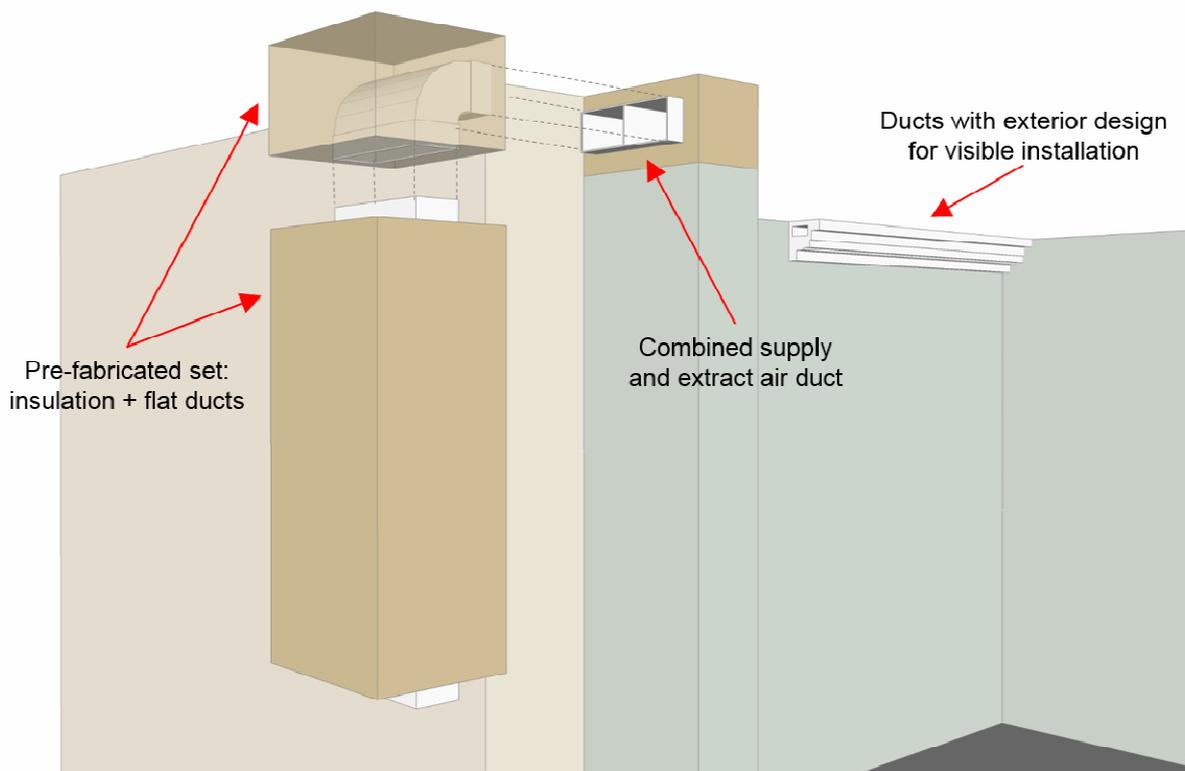


D5.1.10_Ventilation_duct_system



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



Technical References

Project Acronym	EuroPHit
Project Title	Improving the energy performance of step-by-step refurbishment and integration of renewable energies
Project Coordinator	Jan Steiger Passive House Institute, Dr. Wolfgang Feist Rheinstrasse 44/46 D 64283 Darmstadt jan.steiger@passiv.de
Project Duration	1 April 2013 – 31 March 2016 (36 Months)

Deliverable No.	D5.1.10
Dissemination Level	PU
Work Package	WP5_Product Development
Lead beneficiary	05_iEPD
Contributing beneficiary(ies)	01_PHI
Author(s)	Kristin Bräunlich
Co-author(s)	
Date	9.11.2015
File Name	EuroPHit_D5.1.10_Ventilation_Duct_System_PHI

The sole responsibility for the content of this [webpage, publication etc.] lies with the authors. It does not necessarily reflect the opinion of the European Union. Neither the EACI nor the European Commission are responsible for any use that may be made of the information contained therein.

Table of Contents

Abstract	4
1 Ducting within the thermal envelope	5
1.1 Description	5
1.2 Demands	5
1.3 Advantages	5
1.4 Risks	5
1.5 New products	5
Similar products	5
1.6 Ducts suitable for visible installation	6
1.6.1 Description:	6
1.6.2 Demands	6
1.6.3 Advantages	6
1.6.4 Products	6
1.7 Units and ducting outside thermal envelope	6
1.7.1 Description	6
1.7.2 Demands	7
1.7.3 Suitable ducting systems	7
1.7.4 General requirements	7
1.7.5 Advantages	7
1.7.6 Risks	7
1.7.7 New products	8
Similar solutions	Fehler! Textmarke nicht definiert.
1.8 Other space saving installation options for ventilation devices	8
1.8.1 Pre-fabricated component for wall penetrations	8

List of figures and tables

Figure 1: Flat ducts suitable for integration in the façade [source Westaflex].....	5
Figure 2: Pre-fabricated duct system designed for renovation [Source: Helios]	6
Figure 3: Combined Outdoorair-and Exhaustair duct [PHI].....	8

Abstract

This document is a guideline for the ventilation industry interested in developing new products for the Passive House standard. Although this is focused on the needs of step-by-step renovation, the identified areas for product development are mostly valid also for 1-step renovations or new buildings.

The product briefs discuss in more detail the demand of these new products. Similar products and products in development are given as examples to make the case as clear as possible.

It is now up to the manufacturer to gain market advantages through innovations.

1 Ducting within the thermal envelope

1.1 Description

Beside active overflow elements, ducts installed within the thermal envelope might also be an interesting air distribution concept without duct installation inside the dwelling. The idea is to combine the thermal insulation of the building with the installation of the ducting system, which results in ducts integrated in the insulation.

1.2 Demands

Ambitions to integrate the ducting system in the facades do already exist. However the integration of flat ducts into the façade is still not easy, because either cuttings in the insulation are required so that the duct can be integrated, or different layers must be connected so that the ducts can be integrated.

Prefabricated façade elements with already integrated ducts would be much easier to install.

1.3 Advantages

- No duct installation inside the dwelling required

1.4 Risks

- Core hole through the thermal envelope in each room necessary.
- Additional thermal bridge, as the insulation thickness is reduced at the duct position.
- Additional ventilation heat losses of warm ducts inside the insulation, as the insulation thickness is reduced at the duct position.

1.5 New products

- Prefabricated façade elements with already integrated ventilation ducts.

Similar products



Figure 1: Flat ducts suitable for integration in the façade [source Westaflex]

1.6 Ducts suitable for visible installation

1.6.1 Description:

Especially for step-by-step refurbishment, the ductwork should be pre-fabricated in a way that it provides simple mounting possibilities. Furthermore, the ducting system should be designed in a way that an additional cover or false ceiling is dispensable.

1.6.2 Demands

Several manufacturers already provide suitable duct systems for visible installation.

1.6.3 Advantages

- No covering of the duct required

1.6.4 Products



Figure 2: Pre-fabricated duct system designed for renovation [Source: Helios]

Similar components for visible installation are provided e.g. from Heinemann, Westaflex or Swegon

1.7 Units and ducting outside thermal envelope

- Placement: Roof, façade, cold attic
- Type of building: larger buildings or small buildings with unheated attic
- Climatic conditions: Cold, cool temperate, warm temperate, warm

1.7.1 Description

Installing ventilation units and ducts in a refurbishment might not be possible if only the façade or roof is changed. There are several examples of ventilation installation on the outside of walls with ducting below the insulation layer. This can be done in a family house in the attic, but also in apartment blocks or offices. It should be possible to install a well-insulated, airtight standalone unit and ducts below/inside the insulation layer. The unit could include not only ventilation, but also heating and hot water and be connected to PV panels on the roof or facade.

1.7.2 Demands

Ducts integrated in plastered thermal insulation.

1.7.3 Suitable ducting systems

- Ducts for insulation integrated installation: maximum duct length of warm ducts (integrated in insulation)
- Visible duct solutions inside (no casing required): simplified mounting, design

1.7.4 General requirements

- Airtightness, accessibility for maintenance and optional cleaning
- Required length if dispensing with silencers
- Integrated unit with a small well insulated surface
- Possible to connect to airtight layer
- Ducts above airtight layer with airtight connections to inside
- Thermal bridge free design
- Low heat losses
- Homogenous air exchange inside
- Efficiency >75%
- Efficient ventilators <0,45Wh/m³
- Frost protection (cold climates)
- Thermal bridge free installation
- Airtight installation
- Sound protection: max. 35db in technical room and 25db in living areas
- Frsi25 > 0,7 (building physics criteria)

1.7.5 Advantages

- Easy installation of all ducts from outside
- Short distances of ducts
- Easy in and outlet installation in roof
- Minimal effect on the interior of the building
- Cost effective solution

1.7.6 Risks

- Accessibility
- Integrated
- Easy maintenance

1.7.7 New products

- Standalone unit for ventilation integrated in roof or facade
- Ductwork outside of airtight layer

1.8 Other space-saving installation options for ventilation devices

Besides the possibility to integrate the ventilation device into the facade, there might be other options suitable for a step-by-step refurbishment as well. The general requirements are the same as those for the facade integrated devices:

In order to simplify the installation, the design and the noise of the unit should be such that an additional casing could be dispensable. Additionally, the units have to be cost-efficient in order to increase the consumer acceptance.

Devices for flat-wise centralized ventilation are already available in a variety of forms and sizes. But the sound and the design of most of the units available is still improvable.

The further development of space saving devices that can be installed in areas that are already lost for other use is desirable e.g.:

- In the bath room over the bathtub
- Devices for ceiling installation that don't need to be hidden behind a false ceiling.

Furthermore it is desirable to simplify the installation due to a direct connection to the exterior wall or provided pre-fabricated ducting systems through the exterior wall.

1.8.1 Pre-fabricated component for wall penetrations

Pre-fabricated components would reduce the effort for installation not only on the supply and extract air side, but also on the outdoor and exhaust air side. This way, pre-fabricated components would simplify the wall intersections in order to achieve an air tight connection to the component.

A possibility would be a duct-in-duct solution of air intake and exhaust.



Figure 3: Combined Outdoor air and Exhaust air duct [PHI]