

Acoustic Performance of Rainscreen Facade Systems



Introduction

Noise pollution is a major environmental problem which effects thousands of people living in UK towns and cities.

With an ever-increasing demand for housing and the need for space efficiency many of today's residential units are built in close proximity to significant sources of noise which include; road traffic, railway networks, air traffic and even other construction sites.

Modern methods of construction like ventilated rainscreen systems are becoming an increasingly popular system choice for use within: multi-unit residential blocks, office blocks, hotels and multi-use developments.

Whilst ventilated rainscreen systems offer a number of significant benefits, determining the actual level of acoustic performance through these lightweight systems can be a challenge. This technical bulletin will look at the impact of living and working in a noisy urban environment and why there is a need for a more reliable source of acoustically tested external cladding systems. More importantly this document will provide you with the very latest information on the sound reduction performances that can be achieved using ROCKWOOL Stone Wool, which have been determined through a series of actual acoustic tests.

Find out more on how stone wool insulation can be used to reduce external noise, creating a comfortable and healthy living space.

Living in a noisy world

As we move into inner cities our exposure and proximity to external noise sources increases significantly.

With the increasing number of people moving into cities as a result of urbanisation, our working and living spaces are becoming more crowded

Exposure to high levels of noise affects everyone a little differently. Children in general are more sensitive to excessive levels of noise, along with the chronically ill or elderly people. Adults who work in especially noisy environments also experience higher levels of stress and fatigue. Disturbed sleep patterns due to noise pollution can lead to health problems which can be more serious for children as it can impair childhood development.



Planning for acoustic comfort

It is easy enough to measure the noise within a space after it has been built, but by then, rectification can be very difficult and expensive. It is important that we effectively measure noise levels during the planning phase to ensure that the desired acoustic comfort is achieved within the finished build.

Example

If we consider the typical noise levels for road traffic, BS 8233 provides us with some guidance on noise levels for three common situations.



TABLE 1: Typical traffic noise levels measured approximately 1m from the facade

Situation	dB L _{Aeq, 16h}
At 20m from the edge of a busy motorway carrying many heavy vehicles; average traffic speed 100Km/h; intervening ground turfed	78
At 20m from the edge of a busy main road through a residential area; average traffic speed 50Km/h; intervening ground paved	68
On a residential road parallel to a busy main road and screened by the houses from the main road traffic; free flowing traffic	58

Note: Values are for dry road.

Whilst table 1 provides us with a weighted average of noise levels for initial design purposes, there are a number of other factors which can affect the impact of road traffic noise:

- Traffic Flow
- Surface Texture
- Traffic Speed
- Proximity to source
- Weather conditions.

A single passing diesel truck can produce noise levels as high as 85dB and a motorcycle can be as high as 100dB.

It is essential that the proposed site is assessed to identify existing and potential noise sources at planning and early design stages of the development.

This assessment provides the essential data needed to determine the appropriate levels of sound insulation that needs to be achieved within the building envelope.

The need for tested solutions

Finding actual acoustic test data for Rainscreen cladding systems is not easy and up until now, there have been few or no tested solutions which provide reliable data on sound reduction performance.

For a large majority of projects this results in trying to determine the performance through acoustic assessments. A lack of data often leads to over engineered systems which incorporate additional mass layers as a method of building in a safety factor in the absence of any test data.

Adding additional layers of mass to the system can present unnecessary obstacles which include:

- Additional costs (labour and materials)
- Complex installation
- Increased build time.

The reassurance provided by definitive acoustic test data for ROCKWOOL products within Rainscreen systems provides certainty and peace of mind when meeting acoustic specifications, while allowing Acoustic Consultants to make predictions of performance with far greater accuracy and increased confidence.



From noisy inner city to quiet suburb

At ROCKWOOL we continually strive towards the development of products that simplify the specification process, provide peace of mind and improve the quality of life.

To ensure that the Rainscreen insulation solutions we offer are supported by accurate and reliable performance information we have recently undergone a series of acoustic tests.

The results from these tests were very good, in fact if we again look at the typical noise levels produced by heavy inner city traffic (Table 1 – BS 8233) , we can see that by incorporating 100mm of RAINSCREEN Duo Slab® we can reduce the 68 dB external noise level by 59 dB, creating an internal ambient noise level as low as 9 dB, this is the equivalent noise level of leaves rustling in the distance.



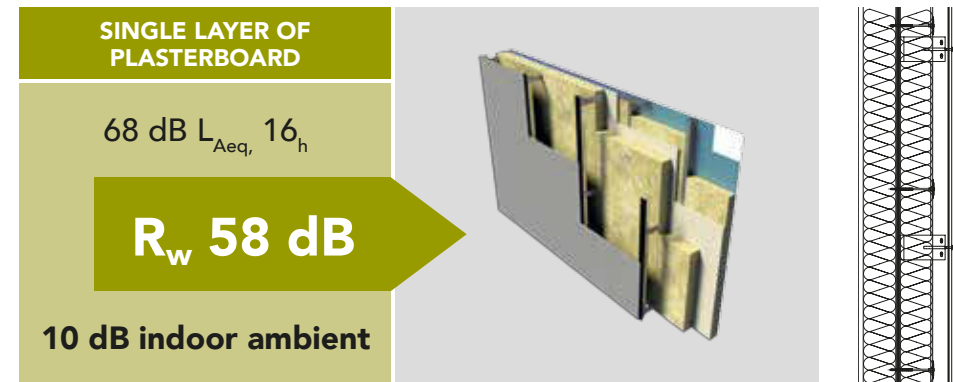
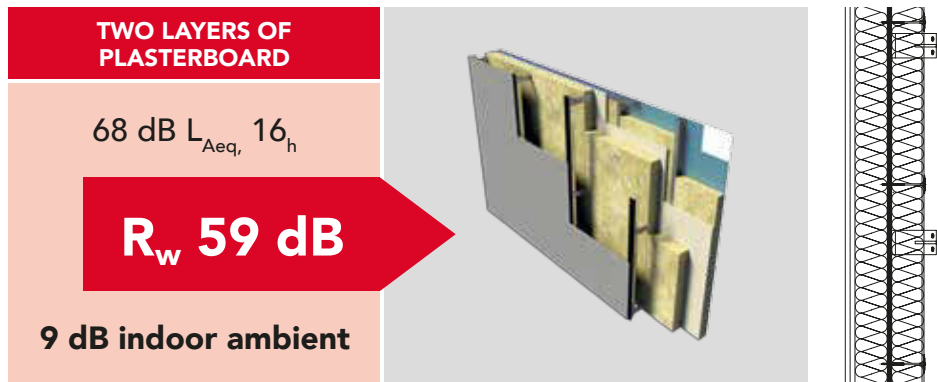
It is important to note that when determining the required indoor ambient noise levels there are other key factors which must be considered:

- Façade Area
- Windows
- Ventilators
- Reverberation Time.

However in simplified terms it can be considered as shown in the examples.

The acoustic levels achieved using ROCKWOOL show that a high sound reduction performance is achievable through the building envelope without the need for additional, costly mass layers. In fact even when reducing this system to a single layer of acoustic plasterboard a good performance level is still achievable.

We continually strive towards the development of products that simplify the specification process.



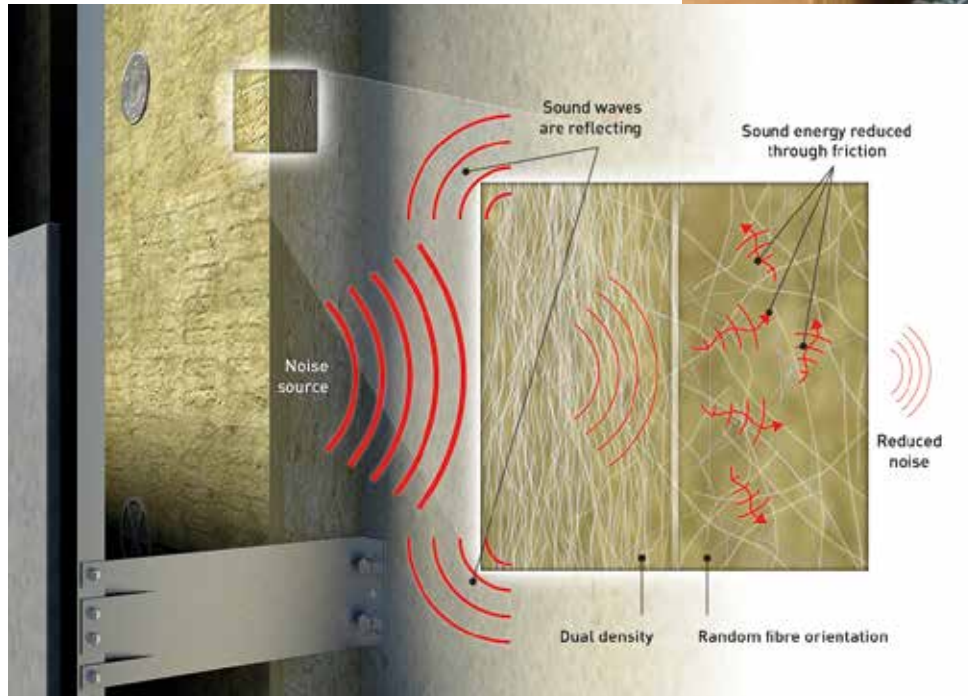
Shielding your spaces from unwanted noise

ROCKWOOL Stone Wool insulation reduces external noise, creating a comfortable and healthy living space.

It's the unique combination of stone wool characteristics found within our products that make them efficient at reducing noise:

Dual Density Technology

The top 15mm layer of each RAINSCREEN DUO SLAB® board is manufactured at a higher density than the remainder of the board. The resulting change in acoustic impedance means that sound is reflected at the interface between the two layers.



Randomly Oriented Fibres

As soundwaves try to pass through the air trapped within the fibrous structure of RAINSCREEN DUO SLAB® they get absorbed by friction as the individual fibres are made to move back-and-forth. In addition the random orientation of the fibres gives rise to high tortuosity, which makes it very difficult for sound to find a path from one side to the other.

Higher Average Density

The higher density of ROCKWOOL slabs compared to other mineral wool products offers excellent absorption characteristics owing to an improved ratio of fibres to trapped air pockets.



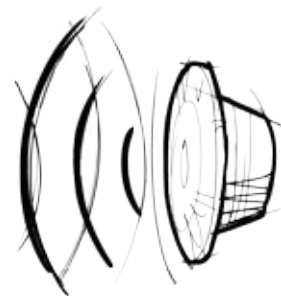
Acoustic performance data

The table below provides a summary of the sound reduction performances achieved using a combination of ROCKWOOL insulation with SFS frame and the cladding zone.

RAINSCREEN DUO SLAB® (mm)	ROCKWOOL Insulation within SFS Frame (mm)	Layers of 15mm Acoustic Plasterboard	8mm Rockclad (Rockpanel)	
			R _w	R _w + C _{tr}
50	90	2	57	50
	90	1	57*	47*
100	90	2	59	52
	90	1	59*	51*
180	90	2	62	54
	90	1	62*	53*

			ACM (Booth Muirie)	
			R _w	R _w + C _{tr}
50	90	2	58	47
	90	1	58	45
100	90	2	58	49
	90	1	58*	48*
180	90	2	60	52
	90	1	60*	52*

*Assessed against the data held within test report held within test report C/23666/T01



New Online ROCKWOOL Acoustic Calculator

The ROCKWOOL Acoustic Calculator is easy to use and has been developed to provide reliable acoustic calculations for multiple building applications.

The acoustic calculator now includes data for Rainscreen Cladding Systems which are available online.



We offer comprehensive technical support and calculated acoustic assessments. Please contact our technical solutions teams on technical.solutions@rockwool.co.uk or call **01656 868 490** for further technical guidance

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