

Project Documentation Gebäude-Dokumentation

1 Abstract / Zusammenfassung



"Civico 1": Single Family House in Cavriago (RE), Italy

1.1 Data of building / Gebäudedaten

Year of construction/ Baujahr	2017	Space heating / Heizwärmebedarf	13kWh/(m²a)
U-value external wall/ U-Wert Außenwand	0.104 W/(m²K)		

U-value basement ceiling/ U-Wert Kellerdecke	0.177 W/(m ² K)	Primary Energy Renewable (PER) / Erneuerbare Primärenergie (PER)	38 kWh/(m ² a)
U-value roof/ U-Wert Dach	0.123 W/(m ² K)	Generation of renewable energy / Erzeugung erneuerb. Energie	39 kWh/(m ² a)
U-value window/ U-Wert Fenster	0.84 W/(m ² K)	Non-renewable Primary Energy (PE) / Nicht erneuerbare Primärenergie (PE)	56 kWh/(m ² a)
Heat recovery/ Wärmerückgewinnung	90 %	Pressure test n ₅₀ / Drucktest n ₅₀	0.5 h-1
Special features/ Besonderheiten	Photovoltaic panels, air-to-water heat pump for heating, cooling/dehumidification, domestic hot water.		

1.2 Brief Description

New construction of a single family house to replace a pre-existing building of the same size. Demolition and new construction was preferred to retrofit because the old house had serious issues regarding universal access, structural integrity. The shape and orientation of the previous building would have made it not cost/effective to do a comprehensive energy retrofit.

1.3 Responsible Project Participants

Architect	Mariana Pickering, Emu Systems
Implementation Planning	Enrico Bonilauri, Emu Systems
Building Systems	Enrico Bonilauri, Emu Systems
Structura Engineering	Lucio Iotti
Building Physics	Enrico Bonilauri, Emu Systems
Passive House Project Planning	Enrico Bonilauri, Emu Systems
Construction Management	Nicola Lucci, Montanari Luigi srl

Certifying Body	Passive House Institute Darmstadt
Certification ID	16939_PHI_PH_20171212_ER
Database ID	5605
Author or Project Documentation	Enrico Bonilauri, Emu Systems

Date, Signature



2 Photos



View from South-East.



View from North.



View from North-East.



View from North-West.

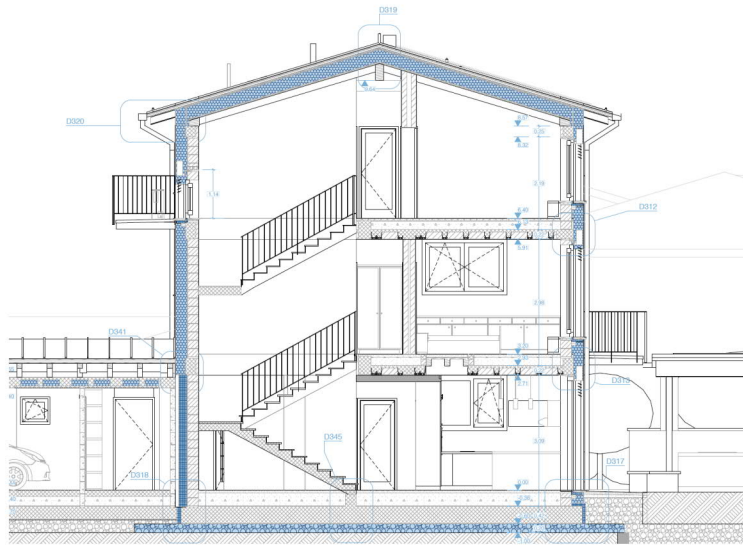


View of Kids' Bedroom.



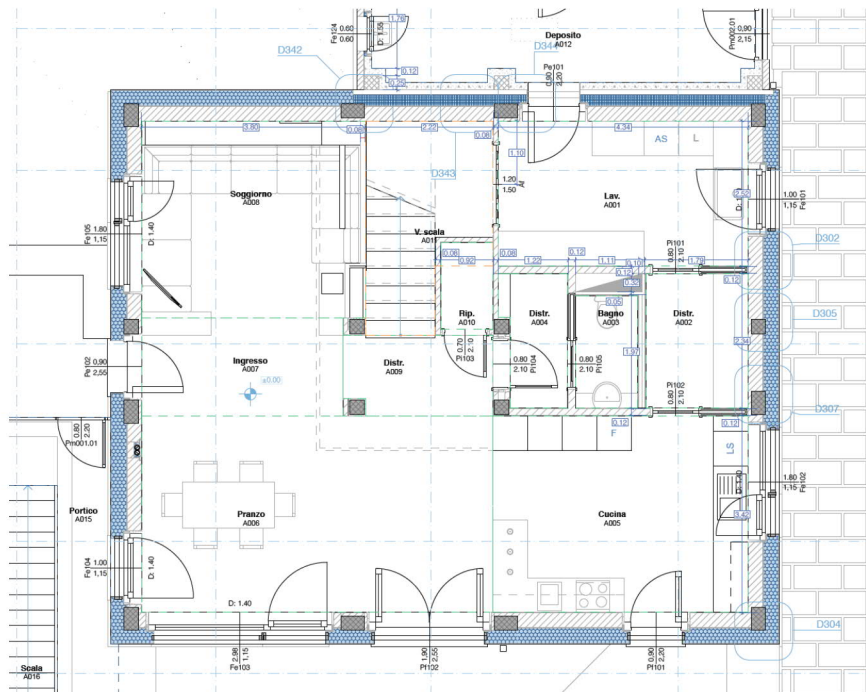
View of Playroom.

3 Section Drawings

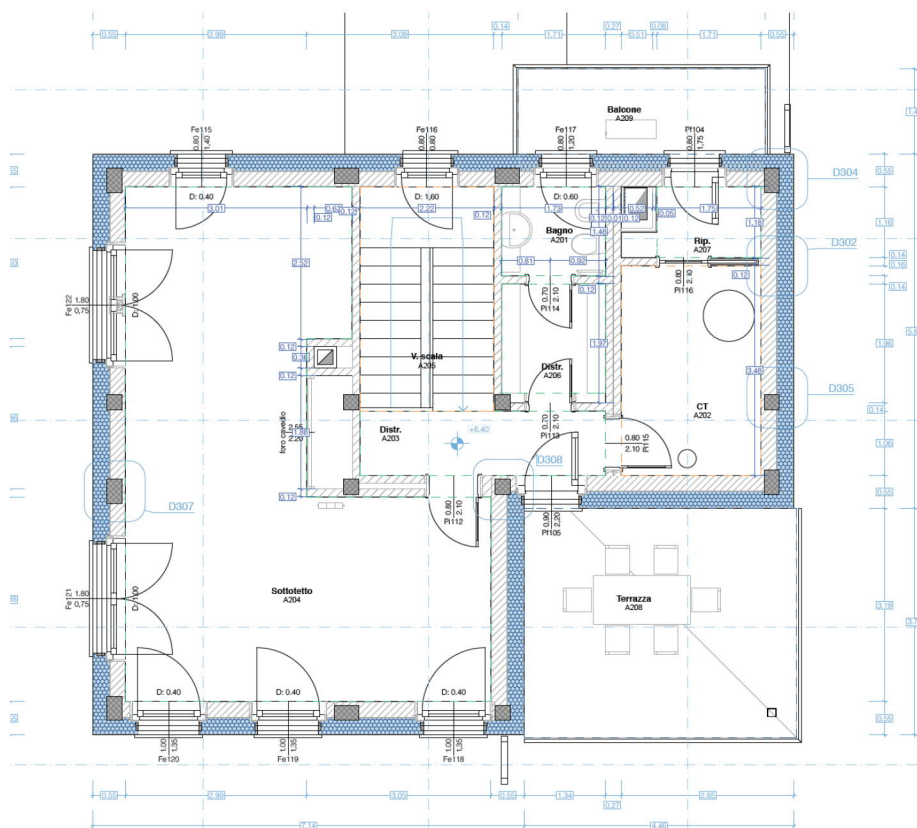
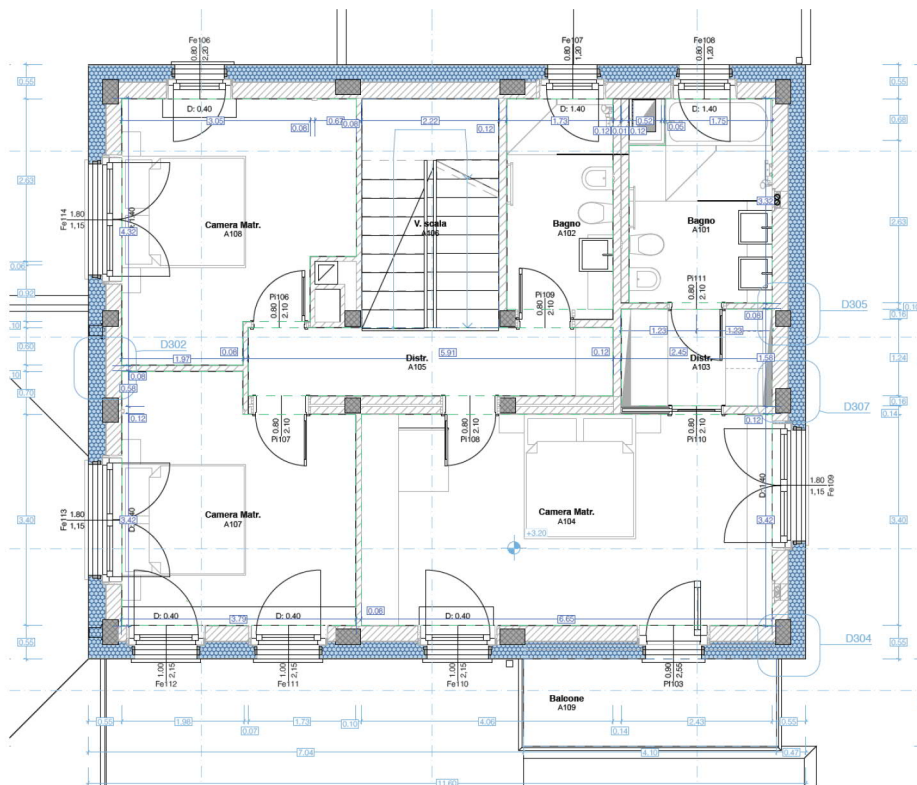


Cross section of the building.

4 Floor Plans



Ground floor plan.



5.1 Floor Slab

The floor is made of a concrete slab cast over an insulation layer of cellular glass gravel. Building services are installed above the slab, before a lightweight concrete screed was cast.

Assembly no.	Building assembly description		Interior insulation?			
01ud	Floor slab		0			
Heat transmission resistance [m ² K/W]						
Orientation of building element: 3-Floor			interior R _{se} : 0,13			
Adjacent to: 2-Ground			exterior R _{se} : 0,00			
Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
FIN301 ceramics	1,000		0,000		0,000	10
MOR201 min. glue	0,900		0,000		0,000	5
CON322 concrete	1,350		0,000		0,000	55
CON301 light concrete	0,100		0,000		0,000	280
CON202 concrete 1%	2,300		0,000		0,000	400
CON321 concrete	1,650		0,000		0,000	80
INS921 f. glass gravel	0,082		0,000		0,000	200
Percentage of sec. 1		Percentage of sec. 2		Percentage of sec. 3		Total
100%		0,0%		0,0%		103,0 cm
U-value supplement: 0,00 W/(m ² K)			U-value: 0,177 W/(m ² K)			

Floor slab assembly in PHPP.



Floor slab under construction, with perimeter insulation of cellular glass.

5.2 External Wall

The external walls are made of traditional fire clay block masonry with EIFS insulation of EPS with graphite. The load bearing structure of the walls is a concrete frame, so the masonry in this case is not load bearing.

Assembly no. 02ud		External wall		Interior insulation? 0	
Orientation of building element 2-Wall		Heat transmission resistance [m²K/W]		interior R _{si} 0,13	
Adjacent to 1-Outdoor air				exterior R _{se} 0,04	
Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]
FIN101 lime plaster	0,800		0,000		0,000
MAS101 b. clay mas.	0,286		0,000		0,000
MOR231 lw. Glue	0,315		0,000		0,000
INS141 EPS with graph.	0,033		0,000		0,000
MOR231 lw. Glue	0,315		0,000		0,000
	0,000		0,000		0,000
	0,000		0,000		0,000
	0,000		0,000		0,000
	0,000		0,000		0,000
Percentage of sec. 1 100%		Percentage of sec. 2 0,0%		Percentage of sec. 3 0,0%	
				Total 56,5 cm	
U-value supplement				U-value: 0,104 W/(m²K)	

External wall assembly in PHPP.



Installation of EIFS insulation over the masonry.

5.3 Roof

Roof is made of timber rafters with wood fiber insulation, vented cavity and metal finish.

Assembly no.		05ud				Roof		Interior insulation?		0	
Orientation of building element		1-Roof		Heat transmission resistance [m ² K/W]		interior R _{si}		0,13			
Adjacent to		3-Ventilated				exterior R _{se}		0,13			
Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]					
WOO102 wood	0,130		0,000		0,000	20					
INS001 EQ wood fiber	0,044				0,000	320					
					0,000						
WOO301 wood wool	0,065		0,000		0,000	25					
	0,000		0,000		0,000	0					
	0,000		0,000		0,000	0					
	0,000		0,000		0,000	0					
	0,000		0,000		0,000	0					
Percentage of sec. 1		Percentage of sec. 2		Percentage of sec. 3		Total					
100%				0,0%		36,5 cm					
U-value supplement				W/(m ² K)		U-value:		0,123		W/(m ² K)	

Roof assembly in PHPP.



Installation of wood fiber insulation on the roof.

5.4 Windows

Smartwin window series was used for the project, produced by Lorber Fensterbau ($U_f = 0.70 \text{ W/m}^2\text{K}$).

Windows have timber frames with frame insulation and external aluminum cladding. Triple pane glazing with low-e coating and argon gas fill were used ($U_g = 0.65 \text{ W/m}^2\text{K}$, $g = 0.51$). Glass spacers used was Swisspacer.



Windows installed in the living area.

6. Airtight Envelope

The air tight layer is made of: concrete slab for the floor; internal plaster for the walls; vapor break membrane for the roof. All junctions and penetrations were sealed with specific products to ensure durability of air tightness.



Detail of the air sealing of the junction between the wall plaster and the window frame, using a specific sealant made of modified polymer.

Abitazione Monofamiliare civico 1

Test in depressione $n_{50} = 0,50 \text{ h}^{-1}$

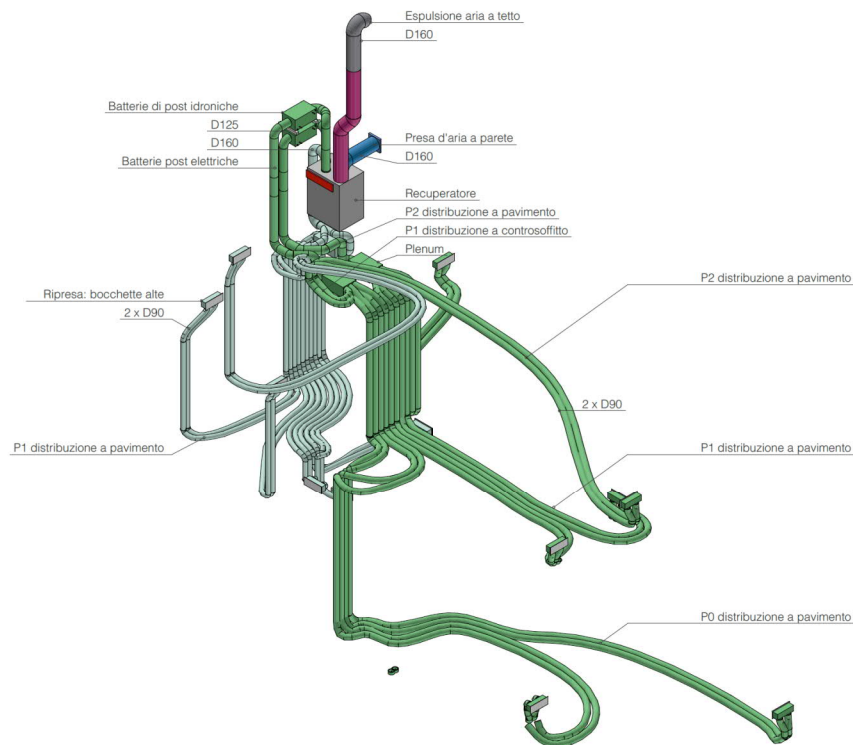
Test in pressione $n_{50} = 0,57 \text{ h}^{-1}$

Media $n_{50} \text{ Pa} = 0,54 \text{ h}^{-1} < \text{A NORMA} >$



7.1 Ventilation Ductwork

Insulated ductwork was used for the Outside and Exhaust air. Supply and Extract air have round metal ducts for the main branches, and PE ducts for the secondary ducts. Supply air ducts are also insulated, as they are used to distribute heating/cooling through the building.



3D modeling of the ventilation system in the BIM software.



Installation of Extract Air ductwork in future laundry room.

7.2 Ventilation Unit

The ventilaiton unit is Paul Novus 300 HRV, wall-mounted in the mechanical room inside the thermal envelope. Sensible heat recovery: 92%, electric efficiency: 0.24 Wh/m3.



The ventilation unit before installation.

8. Heat Supply System

Heating, cooling and dehumidification are provided by an air-to-water heat pump connected to hydronic coils that condition the Supply Air.



Heating system being installed in the mechanical room.

9. PHPP Results

Calculations were carried out with PHPP v9.3.

Passive House Verification									
				Building: CIVICO 1 Street: Via Gorkij 1 Postcode/City: 42025 Cavriago Province/Country: RE IT-Italy Building type: Single family house Climate data set: IT0005a-Bologna Climate zone: 4: Warm-temperate Altitude of location: 88 m					
				Home owner / Client: Bonifauri Torquato Street: Via Aldo Moro 14 Postcode/City: 42027 Montecchio Emilia Province/Country: RE IT-Italy					
				Mechanical system: Bonifauri Enrico Street: Via Gorkij 10 Postcode/City: 42025 Cavriago Province/Country: RE IT-Italy					
				Certification: Passive House Institute Street: Rheinstrasse 44-46 Postcode/City: 64283 Darmstadt Province/Country: Hessen DE-Germany					
Architecture: Pickering Mariana Street: Via Gorkij 10 Postcode/City: 42025 Cavriago Province/Country: RE IT-Italy				Energy consultancy: Bonifauri Enrico Street: Via Gorkij 10 Postcode/City: 42025 Cavriago Province/Country: RE IT-Italy					
Year of construction: 2014-17 No. of dwelling units: 1 No. of occupants: 3,1				Interior temperature winter [°C]: 20,0 Interior temp. summer [°C]: 25,0 Internal heat gains (IHG) heating case [W/m²]: 2,3 IHG cooling case [W/m²]: 2,3 Specific capacity [Wh/K per m² TFA]: 188 Mechanical cooling: x					
Specific building characteristics with reference to the treated floor area									
		Treated floor area m²	218,2		Criteria		Alternative criteria	Fulfilled? ²	
Space heating	Heating demand kWh/(m²a)	13	≤	15	-	yes			
	Heating load W/m²	11	≤	-	10				
Space cooling	Cooling & dehum. demand kWh/(m²a)	6	≤	16	16	yes			
	Cooling load W/m²	7	≤	-	10				
	Frequency of overheating (> 25 °C) %	-	≤	-	-	-			
	Frequency excessively high humidity (> 12 g/kg) %	6	≤	10	-	yes			
Airtightness	Pressurization test result n ₅₀ 1/h	0,5	≤	0,6	-	yes			
Non-renewable Primary Energy (PE)	PE demand kWh/(m²a)	56	≤	-	-	-			
Primary Energy	PER demand kWh/(m²a)	38	≤	60	60	yes			
Renewable (PER)	Generation of renewable energy kWh/(m²a)	39	≥	-	-				
² Empty field: Data missing; -: No requirement									
I confirm that the values given herein have been determined following the PHPP methodology and based on the characteristic values of the building. The PHPP calculations are attached to this verification.									
Task: 2-Certifier		First name: Elena		Surname: Reyes Bernal		Passive House Classic? yes			
Certificate ID: 16939_PHI_PH_20171212_ER		Issued on: 12.12.17		City: Darmstadt		Signature: <i>Elena Reyes B.</i>			
Project data imported from designPH 1.1.0				PHPP9 display.code:		786624500_150415_PHIDE_de09			