Number BAF 12-007/01/C **Replaces:** -	BDA ADVIES kiwa Partner for progress	**Category** Suspended timber and concrete ground floors
Date 2012.11.15	**BDA Agrément® BAF 12-007/01/C** **Document linked with Kiwa Certificate KGaC 2006 GB, issued by Kiwa Ltd., Cheltenham, UK**	**Phase** Assessment
Project number 12-B-0518		**Subject** Multi-layer foil-faced laminate

Product

Foil-Tec Single and Foil-Tec Double Floor Insulation

Producer

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Description

Multi-layer foil-faced laminate with reinforcement; Foil-Tec Single has aluminium foil on one side and Foil-Tec Double has aluminium foil on both sides.

Scope (use)

Thermal insulation for new or existing suspended timber floors or concrete ground floors of dwellings and buildings with similar temperature and humidity conditions, designed and constructed in accordance with the Certificate holder's instructions.

Summary of Certificate

This Certificate covers the following:

- Conditions of use
- Frame of reference, including relevant codes of practice and test reports
- Independently verified product characteristics
- Factory Production Control
- Annual verification procedure
- Points of attention for the specifier and specific details
- Installation procedure
- Compliance with Building Regulations and NHBC Standards

Major points of assessment

Thermal performance aspects (sections 1.2, 8.2 & 8.3)
The basic property of Foil-Tec Single and Foil-Tec Double Floor Insulation concerns the thermal performance. BDA Test Institute has assessed the thermal performance of the product according BS EN ISO 6946 and the principles of BR443. The product can be used to improve the thermal performance of a floor construction.

Condensation and water penetration risk (section 8.4)
The performance of Foil-Tec Single and Foil-Tec Double Floor Insulation with regard to interstitial condensation, surface condensation and water penetration has been considered.

Behaviour in relation to fire (section 8.5)
An insulated ground floor system using Foil-Tec Single or Foil-Tec Double Floor Insulation can be designed to meet the UK requirements.

Durability (section 8.6)
Foil-Tec Single and Foil-Tec Double Floor Insulation are stable, rot-proof and durable and will remain effective as an insulant for the life of the building in which it is installed.

Statement

It is the opinion of the Kiwa BDA Expert Centre Building Envelope (ECBE) that Foil-Tec Single and Foil-Tec Double Floor Insulation are fit for its intended use, provided it is specified, installed and used in accordance with this Certificate.

Professor Nico Hendriks, MSc
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Chairman

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To check the validity of this document please consult www.bda.nl

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1 Conditions of use

1 Application

The assessment and certification of Foil-Tec Single and Foil-Tec Double Floor Insulation relate to the use of the product in dwellings and buildings with similar temperature and humidity conditions and correctly detailed ground floor systems, designed and constructed in accordance with the Certificate holder's instructions. Foil-Tec Single and Foil-Tec Double Floor Insulation shall not be exposed to organic solvents or plasticisers.

2 Assessment

BDA Test Institute*) has assessed the thermal performance of the product according BS EN 6946 and BR 443. The hemispherical emissivity has been assessed according BS EN 16012, Annex D and the characteristic properties according BS EN 16012, BS EN 1848-2 and BS EN 12310-1.

*) *CPD Notified Laboratory Nr. NB 1640; Testing Accreditation RvA L 447 (acknowledged by UKAS)*

3 Installation

It is recommended that the quality of installation and workmanship is controlled by an independent competent inspector. This inspector can be either a qualified employee of the specifier or a qualified employee of a consulting engineer. The product shall be installed strictly in accordance with the instructions of the Certificate holder and the requirements of this Certificate.

4 Geographical scope

The validity of this document is limited to England, Wales, Scotland and Northern Ireland, with due regard to section 11 (Regulations) of this document.

2 Frame of reference

1 BDA Guideline – BDA Agrément®, 15th June 2012
2 BS 5250:2011 Code of practice for control of condensation in buildings
3 BS EN ISO 6946: 2007 Building components and building elements -Thermal resistance and thermal transmittance - Calculation method
4 BR443: Conventions for U-value calculations, 2006 edition, BRE Scotland
5 BS EN ISO 10211: 2007 Thermal bridges in building constructions – Calculation of heat flows and surface temperatures
6 BDA Report 0286-K-12/1: Determination of product characteristics (initial type testing), 2012.09.20
7 BDA-Kiwa report: Technical Documentation, containing information to demonstrate the conformity of the products to the applicable requirements of BDA Agrément®+ Kiwa Certificate BAR 12-007/01/C
8 BBA Information Bulletin No. 3: Reflective foil Insulation – Conventions for U-value calculations, March 2010
9 BS EN 16012: 2012 Thermal insulation for buildings — Reflective insulation products — Determination of the declared thermal performance
10 NHBC Standards, Chapter 5.1 Substructure and ground bearing floors and Chapter 5.2 Suspended ground floors
11 Kiwa Guideline K22005, 15th June 2012
12 Kiwa Certificate KGaC 2006 GB, 2012.08.31, Kiwa Ltd., Cheltenham, UK
13 BS 8102: 2009 Code of practice for protection of below ground structures against water from the ground
14 BDA Report 12-B-0518/1rev Foil-Tec Floor Insulation: calculation of thermal resistance, 2012.09.24

Remark: in the text of this document reference is made to these sources by adding the relevant reference number in superscript

3 Independently verified product characteristics

• nominal length	: 50	(m)
• nominal width	: 1000, 1500	(mm)
• nominal thickness	: ≤ 1	(mm)
• emission coefficient of aluminium foil[6]	: 0.02	(-)
• thermal resistance Foil-Tec Single with one adjacent non-ventilated cavity, heat flow downwards[14]		
- minimum 25 mm cavity, ΔT= 5K	: 1.40	($m^2.K.W^{-1}$)
- minimum 50 mm cavity, ΔT= 5K	: 1,82	($m^2.K.W^{-1}$)
- minimum 25 mm cavity, ΔT= 10K	: 1.24	($m^2.K.W^{-1}$)
- minimum 50 mm cavity, ΔT= 10K	: 1,61	($m^2.K.W^{-1}$)
• thermal resistance Foil-Tec Double with two adjacent non-ventilated cavities, heat flow downwards[14]		
- minimum 25 mm cavity, ΔT= 5K	: 2,81	($m^2.K.W^{-1}$)
- minimum 50 mm cavity, ΔT= 5K	: 3,64	($m^2.K.W^{-1}$)
• dimensional stability (length)	: 1.5	(%)
• dimensional stability (width)	: 2.3	(%)
• tearing resistance (nail shank)[6]	: 408	(N)
• water vapour diffusion factor μ (with seam)	: 1700	(-)
• water vapour diffusion factor μ (without seam)	: 75000	(-)
• reaction to fire classification	: Euroclass E (BS EN 13501-1)	

4 Ancillary items (outside scope of this Certificate)

- YBS Insulation foil-backed tape with acrylic adhesive, width 75 mm
- 14 mm staples or nails
- Foil-Tec saddle clips
- pre-treated counter battens and softwood battens
- additional insulation where required

5 Factory Production Control (FPC)

Kiwa N.V., Approval Body, has determined that Yorkshire Building Services (Whitwell) Ltd. (YBS), with respect to the products Foil-Tec Single and Foil-Tec Double Floor Insulation fulfills all provisions concerning the specifications described in BDA Agrément® nr. BAF 12-00701/C. The Factory Production Control has been found to comply with the Kiwa Guideline K22005[11] and BDA Agrément® nr. BAF 12-007/01/C. The Factory Production Control system of YBS is in line with the Technical Documentation from the producer[7]. Kiwa Ltd. has performed the initial inspection of the factory and of the Factory Production Control and performs the continuous surveillance of the Factory Production Control[12].

6 Quality control

Foil-Tec Single and Foil-Tec Double Floor Insulation are produced under a Quality Management System, which is deemed to satisfy the requirement concerning the FPC. The quality system enables the Certificate holder to demonstrate that the product fulfils the requirements of this Certificate. This means that the following aspects are covered:

- the quality objectives, quality planning, quality manual and control of documents must fully take on board the objective of delivering a product that conforms to the specifications in this Certificate;
- the manufacturer must identify and document the essential requirements that are relevant for the product and the harmonised standards to be used or other technical solutions that will ensure fulfilment of the specifications in this Certificate;
- the identified standards or other technical solutions must be used as design input, and as verification that design output as given in a continuous technical consulting service ensures that the specifications in this Certificate will be met;
- the measures taken by the Certificate holder to control production must ensure that the products conform to the identified safety requirements;
- the Certificate holder in its measurement and control of the production process and finished products must identify and use methods which are identified in standards or other appropriate methods to ensure that the specifications in this Certificate are met; and
- quality records, such as inspection reports and test data, calibration data, qualification reports of the personnel concerned, must be suitable to ensure the fulfilment of the applicable specifications in this Certificate.

7 Annual verification procedure

In order to demonstrate that the FPC is in conformity with the requirements of the technical specification described in this Certificate the continuous surveillance, assessment and approval of the FPC will be done in a frequency of not less than 1 time per year by Kiwa Ltd. For the purpose of the annual assessment a sample of the product (1 roll) will be independently taken at the production site. The annual assessment will concern the following product characteristics, which will be determined and assessed by BDA and Kiwa Ltd.:

- Thickness BS EN 823:1995
- Width BS EN 1848-2:2001
- Length BS EN 1848-2:2001
- Hemispherical emissivity of foil faces BS EN 16012:2012, Annex D

Remark: If at the time of the verification testing a new version of a mentioned Test Standard has been issued, this new version shall prevail

8 Points of attention for the specifier

1 The product is delivered in rolls packed in a protective sealed bag and should include product name, dimensions, the BDA identification mark and the number of this Certificate.

2 **Floor insulation**

- the building physical behaviour of floor constructions incorporating the product must be analyzed by a specialist; The specialist can be either a qualified employee of the specifier or a qualified consultant or a qualified employee of the Certificate holder. He will check the building physical behaviour of the designed floor construction and if need be, advice about improvement to achieve final specification;
- floors will adequately limit the risk of interstitial condensation when they are designed and constructed in accordance with BS 5250[2]. The membranes with sealed joints have a water vapour resistance of greater than 75 m. However, the product should not be used as a water vapour control layer as it is laid with unsealed joints;
- if ventilation openings are used they should be positioned in accordance with BS 5250[2];
- ventilation openings should be arranged in such a way that blockage is prevented and also the ingress of rain, snow, birds and small mammals.

3 **Thermal performance aspects**

- calculations of the thermal transmittance (U value) of specific floor constructions should be carried out in accordance with BS EN ISO 6946[3], BS-EN-ISO 10211[5] and BR 443[4], using an emissivity of 0.02 and an air space of at least 25 mm. Examples of calculated U values are shown in Tables 1 and 2;
- the requirement for limiting the heat loss through the building fabric, including the effect of thermal bridging can be satisfied if the U-values of the building elements do not exceed the maximum values in the relevant Elemental Methods given in the National Building Regulations of England and Wales (Approved Documents L), Scotland (Technical Standards Regulations 9) and Northern Ireland (Technical Booklet F); further information on regulations is given in section 11 of this Certificate;
- some examples of typical floor cross sections are given in Section 9, Figures 1 and 2.

Table 1 – Example U-values for concrete floor buildup with Foil-Tec Single (taking 12 mm timber floor and 100 mm concrete)

P/A ratio	U-value with 50 mm airspace ($W.m^{-2}.K^{-1}$)
0,2	0.22
0,4	0.32
0,6	0.37
0,8	0.41
1,0	0.43

Table 2 – Example U-values for suspended timber floor buildup with Foil-Tec Double (taking 12 mm timber floor)

P/A ratio	U-value with 50 mm airspace ($W.m^{-2}.K^{-1}$)
0,2	0.18
0,4	0.24
0,6	0.27
0,8	0.29
1,0	0.30

4 **Condensation risk**

- floors incorporating the product will adequately limit the risk of interstitial condensation when designed in accordance with BS 5250[2];
- when the product is installed in accordance with Section 10 of this Certificate the floor construction will adequately limit the risk of surface condensation; see also Section 11 Regulations.

5 **Behaviour in relation to fire**

- the product does not prejudice the fire-resistance properties of the floor. Therefore, the insulation will not contribute to the development stages of a fire or present a smoke or toxic hazard;
- when properly installed, the product will not add significantly to any existing fire hazard;
- the product will be contained within the floor by the overlay until the overlay itself is destroyed. Therefore, the products will not contribute to the development stages of a fire or present a smoke or toxic hazard.

6 **Durability**

The product is stable, rot-proof and durable and will remain effective as an insulant for the life of the building in which it is installed. There is no risk for moth or beetle infestation.

9 Specific details

Figure 1 – Concrete floor buildup with Foil-Tec Single (recommended)

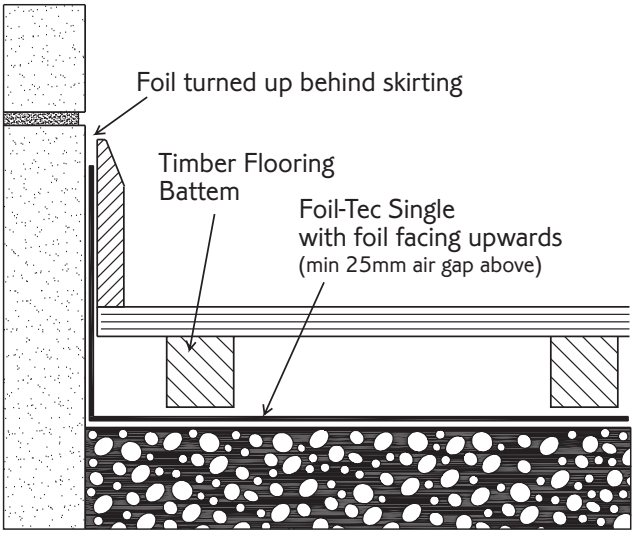
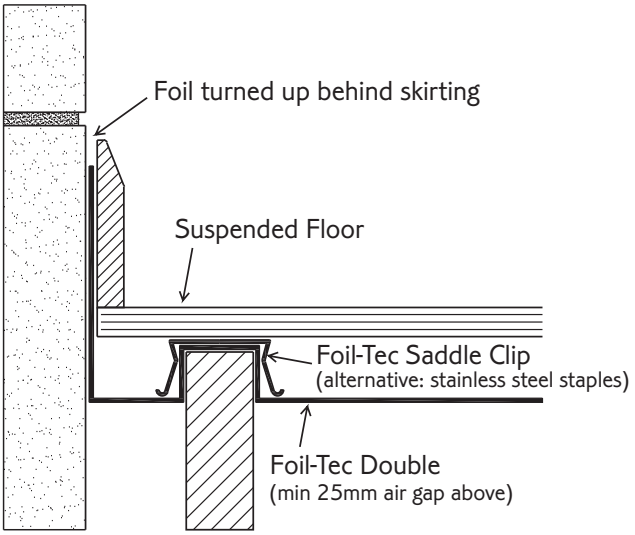


Figure 2 – Suspended timber floor buildup with Foil-Tec Double



10 Installation procedure

1 **General**
- installation of Foil-Tec Single and Foil-Tec Double Floor Insulation and additional products should be in accordance with the Certificate holder's instructions and current good building practice;
- during installation care must be taken to avoid damaging of the product; should damage occur, holes in the product should be repaired with suitable tape, as provided by the Certificate holder;
- in case of joists the product can be attached to these by using Foil-Tec saddle clips (fixed by galvanized nails) or by using stainless staples;
- the width of overlap joints (not to be sealed) must be at least 100 mm;
- when the product is cut to fit around openings or connections, gaps must be minimized; any exposed cut edges should be sealed with suitable tape, as provided by the Certificate holder.

2 **Delivery and site handling**
- the product is delivered to site in rolls packed in a protective bag sealed with a plastic tie; fitting instructions are placed in the bag;
- the rolls should be stored in clean, dry conditions, not exposed to sunlight;
- the product must be protected from being dropped or crushed by objects. Care must be exercised when storing large quantities on site;
- the product must not be exposed to open flame or other ignition sources and must be stored away from flammable material such as paint and solvents;
- to ensure maximum performance of the product when installed, on site precautions must be taken to protect it from mud and dirt.

3 **Solid concrete ground floors (Foil-Tec Single recommended)**
- the product shall be cut equal to the width of the floor plus 150 mm;
- the product should be rolled out on the concrete floor, leaving enough edge overlap for a 75 mm lip to be left behind the skirting;
- timber battens/joists (recommended dimensions 50 mm by 50 mm) are then laid on top of the product, spaced at centres to suit the particular flooring to provide an air space;
- the decking is then fixed with e.g. screws (at 200 mm centres) providing 25 mm penetration into the 50 mm wide battens/joists;
- a possible edge detail is given in Section 9, Figure 1.

4 **Suspended timber ground floors (Foil-Tec Single and Foil-Tec Double)**
- the product should be rolled out continuously across or parallel to the timber joists;
- the product must be brought up behind the skirting board to 75 mm;
- the product is attached to the sides of the joists by Foil-Tec saddle clips (four per m^2, fixed with galvanized nails) or by using stainless staples;
- horizontal joints are overlapped by 100 mm and left open to allow any moisture to dissipate;
- the decking is then fixed with screws (at 200 mm centres) providing 37 mm penetration into the joists;
- a possible edge detail is given in Section 9, Figure 2.

5 **Maintenance and repair**
- once installed, the product does not require any maintenance, provided that it remains installed strictly in accordance with the requirements of this Certificate and of the Certificate holder;
- the Certificate holder must continue to provide a technical consulting service.

11 Regulations

1 **Requirements: The Building Regulations (England and Wales) (as amended)**
- B3(4) Internal fire spread (structure) – combustible materials are permitted by the regulation. Foil-Tec has a Class 1 surface spread of flame rating.
- C4 Resistance to weather and ground moisture – Foil-Tec can adequately resist the passage of moisture, provided the floor is constructed in accordance with BS 8102[13] and Section 10 of this Certificate;
- L1 Conservation of fuel and power – solid concrete ground floors and suspended timber ground floors constructed using Foil-Tec can be designed and constructed to provide a U-value of no greater than 0.20 $W.m^{-2}K^{-1}$; The product, when used in solid concrete ground floors and suspended timber ground floors, can contribute to a building meeting the Target Emission Rate.
- Regulation 7 Materials and workmanship – Foil-Tec is manufactured from suitably safe and durable materials for their application and can be installed to give a satisfactory performance.

11 Regulations (continued)

2 **Requirements: The Building (Scotland) Regulations (as amended)**

2.1 **Regulations 8 (1) Durability of materials and workmanship**

- Foil-Tec Single and Foil-Tec Double Floor Insulation are manufactured from acceptable materials and are considered to be adequately resistant to deterioration and wear under normal service conditions, provided they are installed in accordance with the requirements of this Certificate.

2.2 **Regulation 9 Building Standards Construction**

Section 3 Environment

- 3.10 Precipitation – Foil-Tec can adequately resist the passage of moisture provided the floor is constructed in accordance with BS 8102: 2009[13] and the requirements of Section 10 of this Certificate.
- 3.15 Condensation – a floor formed using Foil-Tec in accordance with the requirements of Section 10 of this Certificate and of BS 5250[2], can be designed and constructed to comply with these Standards.

Section 6 Energy

- 6.1(b) Where a proposed floor U value is not better than (or in Scotland is greater than) the relevant 'notional' value, additional energy saving measures will be required in the building envelope and/or services to achieve the required overall carbon dioxide emission rate reduction of about 20% in dwellings (18% to 25% in Scotland) and 23% to 28% in buildings other than dwellings.
- 6.2.1. Conservation of fuel and power: the building fabric - floors can be designed and constructed with Foil-Tec to provide a U-value of less than 0.25 $W.m^{-2}K^{-1}$.

3 **Requirements: The Building Regulations (Northern Ireland) (as amended)**

- B2 Fitness of materials and workmanship – Foil-Tec is manufactured from materials which are considered to be suitably safe and acceptable for use as insulation for solid concrete ground floors and suspended timber ground floors.
- C5 Resistance to ground moisture and weather – where Foil-Tec is installed within solid concrete ground floors and suspended timber ground floors, these floors can be designed and constructed so as to prevent the passage of moisture or moisture or water vapour through it. Advice is given in Section 10 of this Certificate.
- C7 Condensation - a floor incorporating Foil-Tec can be designed and constructed to prevent any harmful effect from moisture in the form of interstitial condensation.
- F2 Conservation of fuel and power – solid concrete ground floors and suspended timber ground floors, incorporating Foil-Tec, can be designed and constructed to provide a U-value no greater than 0.20 $W.m^{-2}.K^{-1}$.

12 NHBC Standards

NHBC accepts the use Foil-Tec Single and Foil-Tec Double Floor Insulation, provided it is specified, installed and used in accordance with this Certificate, in relation to the NHBC Standards, Chapter 5.1 Substructure and ground bearing floors and Chapter 5.2 Suspended ground floors[10].