LABC Registered Details

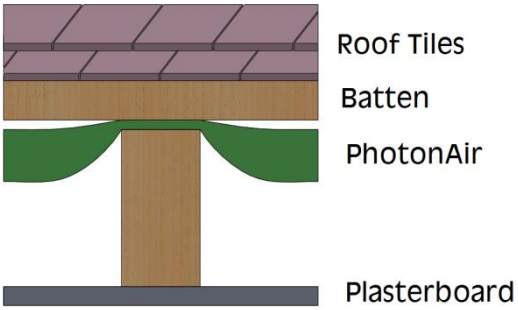
Pitched Roof, U=0.59, 600 rafter, PhotonAir over

RHR_600_PA33_DN_0.59

1 Application

Historic building and public building re-roof, single layer PhotonAir; no change in roof height:

- Pitched roof
- U-Value = 0.59
- PhotonAir draped above rafter
- 600mm rafter spacing
- Plasterboard



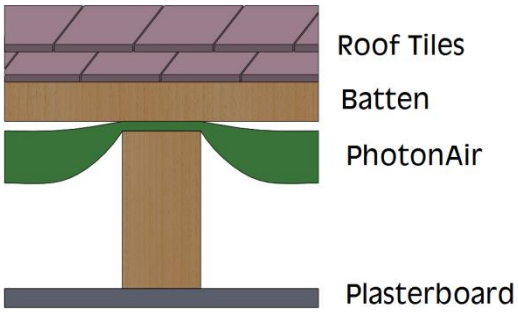
2 Product information

PhotonAir is a breathable lightweight thin flexible reflective insulation that incorporates a breathable underlay. It is constructed with glasswool at its core encapsulated by a perforated reflective lower layer and Klober Permo Air roofing underlay upper layer. In accordance with EN16012 PhotonAir is classified as a Type 1 reflective insulation product.

It has 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. PhotonAir has been tested to determine the 90/90 fractile and accordingly has a core thermal resistance of 0.97 M^2K/W and an emissivity value of 0.05.

Thermal resistance ($\lambda_{90/90}$)	0.034	W/m.K
Emissivity	0.05	
Water vapour resistance	0.22	MN.s/g
Fire performance	Class E	
Product thickness	33	mm
Core R value	0.97	Km2/W
Core R value with 1 air space	1.45	Km2/W
Airspace thickness	≥ 13	mm
Direction of heat flow	Vertical	
Width	1.2	M
Weight	1.0	Kg/m2
Roll length	10	lm

3 Over rafter installation



Install in line with our general installation instructions:

1. Staple PhotonAir over rafters, reflective surface down, with a 10mm drape to allow water run-off.
2. Each layer of PhotonAir must butt-join the previous layer, with the 150mm membrane overlap running onto the lower layer, thus ensuring that any water runs down without penetrating between layers.
3. Fix tile battens and tiles above PhotonAir.
4. Ensure minimum air gap of 13mm between PhotonAir and plasterboard

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 PhotonAir:

1. PhotonAir is classified under BS EN 16012:2012 as product type 1 and is manufactured by Thermic Technology Ltd; registered under ISO 9001 for the design and manufacture of thin reflective insulation.
2. PhotonAir is an assembly of three components:
    a. Upper surface: Klober Permo Air breather membrane
    b. Core: 33 mm Superglass λ0.034 glasswool
    c. Lower surface: Perforated reflective layer manufactured specifically for PhotonAir
3. The core of PhotonAir 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. PhotonAir upper surface declared performance is according to EN 13859-1:2010 and EN 13859-2:2010.

5. PhotonAir lower surface has been tested by NAMAS accredited laboratories in accordance with BS EN 16012:2012 for emissivity and ISO 12572 for water vapour permeability.
6. PhotonFoil has been fire tested to BS EN 11925-2.
7. PhotonFoil has 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

PhotonAir has a defined vapour resistance of 0.22 MN.s/g and when installed above the rafters the risk of condensation calculated in accordance with BS EN ISO 13788 is zero.

The U-Value and condensation risk analysis follow:

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Project Information

Reference PhotonAir
Date Feb 2016
Client LABC Registered System

Construction Type

Element : Pitched roof, ceiling at rafter line - RHR_600_PA33_DN_0.59
Refurbishment and upgrade: PhotonAir single layer draped 75mm rafter 600mm centres
Internal surface emissivity : High External surface emissivity : High
Correction for mechanical fasteners :-

Alpha : 0.8 per m Thermal conductivity of fastener : 17.00 W/mK
Fasteners per square metre : 6.70 off Fasteners cross-sectional area : 7.45 mm²

	Thickness (mm)	Thermal Conductivity (W/mK)	Thermal Resistance (m²K/W)	Pitch (º)	Bridge Details
Outside surface resistance	-	-	0.100		
Tiling including batten space	-	-	0.000		
PhotonAir	33.0	0.034	0.971		0.5% Timber (33.0mm)
Cavity (low emissivity) rafter space >=13mm	38.0	-	0.454		7.8% Timber (38.0mm)
(Bridged un-vented cavity - width=553.0mm, 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	-	-	0.100	-	-
Tiling including batten space	-	-	0.000	-	0.00
PhotonAir	33.0	0.034	0.971	-	0.22
Cavity (low emissivity) rafter space >=13mm	38.0	-	0.454	-	0.00
(Bridged un-vented cavity - width=553.0mm, 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 = 0.59W/m²K

U-value, Combined Method : 0.593W/m²K (upper/lower limit 1.692 / 1.680m²K/W, dUf 0.0066, dUg 0.0000, dUp0.0000, dUr0.0000, dUrc0.0000)

(Correction for mechanical fasteners, Delta Uf = 0.007W/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 69.1%	20.0C 68.0%	20.0C 67.0%	20.0C 66.2%	20.0C 68.0%	20.0C 70.7%	20.0C 74.3%	20.0C 75.1%	20.0C 73.4%	20.0C 71.2%	20.0C 69.2%	20.0C 69.3%
2.5C 90.0%	2.8C 86.5%	4.7C 84.0%	7.0C 81.0%	10.3C 81.0%	13.4C 80.0%	15.5C 80.5%	15.1C 82.5%	12.8C 85.5%	9.7C 88.0%	5.4C 89.5%	3.5C 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	3.5	1.0	0.66	0.79			No
2 Tiling including batten space	3.5	1.0	0.66	0.79			No
3 PhotonAir	13.4	4.8	0.86	1.54			No
4 Cavity (low emissivity) rafter space >=13mm	18.1	4.8	0.86	2.07			No
5 Plasterboard (BS5250)	18.8	13.4	1.53	2.17			No
6 Plaster, lightweight (BS5250)	19.0	14.2	1.61	2.19			No
7 Inside surface resistance							

Worst case internal / external conditions for graph : 20.0℃ @ 69.1%RH / 2.5℃ @ 90.0%RH

Scale 1:1