

Project Documentation

Passivhaus Database ID: 7726

Casa Qualia, Évora, Portugal



Building data - Dados do edifício

Year of construction Ano de construção	2024	Heating Demand Necessidades de aquecimento	13 kWh/(m²a)
U-value floor slab Valor U laje térrea	0.280 W/(m ² K)	Cooling Demand Necessidades de arrefecimento	9 kWh/(m²a)
U-value external walls Valor U paredes exteriores	0.119 W/(m ² K)	Primary Renewable Energy (PER) Energia Primária Renovável (PER)	53 kWh/(m ² a)
U-value roof Valor U cobertura	0.216 W/(m ² K)	Generation of Renewable Energy Geração de Energia Renovável	43 kWh/(m ² a)
U-value Windows Valor U janelas	0.99 W/(m ² K)	Non-renewable Primary Energy (PE) Energia Primária não renovável (PE)	99 kWh/(m ² a)
Heat recovery Recuperador de calor	92 %	Pressurization test n ₅₀ Ensaio de Pressurização n ₅₀	0,6 h ⁻¹
Special Features Soluções especiais	Photovoltaic system and Solar thermal system Sistema de painéis fotovoltaicos e sistema solar térmico		

Brief description of the project - Breve descrição

[EN] “Casa Qualia” is a newly built single-family house (2 bedrooms) located in Canaviais, in the municipality of Évora. It has an energy reference surface of 72,60 m². It is developed in two levels, with the ground floor being open concept. Due to urban planning regulations, the orientation is not the most favorable. However, an attempt was made to distribute the main spaces in the best way, to make the most out of the solar gains in winter, orienting service elements, such as the kitchen and bathroom, to the north.

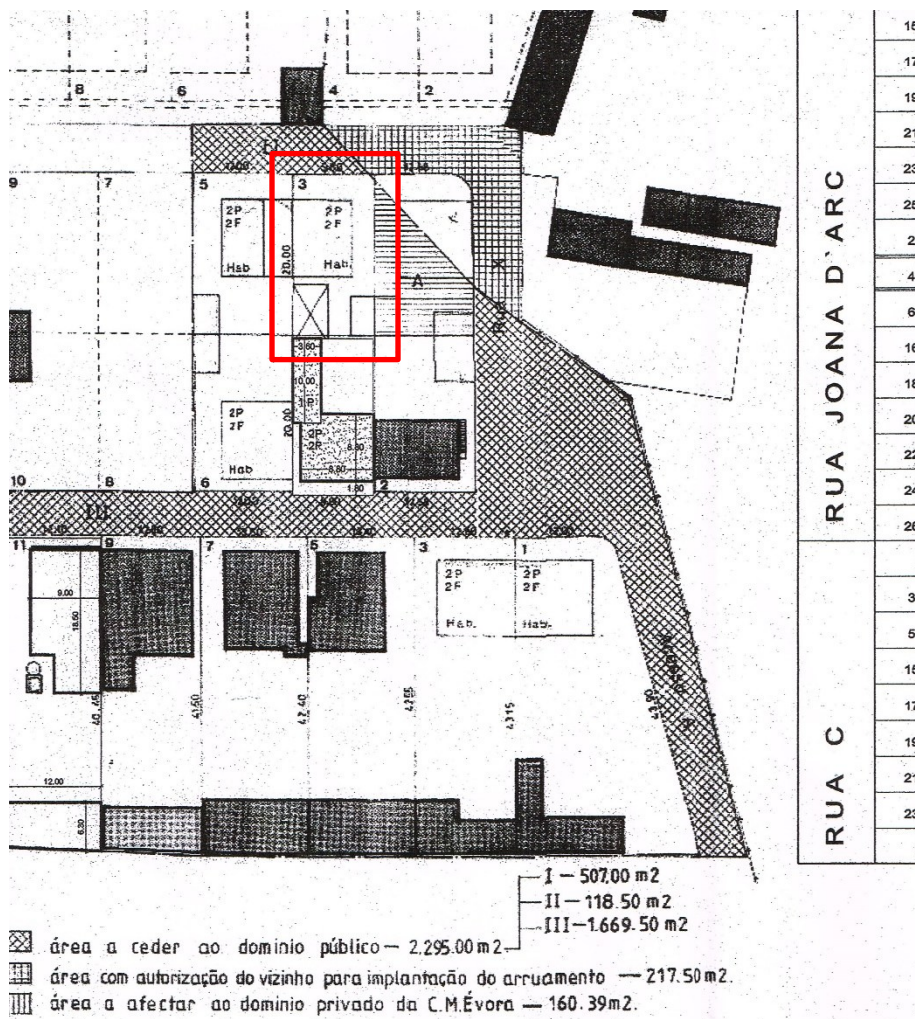
Depending on the initial assumption in terms of cost and execution time, we opted for a Light Steel Framing (LSF) structure. System that allows a certain degree of prefabrication and speed of assembly. This structure was covered and filled with mineral wool thermal insulation. On the internal face of the structural wall, the airtight barrier was created using a vapor barrier. Inside, a technical wall was created to accommodate and distribute installations, allowing future interventions without drilling the airtight barrier. This wall was structured with a wooden slat to reduce the additional thermal bridge of traditional metal profiles. Windows were placed on the inner side of the facade to increase solar protection in Évora’s harsh summer. All windows are protected with blinds placed on the outside. These blinds are motorized and have adjustable slat shutter.

In terms of active systems, an internal split air conditioning unit was used, for heating and cooling. On the ground floor, A/C pre-installation was prepared for the future, if necessary. A solar thermal panel produces domestic hot water. The ventilation system is a dual-flow machine with Zehnder sensible heat recovery, located within the thermal envelope. For the generation of renewable energy, two photovoltaic panels were installed.

[PT] A “Casa Qualia” é uma habitação unifamiliar de nova construção localizada na Freguesia dos Canaviais, no município de Évora. Tem uma superfície de referência energética de 72,60 m². É uma tipologia T2, distribuída em dois andares e com o rés-do-chão em conceito aberto. Devido à regulamentação urbanística, a orientação não foi a mais favorável. No entanto, procurou-se distribuir os espaços principais de forma a aproveitar ao máximo os ganhos solares no inverno, orientando os elementos de serviço, como cozinha e casa de banho, a norte.

Dependendo do pressuposto inicial em termos de custo e tempo de execução, optou-se por uma estrutura em Light Steel Framing (LSF) por ser um sistema que permite um certo grau de pré-fabricação e rapidez de montagem. Esta estrutura foi revestida e preenchida com isolamento térmico em lã mineral. Na face interna da parede estrutural, a barreira hermética foi criada com uma barreira para-vapor em forma de lâmina. No interior foi criada uma parede técnica para acomodar e distribuir as instalações permitindo futuras intervenções sem perfurar a camada estanque. Esta parede técnica foi estruturada com ripas de madeira para reduzir a ponte térmica adicional dos perfis metálicos tradicionais. As janelas foram colocadas na face interior da fachada para aumentar a proteção solar no rigoroso verão de Évora, e estão protegidas com estores de lamas orientáveis motorizadas colocadas no exterior.

Quanto aos sistemas ativos, foi utilizado uma unidade interior de ar condicionado tipo split para aquecimento e arrefecimento. No Piso 0 foi preparada pré-instalação para o futuro, caso seja necessário. Um painel solar térmico produz água quente sanitária. Para o sistema de ventilação foi utilizada uma máquina de ventilação de duplo fluxo com recuperação de calor sensível Zehnder, localizada no interior da envolvente térmica. Para a geração de energia renovável foram instalados dois painéis fotovoltaicos.



Habitación Unifamiliar / Climate: PT0005a-Évora / TFA: 72 m² / Heating: 12.7 kWh/(m².a) / Cooling: 3.4 kWh/(m².a) / PER: 52.5 kWh/(m².a)

Selection of climate data

Country: **ud-User Data**

Region: **All**

Climate data set: **1-Santarem Alentejo**
ud-01-PT0005a-Évora

Climate zone: **5: Warm**

Altitude

Weather station: **246.0** m

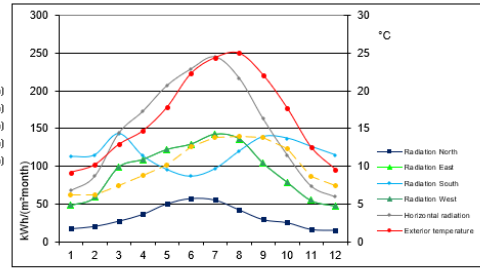
Building location: **260** m

Result overview

Annual heating demand	12.7	kWh/(m².a)
Heating load	13.5	W/m²
Frequency of overheating	-	%
Sensible cooling	3.4	kWh/(m².a)
Latent cooling	0.0	kWh/(m².a)
Cooling load	3.1	W/m²
PER demand	52.5	kWh/(m².a)

Data for heating data from monthly balance

Annual method	Heating		Cooling	
	Heating	Cooling	Heating	Cooling
Heating / cooling period	111	212	365	365
Heating / cooling degree hours	29	41	-78	-78
Radiation North	64	215	469	469
Radiation East	191	853	1285	1285
Radiation South	391	904	1398	1398
Radiation West	191	541	1131	1131
Horizontal radiation	265	813	1782	1782



Month	Days												Heating load		Cooling load		PER factors	
	1	2	3	4	5	6	7	8	9	10	11	12	Weather 1	Weather 2	Weather 1	Weather 2		
ud-01-PT0005a-Évora	Latitude °		38.5		Longitude °		-7.9		Altitude [m]		246		Daily temperature swing Summer [K]				14.0	
Exterior temperature	9.2	10.2	12.9	14.7	17.8	22.3	24.4	25.0	22.1	17.7	12.5	9.6	3.1	7.9	28.5	27.1	1.25	
Radiation North	18	21	28	37	51	68	86	103	120	137	126	115	45	15	85	55	1.25	
Radiation East	49	59	99	109	122	129	142	138	104	79	55	48	75	20	220	190	1.75	
Radiation South	113	115	143	114	96	87	97	120	139	137	126	115	140	40	195	255	1.40	
Radiation West	49	59	99	109	122	129	142	138	104	79	55	48	75	25	220	190	1.75	
Horizontal radiation	68	87	144	173	207	229	245	217	163	115	74	60	130	35	375	320		
Dew point temperature	6.3	6.3	7.4	8.8	10.2	12.6	13.8	14.0	13.9	12.4	8.7	7.5			17.0			
Sky temperature	-0.9	0.1	0.8	2.1	4.5	7.9	9.9	10.1	10.4	7.6	2.7	0.6			14.5	12.5		
Ground temperature	15.0	13.6	13.4	14.5	16.4	19.7	21.9	23.2	23.4	21.5	19.5	17.1	13.4	13.4	23.4	23.4		
Comment:	Derived from LNEG data.																	

Responsible project participant - Participantes no projeto

Architect / Arquitecta	Macarena Bohoyo
HVAC Engineer / Técnico do AVAC	Gil Bravo
Structural engineering / Engenheiro de Estabilidade	Paulo Cândido
Ventilation system / Sistema de ventilação	Climacom
Passivhaus Designer / Desenhadora Passivhaus	Macarena Bohoyo
Passivhaus Tradeperson / Técnico de Obra Passivhaus	Luis Serrano
Client / Cliente	Joana Machorrinho
Certifying body / Entidade certificadora	João Marcelino - www.homegrid.pt
Certification ID / ID Certificado	45270_HGRID_PH_20241119_JOM

Author of the Project Documentation / Autora da memória do projeto

Macarena Bohoyo

Date
Data

Signature
Assinatura

Évora, 21 de novembro de 2024

Exterior photos – Fotos exteriores

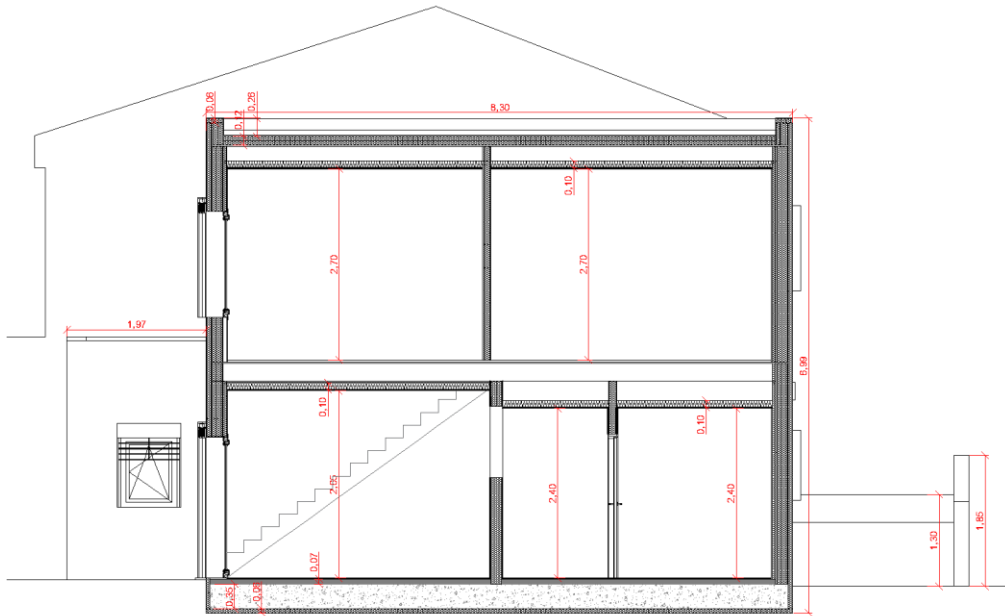
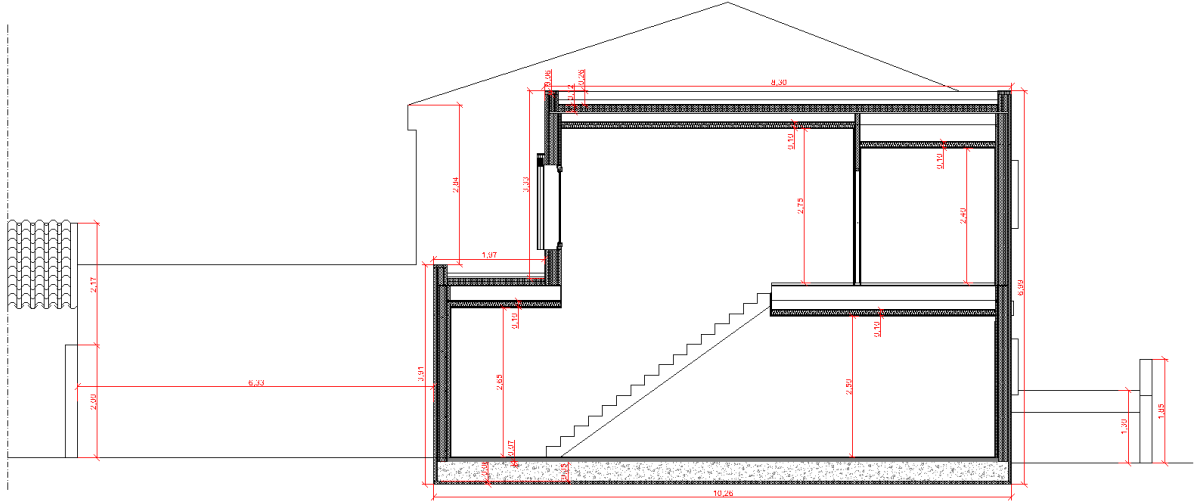


Interior photos – Fotos interiores

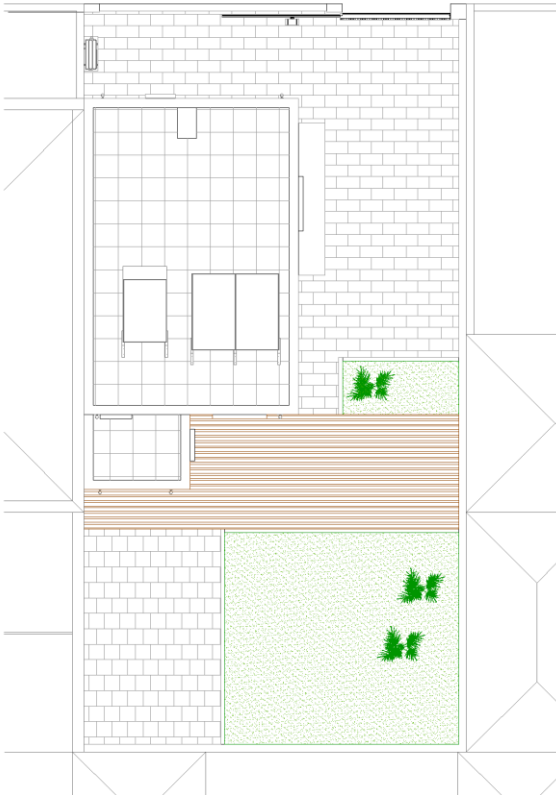


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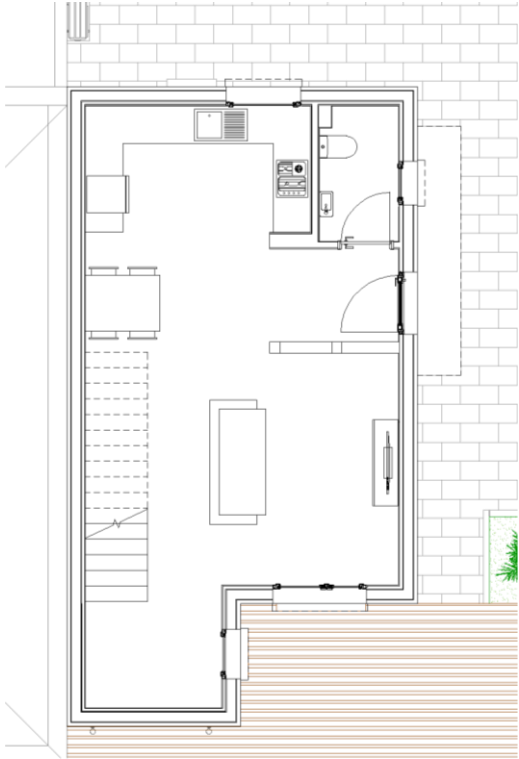
Section – Cortes



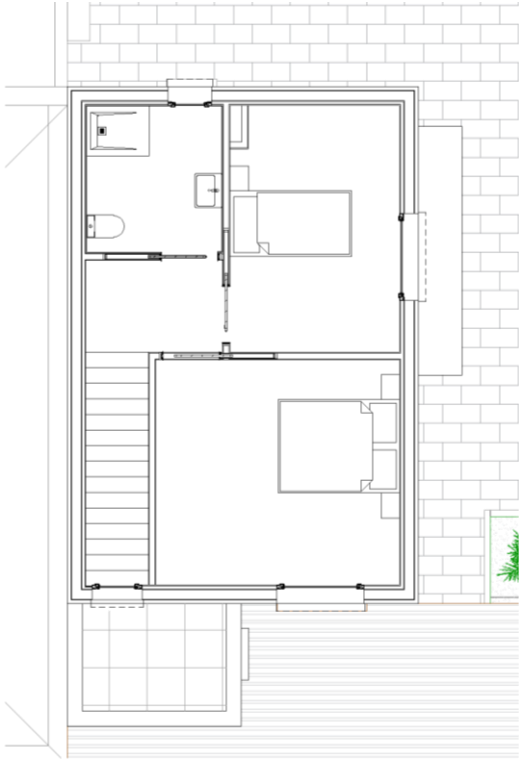
Floor plans – Plantas



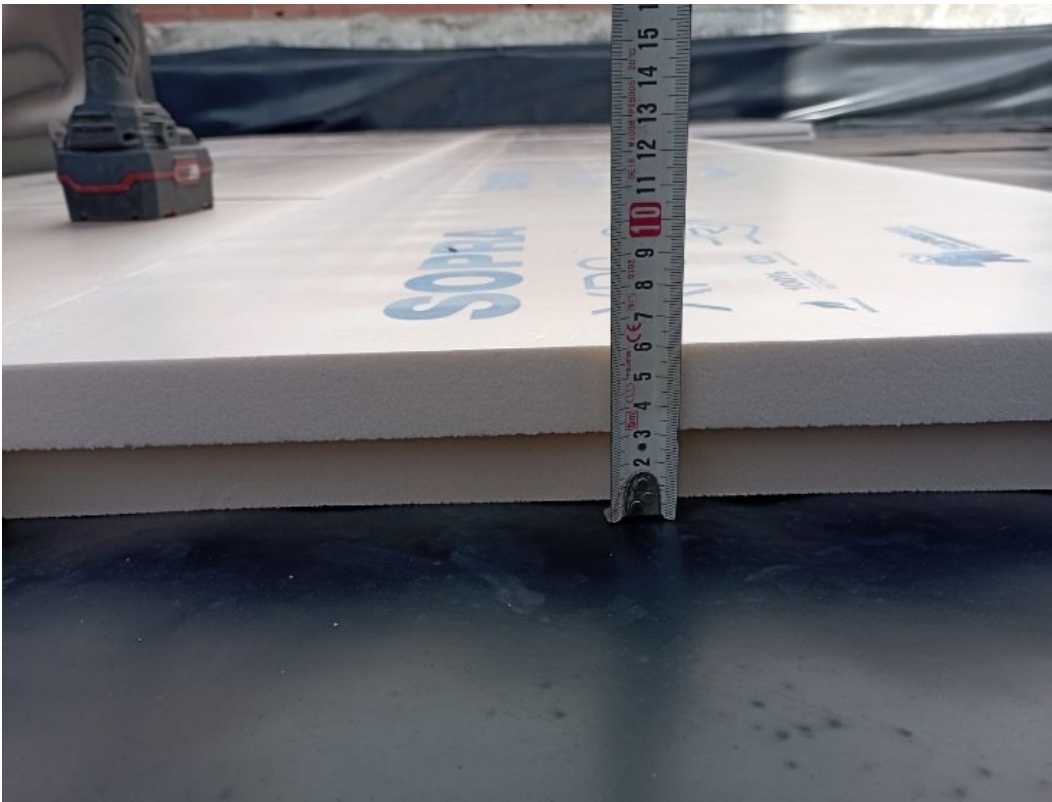
Planta geral



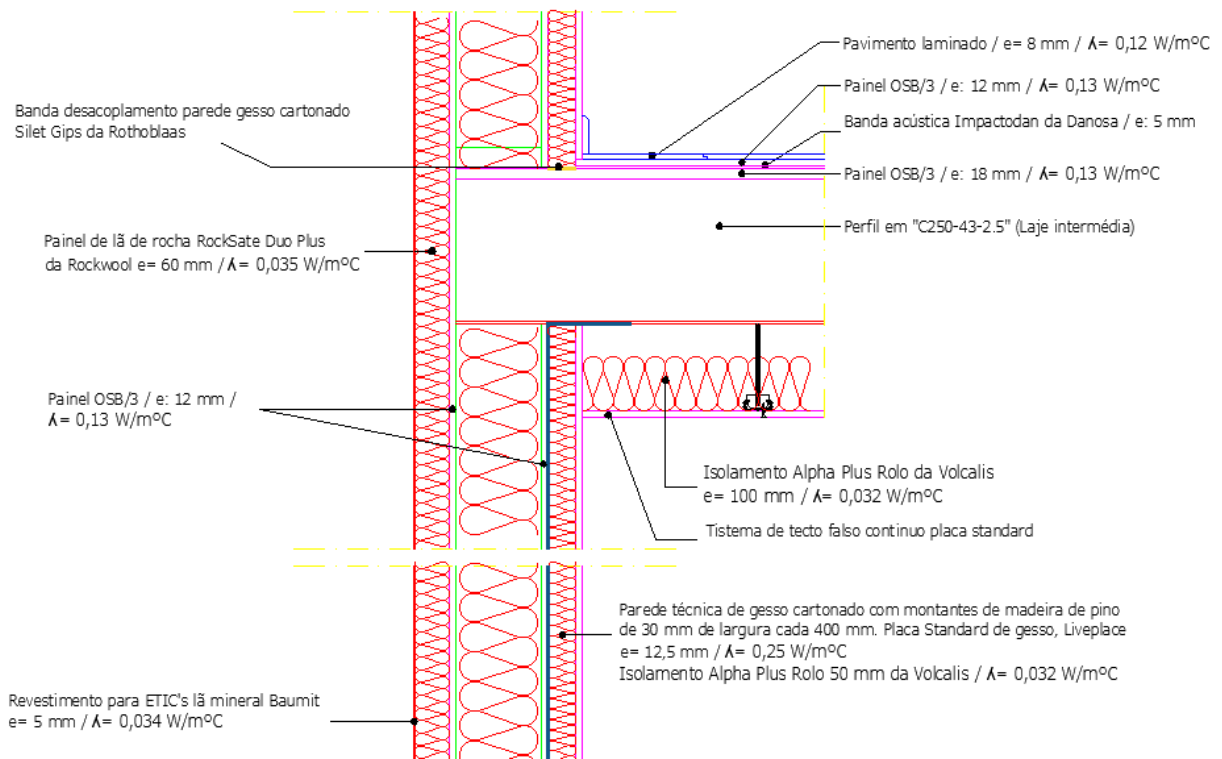
Piso 0



Piso 1



External walls – Paredes exteriores

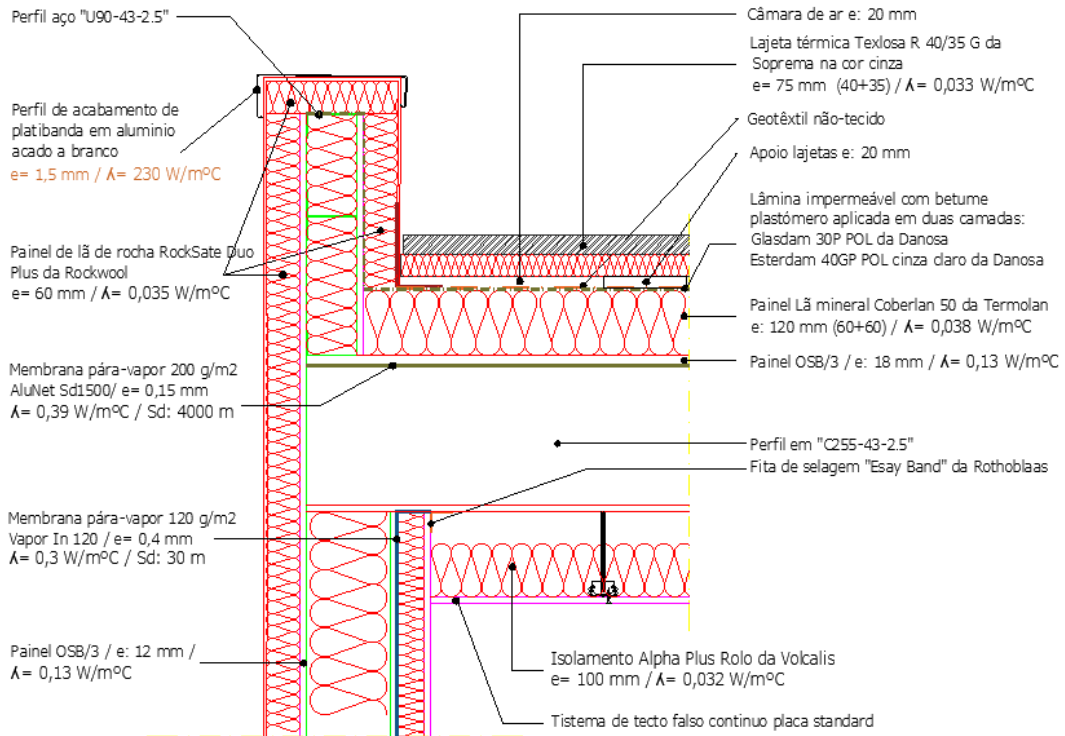


Assembly no.		02ud				Paredes		Interior insulation?	
Orientation of building element		2-Wall		Heat transmission resistance [m ² K/W]		interior R _s		0.13	
Adjacent to		1-Outdoor air		exterior R _s		0.04			
Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]			
Lã Rocha Rocksate Duo Plus	0.035	XPS (fundação)	0.033			60			
Painel OSB	0.130					12			
Lã mineral Alpha Plus	0.032					50			
Lã mineral Alpha Plus	0.032					100			
Painel OSB	0.130					12			
Lã mineral Alpha Plus	0.032					50			
Placa gesso cartonado	0.250					13			
Percentage of sec. 1		Percentage of sec. 2		Percentage of sec. 3		Total			
91%		9.1%				29.7 cm			
U-value supplement				U-value:		0.119 W/(m ² K)			





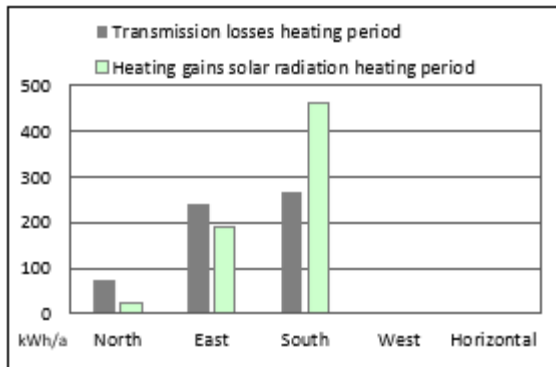
Roof – Cobertura



Assembly no.		Interior insulation?	
04ud	Cobertura	<input type="checkbox"/>	
Heat transmission resistance [m ² K/W]			
Orientation of building element: 1-Roof		interior R _s	0.13
Adjacent to: 1-Outdoor a		exterior R _s	0.04
Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]
Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]	
lajeta térmica	0.033		40
caixa de ar ventilada			20
Lã Mineral Cobertan 50	0.038		60
Lã Mineral Cobertan 50	0.038		60
Painel OSB 18 mm	0.130		12
Percentage of sec. 1		Percentage of sec. 2	Percentage of sec. 3
100%			
U-value supplement		U-value: 0.216 W/(m ² K)	
		Total 19.2 cm	



Windows installation – Instalação de janelas

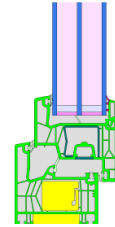


Category: **Window Frame**
 Manufacturer: **PROFINE IBERIA S.A. UNIPERSONAL - SISTEMAS KÖMMERLING, Camarma de Esteruelas, Spain**
 Product name: **KÖMMERLING 76**

This certificate was awarded based on the following criteria for the warm, temperate climate zone

Comfort $U_W = 0,99 \leq 1,00 \text{ W}/(\text{m}^2 \cdot \text{K})$
 $U_{W, \text{installed}} \leq 1,05 \text{ W}/(\text{m}^2 \cdot \text{K})$
 with $U_g = 0,90 \text{ W}/(\text{m}^2 \cdot \text{K})$

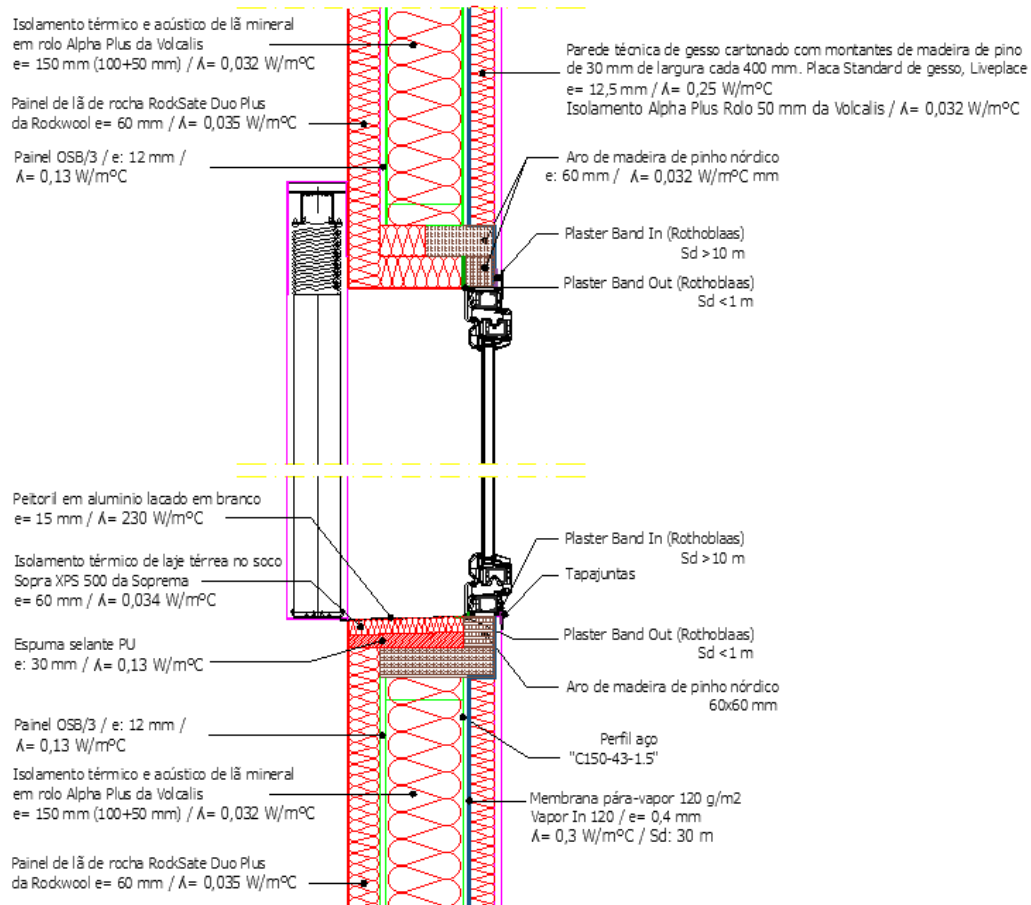
Hygiene $f_{R_{SI=0,25}} \geq 0,65$



Passive House efficiency class **phE** **phD** **phC** **phB** **phA**

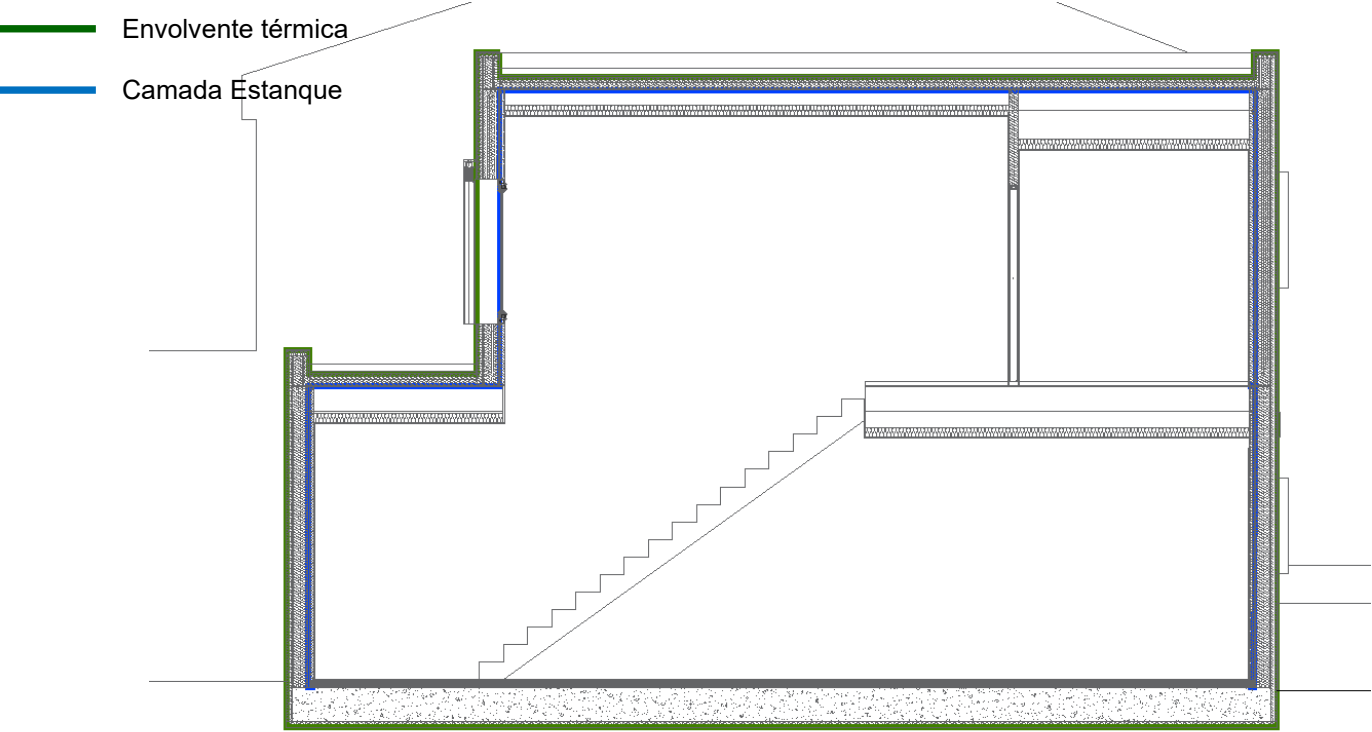
www.passivehouse.com

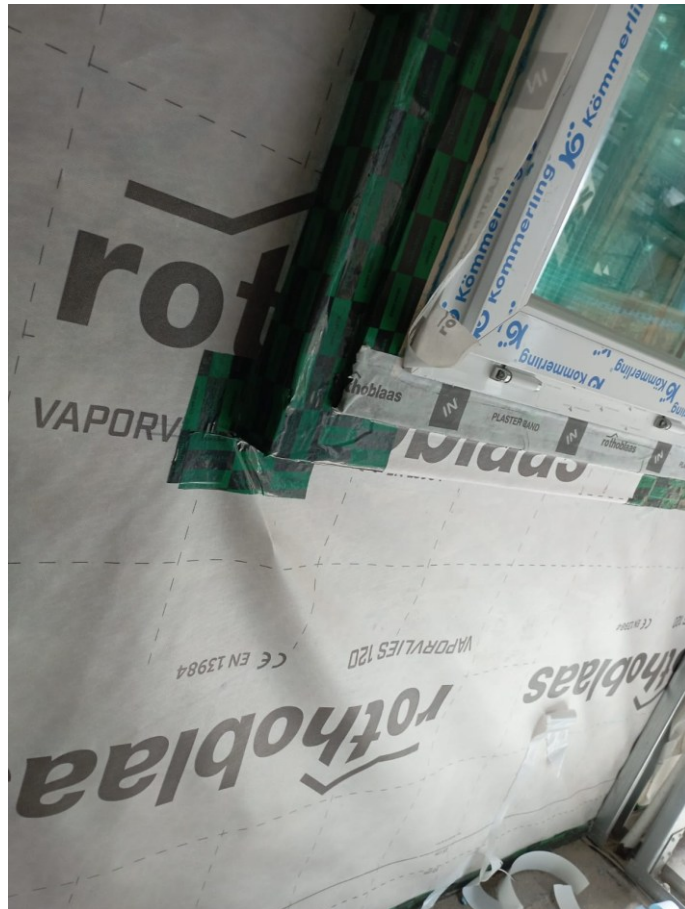
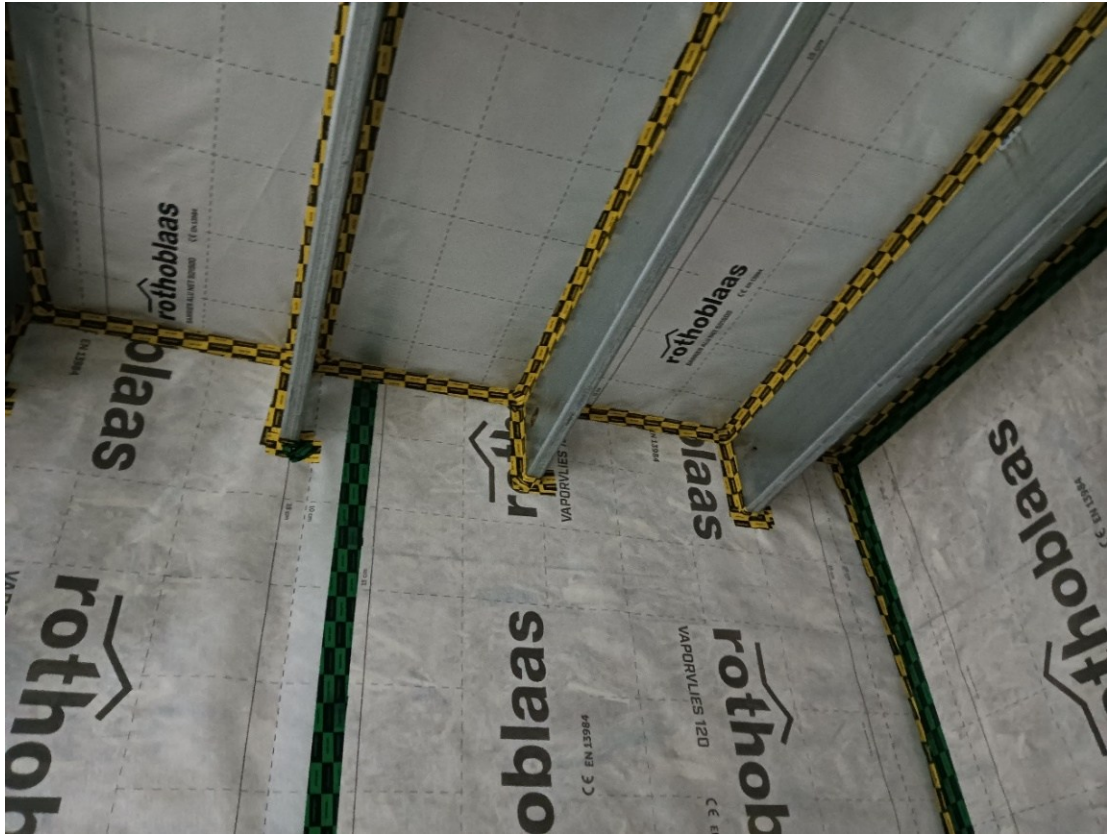
warm, temperate climate
phB
CERTIFIED COMPONENT
 Passive House Institute





Description of airtight envelope – Descrição da camada estanque

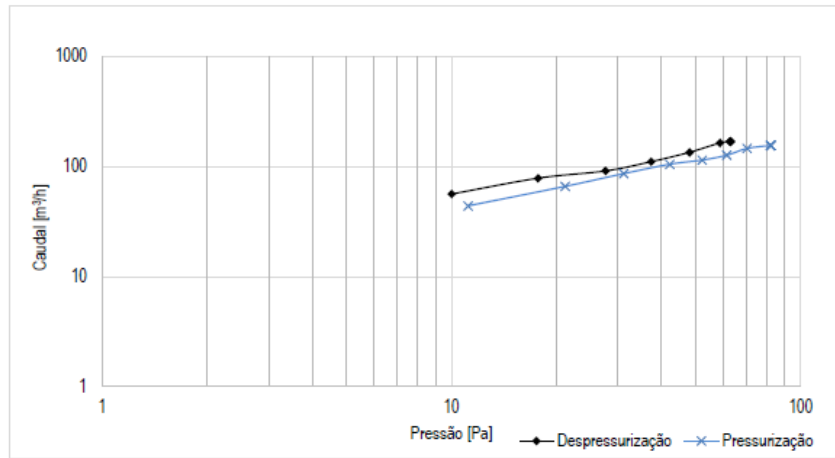




Ensaio Blower Door



Curva de fuga de ar:



Conclusões / Resultados combinados:

	Resultado	Intervalo confiança 95%	
q_{50} [m³/h]	125.66	119.31	132.44
n_{50} [h⁻¹]	0.64	0.61	0.67
q_{E50} [m³/(h·m²)]	0.47	0.45	0.50
q_{F50} [m³/(h·m²)]	1.73	1.64	1.82
ELA ₁₀ [cm²]	32	30	35
ELA _{E10} [cm²/m²]	0.12	0.11	0.13
ELA _{F10} [cm²/m²]	0.44	0.41	0.48

Ventilation system – Sistema de ventilação







Category: **Air handling unit with heat recovery**
 Manufacturer: **Zehnder Group Nederland B.V. Netherlands**
 Product name: **ComfoAir200, ComfoD250, WHR920**
 Specification: **Airflow rate < 600 m³/h**
 Heat exchanger: **Recuperative**

This certificate was awarded based on the product meeting the following main criteria

Heat recovery rate	η_{HR}	\geq	75 %
Specific electric power	$P_{el,spec}$	\leq	0.45 Wh/m ³
Leakage		$<$	3 %
Comfort			Supply air temperature \geq 16.5 °C at outdoor air temperature of -10 °C

cool, temperate climate

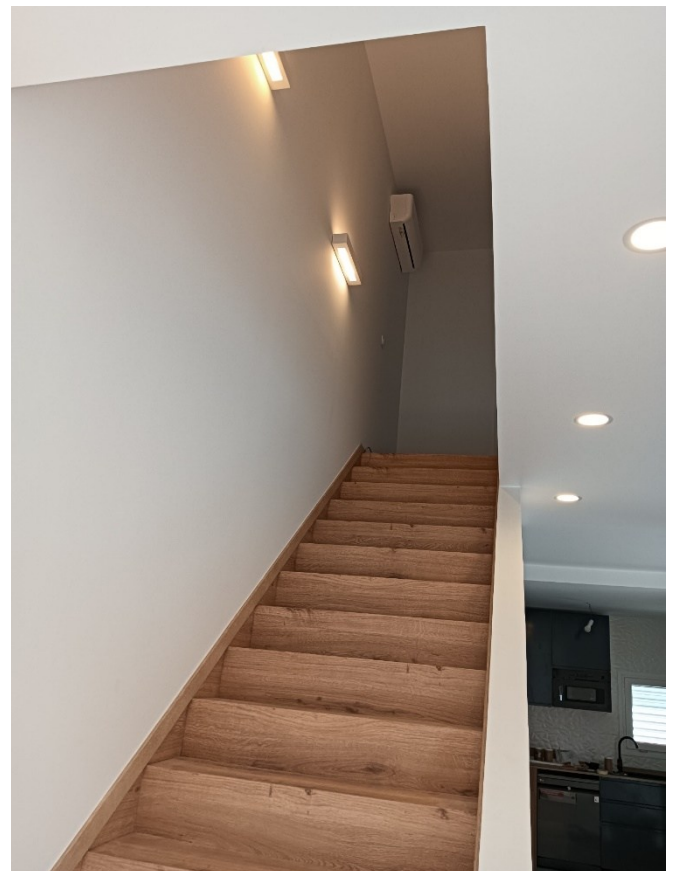
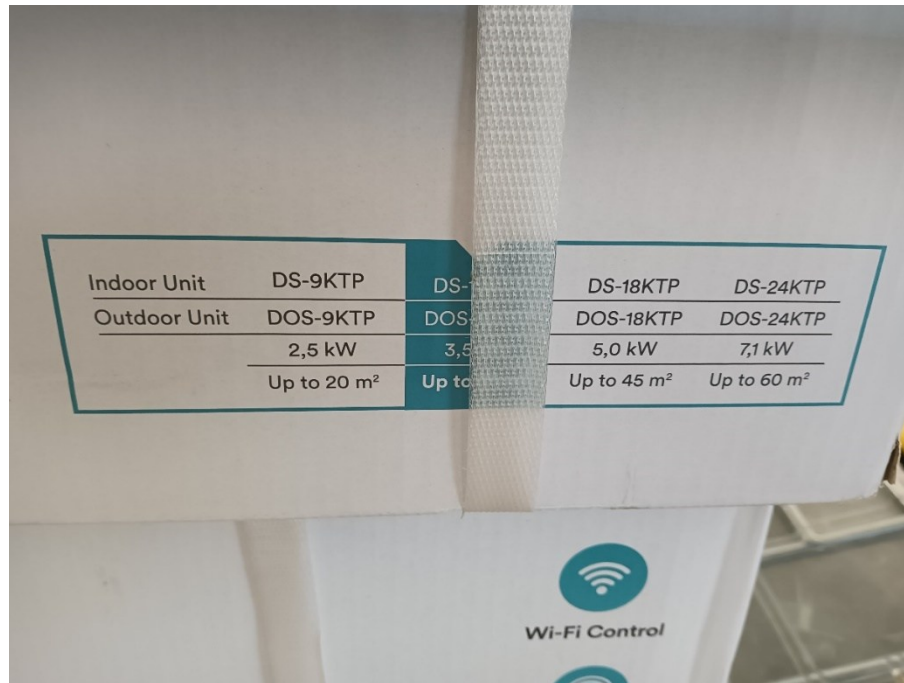



CERTIFIED COMPONENT

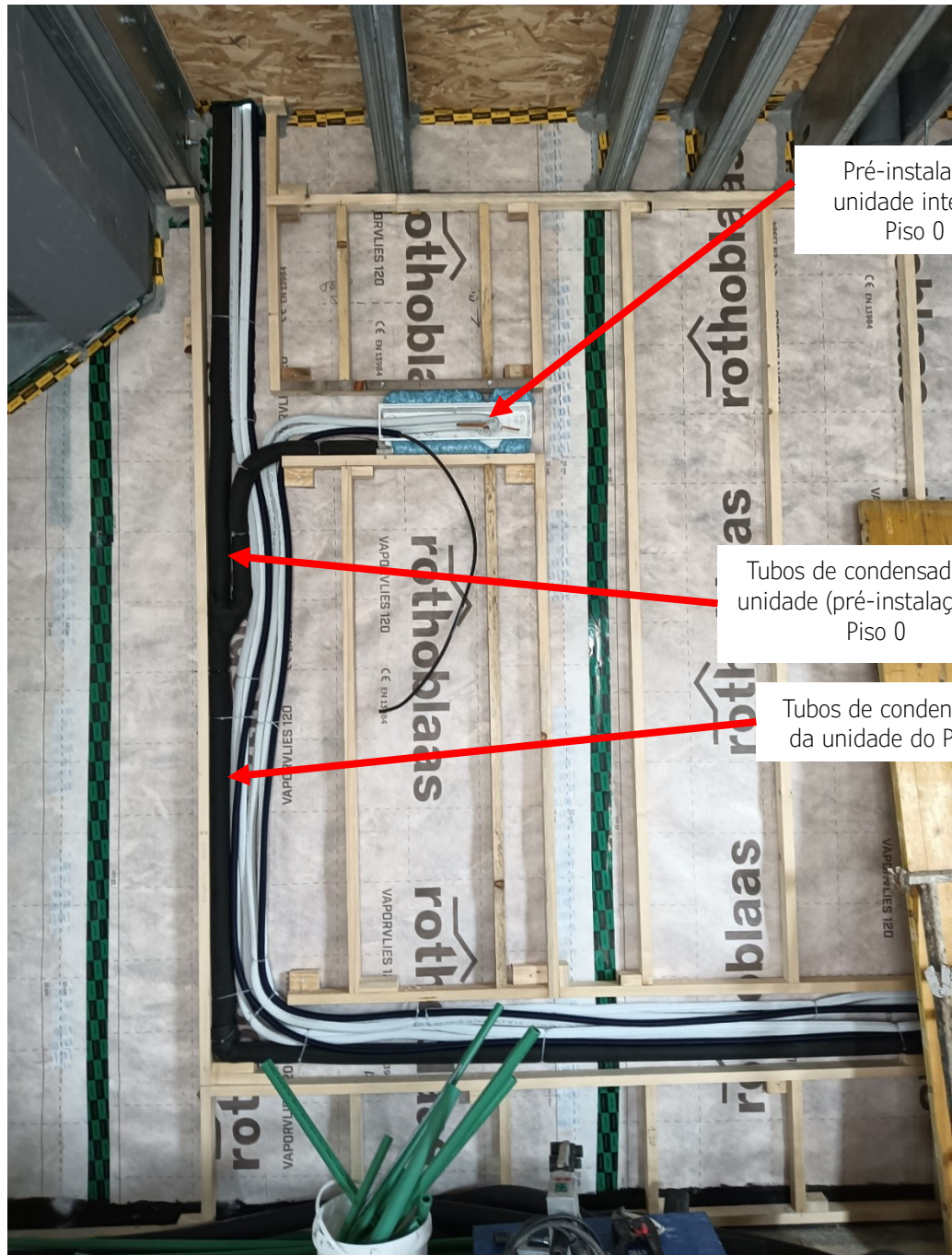
Passive House Institute

Airflow range
60–150 m ³ /h
Heat recovery rate
$\eta_{HR} = 92\%$
Specific electric power
$P_{el,spec} = 0.42 \text{ Wh/m}^3$

Air-conditioning system – Sistema de climatização



Unidade interior split do Piso 1



Pré-instalação
unidade interior
Piso 0

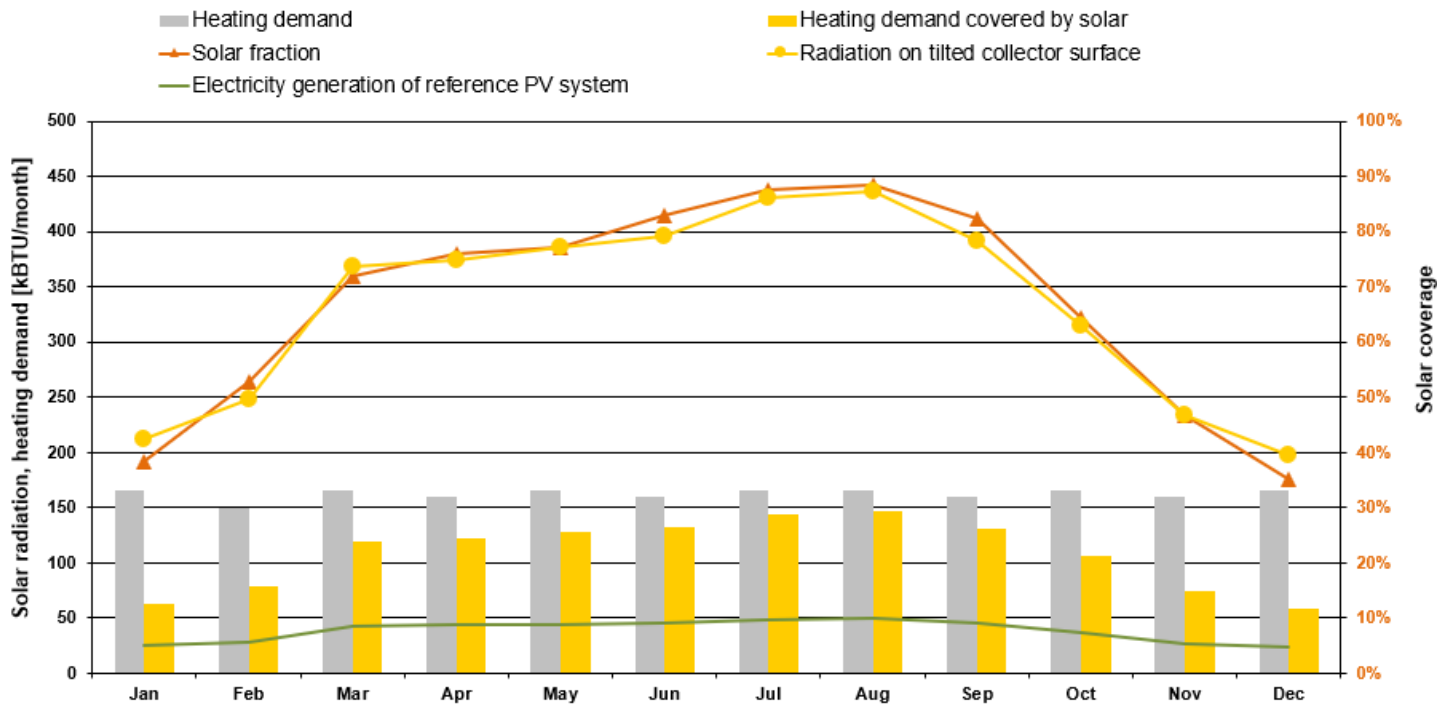
Tubos de condensados da
unidade (pré-instalação) do
Piso 0

Tubos de condensados
da unidade do Piso 1

Distribution Heat Water System – Sistema de água quente sanitária





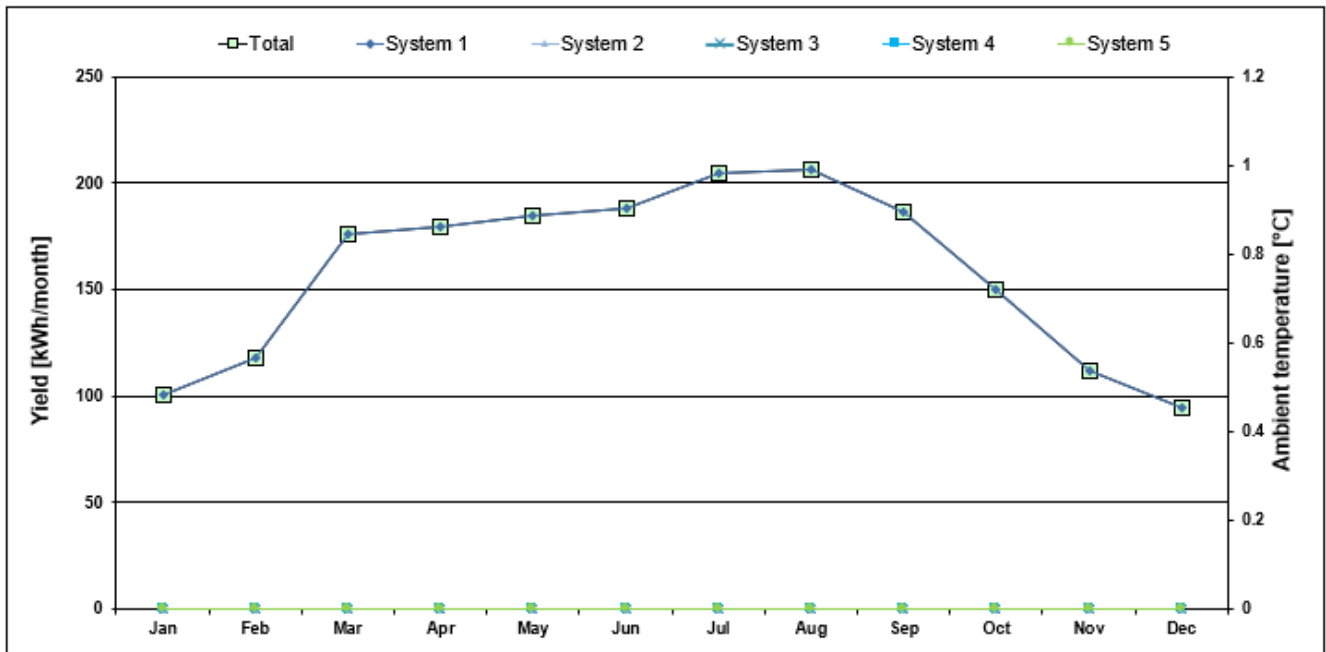


Photovoltaic System – Sistema de energia fotovoltaica






	1903				455	Total	
Annual electricity yield after the inverter, absolute	1903				455	1903	kWh/a
Related to projected building footprint area	35.8				8.6	36	kWh/m ² projected area
CO2-equivalent emissions according to 1-CO2 Factor GEMIS (Germany)	247.3				59.1	247.3	kg/a
PE-factor according to 1-PE Factor (non-renewable) PHI Certification	0.00				0.0	0.00	kWh _{grid} /kWh _{EV}



PHPP Results – Resultados do PHPP

Passive House Verification



Building:	Habitação Unifamiliar		
Street:	Rua da Prata, n°3		
Postcode/City:	7005-369 Canaviais		
Province/Country:	Évora PT-Portugal		
Building type:	Nova construção		
Climate data set:	ud--01-PT0005a-Évora		
Climate zone:	5: Warm Altitude of location: 260 m		
Home owner / Client:	Joana Machorrinho		
Street:	Rua da Prata, n°3		
Postcode/City:	7005-369 Canaviais		
Province/Country:	Évora PT-Portugal		
Mechanical engineer:	Gil Manuel Guerra Bravo		
Street:	Rua das Corgas		
Postcode/City:	6300-152 Panóias de Cima		
Province/Country:	Guarda PT-Portugal		
Certification:	Homegrid, Lda		
Street:	Av. 25 de Abril, 3ª esq. Frente		
Postcode/City:	3830-044 Ílhavo		
Province/Country:	Aveiro PT-Portugal		
Architecture:	Macarena Ávila Bohogo		
Street:	Rua António Mário Virgolino Silva, n°6		
Postcode/City:	7005-636 Tapada do Matias		
Province/Country:	Évora PT-Portugal		
Energy consultancy:	Macarena Ávila Bohogo		
Street:	Rua António Mário Virgolino Silva, n°6		
Postcode/City:	7005-636 Tapada do Matias		
Province/Country:	Évora PT-Portugal		
Year of construction:	2024		
No. of dwelling units:	1		
No. of occupants:	1.9		
Interior temperature winter [°C]:	20.0	Interior temp. summer [°C]:	25.0
Internal heat gains (IHG) heating case [W/m²]:	2.8	IHG cooling case [W/m²]:	2.8
Specific capacity [Wh/K per m² TFA]:	84	Mechanical cooling:	x

Specific building characteristics with reference to the treated floor area						
				Criteria	Alternative criteria	Fullfilled? ²
Space heating	Treated floor area m²	72.3		15	-	yes
	Heating demand kWh/(m²a)	13	≤	-	10	
	Heating load W/m²	14	≤	-	-	
Space cooling	Cooling & dehum. demand kWh/(m²a)	9	≤	15	15	yes
	Cooling load W/m²	9	≤	-	11	
	Frequency of overheating (> 25 °C) %	-	≤	-	-	-
	Frequency of excessively high humidity (> 12 g/kg) %	0	≤	10	-	yes
Airtightness	Pressure test result n ₅₀ 1/h	0.6	≤	0.6	-	yes
Non-renewable Primary Energy (PE)	PE demand kWh/(m²a)	99	≤	-	-	-
Primary Energy Renewable (PER)	PER demand kWh/(m²a)	53	≤	60	60	yes
	Generation of renewable energy (in relation to projected building footprint) kWh/(m²a)	43	≥	-	-	

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: **João** Surname: **Marcelino** **Passive House Classic?** **yes**

Certificate ID: **45270_HGRID_PH_20241119_JOM** Issued on: **Ílhavo** City: **Ílhavo** Signature: _____

Author of Project documentation

28.11.2024

Macarena Bohoyo