Project Documentation
Gebäude-Dokumentation

Abstract | Zusammenfassung

© Rimvydas Adomaitis

Single-family dwelling in Vilnius, Lithuania

Data of building | Gebäudedaten

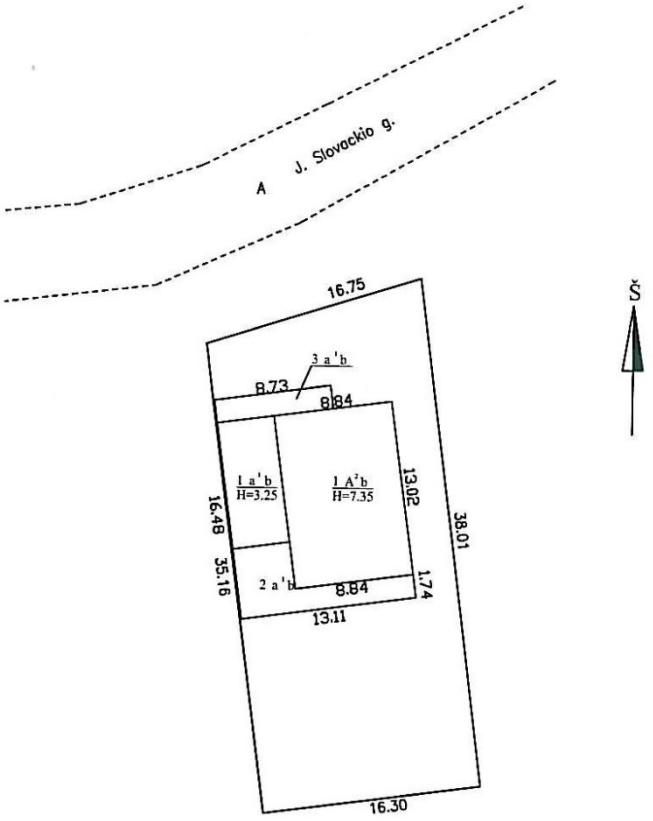
Year of construction Baujahr	2015	**Space heating** **Heizwärmebedarf**	**15** **kWh/(m²a)**
U-value external wall U-Wert Außenwand	0,087 W/(m²K)		
U-value ground floor U-Wert Kellerdecke	0,098 W/(m²K)	Non-renewable Primary Energy (PE) Nicht erneuerbare Primärenergie (PE)	117 kWh/(m²a)
U-value roof U-Wert Dach	0,063 W/(m²K)	Pressurization test n_{50} Drucktest n_{50}	0,21 h^{-1}
U-value window U-Wert Fenster	0,78 W/(m²K)		
Heat recovery Wärmerückgewinnung	84 %		

Single-family dwelling in Vilnius, Lithuania

This house, the living area of which is 169 m², is the first in Lithuania single family dwelling, certificated in 2015 by Passive house institute (PHI) in Germany. It was built in Lithuania, in Vilnius, in the region of single family dwellings of Naujoji Vilnia.

The project of the house was prepared in the period of 2013-2014, the work was done in 2014-2015. The house is built in not a big land plot of 600 m2, the driveway is planned from the Northern side. The relief of the site has a little inclination to the Eastern part. From the East the house is surrounded by a garden, from the South - one floor dwelling house, from the Southwest - two floors dwelling house. The influence of shading objects is evaluated PHPP.

The compact house consists of two floors. Beside the house is not heating garage, storage, and the open terrace. The living-rooms are orientated to the South, where is the inner courtyard. The big windows of the Southern side secure the light of the sun in the winter, and jalousie and a small roof give the protection from the heat in the summer.



Sklypo ribų pažymėjimui panaudotas geodeziškai išmatuoto
sklypo Kad. Nr. 0101/0048:4621 planas,
parengtas 2012-07-02 dieną UAB "Geoksis" matininko V. Kazlausk

Responsible project participants
Verantwortliche Projektbeteiligte

Architect Entwurfsverfasser	Rimvydas Adomaitis, Vilnius P.A.R.Y.Ž.I.U.S. ,UAB http://www.taupusnamai.lt
Implementation planning Ausführungsplanung	Rimvydas Adomaitis, Vilnius P.A.R.Y.Ž.I.U.S. ,UAB http://www.taupusnamai.lt
Building systems Haustechnik	Pastatų inžinerinės technologijos , UAB Tomas Cipkus
Structural engineering Baustatik	Karolis Barysas
Building physics Bauphysik	Karolis Januševičius EE plius, UAB

Certifying body
Zertifizierungsstelle

Passivhaus Institut Darmstadt
www.passiv.de

Certification ID
Zertifizierungs ID

4676	Project-ID (www.passivehouse-database.org) Projekt-ID (www.passivhausprojekte.de)

Author of project documentation
Verfasser der Gebäude-Dokumentation

Rimvydas Adomaitis

Date Datum	06.01.2020	Signature Unterschrift	

1. Views of the building

North view of the house

North-east view of the house

Motorized blinds

Weather station to control motorized blinds

South-west view of the house

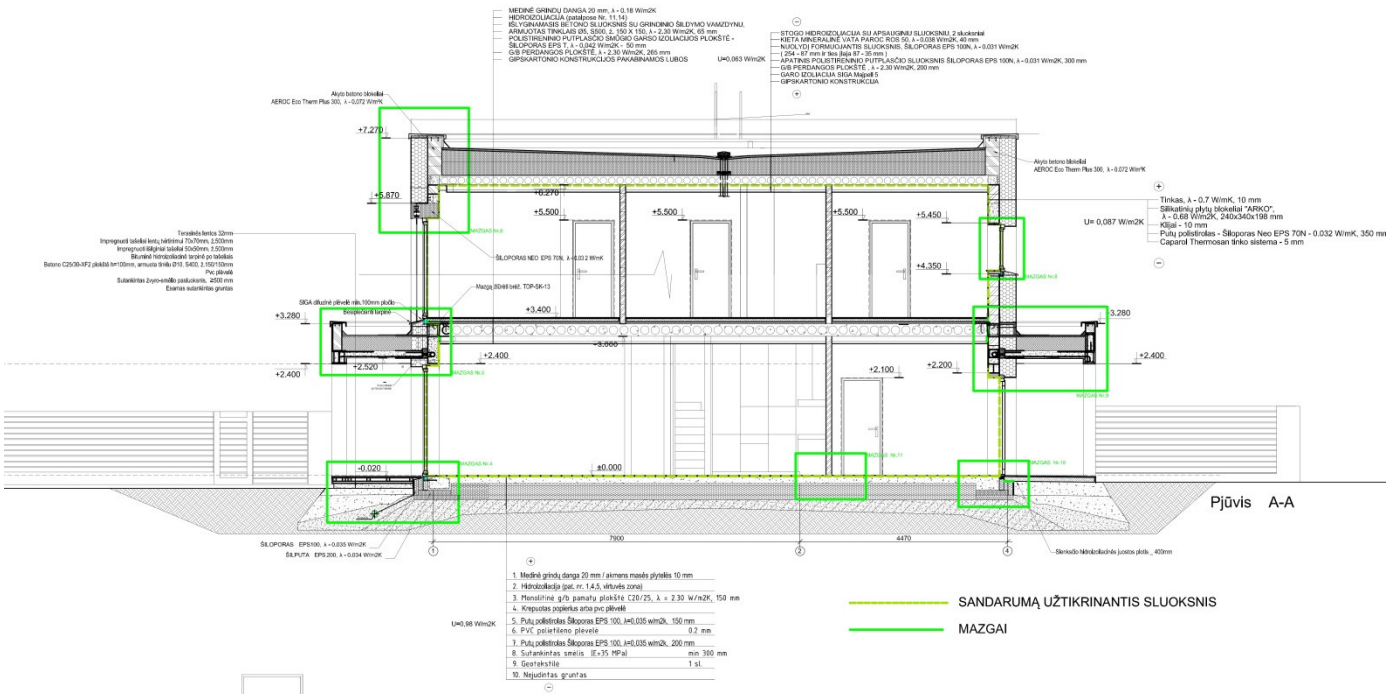
South view of the house

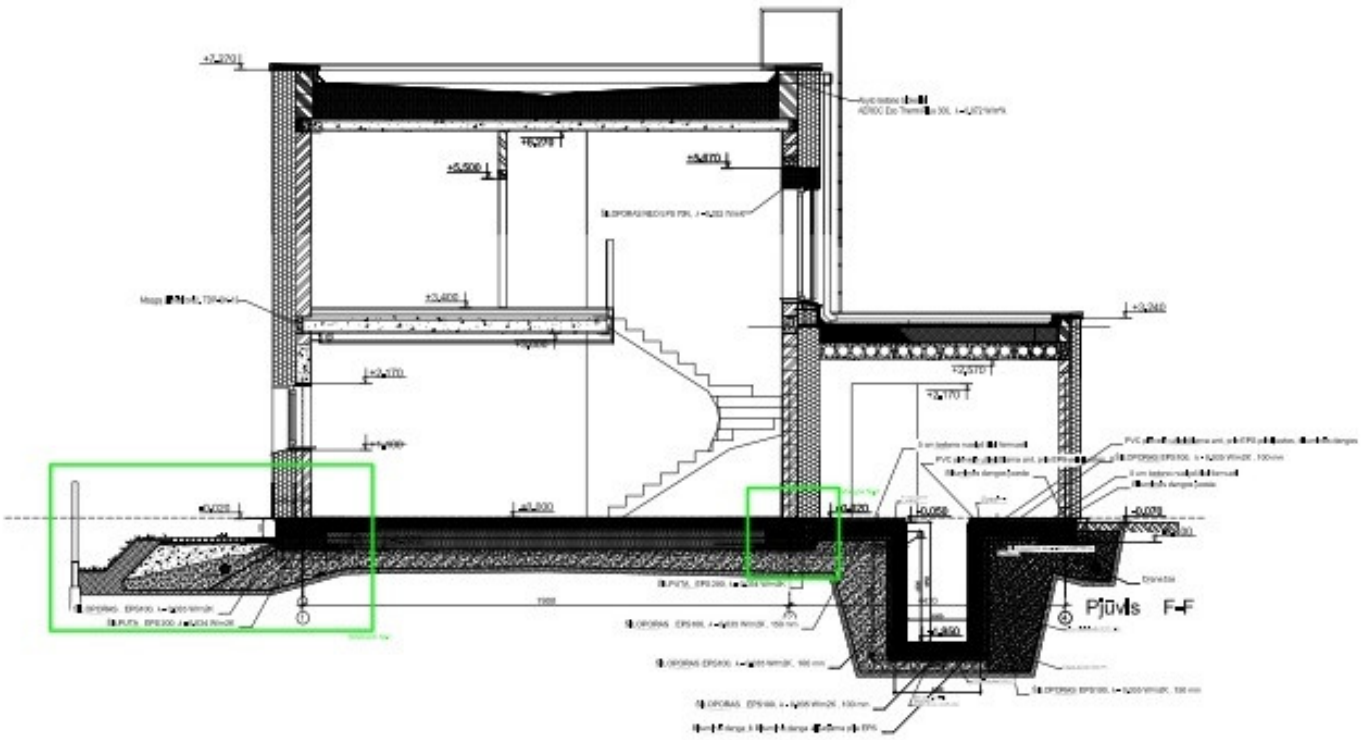
Roof on the south side

Porch

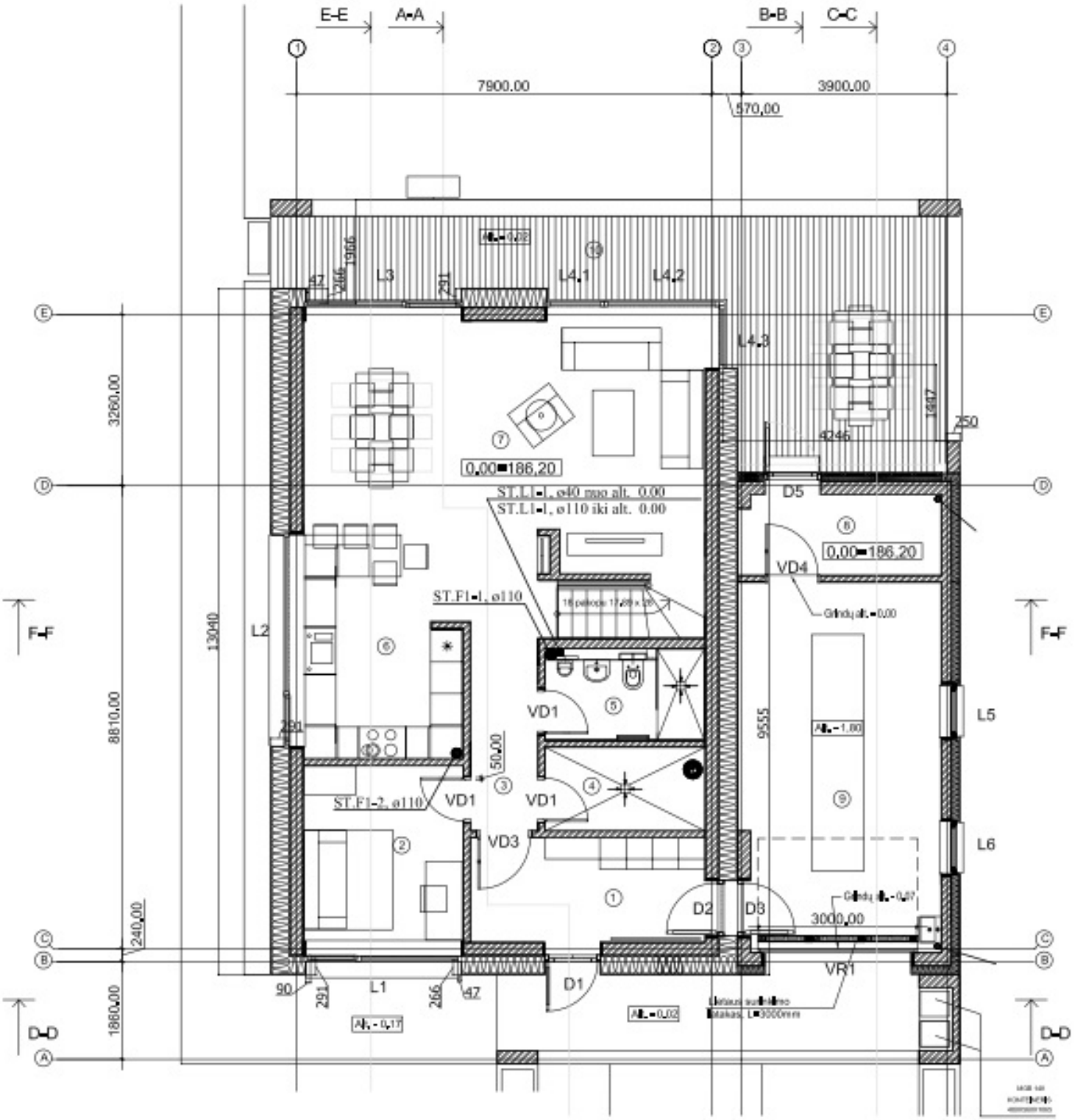
2. The interior

3. Sections

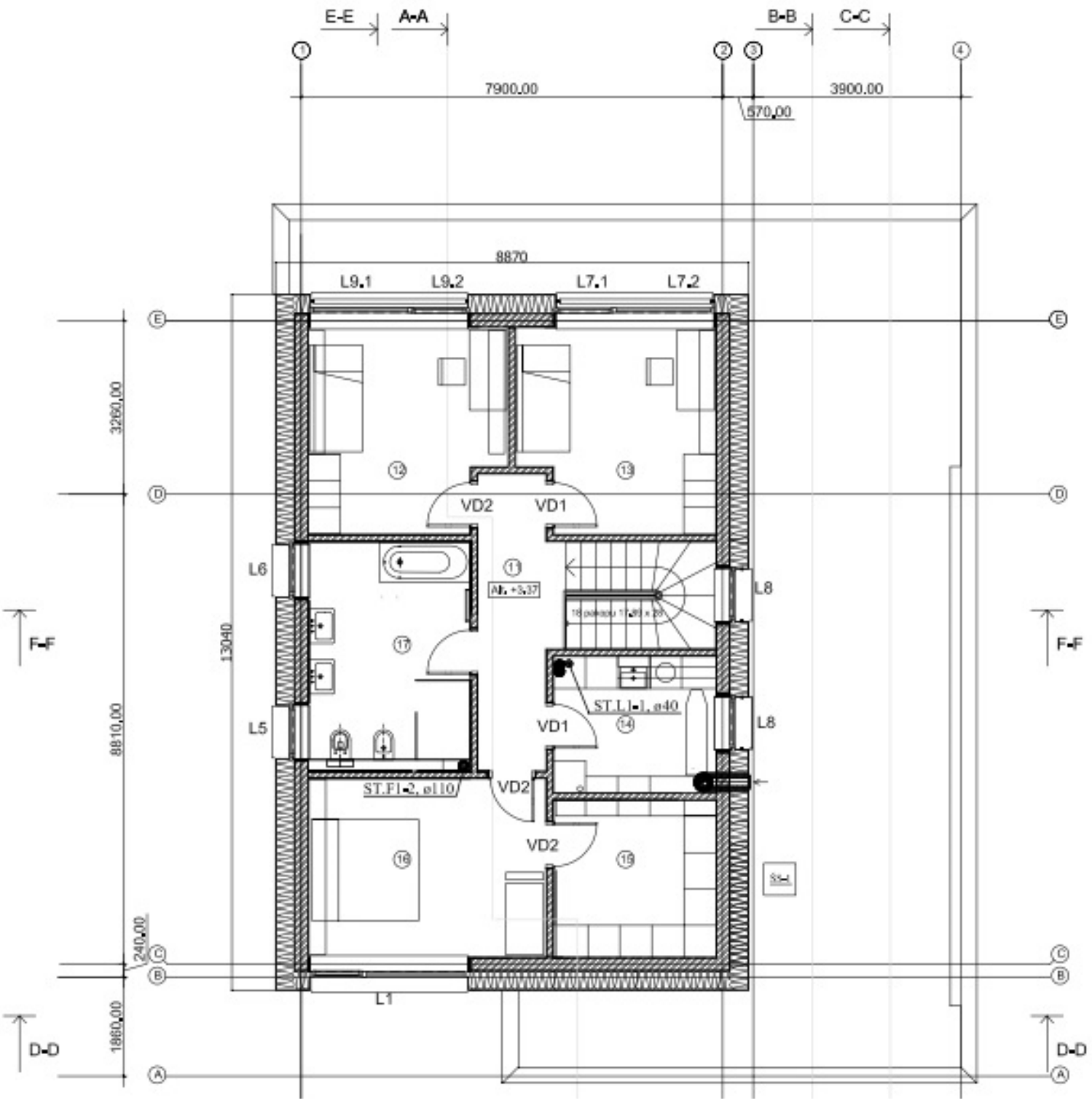

Pjūvis A-A
SANDARUMĄ UŽTIKRINANTIS SLUOKSNIS
MAZGAI


Pjūvis F-F

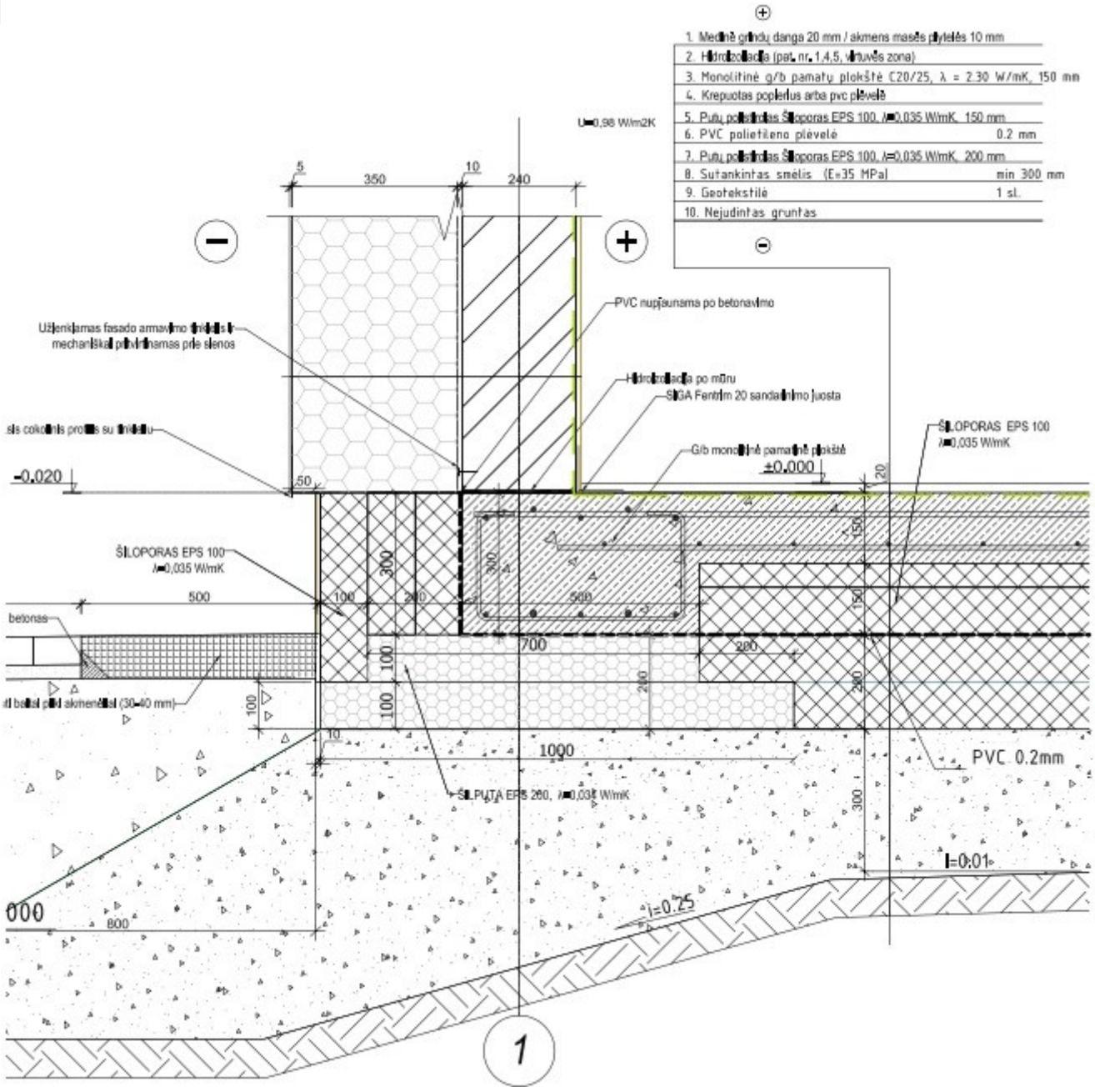
4.1. Ground floor plan



4.2. Second floor plan



5. Construction of floor slab



Assembly no.	Building assembly description	Interior insulation?
3	Floor	

Heat transfer resistance [m²K/W] interior R_{si} : 0.17
exterior R_{se} : 0.00

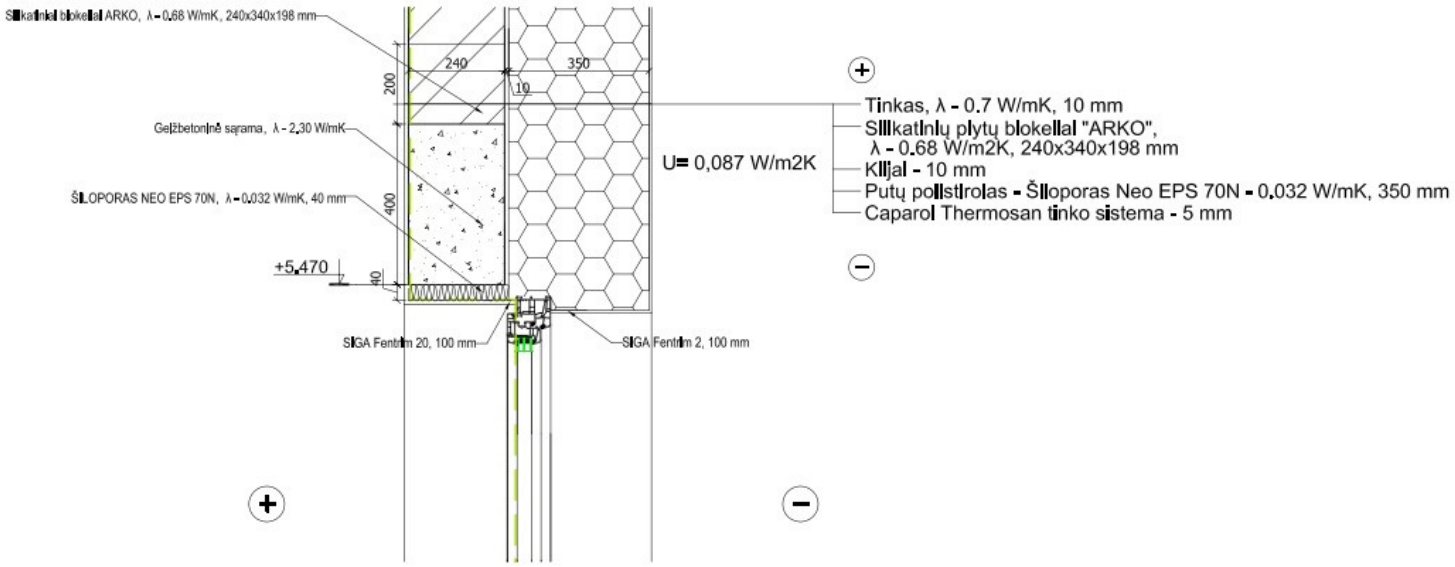
	Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
1.	Wooden floor	0.000					20
2.	Concrete layer	2.300					150
3.	EPS 100	0.035					350
4.							
5.							
6.							
7.							
8.							

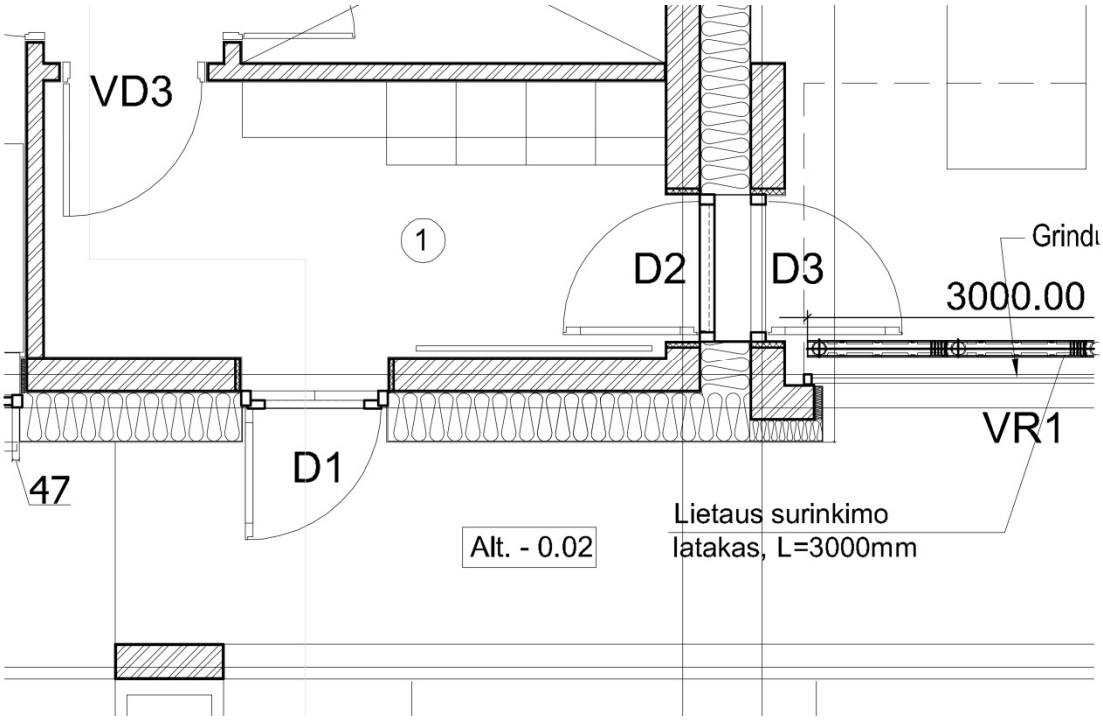
Percentage of sec. 1	Percentage of sec. 2	Percentage of sec. 3	Total
100%			52.0 cm

U-value supplement W/(m²K)

U-Value: 0.098 W/(m²K)

6. Construction of the exterior walls





Assembly no.	Building assembly description	Interior insulation?
1	Wall	

Heat transfer resistance [m²K/W] interior R_{si} : 0.13
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]
1.	Plaster	0.700					10
2.	ARKO Block	0.680					240
3.	EPS 70 N	0.032					350
4.	Plaster	0.700					10
5.							
6.							
7.							
8.							

Percentage of sec. 1	Percentage of sec. 2	Percentage of sec. 3	Total
100%			61.0 cm

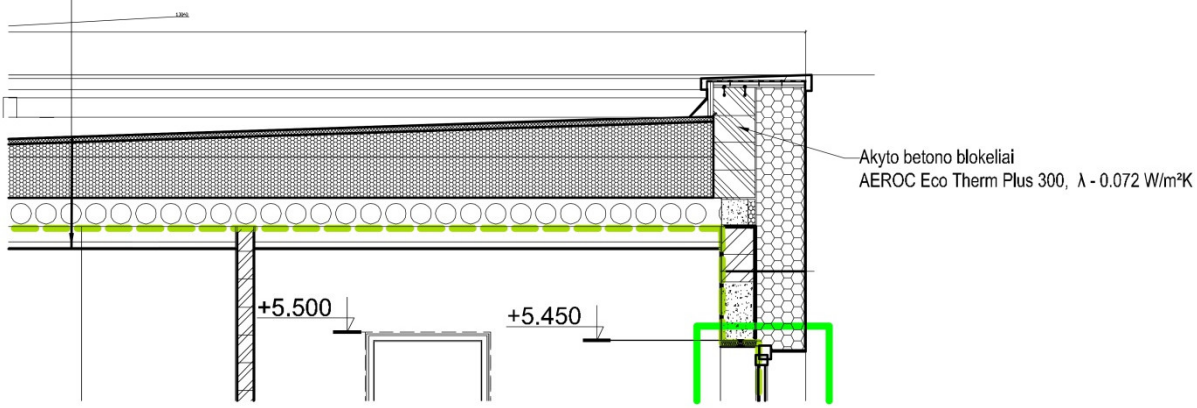
U-value supplement 0.00 W/(m²K)

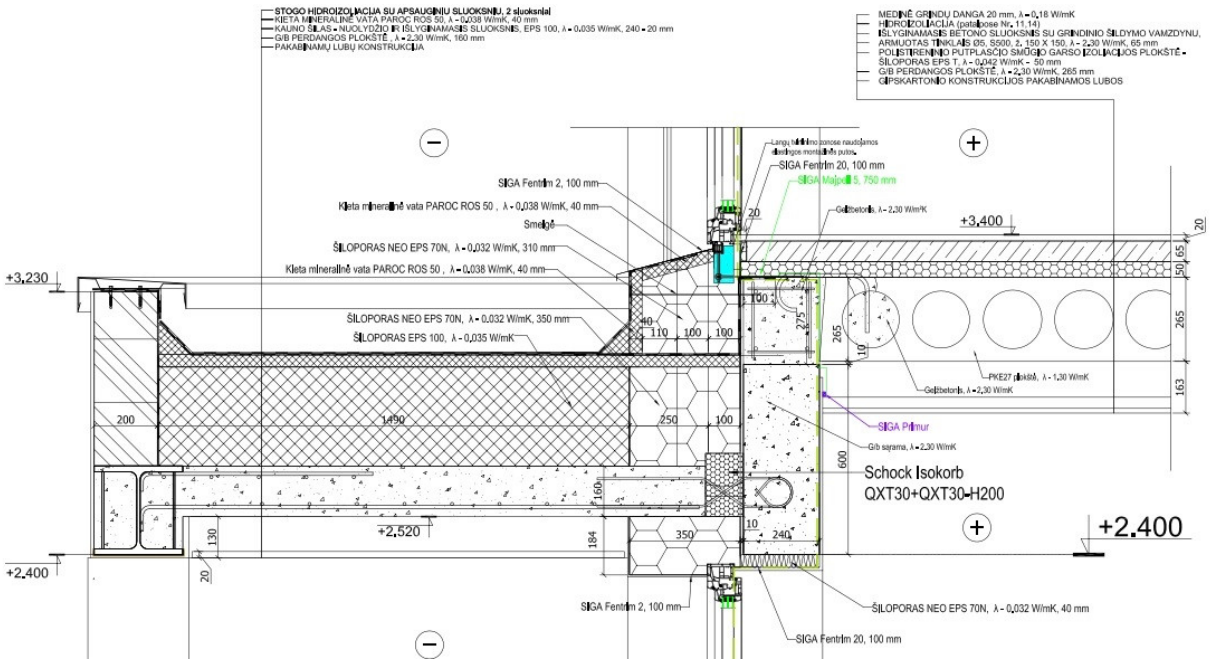
U-Value: 0.087 W/(m²K)

7. Construction roof

U=0,063 W/m2K

STOGO HIDROIZOLIACIJA SU APSAUGINIU SLUOKSNIU, 2 sluoksniai
KIETA MINERALINĖ VATA PAROC ROS 50, λ - 0.038 W/m2K, 40 mm
NUOLYDĮ FORMUOJANTIS SLUOKSNIS, ŠILOPORAS EPS 100N, λ - 0.031 W/m2K
(254 - 87 mm ir ties įlaja 87 - 35 mm)
APATINIS POLISTIRENINIO PUTPLASČIO SLUOKSNIS ŠILOPORAS EPS 100N, λ - 0.031 W/m2K, 300 mm
G/B PERDANGOS PLOKŠTĖ , λ - 2.30 W/m2K, 200 mm
GARO IZOLIACIJA SIGA Majpell 5
GIPSKARTONIO KONSTRUKCIJA





Assembly no.	Building assembly description	Interior insulation?
2	Roof	

Heat transfer resistance [m²K/W] interior R_{si} : 0.10
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]
1.	Reinforced concrete	2.300					200
2.	EPS 100N	0.032					387
3.	EPS 100N	0.032					84
4.	Mineral wool	0.040	see Sidecalculation				40
5.							
6.							
7.							
8.							

Percentage of sec. 1: 100% | Percentage of sec. 2: | Percentage of sec. 3: | Total: 71.1 cm

U-value supplement: W/(m²K)

U-Value: 0.063 W/(m²K)

Wedge-shaped layers (at an inclination of max. 5%)

(Calculation following EN 6946 Appendix C)

Assembly no.	Building assembly description
2.1	Roff with additional Wedge shaped Insolation

Heat transfer resistance [m²K/W] interior Rsi : 0.10
exterior Rse : 0.04

A parallel assemblies layer

	Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Total width Thickness d_0 [mm]
1.	Reinforced concrete	2.300					200
2.	EPS 100N	0.032					300
3.	EPS 100N	0.032					87
4.	Mineral wool	0.040					40
5.							
6.							
7.							
8.							

Percentage of sec. 1: 100% | Percentage of sec. 2: | Percentage of sec. 3: | Total: 62.7 cm

U_0: 0.075 W/(m²K)
R_0: 13.321 (m²K)/W

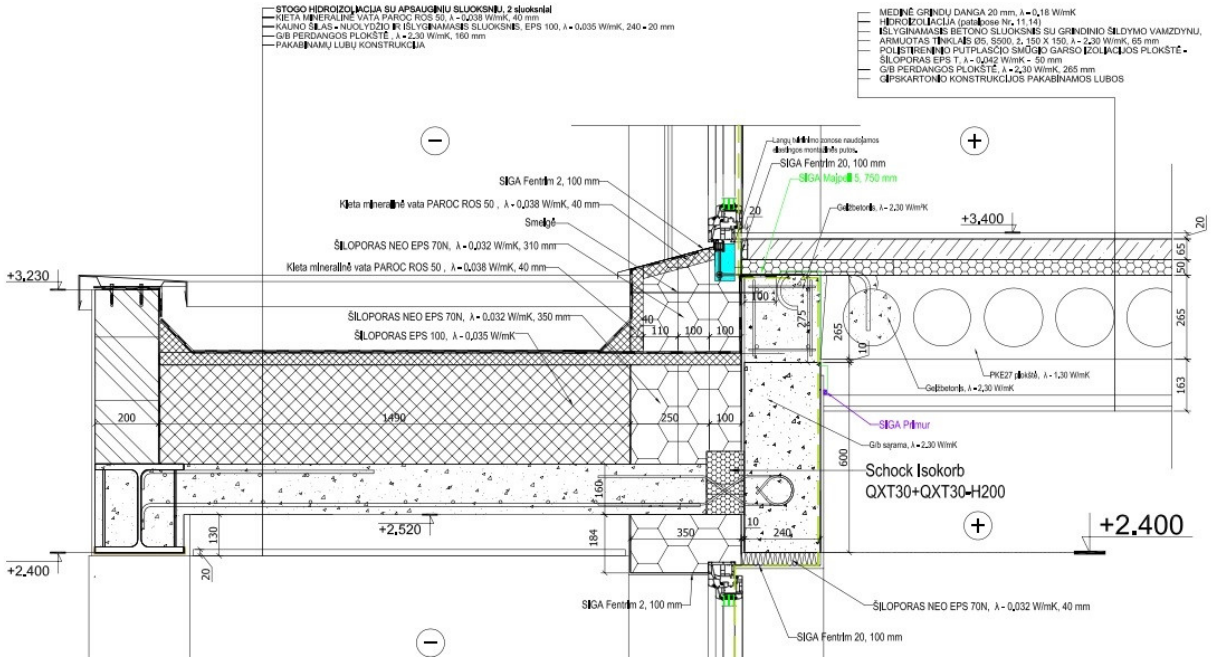
B wedge-shaped assembly layer

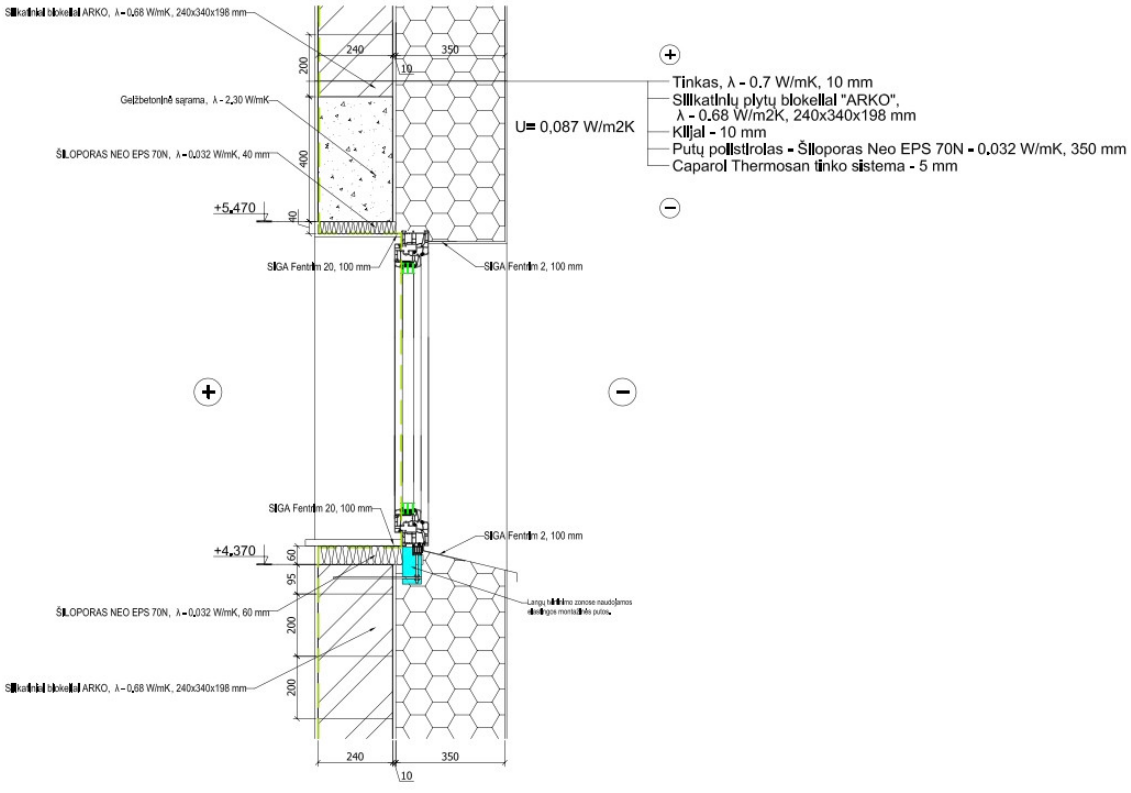
Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness d_1 [mm]
EPS 100 N	0.032					167

Percentage of sec. 2: | Percentage of sec. 3: | Thickness d_1 [cm]: 16.7 cm

U_1: 0.192 W/(m²K)
R_1: 5.219 (m²K)/W
Rectangular area U-Value: 0.063 W/(m²K)
U-value of triangular area with the thickest point at the apex: 0.067 W/(m²K)
U-value of triangular area with the thinnest point at the apex: 0.060 W/(m²K)

8. Windows and installation of the window



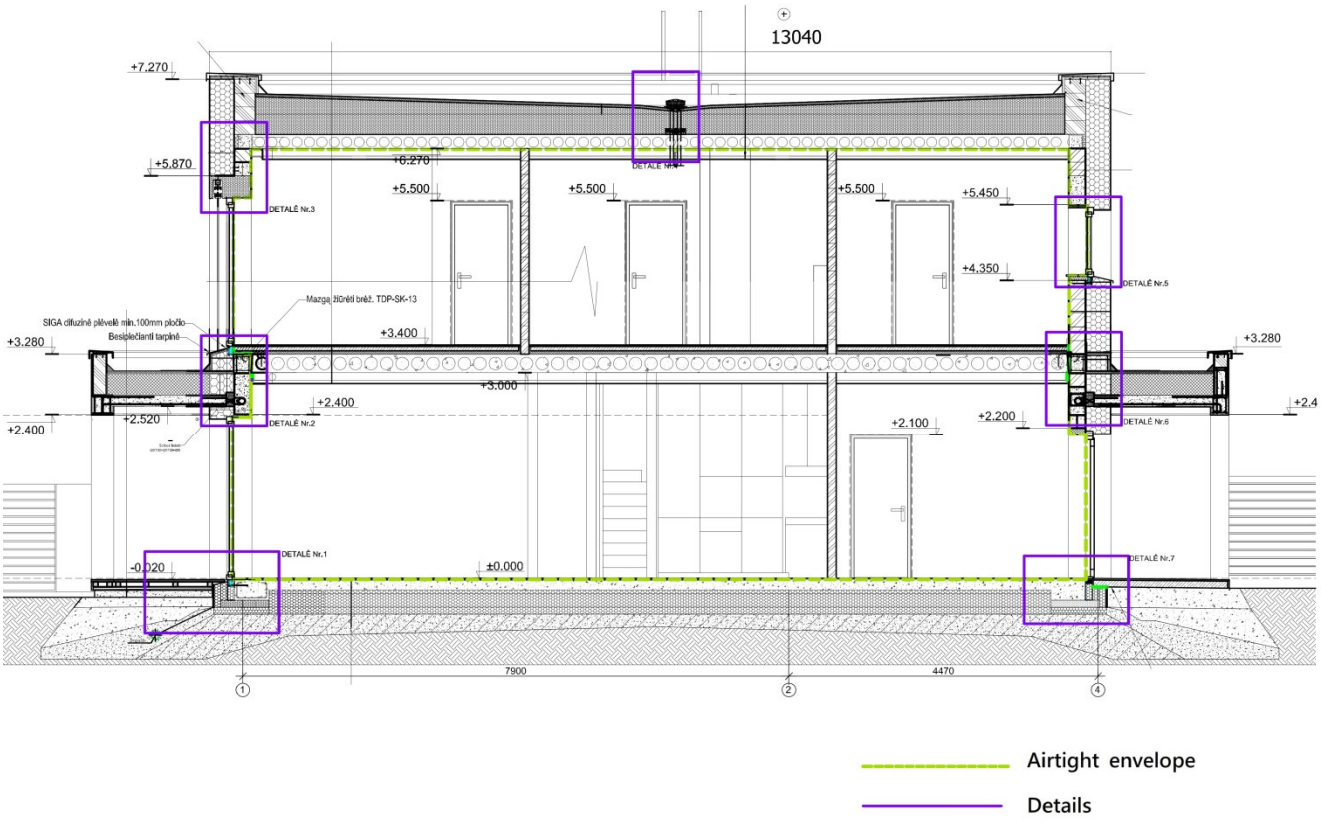


Windows are Rehau Geneo PHZ
and using high specification triple-glazed units:

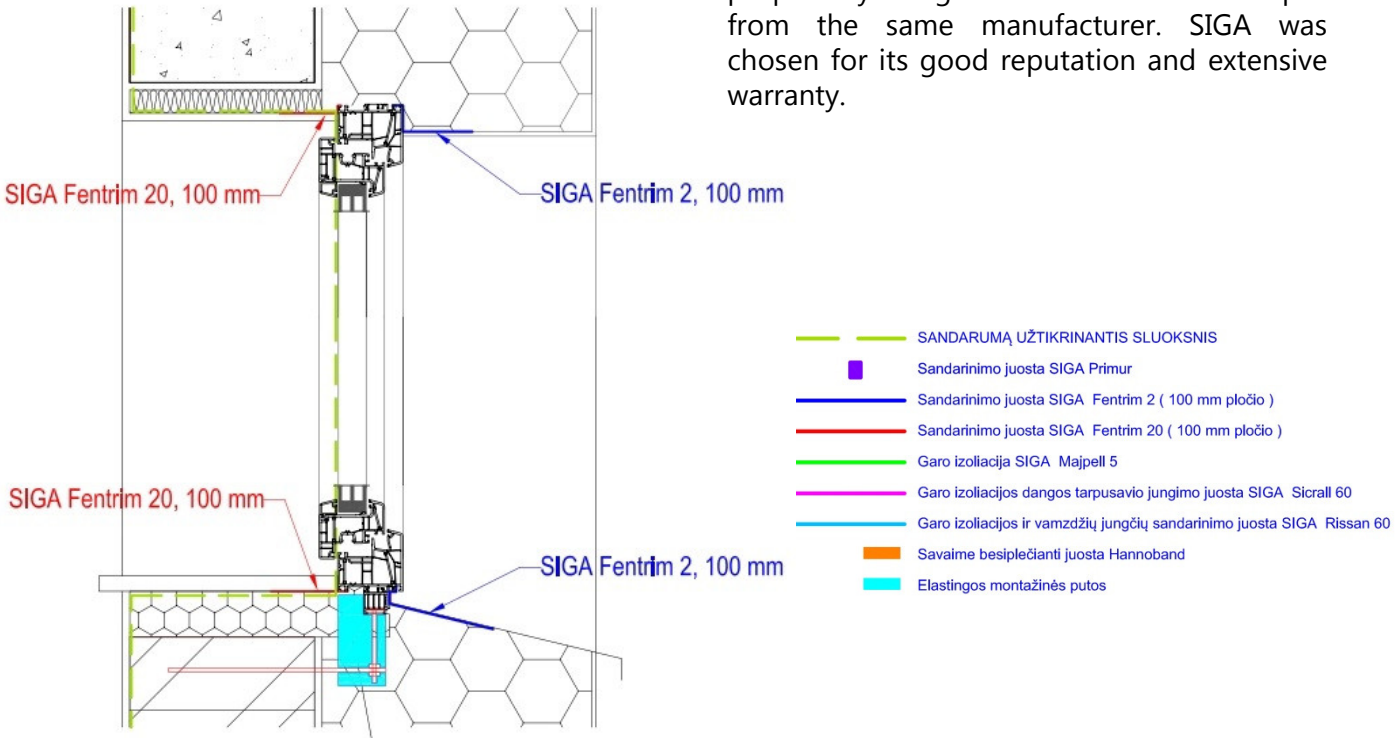
1 - 4GNRG-20Ar-4-20AR-4GNRG _ Ug – 0.60, g – 62%;
2 - 4GNP-20Ar-4-20Ar-4GNP_Ug – 0.50, g – 49.4%;
3 - 6NRG-18Ar-6-16r-6NRG_ Ug – 0.70, g – 60.2%;
4 - 6NRG-18Ar-4-18AR-6NRG, Ug – 0.60, g – 60.7%.

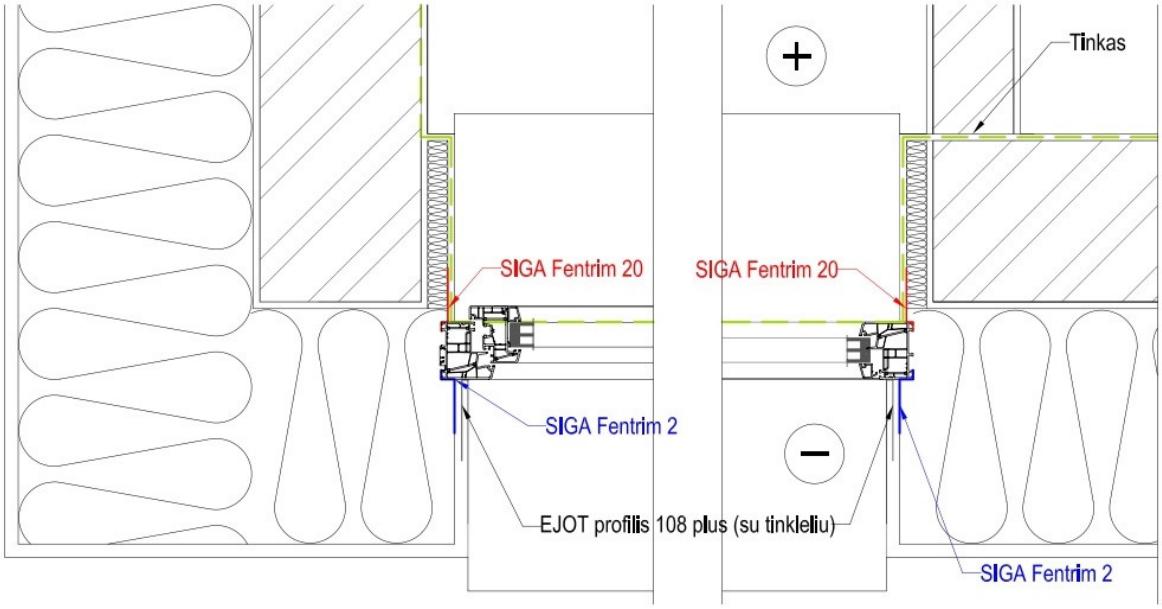
Swisspacer Ultimate – psi 0.030 W/(mK)
Uf value is 0.79 – 0.98 W/(m2K)
Uw-value is 0.78 W(m2K).
Installation thermal bridges is 0.008 – 0.129 W/(mK)

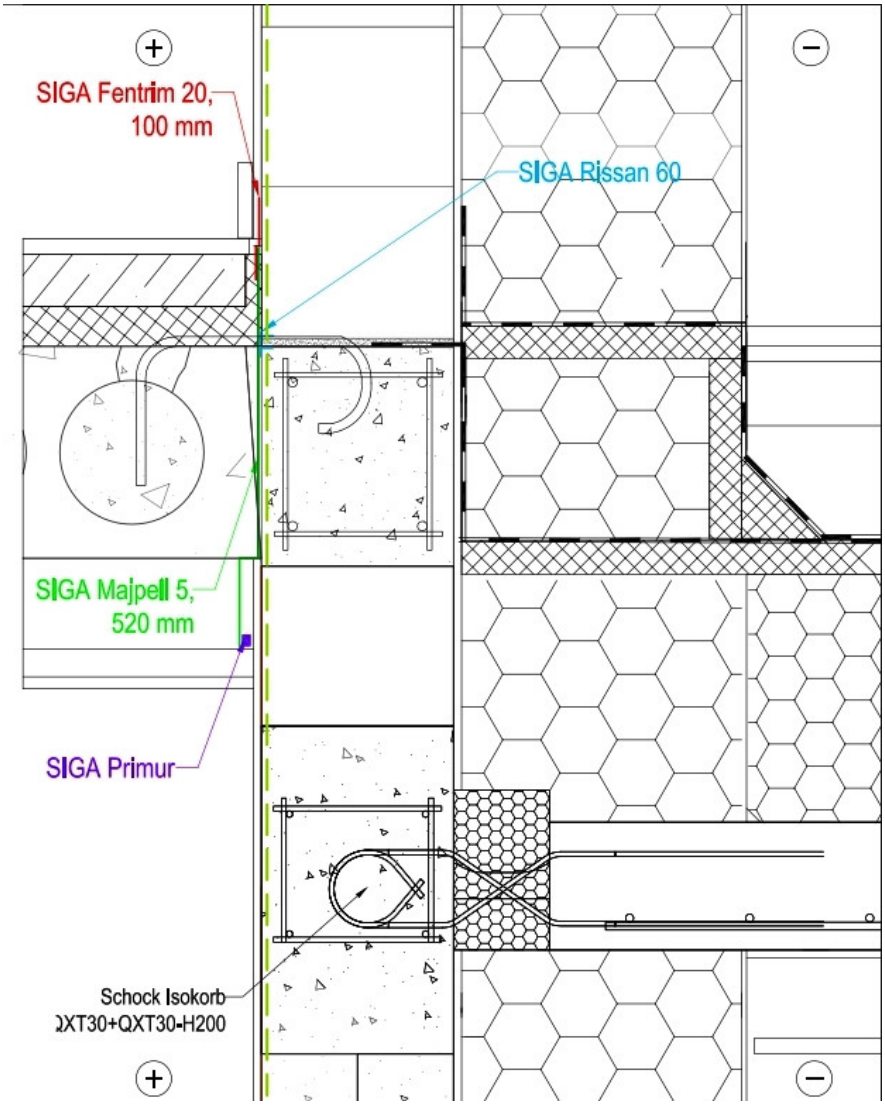
9. Airtight building envelope

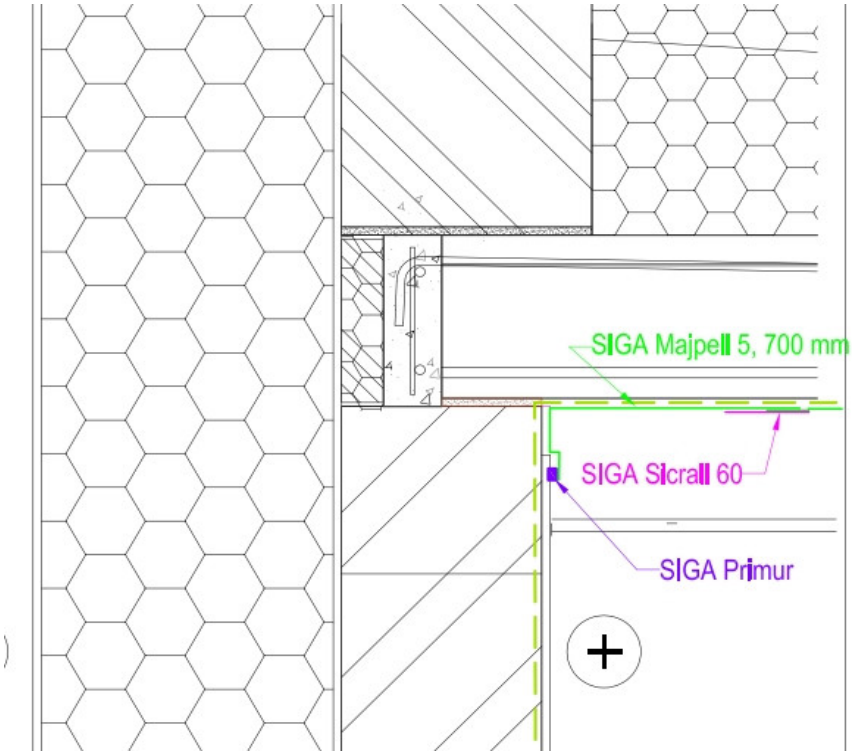


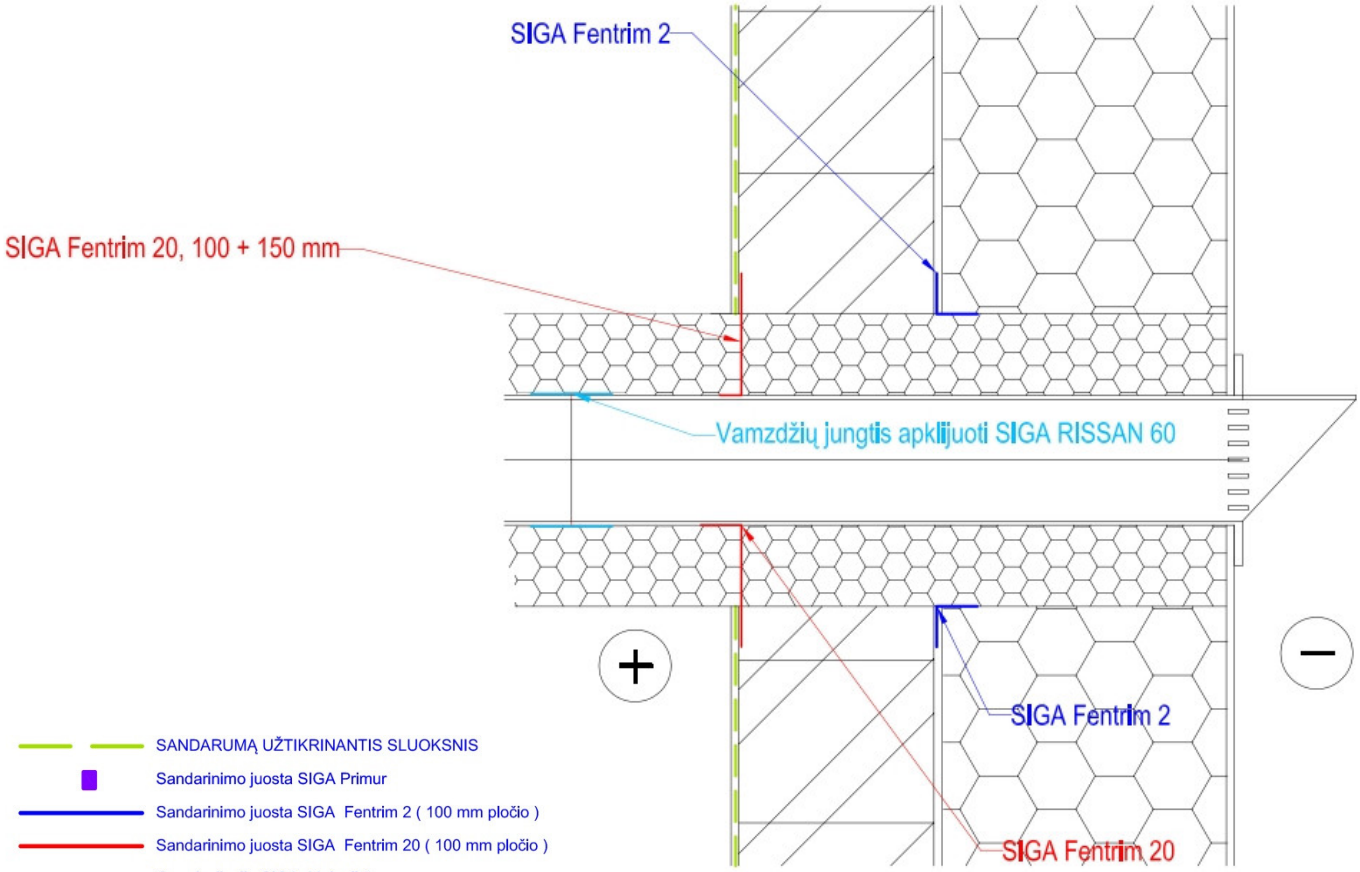
The airtightness strategy was to ensure a single layer of airtightness by the use of proprietary airtightness membrane ant tapes from the same manufacturer. SIGA was chosen for its good reputation and extensive warranty.




Tinkas
SIGA Fentrim 20
SIGA Fentrim 20
SIGA Fentrim 2
EJOT profilis 108 plus (su tinkleliu)
SIGA Fentrim 2


SIGA Fentrim 20,
100 mm
SIGA Rissan 60
SIGA Majpell 5,
520 mm
SIGA Primur
Schock Isokorb
QXT30+QXT30-H200


SIGA Majpell 5, 700 mm
SIGA Sicrall 60
SIGA Primur


SIGA Fentrim 2
SIGA Fentrim 20, 100 + 150 mm
Vamzdžių jungtis apklijuoti SIGA RISSAN 60
SIGA Fentrim 2
SIGA Fentrim 20
SANDARUMĄ UŽTIKRINANTIS SLUOKSNIS
Sandarinimo juosta SIGA Primur
Sandarinimo juosta SIGA Fentrim 2 (100 mm pločio)
Sandarinimo juosta SIGA Fentrim 20 (100 mm pločio)
Garo izoliacija SIGA Majpell 5
Garo izoliacijos dangos tarpusavio jungimo juosta SIGA Sicrall 60
Garo izoliacijos ir vamzdžių jungčių sandarinimo juosta SIGA Rissan 60
Savaime besiplečianti juosta Hannoband
Elastingos montažinės putos


SIGA-Majpell 5
www.siga.ch


SIGA-Majpell
www.siga.ch

9.1 Airtightness testing

Testing was carried aut by the “EE Plius” 12.09.2014.


retroTEC
PASTATŲ ENERGETINIS EFEKTYVUMAS

Pressurize test results

	Rezultatai		
Koreliacija, r [%]	99,25	95% pasikliovimo intervalo ribos	
Pataisa, C_{env} [m³/h.Pa^n]	6,1016	4,429	8,406
Pataisa, C_L [m³/h.Pa^n]	6,1016	4,429	8,406
Posvirio kampas, n	0,71978	0,64070	0,79885

	Rezultatai	95% pasikliovimo intervalas		paklaida
Oro srautas esant 50 Pa, V_{50} [m³/h]	101,94	98,05	106,0	+/-3,9%
Oro kaita pastate esant 50 Pa, n_{50} [1/h]	0,2072	0,1992	0,2153	+/-3,9%

Depressurize test results

	Rezultatai		
Koreliacija, r [%]	95,99	95% pasikliovimo intervalo ribos	
Pataisa, C_{env} [m³/h.Pa^n]	10,720	5,803	19,80
Pataisa, C_L [m³/h.Pa^n]	10,720	5,803	19,80
Posvirio kambas, n	0,58212	0,43011	0,73414

	Rezultatai	95% pasikliovimo intervalas		paklaida
Oro srautas esant 50 Pa, V_{50} [m³/h]	104,52	96,53	113,2	+/-4,9%
Oro kaita pastate esant 50 Pa, n_{50} [1/h]	0,2124	0,1955	0,2294	+/-4,9%

Kombinuoto patikrinimo duomenys

	Rezultatai	95% pasikliovimo intervalas		paklaida
Oro srautas esant 50 Pa, V_{50} [m³/h]	103,5	97,35	109,5	+/-5,9%
Oro kaita patalpoje esant 50 Pa, n_{50} [1/h]	0,2100	0,1965	0,2231	+/-6,3%

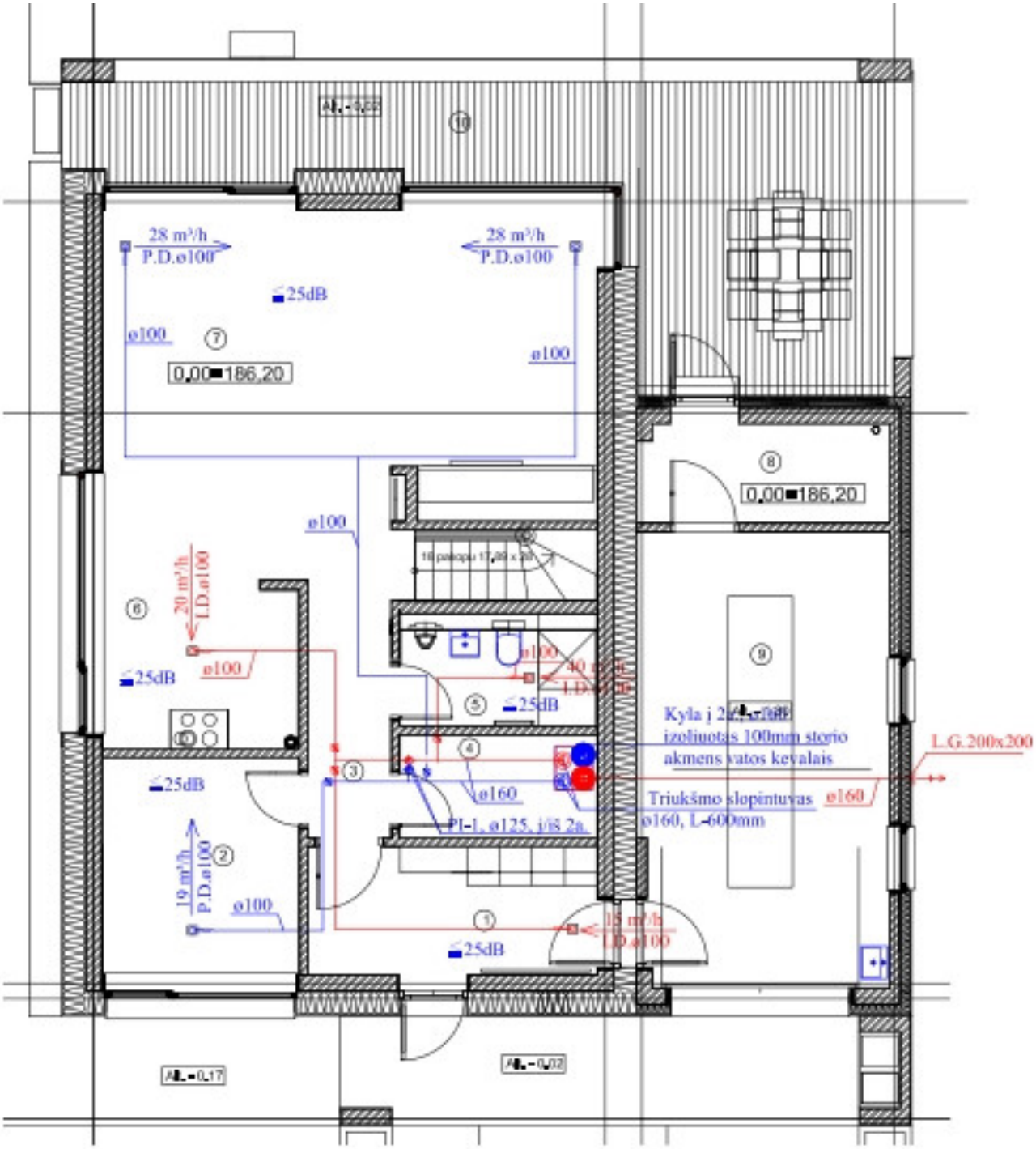
CONCLUSION

Atlikus pastato sandarumo patikrinimą pagal LST EN 13829 standartą, B patikrinimo metodą gautos oro apykaitos reikšmės prie 50 Pa skirtumo tarp vidaus ir išorės:

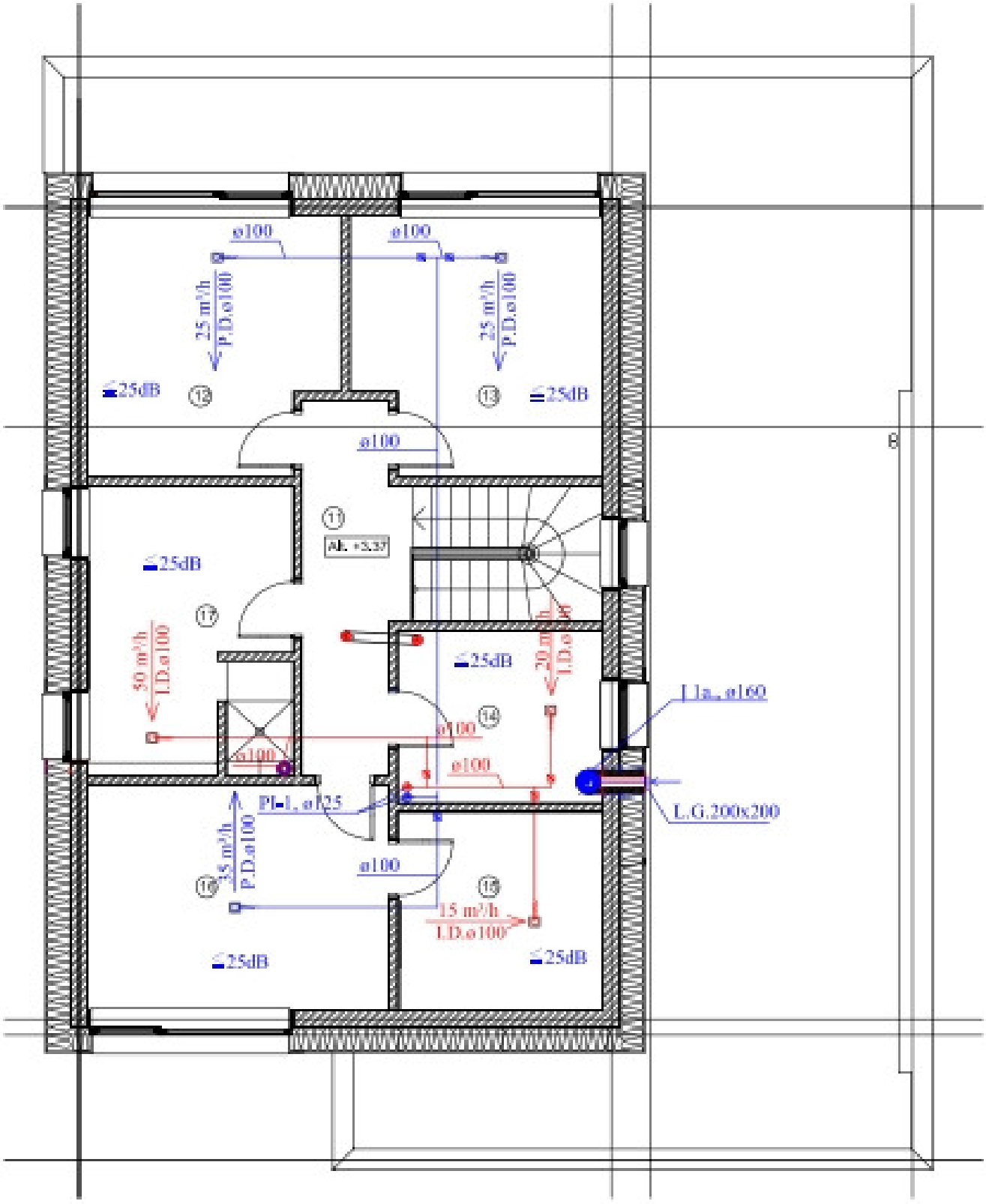
- Patalpose sukūrus aukštesnį slėgį nei aplinkos - oro apykaita prie 50 Pa skirtumo tarp vidaus ir išorės **0,207 h^{-1}** +/- 3,9 %.
- Patalpose sukūrus mažesnį slėgį nei aplinkos - oro apykaita prie 50 Pa skirtumo tarp vidaus ir išorės **0,212 h^{-1}** +/- 4,9 %.
- Bendras patikrinimo rezultatas – oro kaita patalpoje esant 50 Pa skirtumui – **0,210 h^{-1}** +/-4,4 %.

10. Layout of the ventilation system ducting

Design of the ventilation system was carried by Tomas Cipkus of UAB Pastatų inžinerinės technologijos, using a Brink Renovent Excellent 300 4/0 (3/1)(Plus) .
Effective Heat Recovery perfomance – 84 %, electrical efficiency of 0.45Wh/m3.



Ground floor layout

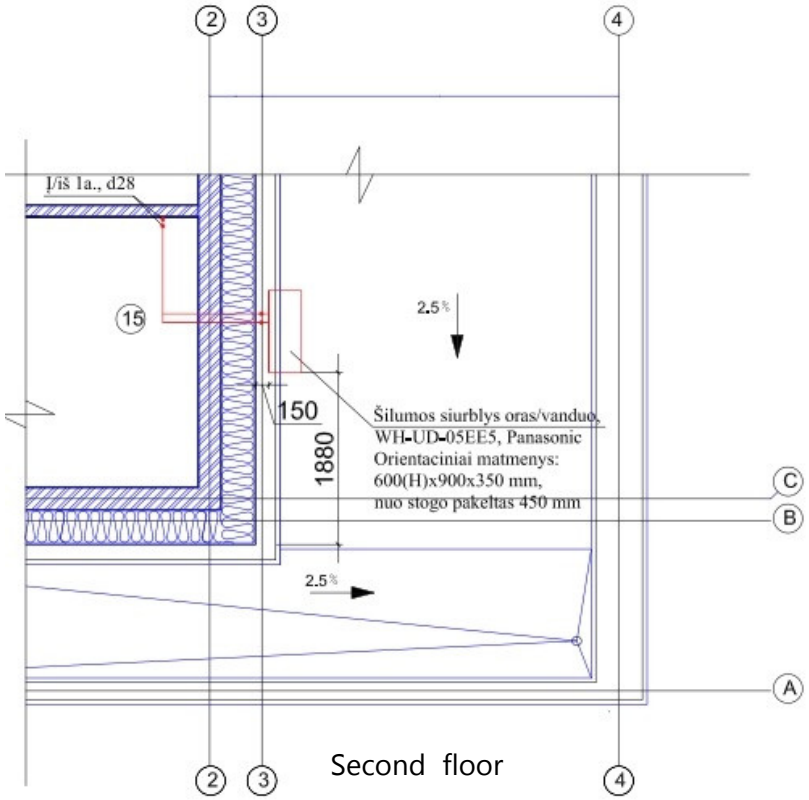


Second floor layout

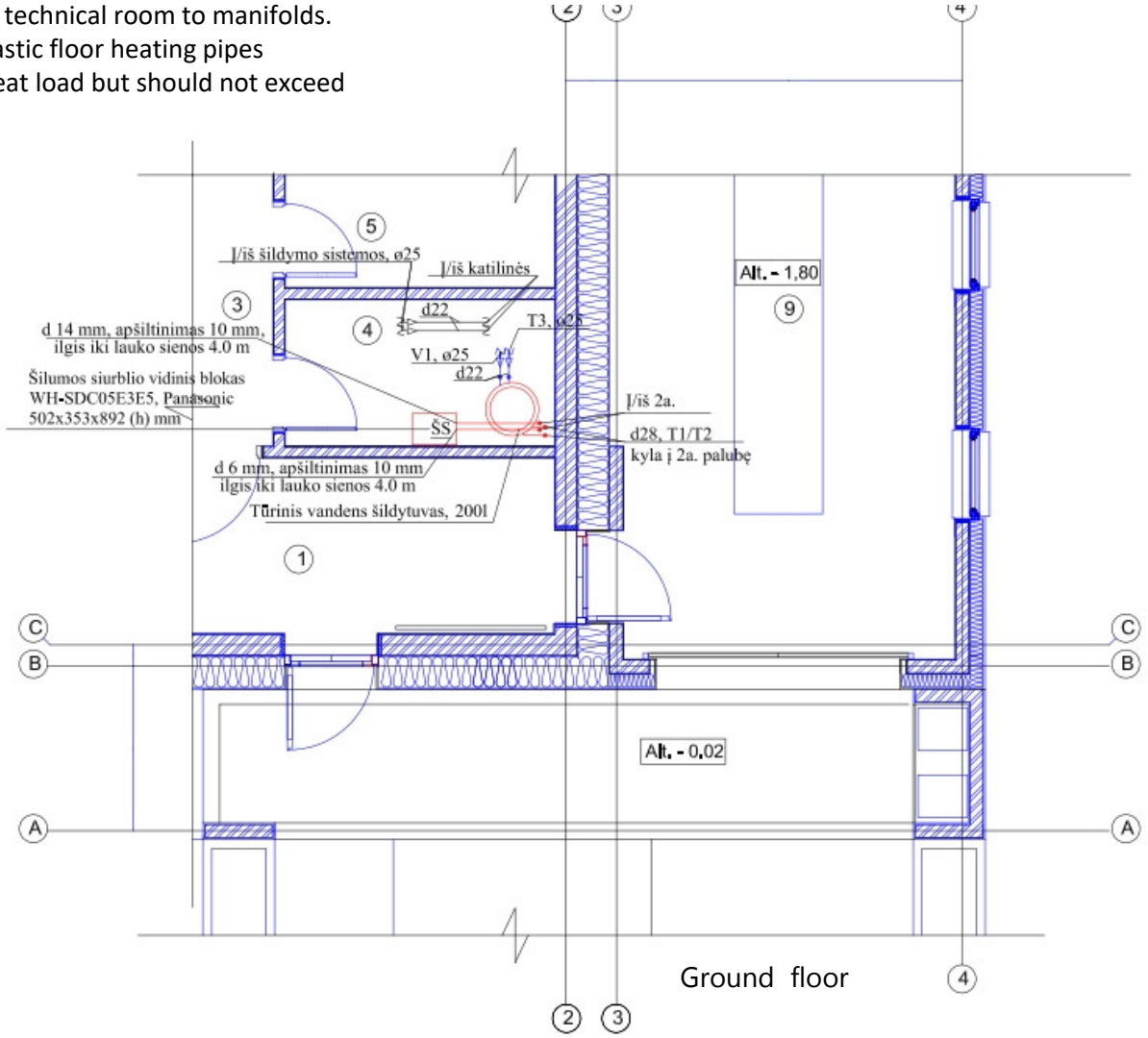
The ventilation duct is designed through the garage space to the outside wall.

11. Heat supply

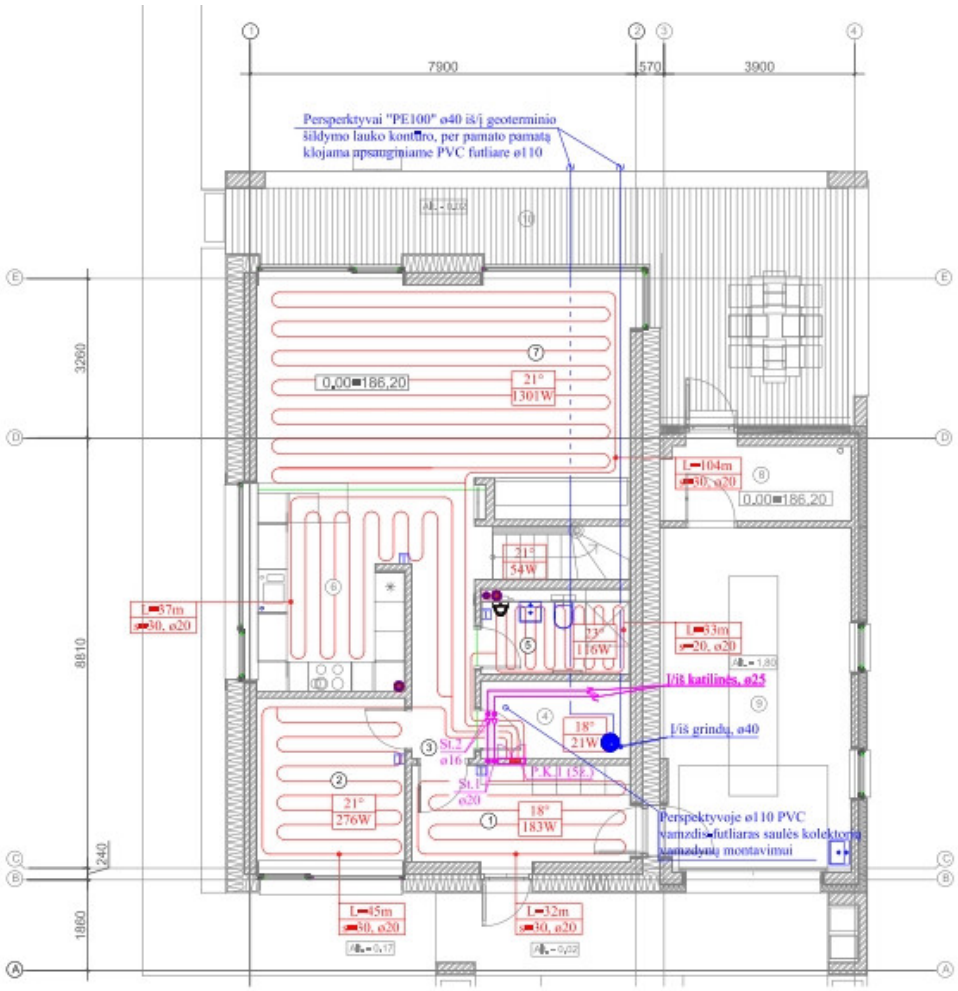
The air/water heat pump used for building provides 8kW of heating energy (with COP 3,9). Outdoor module should be installed next to the building, indoor module in the technical room. Insulated cooper refrigerant pipes used for the connection between indoor and outdoor modules. The heat pump is combined with 200 liters capacity buffer vessel. Hot water storage tank (200ltr) and floor heating system connected to buffer vessel. Circulation pumps, flow control valves, expansion vessel, balancing and closing valves, measure and other necessary devices should be installed in the technical room. Additionally pipes planned for the perspective connection of ground heat pump. In boiler room copper pipes are used. Pipes and fittings should be insulated.
Maximum calculated heat load of the buildings floor heating system - 3,3kW. Manifolds with thermal actuators, and balancing valve on each loop. Room‘s temperature are controlled by room‘s thermostats. Insulated plastic pipes used for connection from technical room to manifolds. Spacing between plastic floor heating pipes depends on room heat load but should not exceed 300mm.



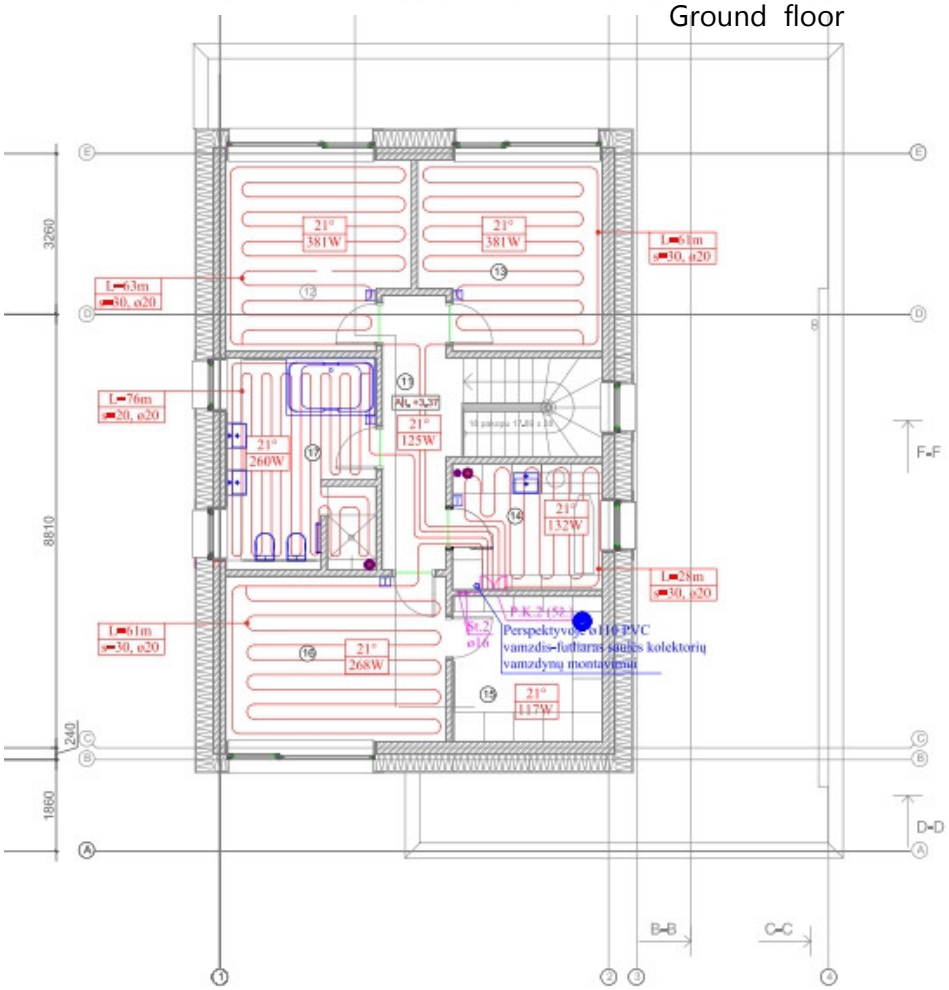
Second floor



Ground floor



Ground floor



Second floor


Panasonic
INVERTER

12. PHPP – Results (verification sheey)

Passive House verification

Building:	Passive House						
Street:							
Postcode / City:	Vilnius						
Country:	Lithuania						
Building type:	Residential building						
Climate:	Vilnius (PEI)			Altitude of building site (in [m] above sea level):	-		
Home owner / Client:							
Street:							
Postcode/City:	Vilnius						
Architecture:	Rimvydas Adomaitis, PARYŽIUS, JSC						
Street:	Tilto g. 35						
Postcode / City:	Vilnius						
Mechanical system:	Pastatų Inžinerinės Technologijos, JSC						
Street:	Žalgirio g. 88						
Postcode / City:	Vilnius						
Year of construction:	2014		Interior temperature winter:	20,0	°C	Enclosed volume V_e m³:	863,7
No. of dwelling units:	1		Interior temperature summer:	25,0	°C	Mechanical cooling:	
No. of occupants:	4,8		Internal heat sources winter:	2,1	W/m²		
Spec. capacity:	204	Wh/K per m² TFA	Ditto summer:	4,1	W/m²		

Specific building demands with reference to the treated floor area

				Requirements	Fulfilled?*
	Treated floor area	169,2	m²		
Space heating	Heating demand	15	kWh/(m²a)	15 kWh/(m²a)	yes
	Heating load	14	W/m²	10 W/m²	-
Space cooling	Overall specif. space cooling demand		kWh/(m²a)	-	-
	Cooling load		W/m²	-	-
	Frequency of overheating (> 25 °C)	2,4	%	-	-
Primary energy	Heating, cooling, auxiliary electricity, dehumidification, DHW, lighting, electrical appliances	117	kWh/(m²a)	120 kWh/(m²a)	yes
	DHW, space heating and auxiliary electricity	81	kWh/(m²a)	-	-
	Specific primary energy reduction through solar electricity		kWh/(m²a)	-	-
Airtightness	Pressurization test result n_{50}	0,21	1/h	0,6 1/h	yes

* empty field: data missing; "-": no requirement

Passive House?	yes

We 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 application.

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Company:	EE plius

PHPP Version 8.5

Issued on: 2015-07-24

Signature:

13. Construction Costs

The cost of a passive house without decoration is 700,00 EUR/m2.

14. User's Experiences

Every year the architect and the client meet to discuss the exploitation of the house during the year. Already the four years the price for heating during the year is not more than 90,00 EUR..
The builder is very satisfied.

15. Publications

https://www.respublika.lt/lt/naujienos/lietuva/verslas/sostineje_pristatytas_pirmasis_pasyvus_vienbutis_gyvenamasis_namas/

https://sa.lt/taupus-vokiskai/

https://vilnius.lt/lt/2016/03/03/vilniuje-pirmasis-sertifikuotas-pasyvus-vienbutis-namas-lietuvoje/