

Passive House - Project

Documentation



General Building Information

Passive House Database ID	4988
Building Type	hostel holiday dwelling
Location	GR - 25002 KATO ALISSOS/PATRAS (Peloponnese)



Responsible Project Participants

Architect	Anaptiksi Kataskeuastiki
Mechanical Engineer	Anaptiksi Kataskeuastiki
Building Physics	Dimopoulos Dimitrios
Building Services	Dimopoulos Dimitrios
Statics	Anaptiksi Kataskeuastiki
Craftsperson	Anaptiksi Kataskeuastiki
Certifier	Stefan Pallantzas



Declaration of the Constriction Supervisor

Project name: Enervillas
Location: Kato Alissos
Project name on Certification platform: Enervillas
Construction manager (First name, Surname): Dimitrios Dimopoulos
Project manager (First name, Surname): Dimitrios Dimopoulos

Construction manager certificate

In order for the quality inspection to award the "Certified Passive House" seal for the above mentioned construction project, we hereby assure that the on-site execution is in accordance with the planning documents, technical documents and textual descriptions that have been uploaded to the Passive House Institute's certification platform up to and including 26/10/2018 (and not marked as "obsolete").

This has been checked through regular site visits.

26/10/2018  Dimitrios Dimopoulos	 Dimitrios Dimopoulos
Construction management Date, Signature	Project management Date, Signature

Picture 1

Brief Description

Enervillas is a passive holiday home in Peloponnese in Kato Alissos with TFA = 119,7m² , where the visitor can see that if you design a building according to the principles of passive house and using solar and earth energy (photovoltaic and solar panels, geothermal energy), you can achieve maximum thermal comfort and air quality combined with minimum maintenance and construction costs, while producing more energy than you consume and protecting the environment in which you live.

It consists of ground floor, 1 floor, basement and soffit, accessible by internal staircase and elevator. The building has main openings to the south. The construction was completed in 2018 and has been certified as a Passive House Premium.

The BMS will provide automatic lighting and shading control based on the presence, timing, and actual intensity of outdoor natural light.

All field sensor readings (weather station, temperature and humidity sensors, electricity meters, etc.) will be stored in the BMS and presented in real time and historically via the internet for monitoring purposes only and for validation of each building's Energy Plus rating. Lighting requirements will be met using high efficiency LED lamps and luminaires

Data of building

Annual Heating Demand	13 kWh / (m ² a)
Heating Load	14 W/m ²
Cooling Demand	7 kWh/(m ² a)
Cooling Load	7 W/m ²
Primary Energy Renewable (PER)	29 kWh / (m ² a)
Generation of renewable energy	122kWh / (m ² a)
Non renewable Primary Energy (PE)	55 kWh / (m ² a)
Pressure Test n ₅₀	0.4 / h

Structural Component	U - Value (W/(m ² k))
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Exterior Wall	0.154
Interior	
Basement Floor / Floor Slab	0.770
Roof	0.149
Frame	0.1
Glazing	0.5 g value = 50 %
Entrance Door	0,73

Views of the Building

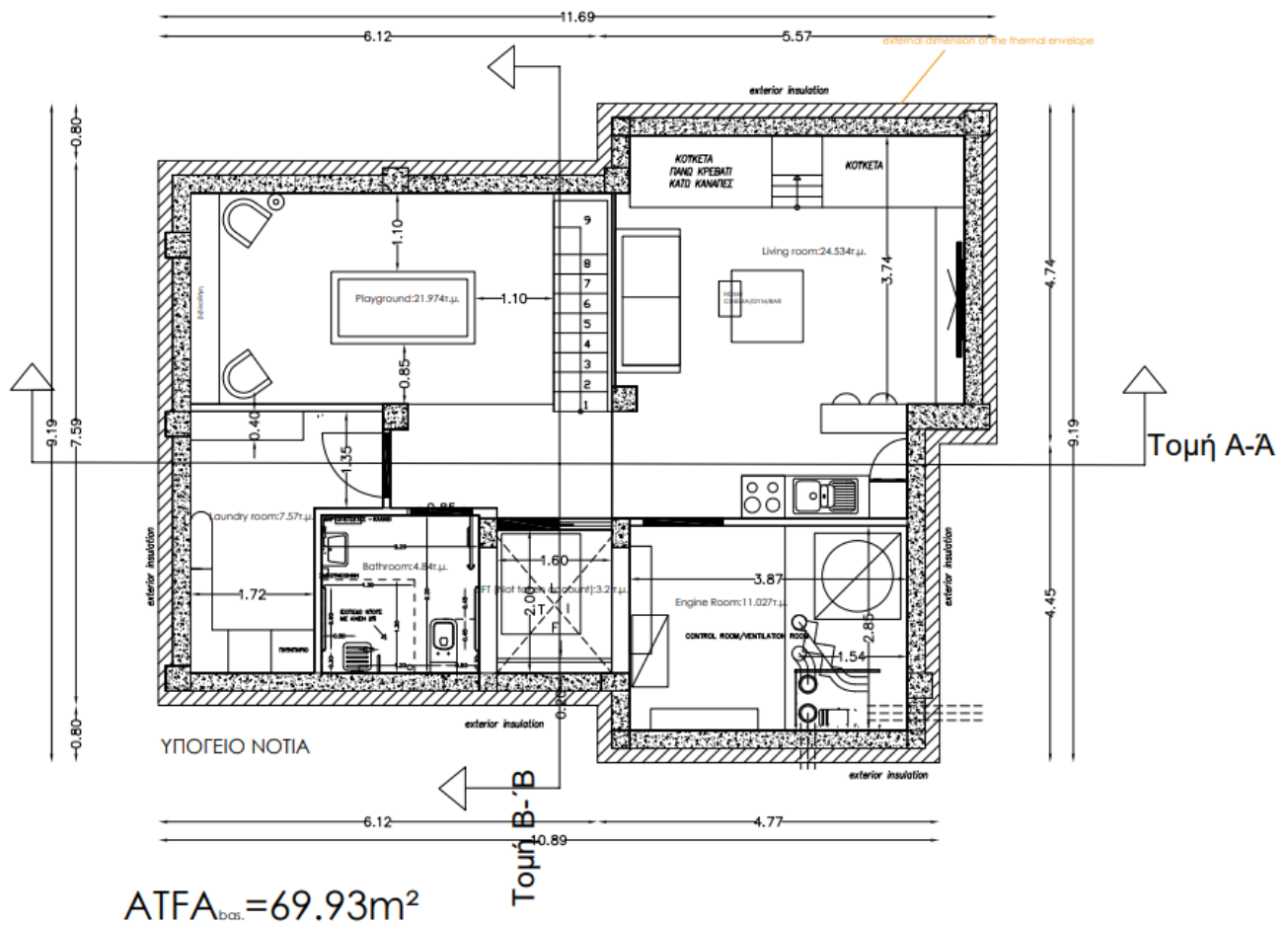


Picture 2: South view of the house

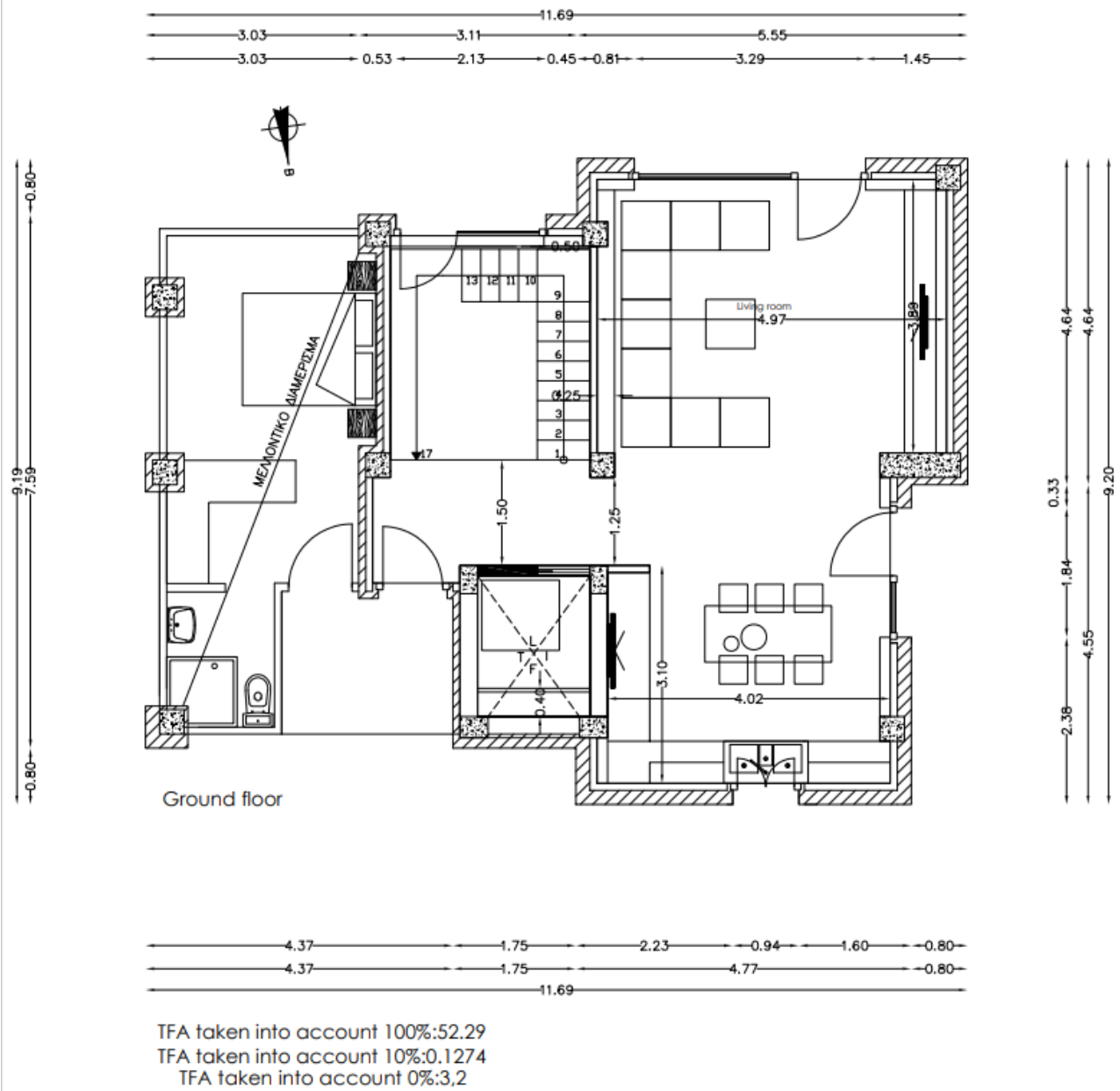


Picture 3: North view of the house

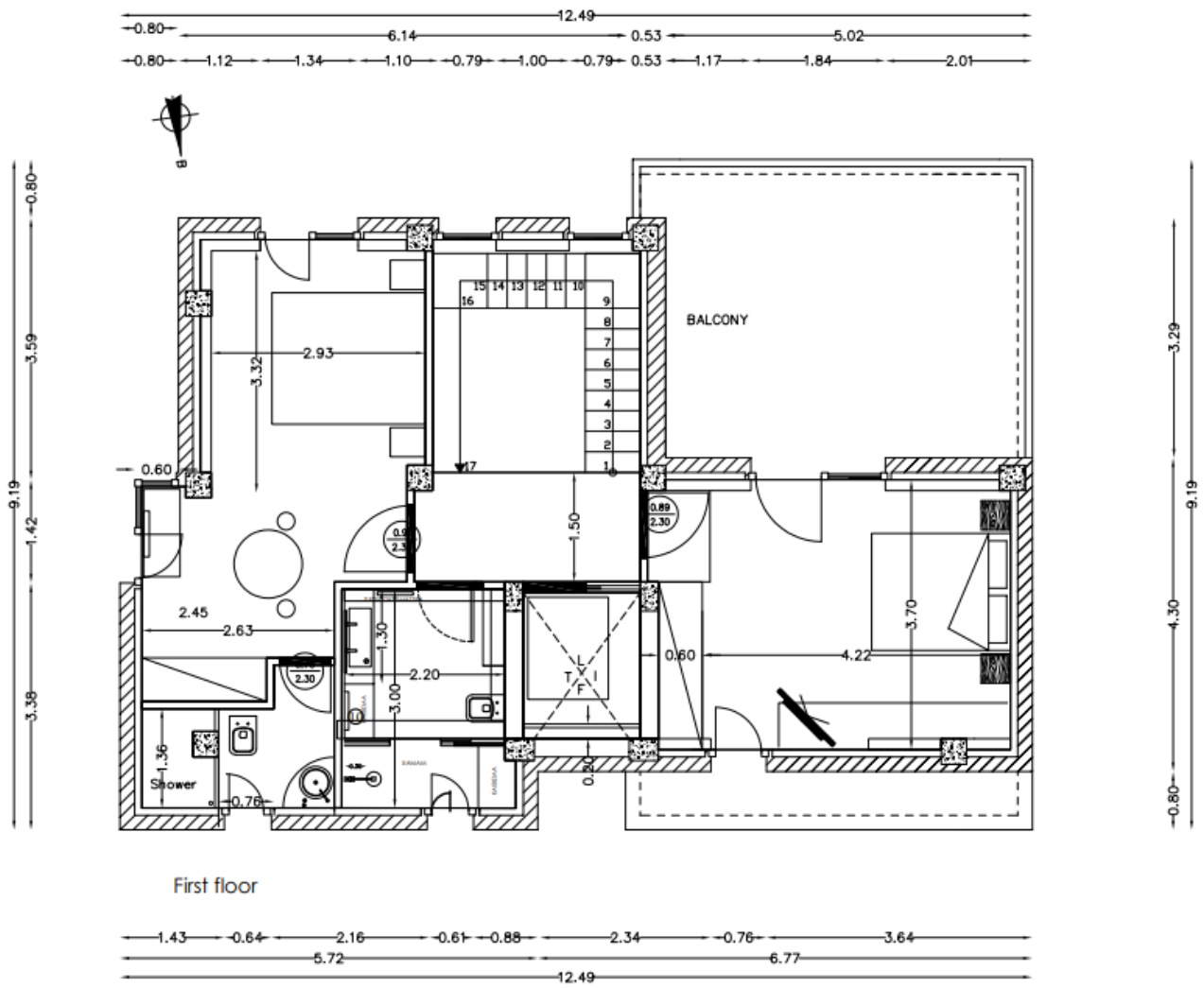
Floor Plans



Picture 4: Basement plan

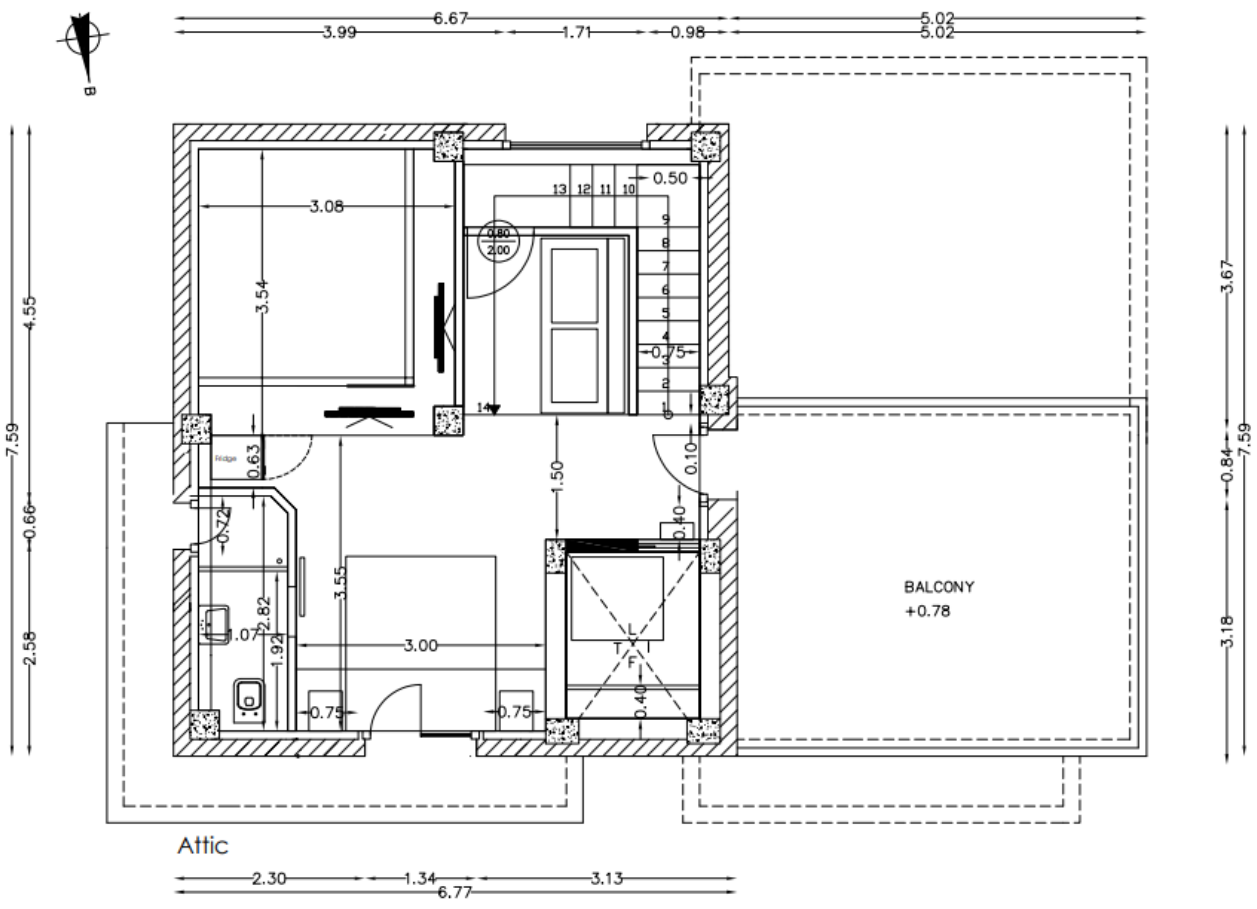


Picture 5: Ground Floor plan



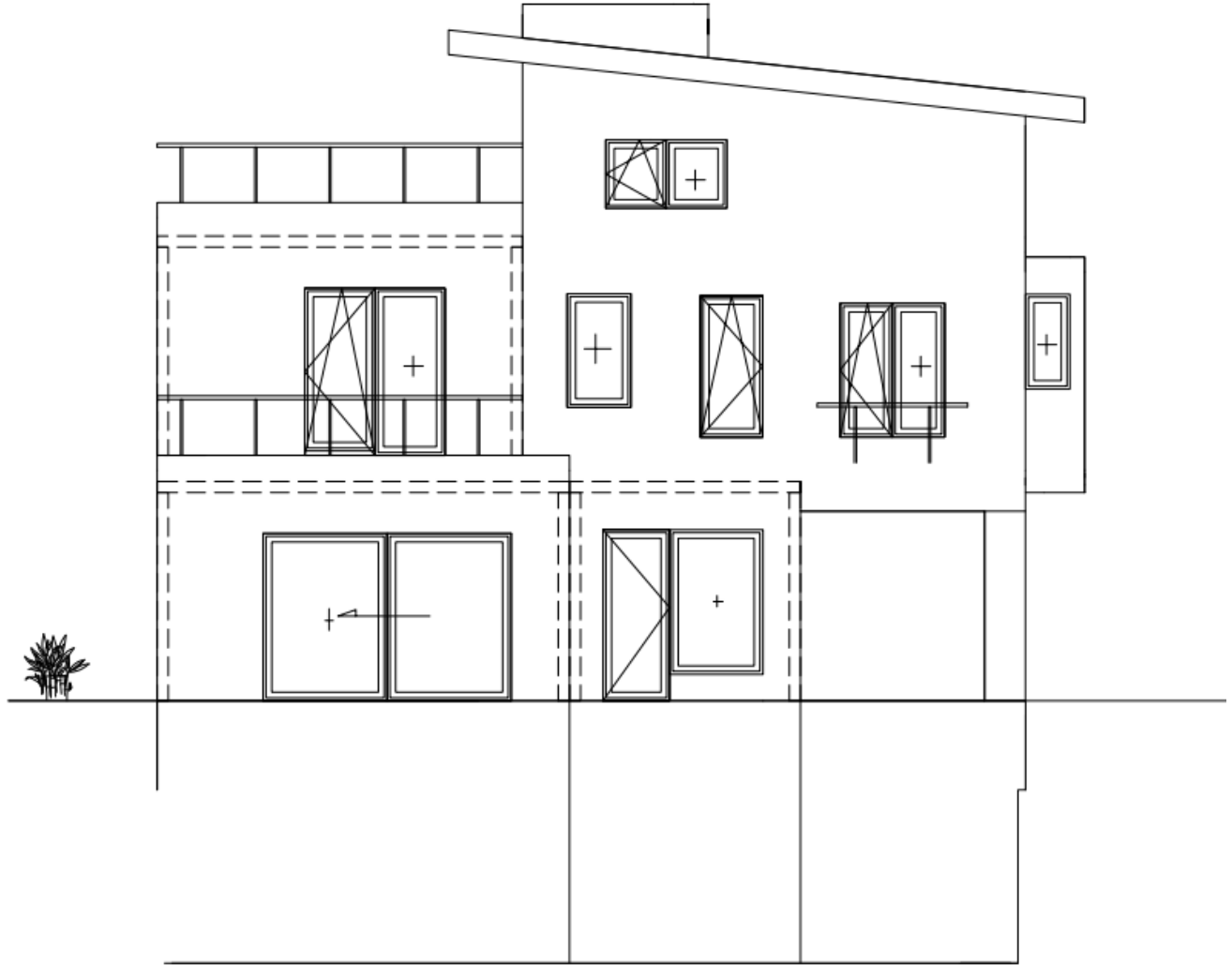
TFA taken into account 100%:60.99
 TFA taken into account 10%:0.47
 TFA taken into account 0%:3.2

Picture 6: First Floor plan



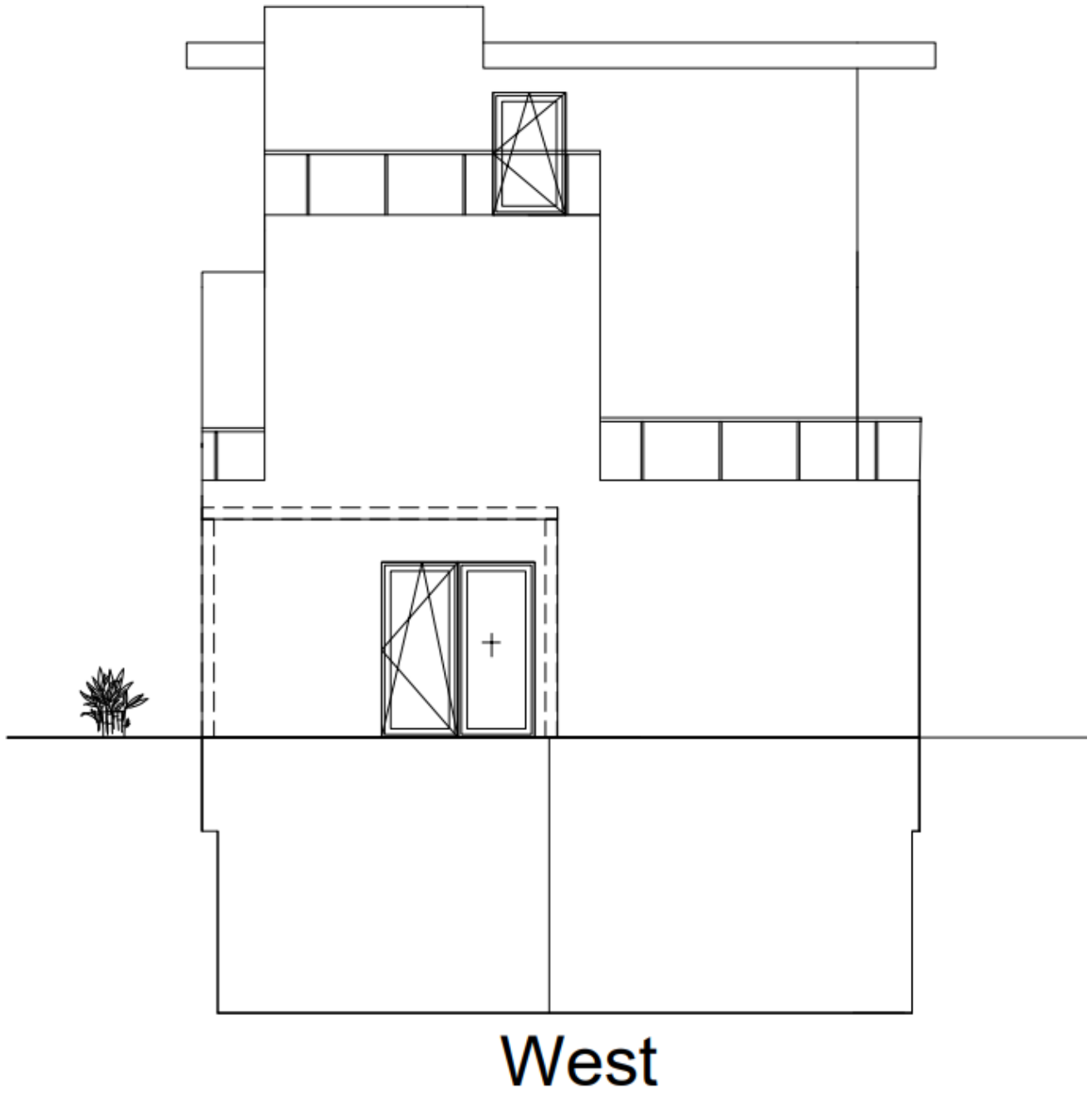
TFA taken into account 100%:36.41
 TFA taken into account 10%:0.1275
 TFA taken into account 0%: 3,2

Picture 7: Soffit Floor plan



South

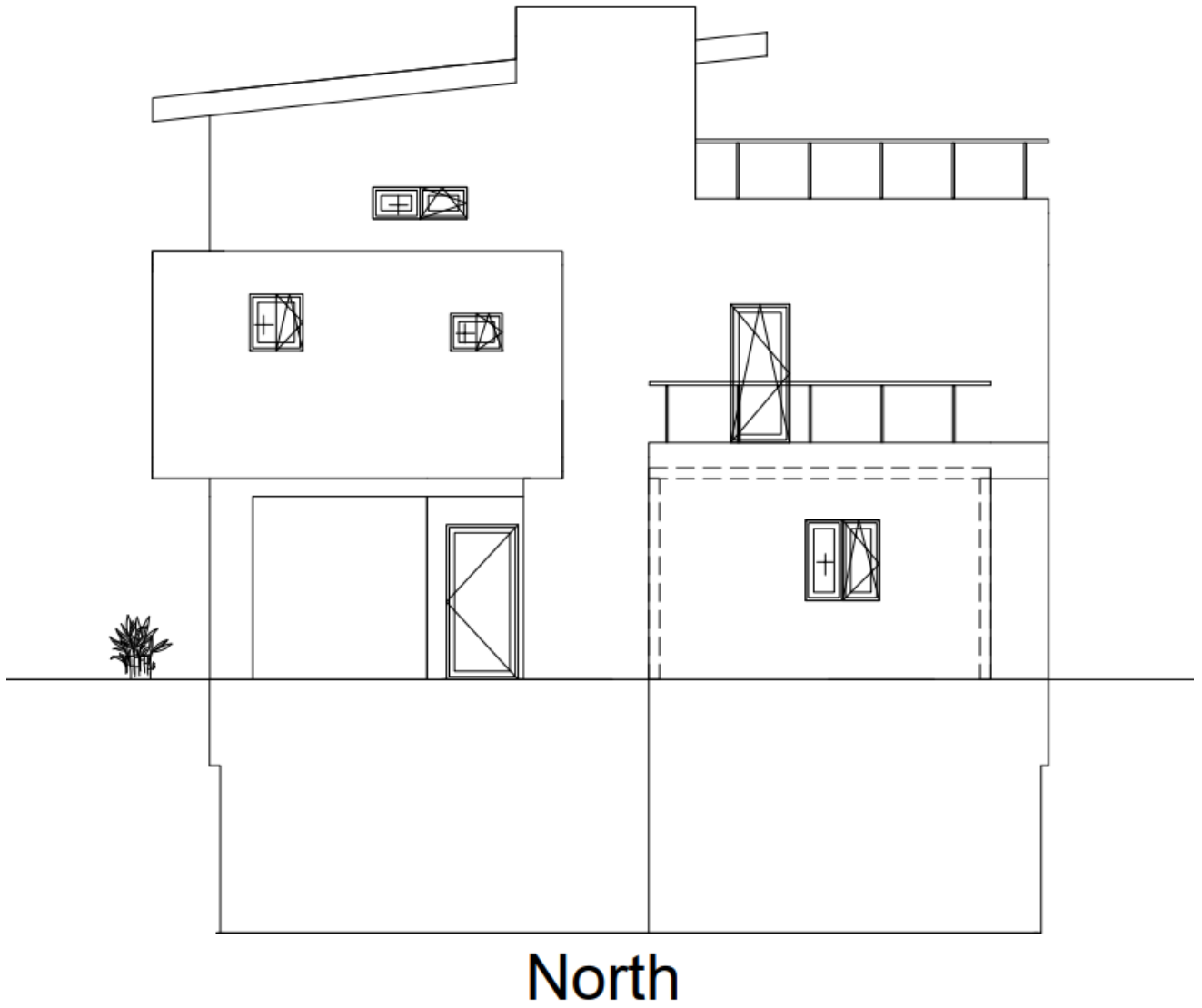
Picture 8: South Elevation



Picture 9: West Elevation



Picture 10: East Elevation



Picture 11: North Elevation

Assembly no.						Interior insulation?
10ud	Polyurethane roof					
Heat transmission resistance [m ² K/W]						
Orientation of building element:		1-Roof	interior R _{si} :	0,17		
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)]	Thickness [mm]
EPS	0,032	Wood	0,120			230
Polyurethane Panel	0,024					100
Percentage of sec. 1		Percentage of sec. 2		Percentage of sec. 3		Total
93%		7,3%				33,0 cm
U-value supplement		W/(m ² K)		U-value:		0,094 W/(m ² K)

Picture 18: PHPP U-Values input

Windows installation details

The placement of the windows was designed to minimize thermal bridges to achieve the Passive House Standard. Windows were hung on the external side of the brick walls, inside the insulation layer.

Frame
KOMMERLING 76 PVC Windows and Doors $U_f = 1,0 \text{ W/(m}^2\text{K)}$

Glazing
Triple Glazing (1st Glass PLANILUX 4mm, Coating PLANITHERM ULTRA N- 2nd Glass PLANILUX 4mm, 3rd Glass PLANILUX 4mm) U_g - value1 = 0.5 W/(m ² K) g - value1 = 0,36 and U_g - value2 = 0.58 W/(m ² K) g - value2 = 0,54



Picture 19 : Door installation




Picture 20: Window installation

- Thermal Bridges

All existing thermal bridges have been calculated and designed to have the least impact on heating or cooling demand of the building and the ψ -values are entered in PHPP.

- Airtightness Test

Summary

 FanTestic	version: 5.10.36	licensed to: Anaptiksi
Test date: 2018-09-30	By: Dimopoulos	
Customer:	enervillas	
Building Lot Number:		
Building address:		

Building and Test Information	
Test file name:	EN13829-EU 2018-09-30 1841
Building volume [m ³]:	549
Envelope Area [m ²]:	150
Floor Area [m ²]:	220
Building Height (from ground to top) [m]:	0
Building Exposure to wind:	Highly exposed building
Accuracy of measurements:	2%

Results	
Air flow at 50 Pa, [m ³ /h]	223.25
Air changes at 50 Pa, n ₅₀ [/h]	0.41
Flow per Envelope Area at 50 Pa, [m ³ /h/m ²]	1.488
Flow per Floor Area at 50 Pa, [m ³ /h/m ²]	1.015
Effective leakage area at 50 Pa, [cm ²]	68.05
Equivalent leakage area at 50 Pa, [cm ²]	111.5
Leakage per Envelope Area at 50 Pa, [cm ² /m ²]:	0.45363
Leakage per Floor Area at 50 Pa, [cm ² /m ²]:	



Picture 21: Ducts



Picture 22: Windows installation



Picture 23: Windows installation

HVAC Systems

- Ventilation

the ventilation system that has been used is 0755vs03-Systemair - SAVE VTC 700 .Typical Ventilation System with HeatRecovery. Eff. specif. HRE: 71,8%

The Ventilation system has been dimensioned for 360 m³/h which covers the air demand (both supply and demand) of Enervillas at nominal operation. The corresponding base and peak ventilation are 276.9 m³/h and 468 m³/h respectively so a SYSTEMAIR SAVE VTC 700 unit has been selected which has a airflow range 250 to 600 m³/h. The dimensioning of 360 m³/h emerges so that all living spaces to have an air supply that covers the needs of 30 m³/(h*p) and a satisfactory Air Change Rate, and also the extract rates to ensure quantities that leave no smells in kitchens, bathrooms and wet rooms. The duct dimensioning was performed in order not to have air velocities which surpass 2.5 m/s in order not to have annoying noises and minimize pressure losses in ducts. The unit was placed in engine room in basement in order to diminish unpleasant noises. Enough space has been calculated in engine room for the changing of filters. With reference to frost protection of down stream hydraulic heater coil, an undershooting of about 4°C supply air temperature leads to a shutdown of the unit. Frost protection of the heat exchanger with a preheater is not needed as extreme winter temperature (-15°C never happens).

FINAL PROTOCOL WORKSHEET for Ventilation Systems: Initial Start-up
Supply / Extract-Air Ventilation System with Heat Recovery

Project Object: <u>Enervillas</u> Location Street, No.: <u>19km Patron Pyrgoy</u> Location Postcode, Town: <u>25002 Kato Aliseos</u> Building Owner Name: <u>Dimitrios Dimopoulos</u> Building Owner Phone No.: <u>+306984164168</u> Year of Construction: <u>2018</u>	Initial Start-up Company: <u>Anaptikai</u> Person in Charge: <u>Dimitrios Dimopoulos</u> Street, No.: <u>Athanasiou Diakou 1</u> Postcode, City: <u>25200 , Kato Achaia</u> Phone No.: <u>+30 2693025674</u> Date: <u>22/10/2018</u>	Ventilation System Manufacturer: <u>Systemair</u> Product Name: <u>Save VTC 700</u> Unit No.: Control No.:
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1. Record of the air flow volumes, supply and extract air

Nr. Room	Design V _{sp} m ³ /h	V _{ex} m ³ /h	V _{noise} m ³ /h	Measurement 1		Measurement 2		Measurement 3		Type of Valve	Adjustment	Flow-Through V _{through} m ³ /h	Noise dB(A)	Filter Grade	Filter Clean?	
				V _{sp} m ³ /h	V _{ex} m ³ /h	V _{sp} m ³ /h	V _{ex} m ³ /h	V _{sp} m ³ /h	V _{ex} m ³ /h							
1 attic	30			12,5	25	25	28			metal air valve		0,6	20,0	f7	yes / no	
2 attic we	30				15			25	29	metal air valve		0,7	20	g4	yes / no	
3 bedroom east	50			62,5		55		52		metal air valve		1,1	22	f7	yes / no	
4 bedroom west	40			51,3		42		41,5		metal air valve		0,9	21	f7	yes / no	
5 bathroom 1st floor	50				55		52		49	metal air valve		1,1	22	g4	yes / no	
6 we 1st floor	40				45,2		42		41	metal air valve		0,9	21	g4	yes / no	
7 kitchen	60				67,5		61		61	metal air valve		1,2	22	g4	yes / no	
8 living room 1	60				68		65		61	metal air valve		1,2	22	f7	yes / no	
9 living room 2	60				69,5		61		58	metal air valve		1,2	22	g4	yes / no	
10 basement bathroom	60				71,2		63		62	metal air valve		1,3	22	g4	yes / no	
11 basement kitchen	60				76,5		64		61	metal air valve		1,3	22	g4	yes / no	
12 laundry	60				70,3		68		60,5	metal air valve		1,3	22	g4	yes / no	
13 basement living r	60				74,5		67		61	metal air valve		1,3	22	f7	yes / no	
14 basement playroom	60				75		63		62,5	metal air valve		1,3	22	f7	yes / no	
15																yes / no
16																yes / no
17																yes / no
18																yes / no
19																yes / no
20																yes / no
sum:	360,00	360,00	--	413,30	400,70	378,00	375,00	364,00	363,50			--	--	--	--	--

2. Balance of airflow volume

	Measurement 1		Measurement 2		Measurement 3		Disbalance	Type of Control	Adjustment	Noise Measurement dB(A)	Filter Grade	Filter Clean?
	V _{sp} m ³ /h	V _{ex} m ³ /h	V _{sp} m ³ /h	V _{ex} m ³ /h	V _{sp} m ³ /h	V _{ex} m ³ /h						
1 fresh air inlet	41,9	--	37,9	--	36,0	--	1%	bus		30	f7c	yes
2 exhaust air outlet	--	405	--	374	--	363,5		bus		30	g4	yes

3. Initial start-up accomplished according to manufacturer's specifications: yes / no

Signature: Dimitrios Dimopoulos

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Picture 24: Ventilation Measurements



Picture 25: Ventilation

- Heating Supply -Cooling Supply- Domestic How Water – PV

The heating demand is covered 205 m^2 out of 219.69 m^2 are with AC (93% of Heating is covered with Heat Pump) and 14.69 m^2 out of 219.69 m^2 are heated with heating towels (7% of Heating is covered with Direct electrical)

The cooling demand covered are on the entire surface with AC (recirculation cooling).

The building's CHP is produced through a combined electricity and solar assisted system. More specifically, the basic unit for the production of domestic hot water is a DAIKIN air-to-air heat pump, "DAIKIN EKHH2E260PAV3 monoblock". This heat pump is integrated in a 260-litre hot water storage tank, which is located in the basement of the building. In addition, a solar collector of selective type with a total surface area of approximately 2,60 m^2 , located on the first floor of the building, is connected.

The distribution network for hot water for domestic use is carried out through CUSMART pipes. More specifically, the pipes are flexible copper pipes with thermal insulation through a special PUR jacket. The average cross-section of the distribution network is $\varnothing 18$. In addition, due to the short length occupied by the hot water distribution network, no recirculation system was installed.

In the building 37 solar modules aleo P18, 255W (specifications attached, sheet 1), have been placed. They are inclined 15° to the horizontal and they face East. With no shading elements and with efficiency of the inverter 98% , our PV system can harvest up to 13.23 MWh/a.

PHHP Results

All the building data have been imported to the PHPP planning program, verifying that the Passive House Classic certification criteria are met.

Passive House Verification



Architecture:	Anaptiksi Dimitrios Dimopoulos		Building:		EnerVillas	
Street:	Ap. Vlachaki 1		Street:		Kato Alissos	
Postcode/City:	25200	Kato Achaia	Postcode/City:		25200	Kato Alissos
Province/Country:	Peloponnese	GR-Greece	Province/Country:		Peloponnese	GR-Greece
Energy consultancy:	Anaptiksi Dimitrios Dimopoulos		Building type:		Masonry	
Street:	Ap. Vlachaki 1		Climate data set:		ud--01-GR0004(a)-Patras	
Postcode/City:	25200	Kato Achaia	Climate zone:		5: Warm	Altitude of location:
Province/Country:	Peloponnese	GR-Greece	Home owner / Client:		Anaptiksi	
Year of construction:	2018		Street:		Ap. Vlachaki 1	
No. of dwelling units:	1		Postcode/City:		25200	Kato Achaia
No. of occupants:	3,1		Province/Country:		Peloponnese	GR-Greece
			Mechanical engineer:		Anaptiksi	
			Street:		Ap. Vlachaki 1	
			Postcode/City:		25200	Kato Achaia
			Province/Country:		Peloponnese	GR-Greece
			Certification:		Stefan Pallantz	
			Street:		Anastaseos 112	
			Postcode/City:		15669	Papagou
			Province/Country:		Peloponnissos	GR-Greece
			Interior temperature winter [°C]:		20,0	Interior temp. summer [°C]:
			Internal heat gains (IHG) heating case [W/m²]:		2,3	IHG cooling case [W/m²]:
			Specific capacity [Wh/K per m² TFA]:		204	Mechanical cooling:
						x

Specific building characteristics with reference to the treated floor area

			Alternative		Fulfilled? ²	
			Criteria	criteria		
Space heating	Treated floor area m ²	219,7				
	Heating demand kWh/(m ² a)	13	≤	15	-	yes
	Heating load W/m ²	14	≤	-	10	
Space cooling	Cooling & dehum. demand kWh/(m ² a)	7	≤	18	18	yes
	Cooling load W/m ²	7	≤	-	10	
	Frequency of overheating (> 25 °C) %	-	≤	-	-	-
	Frequency of excessively high humidity (> 12 g/kg) %	0	≤	10	-	yes
Airtightness	Pressurization test result n ₅₀ 1/h	0,4	≤	0,6	-	yes
Non-renewable Primary Energy (PE)	PE demand kWh/(m ² a)	55	≤	-	-	-
Primary Energy Renewable (PER)	PER demand kWh/(m ² a)	29	≤	30	29	yes
	Generation of renewable energy (in relation to projected building footprint area)	122	≥	120	118	

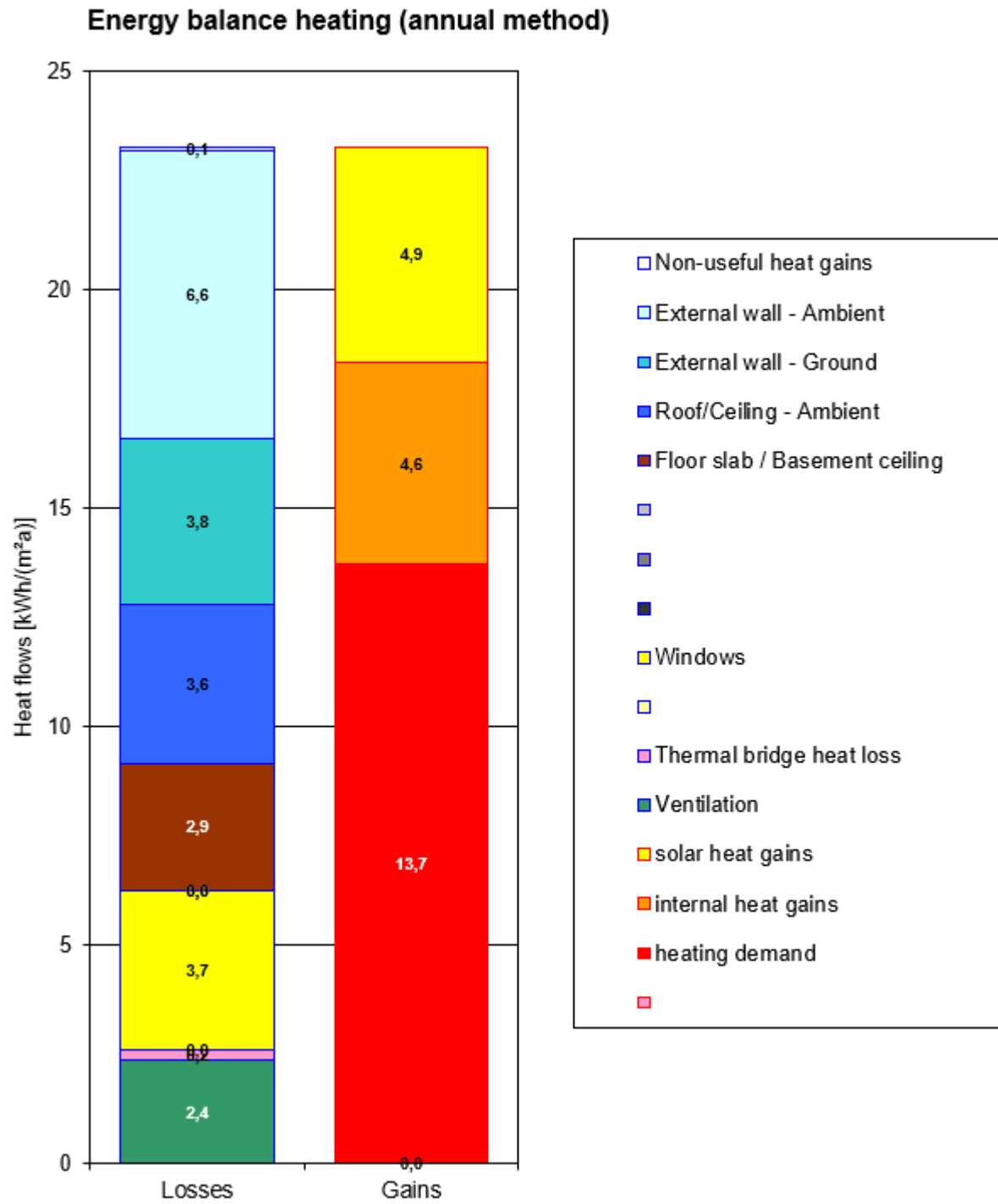
² Empty field: Data missing; -: No requirement

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.

Passive House Premium?

yes

Picture 26: Verification worksheet of the PHPP



Picture 27: The heating demand balance of the single-family house, calculated by the PHPP.

References

Our website at Passive House Database is:

https://passivehouse-database.org/index.php?lang=en#d_4988