

1. Abstract

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

Passivhaus Documentation



Figure 1 : Building appearance

2 rue de la Coudreuse, 67200 Strasbourg, ID : 6408

Consultant	Mme Stiel	https://www.solares-bauen.fr/
Design office	Solares Bauen	https://www.solares-bauen.fr/
Architect	Richter Architectes et Associés	https://richterarchitectes.com/
Builder	Alsabail	https://www.alsabail.fr/

Within this professional building housing the Solares Bauen design office, one finds a balanced distribution of around fifty workstations across three levels (G+2). Project management is entrusted to Solares Bauen, while Richter Architectes et Associés takes on the architectural design, thereby creating a substantial building.

This structure has been developed with a compact approach, while extensively benefiting from natural light through windows present on all four facades.

Year of construction	2019	Space heating	9 kWh/(m ² .an)
U-value external wall	0,113 W/(m ² K)	Primary Energy Renewable (PER)	41 kWh Ep-R/(m ² SRE.an)
U-value floor	0,183 W/(m ² K)	Generation of renewable energy	55 kWh EF/(m ² SOL.an)
U-value roof	0,077 W/(m ² K)	Non-renewable Primary Energy (PE)	87 kWhEP/(m ² TFA.yr)
U-value window	0,53 W/(m ² K)	Pressure test n50	0,4
Heat recovery	78,78%	Cooling load	1 W/m ²
Heating load	10 W/m ²	Special features	Interior insulation

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2. Facade photos



Figure 2 : South facade



Figure 3 : West facade

3. Interior photos

To illustrate the project, two photos of the main rooms of the building are presented :

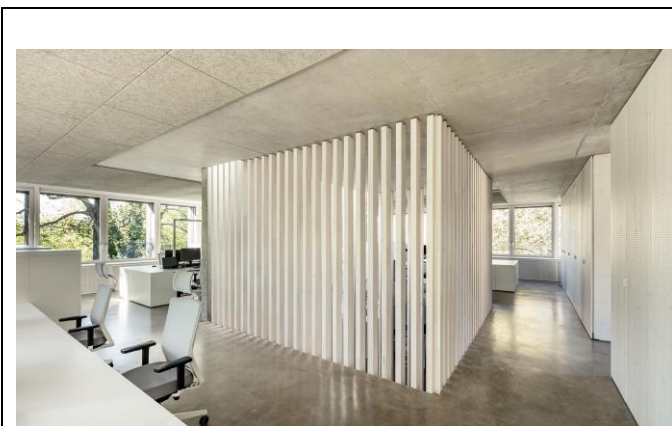


Figure 4 : Stage



Figure 5 : Meeting room

4. Sections

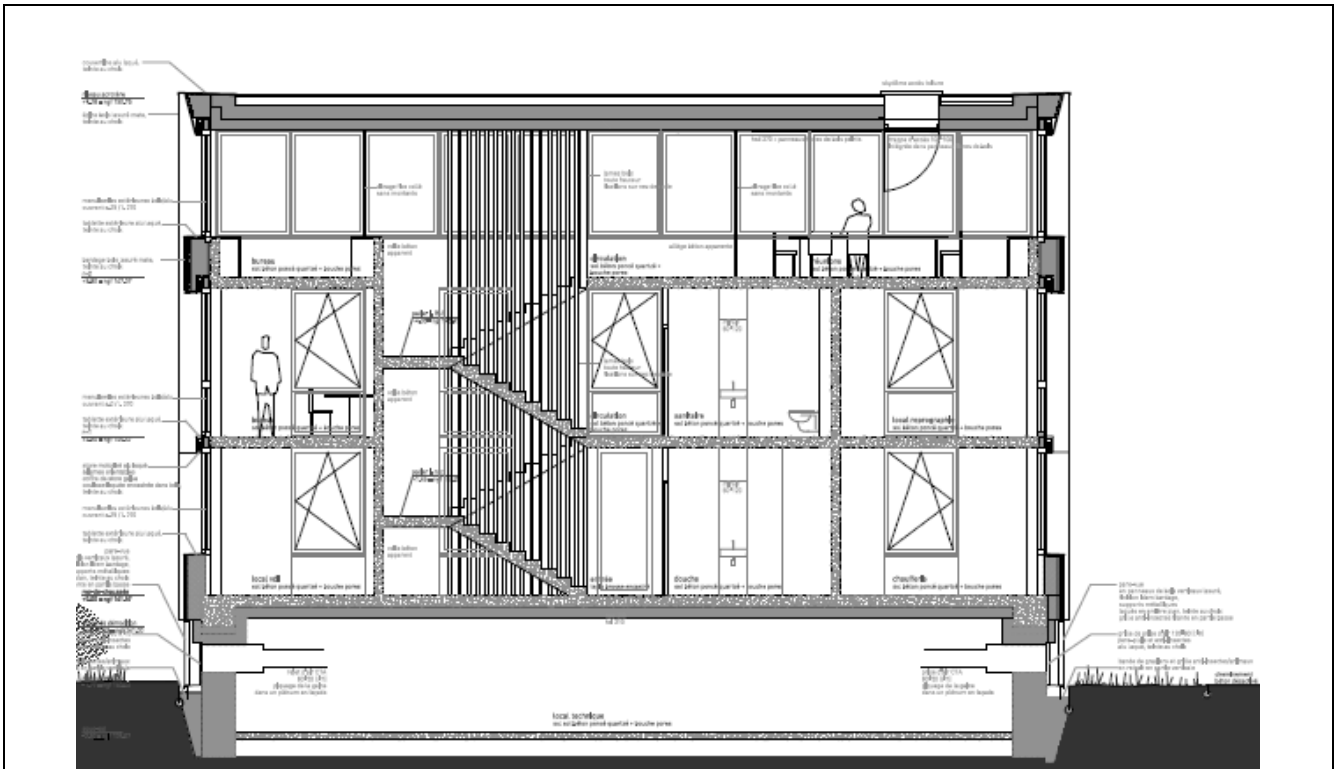


Figure 6 : Cross section AA

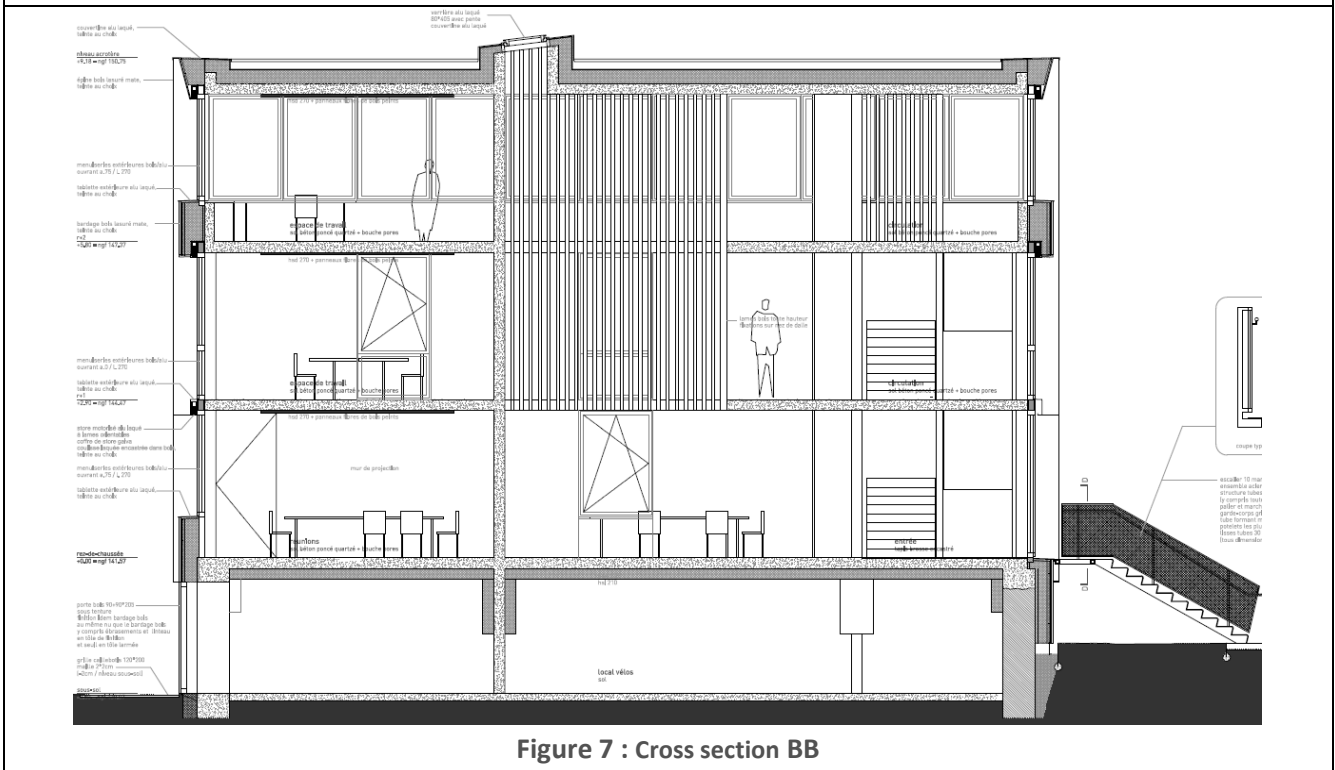


Figure 7 : Cross section BB

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

5. Plans

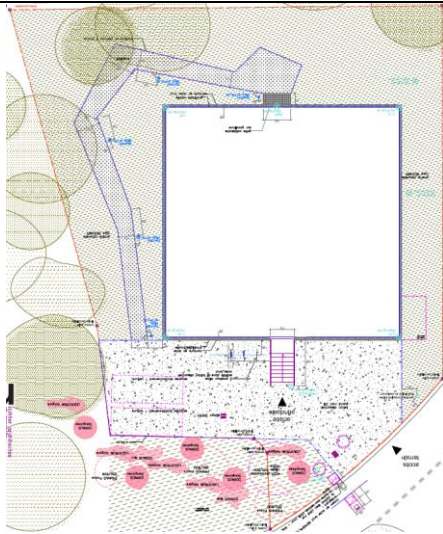


Figure 8 : Ground plan

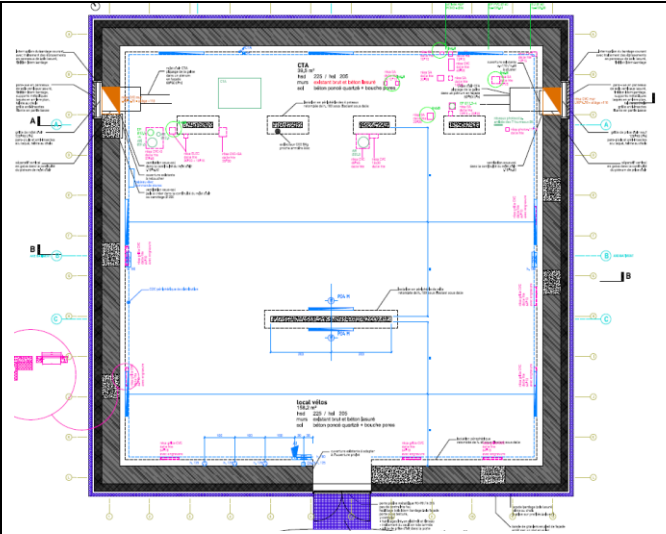


Figure 9 : Floor plan R-1

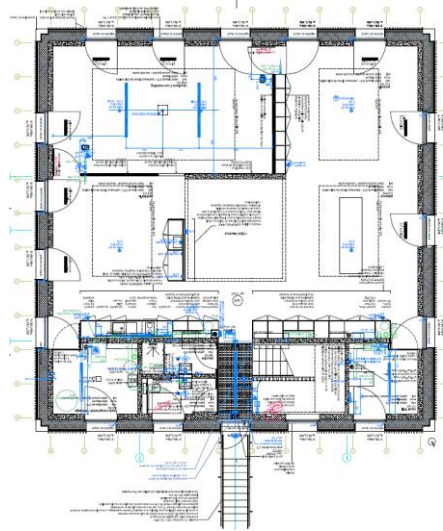


Figure 10 : Ground floor plan

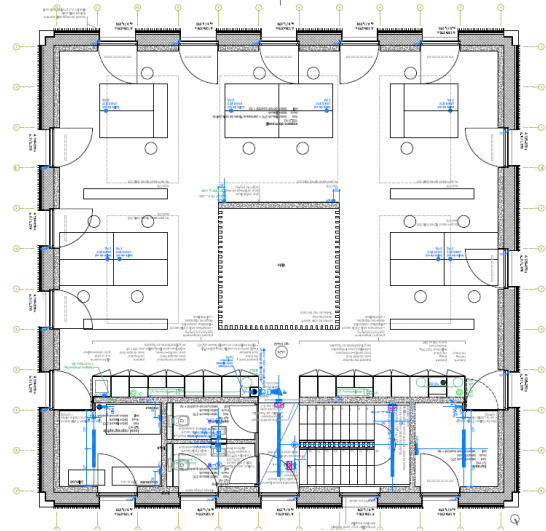


Figure 11 : Floor plan R+1

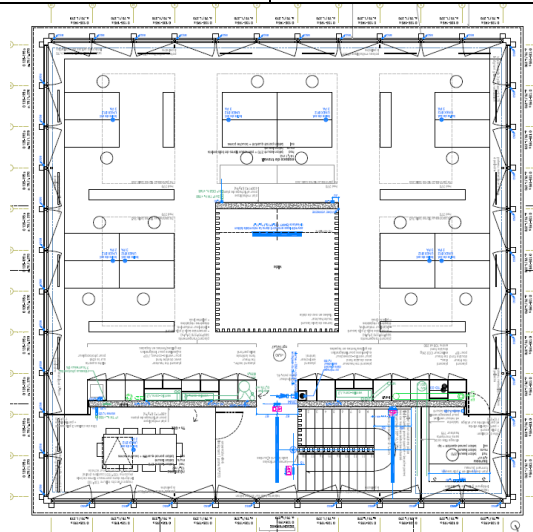
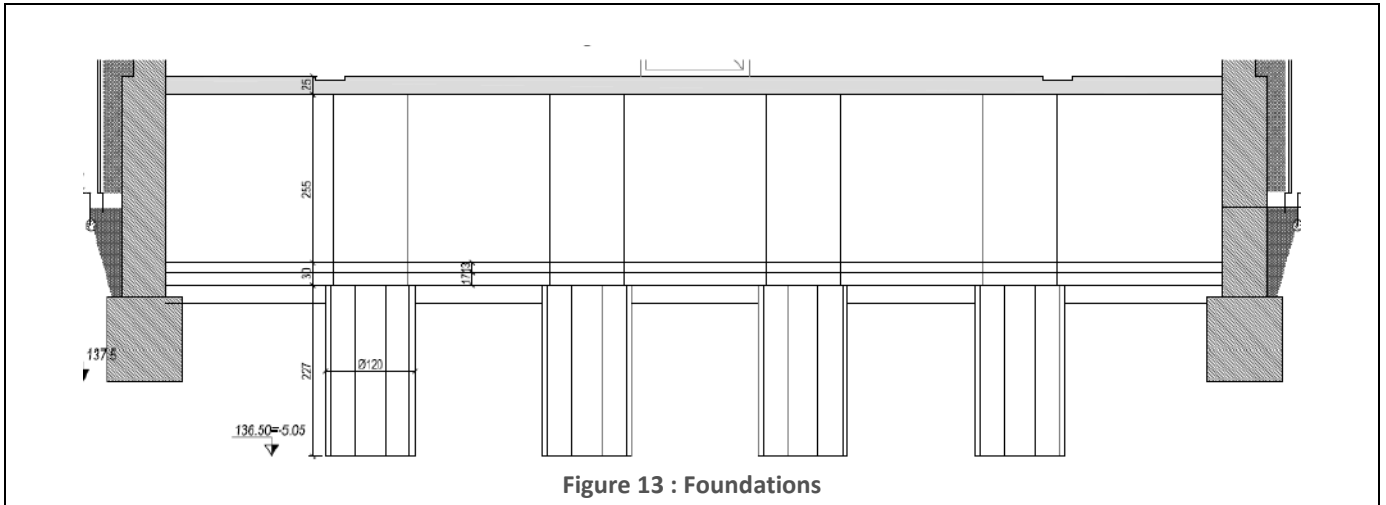


Figure 12 : Floor plan R+2

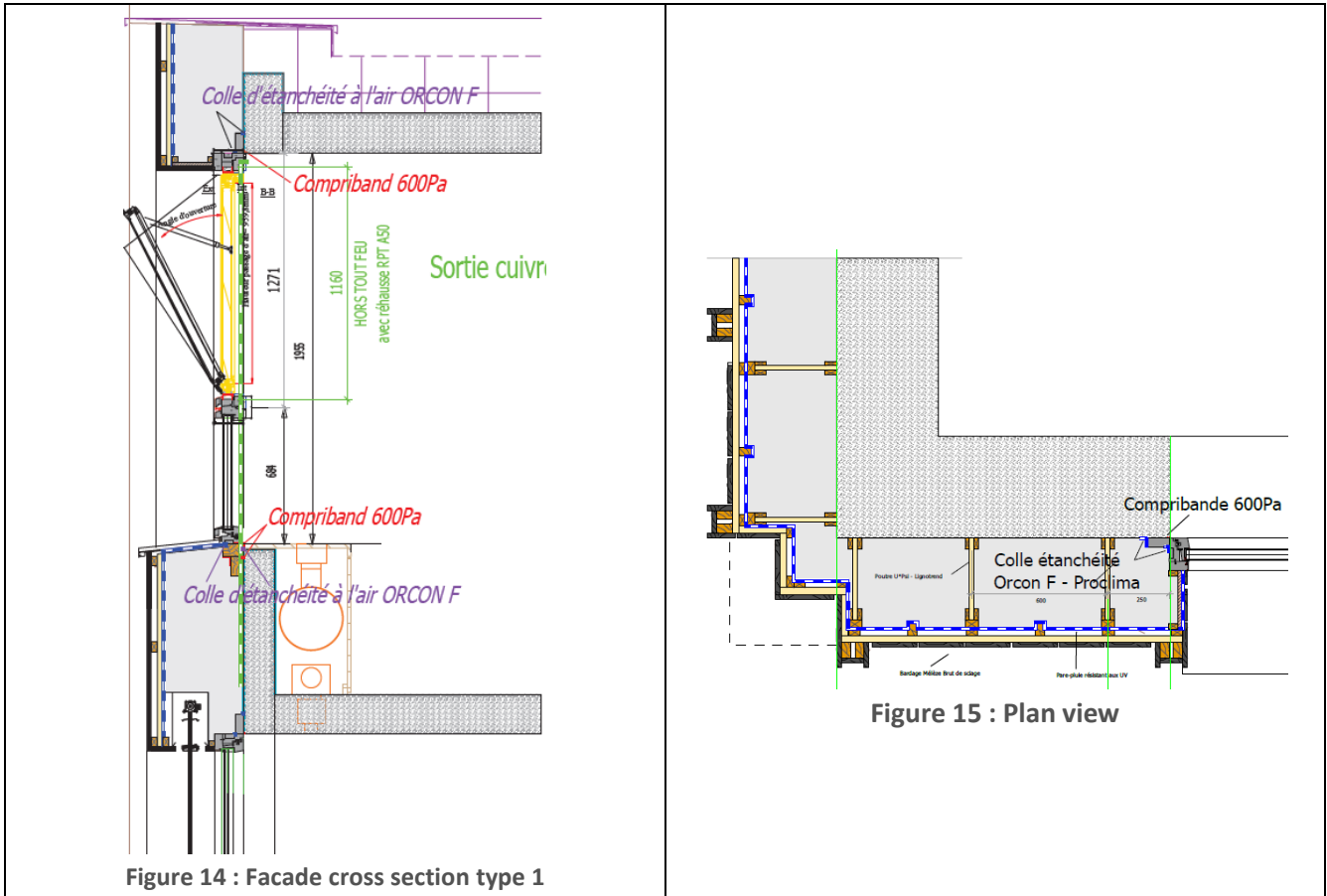
6. Foundation construction details



The basement slab is insulated with 25 cm of TH42 under-slab insulation, along with significant insulation drops on both the exterior and interior.

Nr. de la paroi	02ud			Dalle sur cave			Isolation intérieure?
Orientation des parois	3-sous-sol			Résistance superficielle [m²K/W]			
Adjacent à	3-lame d'air v			intérieure R_{si}	0,17		
				extérieure R_{se}	0,17		
Section 1	λ [W/(mK)]	Section 2 (optionnelle)	λ [W/(mK)]	Section 3 (optionnelle)	λ [W/(mK)]	Epaisseur [mm]	
Dalle béton	2,100					200	
Isolant sous dalle	0,042	Poutre bois	0,130			250	
Pourcentage de surface de la section 1		Pourcentage de surface de la section 2		Pourcentage de surface de la section 3		Total	
92%		7,7%				45,0 cm	
Majoration de la valeur U				Valeur U :			0,178 W/(m²K)

7. Exterior wall construction



The walls are externally insulated with 40 cm of TH42 cellulose wadding.

Nr. de la paroi	Description de la paroi	Résistance superficielle [m²K/W]		Isolation intérieure?
01ud	Murs extérieurs	intérieure R_{si}	0,13	<input type="checkbox"/>
	Orientation de la paroi: 2-mur	extérieure R_{se}	0,13	
	Adjacent à: 3-lame d'air v			

Section 1	λ [W/(mK)]	Section 2 (optionnelle)	λ [W/(mK)]	Section 3 (optionnelle)	λ [W/(mK)]	Epaisseur [mm]
Béton armé	2,100					200
Ouate de cellulose	0,042	Poutre I en bois	0,130			400
Pourcentage de surface de la section 1	97%	Pourcentage de surface de la section 2	3,0%	Pourcentage de surface de la section 3		60,0 cm

Majoration de la valeur U	<input type="checkbox"/>	W/(m²K)	Valeur U: 0,107 W/(m²K)
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8. Roof construction

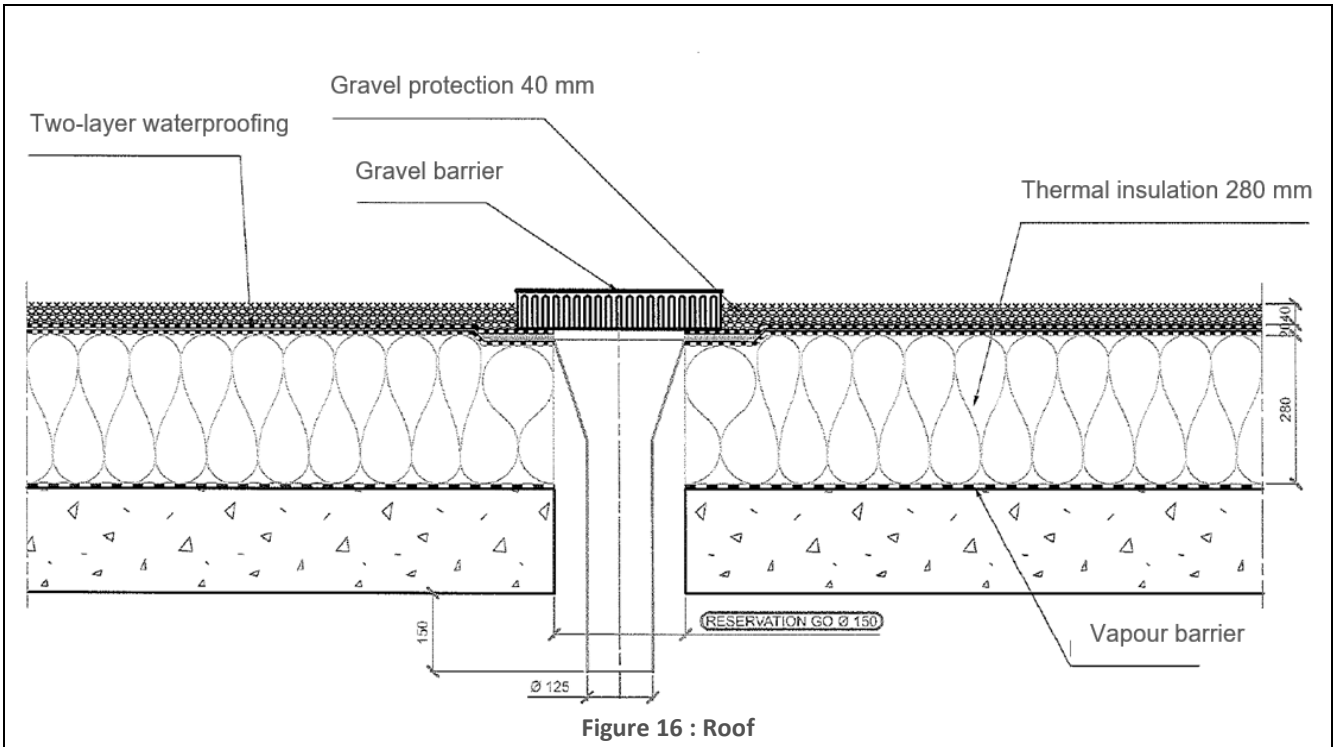


Figure 16 : Roof

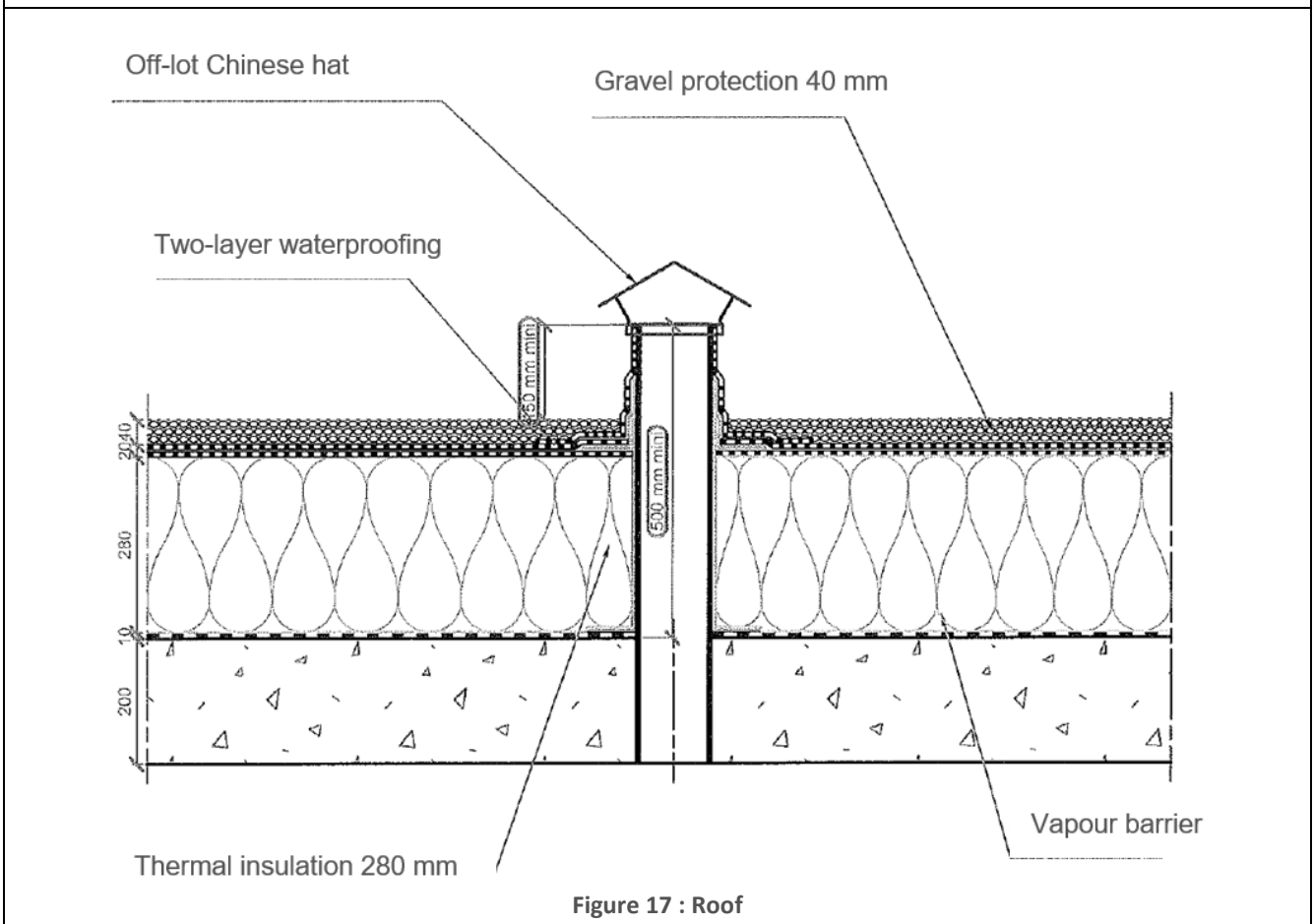


Figure 17 : Roof

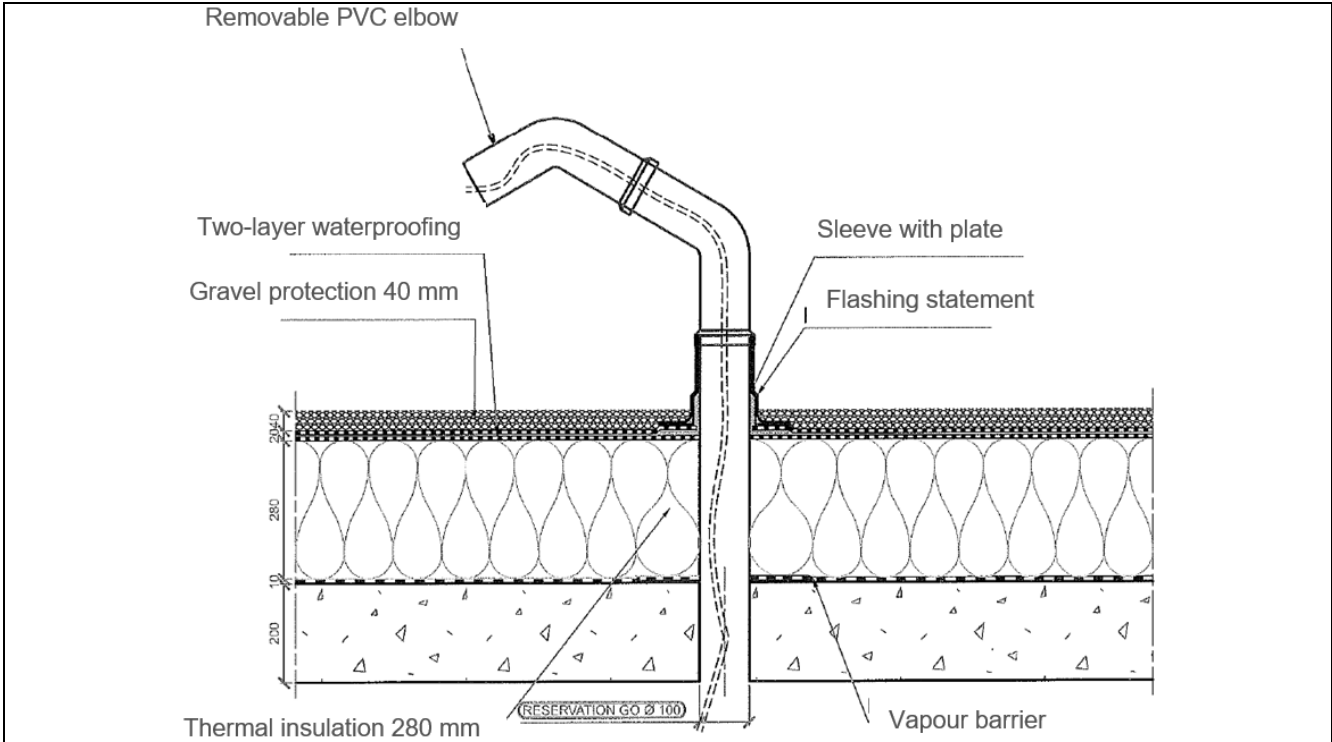


Figure 18 : Roof

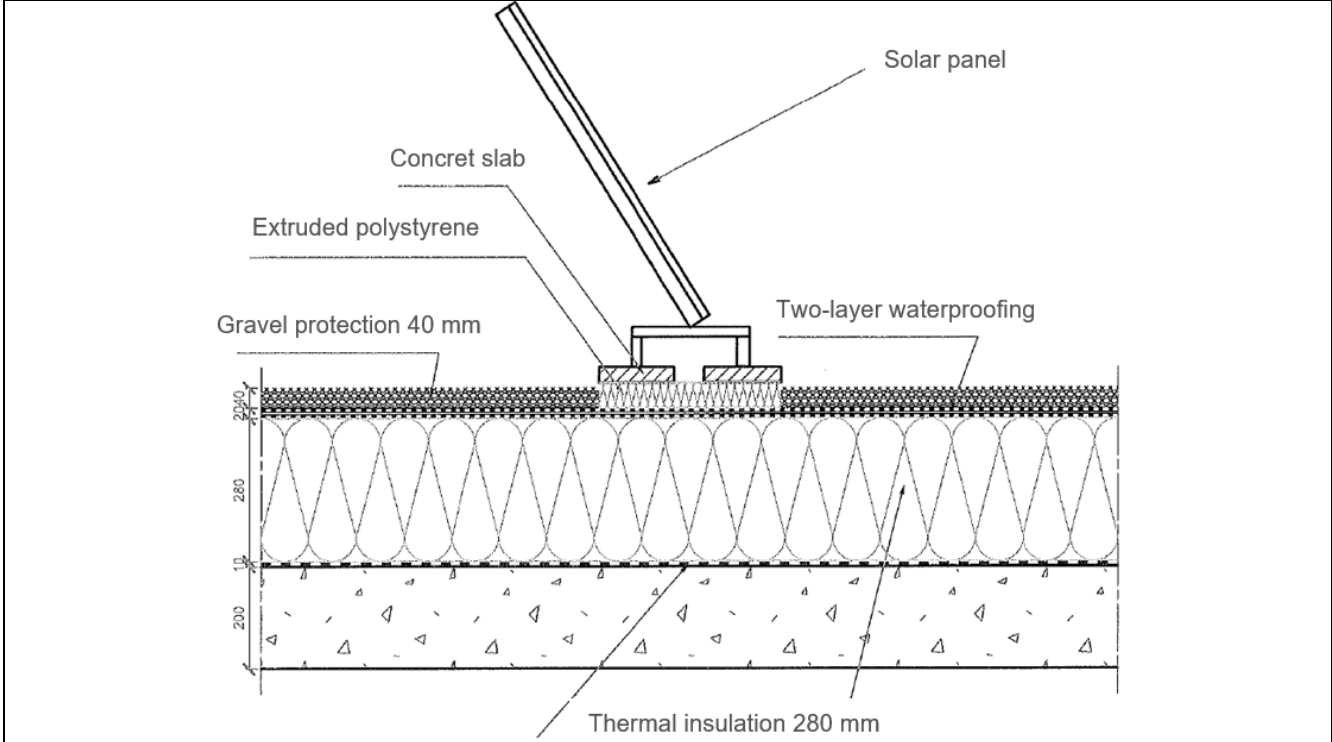


Figure 19 : Roof

The roof is insulated with 28 cm of TH22 polyurethane.

N° de la paroi

03ud **Toiture**

Isolation intérieure?

Résistance superficielle [m²K/W]

Orientation des parois: **1-toit**

intérieure R_{si}: **0,10**

Adjacent à: **1-air extérieu**

extérieure R_{se}: **0,04**

Section 1	λ [W/(mK)]	Section 2 (optionnelle)	λ [W/(mK)]	Section 3 (optionnelle)	λ [W/(mK)]	Epaisseur [mm]
Dalle béton	2,100					200
Polyuréthane	0,022					280
						11,7

Pourcentage de surface de la section 1
100%

Pourcentage de surface de la section 2

Pourcentage de surface de la section 3

Total
49,2 cm

Majoration de la valeur U: W/(m²K)

Valeur U : 0,077 W/(m²K)

9. Windows and window installation

Two types of joinery are implemented in this project :

- Access doors
- Windows

For economic reasons, the windows are triple-glazed and carefully selected to optimize the balance between thermal losses and solar gains.

The frames of the standard windows, made of PVC, are from the Hemia brand and have certification from the Passivhaus Institute.



Figure 20 : Photo of windows



Figure 21 : Photo of window

Vitrages		Vitrages	
	Valeur de départ recommandée pour l'optimisation : vitrage conseillé triple vitrage protection hivernale (Veuillez respecter les critères de confort !)		
ID	Description	Valeur g	Valeur U _g
			W/(m²K)
01ud	Vitrage RdC Stadip - P5A10-16-4-16-4 TRIII E	0,48	0,58
02ud			
03ud	Vitrage R+1 allège - 44²-12-4-14-44² EN2plus	0,49	0,49
04ud	Vitrage R+1 haut - 4-18-4-18-4 EN2plus	0,53	0,53
05ud	Vitrage R+2	0,53	0,53
06ud	Vitrage désenfumage	0,30	1,85
07ud			
08ud	Vitrage verrière	0,50	0,75
09ud	Accès toiture	0,00	0,67
10ud	Porte pleine	0,00	0,60

Châssis de fenêtres					
ID	Description	Valeur U _f			
		gauche	droit	bas	haut
		W/(m²K)	W/(m²K)	W/(m²K)	W/(m²K)
01ud	Smartwin	0,68	0,68	0,89	0,68
02ud	Smartwin partie fixe R+1 partie basse	0,52	0,52	0,69	0,79
03ud	Smartwin partie haute - ouvrant	0,68	0,68	0,79	0,68
04ud					
05ud	Velux verrière	1,25	1,25	1,25	1,25
06ud					
07ud	Désenfumage	1,85	1,85	1,85	1,85
08ud	Partie basse désenfumage	0,68	0,68	0,89	0,68
09ud	Porte pleine	0,86	0,86	1,30	0,86
10ud	accès toiture	0,67	0,67	0,67	0,67

10. Airtightness of the envelope

The airtightness of this project has been achieved through the implementation of a continuous vapor barrier, applied to all exterior walls of the building.



Figure 22 : Vapour barrier

The airtightness test has been realised by Michel Scherrer from Alsatech, the 15/02/2019. The result is below :

Récapitulatif des résultats mesurés		
$Q_{4\text{pa-surf}}$	0,16	$\text{m}^3/(\text{m}^2\text{h})$
n50	0,36	1/h

11. Ventilation system design

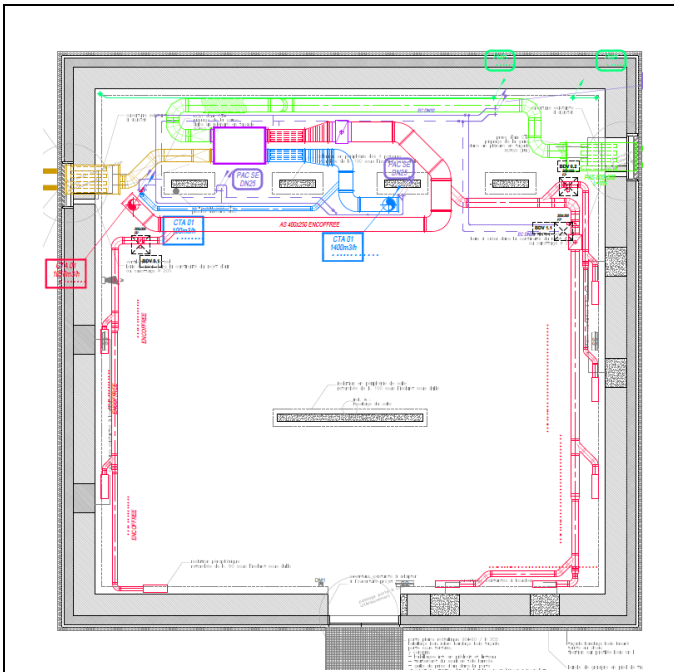


Figure 23 : Ventilation plan at level -1

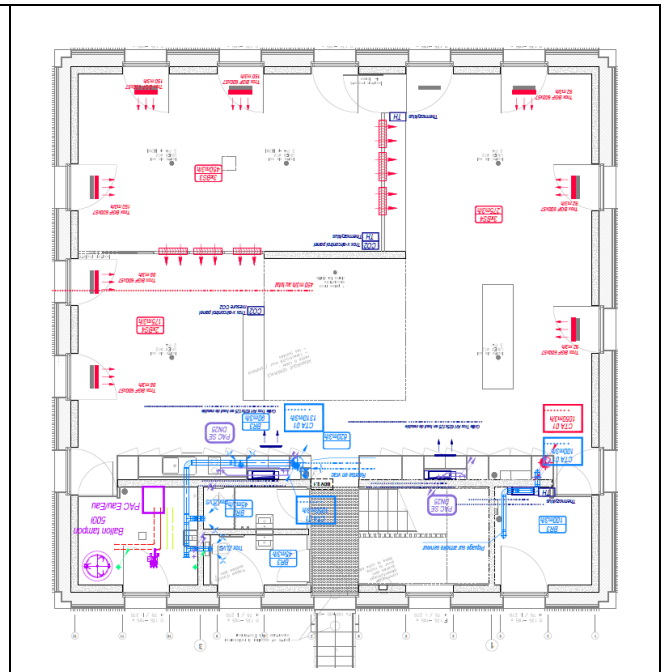


Figure 24 : Ventilation plan at level 0

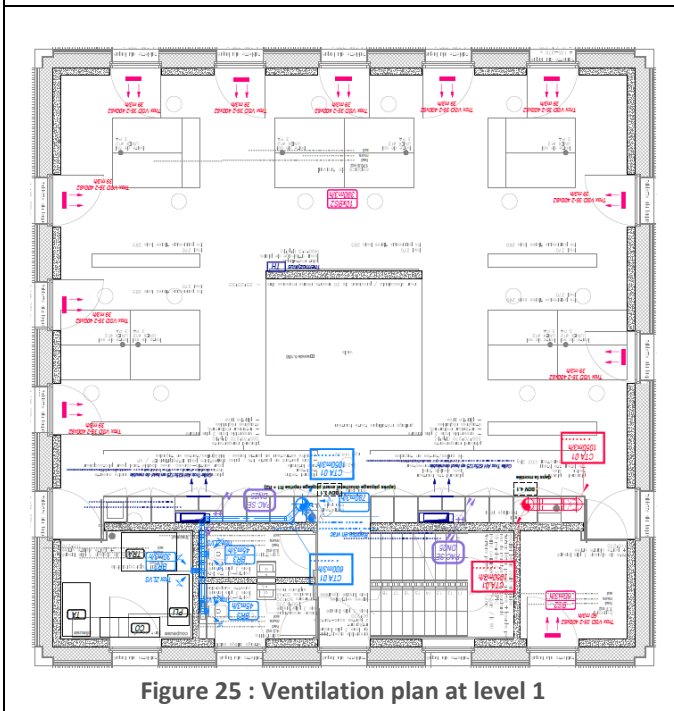


Figure 25 : Ventilation plan at level 1

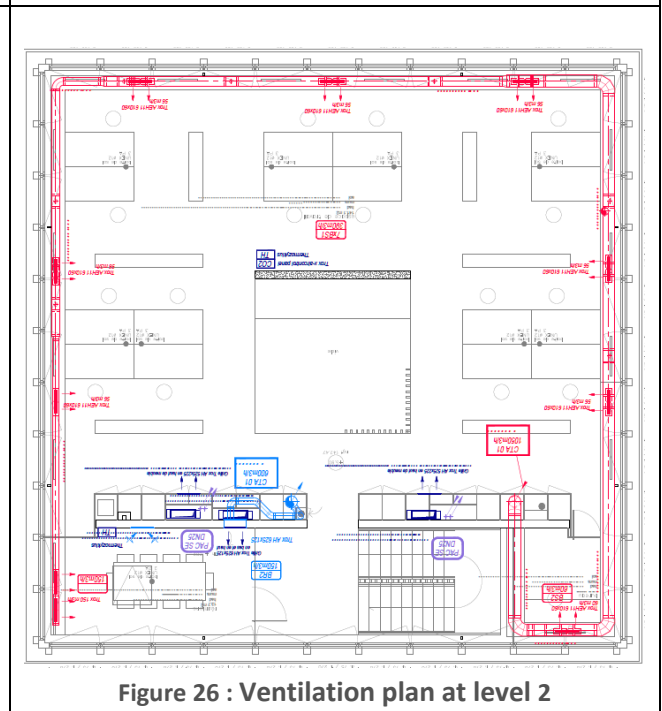


Figure 26 : Ventilation plan at level 2

A Central Air Handling Unit located on the ground floor ensures ventilation for the entire building.

12. Central ventilation unit

Finally, the building ventilation is carried out through a certified double flow central unit by the Passivhaus Institute. It is the COM4mini CC20-CC60 model from FläktGroup, which ensures excellent performance in this regard. The heat recovery efficiency is 82.73%, and the consumption is 0.41 Wh/m³.

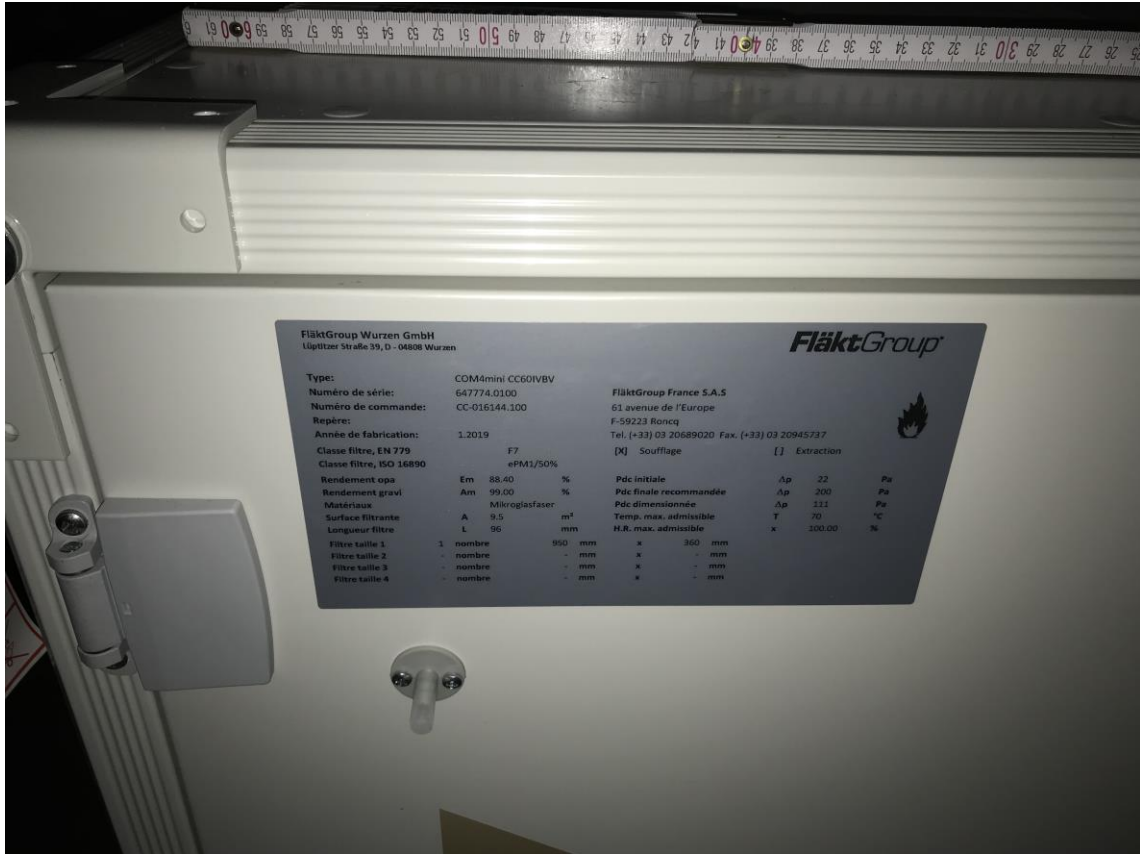


Figure 27 : Photo of the air handling unit

13. DHW (Domestic Hot Water)

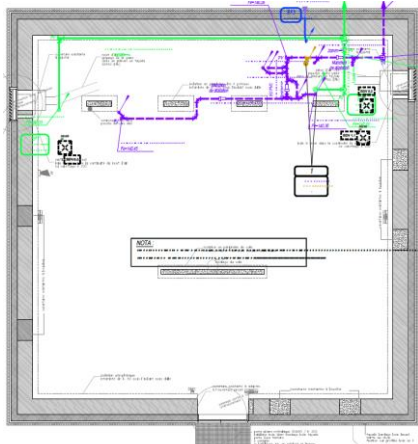


Figure 28 : Plan DHW level -1

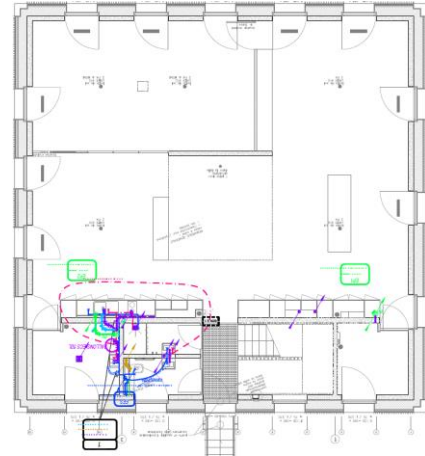


Figure 29 : Plan DHW level 0

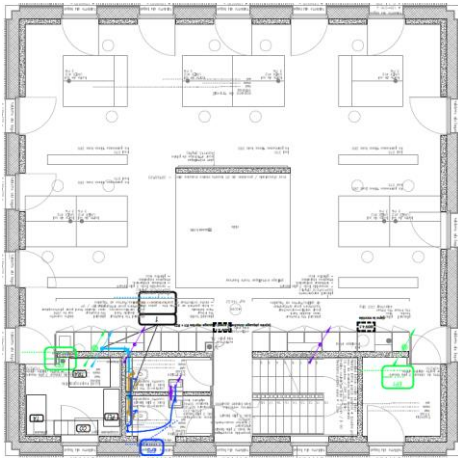


Figure 30 : Plan DHW level 1

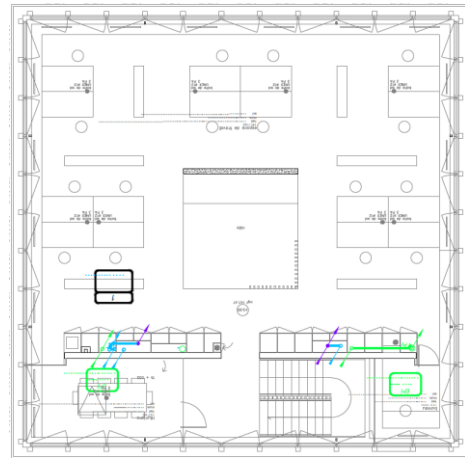


Figure 31 : Plan DHW level 2

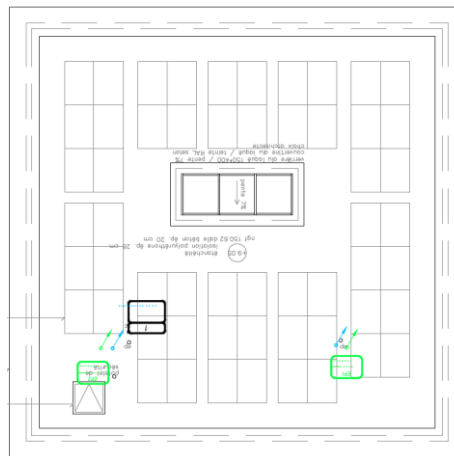


Figure 32 : Plan DHW roof

The DHW production is provided by a Heat Pump. On the plan, there is a well-insulated and streamlined circulation loop, kept to a minimum.

14. Heating system

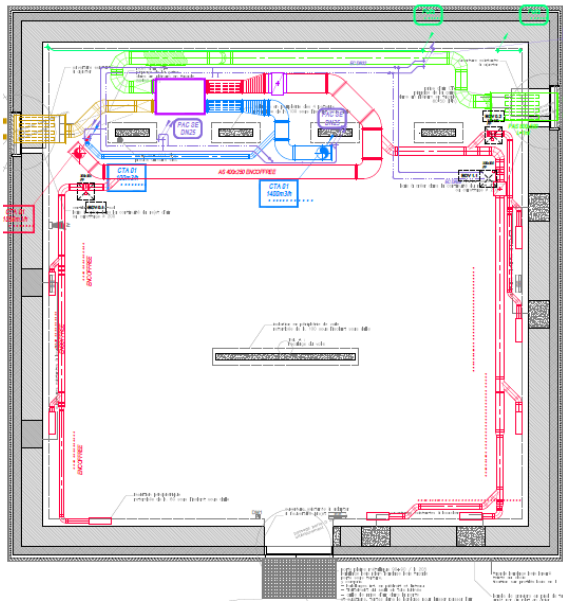


Figure 33 : Heating plan level -1

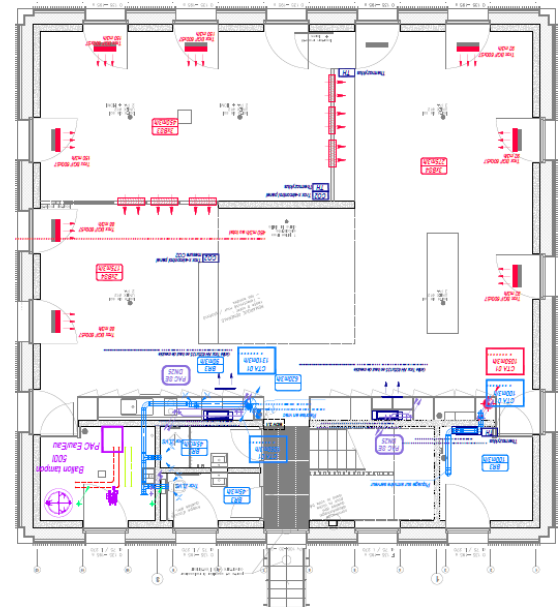


Figure 34 : Heating plan level 0

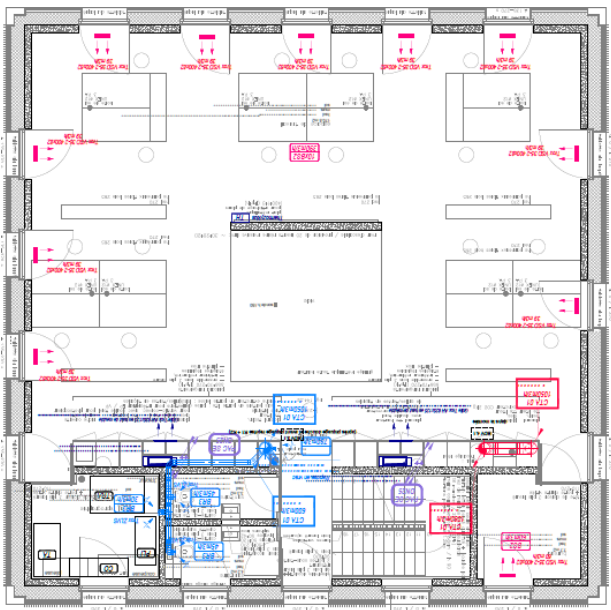


Figure 35 : Heating plan level 1

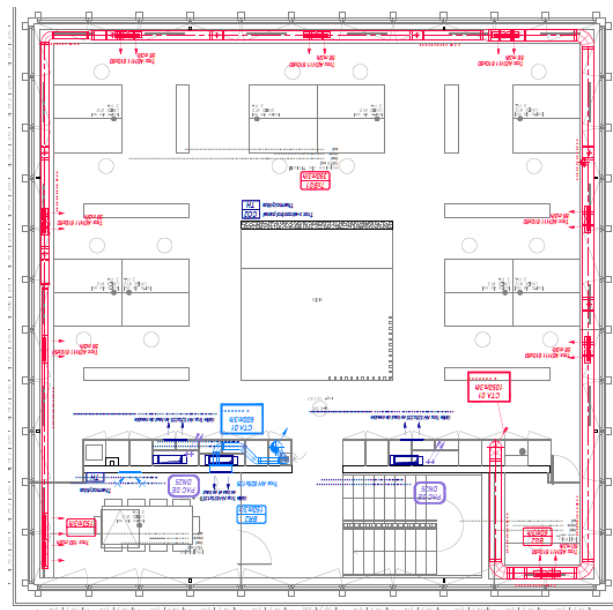



Figure 36 : Heating plan level 2

The installed heating system is cost-effective and feasible due to the low heating demand of the building.



Figure 26 : Boiler

15. Brief descriptions of PHPP results (check sheet)

Bâtiment Passif-Vérification			
		Projet: Nouveaux bureaux de Solares bauen	
		Adresse: 2 rue de la Coudreuse	
Code postal / localité: 67200 Strasbourg		Région: Alsace FR-France	
Type de bâtiment: Bureaux		Données climatiques: FR0012a-Strasbourg	
Région: 3: Climat tempéré frais		Altitude: 143 m	
Maître(s) de l'ouvrage: Alsbail		Adresse: 7 place Brant - CS 8003	
Code postal / localité: 67001 Strasbourg Cedex		Région: Alsace	
Entreprise de construction: Mader (gros œuvre)		Adresse: 7 place Brant - CS 8003	
Code postal / localité: 67001 Strasbourg Cedex		Région: Alsace	
PHPP Bilan énergétique: Solares bauen		Adresse: 2 rue de la Coudreuse	
Code postal / localité: 67200 Strasbourg		Région: Alsace	
Architecte: Richter Architectes et Associés		Adresse: 25 Rue des Serruriers	
Code postal / localité: 67000 Strasbourg		Région: Alsace	
Bureau d'études thermiques: Solares bauen		Adresse: 2 rue de la Coudreuse	
Code postal / localité: 67200 Strasbourg		Région: Alsace	
Année de construction: 2018		Température intérieure hiver [°C]: 20,0	
Nombre de logements: 1		Température intérieure été [°C]: 25,0	
Nombre d'occupants: 25,0		Apports internes Chauffage [W/m²]: 3,5	
Capacité thermique surfacique [Wh/K par m² SRE]: 132		Apports internes Refroidissement [W/m²]: 3,5	
		Refroidissement mécanique: -	
Performance énergétique annuelle du bâtiment			
Surface de référence énergétique: m²		508,9	
Chauffer	Besoin de chauffage kWh/(m²a)	12,71	≤ 15
	Puissance de chauffe W/m²	12	≤ -
Refroidir	Reffroidissement + déshumidification kWh/(m²a)	-	≤ -
	Puissance de refroidissement W/m²	-	≤ -
	Fréquence de surchauffé (> 25°C) %	7	≤ 10
	Fréquence d'humidité excessive (> 12 g/kg) %	0	≤ 20
Etanchéité à l'air	Test d'infiltrométrie n ₅₀ 1/h	0,4	≤ 0,6
Energie primaire non-renouvelable (EP)	Consommation d'EP kWh/(m²a)	81	≤ -
	Consommation d'EP-R kWh/(m²a)	37	≤ 45
Energie primaire renouvelable (EP-R)	Production d'énergie renouvelable (par rapport à la surface au sol kWh/(m²a) de la zone bâtie)	56	≥ 60
			≥ 44
			Conforme?²
			oui
			-
			oui
			oui
			oui
			oui
² champ vide: les données sont manquantes; "-": Aucune exigence			

16. Building costs

Confidential data

17. Construction costs

Confidential data