

Project Documentation

Passivhaus database ID: 7225

Amores Perfeitos

Cascais, Lisboa



Passive House Designer João Pedro Quaresma

jpquaresma@nurture-ad.pt

Data of Building

Year of construction	2022	Space heating	4,4 kWh/(m²a)
U-value external wall	0.257 W/(m²K)		
U-value basement ceiling	0.267 W/(m²K)	Primary Energy Renewable (PER)	34 kWh/(m²a)
U-value roof	0.210 W/(m²K)	Generation of renewable energy	28 kWh/(m²a)
U-value window	1.10 W/(m²K)	Non-renewable Primary Energy (PE)	55 kWh/(m²a)
Heat recovery	90,0 %	Pressure test n ₅₀	0.5 h ⁻¹
Special features	Solar collectors for hot water generation with a heat pump and PV solar panels. One air-conditioning unit in the living room and heat recovery ventilation. This project was certified by the Portuguese Energy Certification System (SCE), reaching class A+ and nZEB.		

Brief description of the project

Semi-Detached, three-bedroom single-family passive house in Rua Amores Perfeitos São Domingos de Rana, County of Cascais district of Lisboa, at 121 meters above sea level. It is a construction of basement, ground floor + first floor.

The building has a compact volume. In the basement are all the complementary uses, the machinery room, laundry room, storage and games room. The ground floor is located in the kitchen and living room, and on the first floor, the bedrooms. The treated floor area is 176,77m² with south and East solar orientation.

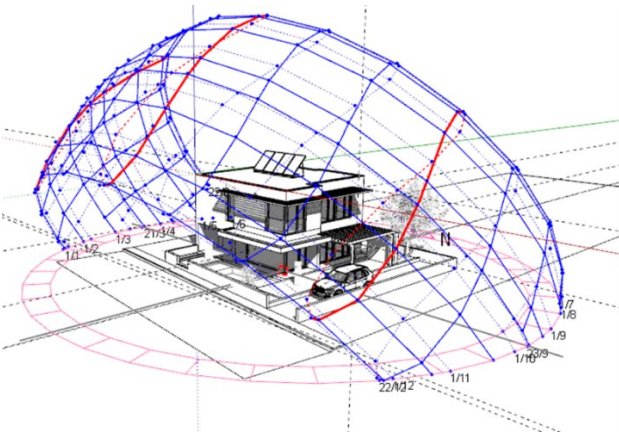
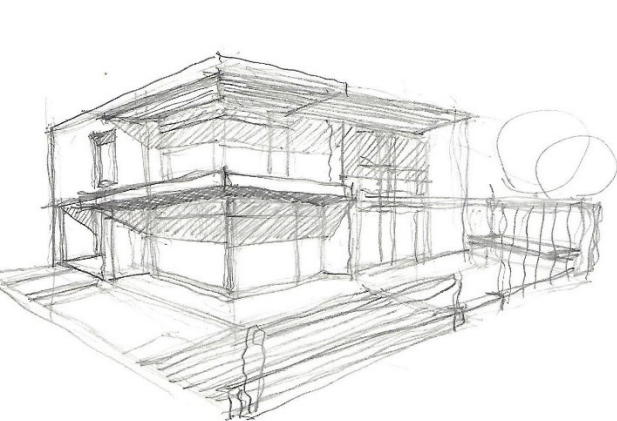
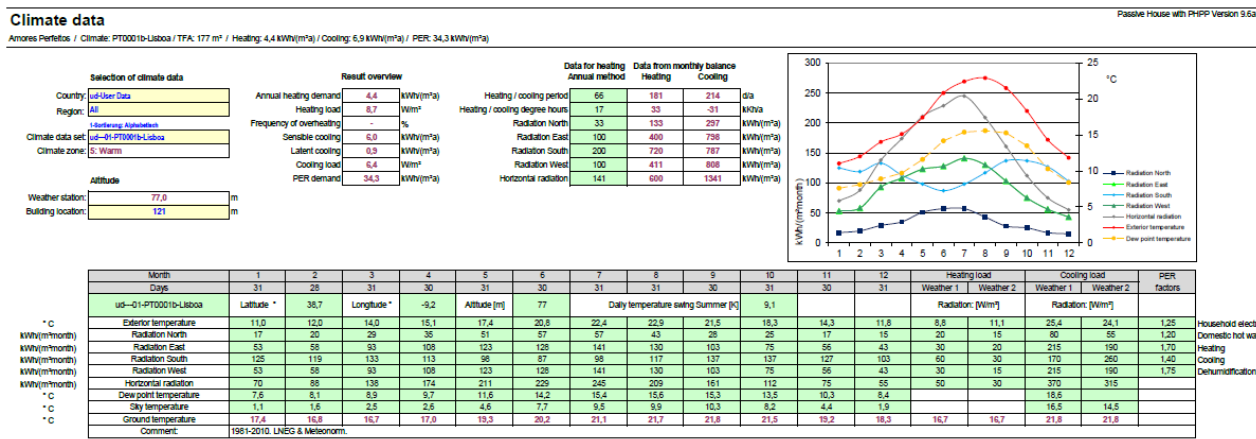
The house is certified to Passivhaus Classic Standard and built with a traditional concrete structure system. All openings are protected with external blinds.

Responsible project participants

Architect	João Pedro Quaresma www.nurture-ad.com
Implementation planning	João Pedro Quaresma www.nurture-ad.com
Building systems	Climacom www.climacom.pt
Structural engineering	João Côrte www.arion.com.pt
Building physics	Patrícia Botelho
Passive House project planning	João Pedro Quaresma www.nurture-ad.com
Construction management	Rui Magalhães
Certifying body	João Marcelino- Homegrid www.homegrid.pt
Certification ID	Project-ID (www.passivehouse-database.org) 7225
Author of project documentation	João Pedro Quaresma www.nurture-ad.com
Date, Signature	22/05/2023 João Pedro Quaresma

Outline

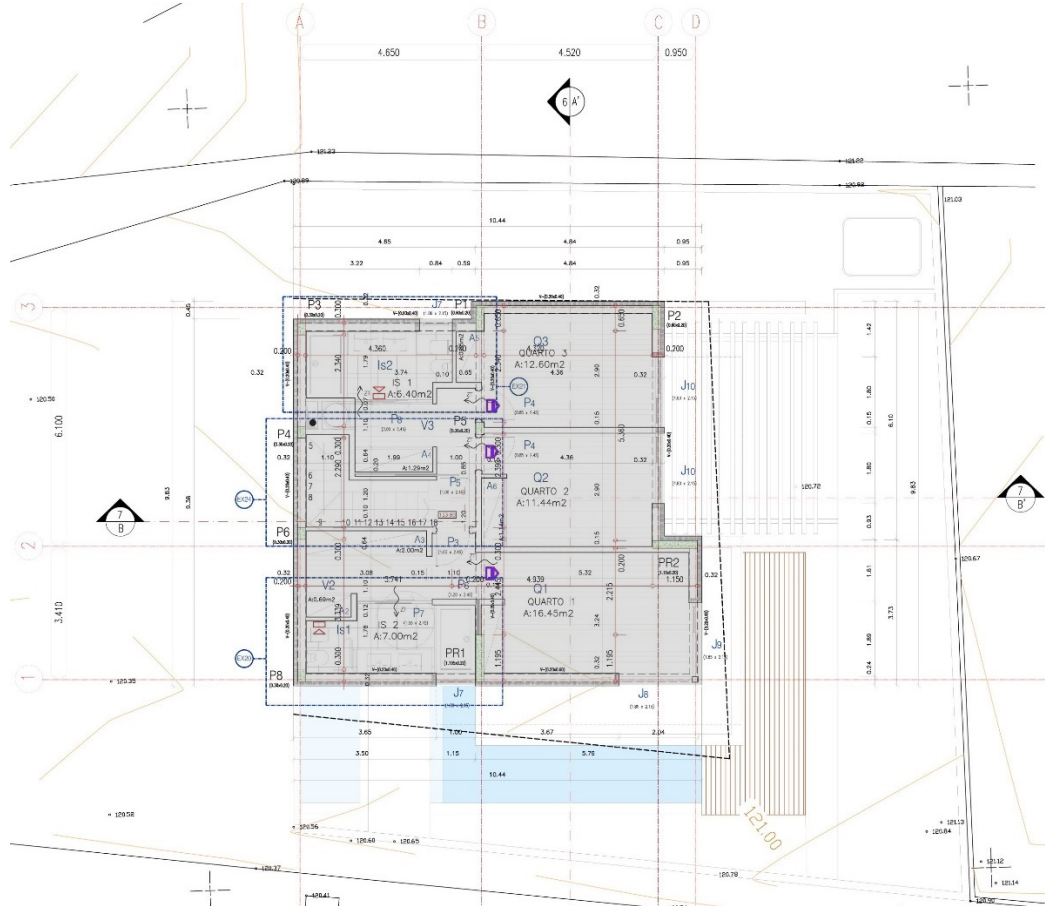
The house outside Portugal’s Capital, Lisbon, is certified to Passivhaus Classic Standard and built with a traditional concrete structure system. All openings are protected with external blinds.



Initial 3D Drawing

Final Photo

GROUND FLOOR



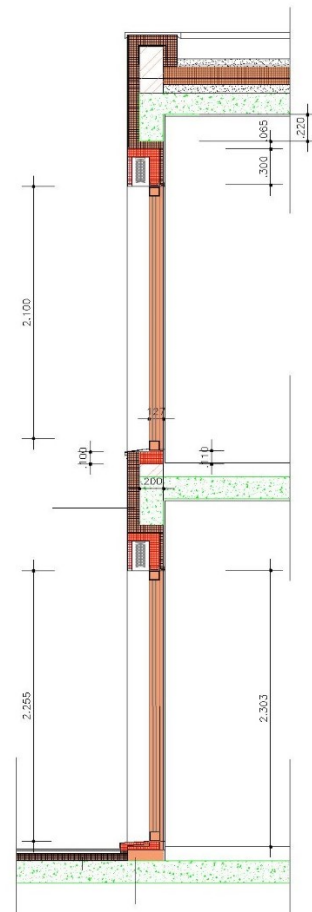
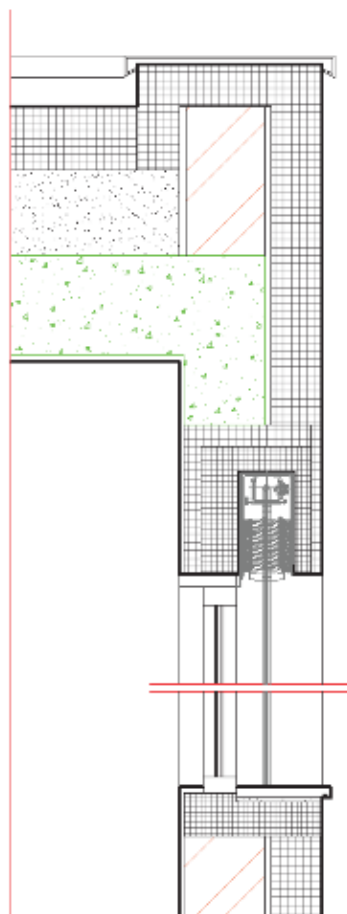
SISTEMA FOTVOLTAICO DE AUTO CONSUMO
COLECTORES SOLARES TÉRMICOS AQS (Produto CERTIF ou Marca Solar Keymark)

RETELHA DE PROTEÇÃO COM PENDENTE DE ESCOAMENTO DE ÁGUAS E ACABAMENTO PARA PROTEÇÃO SOLAR (100 mm)
MEMBRANA DE IMPERMEABILIZAÇÃO EM ESTUQUE PLASTERBO KPP COM 400g/m2 E ARMADURA DE POLIESTER
ISOLAMENTO TÉRMICO EM PLACAS DE POLIESTIRENO EXTRUDIDO (EPS) TIPO MASTRO FIBRAKUPS (150 mm)
RETELHA DE REGULARIZAÇÃO (100 mm)
LAJE EM BETÃO ARMADO (170 mm)
ESTUQUE DE GESSO FINO PROJETADO DE ELEVADA DUREZA DE 1200 KG/M3 (15 mm)
RUFO EM ZINCO
BLOCO ISOLANTE

ESTUQUE DE GESSO FINO PROJETADO DE ELEVADA DUREZA DE 1200 KG/M3 (15 mm)
PAINEL DE ALUMINARIA DE TUAZOL CERÂMICO TUAZOL COM 30x45x45 PERCERAM (RESISTÊNCIA TÉRMICA 0,80 m2 K/W)
LÂ MINERAL EM PAINEL PARA SISTEMA ETICS TIPO KNAUF SATI KPS-S (100 mm) - Lambda 0,036 (W/mK) - INCLUI SISTEMA DE FIXAÇÃO
REBOCO PROJETADO DE ELEVADA DUREZA DE 1200 KG/M3 (25 mm)
PAVIMENTO FLUTUANTE TIPO MCANDERS SÉRIE GO, REF. OLEO TALPE OAK BOMARDO - 1220 mm X 185 mm X 10,5 mm
RETELHA DE REGULARIZAÇÃO
PORTA LACADA E PINTADA NA COR BRANCA RAL 9010 INCLINDO FECHADURAS E TODAS AS FERRAGENS EM AÇO INOXIDÁVEL
PROJECTOR LED PARA EXTERIOR EM AÇO INOXIDÁVEL IP65
TETO FALSO EM GESSO CANTHADO COM PAINELA DE SUPERFÍCIES INTERIOR COM TINTA "VINYL" MATE RAL 9010
ESTRUTURA METÁLICA EM AÇO GALVANIZADO
PAINEL EM MADEIRA TRATADA "TRICAPA" (3,1) PARA EXTERIOR (TINTO/STRATO)
CADEIARIA EM ALUMÍNIO PASSIVE HOUSE COM VIDRO DUPLO RAL 7035
PEDRA CALCÁREA MACIÇA
MOSAICO PARA PISADA EM VIDRO COR BRANCA
MOSES DE COZINHA MODULARES COM ACABAMENTO LACADO NA COR BRANCA E TAMPOS EM REVESTIMENTO SINTÉTICO
LAVERIA COM RECUPERADOR DE CALOR A BOMASSA SPARTHERM VARAC-4394x 8,0 KW (RENDIMENTO 80 %)

ACRÍLICO DE ALTA RESISTÊNCIA PARA PISADAS
CADEIARIA EM ALUMÍNIO PASSIVE HOUSE COM VIDRO DUPLO RAL 7035
ESTUQUE DE GESSO FINO PROJETADO DE ELEVADA DUREZA DE 1200 KG/M3 (15 mm)
PORTA LACADA E PINTADA NA COR BRANCA RAL 9010 INCL. FERRAGENS EM AÇO INOXIDÁVEL

PAVIMENTO EM MOSAICO CERÂMICO TIPO GRÉS NEST GREY MATE 81 X 81
RETELHA DE REGULARIZAÇÃO



Building solutions - ground floor

Assembly no.
04ud

Basement pavement

Interior Insulation?

Heat transmission resistance [m²K/W]

Orientation of building element: 3-Floor
Adjacent to: 2-Ground

Interior R_{si}: 0,10
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]
Internal Finish	0,430					15
Screed Base	1,300					100
Concrete	2,100					200
XPS-ifoam, imperialum	0,035					120
Impermabilization	0,230					1
Percentage of sec. 1: 100%						Total: 43,6 cm
Percentage of sec. 2:						
Percentage of sec. 3:						
U-value supplement:						U-value: 0,267 W/(m²K)

Ground floor insulation: 120 mm
U value= 0,267 W/(m²K)



Assembly no.	Building assembly description					Interior insulation?
01ud	External wall with render- ETICS					
Heat transmission resistance [m ² K/W]						
Orientation of building element	2-Wall	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)]	Thickness [mm]
Internal Render	0,430					15
Thermal Ceramic Brick	0,210					189
Termolan RECot	0,036					100
External Render	1,300					15
Percentage of sec. 1		Percentage of sec. 2		Percentage of sec. 3		Total
100%						31,9 cm
U-value supplement		W/(m ² K)		U-value:		0,257 W/(m ² K)

U value= 0,257 W/(m²K)



Building solutions – Roof

Assembly no.		02ud				Building-roof-Ceiling(Flat)		Interior Insulation?	
Orientation of building element		1-Roof		Heat transmission resistance [m²K/W]		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]			
Internal Render	0,430					15			
Concrete-Slab	2,100					170			
Screed Base	1,300					100			
Coberlan	0,038					80			
Isover IXXO	0,039					40			
XPS rooftec SL	0,035					40			
Impermabilization	0,230					1			
Screed Protection	1,300					100			
Percentage of sec. 1		Percentage of sec. 2		Percentage of sec. 3		Total			
100%						54,6 cm			
U-value supplement				U-value:		0,210 W/(m²K)			

Roof insulation: 160 mm
U value= 0,210 W/(m²K)



Building solutions – Exterior basement ceiling

Assembly no.		Q5ud				Basement Ceiling - External		Interior insulation?	
		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]			
Internal Render	0,430					15			
Concrete-Slab	2,100					170			
Screed Base	1,300					10			
PYR, imperialum	0,023					80			
Screed Base	1,300					20			
Impermabilization	0,230					1			
Outside Finish	1,300					30			
Percentage of sec. 1		Percentage of sec. 2		Percentage of sec. 3		Total			
100%						32,6 cm			
U-value supplement				U-value:		0,259		W/(m ² K)	

Ceiling insulation: 80 mm
U value= 0,259 W/(m²K)



Building solutions – Exterior concrete wall (with ground)

Assembly no. 03ud		External concrete wall				Interior insulation?	
Orientation of building element 2-Wall		Heat transmission resistance [m ² K/W]		Interior R _{si} 0.13		Exterior R _{se} 0.00	
Adjacent to 2-Ground							
Area section 1	1 [W/(mK)]	Area section 2 (optional)	1 [W/(mK)]	Area section 3 (optional)	1 [W/(mK)]	Thickness [mm]	
Internal Render	0.430					15	
Concrete	2.100					200	
Danosol - Danopren TR	0.037					100	
Percentage of sec. 1	100%	Percentage of sec. 2		Percentage of sec. 3		Total	31,5 cm
U-value supplement		U-value	0,338 W/(mK)				



Wall insulation: 100 mm

U value= 0,338 W/(m²K)

Building solutions – Exterior pavement first floor

Assembly no. 03ud		Pavement 1 Floor- External				Interior insulation?	
Orientation of building element 3-Floor		Heat transmission resistance [m ² K/W]		Interior R _{si} 0.10		Exterior R _{se} 0.04	
Adjacent to 1-Outdoor air							
Area section 1	1 [W/(mK)]	Area section 2 (optional)	1 [W/(mK)]	Area section 3 (optional)	1 [W/(mK)]	Thickness [mm]	
Internal Finish	0.430					15	
Screed Base	1.300					100	
Concrete	2.100					200	
Termolan RECot	0.036					100	
Air							
False Ceiling							
Percentage of sec. 1	100%	Percentage of sec. 2		Percentage of sec. 3		Total	41,5 cm
U-value supplement		U-value	0,320 W/(mK)				



Pavement insulation: 100 mm

U value= 0,320 W/(m²K)

Building solutions – Wall with wood

Assembly no. 03ud		External wall with render- ETICS + ripado madeira				Interior insulation?	
Orientation of building element 2-Wall		Heat transmission resistance [m ² K/W]		Interior R _{si} 0.13		Exterior R _{se} 0.04	
Adjacent to 1-Outdoor air							
Area section 1	1 [W/(mK)]	Area section 2 (optional)	1 [W/(mK)]	Area section 3 (optional)	1 [W/(mK)]	Thickness [mm]	
Internal Render	0.430					15	
Thermal Ceramic Brick	0.210					189	
Termolan RECot	0.036					100	
External Render	1.300					15	
ripado de madeira	1.300					19	
Percentage of sec. 1	100%	Percentage of sec. 2		Percentage of sec. 3		Total	32,9 cm
U-value supplement		U-value	0,256 W/(mK)				



Wall insulation: 100 mm

U value= 0,256 W/(m²K)

Building solutions – Windows

Frame

Category: **Window Frame**
Manufacturer: **GEALAN Fenster Systeme GmbH,
Santa Pola-Alicante,
Spain**
Product name: **Certification LINEAR**

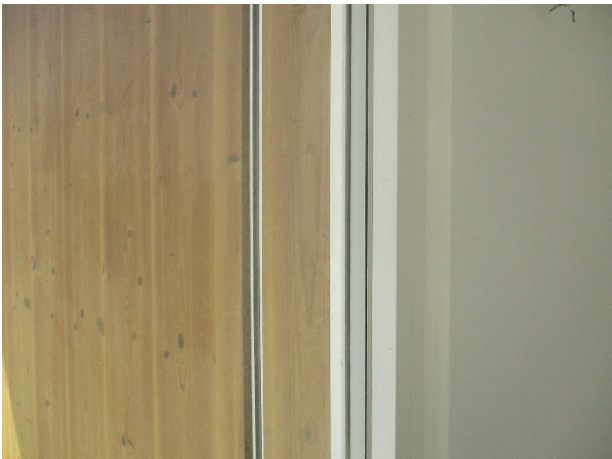
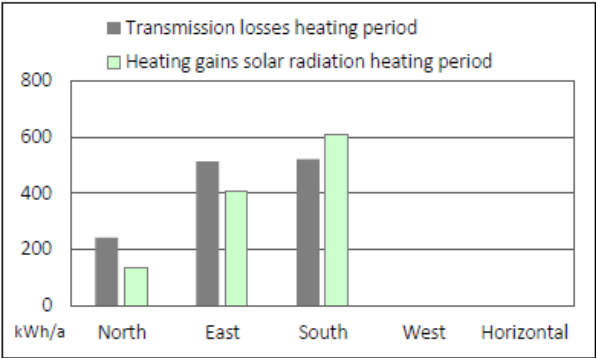
This certificate was awarded based on the following criteria for the warm, temperate climate zone

Comfort $U_W = 1.00 \leq 1.00 \text{ W}/(\text{m}^2 \cdot \text{K})$
 $U_{W, \text{installed}} \leq 1.05 \text{ W}/(\text{m}^2 \cdot \text{K})$
with $U_g = 0.90 \text{ W}/(\text{m}^2 \cdot \text{K})$

Hygiene $f_{Rsi=0.25} \geq 0.65$



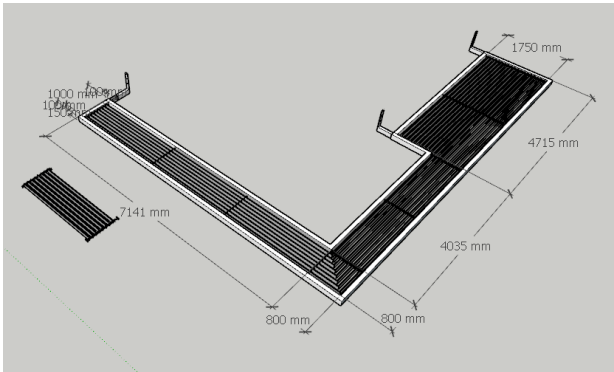
Description	g-Value	U _g -Value
		W/(m²K)
Saint-Gobain SGG CLIMALIT PLUS ULTRA N ACOUSTIC (6x12x4x12x4) GT1	0,57	1,00
Saint-Gobain SGG CLIMALIT PLUS ULTRA N ACOUSTIC (6+Argon+6) GT2	0,61	1,10
Saint-Gobain SGG CLIMALIT PLUS ULTRA N ACOUSTIC (8+16 Argon 90%)+8) GT3	0,60	1,10



Warm Edge

Building solutions – Fixed window shading systems

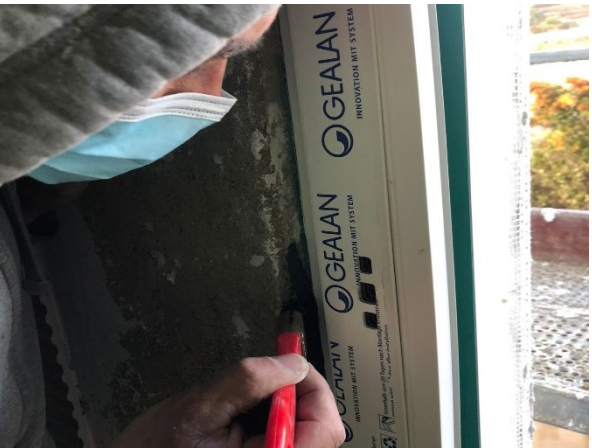
First Floor



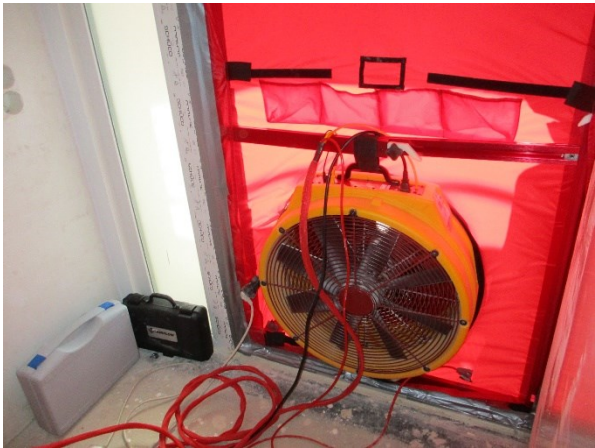
Ground Floor



Airtightness



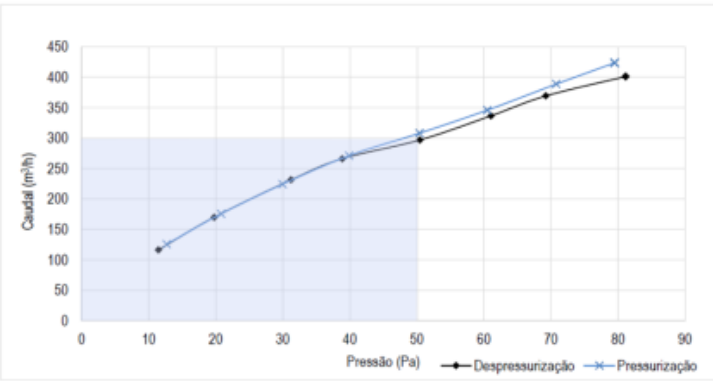
Blower Door Test



Test results



	Resultado	Intervalo confiança 95%	
$q_{10} [m^3/h]$	306.9	300.6	313.3
$n_{10} [h^{-1}]$	0.44	0.44	0.45
$q_{10} [m^3/(h \cdot m^2)]$	0.64	0.63	0.66
$q_{10} [m^3/(h \cdot m^2)]$	1.51	1.48	1.54



Ensaio realizado por: Márcio Gonçalves

Autoria técnica

Responsabilidade técnica

A Direção

OE01322

António Vieira
Técnico Superior

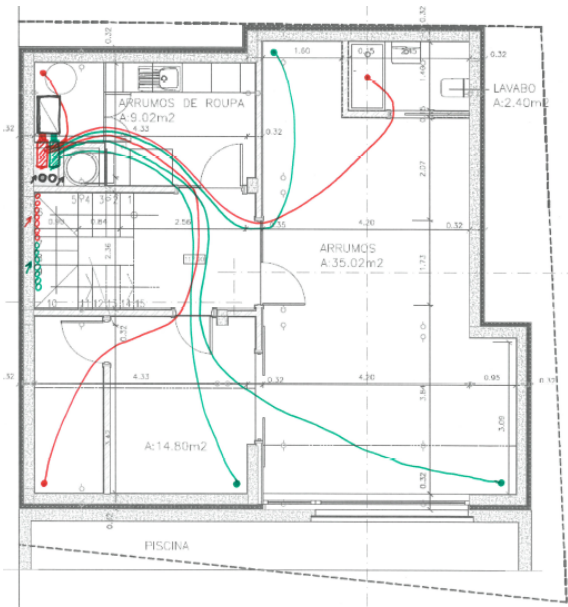
Nuno Simões
Superior Técnico e Certificado

Documento validado

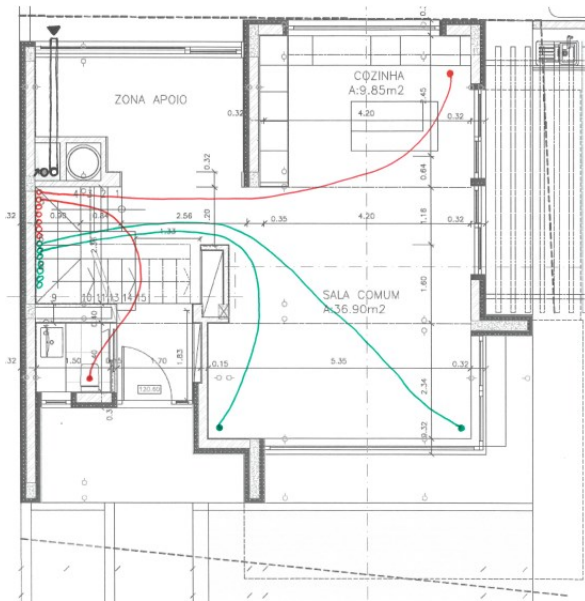
Notas: O presente relatório não pode ser reproduzido, exceto na íntegra, sem o acordo escrito do itecons.
Os resultados apresentados referem-se apenas aos itens ensaiados.

Ventilation system

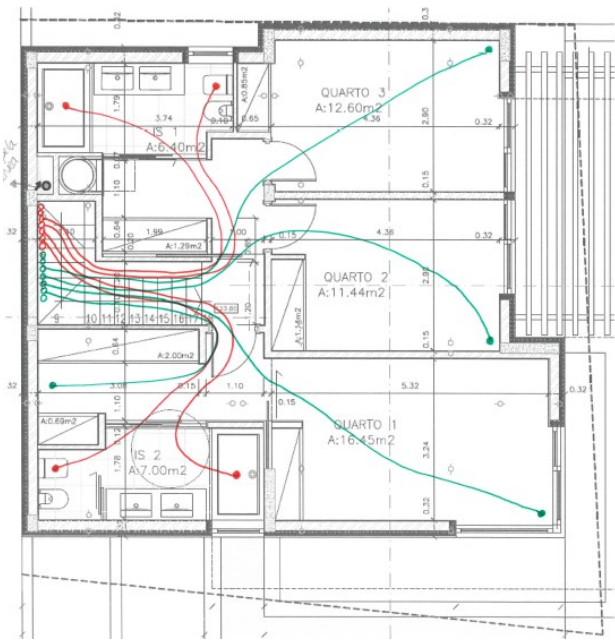
Ventilation Plans



Basement



Ground floor



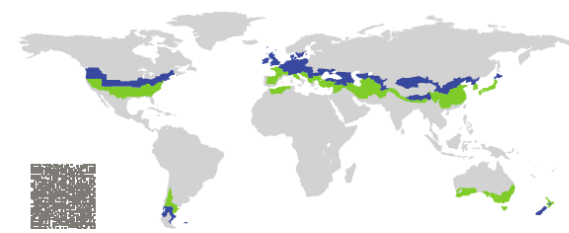
First floor



Heat recovery unit

Zehnder ComfoAir Q350

	Intercambiador sensible	Intercambiador entálpico
Caudal	70-270m³/hr	70-270m³/hr
Eficiencia de recuperación	nHR=90%	nHR=86%
SPF	Pel,spec=0.24 Wh/m³	Pel,spec=0.22 Wh/m³
Recuperación de humedad		nx = 73%

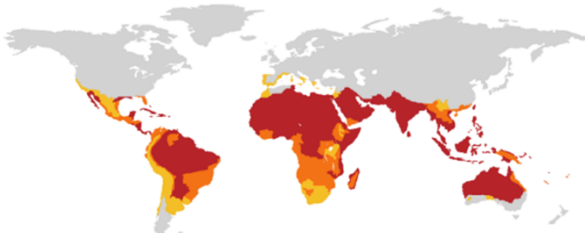


Category: Air handling unit with heat recovery
 Manufacturer: Zehnder Group Zwolle B.V. Netherlands
 Product name: ComfoAir Q350 HRV, Comfort Vent Q350 HRV

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

Airflow range
70–270 m³/h
Heat recovery rate
$\eta_{HR} = 90\%$
Specific electric power
$P_{el,spec} = 0.24 \text{ Wh/m}^3$



Category: Air handling unit with heat recovery
 Manufacturer: Zehnder Group Zwolle B.V. Netherlands
 Product name: ComfoAir Q350 HRV

Specification: Airflow rate < 600 m³/h
 Heat exchanger: Recuperative

This certificate was awarded based on the product meeting the following main criteria
 Cooling recovery $\eta_{HR} \geq 70\%$
 Specific electric power $P_{el,spec} \leq 0.45 \text{ Wh/m}^3$
 Leakage < 3%

Airflow range
71–270 m³/h
Cooling recovery
$\eta_{HR,C} = 87\%$
Specific electric power
$P_{el,spec} = 0.22 \text{ Wh/m}^3$




DHW system

Daikin Altherma R AQS (477 I)

Dados de eficiência		Unidade interior - EKHHP	300A2V3		500A2V3
		Unidade exterior - ERWQ	02AV3		
Potência	Nom.	kW	2,2		
Produção de água quente sanitária - clima quente	Perfil de carga declarado		L		XL
	COP AQS (segundo EN16147)		3,4		3,64
	η_{wh} (eficiência de aquecimento de água)	%	140		149
	Classe de eficiência energética de aquecimento de água		A+ ⁷¹		
Unidade interior		EKHHP	300A2V3		500A2V3
Dimensões	Unidade	Altura/Largura/Profundidade	1 750x615x615		1 750x790x790
Peso	Unidade	kg	70		80
Depósito	Material		Polipropileno		
	Volume de água	l	294		477
	Espessura do isolamento	mm	60		80
	Perdas térmicas	kWh/24h	1,4		1,6
	Classe de eficiência energética		B		
Limites de funcionamento	Temperatura Máx.	°C	85		
	Água quente sanitária	Temp. Exterior Min.-Máx.	2~35		
		Lado da água Min.-Máx.	5~55 (75 com resistência elétrica)		
Fluido frigorígeno	Tipo		R-410A		
Nível de pressão sonora	Nom.	dB(A)	0		
Tempo de recuperação até aos 50°C	Bomba de Calor	h	3,5		6
	Bomba de Calor + Resistência elétrica	h	2		3
Resistência elétrica			Sim, de fábrica		
Permutador	Potência	kW	2		
	Área de permuta	m²	5,6		
	Volume	l	27,1		
	Capacidade térmica média	W/K	2790		
	Pressão máx. de funcionamento	bar	6		
	Área de permuta	m²	-		1,95
	Volume	l	-		9,6
	Capacidade térmica média	W/K	-		945
	Pressão máx. de funcionamento	bar	-		6
	Rede/AQS	Pol.	G 1" (M)		
Ligações hidráulicas	Solar	Drain-Back	Pol.		G 1" (F)
	Pressurizado	Ida/Retorno	-		G 3/4" (F) / G 1" (M)
Alimentação Elétrica	Fase/Frequência/Tensão	Hz/V	1~/50/230		
	Consumo Máx.	A	10		
	Disjuntor Recomendado	A	16		



Vulcano PremiumSun SKT-2S- Solar collector- renewable

Gama		PremiumSun
Modelo		FKT-2S
Certificados		
Montagem		Vertical
Dimensões: A x L x P	mm	2170 x 1175 x 87
Área total	m²	2,55
Área de abertura	m²	2,43
Área do absorvedor	m²	2,35
Volume do absorvedor	l	161
Peso em vazio	kg	45
Pressão de funcionamento admissível do coletor	bar	10
Caudal nominal	l/h	50
Estrutura		Fibra de vidro numa só peça (SMC)
Isolamento		Lã mineral, 55 mm espessura
Absorvedor		Altamente seletivo
Cobertura do absorvedor		PVD
Circuito hidráulico		Dupla serpentina
Curva de rendimento instantâneo segundo EN 12975-2 (baseada na área de abertura)		
Fator de eficiência (η)		0,794
Coefficiente de perdas linear (a_1)	W/(m²K)	3,863
Coefficiente de perdas secundário (a_2)	W/(m²K²)	0,013



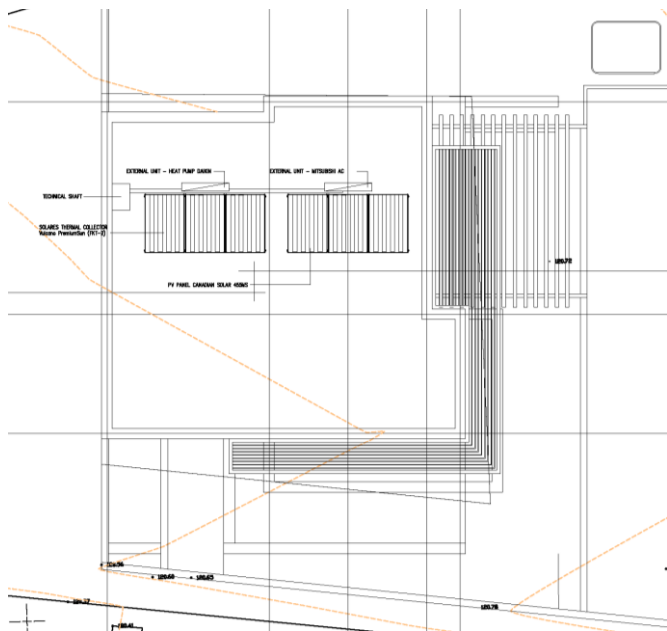
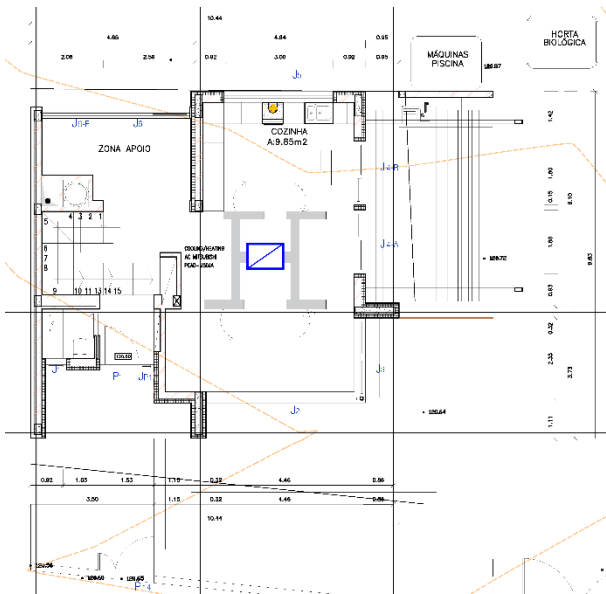
Heating/Cooling installation

Mitsubishi PEZ-ZM50JA System

Internal Unit PEAD-M50JA

External Unit PUZ ZM50VKA

Sistemas PEZ - Modelo de Condutas				
Tipo		PEZ-ZM35JA	PEZ-ZM50JA	
Modelo		PEAD-M35JA	PEAD-M50JA	
Unidade Interior		PUZ-ZM35VKA	PUZ-ZM50VKA	
Unidade Exterior				
Alimentação Eléctrica		U. Ext. (V-50Hz)		
ARREFECIMENTO	Capacidade Nominal	kW	3,6	5,0
	Min-Max		1,6-4,5	2,3-5,6
	Consumo Nominal	kW	0,837	1,201
	EER		4,3	4,16
		Categoria EEL	-	-
	Consumo anual eléctrico ⁹⁹	kWh/a	217	282
	SEER		5,8	6,2
		Categoria energética	A+	A++
	Capacidade Nominal	kW	4,1	6,0
	Min-Max		1,6-5,2	2,5-7,3
AQUECIMENTO	Consumo Nominal	kW	0,917	1,312
	COP		4,47	4,57
		Categoria EEL	-	-
	Capacidade declarada	à temp. referência	2,4 (~10°C)	3,8 (~10°C)
		à temp. bivalente	2,4 (~10°C)	3,8 (~10°C)
	(kW)	à temp. limite funcion.	2,2 (~11°C)	3,7 (~11°C)
	Consumo anual eléctrico ⁹⁹	kWh/a	858	1237
	SCOP		3,9	4,3
		Categoria energética	A	A+

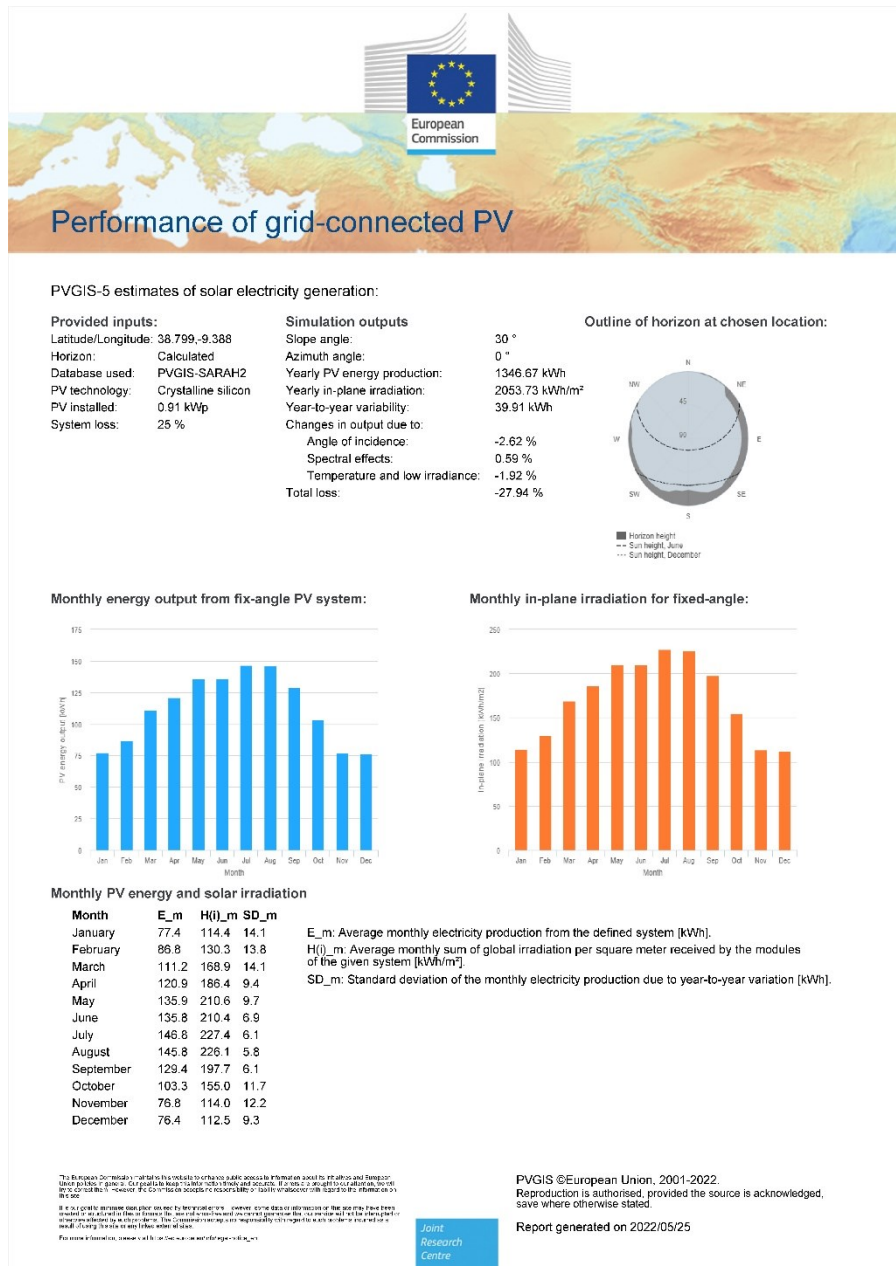


Renewables


HIKU- Canadian Solar PV Panel 455W

ELECTRICAL DATA | STC*

CS3W	435MS	440MS	445MS	450MS	455MS	460MS	465MS
Nominal Max. Power (Pmax)	435 W	440 W	445 W	450 W	455 W	460 W	465 W
Opt. Operating Voltage (Vmp)	40.5 V	40.7 V	40.9 V	41.1 V	41.3 V	41.5 V	41.7 V
Opt. Operating Current (Imp)	10.75 A	10.82 A	10.89 A	10.96 A	11.02 A	11.09 A	11.16 A
Open Circuit Voltage (Voc)	48.5 V	48.7 V	48.9 V	49.1 V	49.3 V	49.5 V	49.7 V
Short Circuit Current (Isc)	11.42 A	11.48 A	11.54 A	11.60 A	11.66 A	11.72 A	11.78 A
Module Efficiency	19.7%	19.9%	20.1%	20.4%	20.6%	20.8%	21.1%
Operating Temperature	-40°C ~ +85°C						
Max. System Voltage	1500V (IEC/UL) or 1000V (IEC/UL)						
Module Fire Performance	TYPE 1 (UL 61730 1500V) or TYPE 2 (UL 61730 1000V) or CLASS C (IEC 61730)						
Max. Series Fuse Rating	20 A						
Application Classification	Class A						
Power Tolerance	0 ~ + 10 W						

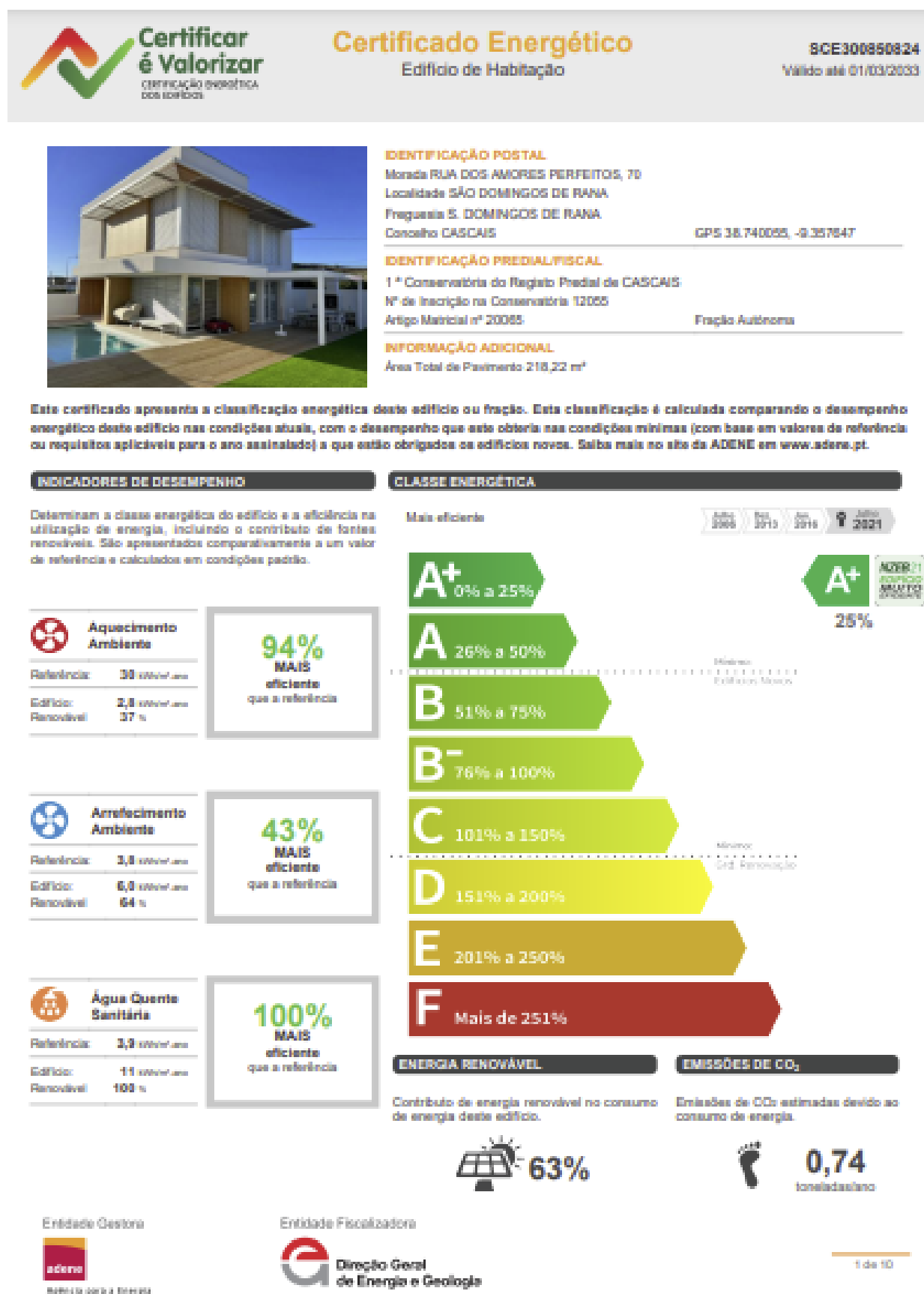


Passive House Verification- PHPP

Passive House Verification																																																																																				
				Building: Amores Perfeitos Street: Rua dos Amores Perfeitos Lote 9 Postcode/City: 2785-647 São Domingos de Rana Province/Country: Lisboa PT-Portugal Building type: Semi Detached House Climate data set: ud--01-PT0001b-Lisboa Climate zone: 5: Warm Altitude of location: 121 m																																																																																
				Home owner / Client: Ricardo José Ribeiro Dias Street: Avenida da República nº 120, 7º C Torre Soleil Postcode/City: 2780-158 Oeiras Province/Country: Lisboa Portugal																																																																																
				Mechanical engineer: Climacom Street: Rua da Junqueira, Armazém nº4 Postcode/City: 3800-034 Cacia Province/Country: Aveiro PT-Portugal																																																																																
				Certification: Homegrid, Lda Street: Av. 25 de Abril, nº 33, 3º esquerdo frente Postcode/City: 3830-044 10-Dwelling Province/Country: Ilhavo/Aveiro 2-User determined																																																																																
Architecture: João Pedro Quaresma- Nurture-AD Street: Avenida 25 de Abril nº 8, 2º Dt Postcode/City: 2750-511 Cascais Province/Country: Lisboa Portugal				Energy consultancy: João Pedro Quaresma- Nurture-AD Street: Avenida 25 de Abril nº 8, 2º Dt Postcode/City: 2750-511 Cascais Province/Country: Lisboa Portugal																																																																																
Year of construction: 2022 No. of dwelling units: 1 No. of occupants: 5,0				Interior temperature winter [°C]: 20,0 Internal heat gains (IHG) heating case [W/m²]: 2,4 Specific capacity [Wh/K per m² TFA]: 204 Interior temp. summer [°C]: 25,0 IHG cooling case [W/m²]: 3,5 Mechanical cooling: x																																																																																
Specific building characteristics with reference to the treated floor area																																																																																				
<table border="1"> <thead> <tr> <th colspan="2"></th> <th>Treated floor area m²</th> <th></th> <th>Criteria</th> <th>Alternative criteria</th> <th>Fulfilled?²</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Space heating</td> <td>Heating demand kWh/(m²a)</td> <td>176,8</td> <td>≤</td> <td>15</td> <td>-</td> <td>yes</td> </tr> <tr> <td>Heating load W/m²</td> <td>9</td> <td>≤</td> <td>-</td> <td>10</td> <td>yes</td> </tr> <tr> <td rowspan="2">Space cooling</td> <td>Cooling & dehum. demand kWh/(m²a)</td> <td>7</td> <td>≤</td> <td>17</td> <td>17</td> <td>yes</td> </tr> <tr> <td>Cooling load W/m²</td> <td>6</td> <td>≤</td> <td>-</td> <td>10</td> <td>-</td> </tr> <tr> <td colspan="2">Frequency of overheating (> 25 °C) %</td> <td>-</td> <td>≤</td> <td>-</td> <td>-</td> <td>yes</td> </tr> <tr> <td colspan="2">Frequency of excessively high humidity (> 12 g/kg) %</td> <td>1</td> <td>≤</td> <td>10</td> <td>-</td> <td>yes</td> </tr> <tr> <td>Airtightness</td> <td>Pressurization test result n₅₀ 1/h</td> <td>0,5</td> <td>≤</td> <td>0,6</td> <td>-</td> <td>yes</td> </tr> <tr> <td>Non-renewable Primary Energy (PE)</td> <td>PE demand kWh/(m²a)</td> <td>55</td> <td>≤</td> <td>120</td> <td>-</td> <td>yes</td> </tr> <tr> <td>Primary Energy</td> <td>PER demand kWh/(m²a)</td> <td>34</td> <td>≤</td> <td>-</td> <td>-</td> <td>-</td> </tr> <tr> <td>Renewable (PER)</td> <td>Generation of renewable energy (in relation to projected building footprint area) kWh/(m²a)</td> <td>28</td> <td>≥</td> <td>-</td> <td>-</td> <td>-</td> </tr> </tbody> </table>												Treated floor area m²		Criteria	Alternative criteria	Fulfilled? ²	Space heating	Heating demand kWh/(m²a)	176,8	≤	15	-	yes	Heating load W/m²	9	≤	-	10	yes	Space cooling	Cooling & dehum. demand kWh/(m²a)	7	≤	17	17	yes	Cooling load W/m²	6	≤	-	10	-	Frequency of overheating (> 25 °C) %		-	≤	-	-	yes	Frequency of excessively high humidity (> 12 g/kg) %		1	≤	10	-	yes	Airtightness	Pressurization test result n ₅₀ 1/h	0,5	≤	0,6	-	yes	Non-renewable Primary Energy (PE)	PE demand kWh/(m²a)	55	≤	120	-	yes	Primary Energy	PER demand kWh/(m²a)	34	≤	-	-	-	Renewable (PER)	Generation of renewable energy (in relation to projected building footprint area) kWh/(m²a)	28	≥	-	-	-
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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: 38678_HGRID_PH_20230503_JOM				Issued on: 14/04/23		City: Ilhavo		Signature:																																																																												

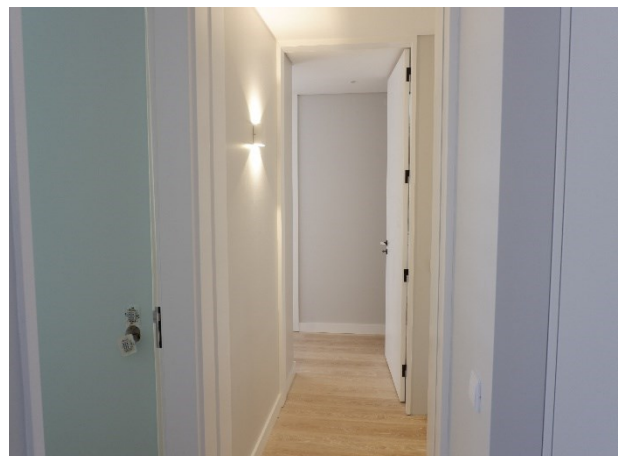
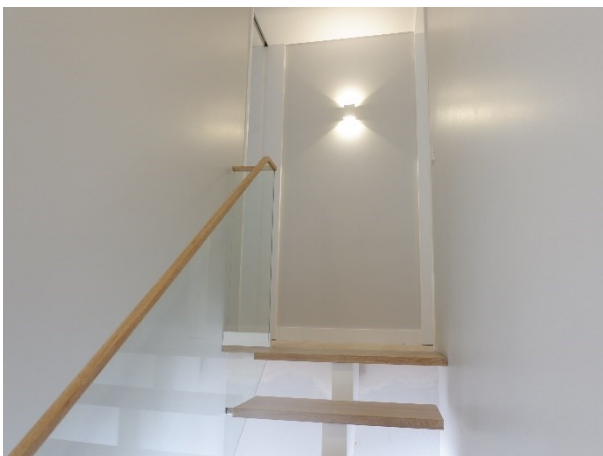
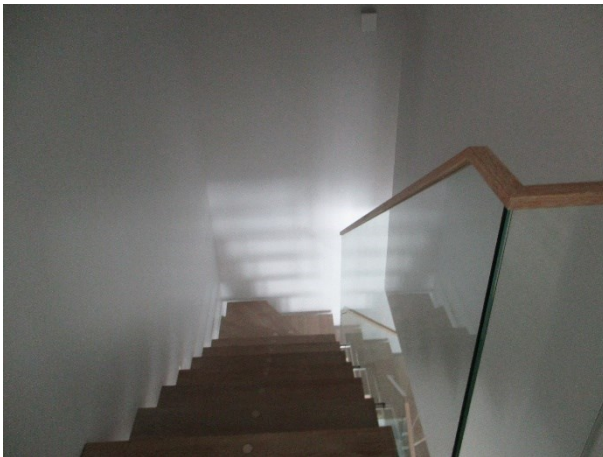
Portuguese Energy Performance Certificate (SCE)

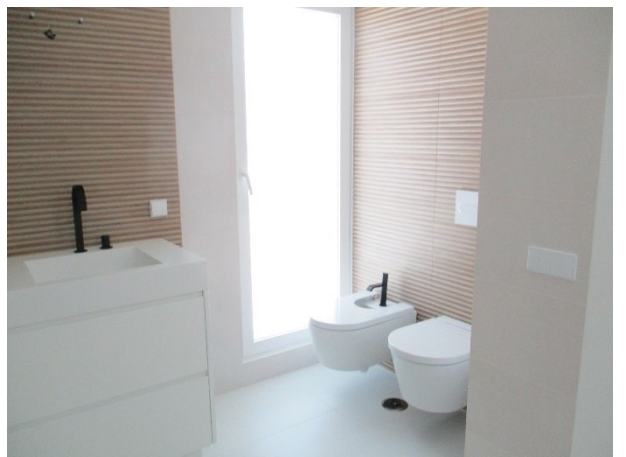
Class A+ and nZEB



Interior Photos







Exterior Photos





Author of Project documentation

22.05.2023

João Pedro Quaresma