EuroPHit

D3.8_Evaluate Specialist Deep-Retrofit Products Report

LAMP

French Projects

INTELLIGENT ENERGY – EUROPE II

Energy efficiency and renewable energy in buildings

IEE/12/070

EuroPHit

[Improving the energy performance of step-by-step refurbishment and integration of renewable energies]

Contract N°: SI2.645928

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Technical References

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Table of Contents

List of tables and figures

Abstract

General overview of what is the main subject of this report.

'Retrofitting to the EnerPHit standard will require the following initiatives with respect to building materials and products:

- Use of existing materials in a non-typical method such as additional thickness of insulation;
- Use of non-typical (or non-commonly used) materials to achieve the extraordinary performance of the EnerPHit standard, such as airtightness tapes and membranes, foam glass for thermal bridging and triple glazing in windows;
- Testing of new-to-market materials which have had limited application in real-world scenarios; and
- Identification of short-comings in the marketplace in terms of products or materials that would greatly enhance the application of EnerPHit on a broader scale.
-

It is planned that existing, uncommon and new to market materials and products will be used on each of the step-by-step EnerPHit projects where possible. Where materials are not yet certified for use on public buildings, their properties will be assessed qualitatively by the design and construction teams in terms of their potential for application in EnerPHit projects in future. ' (source: EuroPHit contract)

1 Introduction

1.1 General project description

1.2 Scope of this report

Brief description of what is the aim of this report.

'generic product types will be qualitatively evaluated by the construction teams using such criteria as those listed below:

- Ease of use, including whether specialist training is required for application;
- Fit for purpose;
- General availability in the marketplace;
- Health and Safety considerations; and
- Cost.

It is anticipated that the construction teams in each country will evaluate 15 generic building products that would be suitable for application in Step-by-step refurbishment to EnerPHit standard. This adds up to 8 construction teams * minimum 15 products=minimum 120 generic products evaluated.' (source: EuroPHit contract)

2 Building envelope

2.1 Membranes

2.1.1 Wind and rain tightness Solitex Plus system

It is a vapour permeable wind and rain tightness system, composed of a roofing underlay (Solitex plus / Plus connect), a multi-purpose adhesive glue (Orcon F), an all-round adhesive tape with fleece backing (Tescon Vana) and a double-sided nail sealing tape (Tescon Naidec).

The system is suited for use as sarking membranes and as roof lining membranes.

Manufacturer	:	proclima
Homepage	:	https://proclima.com/
Product name	:	Solitex Plus system
URL:	:	http://www.ecologicalbuildingsystems.com/docs/pro%20clima%20product%20portfolio%202015%20BBA.pdf http://www.ecologicalbuildingsystems.com/UK/Products/Product-Detail/pro-clima-Solitex-Plus
Fit for purpose	:	Vapour permeable wind and rain tightness system
s_d-value [m]	:	0,02 humidity variable
Surface weight [g/m²]	:	170
Preconditions	:	The membranes are stable in form, they are quick, easy and accurate to lay.
Usability	:	Can be installed by common carpenters
Availability	:	To be ordered from proclima.
Health /Safety	:	Lightweight for ease of handling, the membrane don't blind because of the blue colour
Costs [€/m²] Installed	:	
Other	:	

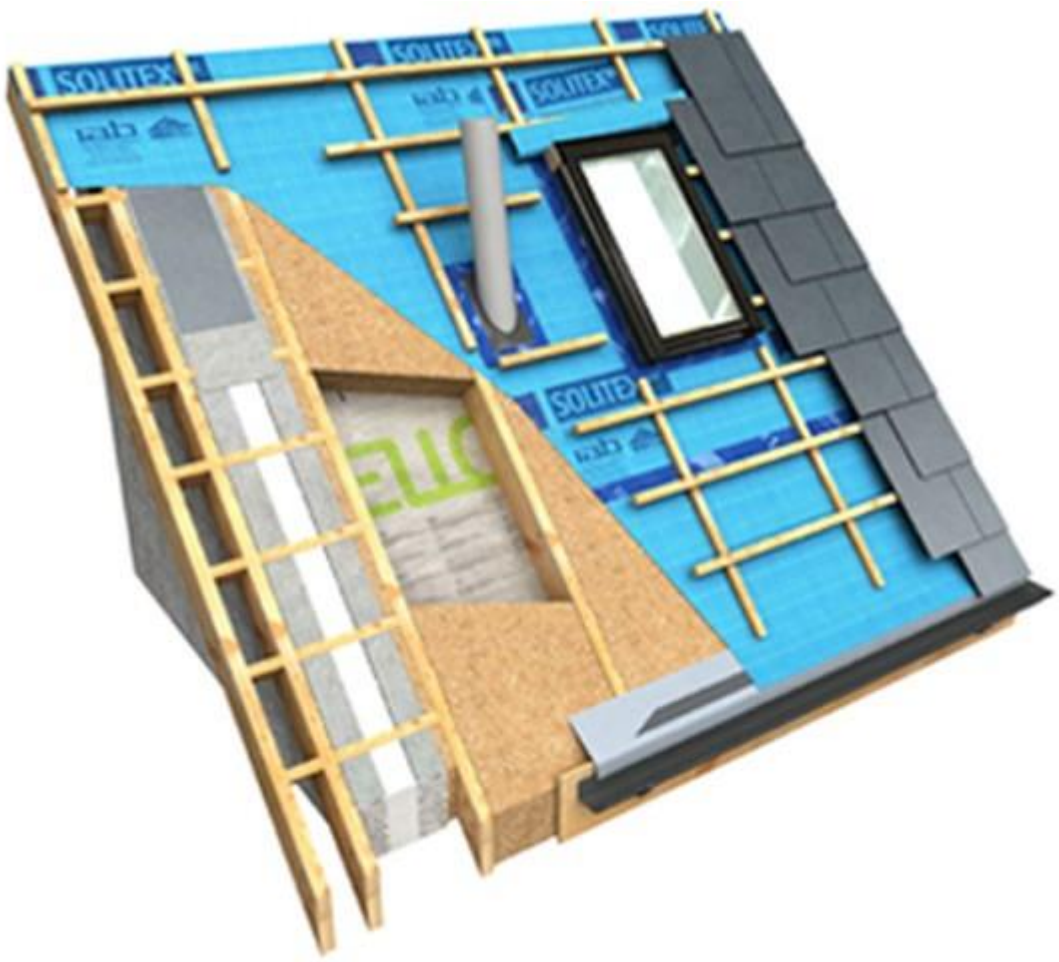


Figure 1: Solitex plus system

- Orcon F glue:

Very high adhesion and quick drying. No pressure lath is required on load-bearing substrates

Air-tight bonds according to DIN 4108-7, SIA 180 and OENORM B 8110-2

Very elastic, permanently flexible

Penetrates deep into the substrate

Can also be stored in the event of frost

Lowest VOC rating in hazardous substance test

Figure 2: Orcon F glue

- Tescon Vana

All-round adhesive tape for internal and external use, 6 months outdoor exposure

Easy to tear off by hand with the soft fleece backing

Can be plastered over

For airtight bonds according to DIN 4108-7, SIA 180 and OENORM B 8110-2

Lowest VOC rating in hazardous substance test

TESCON Vana

- Tescon Naidec

Very good sealing action – liquid butyl adhesives penetrate deep into the lining structure

Water resistant

Suitable for temporary roof coverings

Extra-strong thanks to a reinforcing layer

Contains no bitumen

TESCON® NAiDEC

Figure 3: Tescon Naidec tape

2.1.2 Internal air tightness Dasaplano system

It is an internal air tightness system for renovation, composed of a roofing underlay to be put between insulation layers when renovating roof from the outside (Dasaplano 0,01 connect), a multi-purpose adhesive glue (Orcon F), and an all-round adhesive tape with fleece backing (Tescon Vana).

DASAPLANO 0.01 is placed over the rafters and covered by a sub-roofing panel in soft wood fibers, as an overinsulation. This membrane ensures reliable moisture transport to the outside by its monolithic functional airtight film. Thus, it ensures excellent protection against structural damage and mold.

Manufacturer	:	Proclima
Homepage	:	https://proclima.com/

Product name	:	Dasaplano 0,01 connect
URL:	:	https://fr.proclima.com/systemes/renovation/dasaplano-001
Fit for purpose	:	Vapour permeable wind tightness system
s_d-value [m]	:	0,06
s_d-value [m] humidity variable	:	0,01 humidity variable
Surface weight [g/m²]	:	140
Installation pace	:	Very quick
Preconditions	:	
Usability	:	Can be installed by common carpenters
Availability	:	To be ordered from proclima
Health /Safety	:	Active moisture transport, ensuring dry and safe insulation structures
Costs [€/m²] Installed	:	
Other	:	Three-layer airtightness membrane for roof renovation from the outside in case of fully insulated compartments formed by the rafters. Laying on the rafters, under an additional rafters insulation made with wood fiber under-roof panels.

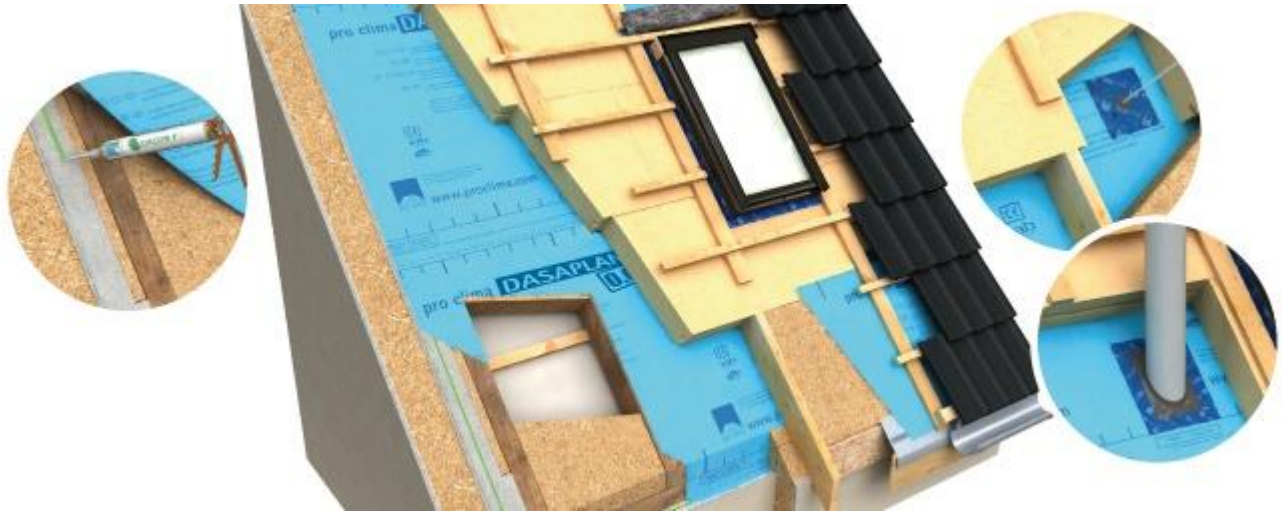


Figure 4 : Dasaplano 0,01 connect system

Phases for system implementation:

1. Fill the compartment
2. Unroll and staple the membrane
3. Realize overlap and gluing membranes
4. Connection to edge
5. Connection to eave

6. Connection to cables and conduits
7. Overinsulation

1-2

3-4

5-6

7

2.2 EIFS (external insulation and finish system)

Parexlanko is a one-stop-shop. All the products needed for external insulation are available.

2.2.1 Parexlanko polystyrene foam with graphite additive

Polystyrene foam with graphite additive panels, intended for external thermal Insulation under rendering. Thickness range varies from 20 to 300 mm.

Manufacturer	:	Parexlanko
Homepage	:	www.parexlanko.com
Product name	:	Pariso PSE
URL:	:	http://www.parexlanko.com/upload/pro_documentations/Pdf/50/guide_des_composants_ITE.pdf
Fit for purpose	:	External insulation
Thermal conductivity [W/mK]	:	0,031
Reaction to fire	:	Euroclass E
Density [kg/m^3]	:	15
Installation pace	:	Very quick
Preconditions	:	
Usability	:	
Availability	:	To be ordered at Parexlanko
Health /Safety	:	
Costs [€/m²] Installed	:	
Other	:	Because of its sensitivity to the sun, gray polystyrene should be protected during storage, during and after laying, using tarpaulins or protective nets not letting more than 30% of solar energy pass. Prolonged exposure to UV is harmful to polystyrene. It must therefore be protected and quickly covered by the sub-rendering.

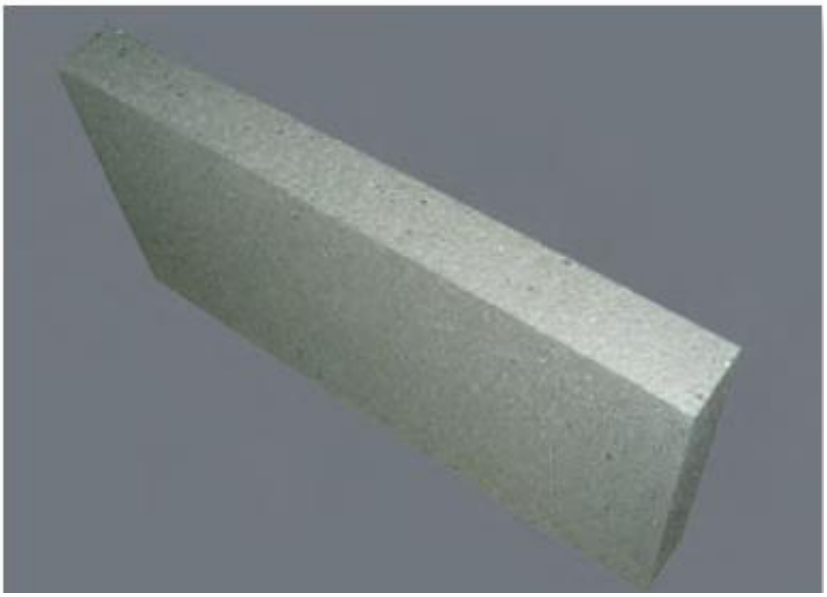


Figure 5 Pariso PSE panel

2.2.2 Parexlanko polystyrene for walls buried part

White polystyrene foam panels for external insulation of walls buried part. Thickness range varies from 40 to 200 mm.

Manufacturer	:	Parexlanko
Homepage	:	www.parexlanko.com
Product name	:	Reference IPSB
URL:	:	http://www.parexlanko.com/upload/pro_documentations/Pdf/50/guide_des_composants_ITE.pdf
Fit for purpose	:	External insulation
Thermal conductivity [W/mK]	:	0,034
Reaction to fire	:	Euroclass E
Density [kg/m^3]	:	30
Installation pace	:	Very quick
Preconditions	:	
Usability	:	
Availability	:	To be ordered at Parexlanko
Health /Safety	:	
Costs [€/m²] Installed	:	
Other	:	

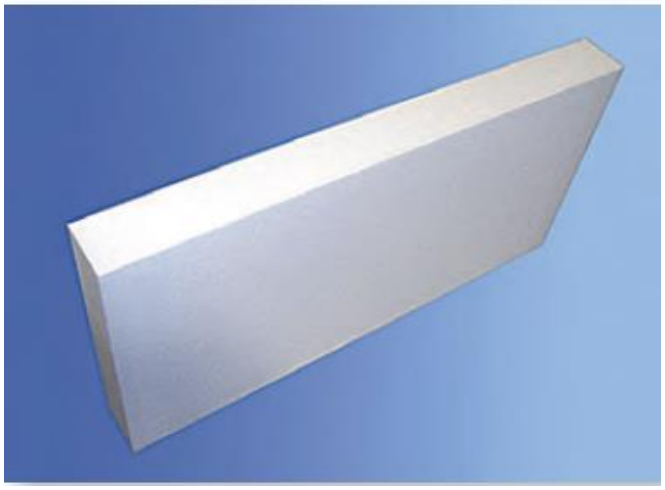


Figure 6 Polystyrene panel for walls buried part

2.2.3 Parexlanko rock wool strips

Insulating pre-coated rock wool strip used like fire protection strip. Thickness range varies from 80 to 200 mm.

Manufacturer	:	Parexlanko
Homepage	:	www.parexlanko.com
Product name	:	Reference IBLR
URL:	:	http://www.parexlanko.com/upload/pro_documentations/Pdf/50/guide_des_composants_ITE.pdf
Fit for purpose	:	Fire protection strip
Thermal conductivity [W/mK]	:	0,040
Reaction to fire	:	Euroclass A1
Density [kg/m^3]	:	95
Thickness tolerance	:	T5
Dimensional stability	:	DST + & DS(TH) according to EN 1604
Compression resistance	:	CS (10/Y) 40 according to EN 826
Perpendicular traction	:	TR80 according to EN 1607
Installation pace	:	Very quick
Preconditions	:	
Usability	:	
Availability	:	To be ordered at Parexlanko
Health /Safety	:	
Costs [€/m²] Installed	:	

Other :

Figure 7 Rock wool strip

2.2.4 Parexlanko hot-wire cutting machine for polystyrene

Device for fast and accurate hot wire cutting of white or graphite polystyrene insulating panels, without production of volatile waste (polystyrene beads). 300 mm thickness maximum.

Manufacturer	:	Parexlanko
Homepage	:	www.parexlanko.com
Product name	:	Reference IDFC
URL:	:	http://www.parexlanko.com/upload/pro_documentations/ Pdf/50/guide_des_composants_ITE.pdf
Fit for purpose	:	Polystyrene cutting
Cutting length [mm]	:	1280 max
Cutting thickness [mm]	:	300 max
Weight [kg]	:	19,3 with transformer
Thickness tolerance	:	T5
Power supply	:	230 V, 50 Hz
Wire diameter [mm]	:	0,65, 0,50 for corners cutting machine
Installation pace	:	Very quick
Preconditions	:	
Usability	:	
Availability	:	To be ordered at Parexlanko
Health /Safety	:	Not to be used under rain or humidity. Mandatory use of protective gloves (risk of burning) and goggles. The filament is live wire. In case of breaking there may be sparks.

Costs [€/m²] Installed :

Other :

Figure 8 Hot-wire cutting machine for polystyrene

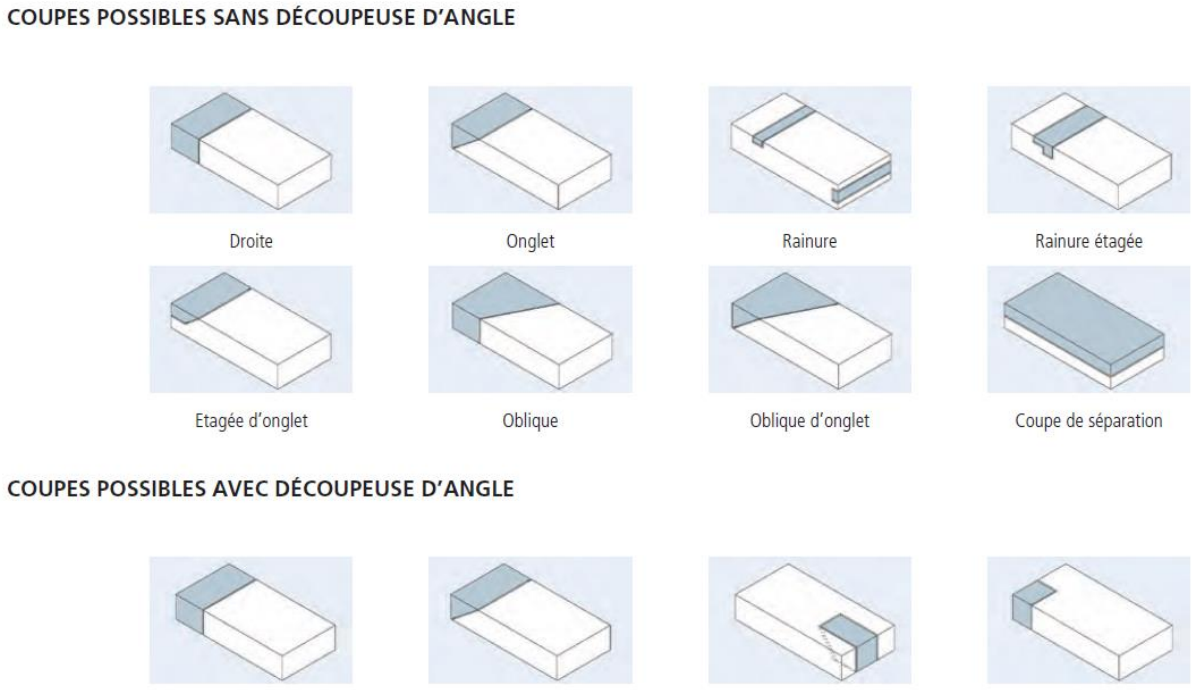


Figure 9 Possible cuts without and with corners cutting machine

2.2.5 Parexlanko adjustable start profile in PVC

Adjustable start profile in PVC, suitable for all external thermal insulation systems of the PARISO range. Adjustable for thicknesses of insulation systems from 100 to 240 mm.

Manufacturer	:	Parexlanko
Homepage	:	www.parexlanko.com
Product name	:	Reference IPVC
URL:	:	http://www.parexlanko.com/upload/pro_documentations/ Pdf/50/guide_des_composants_ITE.pdf
Fit for purpose	:	Insulation starting
Installation pace	:	Very quick
Preconditions	:	
Usability	:	
Availability	:	To be ordered at Parexlanko
Health /Safety	:	
Costs [€/m²] Installed	:	
Other	:	

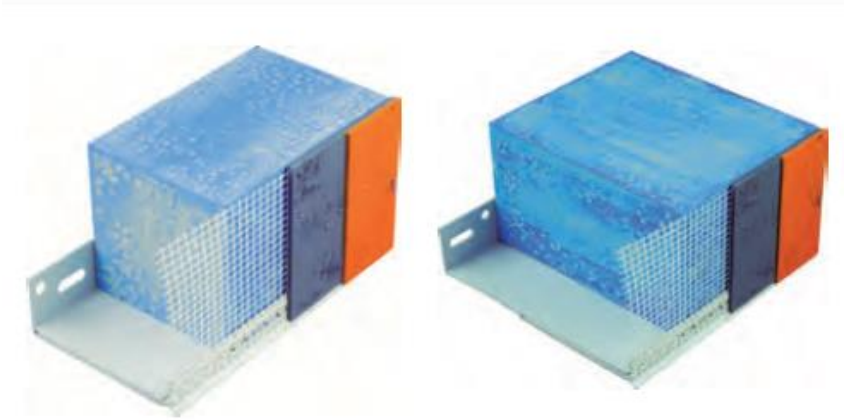


Figure 10 Adjustable start profile in PVC

2.2.6 Parexlanko polyester window sill

Polyester fireproof windowsill. adjustable on construction site, it fits the external thermal insulation during renovation.

Manufacturer	:	Parexlanko
Homepage	:	www.parexlanko.com
Product name	:	IAPF01
URL:	:	http://www.parexlanko.com/upload/pro_documentations/ Pdf/50/guide_des_composants_ITE.pdf
Fit for purpose	:	Windowsill

Width [mm]	:	1400
Depth [mm]	:	400
Height of windowsill [mm]	:	15
Installation pace	:	Very quick
Preconditions	:	
Usability	:	
Availability	:	To be ordered at Parexlanko
Health /Safety	:	
Costs [€/m²] Installed	:	
Other	:	• Adaptable to all types of windows • Possibility of folding "ears" • Noise protection during rain

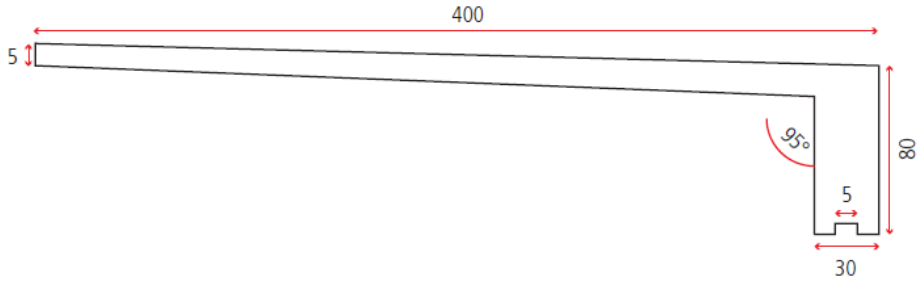


Figure 11 Parexlanko polyester window sill

2.3 Render incorporating phase change material

The wax-based Phase Change Material (PCM) render increases the thermal storage capacity of the building envelope. May be useful in retrofits where the fabric lacks thermal mass and interior faces of the building will be renewed. Whereas these products do not reduce significantly heating demand, they can damper by 25% overheating incurring from solar or internal gains, which makes it an interesting tool for non residential retrofits with limited access to thermal mass.

Figure 12 : micro capsules of PCM render. Source : Enerciel

Figure 13 : Manual application of PCM render. Source : Enerciel

Manufacturer	:	Winco Technologies
Homepage	:	http://www.enerciel-pcm.fr
Product name	:	Enerciel
URL:	:	http://www.enerciel-pcm.fr/performances.php
Fit for purpose	:	Wax-based phase change material render
Transition temperature		23°C
Water vapour transmission sd [m]		0,11
Thermal conductivity [W/mK]	:	0,16
Heating enthalpy [J/g]	:	93
Added specific thermal capacity		~10

[Wh/m²wall.K]		
Installation pace	:	Very quick
Preconditions	:	Airtightness must be ensured by the external wall
Usability	:	Applied manually or sprayed, max 3 mm thickness
Availability	:	To be ordered at Winco
Health /Safety	:	A P2 type masque is mandatory, a P3 type is advisable
Costs [€/m²] Installed	:	50
Other	:	

2.4 Thermal blown insulation on attic floor

2.4.1 Comblissimo

Thermal blown insulation process for unfinished or not easily accessible attics by glass wool blowing in the form of nodules flakes.

Manufacturer	:	SAINT-GOBAIN ISOVER
Homepage	:	www.isover.fr
Product name	:	Comblissimo
URL:	:	https://www.isover.fr/produits/catalogue/comblissimo
Fit for purpose	:	Thermal insulation on attic floor
Thermal conductivity [W/mK]	:	0,046
Reaction to fire	:	Euroclass A1
Surface weight [kg/bag]	:	17,3
Installation pace	:	Very quick
Preconditions	:	Airtightness must be ensured by the external wall
Usability	:	To be blown by a pneumatic machine
Availability	:	To be ordered at Saint Gobain Isover
Health /Safety	:	A P2 type masque is mandatory, a P3 type is advisable
Costs [€/m²] Installed	:	
Other	:	

Figure 14 Blowing the Comblissimo glass wool

2.5 Special products avoiding thermal bridges (e.g. floor, windows, etc.)

'Characteristics, differences from previous work: Window installation thermal bridges during a step-by-step refurbishment, installation solutions recommended by 3ENCULT project, Mitigation of balcony floor thermal bridge with glazed balcony and optimised junction, Mitigation of floor slab/ exterior wall thermal bridge with extended perimeter insulation, Reduction of exterior wall interior insulation/ wooden frame roof with trusses' (source: EuroPHit contract)

2.5.1 IT-fix

Anchoring of heavy loads on façades without thermal bridges through thermal insulation. Rod reinforced with fiberglass, Spacer in composite

Manufacturer	:	IT Fixing
Homepage	:	http://www.it-fixing.com/
Product name	:	IT-fix
URL:	:	
Fit for purpose	:	Anchoring of heavy loads suchs a balconies, stairs, liftcase..
Thermal bridge coefficient [W/K]	:	0,003
Reaction to fire	:	
Installation pace	:	Very quick
Preconditions	:	

Usability	:	
Availability	:	To be ordered at IT Fixing
Health /Safety	:	
Costs [€/m²] Installed	:	
Other	:	

References	ITF 80-M12	ITF 80-M16	ITF 80-M20
Spacer nominal ϕ in mm	ϕ 80	ϕ 80	ϕ 80
ϕ Threaded rod	M12	M16	M20
Traction: Nt [kN]	23	44	70
Compression: Nc [kN]	38	35	32
Flexion: M [Nm]	384	411	444
Shear force: V [kN]	11	21	33
Torque: Cs [Nm]	13	42	72

Figure 15 IT-FIX models allowable loads

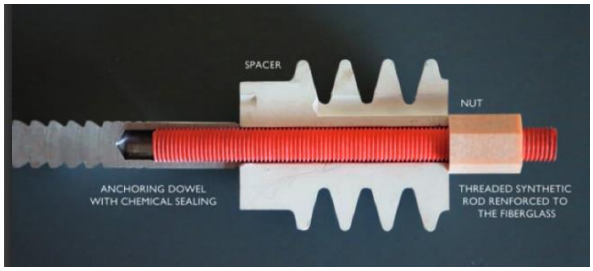


Figure 16 IT-FIX system

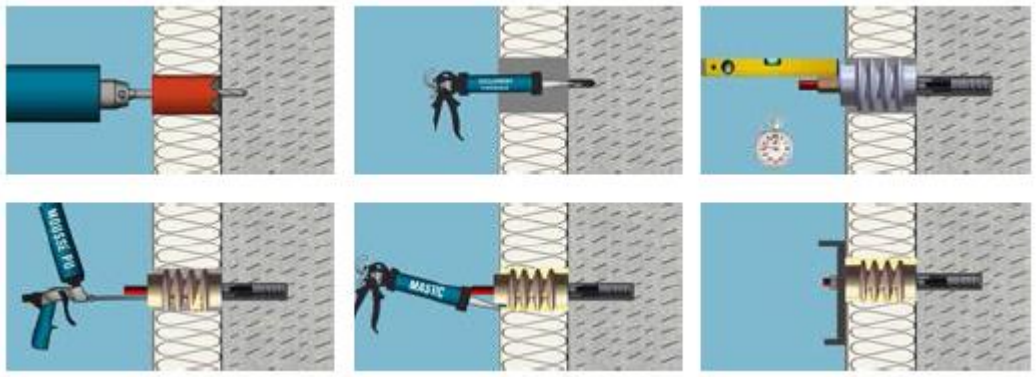


Figure 17 : Installation instructions. Source : IT-Fixing

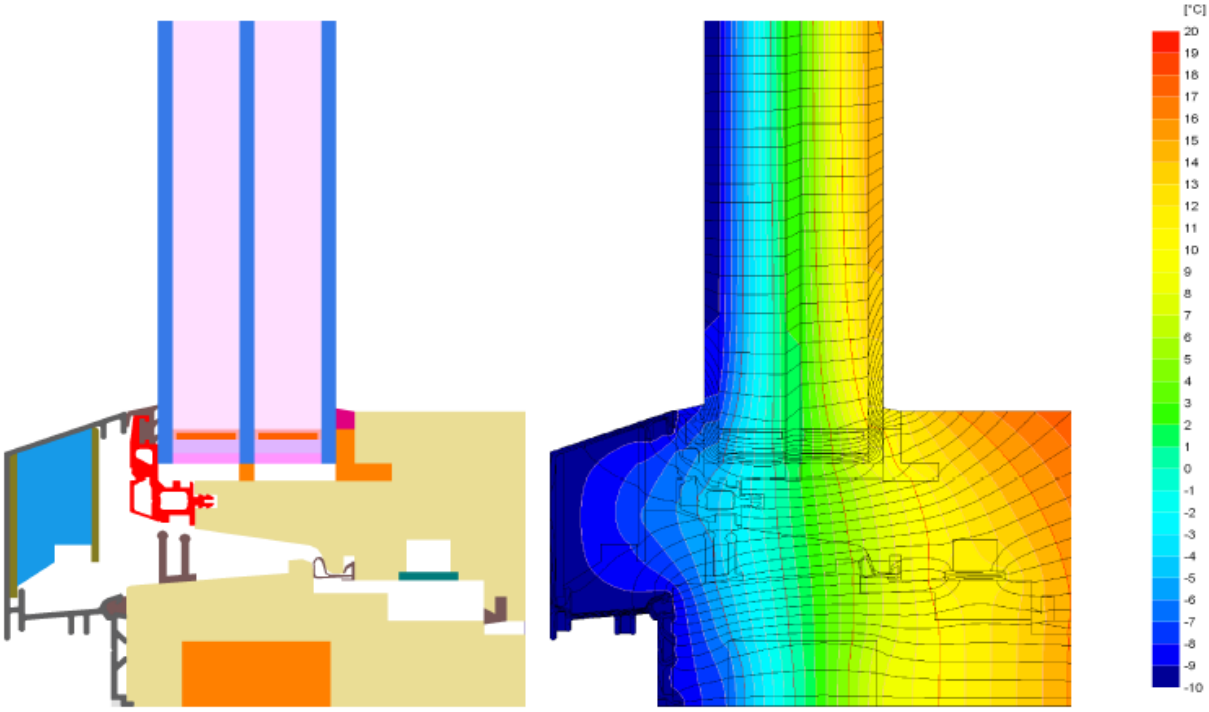
3 Windows

3.1 Window frames

3.1.1 Smartwin

Timber window frame, outside insulated by wood-fibre-board. The outside is rainprotected by aluminium profiles. Used Pane : 48 mm (4/18/4/18/4), intersection of the Glass: 15 mm. Used space: SwisspacerV.

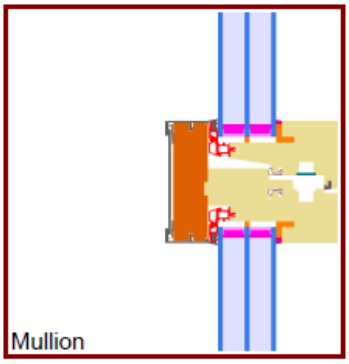
Manufacturer	:	pro Passivhaus fenster GmbH
Homepage	:	www.propassivhausfenster.net
Product name	:	Smartwin
URL:	:	http://www.propassivhausfenster.net/en/products/smartwin.html
Fit for purpose	:	Window frame
U-value [W/m²K]	:	0,78
Uw, installed [W/m²K]	:	0,85
Preconditions	:	
Usability	:	
Availability	:	To be ordered at pro Passivhaus fenster
Health /Safety	:	
Costs [€/m²] Installed	:	
Other	:	



Bottom section Isothermal

Figure 18 Thermal simulation of the Smartwin window

	U_f-value [W/(m²K)]	Width [mm]	Ψ_g [W/(mK)]	$f_{Rsi=0.25}$ [-]
Spacer			SwisspacerV*	
Bottom	0.91	86	0.025	0.70
Side/top	0.70	86	0.026	
Flying Mullion	0.82		0.026	0.72
Spacer			SuperSp. Tri-Seal*	
Bottom	0.91	86	0.026	0.70
Side/top	0.70	86	0.027	
Flying Mullion	0.82		0.027	0.72



* Spacers of lower thermal quality leading to higher thermal losses and lower temperatures.

Figure 19 Thermal data for the window frame

3.2 Window kit solutions

3.2.1 Reawin A window and Tip Tep installation system

Prefabricated window installation with aerogel and cork. It is thought for interior insulation of listed buildings, step-by-step possible. It can also be applied if an interior insulation is present in the existing building structure.

Manufacturer	:	Tillieux Menuiseries
Homepage	:	http://www.tillieux-menuiserie.com/
Product name	:	Tip Tep
URL:	:	http://www.tillieux-menuiserie.com/reawin/
Fit for purpose	:	Window and installation system
Uw, installed [W/m²K]	:	1,04
$\Psi_{installed,\ lateral}$ [W/mK]	:	0,06
$\Psi_{installed,\ bottom}$ [W/mK]	:	0,03
Preconditions	:	
Usability	:	
Availability	:	To be ordered at Tillieux Menuiseries
Health /Safety	:	
Costs [€/m²] Installed	:	745 €/m² (excl. VAT) installed
Other	:	

Figure 20 Reawin window

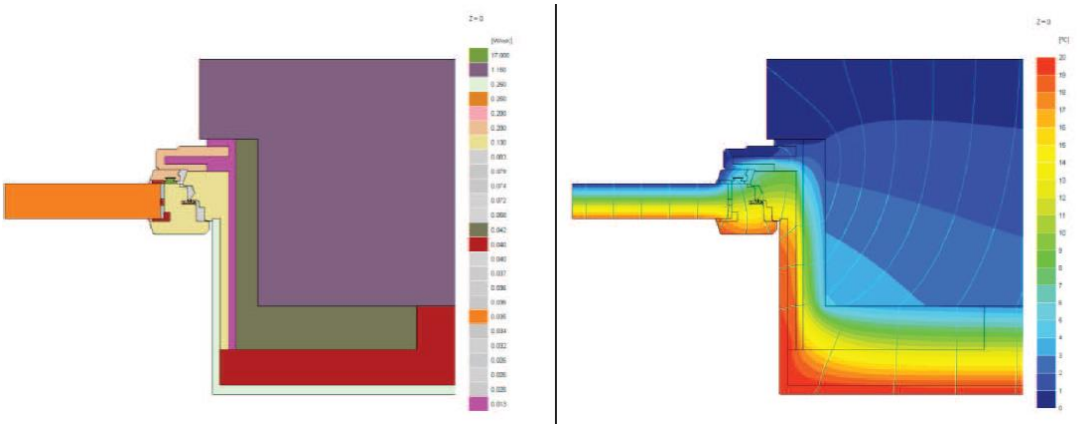


Figure 21 Thermal simulation of the Reawin window

4 Airtightness

4.1 Suitable airtightness rendering

4.1.1 Aéroblue rendering for internal airtightness on wood/masonry

Aéroblue is an interior technical gypsum coating allowing to enhance the airtightness performances (5 mm thick). Successfully tested on various passive house new build projects.

Manufacturer	:	Placo Saint Gobain
Homepage	:	www.placo.fr
Product name	:	Aéroblue
URL:	:	http://www.placo.fr/Solutions/Innovations-et-produits-phares/Innovations-Placo-R/Revetement-interieur-Aeroblue-R
Fit for purpose	:	Interior airtightness
Sd [m]	:	0,03
Preconditions	:	
Usability	:	
Availability	:	Sold in France
Health /Safety	:	
Costs [€/m²] Installed	:	
Other	:	

Figure 22 Before, during and after coating

5 HVAC

5.1 Decentralised ventilation units

Decentralised ventilation units could be useful in dwellings or non-residential units that have little or no space for ducting supply and exhaust air. It is more suitable for large spaces which can be efficiently ventilated by mixing flow. Active overflow could combine with these units to ventilate spaces located in the core of the building. Example below from French manufacturer Aldes with ceramic accumulator for heat recovery:

Manufacturer	:	Aldes
Homepage	:	www.aldes.fr
Product name	:	Nano Air 50
URL:	:	http://pro.aldes.fr/produits/nano-air-50-p30416.htm
Fit for purpose	:	Decentralised ventilation with heat recovery
Heat recovery rate [%] :	:	60-75%
Preconditions	:	Possibility to drill into facades, fresh air intake possible at facades
Usability	:	Airflows from 15 to 55 m3/h, one unit per room
Availability	:	Sold in europe
Health /Safety	:	19 dB(A)
Costs [€/m²] Installed	:	
Other	:	

5.2 Centralised MVHR fire resistant

Centralised unit that can function as extract only in case of fire, during 1/2h for an air temperature at extract inlet of 400°C. In case of fire, extract airflow is maintained at nominal level +-10%, and supply airflow at nominal level +- 20%. To the knowledge of the author other available units on the market require an extra exhaust ventilator that can be triggered in place of the MVHR, which is protected by a fire damper in case of fire. Useful for planning ventilation in multi-family houses or non residential systems: easier to design, reduced global cost in fire protection (investment and annual maintenance of dampers).

Manufacturer	:	France Air
Homepage	:	www.france-air.com
Product name	:	Power box C4 Evo (2015)
URL:	:	http://www.france-air.com/Accueil/Zoomsur/CentraledoublefluxC4/tabid/1413/Default.aspx
Fit for purpose	:	Centralised MVHR with extraction flow working 1/2h at 400°C without additional fire dampers. .
Heat recovery rate [%] :	:	80-85%
Preconditions	:	Centralised extract ducts
Usability	:	Airflows from 1500 to 4500 m3/h Installation on rooftop possible
Availability	:	Sold in Europe
Health /Safety	:	Fire resistant
Costs [€]	:	18-20 k€ excluding VAT and installation
Other	:	

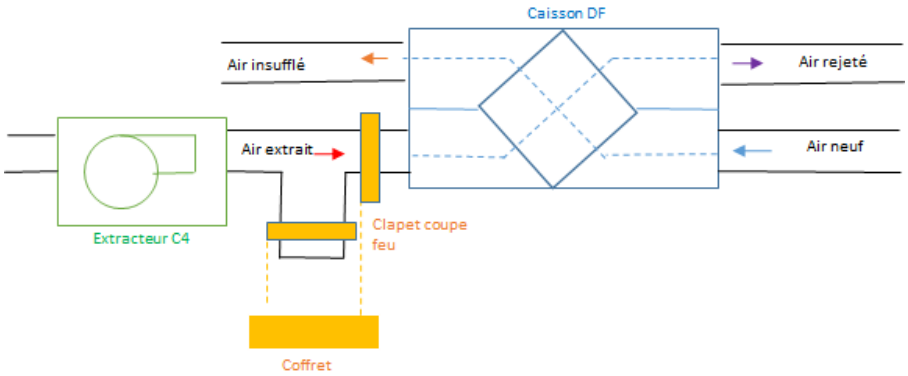


Figure 23 : Usual situation with a MVHR that is not fire-resistant. Additional exhaust ventilator is required, plus fire dampers. Source : France Air

Figure 24 : View of the MVHR unit. Source : France Air

5.3 Heat pump on extract air

A heat pump on extract air for domestic hot water and/or heating is a practical solution for retrofits with low disturbances for tenants.

This solution is indicated for multifamily dwellings. It can be placed on the existing exhaust of a mechanical ventilation system, which is the case of most multifamily dwellings in France. The building must allow easy connection of the heat pump to the hot water vertical distribution.

For higher efficiency, it should be placed after a ventilation with heat recovery, but that solution is more complex to install in usual retrofit situations.

Manufacturer	:	France Air
Homepage	:	www.france-air.com
Product name	:	Soraya
URL:	:	http://espacepro.france-air.com/catalogue-2/chauffage/logements-individuels-et-collectifs-chauffage-et-ecs/systeme-de-prechauffage-ecs/soraya-systeme-de-prechauffage-decs
Fit for purpose	:	Air/water Heat pump on extract air
Seasonal COP	:	~ 3
Preconditions	:	Centralised extract air ducts
Usability	:	7.5kW and 15 kW heating power, 1000-8000 m3/h, 55°C DHW, electric scroller compressor
Availability	:	Sold in Europe
Health /Safety	:	
Costs [€]	:	20 k€ excluding VAT installed
Other	:	

Figure 25 : Extract air heat pump components and integration in a multi-family house. Source: France Air

5.4 Centralised heat pump and heat exchanger on grey domestic hot water

Grey hot water (mostly coming from showers in a residential context) form the dominant heat demand in a refurbished passive house. In a step-by-step retrofit strategy, heat recovery from grey hot water can take place when the DHW generation and distribution system needs renewal.

One option to generate efficiently domestic hot water using heat from grey hot water is to install a centralised unit, recovering all grey water for several zones/apartments, and supplying hot water via storage tanks and hot water loops as needed in the building.

The product below combines a plate heat exchanger and a water/water electric compressor heat pump to lift up the cold water from the mains to a service temperature of 55°C. The heat pump works with a small temperature difference at sources (5-20°C for cold water, 20-30°C for grey water), so COP of 5 to 7 can be reached.

Problem in retrofit for this system is that it might be difficult to adapt to an existing hydraulic installation. Grey waters must be separated from other sewage waters, and existing storage tanks will probably have to be replaced in order for the system to work efficiently, as grey hot water will be stored during long periods. Another challenge is the real performance of the announced self-cleaning filter at the grey water inlet.

Manufacturer	:	France Air
Homepage	:	www.france-air.com
Product name	:	Sourcéo
URL:	:	http://espacepro.france-air.com/sourceo-pac-facteur-7-systeme-de-production-ecs-par-recuperation-denergie-sur-eaux-grises.html#documents
Fit for purpose	:	Heat exchanger and water/water heat pump on grey hot water
Seasonal COP	:	~ 5-7
Preconditions	:	Space in technical room for heat pump and grey hot water storage tanks, existing centralised storage tanks near end of service life
Usability	:	Up to 10 000 L40°C/day
Availability	:	Sold in Europe
Health /Safety	:	Self-cleaning water filter. 55°C DHW
Costs [€]	:	
Other	:	

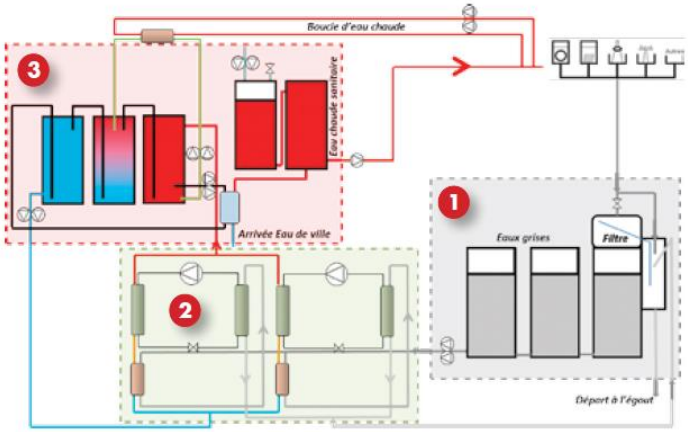


Figure 26 : Schematic of the Sourceo system. Source : France Air

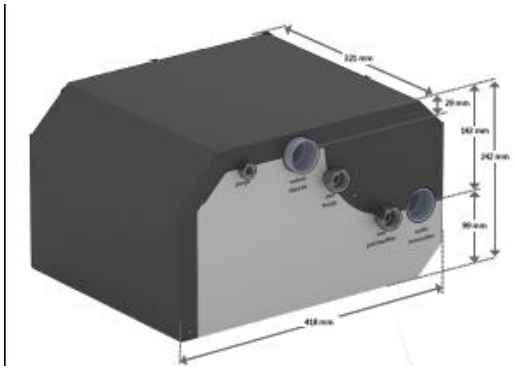
Figure 27 : Integration of Sourcéo in a multifamily house. Source : France Air

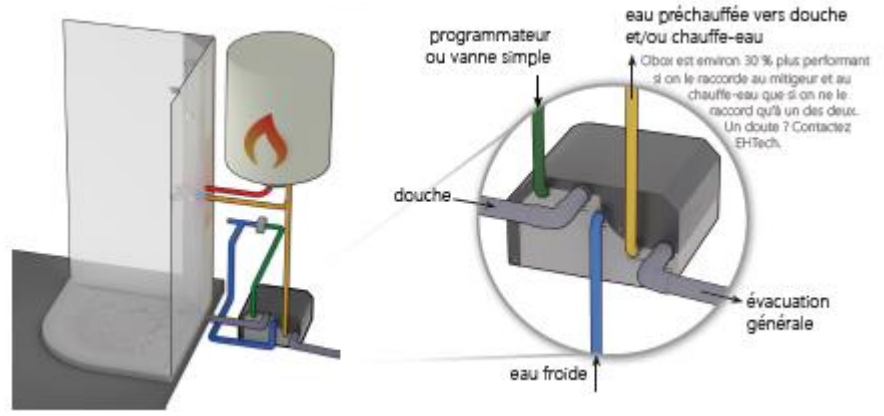
5.5 Decentralised heat exchanger on grey domestic hot water

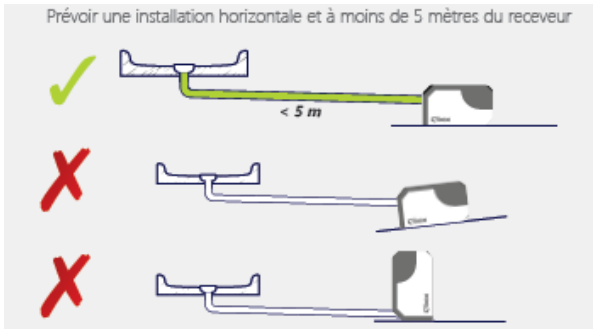
Decentralised compact heat exchanger can be attractive in retrofits where bathrooms need renewal. Such units can be installed below the shower tub.. It is adapted to step-by-step retrofit as it can be the first step of DHW retrofit, before a new generator is installed (eg gas+solar thermal or heat pump). DHW demand can be reduced by 30% compared to a situation without heat recovery.

Manufacturer	:	Energy Harvesting Tech
Homepage	:	www.ehtech.fr
Product name	:	Obox
URL:	:	http://www.ehtech.fr/#!obox/cjg9
Fit for purpose	:	Heat exchanger on grey hot water
Heat recovery rate [%] and DHW demand reduction [%]	:	Heat recovery ~ 60% at steady state DHW demand reduction ~ 30-40% in dwellings
Preconditions	:	Hydraulic connections of showers accessible. Decentralised DHW generators if recovered heat to be sent both to shower and generator. No need for significant height difference as compared to pipe/pipe heat exchangers. Showers to be equipped with thermostatic taps.
Usability	:	Dwellings, Hotels.
Availability	:	Sold in Europe

Health /Safety	:	Self-cleaning filter.
Costs [€]	:	1000 €
Other	:	







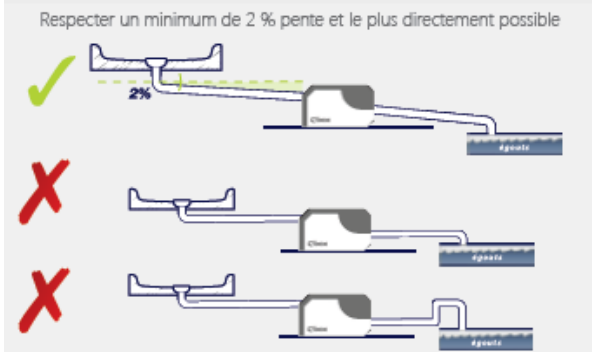


Figure 28 : View of the exchanger unit, recommendations for installation. Source : EH Tech

5.6 Roof integrated solar thermal panels

These panels substitute usual tiles on pitched roof to form “solar thermal tiles”. Designed with thermosiphon to prevent from overheating without need of dedicated forced circulation.

Manufacturer	:	Imerys
Homepage	:	http://www.imerys-toiture.com/
Product name	:	Tuile thermique IMERYS Toiture
URL:	:	http://www.imerys-toiture.com/pro/tuiles-imerys/tuile-thermique.html
Fit for purpose	:	Integrated solar thermal tiles
Optical efficiency [%]	:	73%
Preconditions	:	Existing storage tank needs renewal, or solar thermal connection possible *a posteriori*
Usability	:	Single Family Houses
Availability	:	Sold in Europe
Health /Safety	:	
Costs [€]	:	
Other	:	

5.7 Roof integrated PV + Battery for lighting/demand response

Polycristalline PV modules roof-integrated, 66 Wc / module, connected to Soladin 600 AC/DC inverter embedding MPPT and feeding acid-lead solar batteries. Batteries connected to LED lighting system.

Even if this kit seems limited in terms of power capacity, it can be integrated easily into a step-by-step EnerPHit strategy when tiles need to be replaced. Combining such kits into a global system could feed a high share of the electrical loads in dwellings and small offices. Connecting the inverter to demand response signals from the grid can make such solutions adapted to smart grids (other products show such advanced features, see Sunny Island from SMA or Power Management System solution from Schneider Electrics with Li-Ion SAFT batteries).

Manufacturer	:	Imerys
Homepage	:	http://www.imerys-toiture.com/
Product name	:	Stock'it
URL:	:	http://www.imerys-toiture.com/pro/tuiles-imerys/stock-it.html
Fit for purpose	:	Roof-integrated PV connected to storage
PV efficiency STD [%]	:	10-13%
Preconditions	:	Pitched roof with tiles to be replaced
Usability	:	Dwellings, Small offices
Availability	:	Sold in Europe
Health /Safety	:	
Costs [€]	:	
Other	:	

6 Final remarks

Brief overview of products evaluated above based on practical experience.

Parexlanko products for exterior insulation have proven successful in the observer project 20 in Saint Cyr au Mont d'Or, their ease of use has been approved by workers on site. The one-stop-shop offered by such companies for retrofits that aim high efficiency make designers and contractors save time.

The Smartwin windows have been installed in this observer project as well with good airtightness results at first shot. Their slender profile permitted to keep small openings to their original size.

The Reawin Tiptep system with pre-designed installation profiles has been implemented in various retrofit projects in North of France and is well suited to situations with existing interior insulation. A further development of this product might be to develop a prefabricated or pre-designed solution to anticipate the future exterior insulation.

IT-fixing anchors have been installed in several new build projects aiming at passive house standard. These products still require experienced craftsmen in order to get satisfactory installations on site.

Proclima solutions for wind and air tightness convince craftsmen by their product quality and the precision of the information available to prepare works on site.

EHTech grey hot water heat recovery have been successfully tested by laboratories at CSTB and equip now several energy efficient buildings in France, which are currently monitored.

France Air ventilation and heat pumps units show promising figures and case studies.