# Project Documentation

## Abstract

### Detached single family house in Pantelimon-Romania

## Data of building | Gebäudedaten

| | | | |
|---|---|---|---|
| Year of construction | 2021 | **Space heating**<br>**Heizwärmebedarf** | **15**<br>**kWh/(m²a)** |
| U-value external wall | 0,113<br>W/(m²K) | | |
| U-value floor | 0,134<br>W/(m²K) | Primary Energy Renewable (PER) | 29<br>kWh/(m²a) |
| U-value roof | 0,110<br>W/(m²K) | Generation of renewable Energy | 2<br>kWh/(m²a) |
| U-value window | 0,96<br>W/(m²K) | Non-renewable Primary Energy (PE) | 59<br>kWh/(m²a) |
| Heat recovery | 84,9 % | Pressurization test $n_{50}$ | 0,58 $h^{-1}$ |
| Special features | - | | |

## Brief Description

The land is located in the inner city Pantelimon, on Neptune street, tarla 74, Ilfov county. It is free of other constructions, it has an area of 625 $m^2$. and it is family owned (by Mr. Ion Iosif). The beneficiary required through the design theme an individual home of P+1 height. It was desired to create an energy-efficient residential building. So, special attention was paid to the orientation and building materials. The construction is carried out in a simple and modern adapted language, emphasizing on the comfort requirements and housing affordability. The home is connected to public electricity, water and sewer networks. Rainwater will be drained inside the premises. Household waste will be collected separately and evacuated on the basis of a contract with a sanitation company.

### Responsible project participants

| | |
|---|---|
| Architect | arch. Raluca Munteanu, Sandra Șonei - ARHI.MEDE STUDIO |
| Implementation planning | - |
| Building systems | eng. Cornel Stanciu – INSTAL STUDIO |
| Structural engineering | eng. Cătălin Caraza – INGINERIE CREATIVĂ BIROU DE PROIECTARE |
| Building physics | - |
| Passive House project planning | PhD Eng. Varga Szabolcs – V&V Projekt |
| Construction management | - |

### Certifying body

Passivhaus Institut Darmstadt (www.passiv.de)

### Certification ID

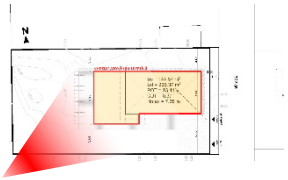
| | |
|---|---|
| 6976 | Project-ID (www.passivehouse-database.org)<br>Projekt-ID (www.passivhausprojekte.de) |

### Author of project documentation

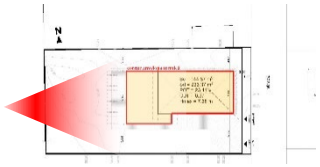
| | |
|---|---|
| Passivhaus Institut Darmstadt (www.passiv.de) |  |
| Date:<br>18 May 2023 | Signature: |

## 1. Exterior photos

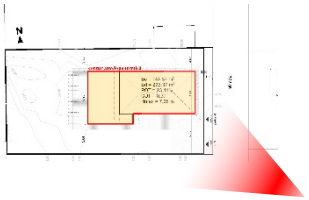
South-West:



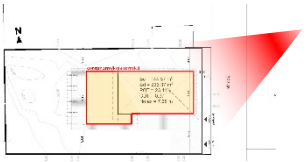
West:



South-East:



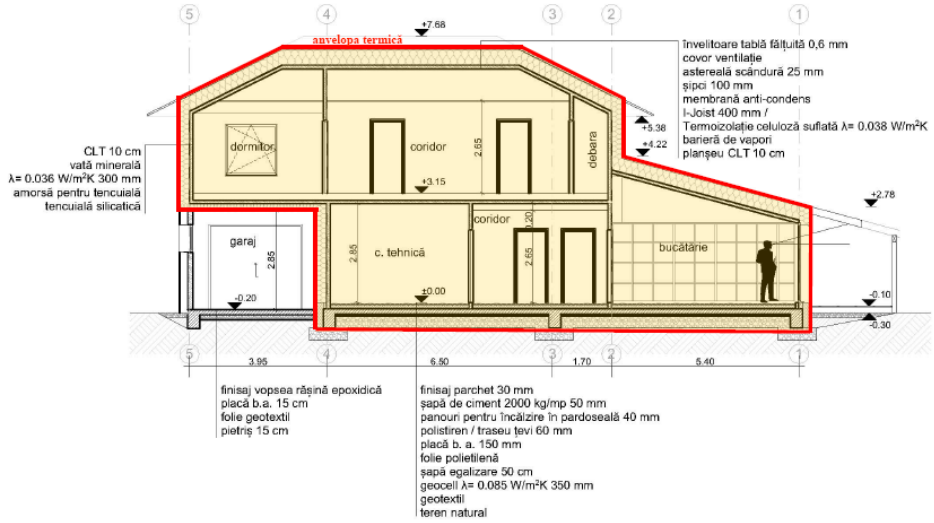
East:





## 2. Interior photos

# 3. Cross sections



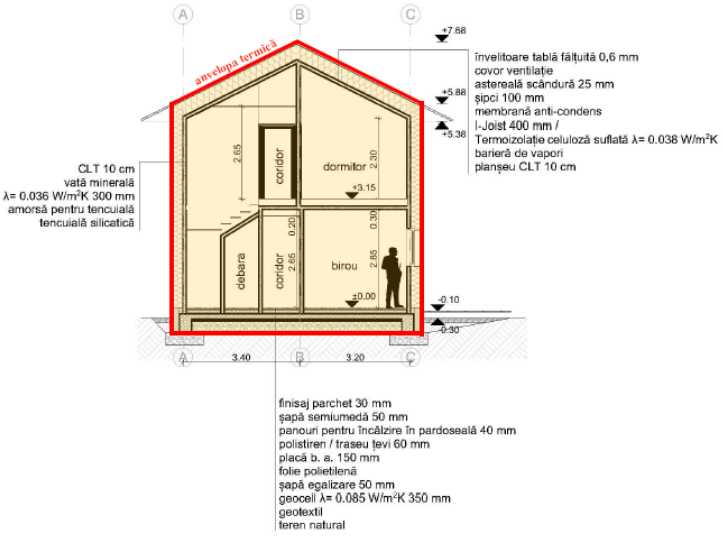

legendă

note

revizii

**LOCUINȚĂ PASIVĂ P+M**
strada Neptun, Pantelimon jud. Ilfov

| | |
|---|---|
| planșa | secțiune 1 |
| nr. planșă | A04 |
| scara | 1:100 |
| data | noiembrie 2019 |
| faza | DTAC |
| beneficiar | Ion Iosif |
| arhitectură | Arhi-Mede Studio srl |
| șef proiect | arh. Raluca Munteanu |
| proiectat | arh. Sandra Șonei |




legendă

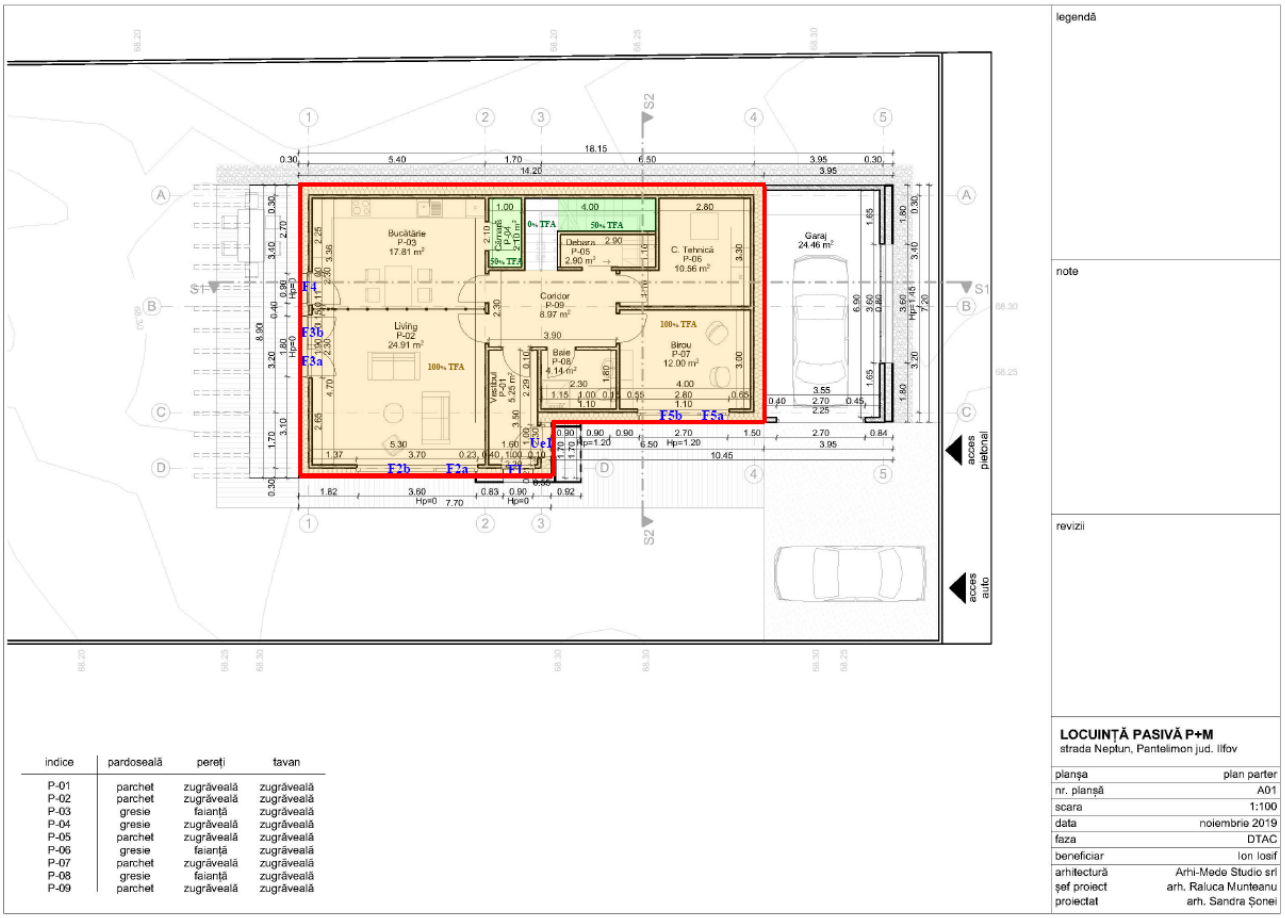
note

revizii

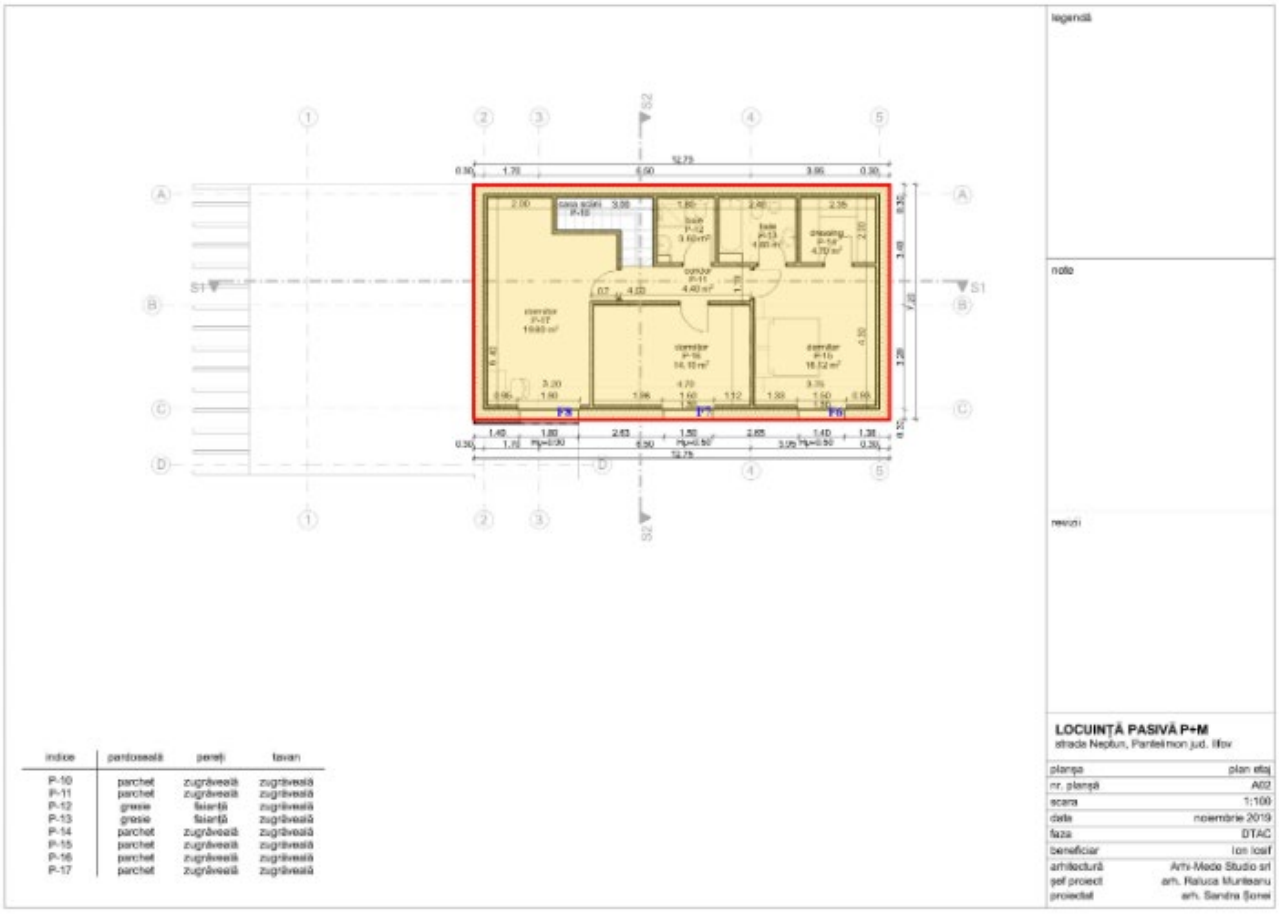
**LOCUINȚĂ PASIVĂ P+M**
strada Neptun, Pantelimon jud. Ilfov

| | |
|---|---|
| planșa | Secțiune 2 |
| nr. planșă | A05 |
| scara | 1:100 |
| data | noiembrie 2019 |
| faza | DTAC |
| beneficiar | Ion Iosif |
| arhitectură | Arhi-Mede Studio srl |
| șef proiect | arh. Raluca Munteanu |
| proiectat | arh. Sandra Șonei |

# 4. Floor plans

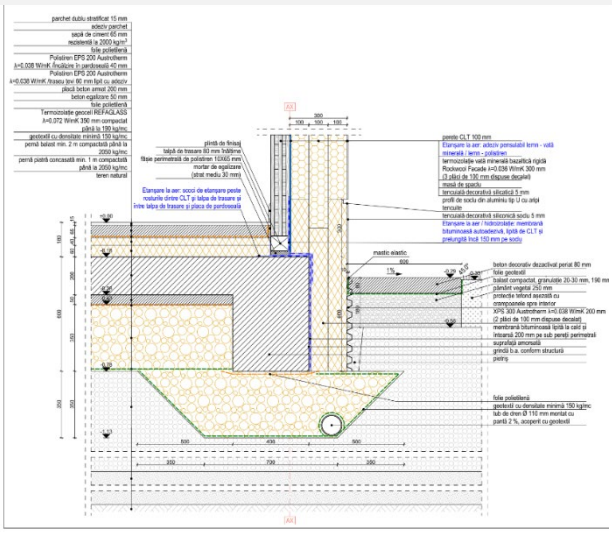



| indice | pardoseală | pereți | tavan |
|---|---|---|---|
| P-01 | parchet | zugrăveală | zugrăveală |
| P-02 | parchet | zugrăveală | zugrăveală |
| P-03 | gresie | faianță | zugrăveală |
| P-04 | gresie | zugrăveală | zugrăveală |
| P-05 | parchet | zugrăveală | zugrăveală |
| P-06 | gresie | faianță | zugrăveală |
| P-07 | parchet | zugrăveală | zugrăveală |
| P-08 | gresie | faianță | zugrăveală |
| P-09 | parchet | zugrăveală | zugrăveală |




| indice | pardoseală | pereți | tavan |
|---|---|---|---|
| P-10 | parchet | zugrăveală | zugrăveală |
| P-11 | parchet | zugrăveală | zugrăveală |
| P-12 | gresie | faianță | zugrăveală |
| P-13 | gresie | faianță | zugrăveală |
| P-14 | parchet | zugrăveală | zugrăveală |
| P-15 | parchet | zugrăveală | zugrăveală |
| P-16 | parchet | zugrăveală | zugrăveală |
| P-17 | parchet | zugrăveală | zugrăveală |

# 5. Construction of floor slab



The thermal insulation under the ground floor is ENERGOCELL type/brand material, thickness 35cm, with λ=0.086W/mK.

The thermal insulation of the plinth is GIAS GRAFIT type/brand material, extruded polystyrene, thickness 20cm, with λ=0.03W/mK, 60 cm depth from the level of the systematized land.

| Component nr. | | | | | | Izolație la interior |
|---|---|---|---|---|---|---|
| 06ud | 6. placa pe sol | | | | | |

Rezistență la transfer termic [m²K/W]

Orientarea elementului de clădire: 0.17 — $R_{si}$ (interior): 0.17

Adiacent la: 0 — $R_{se}$ (exterior): 0.00

| Aria secțiunii 1 | λ [W/(mK)] | Aria secțiunii 2 (optional) | λ [W/(mK)] | Aria secțiunii 3 (optional) | λ [W/(mK)] | Grosime [mm] |
|---|---|---|---|---|---|---|
| finisaj int | 1.200 | | | | | 15 |
| sapa | 1.200 | | | | | 35 |
| sistem incalz. pard. | 0.036 | | | | | 55 |
| polistiren | 0.036 | | | | | 40 |
| placa b.a. | 2.500 | | | | | 200 |
| umplutura | 1.000 | | | | | 400 |
| radier b.a. | 2.500 | | | | | 200 |
| Energocell | 0.086 | | | | | 350 |
| | Procentaj sect. 1 | | Procentaj sect. 2 | | Procentaj sect. 3 | Total |
| | 100% | | | | | 129.5 cm |

supliment la valoarea-U: W/(m²K)

**Valoare-U: 0.134** W/(m²K)

# 6. Construction of exterior walls

The thermal insulation of the external walls is ROCKWOOL Frontrock MAX PLUS type/brand material, thickness 15cm, with λ=0.035W/mK. To this, add the thermal insulation inside the prefabricated timber-frame panels, made of 15cm thick basalt mineral wool, with λ=0.036W/mK:

| Component nr. | | | | | | Izolație la interior? |
|---|---|---|---|---|---|---|
| 02ud | 2. perete ext. | | | | | |

Rezistență la transfer termic [m²K/W]

Orientarea elementului de clădire: 0.13 — $R_{si}$ (interior): 0.13

Adiacent la: 0.04 — $R_{se}$ (exterior): 0.04

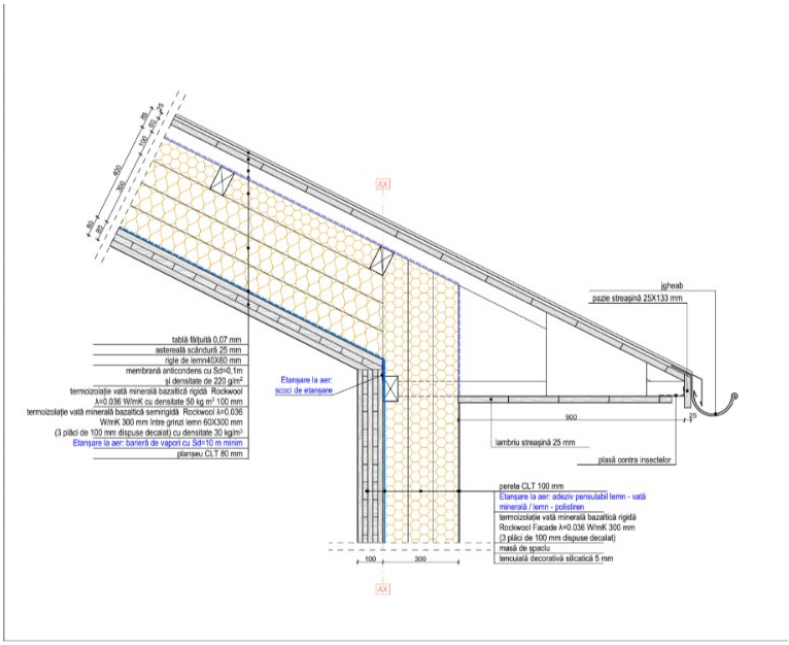
| Aria secțiunii 1 | λ [W/(mK)] | Aria secțiunii 2 (optional) | λ [W/(mK)] | Aria secțiunii 3 (optional) | λ [W/(mK)] | Grosime [mm] |
|---|---|---|---|---|---|---|
| finisaj ext,,, | | | | | | |
| vata min. | 0.035 | | | | | 150 |
| DHF | 0.130 | | | | | 15 |
| vata min din panou TF | 0.036 | | | | | 150 |
| OSB 3 | 0.130 | | | | | 15 |
| finisaj int,,, | | | | | | |
| | | | | | | |
| | | | | | | |

| Procentaj sect. 1 | Procentaj sect. 2 | Procentaj sect. 3 | Total |
|---|---|---|---|
| 100% | | | 33.0 cm |

supliment la valoarea-U: W/(m²K)

**Valoare-U: 0.113** W/(m²K)

# 7. Construction of the roof



The thermal insulation of the roof is ROCKWOOL Acoustic type/brand material, total thickness 40 cm, with λ=0.035W/mK.

| Component nr. | Descriere element de clădire | | | | | Izolație la interior? |
|---|---|---|---|---|---|---|
| 01ud | 1. acoperis | | | | | |

Rezistență la transfer termic [m²K/W]

Orientarea elementului de clădire: 0.1 — $R_{si}$ (interior): 0.10

Adiacent la: 0.04 — $R_{se}$ (exterior): 0.04

| Aria secțiunii 1 | λ [W/(mK)] | Aria secțiunii 2 (optional) | λ [W/(mK)] | Aria secțiunii 3 (optional) | λ [W/(mK)] | Grosime [mm] |
|---|---|---|---|---|---|---|
| finisaj ext,,, | | | | | | |
| Frontrock acoustic | 0.035 | distantieri lemn | 0.130 | | | 200 |
| Frontrock acoustic | 0.035 | | | grinzi lemn | 0.130 | 200 |
| finisaj int,,, | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

| Procentaj sect. 1 | Procentaj sect. 2 | Procentaj sect. 3 | Total |
|---|---|---|---|
| 70% | 15.0% | 15.0% | 40.0 cm |

supliment la valoarea-U: W/(m²K)

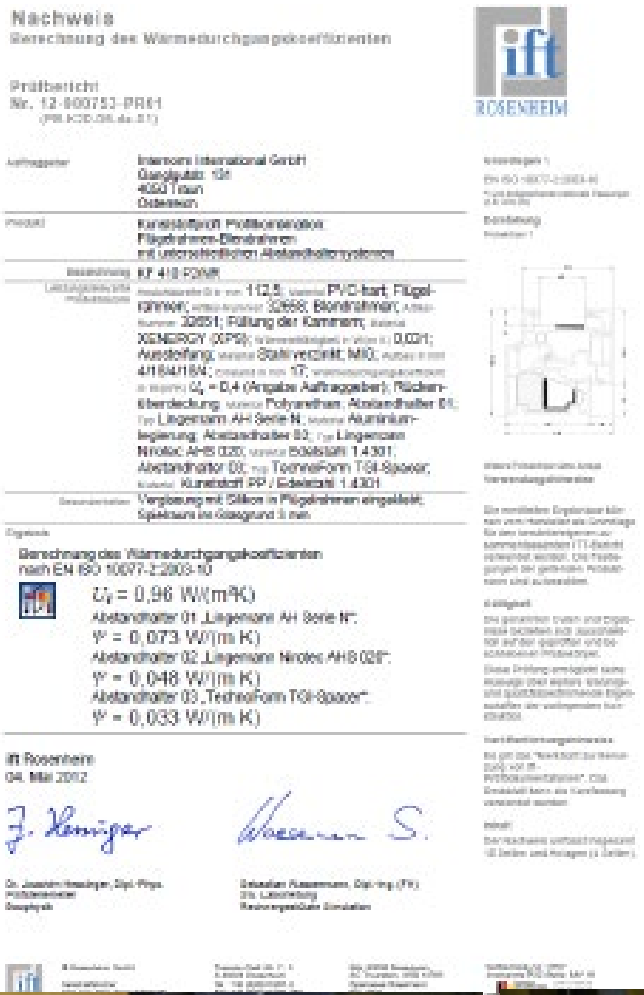
**Valoare-U:** 0.110 W/(m²K)

## 8. Windows

frame:
profile type/brand is INTERNORM KF410, with Uf=0.96W/m$^2$K.

glass:
- SAINT GOBAIN Calumen: 3N2: 4/18Ar/4/18Ar/4mm, with Ug=0,5W/m$^2$K;
- SAINT GOBAIN Calumen 34G: 6/16Ar/6/14Ar/6mm, with Ug=0,6W/m$^2$K;
g=60% and 58%;
ISO spacer black, ψg=0,4 W/mK.





Nachweis
Berechnung des Wärmedurchgangskoeffizienten

Prüfbericht
Nr. 12-000753-PR01

ift ROSENHEIM

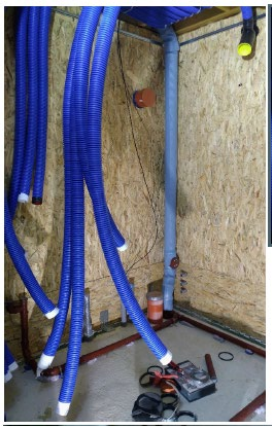
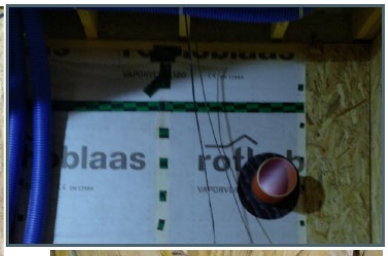
Berechnung des Wärmedurchgangskoeffizienten
nach EN ISO 10077-2:2003-10

$U_f$ = 0,96 W/(m²K)
Abstandhalter 01 „Lingemann AH Serie N":
Ψ = 0,073 W/(m K)
Abstandhalter 02 „Lingemann Nirotec AHS 020":
Ψ = 0,048 W/(m K)
Abstandhalter 03 „TechnoForm TGI-Spacer":
Ψ = 0,033 W/(m K)

ift Rosenheim
04. Mai 2012

The thermal insulation on all sides of the windows is ROCKWOOL Frontrock MAX PLUS, type/brand material (3cm overlapping over the window frame), with λ=0.035W/mK:

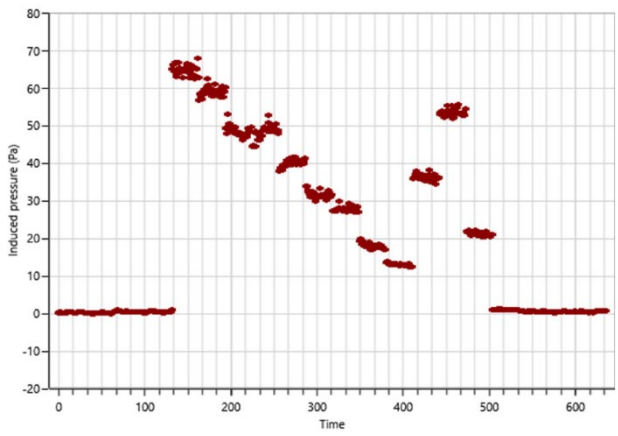
## 9. Airtight envelope

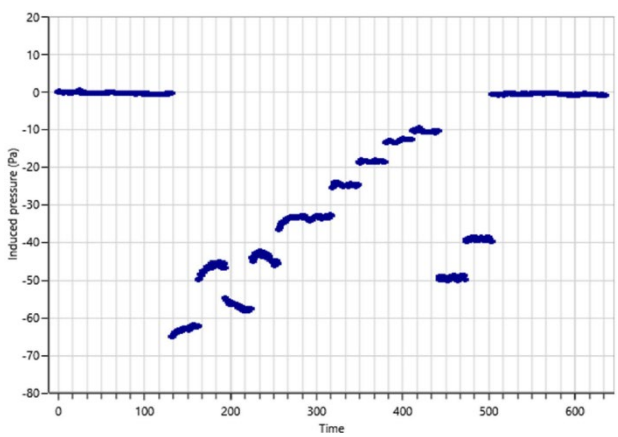




The final pressure test (Blower Door test) was carried out by Mr. Horia Petran (from Urban-Incerc Institute, Bucuresti) on 14 of April 2022, using Retrotec 1000, DM-2 equipment and the result are listed below:

| **Informații privind clădirea si încercarea** | |
|---|---|
| Fișier asociat încercării: | **ISO9972EU_Ion-Iosif_2022-04-14 1607** |
| Volumul interior al clădirii [m³]: | **476,8** |
| Aria anvelopei clădirii [{m²]: | **426** |
| Aria utilă a pardoselii [{m²]: | **159** |
| Înălțimea clădirii (de la sol) [m]: | **7,7** |
| Altitudine [m]: | **90** |
| Exactitatea măsurării volumului: | **3%** |
| Exactitatea măsurării ariei anvelopei: | **3%** |
| Exactitatea măsurării ariei utile: | **3%** |
| Număr de niveluri ale clădirii: | **1** |

| **Rezultate Results** | |
|---|---|
| Nr. de schimburi de aer la 50 Pa, $n_{50}$ [/h] | **0,51** |
| Debit de aer la 50 Pa, [m³/h] | **245,30** |
| Debit de aer la 10 Pa, [m³/h] | **65,225** |
| Debit specific de scurgeri de aer (anvelopă) la 50 Pa, [m³/h/m²] | **0,576** |
| Debit specific de scurgeri de aer (pardoseală) la 50 Pa, [m³/h/m²] | **1,543** |
| Arie echivalentă a neetanșeităților 50 Pa, [cm²] | **74,75** |
| Arie echivalentă specifică a neetanșeităților (anvelopă) la 50 Pa, [cm²/m²]: | **0,17551** |
| Arie echivalentă specifică a neetanșeităților (pardoseală) la 50 Pa, [cm²/m²]: | **0,470** |



## 10. Ventilation unit

The ventilation of the spaces is ensured by a system composed of a plate heat recuperator, ventilation piping and air intake grilles. In this way, a wall-mounted heat recovery unit is provided in the technical room (Zehnder ComforAir Q350 enthalpy, up to 95% recovery, assembled by EcoInstal firm), with the air flow required to ventilate the spaces (rate of the air recuperator is 200 mc/h). This ensures a supply of 100% fresh air treated through the heat recovery unit. Air heating is provided by a heating battery, mounted on the inlet pipe. The distribution network is made up of FLX-HDPE-90 circular piping and air grilles. Fresh air is introduced through air grilles mounted in the floor. The air is exhausted from the rooms through the air grilles mounted in the ceiling. Air distribution is done throughout the building by means of a branched system of air ducts, dimensioned at speeds lower than the maximum admissible ones (according to I5), so that the perceptible noise level is below the maximum admissible limits.

Decorative Radiators ■ Comfortable indoor ventilation ■ Heating and cooling ceiling systems ■ Clean air solutions

zehnder
always the best climate

Zehnder ComfoAir Q 350

The Zehnder ComfoAir Q is the next generation of heat recovery ventilation units, with state of the art design and intelligent technology, regardless of whether you are working on a new build or an old building, with Zehnder comfortable ventilation you have an innovative, tried and tested complete system. It contains features such as its automatic modulating true summer by-pass, world class heat recovery efficiency and integrated humidity sensor to provide a comfortable, healthy and energy-efficient indoor climate.

CCRFZ Radio Frequency | ComfoSense C67 | ComfoSwitch C67 | Zehnder ComfoControl App

**Key Features**

- World class 96% efficiency.
- 100% full and filtered modulating summer bypass.
- Left or right hand configuration through software alone, no mechanical alteration required.
- Commissioning wizard for a quick and simple set-up process.
- Flow control to maintain commissioned flow rates.
- Adaptive comfort technology.
- Automatic passive temperature boost in summer.
- Humidity boost continuously monitors the humidity level within the home and looks for a man-made spike before boosting the unit, irrespective of distance or dilution.
- Tool free filter access.
- ISO ePM1 >65% (F7) filter option.
- App for installer and end user option.
- Wireless commissioning option.
- Remote access option.
- KNX compatibility option.
- 0-10V input option.
- Internal pre-heater option.
- Post heater control option.
- Enthalpy cube option.
- Passive House certified.

**SAP PCDB Test Results**

| | SFP (W/l/s) | | Efficiency (%) | |
|---|---|---|---|---|
| | 2009 | 2012 | 2009 | 2012 |
| K+1 | | 0.60 | | 96% |
| K+2 | 0.60 | 0.53 | 96% | 95% |
| K+3 | 0.51 | 0.57 | 95% | 94% |
| K+4 | 0.50 | 0.64 | 95% | 94% |
| K+5 | 0.54 | 0.72 | 94% | 93% |
| K+6 | 0.60 | 0.89 | 94% | 93% |
| K+7 | 0.68 | 1.03 | 94% | 93% |

**SEC Class**

A+ Based on average climate with local demand control

**Passive House Certification**

| | Standard heat exchanger | Enthalpy heat exchanger |
|---|---|---|
| Air flow range | 70-270m³/hr | 70-270m³/hr |
| Heat recovery rate | nHR=80% | nHR=86% |
| Specific electric power | Pel,spec=0.24 Wh/m³ | Pel,spec=0.22 Wh/m³ |
| Humidity recovery | | nx = 73% |

CERTIFIED COMPONENT

ECO INSTAL

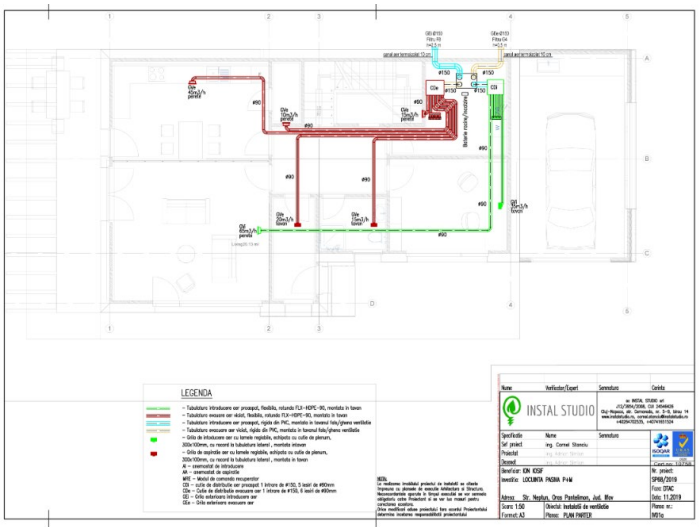
**S.C. ECOINSTAL IT CONSULT S.R.L**
STR. FĂGĂRAȘULUI 12/26, 545300 REGHIN, JUD. MUREȘ
J26/397/2003 RO15349603
TEL. 0745 54 22 46
contact@pompedecaldura.eu
www.pompedecaldura.eu

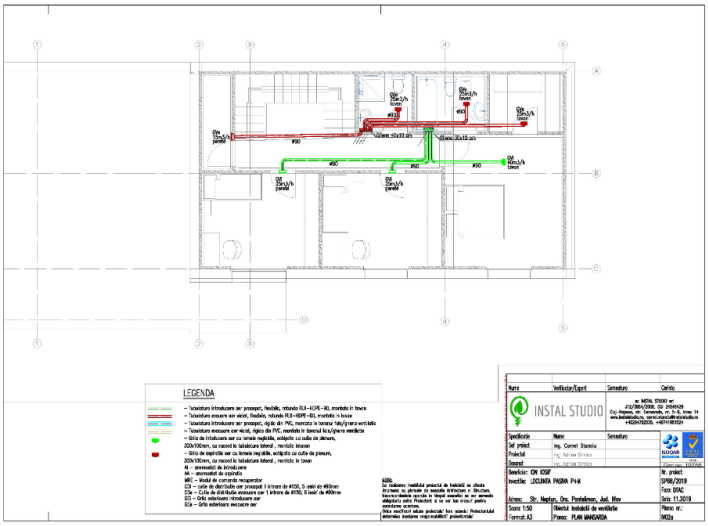
**ANEXA 4/20.05.2021 LA CONTRACT 17/20.05.2021**

| | | | | |
|---|---|---|---|---|
| **Beneficiar** | **Oferta de pret** | **2020-248** | **din** | 12-Jun-2020 |
| **Iosif Ion** | | | | |
| **Pantelimon** | **Date santier:** | **Casa unifamiliala** | | |
| **Jud Ilfov** | | **Pantelimon** | | |
| | | **Jud Ilfov** | | |
| **Tel:** | | | | |
| **Mobil:** | | | | |
| **e-mail:** | | | | |

| Art-Nr.: | Articol | Cantit. | Preț € | Sumă € |
|---|---|---|---|---|
| | **Aparat de ventilare**<br>Zehnder ComfoAir Q350 enthalpy | 1.00 buc. | | |
| | Aparat de ventilaţie cu o recâştigare de energie de pana la 95% şi cu o capacitate de 350 m³/h, 3 trepte reglabile fiind cel mai silenţios si mai eficient aparat de pe piaţă.<br><br>Aparatul este încorporat într-o carcasă de polistiren foarte uşoară şi rezistentă la zgârieturi,presiune şi şocuri, având un schimbător de căldură cu o suprafaţă desfăşurată de **60 m²,** ceea ce înseamnă că suprafaţa de schimb de căldură este de 8 ori mai mare ca si la schimbatoarele de căldură obişnuite. Aparatul este dotat cu un Bypass de vară pentru o ventilare comfortabilă in lunile de vară. Acest aparat este certificat ca fiind cel cu cea mai mare eficienţă şi funcţionează cu ventilatoare alimentate cu curent continuu foarte economice. | | | |
| | **ComfoConnect Lan C interface**<br>optional | 1.00 buc. | | |

# 11. Ventilation distribution





INSTAL STUDIO

| | | |
|---|---|---|
| 6. | Plenum<br><br>- racord de 90<br>- din plastic<br>- deschiderea acaptorului este mai lunga cu 10 mm decat gmarimea grilei | |
| 7. | Grila de transfer 150x300, cu lamele fixe, montate in perete<br><br>- grilele concepute pentru a avea o arie cat mai libera a aerului<br>- din aluminiu<br>- diametrul interior: 150 (mm)<br>- diametrul exterior: 210 (mm) | |
| 8. | Grila de exterior<br><br>- dimensiuni: 260x150 (mm)<br>- confectionata din plastic<br>- flansa cu DN=150 (mm)<br>- plasa de insecte: 260x260 (mm) | |
| 9. | Izolatie termica elastomerica:<br><br>- domeniu de temperatura: -40 °C - +116 °C<br>- conductivitate termica la 0°C: 0.036 W/mK<br>- conductivitate termica la 40°C: 0.040 W/mK<br>- banca autocolanta pentru acoperirea imbinarilor, etansarea izolatiei<br>- diluant si lipici pentru fixarea izolatiei pe tubulatura | |

**Intocmit,**
Ing. Adrian Simion

**Data,**
Noiembrie 2019



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INSTAL STUDIO

**10.2a. SPECIFICAŢII TEHNICE MATERIALE VENTILATII**

Materialele folosite la realizarea instalaţiilor care fac obiectul prezentului proiect trebuie să întrunească următoarele condiţii :

**Specificaţii tehnice pentru materialele utilizate la instalaţiile de ventilatie**

| Nr. crt. | Denumire, caracteristici principale | Fotografie |
|---|---|---|
| 1. | Canale rigide de aer:<br><br>- confectionat din polietilena<br>- circulare<br>- semirigid<br>- tratat impotriva bacteriilor<br>- diametre ajung pana la 160 (mm) | |
| 2. | Tubulatura flexibila izolata<br><br>- tratat impotriva bacteriilor<br>-temperatura max. 250 (°C)<br>- rezistenta la imbatranire<br>- rezistenta la produse chimice<br>- sunt flexibile<br>- DN=90 (mm) | |
| 3. | Accesorii canale aer:<br><br>- confectionat din polietilena<br>- circulare<br>- semirigid<br>- tratat impotriva bacteriilor | |
| 4. | Sisteme de prindere<br><br>- sisteme de prindere formate din: ancoră de fixare, tije filetate de susţinere, brida metalica de fixare, colier izolant pentru tubulatură circulară si redangulara | |
| 5. | Grila de faţaţ pe 4 directii cu plenum:<br><br>- jaluzele mobile pentru evacuare sau aspiratie aerului<br>- din aluminiu special extrudat<br>- dimensiuni 260x160 | |



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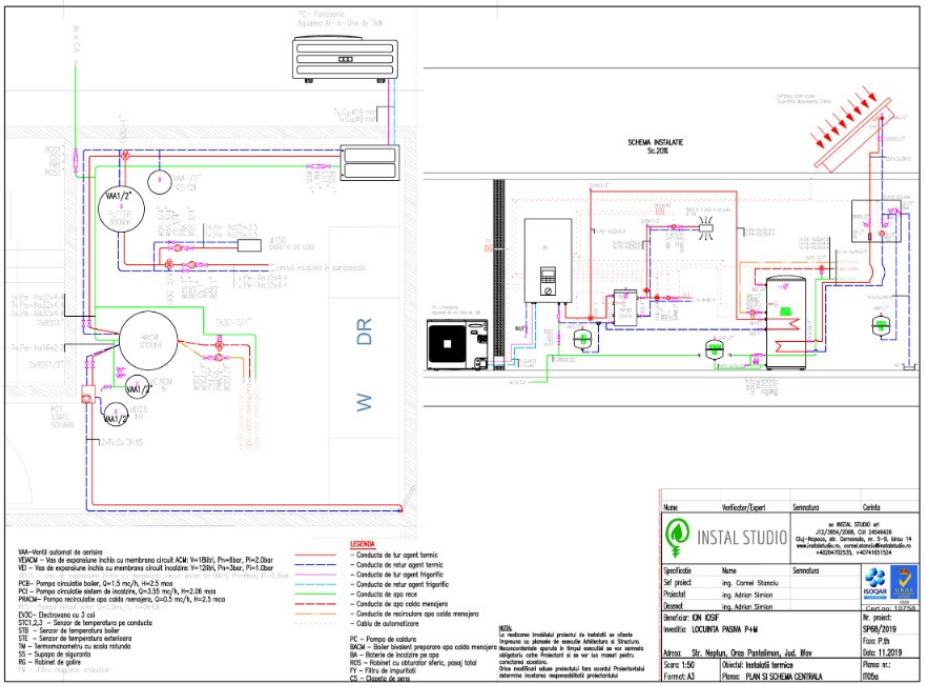
## 12. Heating

An air-water heat pump and floor heating system were provided for the entire building; the distribution is carried out through cross-linked polyethylene pipes, the joints being made with a sliding sleeve. The necessary heating agent will be prepared centrally by means of a 7kW air-water heat pump and a 300-liter boiler. The adjustment of the heating agent parameters is done centrally in the heating plant, at a temperature of 40/35°C. The central unit is used for the heating circuit and for the preparation of domestic hot water with the help of a 300 l boiler mounted on the domestic hot water circuit. An 18 l expansion tank will be installed on the domestic hot water circuit. The heating agent is water, the flow temperature of the heating agent is 60ºC and the return temperature of the heating agent is 40ºC. Shut-off valves on flow and return and type FY filter on flow are provided for the central unit. For the distribution of the thermal agent, two distributors / collectors for underfloor heating were provided.
Solar and photovoltaic panels are to be added into the next phase.




ECO INSTAL

S.C. ECOINSTAL IT CONSULT S.R.L
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| | | | | |
|---|---|---|---|---|
| POMPA DE CALDURA SOLUTIE GLICOL/APA STANDARD | | | | |
| POMPA DE CALDURA ECOINSTAL 7 KW SWS SOL-APA | | | | |
| 1 SONDA IN SOL 40 MM | | | | |
| IOSIF ION | | | | |
| ORAS PANTELIMON | | | | |
| | TEMP SURSA C | TEMP AGENT TERMIC C | PUTERE TERMICA INCALZIRE KW | COP |
| PUNCT DE INCERCARE 1 | -7 | 35 | 7.84 | 4.7 |
| PUNCT DE INCERCARE 2 | 0 | 35 | 8.08 | 4.84 |
| PUNCT DE INCERCARE 3 | 5 | 35 | 8,51 | 5.1 |
| PUNCT DE INCERCARE 4 | -5 | 55 | 5.34 | 3.2 |
| PUNCT DE INCERCARE 5 | 0 | 55 | 5.67 | 3.4 |
| PUNCT DE INCERCARE 6 | 5 | 55 | 6.76 | 4.05 |

DIFERENTA DE TEMPERATURA IN SURSA CALDA 5 C

ECOINSTAL IT CONSULT

## 13. Construction costs

This passive house was finished last year, with a total cost of roughly 300.000 EUR (approx. 1270EUR/$m^2$). Additional investments for passive requirements were around 300EUR/$m^2$). or about 24% of the construction costs.

## 14. Literature


- Passivhaus-Bauteilkatalog _ Details for Passive Houses_ Ökologisch bewertete Konstruktionen-Springer Vienna (2008);
- Christina J. Hopfe, Robert S. McLeod-The Passivhaus designer's manual-Routledge (2014);
- Understanding architectural details - 1, 2 and 3, Emma Walshaw;
- Transfer de caldura si masa, Gelu Coman;
- Bazele transferului de caldura si masa in costructii, curs;
- web – Passive House Institute pages:
    - Passipedia articles (public or for IPHA members);
    - Component database.

# 15. PHPP-Results

## Casa Pasivă - Verificare

| | | | |
|---|---|---|---|
| **Clădire:** | Locuință pasivă P+M | | |
| Strada: | Neptun, nr. 12 | | |
| Cod poştal/Localitate: | 77145 | Pantelimon | |
| Provincia/Ţara: | jud. Ilfov | RO-România | |
| Tip de clădire: | locuinta unifamiliala | | |
| Set de date climatice: | ud---04-RO0004a-Bucharest | | |
| Zonă climatică: | 4: Temperată caldă | Altitudine: | 68 m |
| **Proprietar / Client:** | Iosif Ion şi Iosif Daniela-Cristina | | |
| Strada: | Prevedrii, nr. 13A | | |
| Cod poştal/Localitate: | 32294 | Bucureşti | |
| Provincia/Ţara: | Bucureşti | RO-România | |

| | | | |
|---|---|---|---|
| **Arhitectură:** | arch. Raluca Munteanu, Sandra Şonei - Arhi.Mede | | |
| Strada: | str. Colentina, nr. 2C | | |
| Cod poştal/Localitate: | 21173 | mun. Bucureşti | |
| Provincia/Ţara: | Bucureşti | RO-România | |
| **onsultanţă energetică:** | arch. Adriana-Niculina Sîngeap - BIA | | |
| Strada: | Baba Novac, nr. 18 | | |
| Cod poştal/Localitate: | 31629 | mun. Bucureşti | |
| Provincia/Ţara: | Bucureşti | RO-România | |

| | | | |
|---|---|---|---|
| **Inginer instalaţii:** | eng. Cornel Stanciu- INSTAL STUDIO | | |
| Strada: | Cernavoda, nr. 5-9 | | |
| Cod poştal/Localitate: | 400188 | Cluj-Napoca | |
| Provincia/Ţara: | jud. Cluj | RO-România | |
| **Certificare:** | PhD Eng. Ɣarga Szabolcs - Ɣ&Ɣ Projekt | | |
| Strada: | Gödri Ferenc nr. 2, bl. 2. ap. 31 | | |
| Cod poştal/Localitate: | 520023 | Sfantu Gheorghe | |
| Provincia/Ţara: | Covasna | RO-România | |

| | | | | | |
|---|---|---|---|---|---|
| Anul de construcţie: | 2021 | Temperatură interioară de iarnă [°C]: | 20.0 | Temp. Int. de vară [°C]: | 25.0 |
| Nr. de unităţi de locuit: | 1 | Aporturi interne de căldură (IHG) pentru încălzire [W/m²]: | 2.4 | IHG caz răcire [W/m²]: | 5.1 |
| Nr. de ocupanţi: | 3.0 | Masivitate termică [Wh/K pe m² TFA]: | 84 | Răcire artificială: | x |

**Caracteristici specifice clădirii raportate la aria de referinţă a pardoselii**

| | | | | | Criterii | Criterii alternative | Îndeplinit?[2] |
|---|---|---|---|---|---|---|---|
| | Aria utilă a pardoselii | m² | 156.1 | | | | |
| **Încălzire spaţii** | Necesar de căldură încălzire | kWh/(m²a) | 15 | ≤ | 15 | - | da |
| | Sarcina termică | W/m² | 15 | ≤ | - | 10 | |
| **Răcire spaţii** | Nec. răcire & dezumid. | kWh/(m²a) | 14 | ≤ | 15 | 15 | da |
| | Sarcină de răcire | W/m² | 10 | ≤ | - | 10 | |
| | Frecvenţa perioadei de supraîncălzire (> 25 °C) | % | - | ≤ | - | | - |
| | Frecvenţa per. cu umiditate excesiv de mare (> 12 g/kg) | % | 0 | ≤ | 10 | | da |
| **Etanşeitate la aer** | Rezultat test la presiune $n_{50}$ | 1/h | 0.6 | ≤ | 0.6 | | da |
| **Energie Primară Neregenerabilă (PE)** | Consum PE | kWh/(m²a) | 59 | ≤ | - | | - |
| **Energie primară regenerabilă (PER)** | Necesar PER | kWh/(m²a) | 29 | ≤ | 60 | 60 | da |
| | Producţie de energie regenerabilă (raportată la aria amprentei la sol a clădirii) | kWh/(m²a) | 2 | ≥ | - | - | |

[2] Câmp gol: Lipsă date; '-': Nici o cerinţă

Confirm că aceste valori furnizate aici au fost determinate urmând metodologia PHPP şi sunt bazate pe valorile caracteristice ale clădirii. Calculele PHPP sunt ataşate acestei verificări.

**Casă Pasivă Classic?** da

| Sarcina: | Prenume: | Nume: | Semnătura: |
|---|---|---|---|
| 2-Certificator | Szabolcs | Ɣarga | |