Flat Roof Acoustic Reference Guide
Complete ROCKWOOL Acoustic Flat Roof System used at Stopsley High School to achieve $R_w \ 44\text{dB}$
Introduction

As part of the building envelope modern flat roof systems play an important part in controlling noise that can either enter or leave the building.

As today’s buildings are often located in built up areas, unwanted noise from road, rail, construction sites and air traffic all have the potential to disrupt our home, work and learning environments.

ROCKWOOL Flat Roof systems significantly reduce unwanted noise and support in creating a more comfortable internal environment. There are many building types that benefit from ROCKWOOL Flat Roof acoustic systems and these include:

Schools

40 years of research has shown that noise and poor acoustics in schools can:

- Lower pupils academic performance
- Compromise classroom control
- Damage teachers’ health
- Disadvantage children with special needs

In 2003 the department for education introduced a new acoustic performance standard for schools under the Building Regulations - Building Bulletin 93 (BB93). In 2015 this was re-written and published as: Acoustic Design of Schools: Performance Standards, Building Bulletin 93.

Whether it is reducing noise entering the school building, removing disruption from rain noise or preventing noise from breaking out, ROCKWOOL can provide a number of tested solutions which achieve the requirements of BB93.

Healthcare

The Department for Health recognises that good acoustic design in healthcare facilities brings a number of benefits and these are covered in the Health Technical Memorandum 08-01: Acoustics (HTM 08-01). Good acoustic conditions play a key part in patient recovery whilst also providing better working conditions for staff.

ROCKWOOL Flat Roof systems can support in creating a healthier acoustic environment, providing the right internal conditions for both patients and staff.
Many of today’s commercial properties are located in heavily built up areas and therefore prone to many types of noise pollution. Effective ROCKWOOL Flat Roof acoustic insulation can support in creating a distraction-free environment, making employees more productive.

Leisure Facilities and Entertainment Venues
Acoustic design is not always about stopping the transfer of sound. In theatres, concert halls and stadiums it is often about the quality of the acoustic performance and creating an environment that offers the audience a great experience.

ROCKWOOL Flat Roof acoustic systems can support in controlling sound levels, ensuring the desired acoustic ambience meets the design requirements.

Industrial and Manufacturing Facilities
Often sources of noise pollution, industrial facilities can impact on other buildings that are in close proximity. Using ROCKWOOL Flat Roof acoustic solutions within the building envelope will reduce sound from escaping the building, lowering the impact on the surrounding environment. Tested ROCKWOOL systems could be used to support planning applications for this type of facility.

Many Other Benefits
As well as offering high performing acoustic solutions ROCKWOOL Flat Roof products offer a wide range of other benefits which include:

- Superior Fire Resistance
- Long-term, Stable Thermal Performance
- Vapour Permeability
- Sustainability
Complete ROCKWOOL Acoustic Systems

With airborne sound reduction levels ranging from 40-50dB complete ROCKWOOL flat roof acoustic systems provide an array of high performance options suited to any project.

The following tables provide performance data for both airborne sound reduction and rain noise intensity in line with thermal performances ranging from 0.25 - 0.14 W/m²K.

### AIRBORNE SOUND REDUCTION

**ROCKWOOL System: HARDROCK® Multi-Fix (DD)**

<table>
<thead>
<tr>
<th>Base Layer (mm)</th>
<th>Upper Layer</th>
<th>Predicted Airborne Sound Reduction (dB)</th>
<th>U-value (W/m²K)</th>
</tr>
</thead>
<tbody>
<tr>
<td>150</td>
<td>-</td>
<td>41</td>
<td>0.25</td>
</tr>
<tr>
<td>170</td>
<td>-</td>
<td>44</td>
<td>0.22</td>
</tr>
<tr>
<td>185</td>
<td>-</td>
<td>45</td>
<td>0.20</td>
</tr>
<tr>
<td>150</td>
<td>60</td>
<td>46</td>
<td>0.18</td>
</tr>
<tr>
<td>150</td>
<td>85</td>
<td>47</td>
<td>0.16</td>
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<tr>
<td>150</td>
<td>105</td>
<td>48</td>
<td>0.15</td>
</tr>
<tr>
<td>150</td>
<td>115</td>
<td>48</td>
<td>0.14</td>
</tr>
</tbody>
</table>

The above table shows predicted values which have been calculated using the data provided in test report: DPA Cauberg - Huygen 20151078 - 03.

### RAIN NOISE INTENSITY

**ROCKWOOL System: HARDROCK® Multi-Fix (DD)**

<table>
<thead>
<tr>
<th>Base Layer (mm)</th>
<th>Upper Layer</th>
<th>Predicted Rain Noise Intensity (LIA-dB)</th>
<th>1.2mm Single Ply</th>
<th>2 Layer Bitumen</th>
</tr>
</thead>
<tbody>
<tr>
<td>150</td>
<td>-</td>
<td>55.4</td>
<td>54.2</td>
<td></td>
</tr>
<tr>
<td>170</td>
<td>-</td>
<td>54.6</td>
<td>53.6</td>
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<tr>
<td>185</td>
<td>-</td>
<td>54.1</td>
<td>53.2</td>
<td></td>
</tr>
<tr>
<td>150</td>
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<td>53.2</td>
<td>52.3</td>
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<tr>
<td>150</td>
<td>105</td>
<td>52.0</td>
<td>51.3</td>
<td></td>
</tr>
<tr>
<td>150</td>
<td>115</td>
<td>51.8</td>
<td>51.1</td>
<td></td>
</tr>
</tbody>
</table>

The above table shows predicted values which have been calculated using the data provided in test report: BRE 241438 L707 - 008.

The acoustic data shown in both tables is based on a warm flat roof construction which includes the following components:

- 0.7mm Steel Deck
- Vapour Control Layer
### Sound Absorption

**ROCKWOOL System: ROCKWOOL® Acoustic Infill**

<table>
<thead>
<tr>
<th>Frequency (Hz)</th>
<th>125</th>
<th>250</th>
<th>500</th>
<th>1K</th>
<th>2K</th>
<th>4K</th>
<th>Weighted Sound Absorption Coefficient (α_w)</th>
<th>Noise Reduction Coefficient (NRC)</th>
<th>Absorption Classification Class</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.55</td>
<td>0.95</td>
<td>1.00</td>
<td>0.90</td>
<td>0.60</td>
<td>0.45</td>
<td>0.60(LM)</td>
<td>0.9</td>
<td>C</td>
</tr>
</tbody>
</table>

The values shown are actual test results as shown in Test Report: C/06/5/1/3434/2.

The acoustic data shown is the result of testing that was carried out on a warm flat roof system which included the following components:

- 0.7mm Tata D60 Perforated Deck (13% open area)
- ROCKWOOL® Acoustic Infill
- 0.22mm Vapour Control Layer
- 210mm ROCKWOOL Hardrock
- 1.5mm Single-Ply Membrane