---|
| | ⅓ Oct | Octave |
| 50+ | 26.1 | 29.9 |
| 63+ | 34.1 | |
| 80+ | 36.6 | |
| 100 | 41.8 | 44.4 |
| 125 | 45.1 | |
| 160 | 49.0 | |
| 200 | 51.9 | 53.7 |
| 250 | 54.5 | |
| 315 | 55.7 | |
| 400 | 58.1 | 60.0 |
| 500 | 60.3 | |
| 630 | 63.0 | |
| 800 | 63.5 | 64.6 |
| 1000 | 63.9 | |
| 1250 | 67.5 | |
| 1600 | 70.0 | 70.7 |
| 2000 | 70.8 | |
| 2500 | 71.3 | |
| 3150 | 73.4 | 75.1 |
| 4000 | 75.2 | |
| 5000 | 77.7 * | |
| 6300+ | 79.5 * | 72.7 |
| 8000+ | 75.1 * | |
| 10000+ | 69.3 * | |
| Average 100-3150 | 60.0 | SRL Version 20.1124.15.09 |

* shows measurement corrected for background

> shows measurement limited by background

\+ shows Frequency beyond standard and not UKAS accredited




Rating according to BS EN ISO 717-1:2013

**$R_w(C;C_{tr})$= 63 (-1;-6) dB**

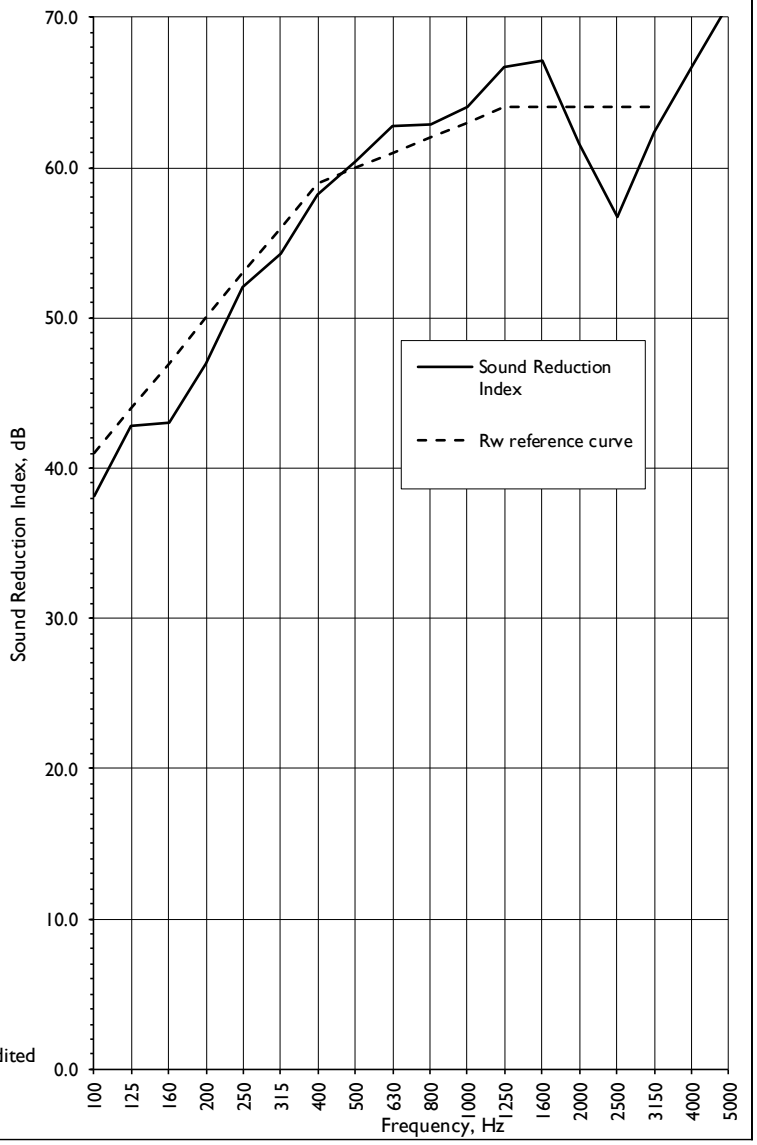
## Data Sheet 5

Laboratory Measurement of Sound Reduction Index to BS EN ISO 10140-2:2010

| | | | | |
|---|---|---|---|---|
| **Test Number:** | 5 | **Test Room:** | **Source** | **Receiving** |
| **Client:** | Hadley Group | **Air Temperature:** | 11.1 °C | 11.1 °C |
| **Test Date:** | 16/02/2022 | **Air Humidity:** | 86 % | 88 % |
| **Sample Height:** | 2.62 m | **Volume:** | 60.9 m³ | 57.4 m³ |
| **Sample Width:** | 4.18 m | **Air Pressure:** | 983 mbar | |
| **Sample Weight:** | 61.4 kg/m² | | | |

**Product Identification:** **2x15mm Gyproc SoundBloc, 60mm Hadley I studs @ 300mm centres staggered in 72mm channel, 50mm APR, 2x15mm Gyproc SoundBloc. Overall width 132mm.**

| Frequency Hz | Sound Reduction Index, dB | |
|---|---|---|
| | ⅓ Oct | Octave |
| 50+ | 19.9 | 23.5 |
| 63+ | 25.5 | |
| 80+ | 33.4 | |
| 100 | 38.1 | 40.7 |
| 125 | 42.8 | |
| 160 | 43.0 | |
| 200 | 47.0 | 50.0 |
| 250 | 52.1 | |
| 315 | 54.3 | |
| 400 | 58.2 | 60.1 |
| 500 | 60.4 | |
| 630 | 62.8 | |
| 800 | 62.9 | 64.3 |
| 1000 | 64.1 | |
| 1250 | 66.7 | |
| 1600 | 67.1 | 60.0 |
| 2000 | 61.6 | |
| 2500 | 56.7 | |
| 3150 | 62.4 | 65.4 |
| 4000 | 66.6 | |
| 5000 | 71.0 | |
| 6300+ | 75.1 | 71.7 |
| 8000+ | 74.1 * | |
| 10000+ | 68.8 * | |
| Average 100-3150 | 56.3 | SRL Version 20.1124.15.09 |




* shows measurement corrected for background

> shows measurement limited by background

\+ shows Frequency beyond standard and not UKAS accredited

Rating according to BS EN ISO 717-1:2013

**$R_w(C;C_{tr})$= 60 (-2;-6) dB**

0444

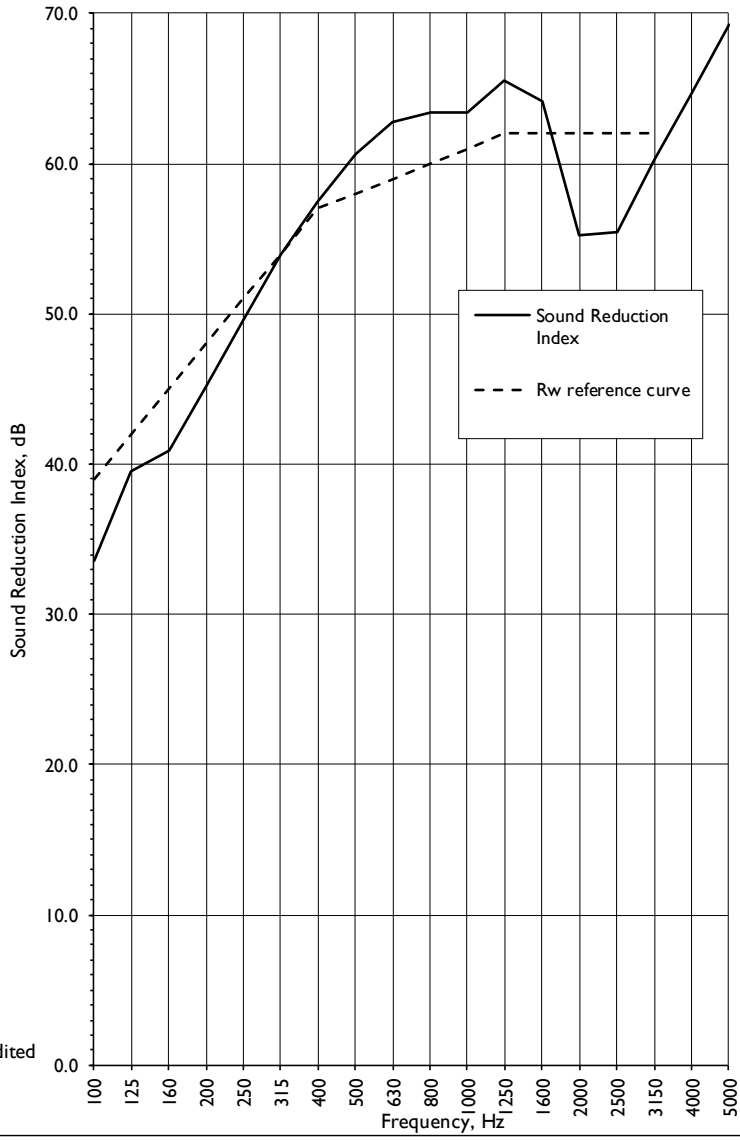
## Data Sheet 6

Laboratory Measurement of Sound Reduction Index to BS EN ISO 10140-2:2010

| | | | Source | Receiving |
|---|---|---|---|---|
| **Test Number:** | 6 | **Test Room:** | | |
| **Client:** | Hadley Group | **Air Temperature:** | 11 °C | 11.1 °C |
| **Test Date:** | 17/02/2022 | **Air Humidity:** | 76 % | 76 % |
| **Sample Height:** | 2.62 m | **Volume:** | 60.9 m³ | 57.4 m³ |
| **Sample Width:** | 4.18 m | **Air Pressure:** | 999 mbar | |
| **Sample Weight:** | 53.8 kg/m² | | | |

**Product Identification:** **2x15mm Knauf Soundshield Plus, 60mm I studs @ 300mm centres staggered in 72mm channel, 50mm APR, 2x15mm Knauf Soundshield Plus. Overall width 132mm.**

| Frequency Hz | Sound Reduction Index, dB | |
|---|---|---|
| | ⅓ Oct | Octave |
| 50+ | 18.7 | 21.2 |
| 63+ | 20.9 | |
| 80+ | 29.3 | |
| 100 | 33.6 | 36.8 |
| 125 | 39.5 | |
| 160 | 40.9 | |
| 200 | 45.2 | 48.2 |
| 250 | 49.5 | |
| 315 | 54.0 | |
| 400 | 57.5 | 59.8 |
| 500 | 60.6 | |
| 630 | 62.8 | |
| 800 | 63.4 | 64.0 |
| 1000 | 63.4 | |
| 1250 | 65.5 | |
| 1600 | 64.2 | 56.8 |
| 2000 | 55.2 | |
| 2500 | 55.5 | |
| 3150 | 60.2 | 63.2 |
| 4000 | 64.6 | |
| 5000 | 69.2 | |
| 6300+ | 73.3 | 70.9 |
| 8000+ | 73.4 * | |
| 10000+ | 68.2 * | |
| Average 100-3150 | 54.4 | SRL Version 20.1124.15.09 |




* shows measurement corrected for background

> shows measurement limited by background

\+ shows Frequency beyond standard and not UKAS accredited

Rating according to BS EN ISO 717-1:2013

**$R_w(C;C_{tr})$= 58 (-3;-7) dB**

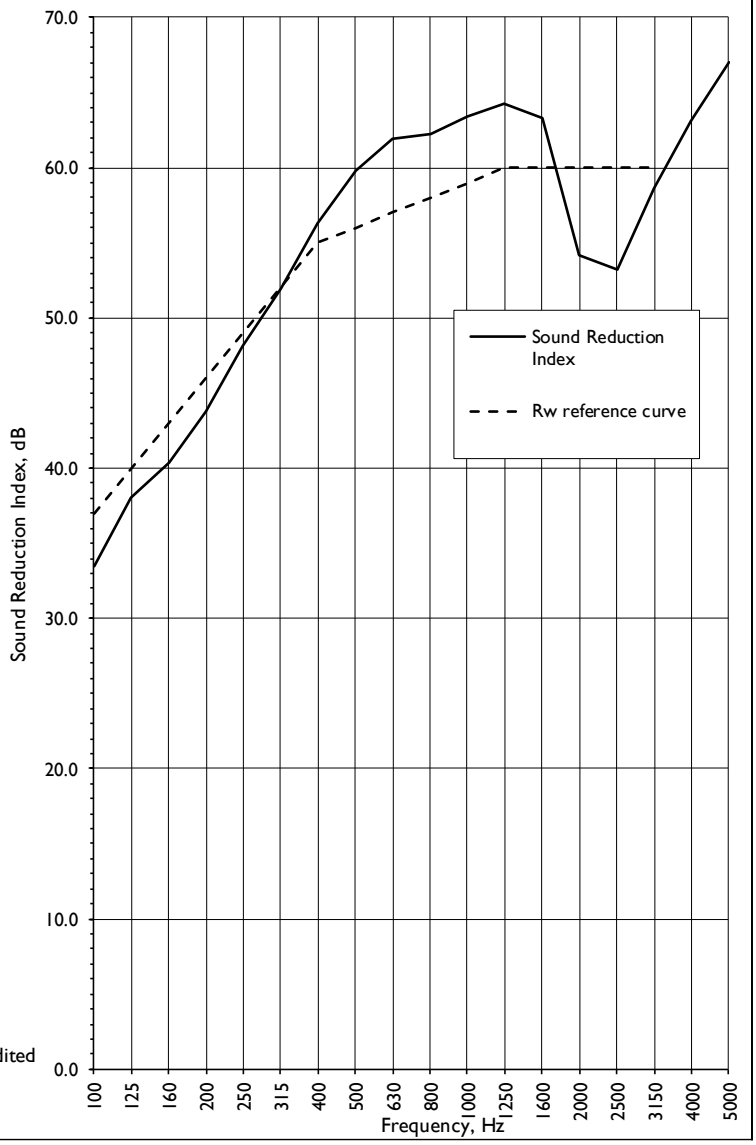
## Data Sheet 7

Laboratory Measurement of Sound Reduction Index to BS EN ISO 10140-2:2010

| | | | Source | Receiving |
|---|---|---|---|---|
| **Test Number:** | 7 | **Test Room:** | | |
| **Client:** | Hadley Group | **Air Temperature:** | 10.8 °C | 10.9 °C |
| **Test Date:** | 17/02/2022 | **Air Humidity:** | 70 % | 67 % |
| **Sample Height:** | 2.62 m | **Volume:** | 60.9 m³ | 57.4 m³ |
| **Sample Width:** | 4.18 m | **Air Pressure:** | 1001 mbar | |
| **Sample Weight:** | 51.5 kg/m² | | | |

**Product Identification:** **2x15mm Gtec dB, 60mm I studs @ 300mm centres staggered in 72mm channel, 50mm APR, 2x15mm Gtec. Overall width 132mm.**

| Frequency Hz | Sound Reduction Index, dB | |
|---|---|---|
| | ⅓ Oct | Octave |
| 50+ | 18.8 | 22.1 |
| 63+ | 23.5 | |
| 80+ | 30.0 | |
| 100 | 33.5 | 36.3 |
| 125 | 38.0 | |
| 160 | 40.4 | |
| 200 | 43.8 | 46.7 |
| 250 | 48.1 | |
| 315 | 51.9 | |
| 400 | 56.3 | 58.7 |
| 500 | 59.8 | |
| 630 | 61.9 | |
| 800 | 62.2 | 63.2 |
| 1000 | 63.4 | |
| 1250 | 64.3 | |
| 1600 | 63.3 | 55.2 |
| 2000 | 54.2 | |
| 2500 | 53.2 | |
| 3150 | 58.6 | 61.6 |
| 4000 | 63.1 | |
| 5000 | 67.0 | |
| 6300+ | 70.8 | 69.8 |
| 8000+ | 72.2 * | |
| 10000+ | 67.6 * | |
| Average 100-3150 | 53.3 | SRL Version 20.1124.15.09 |




* shows measurement corrected for background

> shows measurement limited by background

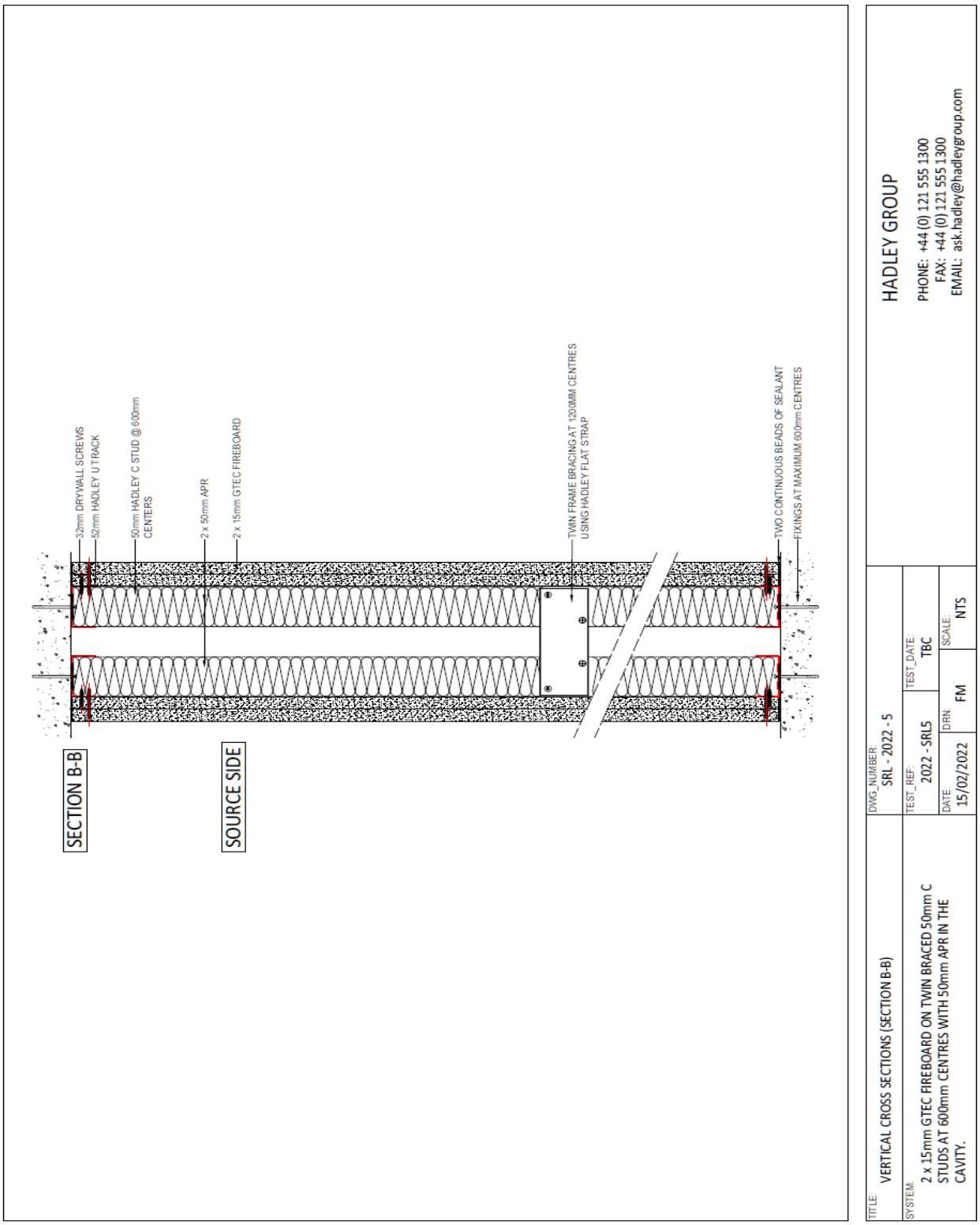
\+ shows Frequency beyond standard and not UKAS accredited

Rating according to BS EN ISO 717-1:2013

**$R_w(C;C_{tr})$= 56 (-2;-6) dB**

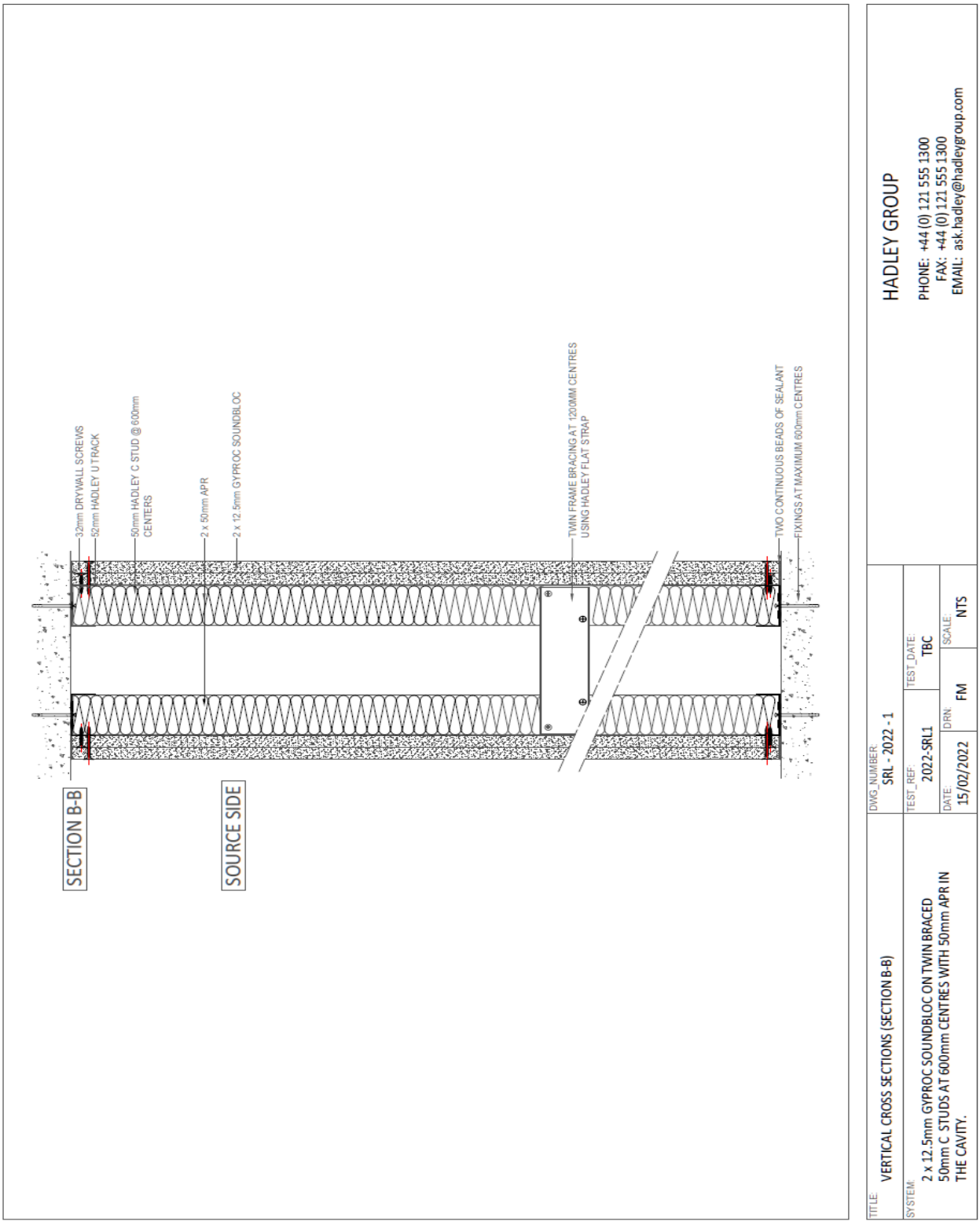
0444

## Drawing 1 – SRL Test 1



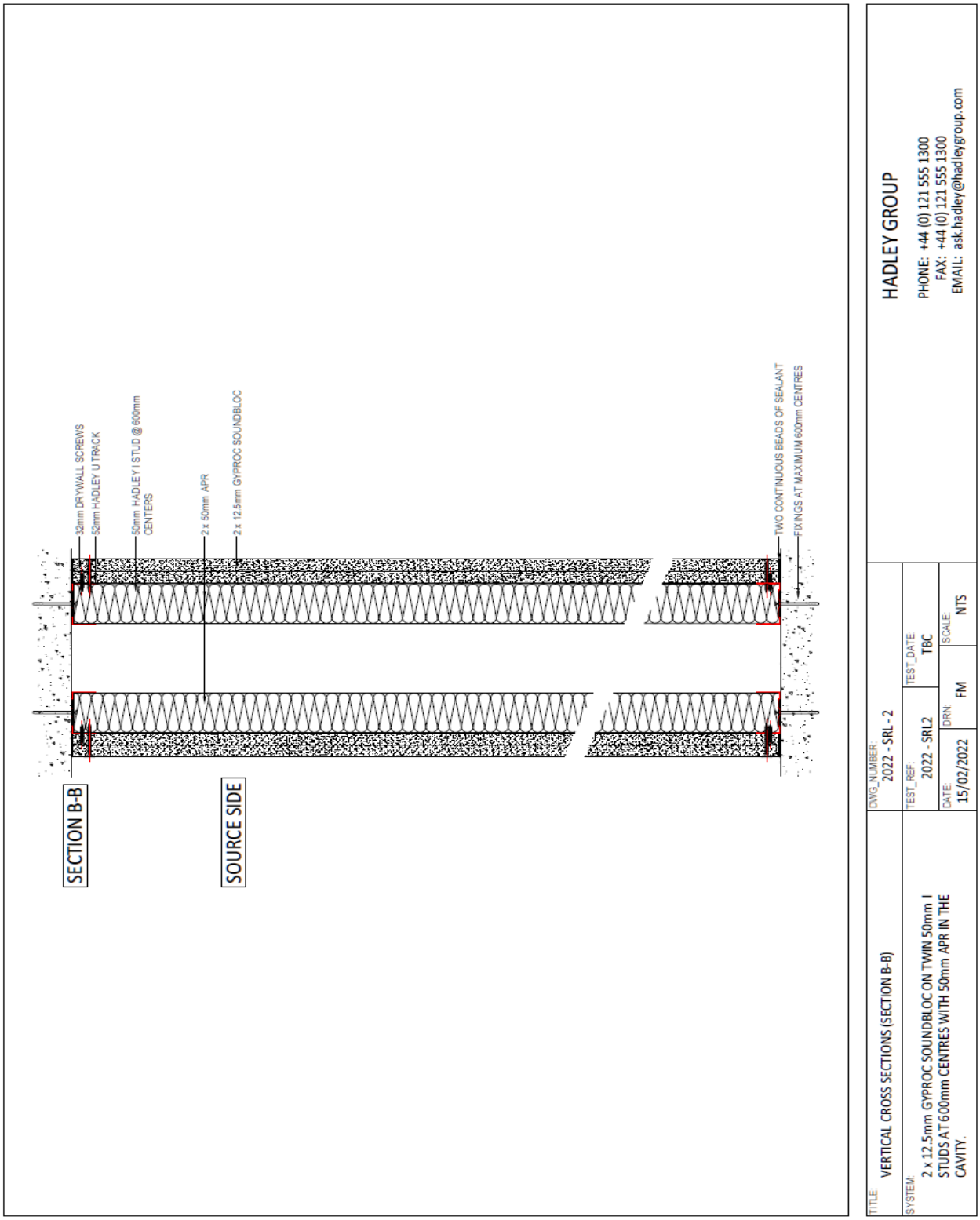
0444

## Drawing 2 – SRL Test 2



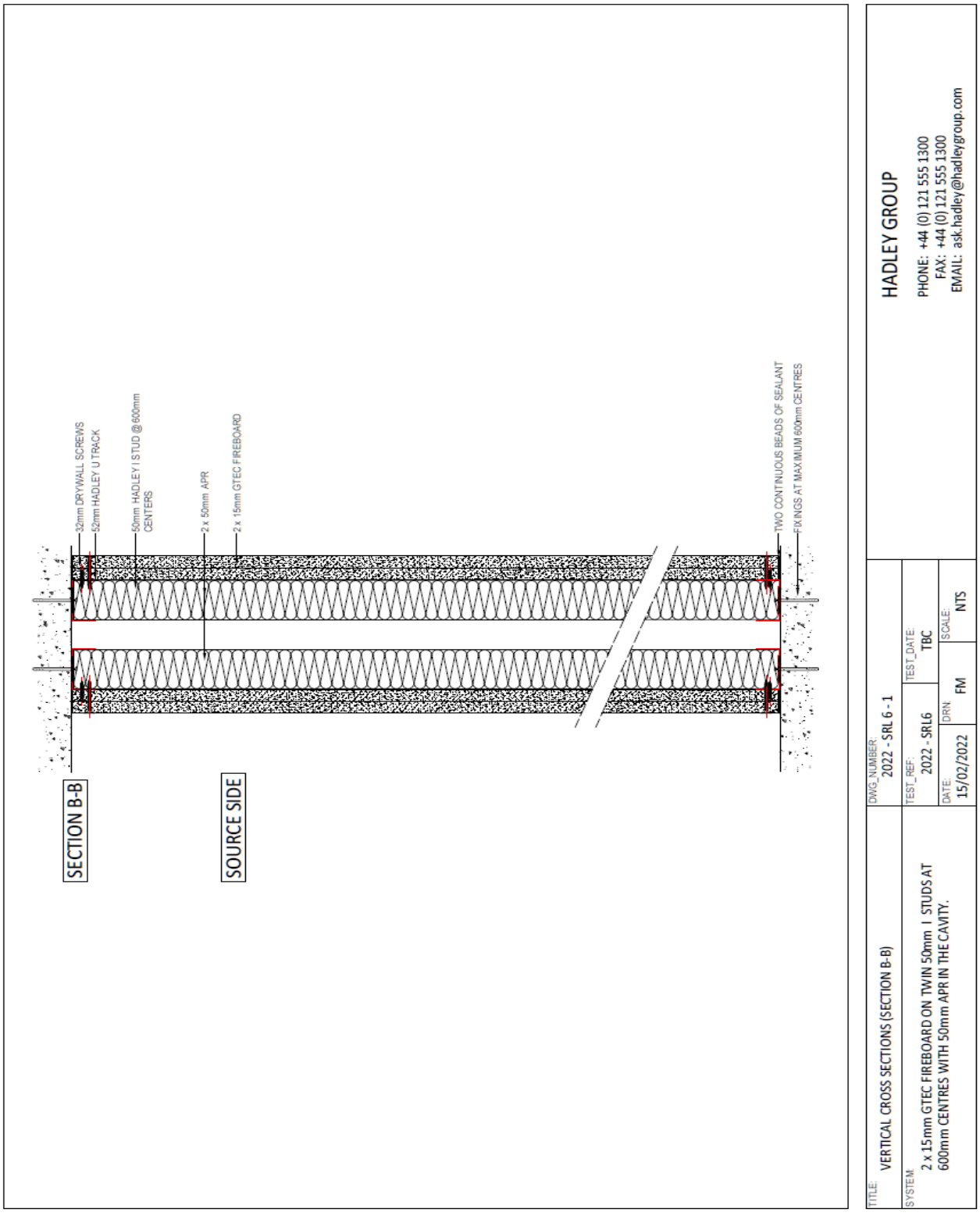
0444

## Drawing 3 – SRL Test 3



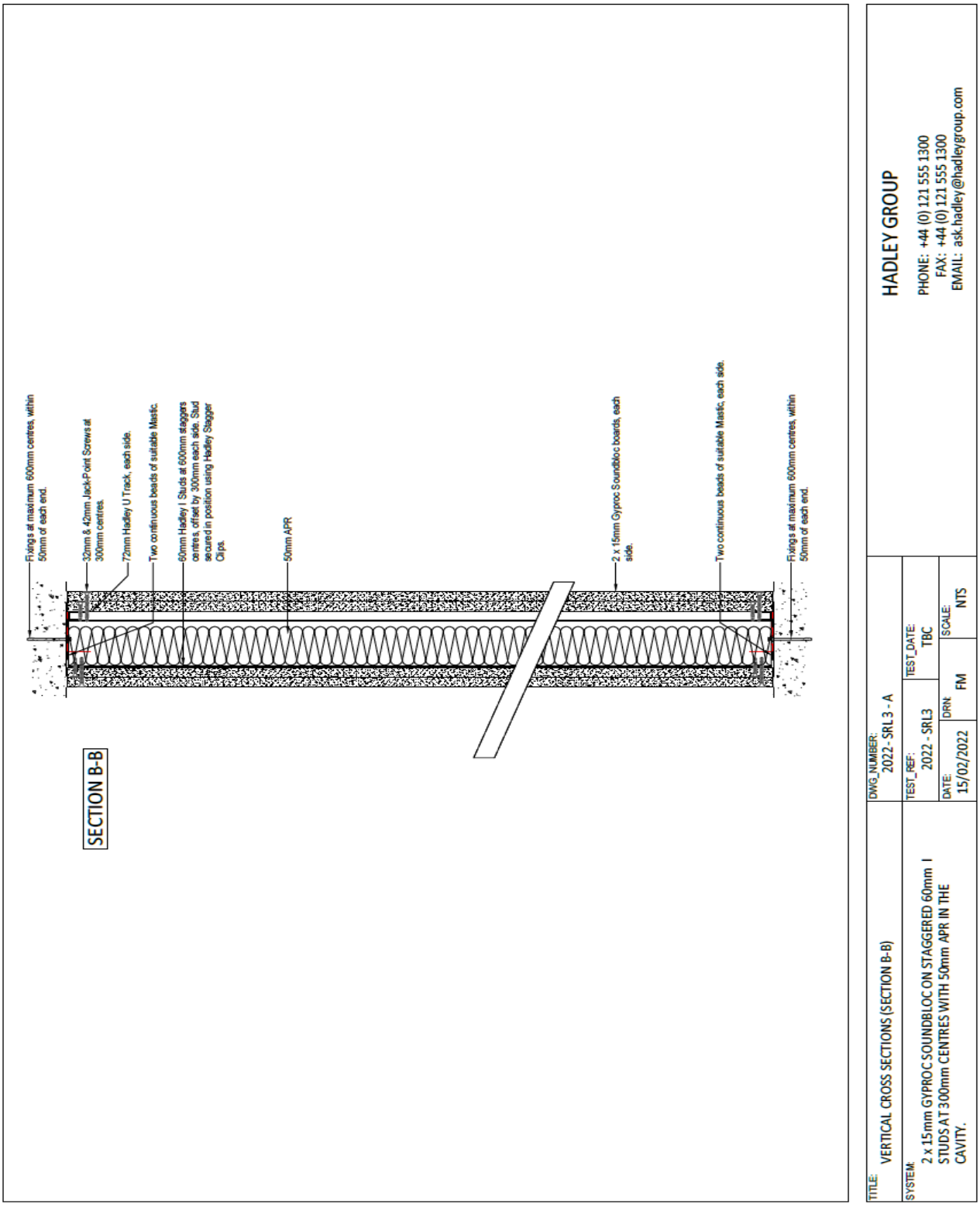
0444

## Drawing 4 – SRL Test 4



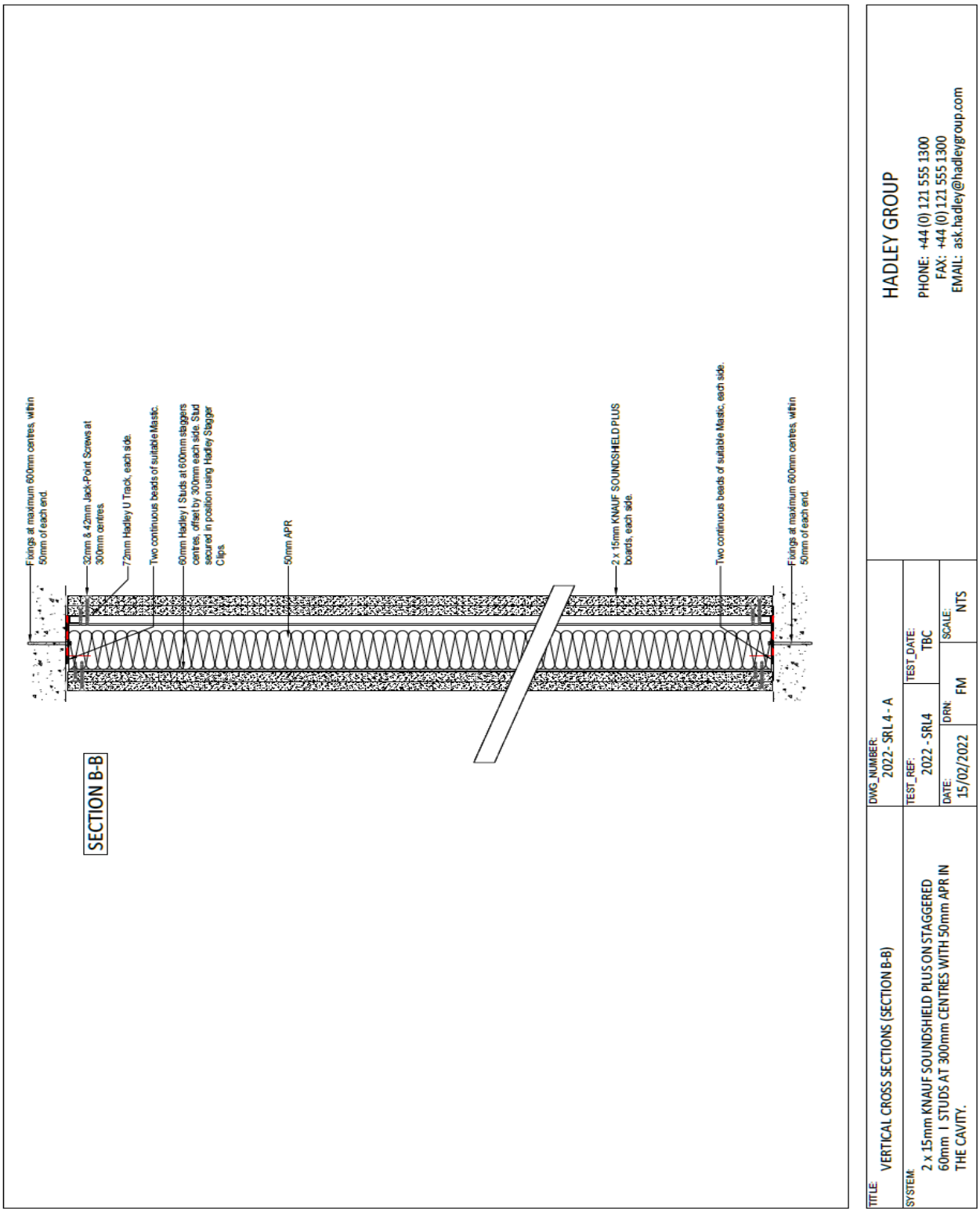
0444

## Drawing 5 – SRL Test 5



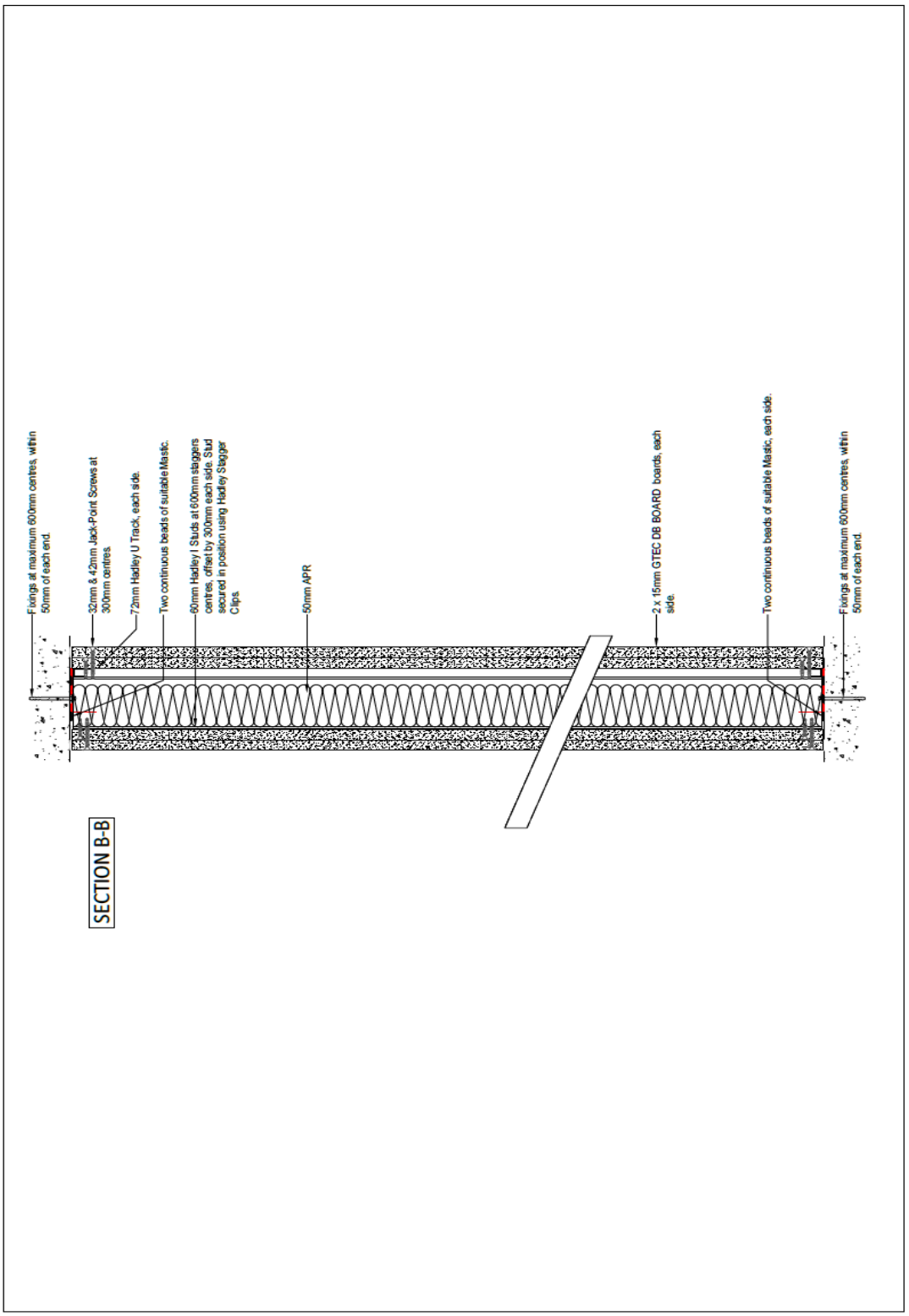
0444

## Drawing 6 – SRL Test 6



0444

## Drawing 7 – SRL Test 7



# Appendix A - Details of Measurements

## A1. Location

Sound Research Laboratories

Holbrook House

Little Waldingfield

Sudbury

Suffolk

CO10 0TF

## A2. Test Dates

15 - 17 February 2022

## A3. Testers

Richard Calvert and Allen Smalls of SRL Technical Services Limited

## A4. Instrumentation and Apparatus Used

| Make | Description | Type |
|---|---|---|
| Norsonic | Multichannel Sound Level Meter | Nor850 |
| | Rotating microphone boom | Nor265 |
| G.R.A.S | Microphone Pre-Amp | 26AK |
| | Calibrator | 42AB |
| | Microphone | 40AR |
| dbx | Graphic Equaliser | 131s |

| | | |
|---|---|---|
| Crown | Class D Amplifier | XLS 1502 |
| ntek | Rotating microphone boom | MB01 |
| Bruel & Kjaer | Omni directional loud speaker | 4296 |
| QSC Audio | Power Amplifier | RMX 1450 |
| National Geographic | Temperature & Humidity & Probe | 9070600 |

## A5. References

| | |
|---|---|
| BS EN ISO 717-1:2013 | Rating of sound insulation in buildings and of building elements. Airborne Sound Insulation. |
| BS EN ISO 10140-2:2010 | Laboratory measurement of sound insulation for building elements – Part 2: Measurement of airborne sound insulation. |

## Appendix B – Test Procedure

**Measurement of Sound Transmission in Accordance With**

**BS EN ISO 10140-2: 2010 – TP33**

In the laboratory, airborne sound transmission is determined from the difference in sound pressure levels measured across a test sample installed between two reverberant rooms. The difference in measured sound pressure levels is corrected for the amount of absorption in the receiving room. The test is done under conditions which restrict the transmission of sound by paths other than directly through the sample. The source sound field is randomly incident on the sample.

The test sample forms the whole of a 4.18m wide x 2.62m high dividing wall between the two rectangular reverberant rooms, both of which are constructed from dense masonry blockwork with reinforced concrete floors and roofs.

One of the rooms is used as the receiving room and has a nominal volume of 52 cubic metres. It is isolated from the surrounding structure and the adjoining room by the use of resilient mountings and seals ensuring good acoustic isolation. The adjoining source room has a nominal volume of 62 cubic metres. Reverberation time measurements are done in the receiving room to calibrate it.

Broad band noise is produced in the source room from an electronic generator, power amplifier and loudspeaker. The resulting sound pressure levels in both rooms are sampled using a microphone mounted on an oscillating boom and connected to a real time analyser. The signal is filtered into one third octave band widths, integrated and averaged. The value obtained at each frequency is known as the average sound pressure level for either the source or the receiving room. The change in level across the test sample is termed the sound pressure level difference, i.e.

$$D = L_1 - L_2$$

where

$D$ is the equivalent Sound Pressure level difference, dB

$L_1$ is the equivalent Sound Pressure level in the source room, dB

$L_2$ is the equivalent Sound Pressure level in the receiving room, dB

The Sound Reduction Index (R), also known by the American terminology Sound Transmission Loss, is defined as the number of decibels by which sound energy randomly incident on the test sample is reduced in transmitting through it and is given by the formula:

$$R = D + 10\log_{10}\frac{S}{A}. \text{ in decibels}$$

where

S is the area of the sample, $m^2$

A is the total absorption in the receiving room, $m^2$

The Sound Reduction Index is an expression of the laboratory sound transmission performance of a particular element or construction. It is a function of the mass, thickness, sealing, method of mounting etc. and is independent of the overall area of the sample.

However, when an example of this construction is installed on site, the sound insulation obtained will depend upon its surface area, as well as the absorption in the receiving room. The larger the area the greater the sound energy transmitted. Also, the overall sound insulation is affected by the sound transmission through other building elements, some of which may have an inferior performance to the sample tested. In practice, therefore, the potential sound reduction index of a construction is not fully realised on site. Furthermore, the sound reduction index of a particular sample of that construction can only be measured accurately in a laboratory, because only under such controlled conditions can the sound transmission path be limited to the sample under test.

$R_w$, C and $C_{tr}$ have been calculated in accordance with the relevant section of BS EN ISO 717-1:2013 from the results of laboratory tests carried out in accordance with BS EN ISO 10140-2:2010.

## Appendix C – Measurement Uncertainty

**BS EN ISO 10140-2: 2010 – TP33**

The following values of uncertainty are based on a standard uncertainty multiplied by a coverage factor of k = 2, which provides a level of confidence of approximately 95%.

| Frequency, Hz | Uncertainty, ± dB |
|---|---|
| 100 | 3.2 |
| 125 | 2.9 |
| 160 | 2.5 |
| 200 | 2.5 |
| 250 | 1.8 |
| 315 | 1.8 |
| 400 | 1.5 |
| 500 | 1.5 |
| 630 | 1.2 |
| 800 | 1.2 |
| 1000 | 1.2 |
| 1250 | 1.2 |
| 1600 | 1.2 |
| 2000 | 1.2 |
| 2500 | 1.2 |
| 3150 | 1.2 |
| Temperature | ±0.8 °C |
| Humidity | ±10 %RH |
| Static Pressure | ±1 mbar |

0444

**Laboratory**
Holbrook House
The Street
Little Waldingfield
Sudbury
Suffolk
CO10 0TF
Tel: +44 (0)1787 247595

Website: www.srltsl.com
e-mail: srl@srltsl.com

**Registered Name and Address:**
SRL Technical Services Limited
Holbrook House
Little Waldingfield
Sudbury
Suffolk
CO10 0TF

Registered Number: 907694 England