LABC Registered Details

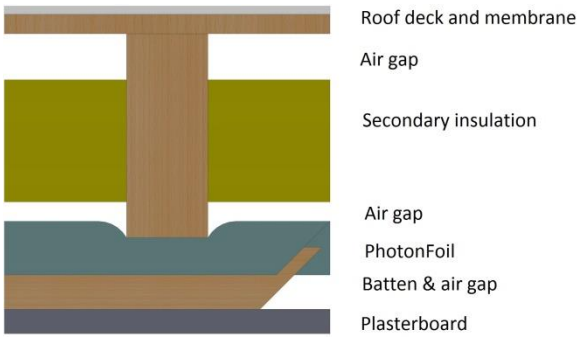
Flat Roof, U=0.16, 600 rafter, 38mm, PhotonFoil/PhotonFoil-A1 under, PIR between

CFR_0.16_600_38_P

1 Application

Cold deck flat roof with PhotonFoil/PhotonFoil-A1 below joists and additional insulation between joists:

- Flat roof
- U-Value = 0.16
- 600mm rafter spacing, 38mm wide
- 100mm PIR λ 0.020 additional insulation between joists
- PhotonFoil/PhotonFoil-A1 below joists
- Plasterboard



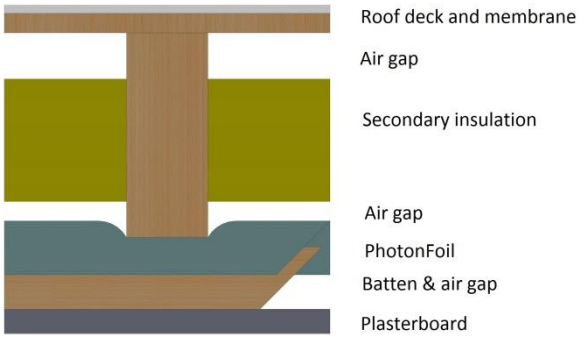
2 Product information

PhotonFoil/PhotonFoil-A1 are multi foil insulation constructed with a high density glasswool core encased in reflective outer layers. In accordance with EN16012 PhotonFoil/PhotonFoil-A1 are classified as a Type 1 reflective insulation products.

They have been designed for and fully tested in accordance with the EN 16012 standard for reflective insulation products, including the application of 90/90. All testing of the product has been carried out by accredited test houses and Notified Bodies. Initial Type Testing to determine the 90/90 fractile has demonstrated that PhotonFoil/PhotonFoil-A1 have a core thermal resistance of 0.97 M^2K/W and an emissivity value of 0.05.

	PhotonFoil	PhotonFoil-A1	
Thermal conductivity ($\lambda_{90/90}$)	0.034	0.034	W/mK
Emissivity	0.05	0.05	
Water vapour resistance	410	4000	MNs/g
Fire performance	Class E	Class A1	
Product thickness	33	33	mm
Core R_D value (thermal resistance)	0.97	0.97	m2/KW
Core R_D value with 2 air spaces	2.35	2.35	m2/KW
Air space thickness	≥ 13	≥ 13	mm
Direction of heat flow	Vertical	Vertical	
Width	1.2	1.2	M
Weight	0.95	1.200	Kg/m2
Roll length	10	10	lm

3 Below joist installation



Following our general installation instructions:

1. Insert secondary insulation between the joists, ensuring a tight fit and that there is a 50mm ventilated space below the decking.
2. Staple PhotonFoil/PhotonFoil-A1 beneath joists and tape joints.
3. 38 mm batten at right angles to joists ensuring ≥ 13mm unventilated air cavities above and below the PhotonFoil/PhotonFoil-A1.
4. Plasterboard and skim.

4 Declared Testing Method

BS EN 16012:2012 states that where a product is already subject to a product specification that describes procedures for the measurement of the aged 90/90 fractile thermal conductivity or thermal resistance of the core insulation material, its guidance should only be used to determine the component of its thermal performance that depends on the emissivity of its external faces; this is the case for PhotonFoil/PhotonFoil-A1:

1. PhotonFoil/PhotonFoil-A1 are classified under BS EN 16012:2012 as product type 1 and are manufactured by Thermic Technology Ltd; registered under ISO 9001 for the design and manufacture of thin reflective insulation.
2. PhotonFoil/PhotonFoil-A1 are an assembly of three components:
    a. Upper surface: Aluminium composite reflective layer
    b. Core: 33 mm λ0.034 glasswool
    c. Lower surface: Aluminium composite reflective layer
3. The core of PhotonFoil/PhotonFoil-A1 is λ0.034 glasswool manufactured in accordance with BS EN 13162:2012, BS EN 13172:2012 and ISO9001 Quality Management Systems and meets the

requirements of Annex ZA of Harmonised European Product standard EN 13162 with its conformity established according to Harmonised European standard EN 13172.

4. PhotonFoil upper and lower surface has been tested by Notified Body Kiwa in accordance with BS EN 16012:2012 for emissivity and EN 13984:2013, EN 1931:2001 for water vapour transmission. PhotonFoil-A1 upper and lower surface aluminium foil emissivity and water vapour transmission is defined by CIBSE Guide A - Environmental Design.
5. PhotonFoil has been fire tested by Notified Body BTTG to BS EN 11925-2. PhotonFoil-A1 has been fire tested by Notified Body BRE to BS EN 13501-1.
6. PhotonFoil/PhotonFoil-A1 have a core R value of 0.97 Km2/W, and an emissivity of 0.05 declared to 90/90.

5 U value calculation and condensation risk

PhotonFoil/PhotonFoil-A1 are both vapour barriers and when installed below the rafters the risk of condensation calculated in accordance with BS EN ISO 13788 is zero.

The following U-Value and condensation risk analysis applies to both PhotonFoil and PhotonFoil-A1:

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info@thermictechnology.co.uk

Project Information

Reference	PhotonFoil
Date	February 2016
Client	LABC Registered Details
Tel:	0207 091 6877
Email:	rd@labc.co.uk

Construction Type

Element : Flat roof - CFR_0.16_600_38_P
Cold flat roof
Internal surface emissivity : High External surface emissivity : High

	Thickness (mm)	Thermal Conductivity (W/mK)	Thermal Resistance (m²K/W)	Pitch (º)	Bridge Details
Outside surface resistance	-	-	0.040		
Roofing Membrane	-	-	-		
Plywood	-	-	0.000		
Ventilated Cavity	50.0	-	0.000		
Kooltherm K7 or equivalent	100.0	0.020	5.000		6.3% Timber (100.0mm)
Cavity (low emissivity) joist space >=13mm	20.0	-	0.481		6.3% Timber (20.0mm)
(Bridged un-vented cavity - width=562.0mm, hro=5.100, E1=0.050, E2=0.050, upward heat flow)					
PhotonFoil	33.0	0.034	0.971		
Cavity (low emissivity) batten space >=13mm	21.0	-	0.454		6.3% Timber (21.0mm)
(Bridged un-vented cavity - width=562.0mm, hro=5.100, E1=0.050, E2=0.900, upward heat flow)					
Plasterboard (BS5250)	12.5	0.170	0.074		
Plaster, lightweight (BS5250)	3.0	0.220	0.014		
Inside surface resistance	-	-	0.100		

	Thickness (mm)	Thermal Conductivity (W/mK)	Thermal Resistance (m^2K/W)	Vapour Resistivity (MNs/gm)	Vapour Resistance (MNs/g)
Outside surface resistance	-	-	0.040	-	-
Roofing Membrane	-	-	-	-	0.00
Plywood	-	-	0.000	-	0.00
Ventilated Cavity	50.0	-	0.000	-	0.00
Kooltherm K7 or equivalent	100.0	0.020	5.000	-	100.00
Cavity (low emissivity) joist space >=13mm	20.0	-	0.481	-	0.00
(Bridged un-vented cavity - width=562.0mm, hro=5.100, E1=0.050, E2=0.050, upward heat flow)					
PhotonFoil	33.0	0.034	0.971	-	192.00
Cavity (low emissivity) batten space >=13mm	21.0	-	0.454	-	0.00
(Bridged un-vented cavity - width=562.0mm, hro=5.100, E1=0.050, E2=0.900, upward heat flow)					
Plasterboard (BS5250)	12.5	0.170	0.074	60.00	0.75
Plaster, lightweight (BS5250)	3.0	0.220	0.014	30.00	0.09
Inside surface resistance	-	-	0.100	-	-

U-value = 0.16W/m²K

U-value, Combined Method : 0.165W/m²K (upper/lower limit 6.391 / 5.738m²K/W, dUf 0.0000, dUg 0.0000, dUp0.0000, dUr0.0000, dUrc0.0000)

(Correction for mechanical fasteners, Delta Uf = 0.000W/m²K)
(Correction for air gaps, Delta Ug = 0.000W/m²K)

(Based on the combined method for determining U-values of structures containing repeating thermal bridges)

Condensation Risk Analysis (no account taken of thermal bridges)

4 - Dwellings with high occupancy, sport halls, kitchens, canteens; buildings heated with unflued gas heaters

Jan (worst)	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
20.0C 46.5%	20.0C 46.8%	20.0C 48.7%	20.0C 51.0%	20.0C 54.3%	21.2C 57.4%	22.3C 59.5%	22.1C 59.1%	20.9C 56.8%	20.0C 53.7%	20.0C 49.4%	20.0C 47.5%
1.5C 90.0%	1.8C 86.5%	3.7C 84.0%	6.0C 81.0%	9.3C 81.0%	12.4C 80.0%	14.5C 80.5%	14.1C 82.5%	11.8C 85.5%	8.7C 88.0%	4.4C 89.5%	2.5C 90.5%

	Interface Temp. ºC	Dewpoint Temp. ºC	Vapour Pressure (kPa)	Saturated V.P. (kPa)	Worst Cond. (g/m²)	Peak Buildup (g/m²)	Conden-sation
1 Outside surface resistance	1.6	0.0	0.61	0.69			No
2 Roofing Membrane	1.6	0.0	0.61	0.69			No
3 Plywood	1.6	0.0	0.61	0.69			No
4 Ventilated Cavity	1.6	0.0	0.61	0.69			No
5 Kooltherm K7 or equivalent	14.6	3.3	0.77	1.66			No
6 Cavity (low emissivity) joist space >=13mm	15.8	3.3	0.77	1.80			No
7 PhotonFoil	18.3	8.2	1.09	2.11			No
8 Cavity (low emissivity) batten space >=13mm	19.5	8.2	1.09	2.27			No
9 Plasterboard (BS5250)	19.7	8.2	1.09	2.29			No
10 Plaster, lightweight (BS5250)	19.7	8.2	1.09	2.30			No
11 Inside surface resistance							

Worst case internal / external conditions for graph : 20.0℃ @ 46.5%RH / 1.5℃ @ 90.0%RH