



Acoustic Insulation

Efficient External Wall Insulation for Residential Applications

Overview

Reducing the external noise from a busy roadway to an acceptable level inside your home requires an efficient design of walls, windows, doors, ceilings and building layout. A home considered to have acceptable internal sound levels will need to reduce external noise to approximately 30-35 dB. A typical busy road will generate approximately 70 decibels.

Using high performance wall insulation in conjunction with other design features can significantly reduce the ingress of unwanted noise. EarthWool™ R2.5 High Performance Wall Batts will provide both high thermal and acoustic performance. This insulation combined with quality windows and doors will provide a quiet internal environment.

A well designed home should firstly efficiently lay out the rooms with bedrooms furthest from the noise source with the garage, laundry and bathrooms positioned to intercept the external or internal noise source. Landscaping and fencing can also reduce external noise.

Other transmission paths and treatment options need to be addressed including:

Windows

- Relocate windows facing noise source by better home design and layout
- Shut windows during peak noise and ensure windows are fully sealed
- Reduce window size
- Install fixed windows
- Install thicker laminated glass
- Install double glazing

External Doors

- Face doors away from noise source
- Install solid core doors with seals

Eaves

- Install fibre cement sheeting to the internal stud frame on the cavity side from the top plate to below the top course of the external masonry veneer
- Fill space above window lintels with timber blocking or fibre cement sheeting

Roof/Ceiling

- Install thicker grades of ceiling plasterboard on resilient mounted battens
- Install higher or denser grades of ceiling insulation

Internal Noise

- Home theatres, garage, home office and children's play rooms. Upgrade internal walls and ceilings with insulation, additional plasterboard, staggered or separated stud wall construction and upgrade ceilings

The wall insulation should provide both high thermal performance and acoustic performance that in conjunction with acoustic quality windows and doors will provide a quiet internal environment. EarthWool™ R2.5 High Performance Batts meet this criteria.

September 2010

Specification Compliance

Acoustic Performance

AS ISO 354-2006
AS ISO 11654-1997
ASTM C423-90A

Thermal Conductivity

ASTM C 518 and AS/NZS 4859.1: 2002

Thermal Resistance

ASTM C 653 and AS/NZS 4859.1: 2002

Technical Data

Water Vapour Absorption (ASTM C 1104)

- Less than 5% by weight.

Corrosion Resistance (ASTM C 665)

- No greater than sterile cotton.

Microbial Growth (ASTM C 1338)

- Does not support microbial growth.

Fire Resistance (ASTM C 136)

- Non-combustible.

Worked example - Residence facing busy road

Element	Internal Space	External Noise Level dB	Affect of noise on Room Occupant	Considerations	Owners Preferred Internal Noise Level	Estimated Internal Noise Level	Element required performance dB	Cost benefit solution option(s)
Wall	Bedrooms	70	Highest	Is noise 24 hours?	20-30	> 55	> 55	Insulate with EarthWool™ R2.5 HP Batts
	Living	70	High	Occupant lifestyle?	30-40	> 35	> 35	Insulate with standard thermal batts
	Study/Office	70	High	No distractions desired	20-30	> 40	> 40	Insulate with EarthWool™ R2.5 HP Batts
	Laundry	70	Not critical	Noise generating room	< 40	> 35	> 35	Consider insulating internal walls
	Garage	70	Not applicable	Noise generating room	NA	NA	NA	Consider insulating internal walls
Window	Bedrooms	70	Highest	Solar and view desired	20-30	> 55	> 55	Heavy laminated or Double glaze, install external shutters and minimise window area
	Living	70	High	Solar and view desired	30-40	> 35	> 35	Heavy laminated or Double glazing and minimise window area
	Study/Office	70	High	Day noise only	30-35	> 40	> 40	Sealed & fixed heavy laminated single glazing
	Laundry	70	Not critical	Transmission to other rooms	< 45	< 25	< 25	Varies depending transmission path and adjacent room use
	Garage	70	Not applicable	Transmission to other rooms	NA	NA	NA	Not usually critical
External Door	Bedrooms	70	Highest	Time of noise source?	20-30	> 55	> 55	Not usually required
	Living	70	High	Time of noise source?	30-40	> 35	> 35	Use solid core door and reorientate from noise source
	Study/Office	70	High	Time of noise source?	30-35	> 40	> 40	Use solid core door and reorientate from noise source
	Laundry	70	Not critical	Time of noise source?	< 40	> 35	> 35	Varies on transmission path and adjacent room use
	Garage	70	Not applicable	Time of noise source?	NA	NA	NA	Not usually critical
Ceiling	Bedrooms	70	Highest		20-30	> 55	> 55	Relocate bedroom or install acoustic Plasterboard fixed to resilient mounted battens and upgrade ceiling insulation
	Living	70	High		30-40	> 35	> 35	Relocate bedroom or install acoustic Plasterboard fixed to resilient mounted battens and upgrade ceiling insulation
	Study/Office	70	High		30-35	> 40	> 40	Relocate bedroom or install acoustic Plasterboard fixed to resilient mounted battens and upgrade ceiling insulation
	Laundry	70	Not critical		< 40	> 35	> 35	Not usually critical
	Garage	70	Not applicable		NA	NA	NA	Not usually critical

Frequency (Hz)	125	250	500	1000	2000	4000
Practical Sound Absorption Coefficient, (α_p)	0.5	1.00	1.00	1.00	1.00	1.00

NRC of the sample calculated in accordance with ASTM C423-90A is: **1.20**

RMIT Test Report - 1211/10-76/PD

Field Performance EarthWool™ HP Batts in Masonry Veneer Walls

The field performance can vary from a well constructed laboratory tested wall using selected materials. Depending on construction a masonry veneer wall with EarthWool™ HP insulation will achieve a theoretical acoustic rating of $R_w 56^\dagger$. On site acoustic performance will vary with regard to brick mass, render, cavity, wall wrap, weep holes, raked or flush joints, unfilled perpend, framing, plasterboard and more importantly flanking sound transmission losses.

[†] Opinion provided by BGMA P/L report September 2010

Physical Description - EarthWool™ R2.5 HP Batts

Reference	R-Value	Thickness (mm)	Width (mm)	Length (mm)	Mass (kg)
AZ05EV	2.5	90	430	1160	0.83
AZ06E	2.5	90	580	1160	1.12

Knauf Insulation Pty Ltd

Unit 3, 50 Secam Street

Mansfield QLD 4122

Customer Service (sales)

Tel: +61 7 3343 1989

Fax: +61 7 3343 1898

Email: sales.au@knaufinsulation.com

Technical Support

Email: tech.au@knaufinsulation.com

For more information please visit
www.knaufinsulation.com.au