

## **PASSIVE HOUSE OBJECT DOCUMENTATION**

### **Iga Passive House – ID 6319**

Detached single family house in Iga, Mie, Japan



Client / Building Services :	Hideaki Mori	Moridaikenchisan
Architect :	Yutaka Iizuka	i + i architects
Energy consultant :	Kota Aoyama	Ingerosec Corporation



This is a model house proposed by a construction company based in Iga, focusing on domestic building materials in order to realize an affordable and simple passive house. The owner is the president of the construction company. The building is two levels with wood-frame.

U-Value exterior wall = 0.167 W/m<sup>2</sup>K

U-Value floor = 0.265 W/m<sup>2</sup>K

U-Value roof = 0.125 W/m<sup>2</sup>K

U-Value windows = 1.18 W/m<sup>2</sup>K

PHPP annual heating demand = 8.56 kWh/m<sup>2</sup>a

PHPP Primary energy demand = 98 kWh/m<sup>2</sup>a

Heat recovery efficiency = 86%

Pressure test n<sub>50</sub> = 0.30/h

## **1. Description of the construction task**

This is a model house proposed by a construction company based in Iga (known as Ninja village), focusing on domestic building materials in order to realize an affordable and simple passive house. The owner is the president of the construction company.

Iga is a basin with a climate that is hot in summer and cold in winter, and is one of the coldest areas in Mie prefecture. He, the owner and president of the construction company, thought that a passive house would be suitable for such a harsh climate and would be the standard for homes that locals want.

The building faces south and the roof is gabled. Most of the south surface is an opening, and the south side of the first floor is set back, so that the solar shading/acquisition in the summer and winter will work effectively. The light taken in from the south reaches the entire house by the central atrium. Therefore, electricity for lighting in the daytime is almost unnecessary. From the window on the west side of the second floor, residents can see the mountains of Iga and feel a sense of unity with nature.

There are two air conditioners, an underfloor air conditioner on the 1st floor and a wall-mounted air conditioner on the 2nd floor, and these two units are used according to the season. Focus200 is used for the ventilation system, and an indoor circulation type range hood is used because the kitchen is IH.

Insulation of walls and roof is composed of Urethane foam with  $\lambda$ -value: 0.021(W/mK) and Phenolic foam with  $\lambda$ -value: 0.020(W/mK), and around the foundation is composed of concrete with XPS with  $\lambda$ -value: 0.028(W/mK).

The windows are PVC windows (triple glazing) made by a Japanese manufacturer (YKK AP), and used solar acquisition type glazing and solar shielding type glazing properly on the south side and other sides.

And solar collector backed up by a gas boiler is used for hot water supply.

## 2. Exterior photos



South elevation



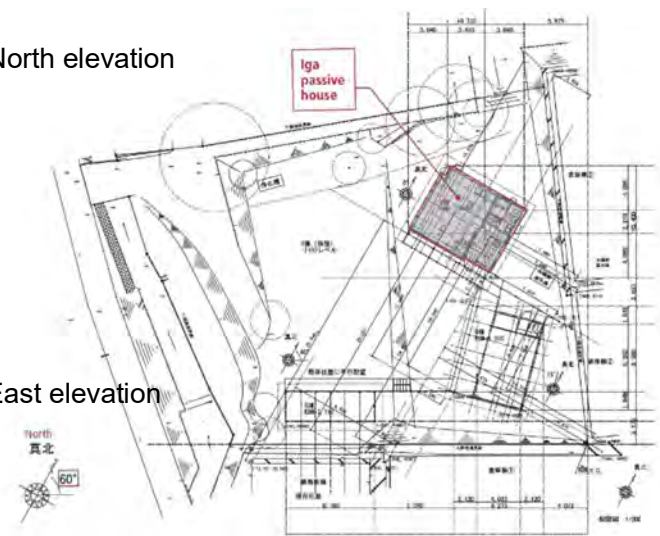
North elevation



East elevation



West elevation





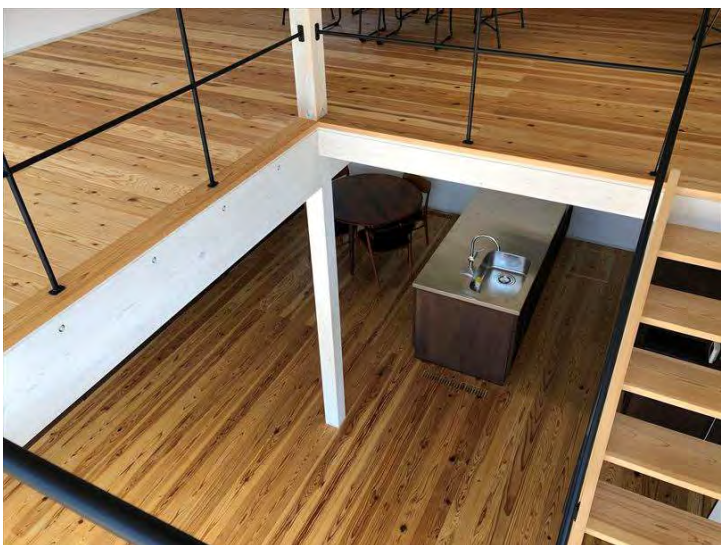
### 3. Interior photos



1F Living & Dining



1F Living & Dining



Double Height

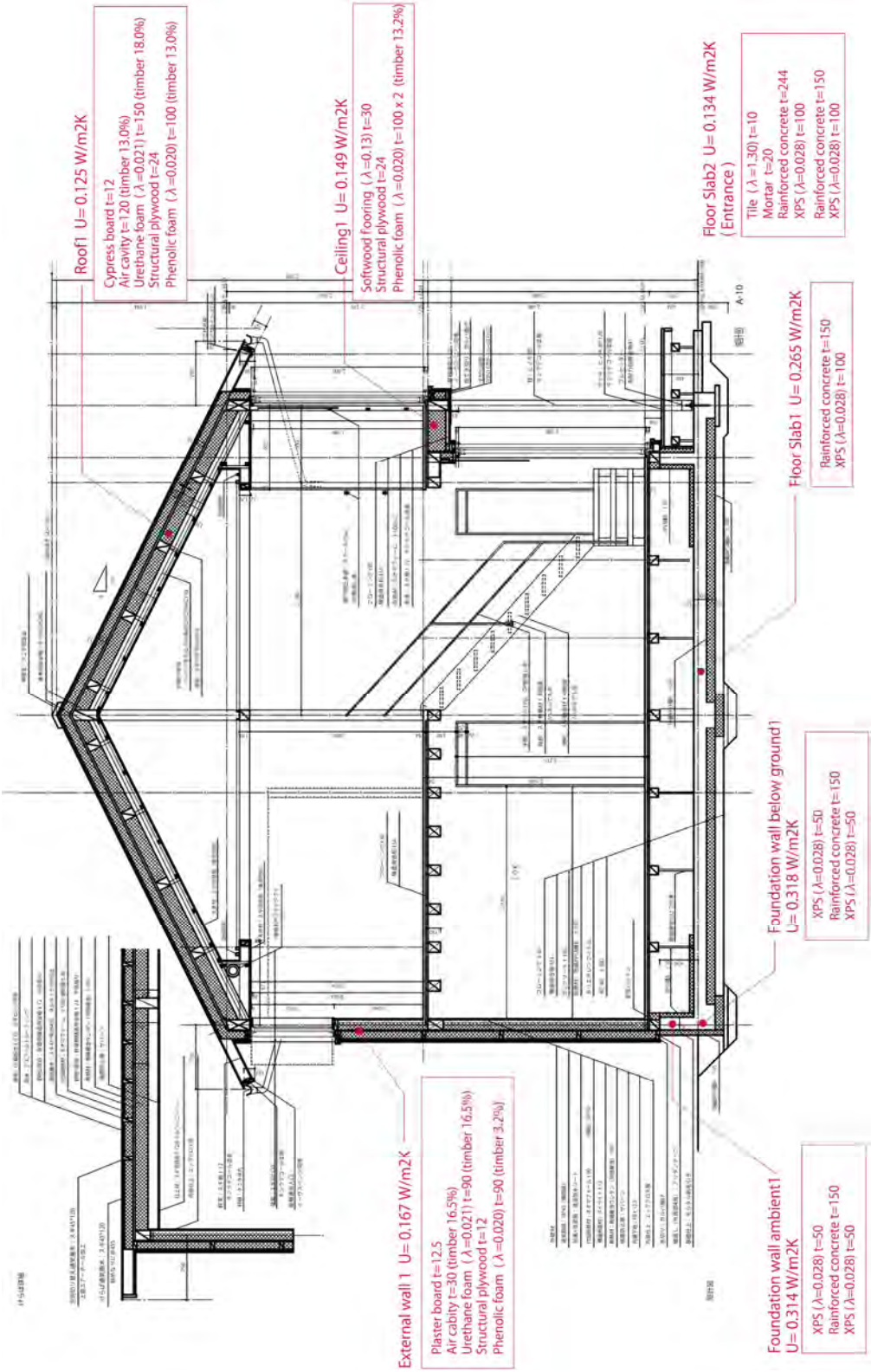


2F Free Space



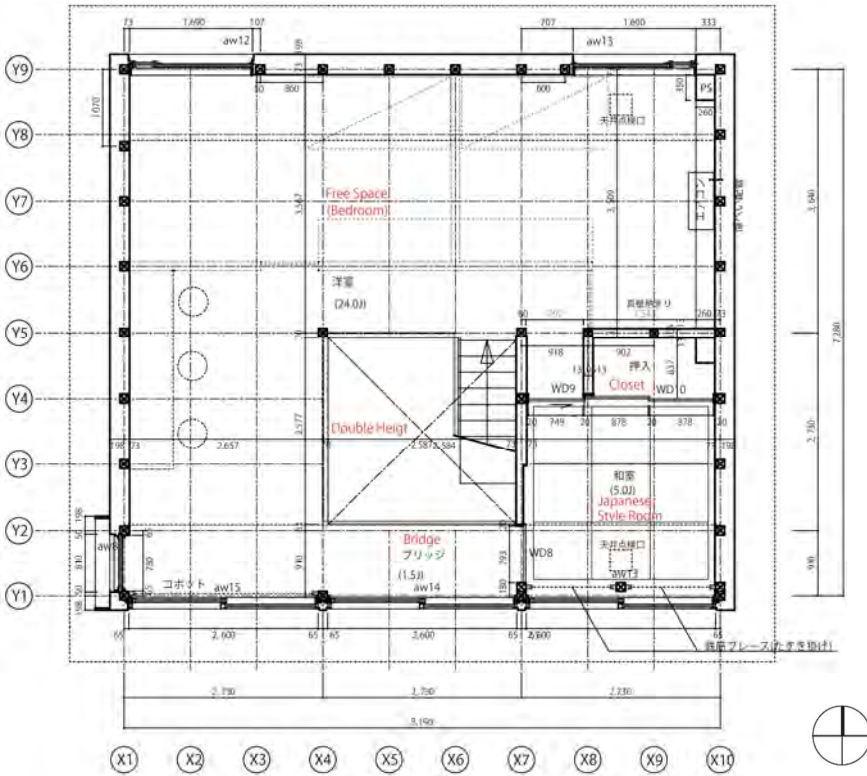
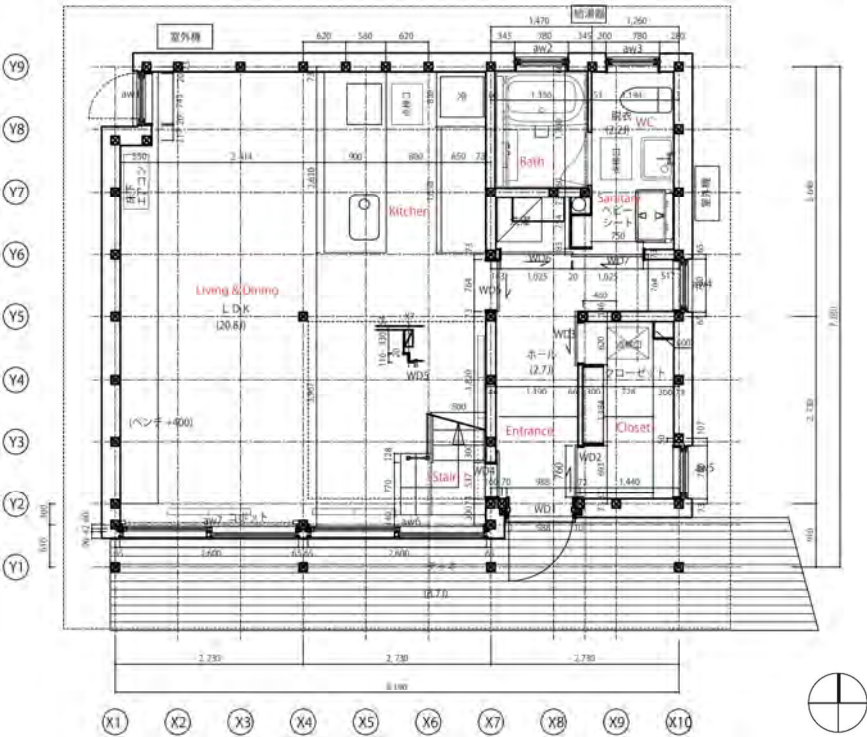
2F Bridge

#### 4. Cross section

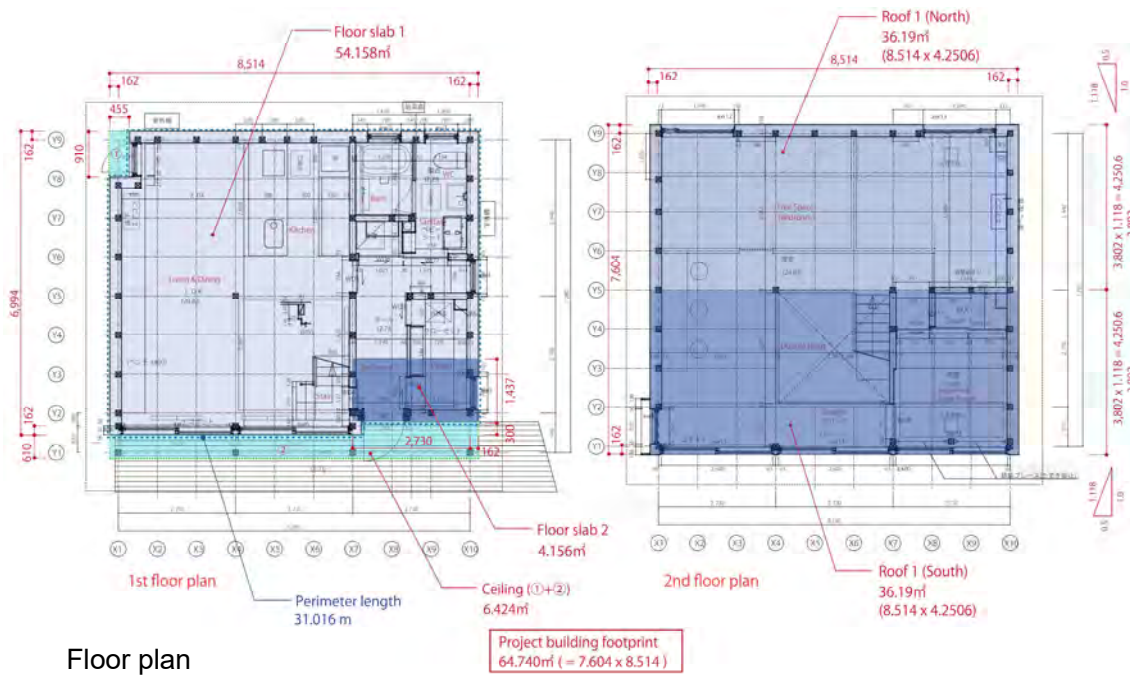




# 5. Floor plans



## 6. Thermal envelope area



Floor plan

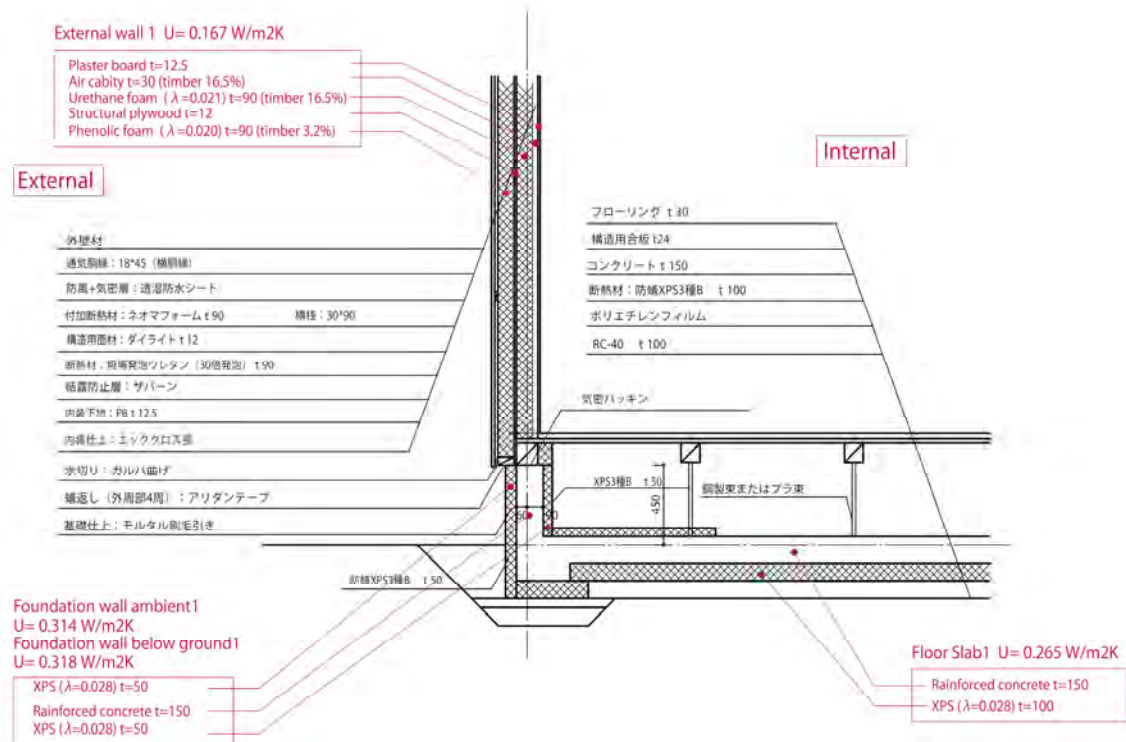


Elevation

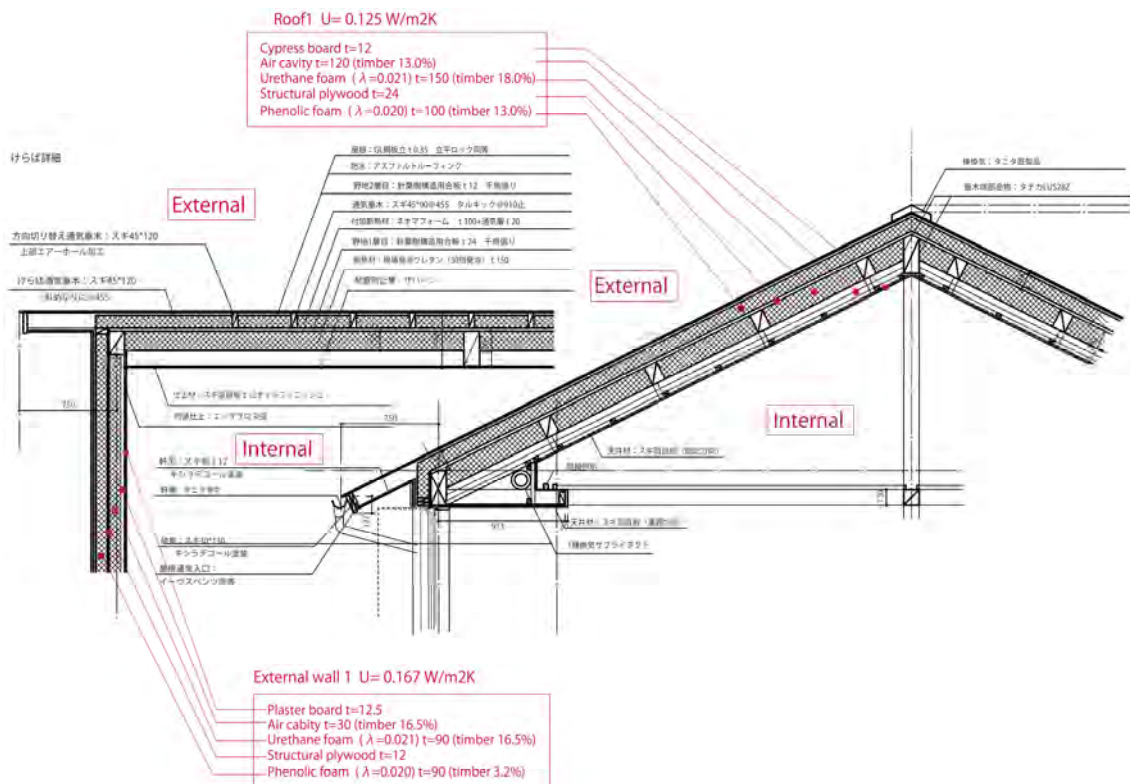


## 7. Construction details

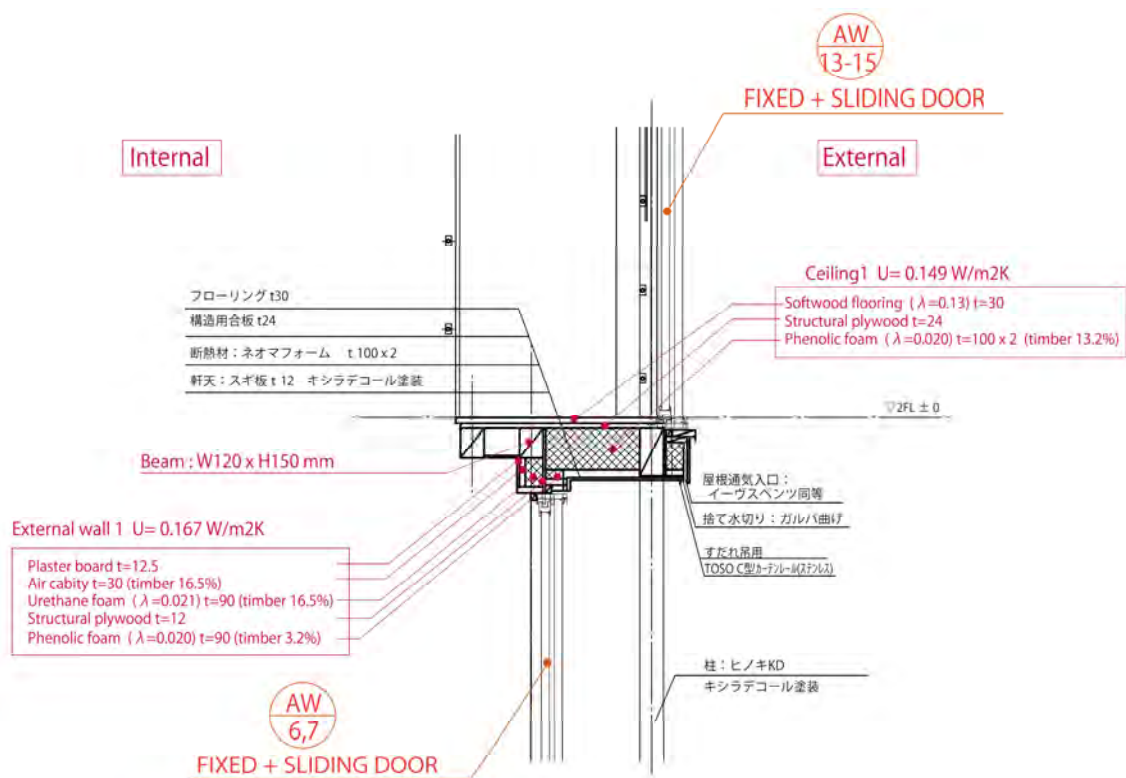
### 7.1 External wall build-up against the ground



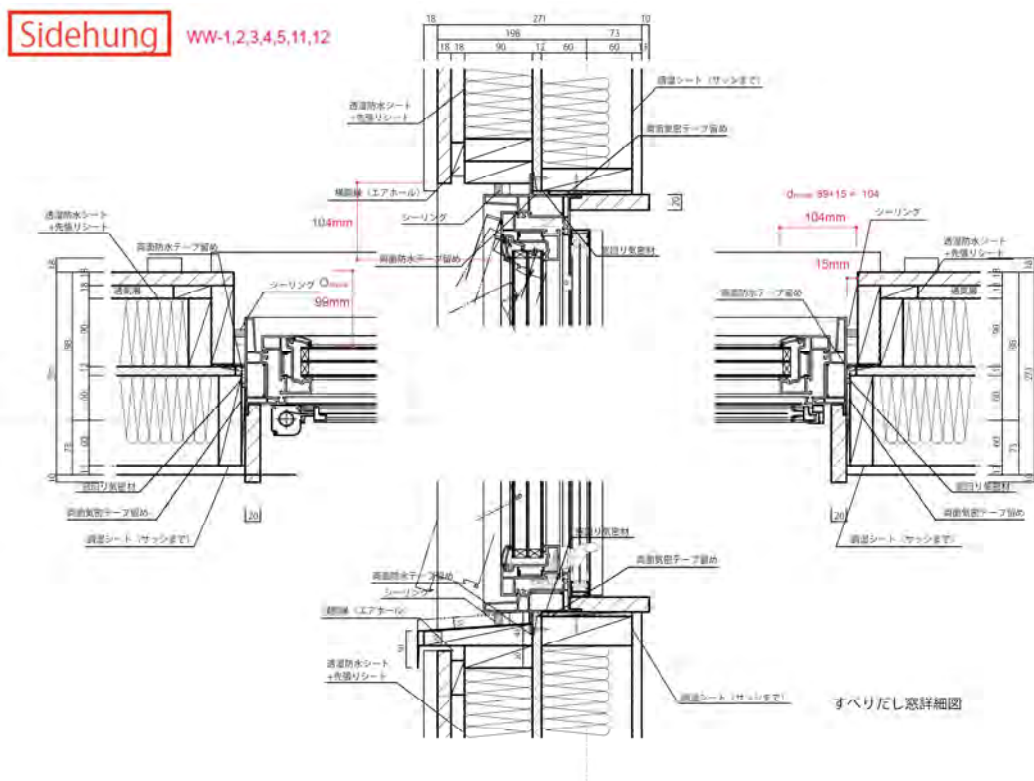
### 7.2 Roof build-up / Ceiling build-up



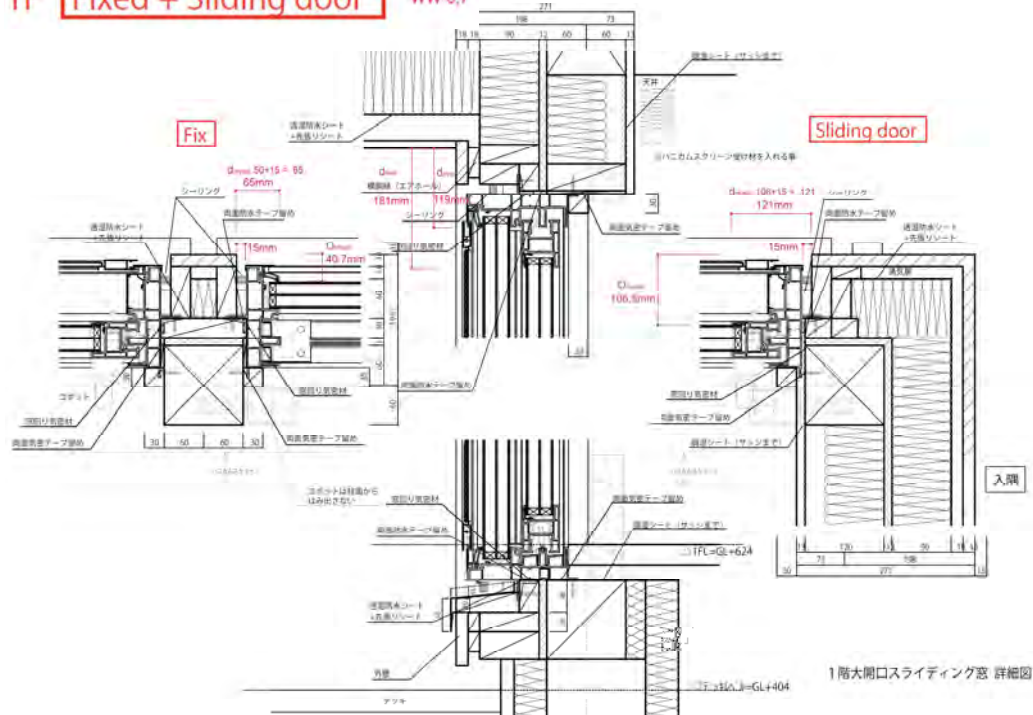
### 7.3 Ceiling build-up



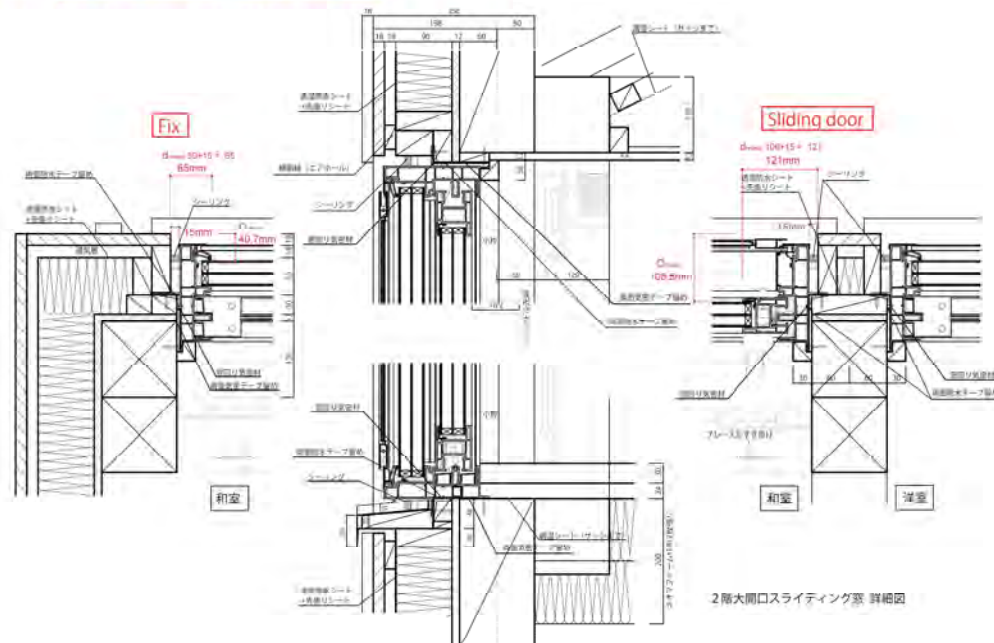
## 7.4 Window installation



## 1F Fixed + Sliding door WW-6,7



## 2F Fixed + Sliding door WW-13,14,15



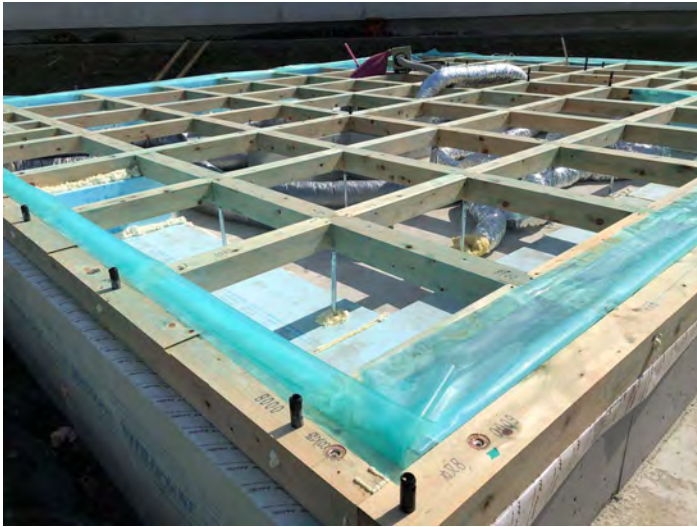
The windows are PVC window developed by YKK AP in Japan. The “APW430” series with triple glass is used in this building.  $U_f$  is 1.25-2.20 W/m<sup>2</sup>K.  $U_g$  and  $g$ -value are as follows.

-Solar acquisition 3+Ar16+3+Ar16+low-E3 :  $U_g$  = 0.97 W/m<sup>2</sup>K,  $g$ -value = 0.57

-Solar shielding Low-E3+Ar16+3+Ar16+low-E3 :  $U_g$  = 0.60 W/m<sup>2</sup>K,  $g$ -value = 0.31



## 7.5 Construction Site Photos



Thermal insulation work  
for basement  
XPS:  $t=50\text{mm} \times 2$   
(Inside and Outside)

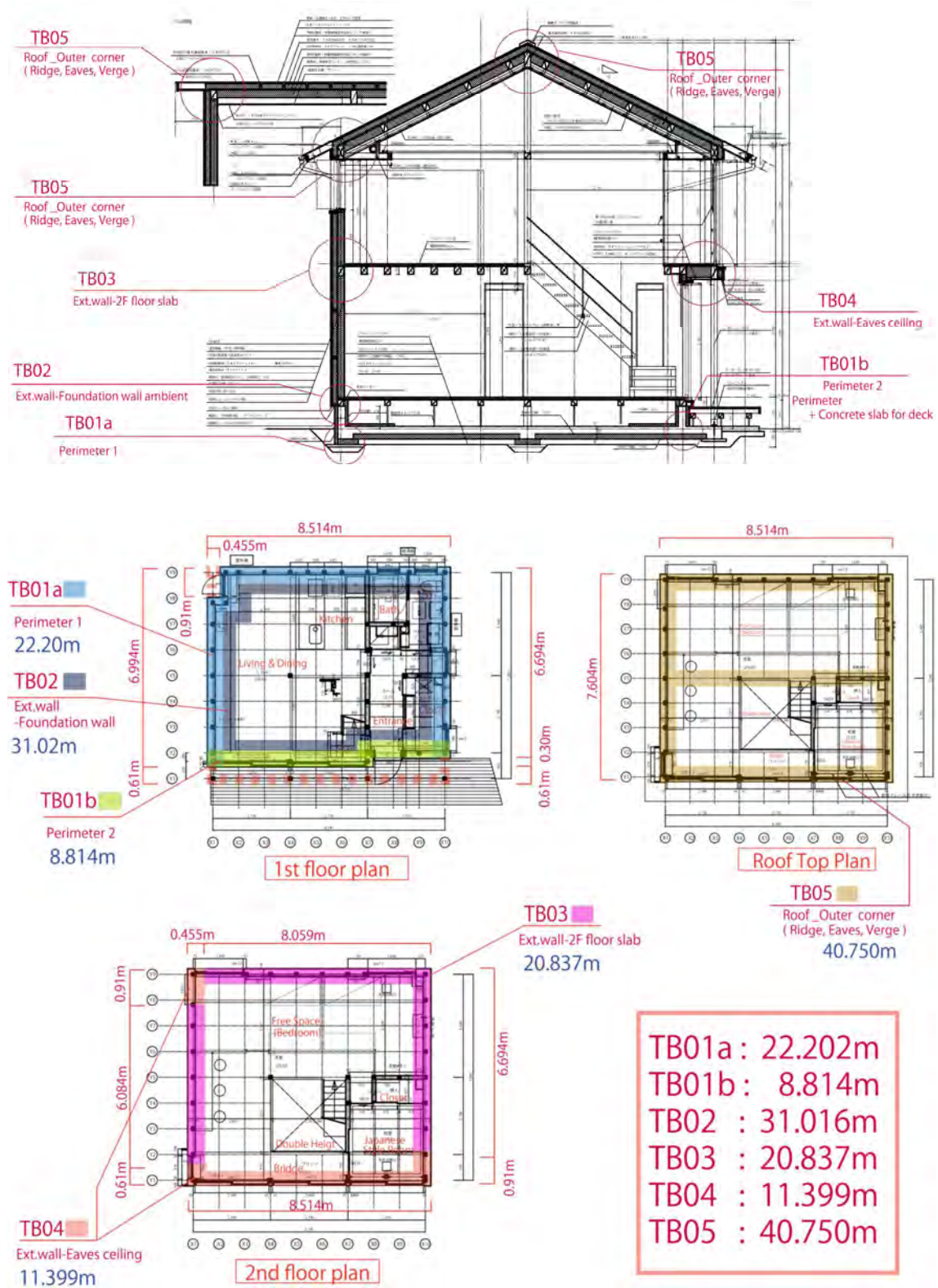


Thermal insulation work  
for wall  
Urethanform:  $t=90\text{mm}$



Thermal insulation work  
for wall  
Urethanform:  $t=150\text{mm}$

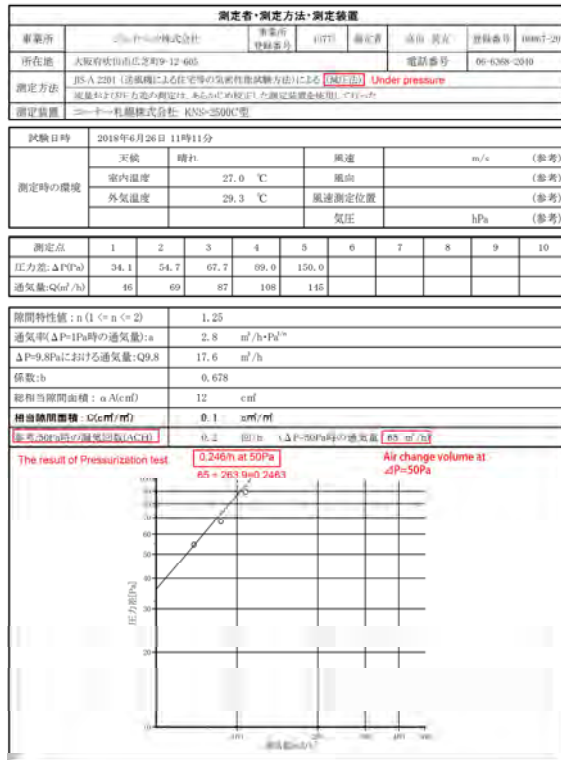
## 7.6 Thermal Bridges



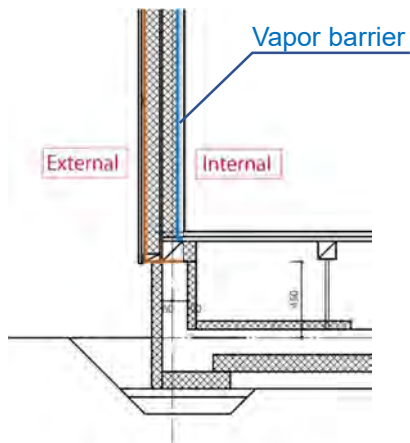
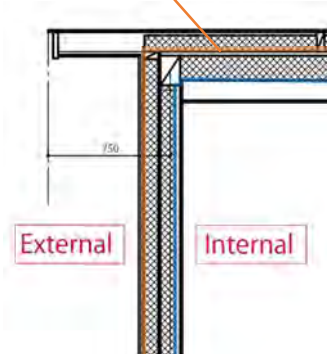
## 7.7 Airtightness

### Under Pressure 住宅の気密性能試験結果(2)

二重窓連続住宅モデル (伊賀の家) プロジェクトA棟



Breather membrane



### Over Pressure 住宅の気密性能試験結果(2)

二重窓連続住宅モデル (伊賀の家) プロジェクトA棟



Net Air Volume for Airtightness test:

$V_t = 263.9 \text{ m}^3$

The result of Pressurization test:

Under Pressure **0.246 / h** at 50Pa

Over Pressure **0.360 / h** at 50Pa

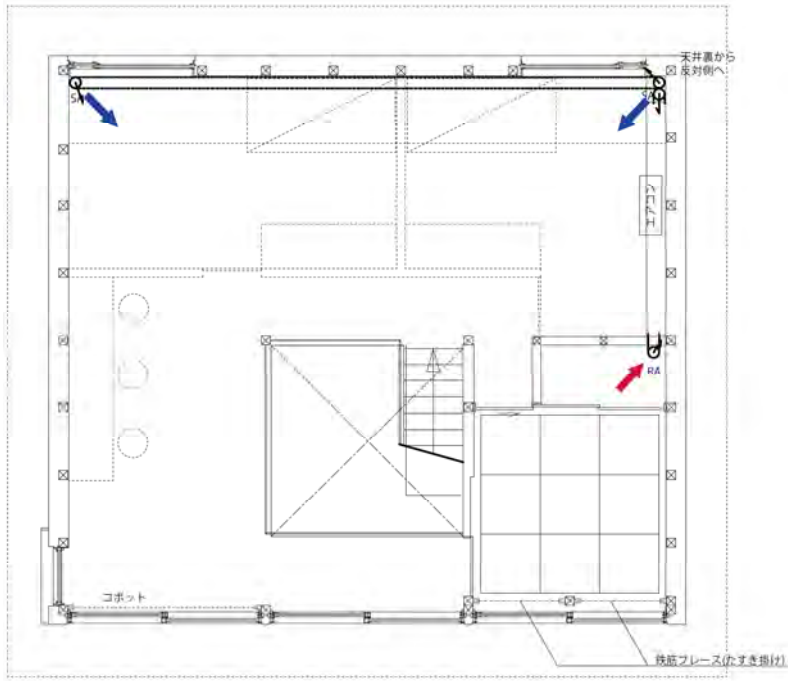
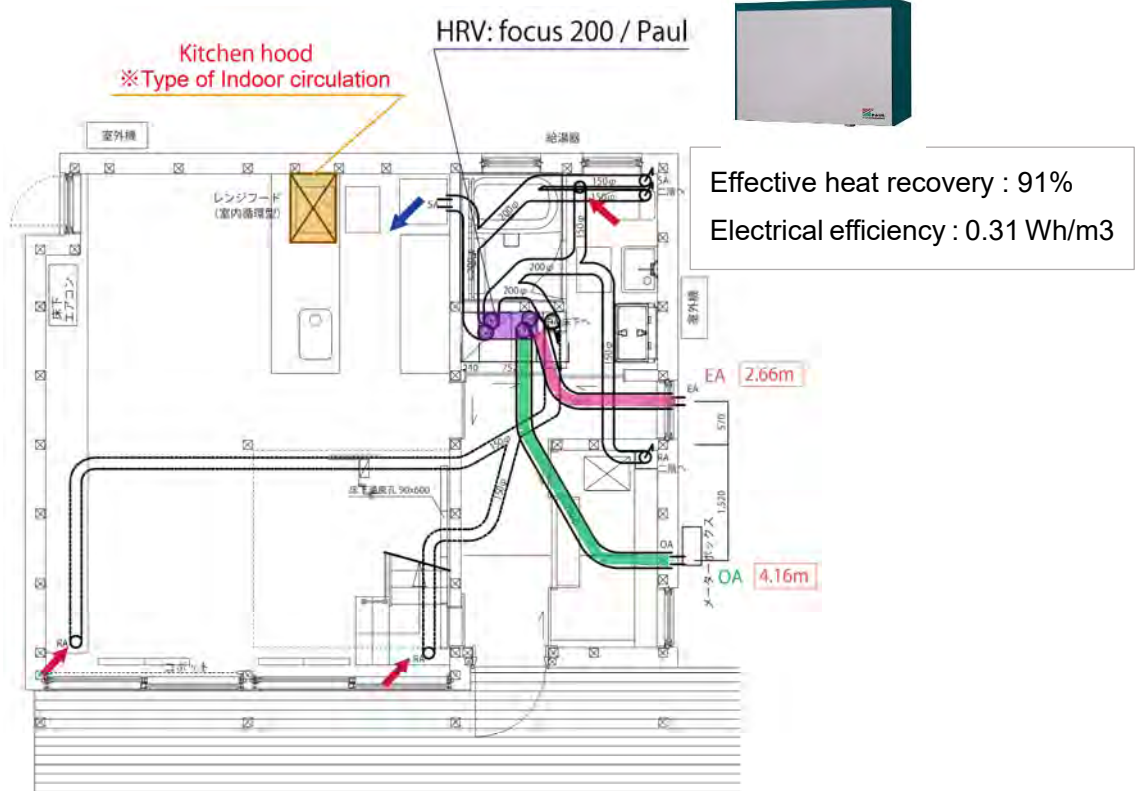
Average Air change rate:

$(0.246 + 0.360) / 2 = 0.3032$

**0.30 / h at 50Pa**



7.8 Ventilation



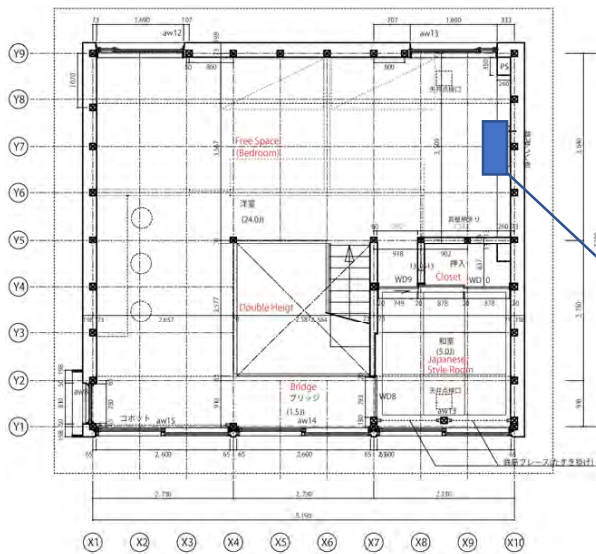
# 7.9 Heating and Cooling



1st floor plan



Air-conditioner partly installed  
in crawl space  
(Mainly for Heating)

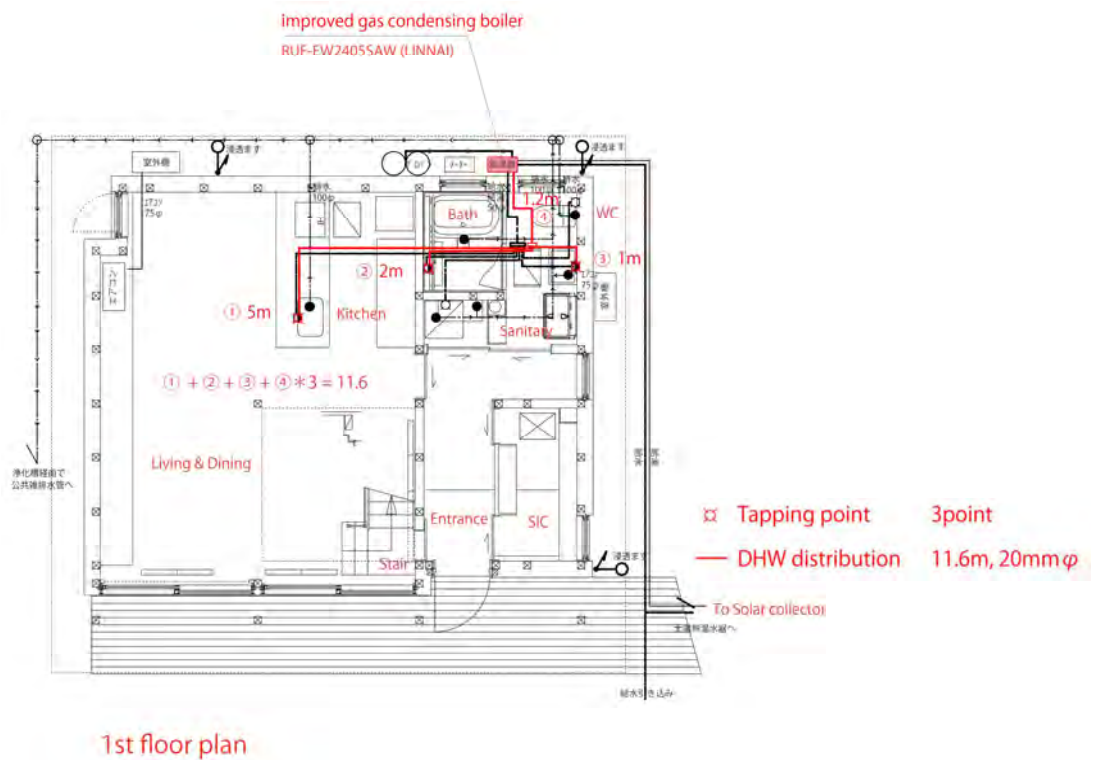
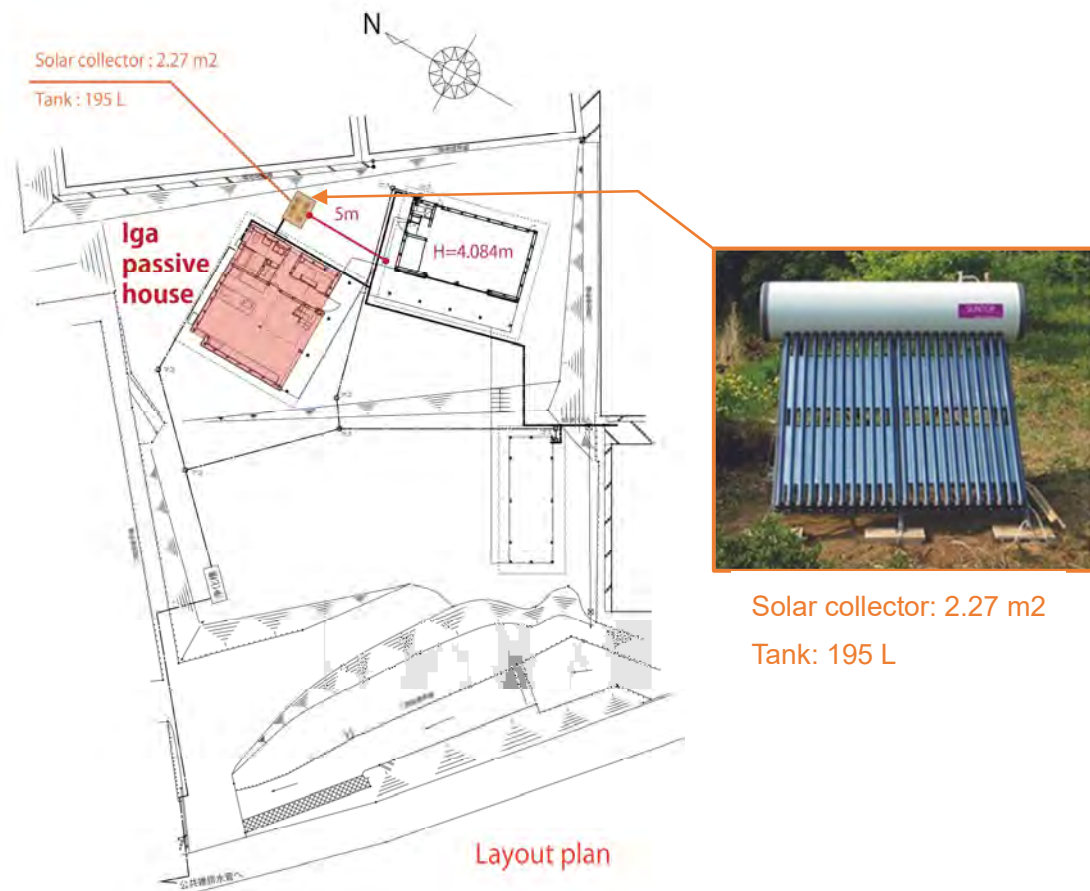


2nd floor plan




Wall mounted Air-conditioner  
(Mainly for Cooling)

## 7.10 DHW (Domestic Hot Water)





## 8. PHPP results

Passive House Verification					
		<b>Building:</b> Iga Passive House <b>Street:</b> 1238 Mashino, Iga <b>Postcode/City:</b> 518-1414 Mie <b>Province/Country:</b> Mie JP-Japan <b>Building type:</b> Detached timber house (single family) <b>Climate data set:</b> ud---00-JP0025(a)-Kyoto <b>Climate zone:</b> 4: Warm-temperate <b>Altitude of location:</b> 300.3 m			
		<b>Home owner / Client:</b> Hideki Mori, Moridakenchisan <b>Street:</b> 1238 Mashino, Iga <b>Postcode/City:</b> 518-1414 Mie <b>Province/Country:</b> Mie JP-Japan			
		<b>Mechanical engineer:</b> Moridakenchisan <b>Street:</b> 1238 Mashino, Iga <b>Postcode/City:</b> 518-1414 Mie <b>Province/Country:</b> Mie JP-Japan			
		<b>Certification:</b> PASSIVE HOUSE JAPAN <b>Street:</b> 3-21-10, Ohmachi, Kamakura <b>Postcode/City:</b> 248-0007 Kanagawa <b>Province/Country:</b> Kanagawa JP-Japan			
<b>Architecture:</b> I+i architects <b>Street:</b> 4-32-4-709 Nishi-Shinjuku, Shinjuku-ku, <b>Postcode/City:</b> 160-0023 Tokyo <b>Province/Country:</b> Tokyo JP-Japan		<b>Energy consultancy:</b> INGEROSEC Corporation <b>Street:</b> 6-5-1 43F Nishi-Shinjuku, Shinjuku-ku <b>Postcode/City:</b> 163-1343 Tokyo <b>Province/Country:</b> Tokyo JP-Japan		<b>Year of construction:</b> 2017 <b>No. of dwelling units:</b> 1 <b>No. of occupants:</b> 2.0	
		<b>Interior temperature winter [°C]:</b> 20.0 <b>Internal heat gains (IHG) heating case [W/m²]:</b> 2.6 <b>Specific capacity [Wh/K per m² TFA]:</b> 84		<b>Interior temp. summer [°C]:</b> 25.0 <b>IHG cooling case [W/m²]:</b> 2.6 <b>Mechanical cooling:</b> x	
<b>Specific building characteristics with reference to the treated floor area</b>					
Treated floor area m²		97.4			
Space heating	Heating demand kWh/(m²a)	8.56	15	-	yes
	Heating load W/m²	10.34			
Space cooling	Cooling & dehum. demand kWh/(m²a)	21.20	21	21	yes
	Cooling load W/m²	14.50			
	Frequency of overheating (> 25 °C) %	-	-	-	-
	Frequency of excessively high humidity (> 12 g/kg) %	0	10	-	yes
Airtightness	Pressurization test result n <sub>50</sub> 1/h	0.30	0.6	-	yes
Non-renewable Primary Energy (PE)	PE demand kWh/(m²a)	98	120	-	yes
Primary Energy Renewable (PER)	PER demand kWh/(m²a)	65	-	-	-
	Generation of renewable energy (in relation to projected kWh/(m²a) building footprint area)	3	-	-	-
<small>² Empty field. Data missing. -¹: No requirement</small>					
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.					
<b>Task:</b> 2-Certifier <b>First name:</b> Miwa <b>Certificate ID:</b> 26488_PHJ_PH_20200518_MMO		<b>Surname:</b> Mori <b>Issued on:</b> Kamakura <b>City:</b>		<b>Passive House Classic?</b> yes <b>Signature:</b> <i>M. Mori</i>	

## 9. Year of Construction and Costs

Year: 2017 – 2018

Costs: Information not available

## 10. Further Information

Client and Construction company:

Moridaikenchisan Corporation



<https://www.mori-dai.com/event/passivehouse/>



Architect:

i + i architects

<https://iplusi.info/>



Movie with the interview:

<https://youtu.be/urKjeyTwCvI>

