



BRANZ Appraised

Appraisal No.648 [2009]

BRANZ Appraisals

Technical Assessments of products
for building and construction

**BRANZ
APPRAISAL
No. 648 (2009)**

**KNAUF EARTHWOOL
INSULATION**

Knauf Insulation

One Knauf Drive
Shelbyville
IN 46176
USA

Distributor:

Knauf Insulation

P O Box 175
Brisbane Market
4106 Queensland, Australia
Tel: +61 4 3838 8707

Web: www.knaufinsulation.com.au



BRANZ

**BRANZ Limited
Private Bag 50 908
Porirua City
New Zealand**

Tel: +64 4 237 1170

Fax: +64 4 237 1171

www.branz.co.nz



Product

1.1 Knauf Earthwool Insulation is a range of insulation materials manufactured from Ecosol resin bonded glass wool fibres. The insulation is pre-cut to suit a wide range of thermal insulation requirements and framing set-outs in walls, roofs, ceilings and under floors of buildings.



Scope

2.1 Knauf Earthwool Insulation has been appraised as a thermal insulation material for walls, roofs, ceilings, and under floors of buildings within the following scope:

- framed or part-framed domestic and commercial buildings where the insulation remains dry during its serviceable life.

2.2 Knauf Earthwool Insulation must be installed in accordance with the manufacturer's Technical Literature to meet the stated thermal performance rating of the insulation. See Paragraph 6.1.

Building Regulations

New Zealand Building Code (NZBC)

3.1 In the opinion of BRANZ, Knauf Earthwool Insulation if designed, used, installed and maintained in accordance with the statements and conditions of this Appraisal, will meet or contribute to meeting the following provisions of the NZBC:

Clause B2 DURABILITY: Performance B2.3.1(a) not less than 50 years and B2.3.1(b) 15 years and B2.3.2. Knauf Earthwool Insulation will meet these requirements. See Paragraph 8.1.

Clause E3 INTERNAL MOISTURE: Performance E3.3.1. Knauf Earthwool Insulation will contribute to meeting this requirement. See Paragraphs 12.1 and 12.2.

Clause F2 HAZARDOUS BUILDING MATERIALS: Performance F2.3.1. Knauf Earthwool Insulation meets this requirement and will not present a health hazard to people.

Clause H1 ENERGY EFFICIENCY: Performance H1.3.2. E. Knauf Earthwool Insulation will contribute to meeting these requirements. See Paragraphs 13.1 – 13.8.

3.2 This is an Appraisal of an **Acceptable Solution** in terms of New Zealand Building Code Compliance. Knauf Earthwool Insulation thermal resistance (R-value) has been determined by testing to AS/NZS 4859.1 which is an acceptable method.

Building Code of Australia (BCA2008)

3.3 In the opinion of BRANZ, Knauf Earthwool Insulation, if designed, used, installed and maintained in accordance with the statements and conditions of this Appraisal, will contribute to meeting the following provisions of the BCA:

BCA 2008 Volume 1 – Class 2 to 9 Buildings

Section J - Energy Efficiency - Knauf Earthwool Insulation will contribute to meeting the provisions of Acceptable Construction Practice through compliance with AS/NZS 4859.1: 2002. See Paragraphs 14.1-14.4.

BCA 2008 Volume 2 – Class 1 and Class 10 Buildings

Part 2.6 Energy Efficiency, Performance Requirement P3.12. -Knauf Earthwool Insulation will contribute to meeting the provisions of Acceptable Construction Practice through compliance with AS/NZS 4859.1: 2002. See Paragraphs 14.1-14.4.

Technical Specification

Mineral Wool Insulation

4.1 Knauf Earthwool Insulation is an Ecosse resin bonded fibrous glass wool insulation. The main ingredients of Knauf Earthwool Insulation are:

- Glasswool - Recycled and or virgin glass
- Ecosse resin.

4.2 The product is available as set out in Table 1.

4.3 Knauf Earthwool Insulation is brown in colour and is compression packaged in white pre-printed poly bags. Each package is supplied with attached labelling in compliance with AS/NZS 4859.1.

4.4 Accessories used with Knauf Earthwool Insulation which are supplied by the Insulation Installer are :

- Plastic strapping – Where plastic strapping is used to control the insulation material from movement that would affect the performance of the thermal or acoustic insulation performance, strapping that meets the requirements of NZBC Clause B2 DURABILITY: Performance B2.3.1(a) not less than 50 years, must be used.
- Plastic strapping fixings – Plastic strapping fixings such as hot dipped galvanised clouts or zinc plated staples that meet the requirements of NZBC Clause B2 DURABILITY: Performance B2.3.1(a) not less than 50 years.

Handling and Storage

5.1 Knauf Earthwool Insulation must be stored under cover and in dry conditions. Heavy objects must not be stacked on the packs. The packs must be stored in an orientation that avoids excessive compression of the product.

5.2 Compression packaged glasswool is subjected to a maximum combination of compression density and storage time after which the product may not loft to its nominal thickness and therefore may not achieve its designed thermal performance.

Technical Literature

6.1 Refer to the Appraisals listing on the BRANZ website for details of the current Technical Literature for Knauf Earthwool Insulation. The Technical Literature must be read in conjunction with this Appraisal. All aspects of design, use, installation and maintenance contained in the Technical Literature and within the scope of this Appraisal must be followed.

Design Information

General

7.1 Knauf Earthwool Insulation is designed to be used as thermal insulation to meet the energy efficiency and other BCA and NZBC insulation requirements, or to provide greater ratings when required by the designer, when installed in building walls, roofs, ceilings and floors.

7.2 Knauf Earthwool Insulation is designed to be friction-fitted between wall, ceiling or roof framing. The insulation is supplied in an R-value range designed to meet a variety of construction forms that will enable compliance with the minimum requirements of NZS 4218 to be met for walls, roofs and ceilings.

7.3 The building envelope must be constructed to ensure the insulation remains dry during installation and throughout the life of the building.

7.4 Subject to the maximum compression density and storage conditions not being exceeded, all products covered by this Appraisal should recover to their nominal thickness within 24 hours after being removed from their compressed bales.

7.5 Knauf Earthwool Insulation may increase in thickness due to high temperatures. To prevent moisture transfer to Knauf Earthwool Insulation in confined situations in ceilings, i.e. skillion roofs and at external eaves, a separation (minimum 50 mm) is required between Knauf Earthwool Insulation and any flexible roof underlay. Where there is a rigid sheathing or roofing substrate such as plywood, provided there is no design requirement for roof space ventilation, a separation between Knauf Earthwool Insulation and the sheathing or substrate is not required.

7.6 The clearances specified in the Installation Instructions, or specified by the manufacturer of heating appliances and recessed light fittings must be met. The use of recessed light fittings may, therefore, reduce the thermal performance of insulated ceilings. This factor must be taken into account in the assessment of compliance with NZBC Clause H1 Energy Efficiency and the BCA 2008 Volume 1 – Class 2 to 9 Buildings Section J - Energy Efficiency and BCA2008 Volume 2 – Class 1 and Class 10 Buildings Part 2.6 - Energy Efficiency.

7.7 Where the insulation material is not laid directly on a ceiling lining or over ceiling battens or joists, it must be adequately supported by galvanised wire netting or some other suitable corrosion resistant material.

7.8 When the insulation is installed in a wall with a drained cavity where the stud spacings are greater than 450 mm, an intermediate means of restraining the insulation from bulging into the cavity must be installed in accordance with NZBC Acceptable Solution E2/AS1 Paragraph 9.1.8.5.

7.9 Where the insulation is installed in exterior walls, it is preferable for the insulation materials nominal thickness to be selected to provide a snug close fit of the insulation between the building wrap and the interior wall lining.

7.10 Where the insulation is installed under suspended timber floors, the flooring manufacturers' technical specification must be complied with including compliance with subfloor ventilation requirements.

Table 1: Product Range

Product * **	R Value	Nominal Thickness (mm)	Width (mm)	Length (mm)	Pieces per Bale	Nett Area per Bale (m ²)	Nett Weight (kg)
Wall	1.5	75	430	1160	42	20.9	11.5
	1.5	75	450	1200	42	22.7	12.4
	1.5	75	580	1160	42	28.3	15.5
	1.5	75	600	1200	42	30.2	16.6
	2.0	90	430	1160	32	16.0	13.4
	2.0	90	450	1200	32	17.3	15.4
	2.0	90	580	1160	32	21.5	18.2
	2.0	90	600	1200	32	23.0	20.4
	2.5	90	430	1160	14	7.0	11.5
	2.5	90	580	1160	14	9.4	15.5
Roof / Ceiling	2.5	125	430	1160	30	15.0	13.7
	2.5	125	580	1160	30	20.2	18.5
	3.0	145	430	1160	23	11.5	13.4
	3.0	145	580	1160	23	15.5	17.7
	3.3	150	430	1160	20	10.0	13.6
	3.3	150	580	1160	20	13.5	18.4
	3.5	175	430	1160	21	10.5	13.4
	3.5	175	580	1160	21	14.1	18.1
	3.8	185	430	1160	20	10.0	14.5
	3.8	185	580	1160	20	13.5	19.3
	4.0	195	430	1160	18	9.0	13.5
	4.0	195	450	1160	18	9.4	14.2
	4.0	195	580	1160	18	12.1	18.2
	4.0	195	600	1160	18	12.5	19.1
	5.0	210	430	1160	11	5.5	12.9
	5.0	210	450	1160	11	5.7	14.4
	5.0	210	580	1160	11	7.4	17.4
	5.0	210	600	1160	11	7.7	19.1
	6.0	275	430	1160	11	5.5	14.1
	6.0	275	450	1160	11	5.7	14.7
	6.0	275	580	1160	11	7.4	19.0
	6.0	275	600	1160	11	7.7	19.5

**Insulation must not be fitted into sealed cavities that are less than the labelled insulation nominal thickness.*

***Table 1 products may be selected to be used as under floor thermal insulation.*

Durability

Serviceable Life

8.1 Where the building is maintained so that provisions of the NZBC E2 and E3 Clauses are met, and where the insulation is not crushed or exposed to conditions that will diminish its thermal performance, (e.g. moisture), then it can be expected to have a serviceable life of at least 50 years. Knauf Earthwool Insulation must be installed in a dry, protected construction cavity.

Maintenance

9.1 The building must be maintained weatherproof at all times. If, during normal routine maintenance it is discovered that moisture has entered the building envelope, or that dampness has occurred because of leaking plumbing or some other source, then that source must be repaired immediately. Wet or damp insulation must be removed and then replaced with new insulation of an equivalent thermal rating. Cavities must be clean, dry and free of all contaminants and mould before fitting new insulation. NZS 4246 Paragraph 3.3 gives guidance on thermal insulation maintenance due to water damage.

Outbreak of Fire

10.1 Knauf Earthwool Insulation must be separated or protected from sources of heat such as chimneys, fireplaces, flues and fuel burning appliances in accordance with the requirements of NZBC Acceptable Solution C/AS1 Part 9.

10.2 The Technical Literature must be read for instruction on the required separation distances from sources of heat for compliance with the BCA.

10.3 Where Knauf Earthwool Insulation is used in bushfire areas and not protected by non-combustible building elements, consideration must be given to the provisions of BCA 2008 Part 3.7.4.

External Moisture

11.1 The total building envelope must comply with the requirements of NZBC Clause E2 to ensure that the insulation remains dry in use.

11.2 The moisture content of the construction materials at the time of installing and enclosing the insulation must meet the requirements of NZBC Acceptable Solution E2/AS1, Paragraph 11.2(a), or a lower moisture content if required by the lining manufacturer.

Internal Moisture

12.1 Buildings other than Communal Non-residential, Commercial, Industrial, Outbuildings or Ancillary buildings, must be constructed with an adequate combination of thermal resistance, ventilation, and space temperature provided to all habitable spaces, bathrooms, laundries and other spaces where moisture may be generated or may accumulate.

12.2 Roofs and walls of housing complying with the Schedule Method for Compliance with Clause H1.3.2 E will have adequate thermal resistance. Other buildings may require more thermal insulation to satisfy the requirements of NZBC Acceptable Solution E3/AS1 than that to satisfy the energy efficiency provisions alone.

Energy Efficiency New Zealand

Building Thermal Envelope

13.1 NZBC Verification Method H1/VM1 can be used for housing, Communal Residential, Communal Non-residential and Commercial Buildings.

Modelling of Housing and Smaller Buildings

13.2 The modelling method described in NZS 4218 Section 3.3 (as modified by NZBC Verification Method H1/VM1 Paragraphs 1.1.2 and 1.1.3) is a Verification Method for NZBC Clause H1.3.1(a) for the following types of buildings:

- a) Housing, regardless of total floor area (the method is also a means of compliance with H1.3.2 E, which applies only to housing); and,
- b) Small buildings other than housing having a net lettable area no greater than 300 m².

Building Performance Index for Housing

13.3 Compliance with NZBC Clause H1.3.2 E (Building Performance Index or BPI) satisfies Clause H1.3.1(a).

Modelling of Large Buildings Other Than Housing

13.4 The modelling method described in NZS 4243.1 Section 4.4 is a Verification Method for NZBC Clause H1.3.1(a) for buildings other than Housing having a net lettable area greater than 300 m².

Determining Thermal Resistance

13.5 The thermal resistance (R-values) of building elements may be verified by using NZS 4214.

The BRANZ 'House Insulation Guide' Third Edition provides thermal resistances of common building elements and is based on calculations from NZS 4214.

Building Thermal Envelope

13.6 NZBC Acceptable Solution H1/AS1 can be used for Housing, Communal Residential, Communal Non-Residential and Commercial buildings.

Housing and Small Buildings

13.7 Construction in accordance with NZS 4218 Sections 3.1 or 3.2 (as modified by NZBC Acceptable Solution H1/AS1 Paragraphs 2.1.3 and 2.1.4) satisfies NZBC H1.3.1 (a) for housing of any size and all buildings having a net lettable area no greater than 300 m².

13.8 Construction in accordance with NZS 4218 sections 3.1 or 3.2 (as modified by NZBC Acceptable Solution H1/AS1 Paragraphs 2.1.3 and 2.1.4) satisfies NZBC H1.3.2 E for housing of any size, including the external walls of multi-unit dwellings. (Note that common walls between household units of multi-unit dwellings need not comply with NZS 4218.)

Energy Efficiency Australia

14.1 When Knauf Earthwool Insulation is installed in accordance with this Appraisal and the provisions of the BCA2008 Volume 2 – Class 1 Section J and Class 10 Buildings Part 2.6 Energy Efficiency Performance Requirements will be met.

14.2 Contribution to the overall thermal performance and energy rating of houses needs to be considered. The individual thermal conductivity of the insulation contributes to the overall thermal energy rating but its thermal conductivity on its own cannot be used to determine the contribution to the overall energy rating and thermal efficiency of the house.

14.3 The protocol for thermal calculation methods is detailed in ABCB Protocol for House Energy Rating Software which includes NatHERS.

14.4 For details of State and Territory Variations refer to the BCA.

Installation Information

Installation Skill Level Requirements

15.1 Installation of Knauf Earthwool Insulation must be completed by an installer with an understanding of insulation installation, in accordance with the instructions given within the Technical Literature, Installation Instructions and this Appraisal.

General

16.1 Installation of Knauf Earthwool Insulation must be in accordance with the manufacturer's Technical Literature, Installation Instructions and this Appraisal. NZS 4246 should be used as a guide for installing insulation in residential buildings in New Zealand and AS 3999 in Australia.

16.2 The product must be installed only when the building is enclosed and when the construction materials have achieved the required maximum moisture content or less, to ensure the insulation does not become wet.

16.3 Knauf Earthwool Insulation must be released from the packaging and allowed to re-loft prior to installation. The time to loft will depend upon the length of time the product has been packaged and stored.

16.4 Knauf Earthwool Insulation is manufactured in segment sizes to allow cutting to suit wall, floor and ceiling framing spaces (See Table 1).

16.5 Knauf Earthwool Insulation must be cut to fit into cavities where required.

16.6 Where Knauf Earthwool Insulation is cut to fit wall cavities, the wall cavities must be completely filled to prevent sagging and thermal convection.

Basis of Appraisal

The following is a summary of the technical investigations carried out:

Tests

18.1 BRANZ has carried out thermal resistance testing of Knauf Earthwool Insulation in accordance with AS/NZS 4859.1.

Other Investigations

19.1 An assessment of the durability of Knauf Earthwool Insulation has been made by BRANZ technical experts.

19.2 The manufacturer's Technical Literature and Installation Instructions have been reviewed by BRANZ and found to be satisfactory.

19.2 The Biopersistence report has been reviewed by BRANZ.

Quality

20.1 The manufacture of Knauf Earthwool Insulation has been examined by BRANZ, including methods adopted for quality control. Details of the manufacturing processes, and quality and composition of the raw materials used were obtained and found to be satisfactory.

20.2 The quality control systems of Knauf Earthwool Insulation have been assessed and registered by Underwriters Laboratories Inc as meeting the requirements AS/NZS ISO 9001:2000.

20.3 Knauf Insulation is responsible for the quality of the product supplied.

20.4 Quality of installation of the product on site is the responsibility of the installer.

20.5 Quality of maintenance of the building to ensure the insulation material remains dry is the responsibility of the building owner.

Sources of Information

- AS 3999.1992: Thermal Insulation of Dwellings—Bulk insulation, Installation.
- AS/NZS 4859.1: 2002 Materials for the thermal insulation of buildings.
- BRANZ House Insulation Guide, Third Edition 2007.
- BCA 2008 Volume One: Building Code of Australia Class 2 to 9 Buildings.
- BCA 2008 Volume Two: Building Code of Australia Class 1 and 10 Buildings.
- NZS 4214: 2006 Method of determining the total thermal resistance of parts of buildings.
- NZS 4218: 2004 Energy efficiency – housing and small building envelope.
- NZS 4243: 1996 Energy efficiency – large buildings.
- NZS 4246: 2006 Energy efficiency – Installing Insulation In Residential Buildings.
- Compliance Document for New Zealand Building Code Energy Efficiency Clause H1, Department of Building and Housing, Third Edition, August 2007.
- New Zealand Building Code Handbook, Department of Building and Housing, Third Edition, May 2007.
- The New Zealand Building Regulations 1992, up to, and including August 2008 Amendment.

16.7 The insulation must either be neatly friction fitted between framing members and linings, or fitted over framing members and butted tightly so that the potential for gaps and convective heat loss is reduced. The material must not be folded, tucked or compressed. A close, even fit provides the most efficient thermal performance.

16.8 The insulation must be continuous across the entire roof or ceiling plane between top plates of external walls, and fitted either between or over rafters, ceiling joists or truss chords. Wherever possible the insulation should be fitted beneath wiring or plumbing.

Recessed Light fittings - New Zealand

16.9 Where recessed light fittings are fitted, installation of the insulation material and the light fittings must be in accordance with NZBC C/AS1 Paragraph 9.4. If a gap in the insulation material is required around light fittings, the effectiveness of the thermal envelope will be diminished when the insulation does not form a continuous envelope.

Recessed Light fittings - Australia

16.10 A gap must be allowed for around recessed light fittings. Refer to local or national safety requirements. The effectiveness of the thermal envelope will be diminished when the insulation does not form a continuous envelope.

Inspections

16.11 The Technical Literature and AS 3999 or NZS 4246 must be referred to during the inspection of Knauf Earthwool Insulation installations.

Health and Safety

New Zealand

17.1 Knauf Earthwool Insulation is easy to handle. NZS 4246 gives guidance for health and safety requirements such as personal protective clothing and installation hazard assessment.

Australia

17.2 The fibres used for Knauf Insulation have been independently assessed against the Biopersistence requirements of Note Q, and meets the criteria of the National Health and Safety Commission (NOHSC): NOHSC: 1008 (2004) and NOHSC: 1005 (1994). As a result of this assessment, this product is not classified as hazardous according to the NOHSC criteria.

17.3 Knauf Earthwool Insulation is easy to handle. However, it is recommended that a dust mask and eye protection be worn when handling the product to provide protection from loose fibres and dust that may be disturbed. The Technical Literature contains additional health and safety information.



BRANZ

In the opinion of BRANZ, **Knauf Earthwool Insulation** is fit for purpose and will comply with the Building Code to the extent specified in this Appraisal provided it is used, designed, installed and maintained as set out in this Appraisal.

The Appraisal is issued only to **Knauf Insulation**, and is valid until further notice, subject to the Conditions of Appraisal.

Conditions of Appraisal

1. This Appraisal:
 - a) relates only to the product as described herein;
 - b) must be read, considered and used in full together with the technical literature;
 - c) does not address any Legislation, Regulations, Codes or Standards, not specifically named herein;
 - d) is copyright of BRANZ.
2. **Knauf Insulation**:
 - a) continues to have the product reviewed by BRANZ;
 - b) shall notify BRANZ of any changes in product specification or quality assurance measures prior to the product being marketed;
 - c) abides by the BRANZ Appraisals Services Terms and Conditions.
3. Warrants that the product and the manufacturing process for the product are maintained at or above the standards, levels and quality assessed and found satisfactory by BRANZ pursuant to BRANZ's Appraisal of the product.
4. BRANZ makes no representation or warranty as to:
 - a) the nature of individual examples of, batches of, or individual installations of the product, including methods and workmanship;
 - b) the presence or absence of any patent or similar rights subsisting in the product or any other product;
 - c) any guarantee or warranty offered by **Knauf Insulation**.
5. Any reference in this Appraisal to any other publication shall be read as a reference to the version of the publication specified in this Appraisal.
6. BRANZ provides no certification, guarantee, indemnity or warranty, to **Knauf Insulation** or any third party.

For BRANZ

P Burghout
Chief Executive

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