Pielikums par izmantotajām ievaddatu vērtībām

**Atbilstoši Ministru kabineta 2021.gada 8. aprīļa noteikumiem Nr.222 "Ēku energoefektivitātes aprēķina metodes un ēku energosertifikācijas noteikumi"*

Grādudienas, kKh		Aprēķina periods, dienas		Iekštelpu temperatūra, *C		Āra vides temperatūra, *C	
Zona Nr.1	*Zona Nr.2*	*Zona Nr.1*	*Zona Nr.2*	*Zona Nr.1*	*Zona Nr.2*	*Zona Nr.1*	*Zona Nr.2*
109.81		7272	0	20.0	0.0	**4.90**	

	Zona Nr.1	*Zona Nr.2*	
Iekštelpu vidējā temperatūra periodā:	20.0		°C
Āra vides vidējā temperatūra periodā:	4.90		°C
Novērtējuma periods:	303		dienas
References platība:	210.7		m²
References tilpums:	624.5		m³

1. Siltuma pārnese ar pārvadi

Norobežojošā konstrukcijas tips	Konstrukcijas laukums	Konstrukcijas siltumcaurlaidība	Termiskā tilta garums/skaits	Termiskā tilta siltumcaurlaidība	Siltuma zudumi	Perioda ilgums	Temperatūras starpība	**Siltuma pārnese ar pārvadi**
	m²	W/(m²K)	m, gab	W/m vai W/gab	W/K	h	K	**kWh gadā**
1	2	3	4	5	6	7	8	9
Ārsienas	310.11	0.19			58.6	7272	15.10	6433
Pārsegums	116.42	0.16	58.2	0.04	21.0	7272	15.10	2308
Grīda uz grunts	116.42	**0.17**	58.2	**0.02**	20.8	7272	15.10	2281
Logi / stiklotās durvis	62.20	1.10	97.6	0.04	72.2	7272	15.10	7926
Durvis/lūkas/vārti	2.16	1.80	6.6	0.04	4.2	7272	15.10	456
							Kopējā siltuma pārnese ar pārvadi apkurei:	**19404**

2. Siltuma pārnese ar ventilāciju:

Zonas Nr.	Ventilācijas sistēma	Aprēķina tilpums	Gaisa apmaiņas intensitāte	Darbības ilgums periodā	Ventilācijas siltuma zudumu koeficients*	Enerģijas atgūšanas vidējais rādītājs periodā	Piegādātā gaisa temperatūras starpība	**Siltuma pārnese ar ventilāciju**
		m³	1/h	h	W/K	%	K	**kWh gadā**
1	2	3	4	5	6	7	8	9
1	Dabiskā	624		7272	0.0	0.0	15.10	0
	Mehāniskā	624	0.401	7272	84.1	80.00	3.02	1846
	Infiltrācija	624	0.044	7272	9.2	0.0	15.10	1008
Piezīme* Gaisa tilpuma siltumietilpība 0,336 W/(m³K), LVS ISO 52016-1 p.6.3.6.							**Kopējā siltuma pārnese ar ventilāciju apkurei:**	**2854**

3. Saules siltuma ieguvumi caur caurspīdīgām un necaurspīdīgām norobežojošajām konstrukcijām:

Nr.p.k.	Novietojums	Caurspīdīgo konstrukciju laukums	Samazinājuma faktors	Stiklojuma vidējā g-vērtība	Starojuma intensitāte periodā	**Saules siltuma ieguvumi**
		m²			kWh/m² gadā	**kWh gadā**
1	2	3	4	5	6	7
2.3.1.	Ziemeļi	27.18	0.52	0.50	201.03	1412
2.3.2.	Austrumi	9.29	0.48	0.50	328.54	726
2.3.3.	Dienvidi	24.77	0.57	0.50	494.16	3490
2.3.4.	Rietumi	0.96	0.35	0.50	438.79	73
2.3.5.	Horizontāli	0.00	0.00	0.00	675.14	0
2.3.6.	Necaurspīdīgās norobežojošās konstrukcijas					1326
					Kopējie saules siltuma ieguvumi apkurei:	**7028**

4. Iekšējie siltuma ieguvumi:

Zona Nr.	Apkures perioda ilgums	Īpatnējā iekšējo siltuma ieguvumu jauda**	References platība	**Iekšējie siltuma ieguvumi**
	h gadā	W/m²	m²	**kWh gadā**
1	2	3	4	5
1	7272	3.12	210.7	**4781**
5. Iekšējo siltuma ieguvumu izmantošanas koeficients				0.834076

		kWh/m² gadā	**kWh gadā**
6.	**Gada energoprasība apkurei:**	**58.89**	**12409**

Specific energy for heating (monthly method)

Energy balance calculation with PHPP Version 9.6a

Dzīvojamā māja / Climate: Rīga / TFA: 211 m² / Heating: 58.9 kWh/(m²a) / Freq. overheating: 2 % / PER: 131.8 kWh/(m²a)

The sum of the heating periods calculated through the monthly method will be presented on this side.

Interior temperature:	20	°C
Building type:	Dzīvojamā māja	
Treated floor area A_{TFA}:	210.7	m²
Spec. Capacity:	116	Wh/(m²K)

Building assembly	Temperature zone	Area m²		U-Value W/(m²K)		Month. red. fac.		G_t kKh/a		kWh/a	Per m² of treated floor area
External wall - Ambient	A	310.1	*	0.189	*	1.00	*	110	=	6433	30.53
External wall - Ground	B		*		*	1.00	*		=		
Roof/Ceiling - Ambient	A	116.4	*	0.161	*	1.00	*	110	=	2052	9.74
Floor slab / Basement ceiling	B	116.4	*	0.298	*	1.00	*	62	=	2138	10.14
	A		*		*	1.00	*		=		
	A		*		*	1.00	*		=		
Pret neapkurināmu telpu	X		*		*	0.50	*		=		
Windows	A	62.2	*	1.098	*	1.00	*	110	=	7498	35.58
Exterior door	A	2.2	*	1.800	*	1.00	*	110	=	427	2.03
Exterior TB (length/m)	A	162.4	*	0.040	*	1.00	*	110	=	713	3.38
Perimeter TB (length/m)	P	58.2	*	0.040	*	1.00	*	62	=	143	0.68
Ground TB (length/m)	B		*		*	1.00	*		=		0.00
Transmission heat losses Q_T									Total	19404	kWh/(m²a) 92.1

	Effective air volume V_V	A_{TFA} m²	*	Clear room height m	=	m³ 624			
	$n_{V,system}$ 1/h	η^*_{SHX}		η_{HR}		$n_{V,Res}$ 1/h	=	$n_{V,equi,fraction}$ 1/h	
Effective air change rate Ambient nV,e	0.401	*(1- 0%	)*(1-	0.80	)+	0.044	=	0.124	
Effective air change rate Ground nV,g	0.401	* 0%	*(1-	0.80	)		=	0.000	

	V_V m³		$n_{V,equi,fraction}$ 1/h		c_{Air} Wh/(m³K)		G_t kKh/a	=	kWh/a	kWh/(m²a)
Ventilation losses ambient Q_V	624	*	0.124	*	0.336	*	110	=	2854	13.5
Ventilation losses ground $Q_{V,e}$	624	*	0.000	*	0.336	*	83	=	0	0.0
Ventilation heat losses Q_V								Total	2854	13.5

	Q_T kWh/a		Q_V kWh/a		Reduction factor night/weekend saving	=	kWh/a	kWh/(m²a)
Total heat losses Q_L	(19404	+	2854	) *	1.0	=	22259	**105.6**

Orientation of the area	Reduction factor see 'Windows' worksheet		g-Value (perp. radiation)		Area m²		Global radiation kWh/(m²a)	=	kWh/a
North	0.52	*	0.50	*	27.2	*	201	=	1412
East	0.48	*	0.50	*	9.3	*	329	=	726
South	0.57	*	0.50	*	24.8	*	494	=	3490
West	0.35	*	0.50	*	1.0	*	439	=	73
Horizontal	0.00	*	0.00	*	0.0	*	675	=	0
Sum opaque areas									1326
Available solar heat gains Q_S								Total	7028 kWh/(m²a) 33.4

	kh/d		Length Heat. Period d/a		Spec. Power q_I W/m²		A_{TFA} m²	=	kWh/a	kWh/(m²a)
Internal heat gains Q_I	0.024	*	303	*	3.1	*	210.7	=	4781	22.7

			kWh/a	kWh/(m²a)
Free heat Q_F	Q_S + Q_I	=	11809	56.0
Ratio free heat to losses	Q_F / Q_L	=	0.53	
Utilisation factor heat gains h_G		=	83%	
Heat gains Q_G	η_G * Q_F	=	9849	**46.7**

			kWh/a	kWh/(m²a)
Annual heating demand Q_H	Q_L - Q_G	=	12409	**58.89**

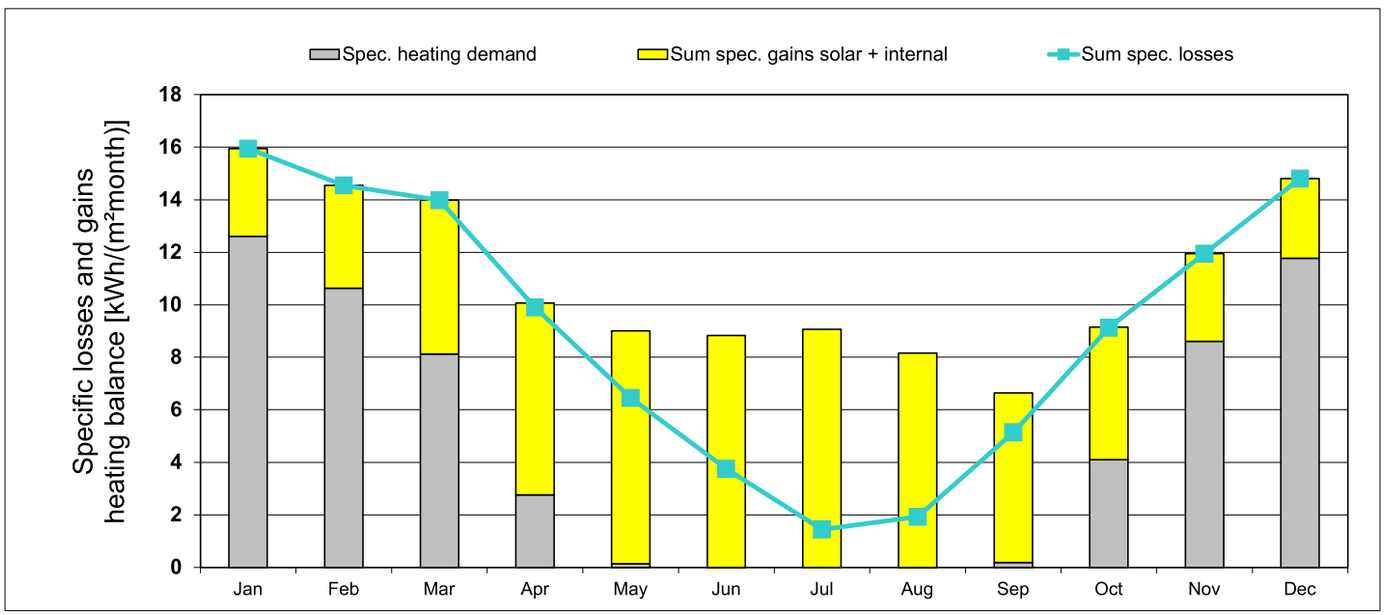
	kWh/(m²*a)		(Yes/No)
Limiting value	-	**Requirement met?**	-

Specific energy for heating (monthly method)

Dzīvojamā māja / Climate: Rīga / TFA: 211 m² / Heating: 58.9 kWh/(m²a) / Freq. overheating: 2 % / PER: 131.8 kWh/(m²a)

Interior temperature: 20 °C
Building type: Dzīvojamā māja
Treated floor area A_{TFA}: 211 m²

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	
Heating degree hours - Externa	16.9	15.3	14.5	9.9	6.2	3.4	1.2	1.9	5.3	9.8	12.8	15.8	113	kKh
Heating degree hours - Ground	7.9	7.7	8.5	7.5	6.5	4.9	2.2	1.5	3.1	3.9	5.0	6.6	65	kKh
Losses - Exterior	3069	2779	2631	1809	1121	611	225	352	971	1779	2333	2875	20555	kWh
Losses - Ground	291	286	315	278	240	180	80	55	113	145	186	246	2416	kWh
Sum spec. losses	15.9	14.5	14.0	9.9	6.5	3.8	1.4	1.9	5.1	9.1	12.0	14.8	109.0	kWh/m²
Solar gains - North	26	57	137	215	316	361	358	269	164	85	35	17	2039	kWh
Solar gains - East	14	30	69	111	166	174	171	137	87	48	17	10	1033	kWh
Solar gains - South	141	234	401	522	599	547	583	567	464	339	142	101	4640	kWh
Solar gains - West	2	4	7	11	15	15	16	13	9	5	2	1	102	kWh
Solar gains - Horiz.	0	0	0	0	0	0	0	0	0	0	0	0	0	kWh
Solar gains - Opaque	32	62	133	208	285	289	294	245	163	96	36	22	1864	kWh
Internal heat gains	489	442	489	473	489	473	489	489	473	489	473	489	5759	kWh
Sum spec. gains solar + interna	3.3	3.9	5.9	7.3	8.9	8.8	9.1	8.2	6.5	5.0	3.3	3.0	73.3	kWh/m²
Utilisation factor	100%	100%	100%	98%	71%	43%	16%	24%	77%	100%	100%	100%	68%	
Annual heating demand	2656	2238	1711	580	28	0	0	0	38	865	1813	2480	12409	kWh
Spec. heating demand	**12.6**	**10.6**	**8.1**	**2.8**	**0.1**	**0.0**	**0.0**	**0.0**	**0.2**	**4.1**	**8.6**	**11.8**	**58.9**	kWh/m²



Annual heating demand: Comparison

Monthly method	*('Heating')*	12409	kWh/a	58.9	**kWh/(m²a)** reference to treated floor area according to PHPP
Annual method	*('Annual heati*	12635	kWh/a	60.0	**kWh/(m²a)** reference to treated floor area according to PHPP

			Kopējā				Apkurināmā			
Stāvs	**Numurs**	**Nosaukums**	**Platība, m²**	**Augstums, m**	**Tilpums, m³**	**TFA koef.**	**TFA, m²**	**TFV, m²**	**Tin, °C**	**Tin avg, °C**
1	101	Halle	7.97	2.80	22.32	1	7.97	22.32	20.00	0.71
1	102	Garderobe	6.50	2.80	18.20	1	6.50	18.20	20.00	0.58
1	103	Tualete	3.52	2.80	9.86	1	3.52	9.86	20.00	0.32
1	104	Saimniecības telpa	11.88	2.80	33.26	1	11.88	33.26	20.00	1.07
1	105	Halle	20.08	2.80	56.22	1	20.08	56.22	20.00	1.80
1	106	Atpūtas telpa	27.30	4.37	119.30	1	27.30	119.30	20.00	3.82
1	107	Virtuve	24.05	2.80	67.34	1	24.05	67.34	20.00	2.16
1	108	Vējtveris	6.00	2.80	16.80	1	6.00	16.80	20.00	0.54
1	109	Tualete	2.75	2.80	7.70	1	2.75	7.70	20.00	0.25
1	110	Kabinets	16.50	2.80	46.20	1	16.50	46.20	20.00	1.48
1	111	Nojume	29.91			0				
1	112	Lievenis	6.96			0				
1	113	Terase	38.97			0				
2	201	Gaitenis	13.45	2.70	36.32	1	13.45	36.32	20.00	1.16
2	202	Vannas istaba	9.25	2.70	24.98	1	9.25	24.98	20.00	0.80
2	203	Guļamistaba	14.25	2.70	38.48	1	14.25	38.48	20.00	1.23
2	204	Guļamistaba	16.23	2.70	43.82	1	16.23	43.82	20.00	1.40
2	205	Guļamistaba	19.11	2.70	51.60	1	19.11	51.60	20.00	1.65
2	206	Garderobe	11.88	2.70	32.08	1	11.88	32.08	20.00	1.03
		KOPĀ	**286.56**	**2.96**	**624.46**		**210.72**	**624.46**		**20.00**

Climate data

Dzīvojamā māja / Climate: Rīga / TFA: 211 m² / Heating: 58.9 kWh/(m²a) / Freq. overheating: 2 % / PER: 131.8 kWh/(m²a)

Selection of climate data

Country:	ud-User Data
Region:	All
	1-Alphabetic sorting
Climate data set:	ud---01-Rīga
Climate zone:	2: Cold

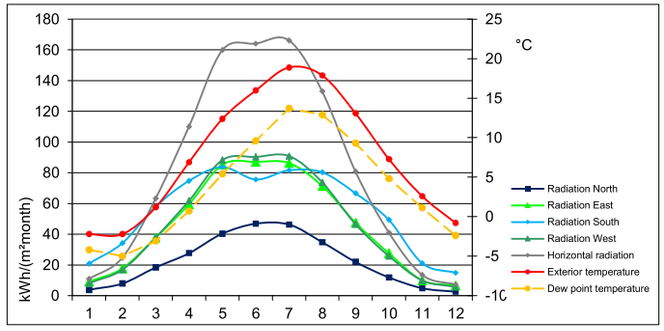
Altitude

Weather station:	3.0	m
Building location:	6	m

Result overview

Annual heating demand	58.9	kWh/(m²a)
Heating load	29.1	W/m²
Frequency of overheating	2.0	%
Sensible cooling	1.4	kWh/(m²a)
Latent cooling	0.0	kWh/(m²a)
Cooling load	-	W/m²
PER demand	131.8	kWh/(m²a)

	Data for heating Annual method	Data from monthly balance Heating	Cooling	
Heating / cooling period	223	303	153	d/a
Heating / cooling degree hours	95	110	-44	kKh/a
Radiation North	87	201	209	kWh/(m²a)
Radiation East	190	329	333	kWh/(m²a)
Radiation South	293	494	391	kWh/(m²a)
Radiation West	189	439	412	kWh/(m²a)
Horizontal radiation	313	675	704	kWh/(m²a)



Month	1	2	3	4	5	6	7	8	9	10	11	12	Heating load		Cooling load		PER factors	
Days	31	28	31	30	31	30	31	31	30	31	30	31	Weather 1	Weather 2	Weather 1	Weather 2		
ud---01-Rīga	Latitude °	57.0	Longitude °	24.1	Altitude [m]	3	Daily temperature swing Summer [K]			8.4			Radiation: [W/m²]		Radiation: [W/m²]			
° C Exterior temperature	-2.2	-2.2	1.2	6.9	12.4	16.0	18.9	17.9	13.1	7.3	2.6	-0.8	-12.8	-9.7	25.5	22.0	1.35	Household electri
kWh/(m²month) Radiation North	4	8	18	28	40	47	46	35	22	12	5	2	4	4	106	60	1.25	Domestic hot wat
kWh/(m²month) Radiation East	9	18	38	59	85	87	86	71	47	28	10	7	5	5	223	163	1.70	Heating
kWh/(m²month) Radiation South	21	34	58	75	84	76	82	80	67	49	21	15	14	14	233	268	1.20	Cooling
kWh/(m²month) Radiation West	8	17	38	62	88	90	91	74	47	26	10	6	7	7	223	163	1.20	Dehumidification
kWh/(m²month) Horizontal radiation	11	25	63	110	160	164	166	133	81	41	14	7	10	10	350	230		
° C Dew point temperature	-4.2	-5.0	-3.1	0.7	5.4	9.6	13.7	12.9	9.3	4.8	1.1	-2.4			16.7			
° C Sky temperature	-12.0	-13.3	-11.9	-7.6	-1.4	2.5	7.6	7.8	2.7	-1.7	-5.8	-10.0			14.1	12.1		
° C Ground temperature	9.4	8.5	8.5	9.6	11.3	13.2	17.1	18.0	15.8	14.7	13.0	11.1	8.5	8.5	18.0	18.0		
Comment:	PHPP, LBN003-19																	

U-value of building assemblies

Energy balance calculation with PHPP Version 9.6a

Dzīvojamā māja / Climate: Rīga / TFA: 211 m² / Heating: 58.9 kWh/(m²a) / Freq. overheating: 2 % / PER: 131.8 kWh/(m²a)

Secondary calculation: Equivalent thermal conductivity of still air spaces -> (on the right)
Wedge-shaped assembly layer -> (on the right)
Unheated / uncooled attic -> (on the right)

Assembly no. 01ud — Building assembly description: **Ārsiena** — Interior insulation?

Heat transmission resistance [m²K/W]

Orientation of building element: 2-Wall — interior R_{si}: 0.13

Adjacent to: 1-Outdoor air — 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]
Iekšējā apdare	0.900					10
Keramzītbetona bloki	0.260					300
Minerālvate	0.038					150
Ārējā apdare	0.900					10

Percentage of sec. 1: 100% — Percentage of sec. 2: — Percentage of sec. 3: — Total: **47.0** cm

U-value supplement: — W/(m²K)

U-value: 0.189 W/(m²K)

Assembly no. 02ud — Building assembly description: **Bēniņu pārsegums P1** — Interior insulation?

Heat transmission resistance [m²K/W]

Orientation of building element: 1-Roof — interior R_{si}: 0.10

Adjacent to: 3-Ventilated — exterior R_{se}: 0.10

Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
Ģipškartons	0.250					25
Beramā siltumizolācija	0.048	Koka sijas	0.130			200
Beramā siltumizolācija	0.048					100

Percentage of sec. 1: 94% — Percentage of sec. 2: 6.0% — Percentage of sec. 3: — Total: **32.5** cm

U-value supplement: — W/(m²K)

U-value: 0.161 W/(m²K)

Assembly no. 03ud — Building assembly description: **Grīda uz grunts** — Interior insulation?

Heat transmission resistance [m²K/W]

Orientation of building element: 3-Floor — interior R_{si}: 0.17

Adjacent to: 2-Ground — 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]
Grīdas segums	0.500					10
Betona izlīdzinošais slānis	2.000					70
Putupolistirols	0.038					100
Blietētas šķembas	2.000					100
Blietēta grunts	2.000					900

Percentage of sec. 1: 100% — Percentage of sec. 2: — Percentage of sec. 3: — Total: **118.0** cm

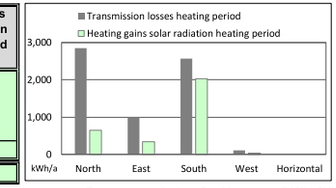
U-value supplement: — W/(m²K)

U-value: 0.298 W/(m²K)

Windows

Dzīvojamā māja / Climate: Rīga / TFA: 211 m² / Heating: 58.9 kWh/(m²a) / Freq. overheating: 2 % / PER: 131.8 kWh/(m²a)

Window area orientation	Global radiation (main orientations)	Shading	Dirt	Non-vertical radiation incidence	Glazing fraction	g-Value	Solar irradiation reduction factor	Window area	Window U-Value	Glazing area	Average global radiation		Transmission losses heating period	Heating gains solar radiation heating period
Standard values →	kWh/(m²a)	0.75	0.95	0.85				m²	W/(m²K)	m²	kWh/(m²a)		kWh/a	kWh/a
North	87	0.81	0.95	0.85	0.79	0.50	0.52	27.18	1.10	21.39	93	North	2853	655
East	190	0.79	0.95	0.85	0.75	0.50	0.48	9.29	1.12	6.94	155	East	989	343
South	293	0.86	0.95	0.85	0.82	0.50	0.57	24.77	1.09	20.27	287	South	2570	2029
West	189	0.74	0.95	0.85	0.58	0.50	0.35	0.96	1.18	0.56	224	West	108	37
Horizontal	313	1.00	0.95	0.85	0.00	0.00	0.00	0.00	0.00	0.00	313	Horizontal	0	0
Total or average value for all windows.						0.50	0.53	62.20	1.10	49.16			6520	3064



Recommendation for $U_{W,installed}$ [W/(m²K)]

0.65	0.70	0.80	0.44

Heating degree hours [kKh/a]: **95.5**

Go to glazing list Go to window frames list

Quantity	Description	Deviation from north	Angle of inclination from the horizontal	Orientation	Window rough openings: Width	Window rough openings: Height	Installed in: Selection from 'Areas' worksheet	Glazing: Selection from 'Components' worksheet	Frame: Selection from 'Components' worksheet	g-Value: Perpendicular radiation	U-Value: Glazing	U-Value: Frames (avg.)	Ψ Glazing edge: $\Psi_{Glazing\ edge}$ (Avg.)	Installation situation (user determined value for '$\Psi_{installation}$ or '1': $\Psi_{installation}$ from 'Components' worksheet '0'- in the case of abutting windows): left	right	bottom	top	$\Psi_{installation}$ (Avg.)	Results: Window Area	Glazing area	U_w installed	Glazed fraction per window
		°	°		m	m		1-Sorting: LIKE LIST	1-Sorting: LIKE LIST	-	W/(m²K)	W/(m²K)	W/(mK)	W/(mK) or 1/0				W/(mK)	m²	m²	W/(m²K)	%
	Z																					
1	L3	-20	90	North	2.700	2.050	1-Z	01ud-3 stiklu pakete	01ud-Logu rāmis	0.50	1.01	1.10	0.035	1	1	1	1	0.000	5.5	4.63	1.08	84%
1	L4	-20	90	North	2.700	1.950	1-Z	01ud-3 stiklu pakete	01ud-Logu rāmis	0.50	1.01	1.10	0.035	1	1	1	1	0.000	5.3	4.38	1.08	83%
1	L5	-20	90	North	1.800	2.050	1-Z	01ud-3 stiklu pakete	01ud-Logu rāmis	0.50	1.01	1.10	0.035	1	1	1	1	0.000	3.7	2.96	1.09	80%
1	L6	-20	90	North	1.800	1.500	1-Z	01ud-3 stiklu pakete	01ud-Logu rāmis	0.50	1.01	1.10	0.035	1	1	1	1	0.000	2.7	2.08	1.11	77%
1	L9	-20	90	North	1.500	1.500	1-Z	01ud-3 stiklu pakete	01ud-Logu rāmis	0.50	1.01	1.10	0.035	1	1	1	1	0.000	2.3	1.69	1.11	75%
1	L10	-20	90	North	0.900	1.600	1-Z	01ud-3 stiklu pakete	01ud-Logu rāmis	0.50	1.01	1.10	0.035	1	1	1	1	0.000	1.4	0.98	1.14	68%
1	L11	-20	90	North	0.900	1.500	1-Z	01ud-3 stiklu pakete	01ud-Logu rāmis	0.50	1.01	1.10	0.035	1	1	1	1	0.000	1.4	0.91	1.14	67%
1	L13	-20	90	North	1.500	0.800	1-Z	01ud-3 stiklu pakete	01ud-Logu rāmis	0.50	1.01	1.10	0.035	1	1	1	1	0.000	1.2	0.78	1.15	65%
1	D1	-20	90	North	1.500	2.500	1-Z	01ud-3 stiklu pakete	01ud-Logu rāmis	0.50	1.01	1.10	0.035	1	1	1	1	0.000	3.8	2.99	1.10	80%
	A																					
1	L5	70	90	East	1.800	2.050	2-A	01ud-3 stiklu pakete	01ud-Logu rāmis	0.50	1.01	1.10	0.035	1	1	1	1	0.000	3.7	2.96	1.09	80%
1	L6	70	90	East	1.800	1.500	2-A	01ud-3 stiklu pakete	01ud-Logu rāmis	0.50	1.01	1.10	0.035	1	1	1	1	0.000	2.7	2.08	1.11	77%
1	L12	70	90	East	2.500	0.800	2-A	01ud-3 stiklu pakete	01ud-Logu rāmis	0.50	1.01	1.10	0.035	1	1	1	1	0.000	2.0	1.38	1.14	69%
1	L16	70	90	East	1.500	0.600	2-A	01ud-3 stiklu pakete	01ud-Logu rāmis	0.50	1.01	1.10	0.035	1	1	1	1	0.000	0.9	0.52	1.18	58%
	D																					
1	L1	160	90	South	3.000	2.500	3-D	01ud-3 stiklu pakete	01ud-Logu rāmis	0.50	1.01	1.10	0.035	1	1	1	1	0.000	7.5	6.44	1.07	86%
1	L2	160	90	South	3.000	2.400	3-D	01ud-3 stiklu pakete	01ud-Logu rāmis	0.50	1.01	1.10	0.035	1	1	1	1	0.000	7.2	6.16	1.07	86%
1	L7	160	90	South	2.000	1.400	3-D	01ud-3 stiklu pakete	01ud-Logu rāmis	0.50	1.01	1.10	0.035	1	1	1	1	0.000	2.8	2.16	1.11	77%
1	L8	160	90	South	1.600	1.500	3-D	01ud-3 stiklu pakete	01ud-Logu rāmis	0.50	1.01	1.10	0.035	1	1	1	1	0.000	2.4	1.82	1.11	76%
1	L14	160	90	South	1.600	0.700	3-D	01ud-3 stiklu pakete	01ud-Logu rāmis	0.50	1.01	1.10	0.035	1	1	1	1	0.000	1.1	0.70	1.16	63%
1	D2	160	90	South	1.500	2.500	3-D	01ud-3 stiklu pakete	01ud-Logu rāmis	0.50	1.01	1.10	0.035	1	1	1	1	0.000	3.8	2.99	1.10	80%

-

Ventilation data

Energy balance calculation with PHPP Version 9.6a

Dzīvojamā māja / Climate: Rīga / TFA: 211 m² / Heating: 58.9 kWh/(m²a) / Freq. overheating: 2 % / PER: 131.8 kWh/(m²a)

Treated floor area A_{TFA}	m²	211		*('Areas' worksheet)*
Room height h	m	2.96	2.96	
Volume of ventilated space (A_{TFA}*h) = V_V	m³	624		*(Worksheet 'Annual heating')*

Ventilation type

Please select: **1-Balanced PH ventilation with HR**

Infiltration air change rate

Wind protection coefficients e and f	Several side exposed	One side exposed
Coefficient e for wind protection class		
No protection	0.10	0.03
Moderate protection	0.07	0.02
High protection	0.04	0.01
Coefficient f	15	20

			For annual demand:	For heating load:				
Wind protection coefficient, e			0.03	0.08				
Wind protection coefficient, f			20	20				
Air change rate at press. test	n_{50}	1/h	1.46	1.46	Net air volume for press. test	V_{n50} 624 m³	Air permeability q_{50}	1.50 m³/(hm²)
			For annual demand:	For heating load:				
Excess extract air		1/h	0.00	0.00				
Infiltration air change rate	$n_{V,Rest}$	1/h	0.044	0.109				

Selection of ventilation input - Results

PHPP offers two methods for dimensioning air quantities and choosing the ventilation unit. With "Standard data input for balanced ventilation", supply or extract air quantities for residential buildings and parameters for ventilation systems with a maximum of 1 ventilation unit can be planned. Projects with up to 10 different ventilation units and air quantities determined according to rooms or zones can be entered in the 'Addl vent' worksheet. Please select your design method here:

	Ventilation unit / Heat recovery efficiency design		Average air flow rate m³/h	Average air change rate 1/h	Extract air excess (extract air system) 1/h	Effective heat recovery efficiency unit [-]	Humidity recovery efficiency [-]	Specific power input Wh/m³	Heat recovery efficiency SHX [-]
x	Standard design	*('Ventilation' worksheet, see below)*	250	0.40	0.00	80.0%	0.0%	0.30	0.0%
	Multiple ventilation units, non-res	*('Addl vent' worksheet)*							

Cooling recovery: | Efficiency SHX η^*_{SHX}: 0%

Average interior humidity during winter operation

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
30%	29%	31%	38%	49%	61%	-	-	60%	47%	39%	32%

Standard data input for balanced ventilation

Energy balance calculation with PHPP Version 9.6a

Dimensioning of ventilation system with only one ventilation unit

Occupancy		m²/P	42			
Number of occupants		P	5.0			
Supply air per person		m³/(P*h)	29			
Supply air requirement		m³/h	144			
Extract air rooms			Kitchen	Bathroom	Bathroom (shower only)	WC
Quantity			1	1		1
Extract air requirement per room		m³/h	60	40	20	20
Total extract air requirement		m³/h	120			

Design air flow rate (maximum): m³/h 375 | Recommended: 375 m³/h

Average air change rate calculation

Type of operation	Daily operation times h/d	Factors referenced to maximum	Air flow rate m³/h	Air change rate 1/h
maximum	14.0	1.00	375	0.60
Standard		0.38	144	0.23
Basic ventilation		0.54	202	0.32
Minimum	10.0	0.20	76	0.12
		Average value 0.67	Average air flow rate (m³/h) 250	Average air change rate (1/h) 0.40

Selection of ventilation unit with heat recovery

Location of ventilation unit: **1-Inside thermal envelope**

	Go to ventilation units list 1-Sorting: LIKE LIST	Heat recovery efficiency	Humidity recovery efficiency	Specific efficiency [Wh/m³]	Application [m³/h]	Frost power input
Ventilation unit selection	02ud-PRANA 150 PREMIUM PLUS MINI	0.80	0.00	0.30	50 - 300	N/A

Conductivity outdoor air duct	Ψ	W/(mK)	0.517	Implementation of frost protection	2-Elec.
Length of outdoor air duct		m	0	Limit temperature [°C]	-1
Conductivity exhaust air duct	Ψ	W/(mK)	0.517	Useful energy [kWh/a]	575
Length of exhaust air duct		m	0		
Temperature of mechanical services room		°C	20	Room temperature (°C)	20
(Enter only if the central unit is outside of the thermal envelope)				Avg. ambient temp. heat. period (°C)	2.6
				Avg. ground temp (°C)	8.6

Effective heat recovery efficiency $\eta_{HR,eff}$: **80.0%**

Effective heat recovery efficiency subsoil heat exchanger

SHX efficiency η^*_{SHX}:

Heat recovery efficiency SHX η_{SHX}: 0%

Secondary calculation Ψ-value supply or outdoor air duct			Secondary calculation Ψ-value extract or exhaust air duct		
Nominal width	160	mm	Nominal width:	160	mm
Insulation thic	30	mm	Insulation thickness	30	mm
Reflective coating?	x	Yes	Reflective coating?	x	yes
		No			no
Thermal conductivity	0.038	W/(mK)	Thermal conductivity	0.038	W/(mK)
Nominal air flow rate	250	m³/h	Nominal air flow rate	250	m³/h
Δϑ	17	K	Δϑ	17	K
Exterior duct diameter	0.160	m	Exterior duct diameter	0.160	m
Exterior diameter	0.220	m	Exterior diameter	0.220	m
α–Interior	14.99	W/(m²K)	α–Interior	14.99	W/(m²K)
α-Surface	3.09	W/(m²K)	α-Surface	3.09	W/(m²K)
Ψ–value	**0.517**	**W/(mK)**	**Ψ–value**	**0.517**	**W/(mK)**
Surface temperature difference	4.198	K	Surface temperature difference	4.198	K

Heat distribution and domestic hot water (DHW) system

Energy balance calculation with PHPP Version 9.6a

Dzīvojamā māja / Climate: Rīga / TFA: 211 m² / Heating: 58.9 kWh/(m²a) / Freq. overheating: 2 % / PER: 131.8 kWh/(m²a)

Interior temperature:	20	°C	Interior temperature summer:	27	°C
Building type:	Dzīvojamā māja				
Treated floor area A_{TFA}:	211	m²			
Occupancy:	5.0	Pers			
Number of dwelling units:	1				
Annual heating demand $q_{Heating}$	12409	kWh/a	Annual useful cooling dem. q_{Cool}	288	kWh/a
Length of heating period:	223	d	Length cooling period:	153	d
Average heating load P_{Heat}:	2.3	kW	Average cooling load $P_{Average}$:	0.1	kW
Marginal usability of additional heat gains:	98%		Marginal utility of additional heat losses:	2%	

Space heat distribution

			Inside thermal envelope					Outside thermal envelope					Total values	
			1	2	3	4	5	1	2	3	4	5	Absolute	Specific
Length of distribution pipes	L_{HL}	m	116.4											
Nominal width of pipe		mm	21											
Insulation thickness		mm	20											
Insulation reflective coating?		-	x											
Thermal conductivity of insulation		W/(mK)	0.040											
Heat loss coefficient per m of insulated pipe		W/(mK)	0.189											
Insulation quality of mountings, pipe suspensions, etc.		-	3 - Good	1-None	1-None	1-None	1-None		1-None	1-None	1-None	1-None		
Thermal bridge supplement		W/K	0.722											
Total heating loss coefficient per m of pipe	Ψ	W/(mK)	0.195											
Temp. of the room through which the pipes pass	ϑ_x	°C	20	20	20	20	20	0.1	0.1	0.1	0.1	0.1		
Design forward flow temperature	ϑ_V	°C	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0		
Design system heating load	$P_{heating}$	kW	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1	6.1		
Forward flow temperature control ('x' if appropriate)			x	x	x	x	x	x	x	x	x	x		
Design return flow temperature	ϑ_R	°C	45.0											
Annual heat emission per m of plumbing	q^*_{HL}	kWh/(m·a)	15											
Possible utilisation factor of released heat	η_{HL}	-	98%											
Annual heat losses of heating distribution	Q_{HL}	kWh/a	30										kWh/a: 30	kWh/(m²a): 0.1
Annual heat losses of heating storage		kWh/a											0	0.0
Annual heat losses of heating		kWh/a											30	0.1
Performance ratio of heat distribution	ea_{HL}	-											100%	

DHW useful heat

DHW demand for showers, per person and day (with 60°C)		litre/person/d	16.0
DHW demand others, per person and day (with 60°C)		litre/person/d	9.0
Performance of shower drain-water heat recovery		-	0%
Effective DHW demand	V_{DHW}	litre/person/d	25
Average cold water temperature of the supply	ϑ_{TW}	°C	8.6
DHW demand for washing machines and dishwashers nom-e		kWh/a	0
Effective useful heat DHW	Q_{DHW}	kWh/a	2722

	kWh/a	kWh/(m²a)
	2722	12.9

Auxiliary calculation - DHW demand calculation (for non-res)

Auxiliary calculation - shower drain-water heat recovery

DHW distribution

			Inside thermal envelope					Outside thermal envelope					Total values	
			1	2	3	4	5	1	2	3	4	5	Absolute	Specific
Temp. of room through which the pipes pass	ϑ_x	°C	20.0	20.0	20.0	20.0	20.0							
Design forward flow temperature	ϑ_{Vd}	°C	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0		
DHW circulation pipes														
Length of circulation pipes (forward + return flow)	L_{HS}	m	24.0											
Nominal width of pipe		mm	21.00											
Insulation thickness		mm	9.00											
Insulation reflective coating?		-												
Thermal conductivity of insulation		W/(mK)	0.040											
Heat loss coefficient per m of insulated pipe		W/(mK)	0.304											
Insulation quality of mountings, pipe suspensions, etc.		-	3 - Good	1-None	1-None	1-None	1-None	1-None	1-None	1-None	1-None	1-None		
Thermal bridge supplement		W/K	0.260											
Total heating loss coefficient per m of pipe	Ψ	W/(mK)	0.315											
Daily circulation period of operation.	td_{Circ}	h/d	20.0											
Design return flow temperature	ϑ_R	°C	51											
Circulation period of operation per year	t_{Circ}	h/a	7300											
Annual heat released per m of pipe	q^*_z	kWh/m/a	75											
Annual heat loss from circulation lines	QZ	kWh/a	1809										kWh/a: 1809	kWh/(m²a): 8.6
DHW individual pipes														
Exterior pipe diameter	$d_{i,i\ Pipe}$	m	0.016											
Accumulated length per single pipes	$L_{i,i}$	m	12.00											
Amount of tapping points in building	$n_{tapping\ points}$	-	6.00											
Average pipe length per tapping point	$L_{i,i\ average}$	m	2.0											
Tap openings per person per day		-	6											
Utilisation days per year		d	365											
Heat loss per tap opening	$q_{Hydraulic}$	l/tap opening	0.0122											
Amount of tap openings per year and person	n_{Tap}	ings per year	2190											
Annual heat loss of individual pipes	Q_{Li}	kWh/a	134										kWh/a: 134	kWh/(m²a): 0.6
Total heat losses of DHW distribution	Q_{WL}												kWh/a: 1943	kWh/(m²a): 9.2
Performance ratio of DHW distribution pipes	ea_{HL}	-											171%	

Storage heat losses

			Storage 1	Storage 2	Buffer storage tank (only heating)	Compact unit		
Selection of storage tank			1-DHW and heating	0-No storage tank	0-No storage tank	0-No		
Storage necessary for HP Solar DHW connection			x		(x)			
Heat loss rate		W/K	1.0		2.5			
Storage volume		litre	250			---		
Standby fraction		-						
Location of storage tank, inside or outside of thermal envelope			1-Inside	1-Inside	1-Inside			
Temperature of mechanical room		°C	20.0					
Typical storage tank temperature		°C	55.0					
Manual entry of storage temperature		°C						
Average standby heat losses storage tank		W	37					
Additional heat losses storage tank, solar operation		W			---	---		
Possibly utilisation factor of heat losses		---	---	---		---		
Annual heat losses DHW storage tank		kWh/a	322		---		kWh/a: 322	kWh/(m²a): 1.5
Annual heat losses buffer storage tank			---	---		---		

Auxiliary calculation - heat losses through storage tank according to EU efficiency classes

Storage tank volume		Litre	250.0		
ErP classification		-	A	C	C
Maximum permissible standby heat loss		W	47		
Heat loss ratio for PHPP calculation		W/K	1.0		

Total energy demand of domestic hot water

		kWh/a	kWh/(m²a)
Heat losses of DHW distribution and storage	Q_{WL}	2265	10.7
Performance ratio DHW-distribution + storage	$e_{a,WL}$	183%	
Total heating demand of DHW system **Including storage tank**	Q_{gDHW}	4986	23.7

Cooling distribution

			Inside thermal envelope					Outside thermal envelope					Total values	
			1	2	3	4	5	1	2	3	4	5	Absolute	Specific
Length of distribution pipes	L_{HL}	m												
Nominal width of pipe		mm												
Insulation thickness		mm												
Insulation reflective coating?		-												
Thermal conductivity of insulation		W/(mK)												
Heat loss coefficient per m pipe	Ψ	W/(mK)												
Temp. of room through which the pipes pass	ϑ_x	°C	27.0	27.0	27.0	27.0	27.0	25.0	25.0	25.0	25.0	25.0		
Design forward flow temperature	ϑ_V	°C	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0		
Dimensioning of cooling load of the system	$P_{cooling}$	kW												
Forward flow temperature control ('x' if appropriate)														
Design return flow temperature	ϑ_R	°C												
Annual heat absorption per m of pipe	q^*_{HL}	kWh/(m·a)												
Possibly utilisation factor of this heat absorption	η_{CL}	-												
Annual heat losses of cooling distribution	Q_{HL}	kWh/a											kWh/a: 0	kWh/(m²a): 0.0
Performance ratio cold water distribution pipes	ea_{HL}	-											100%	

CO2 emisiju un primārās enerģijas aprēķins												
Enerģijas patēriņa pakalpojums	**Energonesējs**	**kWh/m^{2}g**	**MWh/g**	**Sezonālās efektivitātes koeficients**	**CO_2 emisijas faktors, kgCO_2/ MWh**	**CO_2 emisijas kgCO_2**	**f_{Pnren}**	**f_{Pren}**	**PE nren kWh/m^{2}g**	**PE ren kWh/m^{2}g**	**PE tot kWh/m2g**	**CO_2 emisijas kgCO_2/m^2**
Apkure	Cietais biokurināmais	58.89	12.4093	0.85	**40**	584	**0.20**	**1.00**	13.86	69.28	83.14	2.77
Apkure (papildu)	Elektroenerģija no tīkla	1.31	0.2757	1.00	**109**	30	**1.90**	**0.60**	2.49	0.78	3.27	0.14
Karstā ūdens sagatavošana	Cietais biokurināmais	23.66	4.9863	0.85	**40**	235	**0.20**	**1.00**	5.57	27.84	33.41	1.11
Karstā ūdens sagatavošana (papildu)	Elektroenerģija no tīkla	0.71	0.1487	1.00	**109**	16	**1.90**	**0.60**	1.34	0.42	1.76	0.08
Ventilācija	Elektroenerģija no tīkla	5.85	1.2324	1.00	**109**	134	**1.90**	**0.60**	11.11	3.51	14.62	0.64
Apgaismojums	Elektroenerģija no tīkla	0.00	0.0000	1.00	**109**	0	**1.90**	**0.60**	0.00	0.00	0.00	0.00
Dzesēšana	Elektroenerģija no tīkla	0.00	0.0000	3.50	**109**	0	**1.90**	**0.60**	0.00	0.00	0.00	0.00
KOPĀ:		**90.4**	**19.0524**			**999**			**34.36**	**101.84**	**136.20**	**4.74**
				CO_2 emisijas kgCO_2/m^2		**4.74**						
				CO_2 emisijas tCO_2		**1.00**						