Specific energy for heating (monthly method)

Energy balance calculation with PHPP Version 9.6a

Kultūras nams / Climate: Jelgava / TFA: 1050 m² / Heating: 212,3 kWh/(m²a) / Freq. overheating: 0 % / PER: 1024,4 kWh/(m²a)

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

Interior temperature:	18	°C
Building type:	Kultūras nams	
Treated floor area A_{TFA}:	1050,2	m²
Spec. Capacity:	204	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	790,12	*	1,242	*	1,00	*	105,08	=	103112	98,18
External wall - Ground	B		*		*	1,00	*		=		
Roof/Ceiling - Ambient	A	688,64	*	0,986	*	1,00	*	105,08	=	71378	67,97
Floor slab / Basement ceiling	B	692,29	*	1,442	*	1,00	*	27,94	=	27889	26,56
	A		*		*	1,00	*		=		
	A		*		*	1,00	*		=		
	X		*		*	0,75	*		=		
Windows	A	168,72	*	1,305	*	1,00	*	105,08	=	23130	22,02
Exterior door	A	5,76	*	2,000	*	1,00	*	105,08	=	1209	1,15
Exterior TB (length/m)	A	636,60	*	0,061	*	1,00	*	105,08	=	4059	3,86
Perimeter TB (length/m)	P	160,98	*	0,090	*	1,00	*	27,94	=	405	0,39
Ground TB (length/m)	B		*		*	1,00	*		=		0,00
Transmission heat losses Q_T									Total	231181	kWh/(m²a) 220,1

	A_{TFA} m²		Clear room height m		m³
Effective air volume V_V	1050	*	3,55	=	3723

	$n_{V,system}$ 1/h		η^*_{SHX}		η_{HR}		$n_{V,Res}$ 1/h		$n_{V,equi,fraction}$ 1/h
Effective air change rate Ambient nV,e	0,317	*(1-	0%	)*(1-	0,00	)+	0,132	=	0,449
Effective air change rate Ground nV,g	0,317	*	0%	*(1-	0,00	)		=	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	3723	*	0,449	*	0,33	*	105	=	58027	55,3
Ventilation losses ground $Q_{V,e}$	3723	*	0,000	*	0,33	*	88	=	0	0,0
Ventilation heat losses Q_V								Total	58027	55,3

	Q_T kWh/a		Q_V kWh/a		Reduction factor night/weekend saving		kWh/a	kWh/(m²a)
Total heat losses Q_L	(231181	+	58027	) *	1,0	=	289209	**275,4**

Orientation of the area	Reduction factor see 'Windows' worksheet		g-Value (perp. radiation)		Area m²		Global radiation kWh/(m²a)		kWh/a
North	0,49	*	0,64	*	40,6	*	284,20	=	3618
East	0,40	*	0,64	*	51,8	*	604,07	=	7963
South	0,43	*	0,64	*	47,8	*	660,79	=	8592
West	0,35	*	0,64	*	28,6	*	479,75	=	3059
Horizontal	0,00000	*	0,00	*	0,0	*	985,38	=	0
Sum opaque areas									46271
Available solar heat gains Q_S								Total	69503 kWh/(m²a) 66,2

	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	*	365	*	1,8	*	1050,2	=	16468	15,7

			kWh/a	kWh/(m²a)
Free heat Q_F	Q_S + Q_I	=	85970	81,9
Ratio free heat to losses	Q_F / Q_L	=	0,30	
Utilisation factor heat gains h_G		=	77,08%	
Heat gains Q_G	η_G * Q_F	=	66266	**63,1**

			kWh/a	kWh/(m²a)
Annual heating demand Q_H	Q_L - Q_G	=	222943	**212**

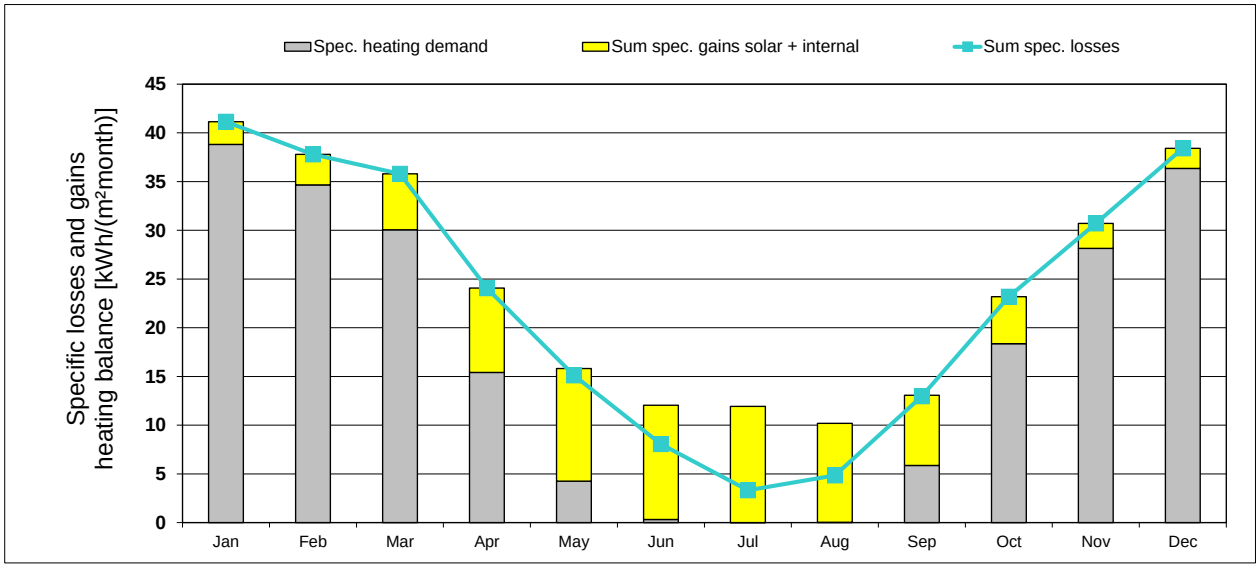
	kWh/(m²a)		(Yes/No)
Limiting value	-	**Requirement met?**	-

Specific energy for heating (monthly method)

Kultūras nams / Climate: Jelgava / TFA: 1050 m² / Heating: 212,3 kWh/(m²a) / Freq. overheating: 0 % / PER: 1024,4 kWh/(m²a)

Interior temperature: 18 °C
Building type: Kultūras nams
Treated floor area A_{TFA}: 1050 m²

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	
Heating degree hours - Externa	16,0	14,7	13,7	9,0	5,4	2,7	0,9	1,6	5,0	9,1	12,1	15,0	105	kKh
Heating degree hours - Ground	3,4	3,2	3,4	2,9	2,4	1,7	1,3	1,2	1,3	1,8	2,3	3,0	28	kKh
Losses - Exterior	39737	36403	34118	22315	13446	6700	2126	3906	12322	22573	29930	37338	260915	kWh
Losses - Ground	3466	3289	3487	2946	2432	1755	1355	1179	1290	1776	2312	3007	28294	kWh
Sum spec. losses	41,1	37,8	35,8	24,1	15,1	8,1	3,3	4,8	13,0	23,2	30,7	38,4	275,4	kWh/m²
Solar gains - North	52	106	243	377	556	635	612	471	302	166	64	34	3618	kWh
Solar gains - East	148	264	556	880	1188	1185	1186	1035	748	478	179	115	7963	kWh
Solar gains - South	218	367	691	975	1116	1027	1106	1076	895	669	273	180	8592	kWh
Solar gains - West	33	75	190	336	499	525	530	412	251	134	48	25	3059	kWh
Solar gains - Horiz.	0	0	0	0	0	0	0	0	0	0	0	0	0	kWh
Solar gains - Opaque	583	1208	2972	5164	7378	7596	7688	6268	4021	2211	765	417	46271	kWh
Internal heat gains	1399	1263	1399	1353	1399	1353	1399	1399	1353	1399	1353	1399	16468	kWh
Sum spec. gains solar + intern	2,3	3,1	5,8	8,7	11,6	11,7	11,9	10,2	7,2	4,8	2,6	2,1	81,9	kWh/m²
Utilisation factor	100%	100%	100%	100%	94%	66%	28%	47%	98%	100%	100%	100%	77%	
Annual heating demand	40771	36409	31556	16191	4466	327	2	37	6157	19292	29559	38176	222943	kWh
Spec. heating demand	**38,8**	**34,7**	**30,0**	**15,4**	**4,3**	**0,3**	**0,0**	**0,0**	**5,9**	**18,4**	**28,1**	**36,4**	**212,3**	kWh/m²



Annual heating demand: Comparison

Monthly method	*('Heating')*	222943	kWh/a	212,3	**kWh/(m²a)** reference to treated floor area according to PHPP
Annual method	*('Annual heati*	218816	kWh/a	208,4	**kWh/(m²a)** reference to treated floor area according to PHPP
		-	kWh/a	-	

Ēkas platības										
			Kopējā				Apkurināmā			
Stāvs	Numurs	Nosaukums	Platība, m²	Augstums, m	Tilpums, m³	TFA koef.	TFA, m²	TFV, m³	Tin, °C	Tin avg, °C
1	1	Ģērbtuve	26,00	2,20	57,20	1	26,00	57,20	18,00	0,28
	2	Elektrosadales telpa	3,30	3,00	9,90	1	3,30	9,90	18,00	0,05
	3	Kāpņu telpa	13,80	3,00	41,40	1	13,80	41,40	18,00	0,20
	4	Vējtveris	7,20	3,00	21,60	1	7,20	21,60	18,00	0,10
	5	Veikals	25,20	3,00	75,60	1	25,20	75,60	18,00	0,37
	6	Ģērbtuve	25,90	3,00	77,70	1	25,90	77,70	18,00	0,38
	7	Kabinets	12,70	3,00	38,10	1	12,70	38,10	18,00	0,18
	8	Gaitenis	3,50	3,00	10,50	1	3,50	10,50	18,00	0,05
	9	Palīgtelpa	8,30	3,00	24,90	1	8,30	24,90	18,00	0,12
	10	Zāle	246,00	5,80	1426,80	1	246,00	1426,80	18,00	6,90
	11	Gaitenis	117,70	3,00	353,10	1	117,70	353,10	18,00	1,71
	12	Vējtveris	19,20	2,65	50,88	1	19,20	50,88	18,00	0,25
	13	Tualete	7,80	3,00	23,40	1	7,80	23,40	18,00	0,11
	14	Tualete	6,00	3,00	18,00	1	6,00	18,00	18,00	0,09
	15	Bibliotēka	15,10	3,00	45,30	1	15,10	45,30	18,00	0,22
	16	Bibliotēka	22,80	3,00	68,40	1	22,80	68,40	18,00	0,33
	17	Gaitenis	16,90	3,00	50,70	1	16,90	50,70	18,00	0,25
	18	Medicīnas kabinets	9,00	3,00	27,00	1	9,00	27,00	18,00	0,13
	19	Priekštelpa	13,60	3,00	40,80	1	13,60	40,80	18,00	0,20
	20	Tualete	2,00	3,00	6,00	1	2,00	6,00	18,00	0,03
	21	Medicīnas kabinets	16,80	3,00	50,40	1	16,80	50,40	18,00	0,24
	22	Kabinets	17,30	3,00	51,90	1	17,30	51,90	18,00	0,25
	23	Katlu telpa	14,00	2,40	33,60	1	14,00	33,60	18,00	0,16
2	24	Kabinets	26,60	2,80	74,48	1	26,60	74,48	18,00	0,36
	25	Palīgtelpa	6,00	2,80	16,80	1	6,00	16,80	18,00	0,08
	26	Kāpņu telpa	13,80	2,80	38,64	1	13,80	38,64	18,00	0,19
	27	Kabinets	10,80	2,80	30,24	1	10,80	30,24	18,00	0,15
	28	Kabinets	30,80	2,80	86,24	1	30,80	86,24	18,00	0,42
	29	Kabinets	15,20	2,80	42,56	1	15,20	42,56	18,00	0,21
	30	Kabinets	26,50	2,80	74,20	1	26,50	74,20	18,00	0,36
	31	Noliktava	5,60	2,80	15,68	1	5,60	15,68	18,00	0,08
	32	Noliktava	15,50	2,80	43,40	1	15,50	43,40	18,00	0,21
	33	Elektrosadales telpa	10,40	2,80	29,12	1	10,40	29,12	18,00	0,14
	34	Tualete	7,50	2,80	21,00	1	7,50	21,00	18,00	0,10
	35	Tualete	6,10	2,80	17,08	1	6,10	17,08	18,00	0,08
	36	Kabinets	7,30	2,80	20,44	1	7,30	20,44	18,00	0,10
	37	Kabinets	14,70	2,80	41,16	1	14,70	41,16	18,00	0,20
	38	Kabinets	14,60	2,80	40,88	1	14,60	40,88	18,00	0,20
	39	Gaitenis	17,40	2,80	48,72	1	17,40	48,72	18,00	0,24
	40	Kabinets	16,60	2,80	46,48	1	16,60	46,48	18,00	0,22
	41	Kabinets	17,10	2,80	47,88	1	17,10	47,88	18,00	0,23
	42	Kabinets	17,00	2,80	47,60	1	17,00	47,60	18,00	0,23
	43	Kabinets	8,80	2,80	24,64	1	8,80	24,64	18,00	0,12
	43	Gaitenis	111,80	2,80	313,04	1	111,80	313,04	18,00	1,51
-1	44	Pagrabs	26,00	2,20	57,20	0	0,00	0,00	0,00	0,00
		KOPĀ	**1076,20**	**3,55**	**3780,66**		**1050,20**	**3723,46**		**18,00**

Climate data

Kultūras nams / Climate: Jelgava / TFA: 1050 m² / Heating: 212,3 kWh/(m²a) / Freq. overheating: 0 % / PER: 1024,4 kWh/(m²a)

Selection of climate data

Country:	ud-User Data
Region:	All
	1-Alphabetic sorting
Climate data set:	ud---05-Jelgava
Climate zone:	2: Cold

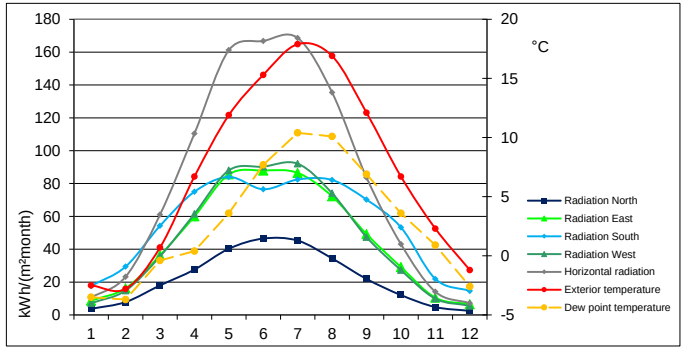
Altitude

Weather station:	1,0	m
Building location:	1	m

Result overview

Annual heating demand	212,3	kWh/(m²a)
Heating load	81,1	W/m²
Frequency of overheating	0,3	%
Sensible cooling	1,3	kWh/(m²a)
Latent cooling	0,0	kWh/(m²a)
Cooling load	-	W/m²
PER demand	1024,4	kWh/(m²a)

	Data for heating Annual method	Data from monthly balance Heating	Cooling	
Heating / cooling period	225	365	183	d/a
Heating / cooling degree hours	98	105	-56	kKh/a
Radiation North	90	284	232	kWh/(m²a)
Radiation East	195	604	472	kWh/(m²a)
Radiation South	292	661	476	kWh/(m²a)
Radiation West	191	480	401	kWh/(m²a)
Horizontal radiation	322	985	826	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---05-Jelgava	Latitude °	56,7	Longitude °	23,7	Altitude [m]	1	Daily temperature swing Summer [K]			9,5			Radiation: [W/m²]		Radiation: [W/m²]			
° C Exterior temperature	-2,5	-2,8	0,7	6,7	11,9	15,3	17,9	16,9	12,1	6,7	2,3	-1,2	-12,4	-11,1	25,3	21,9	1,35	Household electri
kWh/(m²month) Radiation North	4	8	18	28	40	47	45	34	22	12	5	2	10	0	106	60	1,25	Domestic hot wat
kWh/(m²month) Radiation East	9	16	36	60	86	88	86	72	49	29	11	7	16	5	222	159	1,70	Heating
kWh/(m²month) Radiation South	18	29	54	75	84	77	82	82	70	53	22	15	59	5	232	267	1,20	Cooling
kWh/(m²month) Radiation West	7	15	36	62	88	90	92	74	47	27	10	6	19	5	222	159	1,20	Dehumidification
kWh/(m²month) Horizontal radiation	11	23	61	110	161	167	169	135	84	43	14	7	26	10	348	228		
° C Dew point temperature	-3,5	-3,7	-0,4	0,4	3,6	7,7	10,4	10,1	6,9	3,6	0,9	-2,6			13,4			
° C Sky temperature	-15,1	-15,5	-13,3	-6,9	-1,2	3,9	6,7	6,0	1,0	-4,1	-10,2	-13,7			9,7	7,7		
° C Ground temperature	13,4	13,2	13,4	14,0	14,8	15,6	16,2	16,4	16,2	15,6	14,8	14,0	13,2	13,2	21,2	21,2		
Comment:	PHPP, LBN003-19																	

U-value of building assemblies

Energy balance calculation with PHPP Version 9.6a

Kultūras nams / Climate: Jelgava / TFA: 1050 m² / Heating: 212,3 kWh/(m²a) / Freq. overheating: 0 % / PER: 1024,4 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: Grīda uz grunts/ zāle | 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]
Dēļu klājs	0,130					25
Asfalts	0,700					30
Betons	2,000					183
Šķembas	2,000					70

Percentage of sec. 1: 100% | Percentage of sec. 2: | Percentage of sec. 3: | Total: 30,8 cm

U-value supplement: W/(m²K) | **U-value: 1,881** W/(m²K)

Assembly no. 02ud | Building assembly description: Grīda uz grunts/ pārējās telpas | 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]
Grīda uz grunts	0,053					25
Cements	2,000					50
Izdedži	0,300					40
Betons	2,000					50
Šķembas	2,000					100

Percentage of sec. 1: 100% | Percentage of sec. 2: | Percentage of sec. 3: | Total: 26,5 cm

U-value supplement: W/(m²K) | **U-value: 1,147** W/(m²K)

Assembly no. 03ud | Building assembly description: Ārsienas | 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]
Apmetums	0,900					5
Ķieģeļi	0,810					510

Percentage of sec. 1: 100% | Percentage of sec. 2: | Percentage of sec. 3: | Total: 51,5 cm

U-value supplement: W/(m²K) | **U-value: 1,242** W/(m²K)

Assembly no. | Interior insulation?

04ud | **Jumts**

Heat transmission resistance [m²K/W]

Orientation of building element: **1-Roof** | interior R_{si}: 0,10

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]
Ruberoīds	**0,230**					**7**
Betona lējums	**2,000**					**50**
Keramzīts	**0,200**					**75**
Gāzbetons	**0,300**					**100**
Dz/b panelis	**2,000**					**220**

Percentage of sec. 1: 100% | Percentage of sec. 2 | Percentage of sec. 3 | Total: **45,2** cm

U-value supplement: W/(m²K) | **U-value: 0,986** W/(m²K)

Assembly no. | Interior insulation?

05ud | **Pagraba siena virs grunts**

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]
Apmetums	**0,900**					**5**
Dz/b	**2,000**					**600**
Apmetums	**0,900**					**5**

Percentage of sec. 1: 100% | Percentage of sec. 2 | Percentage of sec. 3 | Total: **61,0** cm

U-value supplement: W/(m²K) | **U-value: 2,079** W/(m²K)

Assembly no. | Interior insulation?

06ud | **Pagraba siena zem grunts**

Heat transmission resistance [m²K/W]

Orientation of building element: **2-Wall** | interior R_{si}: 0,13

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]
Apmetums	**0,900**					**5**
Dz/b	**2,000**					**600**
Apmetums	**0,900**					**5**

Percentage of sec. 1: 100% | Percentage of sec. 2 | Percentage of sec. 3 | Total: **61,0** cm

U-value supplement: W/(m²K) | **U-value: 2,267** W/(m²K)

Assembly no.		Interior insulation?
07ud	**Grīda uz grunts**	

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]
Dz/b	**2,000**					**70**
Šķembas	**2,000**					**50**

Percentage of sec. 1	Percentage of sec. 2	Percentage of sec. 3	Total
92%	**8,0%**		**12,0** cm

U-value supplement [ ] W/(m²K) **U-value:** **4,348** W/(m²K)

Assembly no.		Interior insulation?
08ud	**Pagraba pārsegums**	

Heat transmission resistance [m²K/W]

Orientation of building element	**3-Floor**	interior R_{si}	0,17
Adjacent to	**3-Ventilated**	exterior R_{se}:	0,17

Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
Dz/b panelis	**2,000**					**220**
Grīdas segums	**0,250**					**20**

Percentage of sec. 1	Percentage of sec. 2	Percentage of sec. 3	Total
100%			**24,0** cm

U-value supplement [ ] W/(m²K) **U-value:** **1,887** W/(m²K)

Heat losses through the ground 2

Energy balance calculation with PHPP Version 9.6a

Kultūras nams / Climate: Jelgava / TFA: 1050 m² / Heating: 212,3 kWh/(m²a) / Freq. overheating: 0 % / PER: 1024,4 kWh/(m²a)

Error(s):

Building section 2

Ground characteristics

Thermal conductivity	λ	2,0	W/(mK)
Heat capacity	ρc	2,0	MJ/(m³K)
Periodic penetration depth	δ	3,17	m

Building data

Area of ground floor slab / basement c	A	666,3	m²	U-value floor slab/basement ceiling	U_f	1,514 W/(m²K)
Perimeter length	P	161,0	m	TBs floor slab / basement ceiling	Ψ_g*l	0,00 W/K
Charact. dimension of floor slab	B'	8,28	m	U-value floor slab / basement ceiling in	U_f'	1,514 W/(m²K)
				Equivalent thickness floor	d_t	1,32 m

Floor slab type (select only one)

x **Slab on grade**

Perimeter insulation width/depth	D	0,00	m	Orientation of perimeter insulation	horizontal	
Perimeter insulation thickness	d_n	0,00	m	(check only one field)	vertical	x
Conductivity perimeter insulation	λ_n	0,036	W/(mK)			

Heated basement or floor slab completely / partially below ground level

Basement wall height below ground lev	z		m	U-Value wall below ground	U_{wB}	W/(m²K)

Unheated basement

Height aboveground wall	h		m	U-Value wall above ground	U_W	W/(m²K)
Basement wall height below ground lev	z		m	U-Value wall below ground	U_{WB}	W/(m²K)
Air change unheated basement	n		h^{-1}	U-Value basement floor slab	U_{fB}	W/(m²K)
Air volume basement	V		m³			

Suspended floor above a ventilated crawl space (at max. 0.5 m below ground)

U-Value crawl space	U_{Crawl}		W/(m²K)	Area of ventilation openings	$_{ε}P$	m²
Height of crawl space wall	h		m	Wind velocity at 10 m height	v	m/s
U-Value crawl space wall	U_W		W/(m²K)	Wind shield factor	f_W	-

Additional thermal bridge heat losses at perimeter

Phase shift	β		Months	Steady-state fraction	$\Psi_{P,stat}$*l	14,488 W/K
				Harmonic fraction	$\Psi_{P,harm}$*l	0,000 W/K

Groundwater correction

Depth of the groundwater table	z_w	3,0	m	Groundwater correction factor	G_w	1,01629058 -
Groundwater flow rate	q_w	0,01	m/d			

Interim results

Phase shift	β	0,99	Months	Steady-state heat flow	Φ_{stat}	3147,8 W
Steady-state transmittance	L_S	314,78	W/K	Periodic heat flow	Φ_{harm}	631,5 W
Exterior periodic transmittance	L_{pe}	145,74	W/K	Heat losses during heating period	Q_{tot}	20427 kWh
Transmittance building	L_0	1023,40	W/K			

Monthly average temperatures in the ground for monthly method (building assembly 2)

Month	1	2	3	4	5	6	7	8	9	10	11	12	Avg. value
Winter	13,7	13,5	13,6	14,1	14,9	15,6	16,2	16,4	16,2	15,7	15,0	14,2	14,9
Summer	18,5	18,3	18,5	19,0	19,7	20,5	21,0	21,2	21,1	20,6	19,8	19,1	19,8

Design ground temperature for 'Heating load' worksheet 13,5 — **For 'Cooling load' worksheet** 21,2

Reduction factor for 'Annual heating' worksheet 0,23

Heat losses through the ground 3

Energy balance calculation with PHPP Version 9.6a

Kultūras nams / Climate: Jelgava / TFA: 1050 m² / Heating: 212,3 kWh/(m²a) / Freq. overheating: 0 % / PER: 1024,4 kWh/(m²a)

Building section 3

Ground characteristics

Thermal conductivity	λ	2,0	W/(mK)
Heat capacity	ρc	2,0	MJ/(m³K)
Periodic penetration depth	δ	3,17	m

Building data

Area of ground floor slab / basement c	A	26,0	m²	U-value floor slab/basement ceiling	U_f	1,887 W/(m²K)
Perimeter length	P	20,5	m	TBs floor slab / basement ceiling	Ψ_g*l	0,00 W/K
Charact. dimension of floor slab	B'	2,53	m	U-value floor slab / basement ceiling ir	U_f'	1,887 W/(m²K)
				Equivalent thickness floor	d_t	1,06 m

Floor slab type (select only one)

Slab on grade

Perimeter insulation width/depth	D		m	Orientation of perimeter insulation	horizontal	
Perimeter insulation thickness	d_n		m	(check only one field)	vertical	x
Conductivity perimeter insulation	λ_n		W/(mK)			

Heated basement or floor slab completely / partially below ground level

Basement wall height below ground lev	z		m	U-Value wall below ground	U_{wB}	W/(m²K)

x **Unheated basement**

Height aboveground wall	h	0,20	m	U-Value wall above ground	U_W	2,079 W/(m²K)
Basement wall height below ground lev	z	2,00	m	U-Value wall below ground	U_{WB}	2,267 W/(m²K)
Air change unheated basement	n	0,20	h^{-1}	U-Value basement floor slab	U_{fB}	4,348 W/(m²K)
Air volume basement	V	57	m³			

Suspended floor above a ventilated crawl space (at max. 0.5 m below ground)

U-Value crawl space	U_{Crawl}		W/(m²K)	Area of ventilation openings	$_{ε}P$	m²
Height of crawl space wall	h		m	Wind velocity at 10 m height	v	m/s
U-Value crawl space wall	U_W		W/(m²K)	Wind shield factor	f_W	-

Additional thermal bridge heat losses at perimeter

Phase shift	β		Months	Steady-state fraction	$\Psi_{P,stat}$*l	W/K
				Harmonic fraction	$\Psi_{P,harm}$*l	0,000 W/K

Groundwater correction

Depth of the groundwater table	z_w	3,0	m	Groundwater correction factor	G_w	1,00025761 -
Groundwater flow rate	q_w	0,01	m/d			

Interim results

Phase shift	β	0,63	Months	Steady-state heat flow	Φ_{stat}	282,6 W
Steady-state transmittance	L_S	28,26	W/K	Periodic heat flow	Φ_{harm}	113,0 W
Exterior periodic transmittance	L_{pe}	23,97	W/K	Heat losses during heating period	Q_{tot}	2138 kWh
Transmittance building	L_0	49,01	W/K			

Monthly average temperatures in the ground for monthly method (building assembly 3)

Month	1	2	3	4	5	6	7	8	9	10	11	12	Avg. value
Winter	7,5	7,2	8,3	10,3	12,9	15,4	16,9	17,2	16,2	14,1	11,5	9,1	12,2
Summer	10,5	10,2	11,2	13,3	15,9	18,3	19,9	20,2	19,2	17,1	14,5	12,1	15,2

Design ground temperature for 'Heating load' worksheet 7,2 — **For 'Cooling load' worksheet** 20,2

Reduction factor for 'Annual heating' worksheet 0,50

Energy balance calculation with PHPP Version 9.6a

Areas determination

Kultūras nams / Climate: Jelgava / TFA: 1050 m² / Heating: 212,3 kWh/(m²a) / Freq. overheating: 0 % / PER: 1024,4 kWh/(m²a)

Summary

Temp.-zone	Area group	Group no.	Area / Length	Unit	Comment	Building assembly overview	Average U-value [W/(m²K)]	Radiation-gains heating season [kWh/a]	Radiation-load cooling period [kWh/a]
	Treated floor area	1	**1050,20**	m²	*Treated floor area according to PHPP manual*			12 Months	6 Months
A	**North windows**	2	**40,55**	m²	Results come from the 'Windows' worksheet.	**North windows**	**1,282**	**3618**	**2915**
A	**East windows**	3	**51,84**	m²	Window areas are subtracted from individual opaque areas.	**East windows**	**1,310**	**7963**	**6401**
A	**South windows**	4	**47,77**	m²	which is displayed in the 'Windows' worksheet.	**South windows**	**1,312**	**8592**	**5786**
A	**West windows**	5	**28,57**	m²		**West windows**	**1,315**	**3059**	**2798**
A	**Horizontal windows**	6	**0,00**	m²		**Horizontal windows**			
A	**Exterior door**	7	**5,76**	m²	*Please subtract area of door from respective building assembly*	**Exterior door**	**2,000**		
A	**External wall - Ambient**	8	**790,12**	m²	*Temperature zone "A" is ambient air*	**External wall - Ambient**	**1,242**	**5271**	**6257**
B	**External wall - Ground**	9	**0,00**	m²	*Temperature zone "B" is the ground*	**External wall - Ground**			
A	**Roof/Ceiling - Ambient**	10	**688,64**	m²		**Roof/Ceiling - Ambient**	**0,986**	**18101**	**20752**
B	**Floor slab / Basement ceiling**	11	**692,29**	m²		**Floor slab / Basement ceiling**	**1,442**		
		12	**0,00**	m²	*Temperature zones "A", "B","P" and "X" may be used. NOT "I"*				
		13	**0,00**	m²	*Temperature zones "A", "B","P" and "X" may be used. NOT "I"* Factor for X				
X		14	**0,00**	m²	*Temperature zone "X": Please provide user-defined reduction factor (0 < ft < 1):* **75%**				

						Thermal bridges - Overview	**Ψ [W/(mK)]**
A	**Thermal bridges Ambient**	15	**636,60**	m	*Units in m*	**Thermal bridges Ambient**	**0,061**
P	**Perimeter thermal bridges**	16	**160,98**	m	*Units in m; temperature zone "P" is perimeter (see 'Ground' worksheet)*	**Perimeter thermal bridges**	**0,090**
B	**Thermal bridges FS/BC**	17	**0,00**	m	*Units in m*	**Thermal bridges FS/BC**	
I	**Building element towards neigh**	18	**0,00**	m²	*No heat losses, only considered for the heating load calculation*	**Building element towards neighbour**	
Total thermal envelope			**2345,53**	**m²**		**Average therm. envelope**	**1,255**

Go to building components list

Area input

2-Sorting: BY ID

Area no.	Building assembly description	To group No.	Assigned to group	Quantity	x (	a [m]	x	b [m]	+	User determined [m²]	-	User subtraction [m²]	-	Subtraction window areas [m²]	) =	Area [m²]	Selection building assembly / Building system	U-Value [W/(m²K)]	Deviation from North	Angle of inclination from the horizontal	Orientation	Reduction factor shading	Exterior absorptivity	Exterior emissivity
	Projected building footprint	**0**	Projected building footprint	**1**	x (		x		+		-		)		=	0,0									
	Treated floor area	**1**	Treated floor area	**1**	x (		x		+	**1050,20**	-		)		=	1050,2									
	Exterior door	**7**	Exterior door	**1**	x (		x		+	**5,76**	-		) -		=	5,8	Exterior door	**2,00**							
1	**Grīdas grunts/ zāle**	**11**	Floor slab / Basement ceiling	**1**	x (		x		+	**251,80**	-		) -	**0,0**	=	251,80	**01ud-Grīda uz grunts/ zāle**	**1,8809**	**0**	**180**	**Hor**	**0,00**	**0,00**	**0,90**
2	**Grīdas grunts/ pārējas telpa**	**11**	Floor slab / Basement ceiling	**1**	x (		x		+	**414,51**	-		) -	**0,0**	=	414,51	**02ud-Grīda uz grunts/ pārējās telpas**	**1,1474**	**0**	**180**	**Hor**	**0,00**	**0,00**	**0,90**
3	**Pagraba pārsegums**	**11**	Floor slab / Basement ceiling	**1**	x (		x		+	**25,98**	-		) -	**0,0**	=	25,98	**08ud-Pagraba pārsegums**	**1,8868**	**0**	**180**	**Hor**	**0,00**	**0,00**	**0,90**
4	**Jumts**	**10**	Roof/Ceiling - Ambient	**1**	x (		x		+	**692,29**	-	**3,66**	) -	**0,0**	=	688,64	**04ud-Jumts**	**0,9864**	**0**	**0**	**Hor**	**1,00**	**1,00**	**0,90**
5	**Z siena**	**8**	External wall - Ambient	**1**	x (		x		+	**223,19**	-		) -	**40,6**	=	182,64	**03ud-Ārsienas**	**1,2420**	**19**	**90**	**North**	**0,70**	**0,70**	**0,90**
6	**D siena**	**8**	External wall - Ambient	**1**	x (		x		+	**223,19**	-		) -	**47,8**	=	175,42	**03ud-Ārsienas**	**1,2420**	**199**	**90**	**South**	**0,70**	**0,70**	**0,90**
7	**R siena**	**8**	External wall - Ambient	**1**	x (		x		+	**257,28**	-		) -	**28,6**	=	228,72	**03ud-Ārsienas**	**1,2420**	**289**	**90**	**West**	**0,70**	**0,70**	**0,90**
8	**A siena**	**8**	External wall - Ambient	**1**	x (		x		+	**257,28**	-	**2,10**	) -	**51,8**	=	203,35	**03ud-Ārsienas**	**1,2420**	**109**	**90**	**East**	**0,70**	**0,70**	**0,90**
9					x (		x		+		-		) -	**0,0**	=									
10					x (		x		+		-		) -	**0,0**	=									
11					x (		x		+		-		) -	**0,0**	=									
12					x (		x		+		-		) -	**0,0**	=									
13					x (		x		+		-		) -	**0,0**	=									
14					x (		x		+		-		) -	**0,0**	=									
15					x (		x		+		-		) -	**0,0**	=									
16					x (		x		+		-		) -	**0,0**	=									
17					x (		x		+		-		) -	**0,0**	=									
18					x (		x		+		-		) -	**0,0**	=									
19					x (		x		+		-		) -	**0,0**	=									
20					x (		x		+		-		) -	**0,0**	=									
21					x (		x		+		-		) -	**0,0**	=									
22					x (		x		+		-		) -	**0,0**	=									
23					x (		x		+		-		) -	**0,0**	=									
24					x (		x		+		-		) -	**0,0**	=									
25					x (		x		+		-		) -	**0,0**	=									
26					x (		x		+		-		) -	**0,0**	=									
27					x (		x		+		-		) -	**0,0**	=									
28					x (		x		+		-		) -	**0,0**	=									
29					x (		x		+		-		) -	**0,0**	=									

Energy balance calculation with PHPP Version 9.6a

Areas determination

Kultūras nams / Climate: Jelgava / TFA: 1050 m² / Heating: 212,3 kWh/(m²a) / Freq. overheating: 0 % / PER: 1024,4 kWh/(m²a)

Summary

Temp.-zone	Area group	Group no.	Area / Length	Unit	Comment		Building assembly overview	Average U-value [W/(m²K)]	Radiation-gains heating season [kWh/a]	Radiation-load cooling period [kWh/a]
	Treated floor area	1	**1050,20**	m²	*Treated floor area according to PHPP manual*				12 Months	6 Months
A	**North windows**	2	**40,55**	m²	Results come from the 'Windows' worksheet.		**North windows**	**1,282**	**3618**	**2915**
A	**East windows**	3	**51,84**	m²	Window areas are subtracted from individual opaque areas.		**East windows**	**1,310**	**7963**	**6401**
A	**South windows**	4	**47,77**	m²	which is displayed in the 'Windows' worksheet.		**South windows**	**1,312**	**8592**	**5786**
A	**West windows**	5	**28,57**	m²			**West windows**	**1,315**	**3059**	**2798**
A	**Horizontal windows**	6	**0,00**	m²			**Horizontal windows**			
A	**Exterior door**	7	**5,76**	m²	*Please subtract area of door from respective building assembly*		**Exterior door**	**2,000**		
A	**External wall - Ambient**	8	**790,12**	m²	*Temperature zone "A" is ambient air*		**External wall - Ambient**	**1,242**	**5271**	**6257**
B	**External wall - Ground**	9	**0,00**	m²	*Temperature zone "B" is the ground*		**External wall - Ground**			
A	**Roof/Ceiling - Ambient**	10	**688,64**	m²			**Roof/Ceiling - Ambient**	**0,986**	**18101**	**20752**
B	**Floor slab / Basement ceiling**	11	**692,29**	m²			**Floor slab / Basement ceiling**	**1,442**		
		12	**0,00**	m²	*Temperature zones "A", "B","P" and "X" may be used. NOT "I"*					
		13	**0,00**	m²	*Temperature zones "A", "B","P" and "X" may be used. NOT "I"*	Factor for X				
X		14	**0,00**	m²	*Temperature zone "X": Please provide user-defined reduction factor (0 < ft < 1):*	**75%**				

							Thermal bridges - Overview	**Ψ [W/(mK)]**
A	**Thermal bridges Ambient**	15	**636,60**	m	*Units in m*		**Thermal bridges Ambient**	**0,061**
P	**Perimeter thermal bridges**	16	**160,98**	m	*Units in m; temperature zone "P" is perimeter (see 'Ground' worksheet)*		**Perimeter thermal bridges**	**0,090**
B	**Thermal bridges FS/BC**	17	**0,00**	m	*Units in m*		**Thermal bridges FS/BC**	
I	**Building element towards neigh**	18	**0,00**	m²	*No heat losses, only considered for the heating load calculation*		**Building element towards neighbour**	
Total thermal envelope			**2345,53**	**m²**			**Average therm. envelope**	**1,255**

Go to building components list

30					x (		x		+		-		) -	0,0	=								
31					x (		x		+		-		) -	0,0	=								
32					x (		x		+		-		) -	0,0	=								
33					x (		x		+		-		) -	0,0	=								
34					x (		x		+		-		) -	0,0	=								
35					x (		x		+		-		) -	0,0	=								
36					x (		x		+		-		) -	0,0	=								
37					x (		x		+		-		) -	0,0	=								
38					x (		x		+		-		) -	0,0	=								
39					x (		x		+		-		) -	0,0	=								
40					x (		x		+		-		) -	0,0	=								
41					x (		x		+		-		) -	0,0	=								
42					x (		x		+		-		) -	0,0	=								
43					x (		x		+		-		) -	0,0	=								
44					x (		x		+		-		) -	0,0	=								
45					x (		x		+		-		) -	0,0	=								
46					x (		x		+		-		) -	0,0	=								
47					x (		x		+		-		) -	0,0	=								
48					x (		x		+		-		) -	0,0	=								
49					x (		x		+		-		) -	0,0	=								
50					x (		x		+		-		) -	0,0	=								
Aend																							

Areas determination

Kultūras nams / Climate: Jelgava / TFA: 1050 m² / Heating: 212,3 kWh/(m²a) / Freq. overheating: 0 % / PER: 1024,4 kWh/(m²a)

Summary

Temp.-zone	Area group	Group no.	Area / Length	Unit	Comment	Building assembly overview	Average U-value [W/(m²K)]	Radiation-gains heating season [kWh/a]
								12 Months
	Treated floor area	1	**1050,20**	m²	*Treated floor area according to PHPP manual*			
A	**North windows**	2	**40,55**	m²	Results come from the 'Windows' worksheet.	**North windows**	**1,282**	**3618**
A	**East windows**	3	**51,84**	m²	Window areas are subtracted from individual opaque areas.	**East windows**	**1,310**	**7963**
A	**South windows**	4	**47,77**	m²	which is displayed in the 'Windows' worksheet.	**South windows**	**1,312**	**8592**
A	**West windows**	5	**28,57**	m²		**West windows**	**1,315**	**3059**
A	**Horizontal windows**	6	**0,00**	m²		**Horizontal windows**		
A	**Exterior door**	7	**5,76**	m²	*Please subtract area of door from respective building assembly*	**Exterior door**	**2,000**	
A	**External wall - Ambient**	8	**790,12**	m²	*Temperature zone "A" is ambient air*	**External wall - Ambient**	**1,242**	**5271**
B	**External wall - Ground**	9	**0,00**	m²	*Temperature zone "B" is the ground*	**External wall - Ground**		
A	**Roof/Ceiling - Ambient**	10	**688,64**	m²		**Roof/Ceiling - Ambient**	**0,986**	**18101**
B	**Floor slab / Basement ceiling**	11	**692,29**	m²		**Floor slab / Basement ceiling**	**1,442**	
		12	**0,00**	m²	*Temperature zones "A", "B","P" and "X" may be used. NOT "I"*			
		13	**0,00**	m²	*Temperature zones "A", "B","P" and "X" may be used. NOT "I"* Factor for X			
X		14	**0,00**	m²	*Temperature zone "X": Please provide user-defined reduction factor (0 < ft < 1):* **75%**			
						Thermal bridges - Overview	**Ψ [W/(mK)]**	
A	**Thermal bridges Ambient**	15	**636,60**	m	*Units in m*	**Thermal bridges Ambient**	**0,061**	
P	**Perimeter thermal bridges**	16	**160,98**	m	*Units in m; temperature zone "P" is perimeter (see 'Ground' worksheet)*	**Perimeter thermal bridges**	**0,090**	
B	**Thermal bridges FS/BC**	17	**0,00**	m	*Units in m*	**Thermal bridges FS/BC**		
I	**Building element towards neigh**	18	**0,00**	m²	*No heat losses, only considered for the heating load calculation*	**Building element towards neighbour**		
Total thermal envelope			**2345,53**	**m²**		**Average therm. envelope**	**1,255**	

Go to building components list

Thermal bridge inputs

Sortierung ändern

No.	Thermal bridge - denomination	Group No.	Assigned to group	Quantity	x (	Length [m]	-	Subtraction length [m]	)=	Length ℓ [m]	User determined psi value [W/(mK)]	User determined $f_{Rsi=0,25}$ (optional)	or	Selection building system	Ψ-Value [W/(mK)]	f_{Rsi}-Requirement met?
1	**Jumts**	**15**	Thermal bridges Ambient	**1**	x (	**181,52**	-		) =	181,52	**0,080**		or		**0,080**	
2	**Grīda uz grunts/ pārējas telpas**	**16**	Perimeter thermal bridges	**1**	x (	**160,98**	-		) =	160,98	**0,090**		or		**0,090**	
3	**Durvis**	**15**	Thermal bridges Ambient	**1**	x (	**13,24**	-		) =	13,24	**0,090**		or		**0,090**	
4	**Logi**	**15**	Thermal bridges Ambient	**1**	x (	**421,30**	-		) =	421,30	**0,050**		or		**0,050**	
5	**Pagraba pārsegums**	**15**	Thermal bridges Ambient	**1**	x (	**20,54**	-		) =	20,54	**0,090**		or		**0,090**	
6					x (		-		) =				or			
7					x (		-		) =				or			
8					x (		-		) =				or			
9					x (		-		) =				or			
10					x (		-		) =				or			
11					x (		-		) =				or			
12					x (		-		) =				or			
13					x (		-		) =				or			
14					x (		-		) =				or			
15					x (		-		) =				or			
16					x (		-		) =				or			
17					x (		-		) =				or			
18					x (		-		) =				or			
19					x (		-		) =				or			
20					x (		-		) =				or			
21					x (		-		) =				or			
22					x (		-		) =				or			
23					x (		-		) =				or			
24					x (		-		) =				or			
25					x (		-		) =				or			
26					x (		-		) =				or			
27					x (		-		) =				or			
28					x (		-		) =				or			
29					x (		-		) =				or			
30					x (		-		) =				or			
31					x (		-		) =				or			
32					x (		-		) =				or			

Areas determination

Kultūras nams / Climate: Jelgava / TFA: 1050 m² / Heating: 212,3 kWh/(m²a) / Freq. overheating: 0 % / PER: 1024,4 kWh/(m²a)

Summary

Temp.-zone	Area group	Group no.	Area / Length	Unit	Comment		Building assembly overview	Average U-value [W/(m²K)]	Radiation-gains heating season [kWh/a]
									12 Months
	Treated floor area	1	**1050,20**	m²	*Treated floor area according to PHPP manual*				
A	**North windows**	2	**40,55**	m²			**North windows**	**1,282**	**3618**
A	**East windows**	3	**51,84**	m²	Results come from the 'Windows' worksheet.		**East windows**	**1,310**	**7963**
A	**South windows**	4	**47,77**	m²	Window areas are subtracted from individual opaque areas.		**South windows**	**1,312**	**8592**
A	**West windows**	5	**28,57**	m²	which is displayed in the 'Windows' worksheet.		**West windows**	**1,315**	**3059**
A	**Horizontal windows**	6	**0,00**	m²			**Horizontal windows**		
A	**Exterior door**	7	**5,76**	m²	*Please subtract area of door from respective building assembly*		**Exterior door**	**2,000**	
A	**External wall - Ambient**	8	**790,12**	m²	*Temperature zone "A" is ambient air*		**External wall - Ambient**	**1,242**	**5271**
B	**External wall - Ground**	9	**0,00**	m²	*Temperature zone "B" is the ground*		**External wall - Ground**		
A	**Roof/Ceiling - Ambient**	10	**688,64**	m²			**Roof/Ceiling - Ambient**	**0,986**	**18101**
B	**Floor slab / Basement ceiling**	11	**692,29**	m²			**Floor slab / Basement ceiling**	**1,442**	
		12	**0,00**	m²	*Temperature zones "A", "B","P" and "X" may be used. NOT "I"*				
		13	**0,00**	m²	*Temperature zones "A", "B","P" and "X" may be used. NOT "I"*	Factor for X			
X		14	**0,00**	m²	*Temperature zone "X": Please provide user-defined reduction factor (0 < ft < 1):*	**75%**			
							Thermal bridges - Overview	**Ψ [W/(mK)]**	
A	**Thermal bridges Ambient**	15	**636,60**	m	*Units in m*		**Thermal bridges Ambient**	**0,061**	
P	**Perimeter thermal bridges**	16	**160,98**	m	*Units in m; temperature zone "P" is perimeter (see 'Ground' worksheet)*		**Perimeter thermal bridges**	**0,090**	
B	**Thermal bridges FS/BC**	17	**0,00**	m	*Units in m*		**Thermal bridges FS/BC**		
I	**Building element towards neigh**	18	**0,00**	m²	*No heat losses, only considered for the heating load calculation*		**Building element towards neighbour**		
Total thermal envelope			**2345,53**	**m²**			**Average therm. envelope**	**1,255**	

Go to building components list

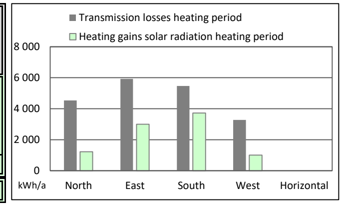
33					x (		-		) =							or			
34					x (		-		) =							or			
35					x (		-		) =							or			
36					x (		-		) =							or			
37					x (		-		) =							or			
38					x (		-		) =							or			
39					x (		-		) =							or			
40					x (		-		) =							or			
41					x (		-		) =							or			
42					x (		-		) =							or			
43					x (		-		) =							or			
44					x (		-		) =							or			
45					x (		-		) =							or			
46					x (		-		) =							or			
47					x (		-		) =							or			
48					x (		-		) =							or			
49					x (		-		) =							or			
50					x (		-		) =							or			
TBend																			

Windows

Energy balance calculation with PHPP Version 9.6a

Kultūras nams / Climate: Jelgava / TFA: 1050 m² / Heating: 212,3 kWh/(m²a) / Freq. overheating: 0 % / PER: 1024,4 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	90	0,82	0,95	0,85	0,74	0,64	0,49	40,55	1,28	29,87	96	North	4534	1225
East	195	0,78	0,95	0,85	0,63	0,64	0,40	51,84	1,31	32,77	228	East	5925	3004
South	292	0,84	0,95	0,85	0,63	0,64	0,43	47,77	1,31	29,94	286	South	5467	3719
West	191	0,70	0,95	0,85	0,61	0,64	0,35	28,57	1,32	17,54	158	West	3277	1005
Horizontal	322	1,00	0,95	0,85	0,00	0,00	0,00	0,00	0,00	0,00	322	Horizontal	0	0
Total or average value for all windows.						0,64	0,42	168,72	1,30	110,11			19203	8953



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

0,65	0,70	0,80	0,45

Go to glazing list

Go to window frames list

Heating degree hours [kKh/a]: 87,2

Installation situation: user determined value for $\Psi_{installation}$ or '1': $\Psi_{installation}$ from 'Components' worksheet; '0': in the case of abutting windows

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: 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)	%
9	D L2	199	90	South	1,450	0,800	6-D siena	02ud-2. stiklu	03ud-PVC	0,64	1,20	1,14	0,040	1	1	1	1	0,000	10,4	6,75	1,31	65%
2	D AD	199	90	South	0,750	2,300	6-D siena	02ud-2. stiklu	03ud-PVC	0,64	1,20	1,14	0,040	0	1	1	1	0,000	3,5	2,31	1,30	67%
32	D L1	199	90	South	0,700	1,400	6-D siena	02ud-2. stiklu	03ud-PVC	0,64	1,20	1,14	0,040	0	1	1	1	0,000	31,4	19,20	1,32	61%
2	D L3	199	90	South	0,900	1,400	6-D siena	02ud-2. stiklu	03ud-PVC	0,64	1,20	1,14	0,040	0	1	1	1	0,000	2,5	1,68	1,30	67%
12	Z L4	19	90	North	1,600	1,250	5-Z siena	02ud-2. stiklu	03ud-PVC	0,64	1,20	1,14	0,040	0	0	1	1	0,000	24,0	17,64	1,28	74%
6	Z L4	19	90	North	1,600	1,250	5-Z siena	02ud-2. stiklu	03ud-PVC	0,64	1,20	1,14	0,040	0	0	0	1	0,000	12,0	8,82	1,28	74%
2	Z L5	19	90	North	1,300	1,750	5-Z siena	02ud-2. stiklu	03ud-PVC	0,64	1,20	1,14	0,040	1	1	1	1	0,000	4,6	3,41	1,28	75%
34	A L1	109	90	East	0,700	1,400	8-A siena	02ud-2. stiklu	03ud-PVC	0,64	1,20	1,14	0,040	0	1	1	1	0,000	33,3	20,40	1,32	61%
28	R L1	289	90	West	0,700	1,400	7-R siena	02ud-2. stiklu	03ud-PVC	0,64	1,20	1,14	0,040	0	1	1	1	0,000	27,4	16,80	1,32	61%
1	R L6	289	90	West	0,900	1,250	7-R siena	02ud-2. stiklu	03ud-PVC	0,64	1,20	1,14	0,040	1	1	1	1	0,000	1,1	0,74	1,30	65%
1	A AD2	109	90	East	1,000	2,100	8-A siena	02ud-2. stiklu	03ud-PVC	0,64	1,20	1,14	0,040	1	1	1	1	0,000	2,1	1,52	1,29	72%
1	A AD2	109	90	East	0,350	2,100	8-A siena	02ud-2. stiklu	03ud-PVC	0,64	1,20	1,14	0,040	1	1	1	1	0,000	0,7	0,29	1,39	39%
4	A AD2	109	90	East	1,400	0,500	8-A siena	02ud-2. stiklu	03ud-PVC	0,64	1,20	1,14	0,040	0	0	1	1	0,000	2,8	1,44	1,34	51%
4	A AD2	109	90	East	1,400	1,500	8-A siena	02ud-2. stiklu	03ud-PVC	0,64	1,20	1,14	0,040	0	0	0	1	0,000	8,4	6,24	1,28	74%
4	A AD2	109	90	East	1,400	0,800	8-A siena	02ud-2. stiklu	03ud-PVC	0,64	1,20	1,14	0,040	0	0	1	1	0,000	4,5	2,88	1,31	64%

Heating degree hours [kKh/a]: **87,2**

					Window rough openings		Installed in	Glazing	Frame	g-Value	U-Value		Ψ Glazing edge	Installation situation user determined value for $\Psi_{installation}$ or '1': $\Psi_{installation}$ from 'Components' worksheet '0': in the case of abutting windows					Results			
Quan-tity	Description	Deviation from north	Angle of inclination from the horizontal	Orien- tation	Width	Height	Selection from 'Areas' worksheet	Selection from 'Components' worksheet	Selection from 'Components' worksheet	Perpen-dicular radiation	Glazing	Frames (avg.)	$\Psi_{Glazing\ edge}$ (Avg.)	left	right	bottom	top	$\Psi_{installation}$ (Avg.)	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)	%

Heating degree hours [kKh/a]: **87,2**

					Window rough openings		**Installed in**	**Glazing**	**Frame**	**g-Value**	**U-Value**		**Ψ Glazing edge**	**Installation situation** user determined value for $\Psi_{installation}$ or '1': $\Psi_{installation}$ from 'Components' worksheet '0': in the case of abutting windows					**Results**			
Quan-tity	Description	Deviation from north	Angle of inclination from the horizontal	Orien- tation	Width	Height	Selection from 'Areas' worksheet	Selection from 'Components' worksheet	Selection from 'Components' worksheet	Perpen- dicular radiation	Glazing	Frames (avg.)	$\Psi_{Glazing\ edge}$ (Avg.)	left	right	bottom	top	$\Psi_{Installation}$ (Avg.)	Window Area	Glazing area	U_w installed	Glazed fraction per window
		°	°		m	m		1-Sorting: LIKE LIST	1-Sorting: LIKE LIST	-	$W/(m^2K)$	$W/(m^2K)$	W/(mK)	W/(mK) or 1/0				W/(mK)	m^2	m^2	$W/(m^2K)$	%

Ventilation data

Kultūras nams / Climate: Jelgava / TFA: 1050 m² / Heating: 212,3 kWh/(m²a) / Freq. overheating: 0 % / PER: 1024,4 kWh/(m²a)

Treated floor area A_{TFA}	m²	1050		*('Areas' worksheet)*
Room height h	m	3,55	3,55	
Volume of ventilated space (A_{TFA}*h) V_V	m³	3723		*(Worksheet 'Annual heating')*

Ventilation type

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

Infiltration air change rate

Wind protection coefficients e and f		
Coefficient e for wind protection class	Several side exposed	One side exposed
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			0,07	0,18				
Wind protection coefficient, f			15	15	Net air volume for press. test	V_{n50}	Air permeability	q_{50}
Air change rate at press. test	n_{50}	1/h	1,89	1,89	3723	m³	3,00	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	0,132	0,331

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 [-]
	Standard design	*('Ventilation' worksheet, see below)*							
x	Multiple ventilation units, non-res	*('Addl vent' worksheet)*	1181	0,32	0,00	0,0%	0,0%	0,00	0,0%

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
24%	23%	29%	31%	39%	52%	62%	61%	49%	39%	32%	25%

Extended input for balanced ventilation

Kultūras nams / Climate: Jelgava / TFA: 1050 m² / Heating: 212,3 kWh/(m²a) / Freq. overheating: 0 % / PER: 1024,4 kWh/(m²a)

Planning ventilation systems with multiple ventilation units

Ventilation unit / Heat recovery efficiency design			
In Ventilation sheet (standard design)			*('Ventilation' worksheet)*
In 'Addl vent worksheet (this worksheet)		x	*(Addl vent)*
Treated floor area A_{TFA}	m²	1050	*('Areas' worksheet)*
Room height h	m	3,55	*(Worksheet 'Annual heating')*
Room air volume for ventilation (A_{TFA}*h) = V_V	m³	3723	*(Worksheet 'Annual heating')*
Number of occupants	P	16,0	*('Ventilation' worksheet)*
Room temperature	°C	18	*(Worksheet 'Annual heating')*
Average external temp. heating period	°C	2,3	*('Ventilation' worksheet)*
Average ground temp.	°C	8,0	*('Ground' worksheet)*
Length of the heating period	d/a	225	*('Heating' worksheet)*
Ventilation type	1-Balanced PH ventilation with HR		*('Ventilation' worksheet)*

Results of ventilation design and unit selection:

Venti-lation unit no.	Description of the unit	Design V_{SUP} m³/h	Design V_{ETA} m³/h	Annual average value V_{SUP} m³/h	Annual average value V_{ETA} m³/h	Annual average value Air ch.rt. 1/h	Effective heat recovery efficiency	Humidity recovery efficiency	Spec. input power	Heat recov. efficiency SHX
1	Visas telpas	3723	3723	1181	1181	---	0%	0%	0,00	0%
2						---				
3						---				
4						---				
5						---				
6						---				
7						---				
8						---				
9						---				
10						---				
Result for overall vent. syst		**3723**	**3723**	**1181**	**1181**	**0,32**	**0,00%**	**0%**	**0,00**	**0%**

Recommendations for dimensioning air quantities

Use of low odour and low VOCs building materials/furnishings:
It is strongly recommended to use building materials that cause no or very low VOCs/odours instead of increasing the outdoor air volume in order to clear the air.
This holds true independently from the chosen approach to determine air quality; emissions of all sources in the room should be considered, e.g. furniture, carpets and ventilation or air-conditioning unit.

Assessment of volume flow rates according to the number of persons
Also in non-residential buildings, the number of persons is fundamentally important for assessing the volume air flow rates. For good indoor air quality volumes between 20 to 30 m³/h/person are sufficient.
Higher outdoor air amounts may lead to excessively dry indoor air in winter. The air flow rates are specified by classification according to EN 13779. The classification must be agreed with the client in advance.
IDA 3 is adequate for office buildings. IDA 4 has proven satisfactory for school buildings as flushing ventilation is carried out during breaks anyway. For typical outdoor air CO_2 concentrations of around 400-500 ppm, it is possible to comply even with 1500 ppm. Exceeding this figure temporarily is permissible.

Outdoor air flow rates per person:
- Recommended for residential buildings: around 30 m³/(h person)
- Recommended for offices and similar uses: around 30 m³/(h person) (AMEV: 28 m³/(h person); EN 13779 / IDA 3: at least 24 m³/(h person))
- Recommended for schools and day care centres: 15 to 20 m³/(h person) (Source: Guidelines for energy-efficient educational buildings, Passive House Institute, 2010)
- Recommendation for sport halls: 60 m³/(h person) (DIN 18032-1)

Flushing phase for intermittent ventilation operation
In case the ventilation is to be used intermittently (turned off at night), then it should be flushed in the morning, approx. 1 to 2 hours before building is occupied. This should be done in order to refresh air from emissions such as VOCs. Flushing the building causes that the ventilation system works for a longer period (utilisation time + flushing phase). Please consider this at design stage.

Dimensioning of air quantities

When dimensioning the air quantities, please consider the design recommendations given above.
The operation period of the ventilation can be determined on the basis of daily utilisation hours, including flushing phase if applicable. In addition, time periods with reduced ventilation requirements (operation modes) can be taken into account by means of reduction factors.

Room no.	Amount a	Room name	Allocation to ventilation unit (No.)	Area A m²	Clear height h m	Room vol. A x h m³	Volume flow per room V_{SUP} m³/h	V_{ETA} m³/h	V_{TRANS} m³/h	Air chng. rt. per room n 1/h	Utilisation times h/d h	d/week d	Duration of holidays d	Reduction factor 1	Operation red. 1	Reduction factor 2	Operation red. 2	Reduction factor 3	Operation red. 3	Annual average value: V_{SUP} m³/h	V_{ETA} m³/h	V_{TRANS} m³/h	Change rate 1/h
1	**1**	**Visas telpas**	**1**	**1050**	**3,55**	3723	**3723**	**3723**		1,00	**12**	**6**		**90%**	**60%**	**50%**	**40%**			1181	1181		0,32
2																							
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Ventilation unit selection

Up to 10 different ventilation units are considered. By changing the amount, identical units can be considered. The data from PHI certified ventilation units as well as the entry data lines for user data for other ventilation units can also be found in the worksheet 'Components'. When choosing to use a compact unit the standard design in the 'Ventilation' worksheet has to be used.

Go to ventilation units list

Venti-lation unit no.	Quan-tity [-]	Description of ventilation units	Selection of type of ventilation	Design vol. flow per unit m³/h	Application range for volume flow rate from m³/h	to m³/h	Electrical efficiency Wh/m³	Pressure loss calculation ODA-SUP Δp_{Duct} Pa	ETA-EHA Δp_{Duct} Pa	Additional Δp_{Intern} Pa	Application range per line $\Delta p_{External}$ Pa	Subtraction Δp_{Intern} Pa	Interior location (x)	Exterior location (x)	Heat recovery efficiency Unit [-]	Effective [-]	Energy recovery efficiency [-]	Frost protection necessary	Subsoil HX Efficiency of heat recovery	Effective efficiency of heat recovery	Frost protection (electr. / hydr.) Tipe perature	Limit temperature °C	Useful Energy kWh/a
			Change sorting type																				
1	1	Visas telpas	03ud-Dabīgā ventilācija	3723	1862	3723	0,00				-	-	x		0,00	0%	0%	N/A		0%	1-No		0
2																					1-No		0
3																					1-No		0
4																					1-No		0
5																					1-No		0
6																					1-No		0
7																					1-No		0
8																					1-No		0
9																					1-No		0
10																					1-No		0
																						Total (directly electric)	0
																						Total (hydraulic and heat generator)	0

Data entries for duct sections between the ventilation unit and the thermal envelope

The duct sections between the ventilation unit and the thermal envelope should be as short as possible and should be well insulated, whether the ventilation unit is located indoors or outdoors. The dimensions of these duct sections can be entered here. The heat losses of the overlying duct sections will be considered for the effective heat recovery efficiency.
One section of a duct entered here may also be used for multiple ventilation units.
If in the section "Ventilation unit - selection" (above) a ventilation unit is selected as multiple units (amount larger than 1 for identical units), then the corresponding duct sections may simply be entered (duct sections for one ventilation unit).

Temperature of installation location: **0,0** (only enter when at least one unit is installed outside of the thermal envelope)

Quan-tity	Round duct ins. diameter mm	Rectangular duct Width mm	Height mm	Insulation thickness mm	Thermal conducti-vity W/(m K)	Reflective insulation duct (x)	Duct transmit- W/(m K)	Length of supply air tance m	Outdoor or supply air duct (1)	Exhaust or extract extract air duct (1)	Duct type	Design volume rate	Assignment to ventilation unit (enter 1 for the corresponding ventilation unit) Vent. unit 1	Vent. unit 2	Vent. unit 3	Vent. unit 4	Vent. unit 5	Vent. unit 6	Vent. unit 7	Vent. unit 8	Vent. unit 9	Vent. unit 10
1	200				0,04	x	2,624	0,5	1		Outdoor air	3723	1									
1	200				0,04	x	2,624	0,5		1	Exhaust air	3723	1									
												0										
												0										
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Heat distribution and domestic hot water (DHW) system

Energy balance calculation with PHPP Version 9.6a

Kultūras nams / Climate: Jelgava / TFA: 1050 m² / Heating: 212,3 kWh/(m²a) / Freq. overheating: 0 % / PER: 1024,4 kWh/(m²a)

Interior temperature:	18	°C	Interior temperature summer:	25	°C
Building type:	Kultūras nams				
Treated floor area A_{TFA}:	1050	m²			
Occupancy:	16,0	Pers			
Number of dwelling units:	1				
Annual heating demand $q_{Heating}$	222943	kWh/a	Annual useful cooling dem. q_{Cool}	1365	kWh/a
Length of heating period:	225	d	Length cooling period:	183	d
Average heating load P_{ave}:	41,2	kW	Average cooling load $P_{Average}$:	0,3	kW
Marginal usability of additional heat gains:	100%		Marginal utility of additional heat losses:	1%	

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_H	m	363,0											
Nominal width of pipe		mm	20											
Insulation thickness		mm	0											
Insulation reflective coating?		-	x											
Thermal conductivity of insulation		W/(mK)	0,039											
Heat loss coefficient per m of insulated pipe		W/(mK)	0,410											
Insulation quality of mountings, pipe suspensions, etc.		-	2 - Moderate	1-None	1-None	1-None	1-None		1-None	1-None	1-None	1-None		
Thermal bridge supplement		W/K	13,306											
Total heating loss coefficient per m of pipe	Ψ	W/(mK)	0,447											
Temp. of the room through which the pipes pass	ϑ_X	°C	18	18	18	18	18	8,0	8,0	8,0	8,0	8,0		
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	85,2	85,2	85,2	85,2	85,2	85,2	85,2	85,2	85,2	85,2		
Forward flow temperature control ('x' if appropriate)			x	x	x	x	x	x	x	x	x	x		
Design return flow temperature	ϑ_R	°C	44,4											
Annual heat emission per m of plumbing	q^*_{HL}	kWh/(m·a)	47											
Possible utilisation factor of released heat	η_G	-	100%											
Annual heat losses of heating distribution	Q_{HL}	kWh/a	0										kWh/a: 0	kWh/(m²a): 0,0
Annual heat losses of heating storage		kWh/a											0	0,0
Annual heat losses of heating		kWh/a											0	0,0
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	12,6
DHW demand others, per person and day (with 60°C)		litre/person/d	7,0
Performance of shower drain-water heat recovery		-	0%
Effective DHW demand	V_{DHW}	litre/person/d	20
Average cold water temperature of the supply	ϑ_{TW}	°C	8,0
DHW demand for washing machines and dishwashers non-ele		kWh/a	0
Effective useful heat DHW	Q_{DHW}	kWh/a	6912

kWh/a	kWh/(m²a)
6912	6,6

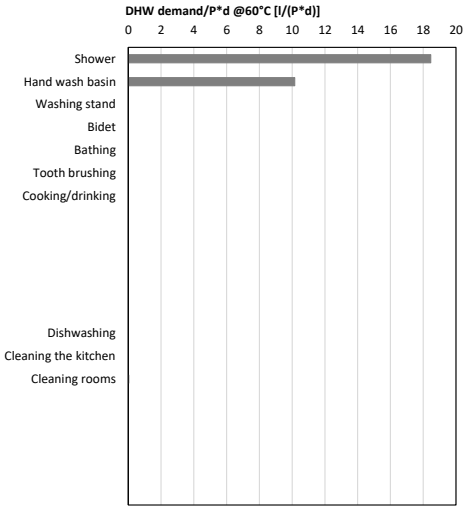
Auxiliary calculation - DHW demand calculation (for non-res)

	l/(P*d) at 60 °C
DHW demand for showering:	**12,6**
DHW demand for other uses:	**7,0**

Days of use per year [d/a]: **250**

Application		Used?	Single-lever mixer?	Time of use per use	Amount of uses according to type of use	Flow rate	Useful temperature	Equivalent average amount of water @ 60°C	Equivalent average amount of water @ 60°C	Useful heat @ 60°C
		-	-	min	-	l/min	°C	l/(WE*d)	l/(P*d)	kWh/a
Shower	Per person	x	x	**4,0**	**1,0**	**8,0**	**38**	295	18	4469
Hand wash basin	Per person	x	x	**2,0**	**3,0**	**4,0**	**30**	162	10	2458
Washing stand	Per person		x	**1,0**	**0,4**	**8,0**	**38**			
Bidet	Per person		x	**1,0**	**0,1**	**8,0**	**38**			
Bathing	Per person		x	**10,0**	**0,0**	**15,0**	**38**			
Tooth brushing	Per person		x	**0,1**	**1,0**	**4,0**	**30**			
Cooking/drinking	Per person		x	**0,3**	**1,0**	**6,0**	**45**			
	Per person		N/A							
	Per person		N/A							
	Per person		N/A							
	Per person		N/A							
	Per person		N/A							
Dishwashing	Per time of use		x	**0,6**	**1,0**	**6,0**	**45**			
Cleaning the kitchen	Per time of use		x	**0,5**	**1,0**	**6,0**	**38**			
Cleaning rooms	Per time of use	x	x	**1,0**	**0,1**	**6,0**	**38**	0	0	7
	Per time of use		N/A							
	Per time of use		N/A							
	Per time of use		N/A							
	Per time of use		N/A							
	Per time of use		N/A							

DHW demand according to use



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	18,0	18,0	18,0	18,0	18,0	**21,0**	21,0	21,0	21,0	21,0		
Design forward flow temperature	ϑ_{dist}	°C	**60,0**	60,0	60,0	60,0	60,0	60,0	60,0	60,0	60,0	60,0		
DHW circulation pipes														
Length of circulation pipes (forward + return flow)	L_{HS}	m	**32,2**											
Nominal width of pipe		mm	**20**											
Insulation thickness		mm	**30**											
Insulation reflective coating?		-												
Thermal conductivity of insulation		W/(mK)	**0,040**											
Heat loss coefficient per m of insulated pipe		W/(mK)	0,173											
Insulation quality of mountings, pipe suspensions, etc.		-	**2 - Moderate**	**1-None**	**1-None**	**1-None**	**1-None**	**2 - Moderate**	**1-None**	**1-None**	**1-None**	**1-None**		
Thermal bridge supplement		W/K	1,726											
Total heating loss coefficient per m of pipe	Ψ	W/(mK)	**0,227**											
Daily circulation period of operation.	td_{Circ}	h/d	**18,0**											
Design return flow temperature	ϑ_R	°C	55											
Circulation period of operation per year	t_{Circ}	h/a	6570											
Annual heat released per m of pipe	q^*_Z	kWh/m/a	59											
Annual heat loss from circulation lines	QZ	kWh/a	**1886**										kWh/a **1886**	kWh/(m²a) **1,8**
DHW individual pipes														
Exterior pipe diameter	d_{U_Pipe}	m	**0,020**											
Accumulated length per single pipes	L_U	m	**42,00**											
Amount of tapping points in building	$n_{tapping\ poin}$	-	**6,00**											
Average pipe length per tapping point	$L_{U,\ average}$	m	7,0											
Tap openings per person per day		-	**5**											
Utilisation days per year		d	**250**											
Heat loss per tap opening	$q_{Individual}$	h/tap opening	0,0848											
Amount of tap openings per year and person	n_{Tap}	ıings per year	1250											
Annual heat loss of individual pipes	Q_U	kWh/a	**1696**										kWh/a **1696**	kWh/(m²a) **1,6**
Total heat losses of DHW distribution	Q_{WL}												kWh/a **3582**	kWh/(m²a) **3,4**
Performance ratio of DHW distribution pipes	$ea_{,HL}$	-											**152%**	

Storage heat losses

		Storage 1	Storage 2	Buffer storage tank (only heating)	Compact unit
Selection of storage tank		2-DHW only	0-No storage tank	0-No storage tank	0-No
Storage necessary for HP					
Solar DHW connection					
Heat loss rate	W/K	0,6	0,9		
Storage volume	litre	30	160		---
Standby fraction	-				
Location of storage tank, inside or outside of thermal envelope		1-Inside	1-Inside	1-Inside	
Temperature of mechanical room	°C	18,0			
Typical storage tank temperature	°C	60,0			
Manual entry of storage temperature	°C				
Average standby heat losses storage tank	W	23			
Additional heat losses storage tank, solar operation	W			---	---
Possibly utilisation factor of heat losses		---	---		---
Annual heat losses DHW storage tank	kWh/a	205		---	
Annual heat losses buffer storage tank		---	---		---

	kWh/a	kWh/(m²a)
	205	0,2

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

Storage tank volume	Litre	30,0	160,0	
ErP classification	-	A	A	C
Maximum permissible standby heat loss	W	25	41	
Heat loss ratio for PHPP calculation	W/K	0,6	0,9	

Total energy demand of domestic hot water

		kWh/a	kWh/(m²a)
Heat losses of DHW distribution and storage	Q_{WL}	3787	3,6
Performance ratio DHW-distribution + storage	$e_{a,WL}$	155%	
Total heating demand of DHW system		kWh/a	kWh/(m²a)
Including storage tank	Q_{gDHW}	10699	10,2

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_H	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	25,0	25,0	25,0	25,0	25,0	**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_G	-												
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%**	

Electricity demand for non-residential buildings

Kultūras nams / Climate: Jelgava / TFA: 1050 m² / Heating: 212,3 kWh/(m²a) / Freq. overheating: 0 % / PER: 1024,4 kWh/(m²a)

Treated floor area A_{TFA}:	1050,2	m²
Auxiliary electricity demand:	2344,9	kWh/a

	PER factors:	PE factors:	
Electricity:	1,35	2,6	kWh/kWh
RE gas / Natural gas:	1,75	1,1	kWh/kWh
Energy carrier for DHW:		1,1	kWh/kWh
Solar fraction of DHW	0%		
Marginal performance ratio DHW:			

Window properties (from 'Windows' worksheet):

	Shading	Dirt factor	Non-perpendicular radiation	Glazing fraction
North	0,82	0,95	0,85	0,74
East	0,78			0,63
South	0,84			0,63
West	0,70			0,61

Lighting / non-residential	Net ground area	Room category	Power of nominal lighting	Facade with windows: Deviation from North	Facade with windows: Orientation	Facade with windows: Light transmission glazing	Facade with windows: Window existing?	Geometry: input of a typical room: Room depth	Room width	Room height	Lintel height	Window width
Room / Zone	m²		Lux	Degrees		-	[x]	m	m	m	m	m
			15									
Telpas	1050,20	42-Theatre auditorium	200	19	North	82%	x	5,0	4,0	2,9	2,5	1,1
						82%						
						69%						
						69%						
						69%						
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Lighting / non-residential	Daylight utilisation	User data: Installed lighting power	Installed lighting power (standard)	Lighting control	Motion detector used?	Lighting check		Utilisation hours per year	User determined: Lighting full load hours	Full load hours of lighting	Electricity demand (kWh/a)	Spec. electricity demand (kWh/(m²a))
Room / Zone		W/m²	W/m²		[x]			h/a	h/a	h/a	kWh/a	kWh/(m²a)
									9			
Telpas	None	5	4,5	1		Manual	Without motion detector	1001	2000	2000	9452	9,0
	None		0,0	1		Manual	Without motion detector					
	None		0,0	1		Manual	Without motion detector					
	None		0,0	1		Manual	Without motion detector					
	None		0,0	1		Manual	Without motion detector					
	None		0,0	1		Manual	Without motion detector					
	None		0,0	1		Manual	Without motion detector					
	None		0,0	1		Manual	Without motion detector					
	None		0,0	1		Manual	Without motion detector					
	None		0,0	1		Manual	Without motion detector					
	None		0,0	1		Manual	Without motion detector					
	None		0,0	1		Manual	Without motion detector					
	None		0,0	1		Manual	Without motion detector					
	None		0,0	1		Manual	Without motion detector					
	None		0,0	1		Manual	Without motion detector					
	None		0,0	1		Manual	Without motion detector					
	None		0,0	1		Manual	Without motion detector					
	None		0,0	1		Manual	Without motion detector					
	None		0,0	1		Manual	Without motion detector					
	None		0,0	1		Manual	Without motion detector					
	None		0,0	1		Manual	Without motion detector					
	None		0,0	1		Manual	Without motion detector					

Office equipment	Room category	Within the thermal envelope [1/0]	Existing [1/0]		Quantity		Power consumption [W]		Utilisation hours per year [h/a]		Relative absenteeism		Duration of utilisation in energy saving mode [h/a]		Useful energy (kWh/a)		Electricity demand [kWh/a]
	2								9	20	18						
PC 1	42-Theatre auditorium	1	1	*	4	*	150	* (	1001	* (1-	0	)		=	601	=	600,6
PC in energy saving mode		1			4	*	2,0	*	1001	*	0			=	0	=	0,0
Monitor 1	42-Theatre auditorium	1	1	*	4	*	150	* (	1001	* (1-	0	)		=	601	=	600,6
Monitor in energy saving mode		1			4	*	2,0	*	1001	*	0			=	0	=	0,0
PC 2		1	0	*		*	80	* (	0	* (1-	0	)		=	0	=	0,0
PC in energy saving mode		1			0	*	2,0	*	0	*	0			=	0	=	0,0
Monitor 2		1	0	*		*	28	* (	0	* (1-	0	)		=	0	=	0,0
Monitor in energy saving mode		1			0	*	2,0	*	0	*	0			=	0	=	0,0
Copier	42-Theatre auditorium	1	1	*	0	*	400	* (	1001			-	0	) =	0	=	0,0
Copier in energy saving mode		1			0	*	30	*	0					=	0	=	0,0
Printer	42-Theatre auditorium	1	1	*	1	*	250	* (	1001			-	0	) =	250	=	250,3
Printer in energy saving mode		1			1	*	2	*	0					=	0	=	0,0
Server	22-Group office	1	1	*	0	*	50	* (	2750					=	0	=	0,0
Server in energy saving mode		1			0	*	2,0	* (	8760			-	2750	) =	0	=	0,0
Telephone system				*		*		*	8760					=	0	=	0,0
				*		*		*						=	0	=	0,0
				*		*		*						=	0	=	0,0
				*		*		*						=	0	=	0,0
				*		*		*						=	0	=	0,0
				*		*		*						=	0	=	0,0

Kitchen / Aux. electricity	Room category (predominant utilisation pattern of building)	Within the thermal envelope [1/0]	Existing [1/0]		Days of utilisation per year [d/a]		Number of meals per day of use		Norm consumption		Useful energy [kWh/a]		Non-electric fraction	Electric fraction	Additional demand	Marginal performance ratio	Solar fraction		Non-electric demand (kWh/a)	Electricity demand [kWh/a]
					8				kWh / Meal											
Cooking:		1		*	0	*	0	*	0,25	=	0	*	100%					=		0,0
1-Electricity									kWh / Cover			*	0%					=	0	
Dishwashing				*	0	*	0	*	0,10	=	0	*	100%					=		0,0
2-Cold water connection									kWh/d			*	0%		* (1+	0,30	) * 1,20 *(1-	0,00	) =	0
Refrigerating					365					=	0	*	100%					=		0,0
Citas iekārtas		1	1		250				2,00		500	*	100%					=		500,0
											0	*	100%					=		0,0
											0	*	100%					=		0,0
											0	*	100%					=		0,0
											0	*	100%					=		0,0
											0	*	100%					=		0,0
											0	*	100%					=		0,0
											0	*	100%					=		0,0
											0	*	100%					=		0,0
Total auxiliary electricity											2345									2344,9

Hot water non-electric dishwashing: 0

Total	13748 kWh	0	0,0	**13748** kWh/a kW
Specific demand		0,0	0,0	**13** kWh/(m²a) kW

Internal heat gains for non-residential buildings

Energy balance calculation with PHPP Version 9.6a

Kultūras nams / Climate: Jelgava / TFA: 1050 m² / Heating: 212,3 kWh/(m²a) / Freq. overheating: 0 % / PER: 1024,4 kWh/(m²a)

Utilisation: 22-Other — IHG: 1,79 W/m² — 1,79 W/m²

Type of values used: 4-PHPP calculation ('IHG non-res' worksheet) — Enter here results from cell above: 1,79 W/m²

Persons: 16,0 P — Heating period: 225 d/a — Room temperature: 18 °C

Treated floor area: 1050,2 m² — Internal heat gains aux. electricity: 399 W

Persons	Selection of user profile	Select	Activity of persons	Planning 0 = according to ground area or usable zone 1 = according to occupancy		Number of occupants		Ground area of useful zone [m²]		Average occupancy [Pers./m²]		Heat emitted per person [W]		Utilisation hours per year [h/a]		Relative presence		Utilisation period [h/a]		Average heat release persons [W]
										27				9		18				
Persons A	42-Theatre auditorium	3	>10 yr., standing or light work	1	Planning with occupancy	{ 16 }*	or	{ 1050,20	*	Not a standard value	} *	100	*	1001	*	1,00	/	8760	=	183
Persons B			Invalid input			{	or	{	*	Not a standard value	} *	0	*	0	*	1,00	/	8760	=	0
Persons C			Invalid input			{	or	{	*	Not a standard value	} *	0	*	0	*	1,00	/	8760	=	0
Persons D			Invalid input			{	or	{	*	Not a standard value	} *	0	*	0	*	1,00	/	8760	=	0
Persons E			Invalid input			{	or	{	*	Not a standard value	} *	0	*	0	*	1,00	/	8760	=	0
Persons F			Invalid input			{	or	{	*	Not a standard value	} *	0	*	0	*	1,00	/	8760	=	0
Persons G			Invalid input			{	or	{	*	Not a standard value	} *	0	*	0	*	1,00	/	8760	=	0
Evaporation (person specific)						16 *							*	1001	*	1,00	/	8760	=	0

Lighting / Equipment / Aux. electricity	Useful energy [kWh/a]		Availability		Utilisation period [h/a]		Average heat release
Lighting	9452	*	1	/	8,76	=	1079
Office applications (within therm. envelope)	1451	*	1	/	8,76	=	166
Cooking (within therm. envelope)	0	*	0,5	/	8,76	=	0
Dishwashing (within therm. envelope)	0	*	0,3	/	8,76	=	0
Cooling (within therm. envelope)	0	*	1	/	8,76	=	0
Other (within thermal envelope)	500	*	1	/	8,76	=	57
Auxiliary appliances (see 'Aux Electricity' worksheet)						=	399

Heat loss due to cold water (calculation from column AJ)	On/Off [1 / 0]	Predominant utilisation pattern of building (Data transferred from 'Electricity non-res' worksheet; input kitchen)		Number of WCs (user data)	Amount of WCs: Utilisation of standard values for schools?	Number of WCs (calculation value)	DT: Cold water temp. - Room temp. [K]	Occupied days per year [d/a]		Loss daytime [W]		Loss night-time [W]		Availability		Utilisation period [d/a]		Average power cold water
		2						8										
Cold water due to flushing WC	0					0	-10,0	0	* (	0	+	-8	) *	1	/	365	=	0

Total IHG		W	1884
Specific IHG		W/m²	1,8
Heat available from internal sources	225 d/a	kWh/(m²a)	10

Pirms

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	Fosilais kurināmais (Dīzeldegviela)	212,29	222,943	0,90	279	69112	1,10	0,00	259,46	0,00	259,46	65,81
Karstā ūdens sagatavošana	Fosilais kurināmais (Dīzeļdegviela)	10,19	10,699	0,90	279	3317	1,10	0,00	12,45	0,00	12,45	3,16
Ventilācija	Elektroenerģija no tīkla	0,00	0,000	1,00	109	0	1,90	0,60	0,00	0,00	0,00	0,00
Apgaismojums	Elektroenerģija no tīkla	9,00	9,452	1,00	109	1030	1,90	0,60	17,10	5,40	22,50	0,98
Dzesēšana	Elektroenerģija no tīkla	5,58	5,857	3,00	109	213	1,90	0,60	3,53	1,12	4,65	0,20
Papildu (apkure)	Elektroenerģija no tīkla	1,76	1,853	1,00	109	202	1,90	0,60	3,35	1,06	4,41	0,19
Papildu (karstā ūdens sagatavošana)	Elektroenerģija no tīkla	0,47	0,492	1,00	109	54	1,90	0,60	0,89	0,28	1,17	0,05
KOPĀ:		**239,28**	**251,29**			**73927**			**296,79**	**7,85**	**304,64**	**70,39**
				CO_2 emisijas kgCO_2/m^2		**70,39**						
				CO_2 emisijas tCO_2		**73,93**						

PĒC												
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	Fosilais kurināmais (Dīzeļdegviela)	96,52	101,362	0,90	279	31422	1,10	0,00	117,96	0,00	117,96	29,92
Karstā ūdens sagatavošana	Fosilais kurināmais (Dīzeļdegviela)	10,19	10,699	0,90	279	3317	1,10	0,00	12,45	0,00	12,45	3,16
Ventilācija	Elektroenerģija no tīkla	0,00	0,000	1,00	109	0	1,90	0,60	0,00	0,00	0,00	0,00
Apgaismojums	Elektroenerģija no tīkla	9,00	9,452	1,00	109	1030	1,90	0,60	17,10	5,40	22,50	0,98
Dzesēšana	Elektroenerģija no tīkla	5,58	5,857	3,00	109	213	1,90	0,60	3,53	1,12	4,65	0,20
Papildu (apkure)	Elektroenerģija no tīkla	1,76	1,853	1,00	109	202	1,90	0,60	3,35	1,06	4,41	0,19
Papildu (karstā ūdens sagatavošana)	Elektroenerģija no tīkla	0,47	0,492	1,00	109	54	1,90	0,60	0,89	0,28	1,17	0,05
KOPĀ:		**123,5**	**129,7**			**36237**			**155,29**	**7,85**	**163,15**	**34,51**
				CO_2 emisijas kgCO_2/m^2		**34,51**						
				CO_2 emisijas tCO_2		**36,24**						

Dzesēšanas enerģijas novērtējums							
Nosaukums	Qdz, kW	EER	Qel,kW	h/gadā	Noslodze	Eletribas paēriņš gadā, kWh gadā	Dzesēšanai nepiecieciešāmā enerģija kWh gadā.
PN1	22,70	3	7,57	516	0,5	1952,20	5856,60
							5,58 kWh/m2 gadā