1. Abstract

Certification Passive House Designer - Passivhaus / Certificate Extension
On the basis of a project Passiv House example

Passivhaus Documentation

Figure 1 : Building appearance

Building 285 boulevard Rémi Belleau in Saint Raphaël, ID : 7361

Consultant	Mme. Boulot	https://www.solares-bauen.fr/
Design office	Solares Bauen	https://www.solares-bauen.fr/
Architect	Jean-Pascal Clément architecte	https://www.jpcarchi.com/
Builder	AEI Promotion immobilière	https://aeipromotion.com/

Within this collective residential building, one can discover a well-balanced distribution of 11 housing units across four levels (R+3). The project management is entrusted to AEI Promotion, while the architectural design is the work of Jean Pascal Clément, thus marking the creation of a substantial structure.

This building has been developed with a compact approach while making ample use of natural light through windows oriented to the South, East, and West.

Year of construction	2021	Space heating	10.8 kWh/(m².yr)
U-value external wall	0.152 W/(m²K)		
U-value floor	0.168 W/(m²K)	Primary Energy Renewable (PER)	46 kWh Ep-R/(m²SRE.yr)
U-value roof	0.150 W/(m²K)	Generation of renewable energy	0 kWh EF/(m²SOL.yr)
U-value window	1.66 W/(m²K)	Non-renewable Primary Energy (PE)	86 kWhEP/(m²TFA.yr)
Heat recovery	83%	Pressure test n50	0.4
Special features	Exterior insulation		

SUMMARY

1. Facade photos

Figure 1 : North-East facades

Figure 2 : South-West facades

2. Interior photos

To illustrate the project, a photo of one of the main living spaces is presented :

Figure 3 : Kitchen

3. Sections plans

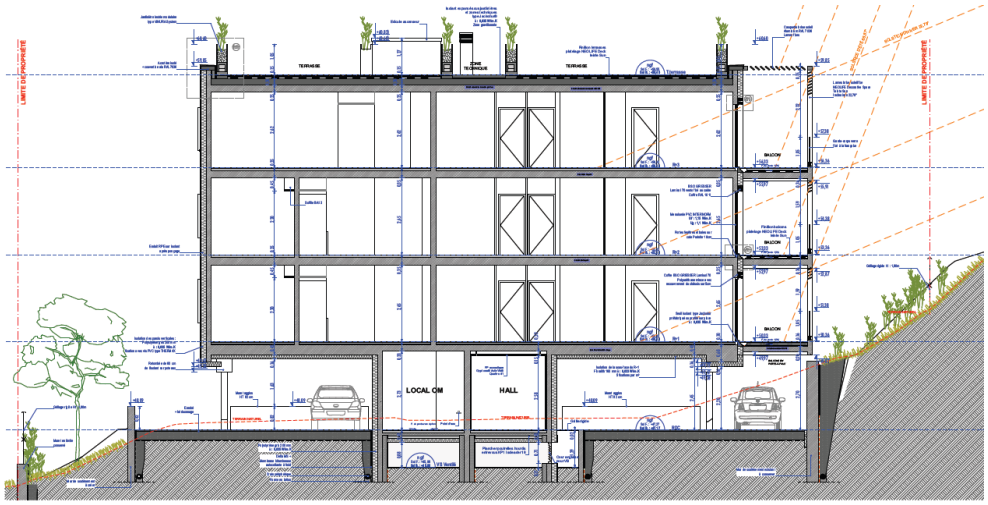

Figure 3 : AA Section

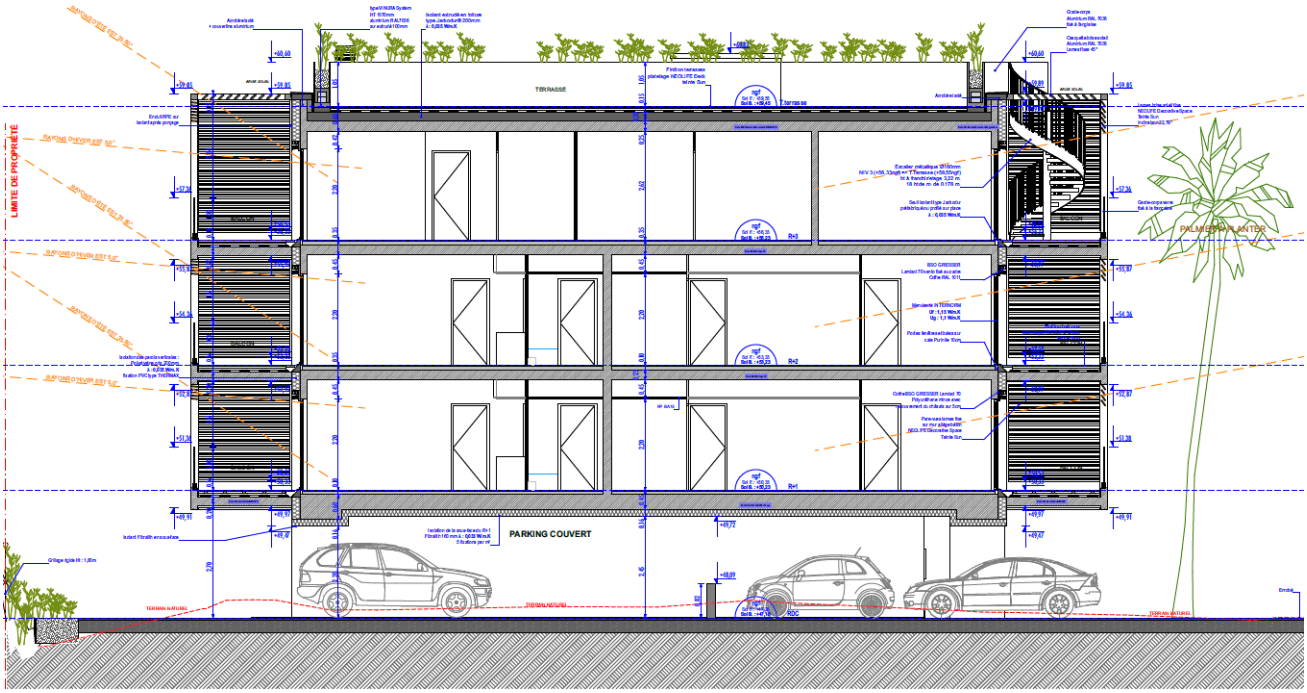

Figure 4 : BB Section

In the sections above, it can be observed that the external insulation limits the presence of thermal bridges.

4. Plans

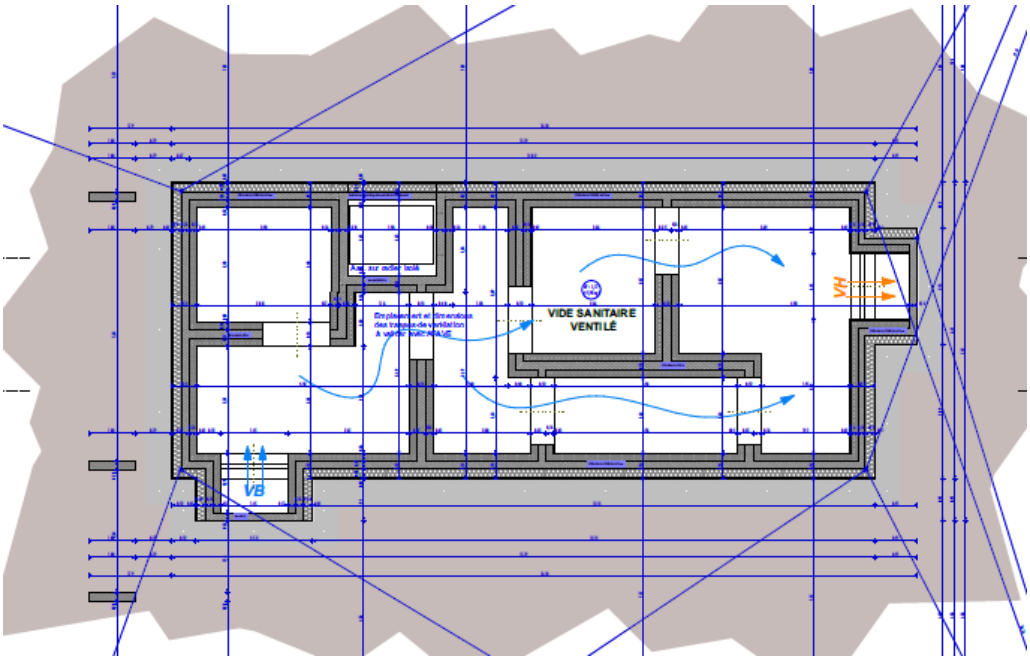

Figure 5 : Crawl space plan

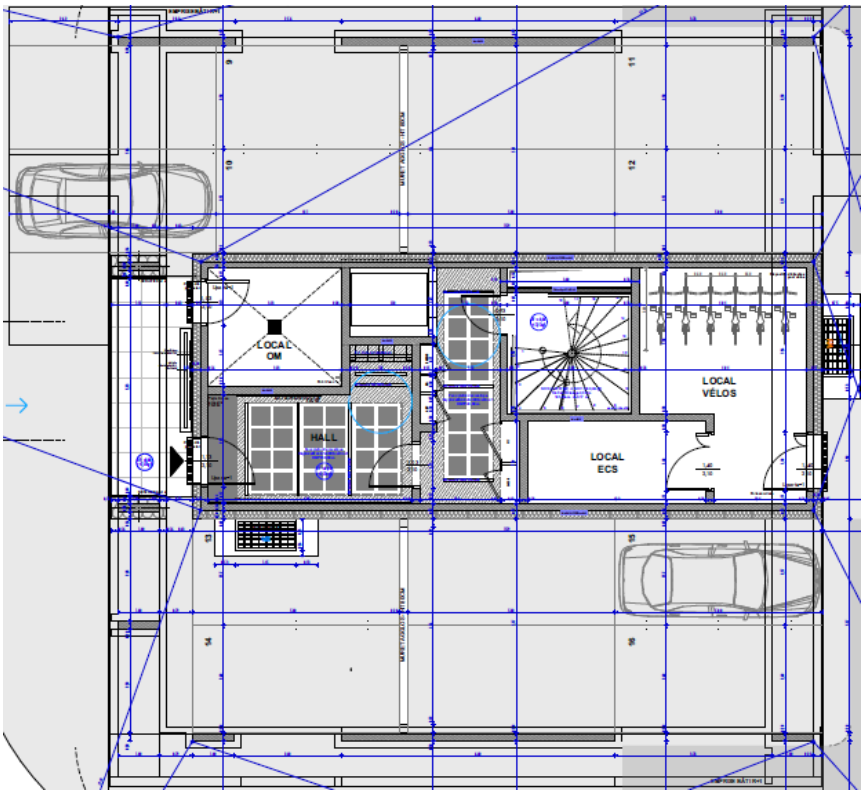

Figure 6 : Ground floor plan

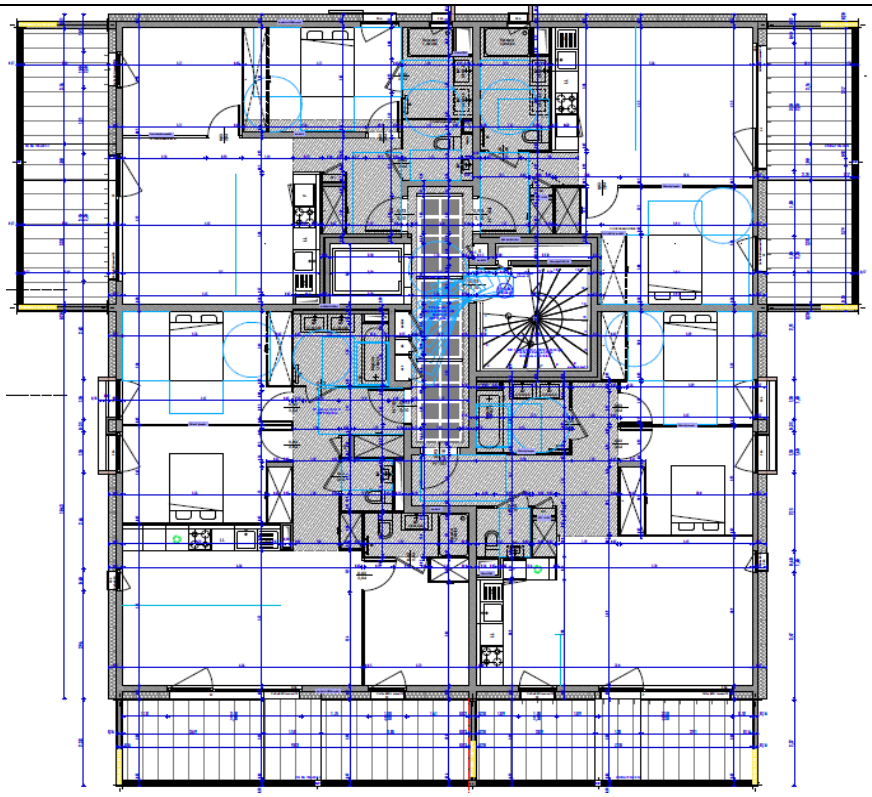

Figure 7 : 1st floor plan

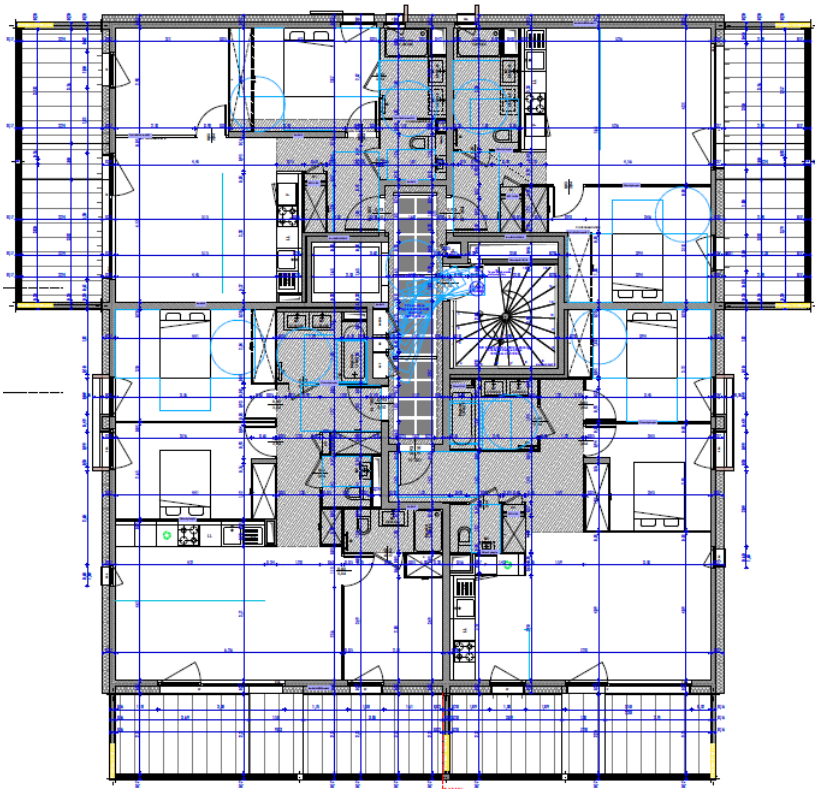

Figure 8 : 2nd floor plan

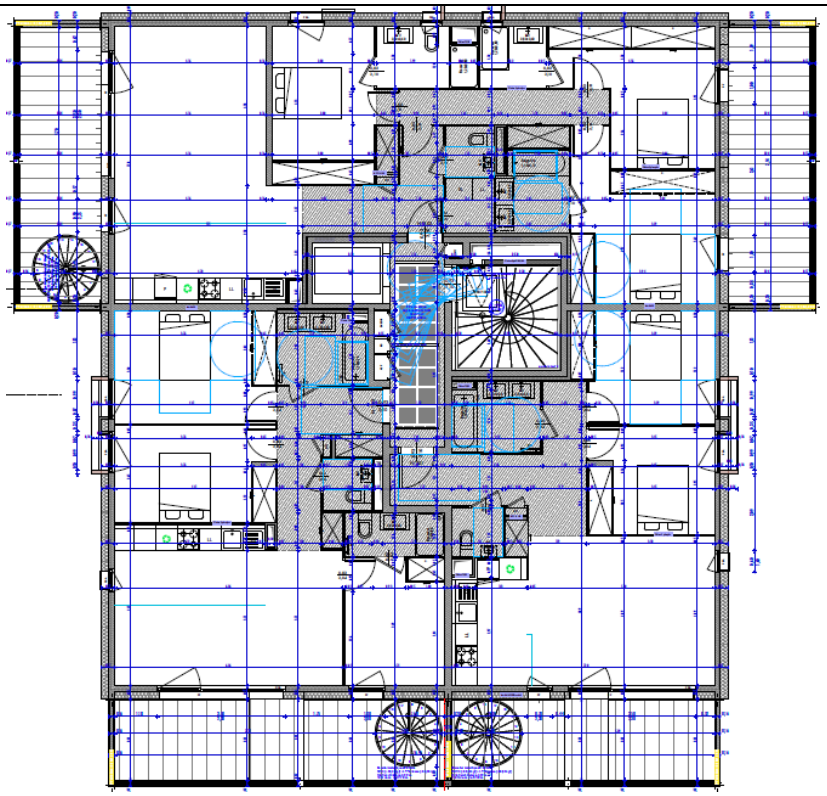

Figure 9 : 3rd floor plan

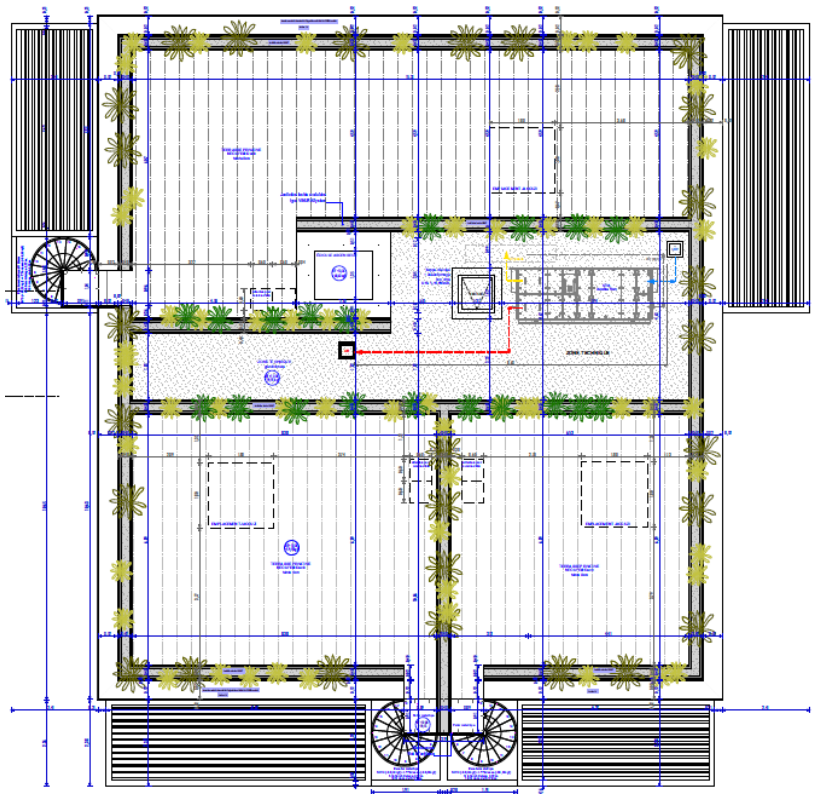

Figure 10 : Roof plan

5. Construction details of the foundations

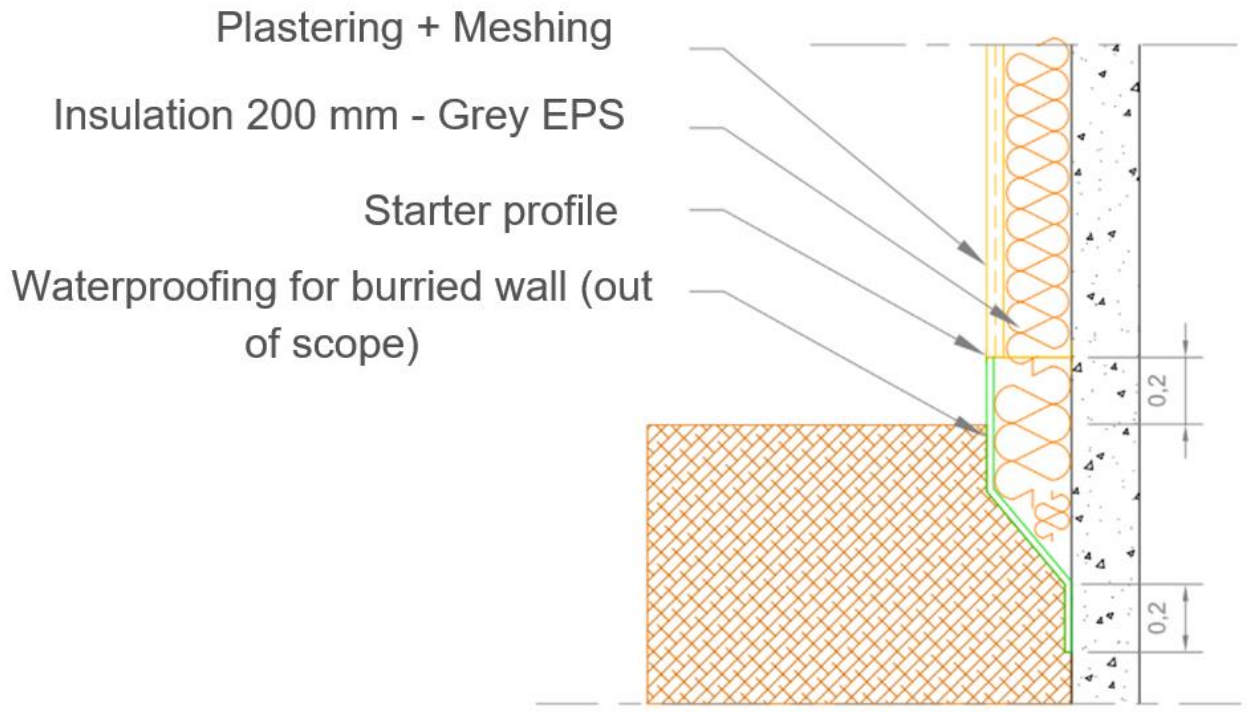

Figure 11 : External ground wall

The exterior ground wall is insulated from the outside with 200 mm of TH35 polystyrene insulation. On the sketch above, one can observe buried insulation, ensuring better insulation performance.

N° de la paroi		Isolation intérieure?
04ud	Plancher bas	

Résistance superficielle [m²K/W]

Orientation des parois	3-sous-sol	intérieure R_{si} :	0,13
Adjacent à	2-sol	extérieure R_{se} :	0,00

Section 1	λ [W/(mK)]	Section 2 (optionnelle)	λ [W/(mK)]	Section 3 (optionnelle)	λ [W/(mK)]	Epaisseur [mm]
Béton	2,200					200
Isolant	0,035					200

Pourcentage de surface de la section 1	Pourcentage de surface de la section 2	Pourcentage de surface de la section 3	Total
100%			40,0 cm

Majoration de la valeur U : W/(m²K)

Valeur U : 0,168 W/(m²K)

6. Construction details of external walls

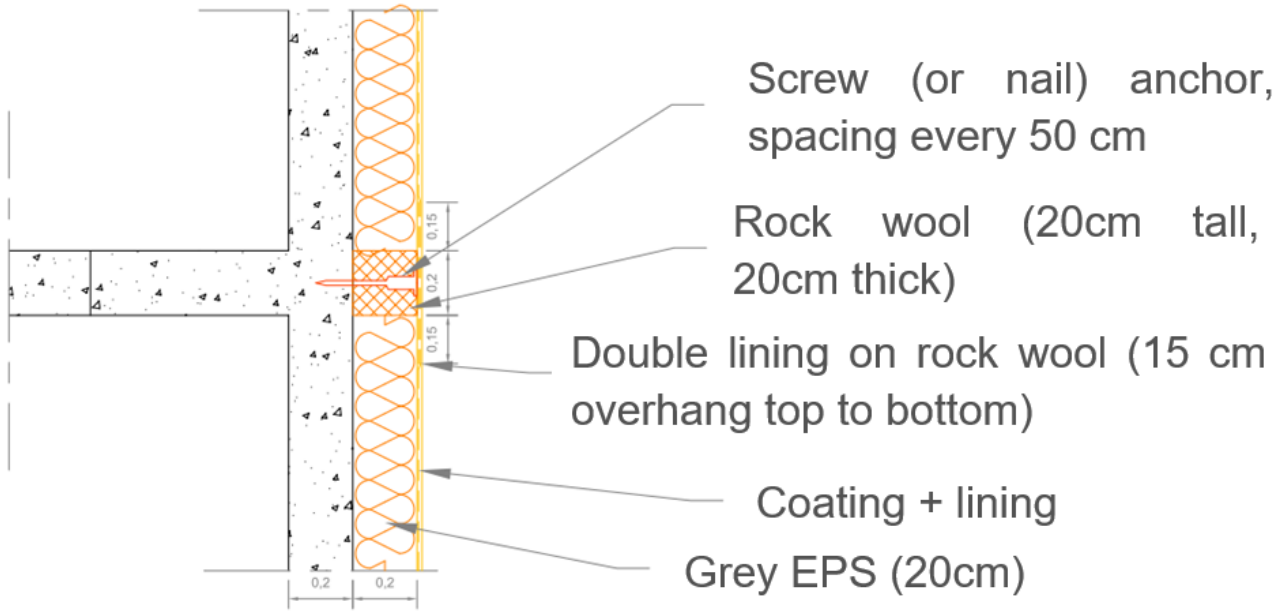

Figure 12 : External wall section

The walls are insulated from the outside with 20 cm of TH31 expanded polystyrene (EPS), allowing for the comprehensive treatment of thermal bridges.

Nr. de la paroi	Description de la paroi	Isolation intérieure?
01ud	Mur extérieur	

Résistance superficielle [m²K/W]

Orientation de la paroi: 2-mur — intérieure R_{si}: 0,13

Adjacent à: 1-air extéri — extérieure R_{se}: 0,04

Section 1	λ [W/(mK)]	Section 2 (optionnelle)	λ [W/(mK)]	Section 3 (optionnelle)	λ [W/(mK)]	Epaisseur [mm]
Béton	2,200					160
PSE	0,031	bande de recoupement	0,036			200

Pourcentage de surface de la section 1	Pourcentage de surface de la section 2	Pourcentage de surface de la section 3	Total
94%	6,2%		36,0 cm

Majoration de la valeur U: 0,00 W/(m²K)

Valeur U: 0,152 W/(m²K)

7. Roof and basement construction

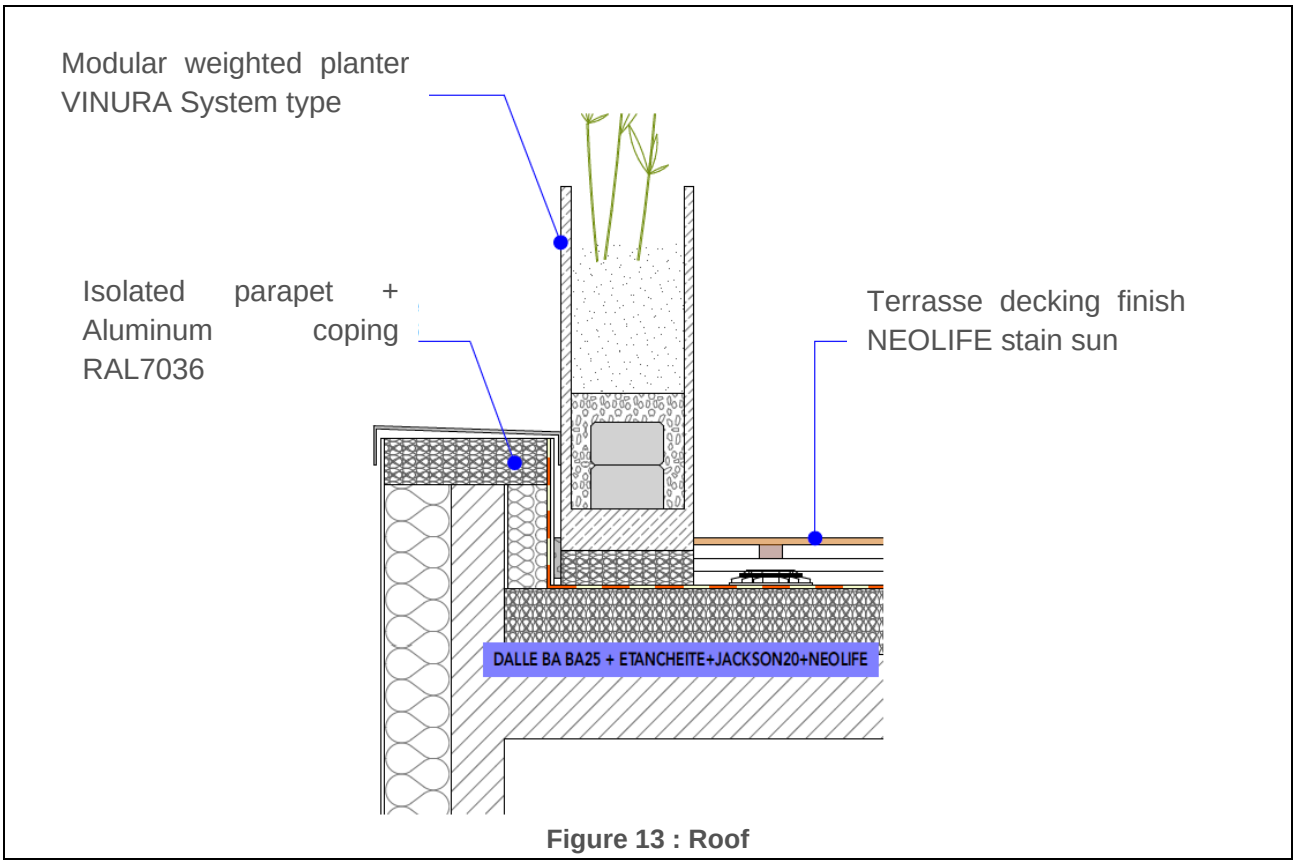

Figure 13 : Roof

The roof is insulated from the outside with 14 cm of TH22 polyurethane (PU) foam.

Nr. de la paroi		Isolation intérieure?
02ud	Toiture	

Résistance superficielle [m²K/W]

Orientation des parois	1-toit	intérieure R_{si} :	0,13
Adjacent à	1-air extéri	extérieure R_{se} :	0,04

Section 1	λ [W/(mK)]	Section 2 (optionnelle)	λ [W/(mK)]	Section 3 (optionnelle)	λ [W/(mK)]	Epaisseur [mm]
Béton	2,200					250
PU	0,022					140

Pourcentage de surface de la section 1	Pourcentage de surface de la section 2	Pourcentage de surface de la section 3	Total
100%			39,0 cm

Majoration de la valeur U: W/(m²K)

Valeur U : 0,150 W/(m²K)

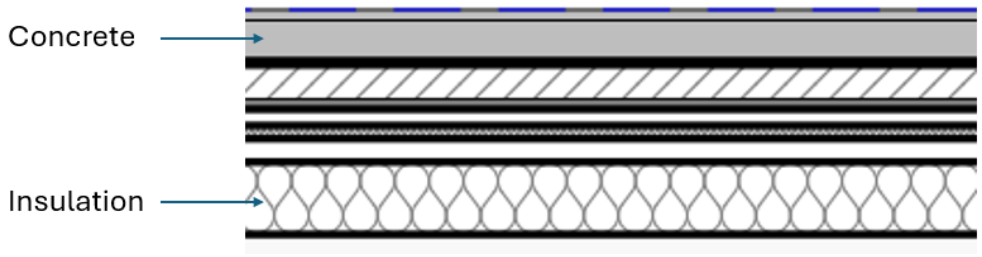

Figure 14 : Basement

The plan of the section above is not up to date.

N° de la paroi						Isolation intérieure?
04ud	Plancher bas					

Résistance superficielle [m²K/W]

Orientation des parois: 3-sous-sol — intérieure R_{si}: 0,13

Adjacent à: 2-sol — extérieure R_{se}: 0,00

Section 1	λ [W/(mK)]	Section 2 (optionnelle)	λ [W/(mK)]	Section 3 (optionnelle)	λ [W/(mK)]	Epaisseur [mm]
Béton	2,200					200
Isolant	0,031					200

Pourcentage de surface de la section 1	Pourcentage de surface de la section 2	Pourcentage de surface de la section 3	Total
100%			40,0 cm

Majoration de la valeur U: W/(m²K)

Valeur U : 0,150 W/(m²K)

8. Windows and windows installations

Three types of carpentry are implemented in this project:

- Skylights
- Windows
- Glass doors

For economic reasons, all carpentry features triple glazing, carefully selected to optimize the balance between thermal losses and solar gains.

Figure 14 : Window photo

Figure 15 : Glass door photo

Vitrages			Vitrages
	Valeur de départ recommandée pour l'optimisation : vitrage conseillé double vitrage protection hivernale (Veuillez respecter les critères de confort !)		
ID	Description	Facteur solaire (valeur g)	Valeur U_g
			W/(m²K)
01ud	DV baie vitrée	0,64	1,15
02ud	lanterneau	0,57	4,29
03ud	Porte pleine	0,00	5,88
04ud	DV vitrage feuilleté	0,59	1,15
05ud	DV salle de bain	0,62	1,15
06ud	DV chambres	0,65	1,15
07ud	DV porte vitrée RDC	0,49	1,02

Châssis

ID	Description	Valeur U_f			
		gauche	droit	bas	haut
		W/(m²K)	W/(m²K)	W/(m²K)	W/(m²K)
01ud	PVC	1,50	1,50	1,50	1,50
02ud	Porte pleine	5,88	5,88	5,88	5,88
03ud	porte fenetre	1,50	1,50	1,50	1,50
04ud	Lanterneau désenfumage	4,29	4,29	4,29	4,29
05ud	porte vitrée rdc	2,60	2,60	2,60	2,60

9. Airtightness of the building envelope

The good airtightness of this project was achieved by implementing a concrete construction, ensuring airtightness throughout all exterior walls.

Figure 16 : Concrete construction

The airtightness test has been realise by Ubat Controle, the 07/02/2023. The result is below :

Résultat de la perméabilité à l'air du bâtiment
n50 = 0,37 h^{-1}
Intervalle : ± 10,88 % [0,33, 0,41]

10. Design of the ventilation system

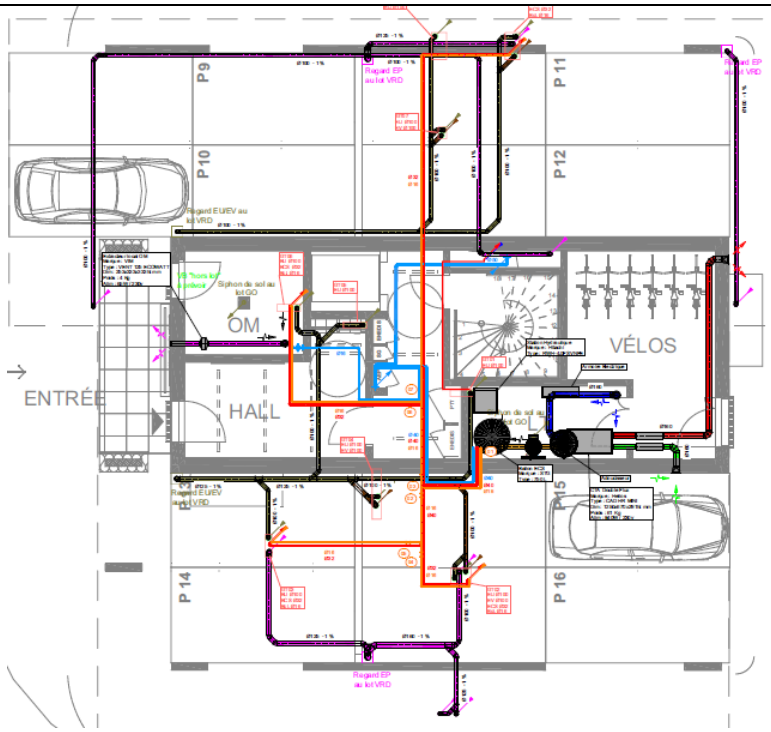

Figure 17 : Ventilation plan at ground level

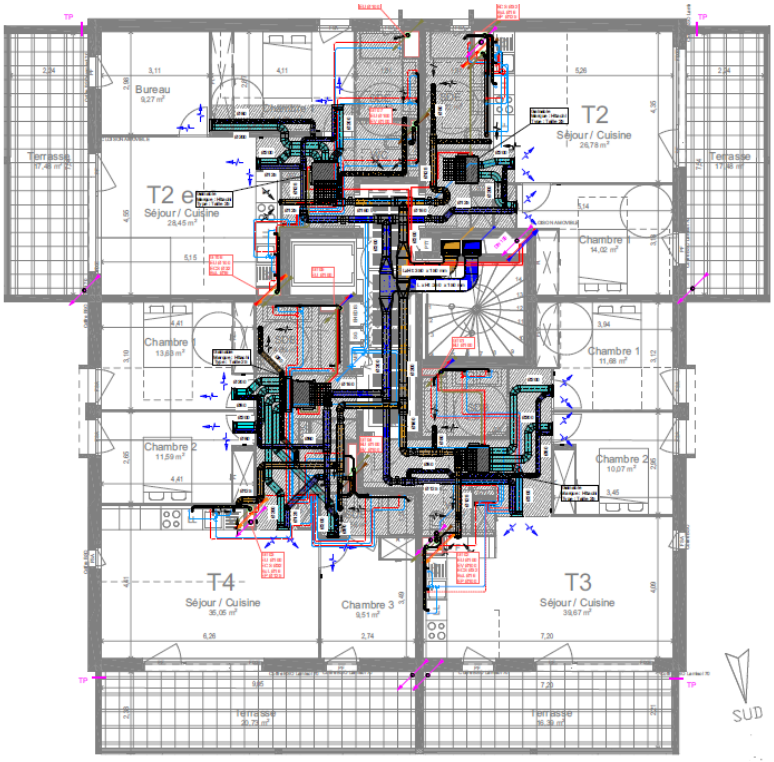

Figure 18 : Ventilation plan at level 1 and 2

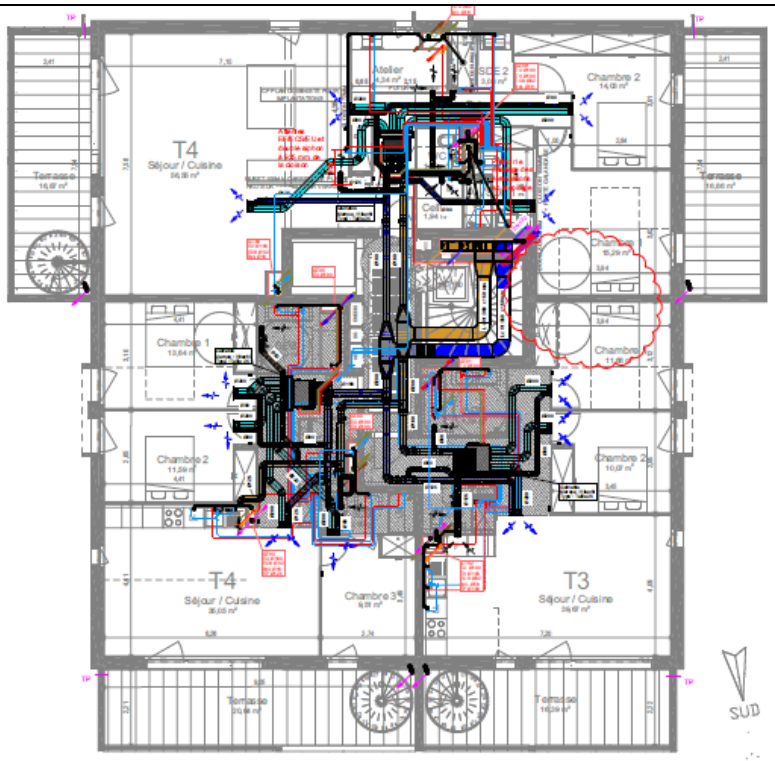

Figure 19 : Ventilation plan at level 3

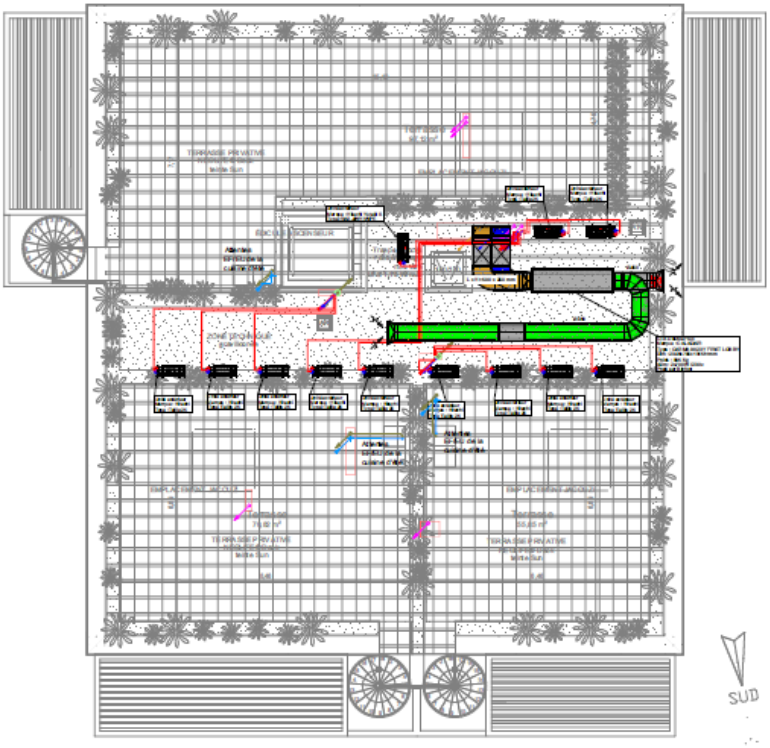

Figure 20 : Ventilation plan of the roof

An air handling unit (AHU), located on the roof, provides ventilation for the entire building.

11. Air handling unit (AHU)

The building ventilation is achieved through a double-flow unit installed on the roof. It is the 9023 Y FIRST LOBBY model from Carma, which ensures excellent performance in this regard. The heat recovery efficiency is 83%, and the energy consumption is optimal, at 0.42 Wh/m3.

Figure 21 : AHU

12. Domestic Hot Water (DHW)

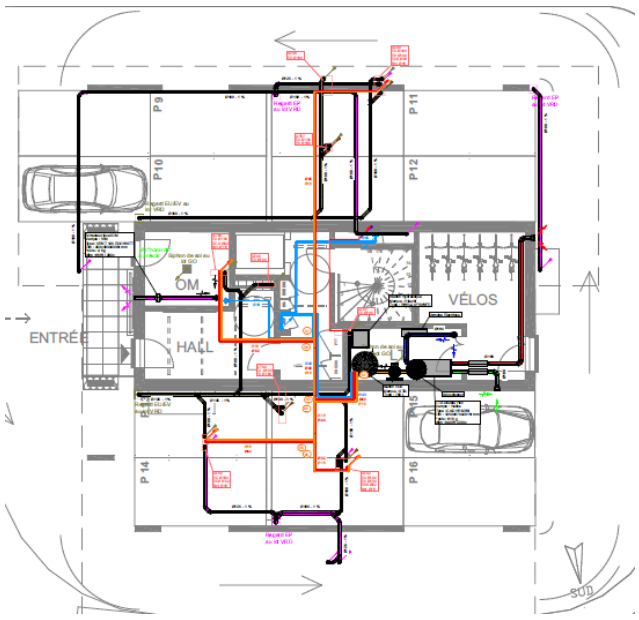

Figure 22 : Plan DHW RDC

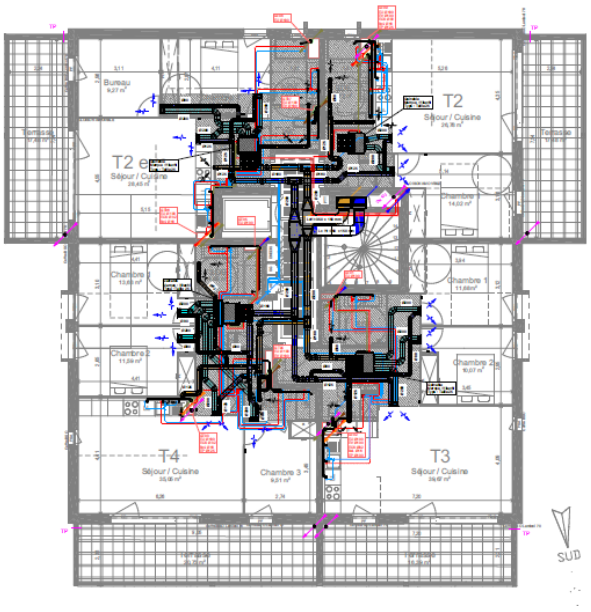

Figure 23 : Plan DHW R+1

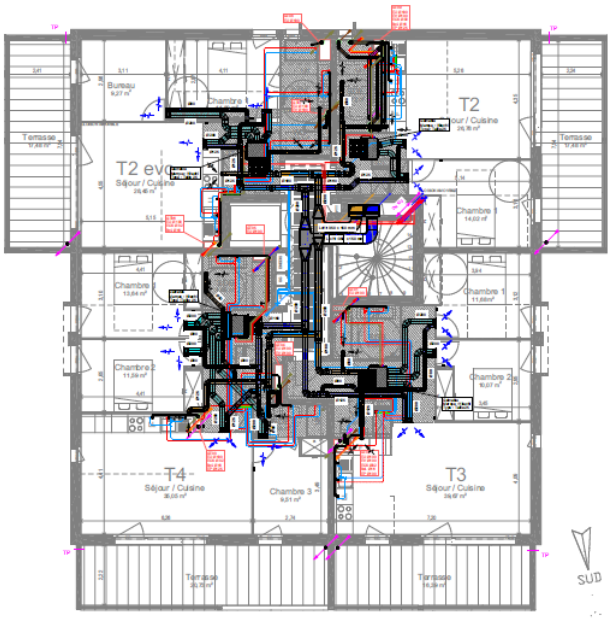

Figure 24 : Plan DHW R+2

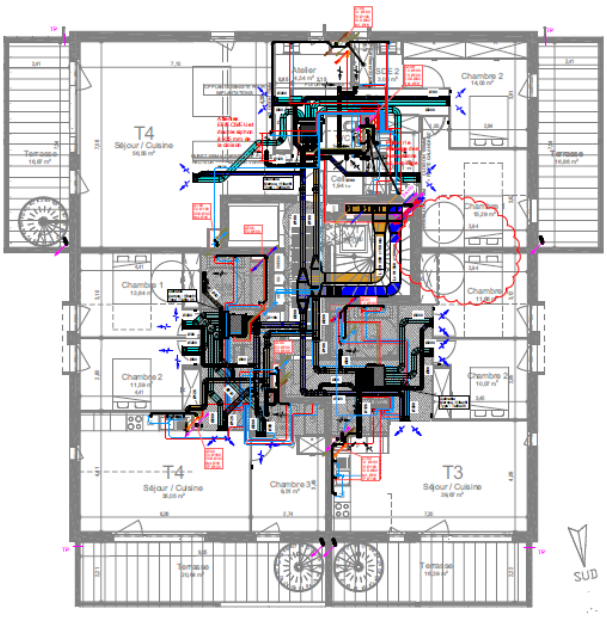

Figure 25 : Plan DHW R+3

The DHW production is ensured by a heat pump. A well-insulated and minimally rationalized loop is observed on the plan to supply all the housing units with DHW.

13. Heating and cooling system

Figure 26 : Heating pump

The installed heating and cooling system is economical and is feasible due to the low energy demand of the building. It is made possible by the presence of a Hitachi heat pumps.

14. Brief descriptions of the PHPP results (verification sheet)

Bâtiment Passif - Vérification

Projet:	**Réalisation de lgts passifs**
Adresse:	**285 boulevard Rémi Belleau**
Code postal / localité:	**Saint Ra**
Région:	**Provence-Alpes-C FR-France**
Type de bâtiment:	**Immeuble de logements**
Données climatiques:	**FR0011a-Nice**
Zone climatique:	**5: Climat tempéré** — Altitude: **48 m**
Maître(s) de l'ouvrage:	**AEI Promotion Immobilière**
Adresse:	
Code postal / localité:	
Région:	
Architecte:	**Jean-Pascal Clément architecte**
Adresse:	
Code postal / localité:	
Région:	
reau d'études fluides :	**Protherm Consult - Lucas Tironi**
Adresse:	
Code postal / localité:	
Région:	
Bureau d'études thermiques:	**Solares Bauen**
Adresse:	
Code postal / localité:	
Région:	
Certification :	**Propassif**
Adresse:	
Code postal / localité:	
Région:	

Année de construction:	2021	Température intérieure hiver [°C]	20,0	Température intérieure été [°C]	25,0
Nombre de logements:	11	Apports internes Chauffage [W/m²]	2,8	Apports internes Clim. [W/m²]	2,8
Nombre d'occupants:	20,9	Capacité thermique surfacique [Wh/K par m² SRE]	204	Climatisation :	x

Caractéristiques du bâtiment rapportées à la Surface de Référence Energétique

					Critères	Critères alternati	Conforme?*
	Surface de Référence Energétique	m²	808,3				
Chauffer	Besoin de chauffage	kWh/(m²a)	10,8	≤	15	-	oui
	Puissance de chauffe	W/m²	9	≤	-	10	
Refroidir	roidissement + déshumidification	kWh/(m²a)	11	≤	19	19	oui
	Puissance de refroidissement	W/m²	6	≤	-	11	
	Fréquence de surchauffe (> 25°C)	%	-	≤	-		-
	Fréquence d'humidité excessive (> 12 g/kg)	%	0	≤	10		oui
Etanchéité à l'air	Test d'infiltrométrie n_{50}	1/h	0,4	≤	0,6		oui
Protection contre l'humidité							
	facteur de température le plus faible $f_{Rsi-0,25=0,70}$	-	-	≥	0,55		-
Confort thermique	ous les critères sont respectés ?	-			oui		oui
	valeur U	W/(m²K)		≤	-		
	valeur U	W/(m²K)		≤	1,30		
	valeur U	W/(m²K)		≤	1,40		
	valeur U	W/(m²K)		≤	-		
Energie primaire non-renouvelable	Consommation d' EP	kWh/(m²a)	86	≤	-		-
Energie primaire renouvelable (EP-R)	Consommation d'EP-R	kWh/(m²a)	41	≤	60	-	oui
	Production d'énergie renouvelable (par rapport à l'emprise au sol de la zone bâtie)	kWh/(m²a)	-	≥	-	-	

15. Cost of the building

Confidential data

16. Building's cost

Confidential data