PHPP

BRIEF INSTRUCTIONS

Place your mouse here to see the PHPP help.

If no help appears when the mouse passes over cell B4, you can activate it by going into the Menu Bar Tools/Options/View, and under "Comments", select "Comment Indicator Only".

Passive House verification: meaning of field formats

Example	Field Format	Meaning
78,8	Arial, blue, bold with yellow background	Input field: Please enter the required value here
01ud Triple-low-e Kr08	Arial Narrow, blue, with yellow background	Data entry field with drop down list
80	Arial, blue, bold with grey background	Link (through Variants-macro). Attention: do not overwrite!
6619	Arial, black, standard on white background	Calculation field; please do not change
78,8	Arial, violet, bold with white background	Field with reference to another worksheet
126,0	Arial, black, large & bold on green background	Important result

Passive House planning: worksheet directory

Worksheet name (to show/hide worksheets please use the separate 'Profile settings' tool)	Function	Brief description	Required for the certification?
Verification	Building data; summary of results	Building description, selection of the calculation method, summary of results	yes
Overview	Overview of the specific data of the project entered	In-depth project description, overview of all results and input variables, specific details on building envelope, building services systems as well as general information.	no
Cross check	Data entry assistance	Information in case PHPP does not calculate, overview of errors, plausibility checks	yes
Variants	Calculation of variants	Input parameters and results for variant calculation. Predefined fields for frequent entries, as well as user-defined area.	no
Comparison	Comparison between two variants	Comparison between two variants from the perspective of energy demand and economic viability. Input of comparison configurations.	No
Climate	Climate region selection or definition of user data	Climate data for: 'Annual heating', 'Windows', 'Heating load', 'Heating', 'Summer', 'Cooling', 'Cooling units', 'Cooling load' worksheets	yes
U-Values	Calculation of standard building assembly U-Values	Heat transmission coefficient calculations in accordance with DIN EN ISO 6946.	yes
Areas	Areas summary	Building assembly areas, thermal bridges, treated floor area. Use exterior dimension references!	yes
Ground	Calculation of reduction factors below ground	More precise calculation of heat losses through the ground	if applicable
Components	Building component database	Database of certified, Passive House suitable components and entry of user-defined components	yes
Windows	UW-Value determination	Input of geometry, orientation, frame lengths, frame widths, U_g and U-values of the frame, and the thermal bridge heat loss coefficients of the connections; from these inputs, determine U_w and total radiation.	yes
Shading	Determination of shading coefficients	Input of shading parameters, e.g. balcony, neighbouring building, window reveal and calculating the shading factors	yes
Ventilation	Air flow rates, Exhaust/Supply air balancing, Pressurization test results	Sizing the ventilation system from extract and supply air requirements, infiltration air change rate and actual efficiency of heat recovery, input of pressurization test results	yes
Addl vent	Design and planning of ventilation systems with diverse ventilation units	Extension of the 'Ventilation' worksheet for dimensioning air flows, for special building uses and systems with various ventilation units	if used
Annual heating	Annual space heating demand / Annual method	Calculation of the annual space heating demand according to the energy balance method following EN 13790: Transmission + Ventilation - h (Solar gains + Internal gains)	no
Heating	Space heating demand calculation Monthly method according to EN 13790	Calculation procedure for the monthly method following EN 13790. Make appropriate selection in the 'Verification' worksheet, if calculations should be performed following this procedure	yes
Heating Load	Building heating load calculation	Calculation of the nominal heating load using a balance procedure for the design day: max transmission + max ventilation - η (minimum solar gains + internal heat gains)	yes
SummVent	Determination of summer ventilation	Ventilation in cooling case and estimation of air flow rates for natural ventilation during the summer period	yes
Summer	Assessment of summer climate	Calculation of the frequency of overheating as a measure of summer comfort	yes
Cooling	Monthly method for cooling demand	Annual useful cooling demand calculation	if present
Cooling units	Latent cooling energy	Calculation of the energy demand for dehumidification and choice of cooling method	if present
Cooling load	Building cooling load calculation	Calculation of the daily average cooling load of the building	no
DHW+Distribution	Distribution losses; DHW requirement and losses	Heat loss calculation of the distribution systems (heating; DHW); calculation of the useful heat requirement of DHW and storage losses	yes
SolarDHW	Solar DHW heating	Solar contribution calculation for DHW and space heating contribution	if solar panels are used
PV	Electricity generation by photovoltaic	Electricity generation calculation of PV system	no
Electricity	Electricity demand for dwellings	Calculation of the electricity demand of Passive Houses with residential use	yes
Use non-res	Patterns of non-residential utilisation	Input or selection of utilisation patterns for planning of electricity demand and internal heat gains	no
Electricity non-res	Electricity demand for non-residential use	Calculation of the electricity demand for lighting, electric devices and kitchens for non-residential buildings	no
Aux Electricity	Auxiliary electricity demand	Calculation of auxiliary electricity and corresponding primary energy demand	yes
IHG	Internal heat gains in dwellings	Calculation of the internal heat gains based on the Electricity and Aux Electricity sheets.	no
IHG non-res	Internal heat gains for non-residential use	Calculation of the internal heat gains for non-residential buildings based on the 'Electricity non-res' worksheet and the occupancy	no
PER	Specific primary energy and CO_2 demands	Selection of heat generators, calculation of the primary energy and CO_2 specific demands from the present results	yes
Compact	Performance ratio of heat generator Compact heat pump unit	Calculation of the performance ratio of combined heat generation for heating and DHW by means of an electric heat pump compact unit exclusively, considering the specific project boundary conditions.	if present
HP	Performance ratio of heat generation of the heat pump	Calculation of the performance ratio for heat generation for one to two electric-run heat pumps, considering the specific project boundary conditions.	if present
HP Ground	Ground probe or ground collector in combination with a heat pump	Heat source calculation for a ground probe or horizontal subsoil heat exchanger for ground-coupled heat pumps, considering the specific project boundary conditions.	if present
Boiler	Performance ratio of heat generator Boiler	For the calculation of the performance ratio of heat generation with standard boilers (NT and calorific boilers) for the project given boundary conditions.	if present
District Heating	District heat transfer station	Calculation of the final and primary energy demands (heat)	if present
Data	Database	Table of primary energy factors following [GEMIS] and database of EnEV (German energy efficiency regulation).	No

EnerPHit Verification

Building:	Archipente		
Street:	2 rue du Repos		
Postcode/City:	42600	MONTBRISON	
Province/Country:			FR-France
Building type:			
Climate data set:	ud---00-Montbrison1314		
Climate zone:	4: Warm-temperate	Altitude of location:	399 m
Home owner / Client:	Cabinet d'architecture Archipente		
Street:	2 rue du Repos		
Postcode/City:	42600	MONTBRISON	
Province/Country:			FR-France

Architecture:	Cabinet d'architecture Archipente		
Street:	2 rue du Repos		
Postcode/City:	42600	MONTBRISON	
Province/Country:			FR-France
Energy consultancy:	La Maison Passive		
Street:	110 rue Réaumur		
Postcode/City:	75002	Paris	
Province/Country:			FR-France

Mechanical system:			
Street:			
Postcode/City:			
Province/Country:			
Certification:	La Maison Passive		
Street:	110 rue Réaumur		
Postcode/City:	75002	Paris	
Province/Country:			FR-France

Year of construction:	2017	Interior temperature winter [°C]:	20,0	Interior temp. summer [°C]:	25,0
No. of dwelling units:	1	Internal heat gains (IHG) heating case [W/m²]:	3,5	IHG cooling case [W/m²]:	3,5
No. of occupants:	10,0	Specific capacity [Wh/K per m² TFA]:	60	Mechanical cooling:	

Specific building characteristics with reference to the treated floor area

					Criteria	Alternative criteria	Fullfilled?[2]
	Treated floor area	m²	163,0				
Space heating	Heating demand	kWh/(m²a)	14	≤	20	-	yes
	Heating load	W/m²	19	≤	-	-	
Space cooling	Cooling & dehum. demand	kWh/(m²a)	-	≤	-	-	-
	Cooling load	W/m²	-	≤	-	-	
	Frequency of overheating (> 25 °C)	%	5	≤	10		yes
	Frequency excessively high humidity (> 12 g/kg)	%	0	≤	20		yes
Airtightness	Pressurization test result n_{50}	1/h	1,0	≤	1,0		yes
Non-renewable Primary Energy (PE)	PE demand	kWh/(m²a)	110	≤	120		yes
Primary Energy Renewable (PER)	PER demand	kWh/(m²a)	91	≤	-	-	-
	Generation of renewable energy	kWh/(m²a)	70	≥	-	-	

EnerPHit (refurbishment): Component characteristics

Building envelope to exterior air[1] (U-value)	W/(m²K)	-	≤	-	-
Building envelope to ground[1] (U-value)	W/(m²K)	0,23	≤	-	-
Wall w/int. insulation in contact w/exterior air (U-value)	W/(m²K)	0,16	≤	-	-
Wall w/interior insulation in contact w/ground (U-value)	W/(m²K)	-	≤	-	-
Flat roof (SRI)	-	19	≥	-	-
Inclined and vertical external surface (SRI)	-	19	≥	-	-
Windows/Entrance doors ($U_{W/D,installed}$)	W/(m²K)	0,87	≤	-	-
Windows ($U_{W,installed}$)	W/(m²K)	-	≤	-	-
Windows ($U_{W,installed}$)	W/(m²K)	-	≤	-	-
Glazing (g-value)	-	0,61	≥	-	-
Glazing/sun protection (max. solar load)	kWh/(m²a)	174	≤	-	-
Ventilation (effective heat recovery efficiency)	%	81	≥	-	-
Ventilation (humidity recovery efficiency)	%	73	≥	-	-

[1] Without windows, doors and external walls with interior insulation
[2] Empty field: Data missing; '-': No requirement

I confirm that the values given herein have been determined following the PHPP methodology and based on the characteristic values of the building. The PHPP calculations are attached to this verification.

EnerPHit Classic? yes

Task:	First name:	Surname:	Signature:
	IngeProjetsLAMP		

Issued on:		City:

Project data imported from designPH 1.0.6

PHPP9 display.code:

PHPP Check

EnerPHit with PHPP Version 9.:

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 kWh/(m²a)

▼ Overview input errors

Congratulations! There are no error messages in your PHPP.

Verification	-
Climate	-
U-Values	-
Areas	-
Ground	-
Components	-
Windows	-
Shading	-
Ventilation	-
Addl vent	-
SummVent	-
Cooling units	-
DHW+Distribution	-
SolarDHW	-
PV	-
Electricity	-
Use non-res	-
Electricity non-res	-
Aux Electricity	-
IHG	-
IHG non-res	-
PER	-
Compact	-
HP	-
HP Ground	-
Boiler	-
District heating	-

▼ **Are results missing from 'Verification' worksheet? Possible causes can be found next**

Variant calculation

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 kWh/(m²a)

Select the active variant here >>>>>>>		Active: 5-PV + Efficient Lighting and elec equipment	Existing	Walls + Ventilation + Suspended floor	Roof + Windows + Efficient hot water storage + Boiler regulation	Airtightness floor	PV + Efficient Lighting and elec equipment	National Regulation
Results	**Units**	5	**1**	**2**	**3**	**4**	**5**	**6**
Heating demand	kWh/(m²a)	**13,8**	155,0	74,1	18,7	13,8	13,8	78,1
Heating load	W/m²	**19,2**	99,5	58,1	26,7	19,2	19,2	67,1
Cooling & dehum. demand	kWh/(m²a)							
Cooling load	W/m²							
Frequency of overheating (> 25 °C)	%	**5,0**	9,2	9,9	4,9	5,0	5,0	4,2
PER demand	kWh/(m²a)	**90,9**	409,5	235,4	113,4	103,3	90,9	246,4
EnerPHit Classic?	yes / no	**yes**	no	no	no	no	yes	no
▼ Final energy		-	-	-	-	-	-	-
▼ User determined results		-	-	-	-	-	-	-
PE demand [kWh/(m².a)]		**109,5**	179,6	155,4	137,3	134,5	109,5	160,5
newable Energy Production [kWh/(m²ground.a)]	**kWh/(m²ground.a)**	**70,4**	0,0	0,0	0,0	0,0	70,4	0,0
DU PT	**W/(m².K)**	**0,01**	0,03	0,01	0,01	0,01	0,01	0,02
			0,0	0,0	0,0	0,0	0,0	0,0
			0,0	0,0	0,0	0,0	0,0	0,0
			0,0	0,0	0,0	0,0	0,0	0,0
			0,0	0,0	0,0	0,0	0,0	0,0
			0,0	0,0	0,0	0,0	0,0	0,0
			0,0	0,0	0,0	0,0	0,0	0,0
			0,0	0,0	0,0	0,0	0,0	0,0
			0,0	0,0	0,0	0,0	0,0	0,0
			0,0	0,0	0,0	0,0	0,0	0,0
			0,0	0,0	0,0	0,0	0,0	0,0
			0,0	0,0	0,0	0,0	0,0	0,0
			0,0	0,0	0,0	0,0	0,0	0,0
			0,0	0,0	0,0	0,0	0,0	0,0
			0,0	0,0	0,0	0,0	0,0	0,0
			0,0	0,0	0,0	0,0	0,0	0,0
			0,0	0,0	0,0	0,0	0,0	0,0
			0,0	0,0	0,0	0,0	0,0	0,0
			0,0	0,0	0,0	0,0	0,0	0,0
			0,0	0,0	0,0	0,0	0,0	0,0
			0,0	0,0	0,0	0,0	0,0	0,0
			0,0	0,0	0,0	0,0	0,0	0,0

Input variables	**Units**	**Value**	**1**	**2**	**3**	**4**	**5**	**6**
▼ Building assembly layers	U-Value							
▼ Radiation balance	Areas							
▼ Thermal bridges	Areas							
▼ Windows and shading	Windows	Shading						
▼ Ventilation	Ventilation							
Ventilation type	select	1-Balanced PH ventilation with HR	2-Extract air unit	1-Balanced PH ventilation with HR	1-Balanced PH ventilation with HR	1-Balanced PH ventilation with HR	1-Balanced PH ventilation with HR	2-Extract air unit
Air change rate at pressurisation test (n_{50})	1/h	1,00	6,77	4	2,5	1	1	6,77
Design air flow rate (maximum)	m³/h	173	173	173	173	173	173	173
Installation site ventilation unit	Inside / Outside	2-Outside of thermal envelope		2-Outside of thermal envelope	2-Outside of thermal envelope	2-Outside of thermal envelope	2-Outside of thermal envelope	
Ventilation unit selection	select	0304vs03-PAUL - novus F 300		0304vs03-PAUL - novus F 300	0304vs03-PAUL - novus F 300	0304vs03-PAUL - novus F 300	0304vs03-PAUL - novus F 300	
▼ Summer ventilation	SummVent							
▼ Heat generator	PER							
▼ Compressor cooling units	Cooling units							
▼ User determined parameters								

Information: New feature for experienced PHPP users (feedback welcome)!

EnerPHit with PHPP Version 9.3

Comparison between two variants

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 kWh/(m²a)

Selection of comparison configuration

Description	1-	
Component type		
Building component		

Calculation of the selected configuration

	Poorer energy efficiency		Better energy efficiency		Difference / Savings / Profit		
Design according to variant							
Minimum inside surface temperature							°C

	Investment costs						
	Per m² of building element	Complete building element	Per m² of building element	Complete building element	Per m² of building element	Complete building element	
Area of building element	1		1		1		m²
Investment costs minus financial support							€
Annuity (annual capital costs)							€/a

	Operation (heating + cooling + mechanical ventilation)						
	Per m² of TFA	Entire building	Per m² of TFA	Entire building	Per m² of building element	Complete building element	
Area	1		1		1		m²
Heating demand							kWh/a
Cooling + dehumidification demand							kWh/a
CO_2 emissions							kg/a
Primary energy renewable (PER)							kWh/a
Annual operation costs							€/a

	Cost-effectiveness						
Maximal economically viable additional investment costs							€
Average cost for saved kWh of final energy					-		Cent/kWh
Total annual costs							€/a

Boundary conditions					
Interest rate + inflation		**Price of final energy [€/kWh]**		**Utilisation period [a]**	
Nominal interest rate	3,0%	Electricity	0,15	Assembly layers	50
Inflation	1,0%	Gas / Oil	0,09	Vent. system	30
Period under consideration [a]	20	Wood	0,07	Thermal bridges	50
		District heating	0,10	Entire building	50
		Other	0,09	Windows	40

▼ Surface temperature

▼ Annuity

▼ Energy, CO_2, Costs

▼ Boundary conditions

Input of comparison configurations	1	2	3	4	5
Description					
Component type					
Building component					
Variant "Poorer energy efficiency"					
Investment costs [€]					
Annual maintenance costs [€/a]					
Variant "Better energy efficiency"					
Investment costs [€]					
Annual maintenance costs [€/a]					
Financial support (present value) [€]					

Results (manual transfer)

Description					
	9,09				

Climate data

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 kWh/(m²a)

Selection of climate data

Country:	ud-User Data
Region:	All
	1-Alphabetic sorting
Climate data set:	ud---00-Montbrison1314
Climate zone:	4: Warm-temperate

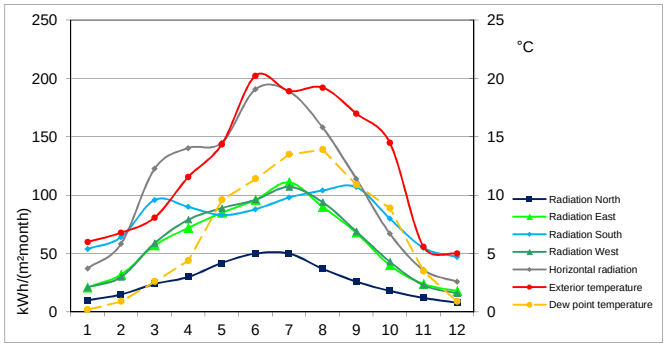
Altitude

Weather station:	399,0	m
Building location:	399	m

Result overview

Annual heating demand	13,8	kWh/(m²a)
Heating load	19,2	W/m²
Frequency of overheating	5,0	%
Sensible cooling	8,9	kWh/(m²a)
Latent cooling	0,1	kWh/(m²a)
Cooling load	-	W/m²
PER demand	90,9	kWh/(m²a)

	Data for heating Annual method	Data from monthly balance Heating	Cooling	
Heating / cooling period	180	273	365	d/a
Heating / cooling degree hours	57	73	-121	kKh/a
Radiation North	91	185	322	kWh/(m²a)
Radiation East	201	417	714	kWh/(m²a)
Radiation South	378	676	966	kWh/(m²a)
Radiation West	202	429	726	kWh/(m²a)
Horizontal radiation	372	747	1285	kWh/(m²a)



	Month	1	2	3	4	5	6	7	8	9	10	11	12	Heating load		Cooling load		PER	
	Days	31	28	31	30	31	30	31	31	30	31	30	31	Weather 1	Weather 2	Weather 1	Weather 2	factors	
	ud---00-Montbrison1314	Latitude °	45,6	Longitude °	4,1	Altitude [m]	399	Daily temperature swing Summer [K]			4,0			Radiation: [W/m²]		Radiation: [W/m²]			
° C	Exterior temperature	6,0	6,8	8,1	11,6	14,4	20,2	18,9	19,2	17,0	14,5	5,6	5,0	-6,0	-2,0	25,1	25,1	1,30	Household electricity
kWh/(m²month)	Radiation North	10	15	24	30	42	50	50	37	26	18	12	8	10	5	104	104	1,30	Domestic hot water
kWh/(m²month)	Radiation East	21	32	57	72	85	96	111	90	68	40	24	18	15	5	185	185	1,80	Heating
kWh/(m²month)	Radiation South	54	64	96	90	83	88	98	104	107	80	55	47	50	10	208	208	1,10	Cooling
kWh/(m²month)	Radiation West	21	30	59	79	89	96	107	94	69	43	23	16	15	5	207	207	1,15	Dehumidification
kWh/(m²month)	Horizontal radiation	37	58	123	140	145	191	189	158	114	67	36	26	20	5	347	347		
° C	Dew point temperature	0,2	0,9	2,6	4,4	9,6	11,4	13,5	13,9	10,9	8,9	3,5	0,9			16,9			
° C	Sky temperature	-10,9	-9,0	-5,1	-0,9	5,6	8,1	10,6	10,4	5,7	0,7	-5,6	-10,7			14,3	12,3		
° C	Ground temperature	13,6	13,1	15,3	16,2	17,5	18,9	20,0	20,5	20,3	19,3	16,1	14,7	13,1	13,1	20,5	20,5		
	Comment:	Text																	

U-value of building assemblies

EnerPHit with PHPP Version 9.3

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 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.	Building assembly description	Interior insulation?
01ud	MurOB	0

Heat transmission resistance [m²K/W]

Orientation of building element: 0,13 — interior R_{si}: 0,13
Adjacent to: 0,04 — 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]
Fermacell	0,350		0,000		0,000	13
LaineBois	0,040	OssatureBois	0,130		0,000	100
IsoToit	0,040		0,000		0,000	200
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0

Percentage of sec. 1	Percentage of sec. 2	Percentage of sec. 3	Total
91%	9,0%	0,0%	31,3 cm

U-value supplement: 0,00 W/(m²K)

U-value: 0,135 W/(m²K)

Assembly no.		Interior insulation?
02ud	MurBetonEntree	0

Heat transmission resistance [m²K/W]

Orientation of building element: 0,13 — interior R_{si}: 0,13
Adjacent to: 0,04 — 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]
Fermacell	0,350		0,000		0,000	13
PSE	0,040		0,000		0,000	100
Beton	2,300		0,000		0,000	160
	0,040		0,000		0,000	200
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0

Percentage of sec. 1	Percentage of sec. 2	Percentage of sec. 3	Total
100%	0,0%	0,0%	47,3 cm

U-value supplement: 0,00 W/(m²K)

U-value: 0,129 W/(m²K)

Assembly no.		Interior insulation?
03ud	Auvent	0

Heat transmission resistance [m²K/W]

Orientation of building element: 0,1 — interior R_{si}: 0,10
Adjacent to: 0,04 — 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]
TroisPlis	0,130		0,000		0,000	30
	0,032		0,000		0,000	100
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0

Percentage of sec. 1	Percentage of sec. 2	Percentage of sec. 3	Total
100%	0,0%	0,0%	13,0 cm

U-value supplement	0,00	W/(m²K)	**U-value:**	0,286	W/(m²K)

Assembly no.		Interior insulation?
04ud	**PorteFaux**	**0**

Heat transmission resistance [m²K/W]

Orientation of building element	**0,17**	interior R_{si}	0,17
Adjacent to	**0,04**	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]
Parquet	**0,130**		**0,000**		**0,000**	**60**
LaineMin	**0,040**	**Ossature**	**0,130**		**0,000**	**180**
TroisPlis	**0,130**		**0,000**		**0,000**	**20**
	0,032		**0,000**		**0,000**	**100**
	0,000		**0,000**		**0,000**	**0**
	0,000		**0,000**		**0,000**	**0**
	0,000		**0,000**		**0,000**	**0**
	0,000		**0,000**		**0,000**	**0**

Percentage of sec. 1	Percentage of sec. 2	Percentage of sec. 3	Total
91%	**9,0%**	**0,0%**	**36,0** cm

U-value supplement **0,00** W/(m²K) **U-value: 0,127** W/(m²K)

Assembly no.		Interior insulation?
05ud	**IsolantSousSol**	**0**

Heat transmission resistance [m²K/W]

Orientation of building element	**0,17**	interior R_{si}	0,17
Adjacent to	**0,17**	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]
Parquet	**0,130**		**0,000**		**0,000**	**13**
LaineMin	**0,040**	**Ossature**	**0,130**		**0,000**	**100**
LaineMin	**0,040**	**Ossature**	**0,130**		**0,000**	**80**
Melamine	**0,130**		**0,000**		**0,000**	**22**
	0,000		**0,000**		**0,000**	**0**
	0,000		**0,000**		**0,000**	**0**
	0,000		**0,000**		**0,000**	**0**
	0,000		**0,000**		**0,000**	**0**

Percentage of sec. 1	Percentage of sec. 2	Percentage of sec. 3	Total
100%	**0,0%**	**0,0%**	**21,5** cm

U-value supplement **0,00** W/(m²K) **U-value: 0,196** W/(m²K)

Assembly no.		Interior insulation?
06ud	**VR**	**0**

Heat transmission resistance [m²K/W]

Orientation of building element	**0,13**	interior R_{si}	0,13
Adjacent to	**0,04**	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]
LaineMin	**0,040**		**0,000**		**0,000**	**50**
	0,000		**0,000**		**0,000**	**0**
	0,000		**0,000**		**0,000**	**0**
	0,000		**0,000**		**0,000**	**0**
	0,000		**0,000**		**0,000**	**0**
	0,000		**0,000**		**0,000**	**0**
	0,000		**0,000**		**0,000**	**0**
	0,000		**0,000**		**0,000**	**0**

Percentage of sec. 1	Percentage of sec. 2	Percentage of sec. 3	Total
100%	**0,0%**	**0,0%**	**5,0** cm

U-value supplement **0,00** W/(m²K) **U-value: 0,704** W/(m²K)

Assembly no. 07ud — **Rampant** — Interior insulation? **0**

Heat transmission resistance [m²K/W]

Orientation of building element **0,1** — interior R_{si} 0,10

Adjacent to **0,04** — 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]
Isotoit	**0,040**		**0,000**		**0,000**	**22**
LaineMin	**0,040**		**0,000**		**0,000**	**60**
LaineMin	**0,040**	**OssatureBois**	**0,130**		**0,000**	**200**
Triply	**0,130**		**0,000**		**0,000**	**22**
	0,000		**0,000**		**0,000**	**0**
	0,000		**0,000**		**0,000**	**0**
	0,000		**0,000**		**0,000**	**0**
	0,000		**0,000**		**0,000**	**0**

Percentage of sec. 1: 95% — Percentage of sec. 2: **5,0%** — Percentage of sec. 3: **0,0%** — Total: **30,4** cm

U-value supplement **0,00** W/(m²K) — **U-value: 0,144** W/(m²K)

Assembly no. 08ud — **SolivesSousSol** — Interior insulation? **0**

Heat transmission resistance [m²K/W]

Orientation of building element **0,17** — interior R_{si} 0,17

Adjacent to **0,17** — 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]
Solives	**0,130**		**0,000**		**0,000**	**180**
	0,000		**0,000**		**0,000**	**0**
	0,000		**0,000**		**0,000**	**0**
	0,000		**0,000**		**0,000**	**0**
	0,000		**0,000**		**0,000**	**0**
	0,000		**0,000**		**0,000**	**0**
	0,000		**0,000**		**0,000**	**0**
	0,000		**0,000**		**0,000**	**0**

Percentage of sec. 1: 100% — Percentage of sec. 2: **0,0%** — Percentage of sec. 3: **0,0%** — Total: **18,0** cm

U-value supplement **0,00** W/(m²K) — **U-value: 0,580** W/(m²K)

Assembly no. 09ud — **ToitureEntree** — Interior insulation? **0**

Heat transmission resistance [m²K/W]

Orientation of building element **0,1** — interior R_{si} 0,10

Adjacent to **0,04** — 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]
Fermacell	**0,350**		**0,000**		**0,000**	**10**
LaineMin	**0,040**	**OssatureBois**	**0,130**		**0,000**	**180**
	0,000		**0,000**		**0,000**	**0**
	0,000		**0,000**		**0,000**	**0**
	0,000		**0,000**		**0,000**	**0**
	0,000		**0,000**		**0,000**	**0**
	0,000		**0,000**		**0,000**	**0**
	0,000		**0,000**		**0,000**	**0**

Percentage of sec. 1: 90% — Percentage of sec. 2: **10,0%** — Percentage of sec. 3: **0,0%** — Total: **19,0** cm

U-value supplement **0,00** W/(m²K) — **U-value: 0,259** W/(m²K)

Assembly no.		Interior insulation?
10ud	PlancherBetonEntree	0

Heat transmission resistance [m²K/W]

Orientation of building element	0,17	interior R_{si}	0,17
Adjacent to	0,17	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]
Beton	2,100		0,000		0,000	180
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0

Percentage of sec. 1	Percentage of sec. 2	Percentage of sec. 3	Total
100%	0,0%	0,0%	18,0 cm

U-value supplement 0,00 W/(m²K) **U-value:** 2,349 W/(m²K)

Assembly no.		Interior insulation?
11ud	PlancherBasBois	0

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]
Parquet	0,130		0,000		0,000	60
LaineMin	0,040	Ossature	0,130		0,000	180
TroisPlis	0,130		0,000		0,000	20
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0

Percentage of sec. 1	Percentage of sec. 2	Percentage of sec. 3	Total
84%	16,0%	0,0%	26,0 cm

U-value supplement 0,00 W/(m²K) **U-value:** 0,228 W/(m²K)

Assembly no.		Interior insulation?
12ud		0

Heat transmission resistance [m²K/W]

Orientation of building element	0	interior R_{si}	0,00
Adjacent to	0	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]
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0

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

U-value supplement 0,00 W/(m²K) **U-value:** ##### W/(m²K)

Assembly no. 13ud — Interior insulation? 0

Heat transmission resistance [m²K/W]

Orientation of building element 0 — interior R_{si} 0,00

Adjacent to 0 — 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]
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0

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

U-value supplement 0,00 W/(m²K) — **U-value:** ##### W/(m²K)

Assembly no. 14ud — Interior insulation? 0

Heat transmission resistance [m²K/W]

Orientation of building element 0 — interior R_{si} 0,00

Adjacent to 0 — 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]
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0

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

U-value supplement 0,00 W/(m²K) — **U-value:** ##### W/(m²K)

Assembly no. 15ud — Interior insulation? 0

Heat transmission resistance [m²K/W]

Orientation of building element 0 — interior R_{si} 0,00

Adjacent to 0 — 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]
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0

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

U-value supplement 0,00 W/(m²K) — **U-value:** ##### W/(m²K)

Assembly no. 16ud

Interior insulation? 0

Heat transmission resistance [m²K/W]

Orientation of building element 0 — interior R_{si} 0,00

Adjacent to 0 — 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]
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0

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

U-value supplement 0,00 W/(m²K)

U-value: ##### W/(m²K)

Assembly no. 17ud

Interior insulation? 0

Heat transmission resistance [m²K/W]

Orientation of building element 0 — interior R_{si} 0,00

Adjacent to 0 — 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]
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0

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

U-value supplement 0,00 W/(m²K)

U-value: ##### W/(m²K)

Assembly no. 18ud

Interior insulation? 0

Heat transmission resistance [m²K/W]

Orientation of building element 0 — interior R_{si} 0,00

Adjacent to 0 — 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]
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0

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

U-value supplement 0,00 W/(m²K)

U-value: ##### W/(m²K)

Assembly no.		Interior insulation?
19ud		0

Heat transmission resistance [m²K/W]

Orientation of building element	0	interior R_{si}	0,00
Adjacent to	0	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]
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0

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

U-value supplement 0,00 W/(m²K) **U-value:** ##### W/(m²K)

Assembly no.		Interior insulation?
20ud		0

Heat transmission resistance [m²K/W]

Orientation of building element	0	interior R_{si}	0,00
Adjacent to	0	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]
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0
	0,000		0,000		0,000	0

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

U-value supplement 0,00 W/(m²K) **U-value:** ##### W/(m²K)

Areas determination

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 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	**163,00**	m²	*Treated floor area according to PHPP manual*				9 Months	12 Months
A	**North windows**	2	**13,66**	m²	Results come from the 'Windows' worksheet.		**North windows**	**0,890**	**655**	**631**
A	**East windows**	3	**15,63**	m²	Window areas are subtracted from individual opaque areas.		**East windows**	**0,877**	**2011**	**1932**
A	**South windows**	4	**29,57**	m²	which is displayed in the 'Windows' worksheet.		**South windows**	**0,845**	**6028**	**3100**
A	**West windows**	5	**15,54**	m²			**West windows**	**0,884**	**1787**	**1648**
A	**Horizontal windows**	6	**0,00**	m²			**Horizontal windows**			
A	**Exterior door**	7	**0,00**	m²	*Please subtract area of door from respective building assembly*		**Exterior door**			
A	**External wall - Ambient**	8	**70,49**	m²	*Temperature zone "A" is ambient air*		**External wall - Ambient**	**0,117**	**16**	**109**
B	**External wall - Ground**	9	**0,00**	m²	*Temperature zone "B" is the ground*		**External wall - Ground**			
A	**Roof/Ceiling - Ambient**	10	**231,58**	m²			**Roof/Ceiling - Ambient**	**0,177**	**430**	**1105**
B	**Floor slab / Basement ceiling**	11	**97,79**	m²			**Floor slab / Basement ceiling**	**0,228**		
		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	**159,30**	m	*Units in m*		**Thermal bridges Ambient**	**0,021**
P	**Perimeter thermal bridges**	16	**35,65**	m	*Units in m; temperature zone "P" is perimeter (see 'Ground' worksheet)*		**Perimeter thermal bridges**	**0,000**
B	**Thermal bridges FS/BC**	17	**9,00**	m	*Units in m*		**Thermal bridges FS/BC**	**0,211**
I	**Building element towards neighbour**	18	**0,00**	m²	*No heat losses, only considered for the heating load calculation*		**Building element towards neighbour**	
Total thermal envelope			**474,27**	**m²**			**Average therm. envelope**	**0,298**

Go to building components list

Area input

Sort: 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		+	**97,79**	-		)		=	97,8									
	Treated floor area	**1**	Treated floor area	**1**	x (		x		+	**163,00**	-		)		=	163,0									
	Exterior door	**7**	Exterior door		x (		x		+		-		) -		=		Exterior door								
1	**Roof_311968_H**	**10**	Roof/Ceiling - Ambient	**1**	x (	**12,60**	x	**4,03**	+		-		) -	**0,0**	=	50,8	**07ud Rampant**	**0,144**	**360**	**19**	**Hor**	**1,00**	**0,80**	**0,90**
2	**Roof_311891_H**	**10**	Roof/Ceiling - Ambient	**1**	x (	**12,60**	x	**4,03**	+		-		) -	**0,0**	=	50,8	**07ud Rampant**	**0,144**	**180**	**19**	**Hor**	**1,00**	**0,80**	**0,90**
3	**Roof_312125_H**	**10**	Roof/Ceiling - Ambient	**1**	x (		x		+	**18,95**	-		) -	**0,0**	=	19,0	**03ud Auvent**	**0,286**	**180**	**9**	**Hor**	**1,00**	**0,80**	**0,90**
4	**Roof_312172_H**	**10**	Roof/Ceiling - Ambient	**1**	x (		x		+	**18,79**	-		) -	**0,0**	=	18,8	**03ud Auvent**	**0,286**	**360**	**9**	**Hor**	**1,00**	**0,80**	**0,90**
5	**Roof_156322_H**	**8**	External wall - Ambient	**1**	x (	**7,66**	x	**2,40**	+		-		) -	**0,0**	=	18,4	**09ud ToitureEntree**	**0,259**	**90**	**0**	**Hor**	**1,00**	**0,80**	**0,90**
6	**Roof_312301_H**	**10**	Roof/Ceiling - Ambient	**1**	x (		x		+	**12,17**	-		) -	**0,0**	=	12,2	**03ud Auvent**	**0,286**	**270**	**9**	**Hor**	**1,00**	**0,80**	**0,90**
7	**Roof_312061_H**	**10**	Roof/Ceiling - Ambient	**1**	x (		x		+	**12,06**	-		) -	**0,0**	=	12,1	**03ud Auvent**	**0,286**	**90**	**9**	**Hor**	**1,00**	**0,80**	**0,90**
8	**Wall_161399_N**	**8**	External wall - Ambient	**0**	x (	**2,66**	x	**2,11**	+		-		) -	**1,2**	=	-1,2	**02ud MurBetonEntree**	**0,129**	**0**	**90**	**North**	**0,90**	**0,80**	**0,90**
9	**Wall_161577_N**	**8**	External wall - Ambient	**0**	x (	**2,66**	x	**2,11**	+		-		) -	**1,2**	=	-1,2	**02ud MurBetonEntree**	**0,129**	**0**	**90**	**North**	**0,90**	**0,80**	**0,90**
10	**Wall_311866_S**	**8**	External wall - Ambient	**1**	x (	**12,60**	x	**0,30**	+		-		) -	**0,0**	=	3,8	**01ud MurOB**	**0,135**	**180**	**90**	**South**	**0,90**	**0,80**	**0,90**
11	**Wall_311917_N**	**8**	External wall - Ambient	**1**	x (	**12,60**	x	**0,30**	+		-		) -	**0,0**	=	3,8	**01ud MurOB**	**0,135**	**360**	**90**	**North**	**0,90**	**0,80**	**0,90**
12	**Wall_534934_E**	**8**	External wall - Ambient	**0**	x (		x		+	**4,79**	-		) -	**1,0**	=	-1,0	**02ud MurBetonEntree**	**0,129**	**90**	**90**	**East**	**0,90**	**0,80**	**0,90**
13	**Wall_312786_N**	**8**	External wall - Ambient	**1**	x (	**3,00**	x	**1,56**	+		-		) -	**0,9**	=	3,7	**01ud MurOB**	**0,135**	**360**	**90**	**North**	**0,90**	**0,80**	**0,90**
14	**Wall_312383_N**	**8**	External wall - Ambient	**1**	x (	**3,00**	x	**1,56**	+		-		) -	**1,0**	=	3,7	**01ud MurOB**	**0,135**	**0**	**90**	**North**	**0,90**	**0,80**	**0,90**
15	**Wall_534926_W**	**8**	External wall - Ambient	**0**	x (		x		+	**4,79**	-		) -	**1,1**	=	-1,1	**02ud MurBetonEntree**	**0,129**	**270**	**90**	**West**	**0,90**	**0,80**	**0,90**
16	**Wall_313691_S**	**8**	External wall - Ambient	**1**	x (	**3,00**	x	**1,56**	+		-		) -	**1,0**	=	3,7	**01ud MurOB**	**0,135**	**180**	**90**	**South**	**0,90**	**0,80**	**0,90**
17	**Wall_313865_E**	**8**	External wall - Ambient	**1**	x (	**3,00**	x	**1,56**	+		-		) -	**1,0**	=	3,7	**01ud MurOB**	**0,135**	**90**	**90**	**East**	**0,90**	**0,80**	**0,90**
18	**Wall_313427_W**	**8**	External wall - Ambient	**1**	x (	**3,00**	x	**1,56**	+		-		) -	**1,0**	=	3,7	**01ud MurOB**	**0,135**	**270**	**90**	**West**	**0,90**	**0,80**	**0,90**
19	**Wall_312998_W**	**8**	External wall - Ambient	**1**	x (	**3,00**	x	**1,56**	+		-		) -	**1,0**	=	3,7	**01ud MurOB**	**0,135**	**270**	**90**	**West**	**0,90**	**0,80**	**0,90**
20	**Wall_313517_S**	**8**	External wall - Ambient	**1**	x (	**3,00**	x	**1,56**	+		-		) -	**1,0**	=	3,7	**01ud MurOB**	**0,135**	**180**	**90**	**South**	**0,90**	**0,80**	**0,90**
21	**Wall_314198_E**	**8**	External wall - Ambient	**1**	x (	**3,00**	x	**1,56**	+		-		) -	**1,0**	=	3,7	**01ud MurOB**	**0,135**	**90**	**90**	**East**	**0,90**	**0,80**	**0,90**
22	**Wall_536451_N**	**8**	External wall - Ambient	**1**	x (		x		+	**3,59**	-		) -	**0,0**	=	3,6	**01ud MurOB**	**0,135**	**360**	**90**	**North**	**0,90**	**0,80**	**0,90**
23	**Wall_312507_N**	**8**	External wall - Ambient	**1**	x (	**3,00**	x	**1,25**	+		-		) -	**0,8**	=	2,9	**01ud MurOB**	**0,135**	**0**	**90**	**North**	**0,90**	**0,80**	**0,90**
24	**Wall_312701_N**	**8**	External wall - Ambient	**1**	x (	**3,00**	x	**1,25**	+		-		) -	**0,8**	=	2,9	**01ud MurOB**	**0,135**	**0**	**90**	**North**	**0,90**	**0,80**	**0,90**
25	**Wall_313591_S**	**8**	External wall - Ambient	**1**	x (	**3,00**	x	**1,25**	+		-		) -	**0,9**	=	2,9	**01ud MurOB**	**0,135**	**180**	**90**	**South**	**0,90**	**0,80**	**0,90**
26	**Wall_314031_E**	**8**	External wall - Ambient	**1**	x (	**3,00**	x	**1,25**	+		-		) -	**0,9**	=	2,9	**01ud MurOB**	**0,135**	**90**	**90**	**East**	**0,90**	**0,80**	**0,90**
27	**Wall_313282_W**	**8**	External wall - Ambient	**1**	x (	**3,00**	x	**1,25**	+		-		) -	**0,9**	=	2,9	**01ud MurOB**	**0,135**	**270**	**90**	**West**	**0,90**	**0,80**	**0,90**
28	**Wall_313355_W**	**8**	External wall - Ambient	**1**	x (	**3,00**	x	**1,25**	+		-		) -	**0,9**	=	2,9	**01ud MurOB**	**0,135**	**270**	**90**	**West**	**0,90**	**0,80**	**0,90**
29	**Wall_313201_W**	**8**	External wall - Ambient	**1**	x (	**3,00**	x	**1,25**	+		-		) -	**0,9**	=	2,9	**01ud MurOB**	**0,135**	**270**	**90**	**West**	**0,90**	**0,80**	**0,90**
30	**Wall_313949_E**	**8**	External wall - Ambient	**1**	x (	**3,00**	x	**1,25**	+		-		) -	**0,9**	=	2,9	**01ud MurOB**	**0,135**	**90**	**90**	**East**	**0,90**	**0,80**	**0,90**

Areas determination

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 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]
									9 Months	12 Months
	Treated floor area	1	**163,00**	m²	*Treated floor area according to PHPP manual*					
A	**North windows**	2	**13,66**	m²	Results come from the 'Windows' worksheet.		**North windows**	**0,890**	**655**	**631**
A	**East windows**	3	**15,63**	m²	Window areas are subtracted from individual opaque areas.		**East windows**	**0,877**	**2011**	**1932**
A	**South windows**	4	**29,57**	m²	which is displayed in the 'Windows' worksheet.		**South windows**	**0,845**	**6028**	**3100**
A	**West windows**	5	**15,54**	m²			**West windows**	**0,884**	**1787**	**1648**
A	**Horizontal windows**	6	**0,00**	m²			**Horizontal windows**			
A	**Exterior door**	7	**0,00**	m²	*Please subtract area of door from respective building assembly*		**Exterior door**			
A	**External wall - Ambient**	8	**70,49**	m²	*Temperature zone "A" is ambient air*		**External wall - Ambient**	**0,117**	**16**	**109**
B	**External wall - Ground**	9	**0,00**	m²	*Temperature zone "B" is the ground*		**External wall - Ground**			
A	**Roof/Ceiling - Ambient**	10	**231,58**	m²			**Roof/Ceiling - Ambient**	**0,177**	**430**	**1105**
B	**Floor slab / Basement ceiling**	11	**97,79**	m²			**Floor slab / Basement ceiling**	**0,228**		
		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	**159,30**	m	*Units in m*		**Thermal bridges Ambient**	**0,021**		
P	**Perimeter thermal bridges**	16	**35,65**	m	*Units in m; temperature zone "P" is perimeter (see 'Ground' worksheet)*		**Perimeter thermal bridges**	**0,000**		
B	**Thermal bridges FS/BC**	17	**9,00**	m	*Units in m*		**Thermal bridges FS/BC**	**0,211**		
I	**Building element towards neighbour**	18	**0,00**	m²	*No heat losses, only considered for the heating load calculation*		**Building element towards neighbour**			
Total thermal envelope			**474,27**	**m²**			**Average therm. envelope**	**0,298**		

Go to building components list

31	Wall_313770_S	8	External wall - Ambient	1	x (	3,00	x	1,25	+		-		) -	0,9	=	2,9	01ud MurOB	0,135	180	90	South	0,90	0,80	0,90
32	Wall_312880_N	8	External wall - Ambient	1	x (		x		+	3,59	-		) -	0,8	=	2,8	01ud MurOB	0,135	0	90	North	0,90	0,80	0,90
33	Wall_154561_W	8	External wall - Ambient	1	x (		x		+	2,40	-		) -	0,0	=	2,4	01ud MurOB	0,135	270	90	West	0,90	0,80	0,90
34	Wall_154312_E	8	External wall - Ambient	1	x (		x		+	2,40	-		) -	0,0	=	2,4	01ud MurOB	0,135	90	90	East	0,90	0,80	0,90
35	Wall_154480_W	8	External wall - Ambient	1	x (		x		+	2,40	-		) -	0,0	=	2,4	01ud MurOB	0,135	270	90	West	0,90	0,80	0,90
36	Wall_154395_E	8	External wall - Ambient	1	x (		x		+	2,40	-		) -	0,0	=	2,4	01ud MurOB	0,135	90	90	East	0,90	0,80	0,90
37	Wall_156313_N	8	External wall - Ambient	0	x (	7,66	x	0,23	+		-		) -	0,0	=	0,0	02ud MurBetonEntree	0,129	0	90	North	0,90	0,80	0,90
38	Wall_539190_E	8	External wall - Ambient	0	x (		x		+	1,71	-		) -	0,0	=	0,0	02ud MurBetonEntree	0,129	90	90	East	0,90	0,80	0,90
39	Surface_161827_W	8	External wall - Ambient	0	x (		x		+	1,71	-		) -	0,0	=	0,0	02ud MurBetonEntree	0,129	270	90	West	1,00	0,80	0,90
40					x (		x		+		-		) -	0,0	=				270	180	Hor	1,00	0,80	0,90
41					x (		x		+		-		) -	0,0	=				90	0	Hor	1,00	0,80	0,90
42	Wall_311899_E	8	External wall - Ambient	1	x (		x		+	1,29	-		) -	0,0	=	1,3	01ud MurOB	0,135	90	90	East	0,90	0,80	0,90
43	Wall_311856_E	8	External wall - Ambient	1	x (		x		+	1,29	-		) -	0,0	=	1,3	01ud MurOB	0,135	90	90	East	0,90	0,80	0,90
44	Wall_311936_W	8	External wall - Ambient	1	x (		x		+	1,29	-		) -	0,0	=	1,3	01ud MurOB	0,135	270	90	West	0,90	0,80	0,90
45	Wall_311882_W	8	External wall - Ambient	1	x (		x		+	1,29	-		) -	0,0	=	1,3	01ud MurOB	0,135	270	90	West	0,90	0,80	0,90
46					x (		x		+		-		) -	0,0	=				90	180	Hor	1,00	0,80	0,90
47					x (		x		+		-		) -	0,0	=				90	180	Hor	1,00	0,80	0,90
48	Wall_161561_E	8	External wall - Ambient	0	x (	2,59	x	0,22	+		-		) -	0,0	=	0,0	02ud MurBetonEntree	0,129	90	90	East	0,90	0,80	0,90
49	Wall_313018_S	8	External wall - Ambient	1	x (	2,35	x	0,21	+		-		) -	0,0	=	0,5	01ud MurOB	0,135	180	90	South	0,90	0,80	0,90
50					x (		x		+		-		) -	0,0	=				180	90	South	0,90	0,80	0,90
51	Wall_357159_N	8	External wall - Ambient	1	x (	1,15	x	0,36	+		-		) -	0,0	=	0,4	01ud MurOB	0,135	0	90	North	0,90	0,80	0,90
52	Wall_357175_N	8	External wall - Ambient	1	x (	1,15	x	0,36	+		-		) -	0,0	=	0,4	01ud MurOB	0,135	0	90	North	0,90	0,80	0,90
53	Wall_357095_N	8	External wall - Ambient	1	x (	1,15	x	0,36	+		-		) -	0,0	=	0,4	01ud MurOB	0,135	0	90	North	0,90	0,80	0,90
54	Wall_357119_N	8	External wall - Ambient	1	x (	1,15	x	0,36	+		-		) -	0,0	=	0,4	01ud MurOB	0,135	0	90	North	0,90	0,80	0,90
55	Wall_357127_N	8	External wall - Ambient	1	x (	1,15	x	0,36	+		-		) -	0,0	=	0,4	01ud MurOB	0,135	0	90	North	0,90	0,80	0,90
56	Wall_357087_N	8	External wall - Ambient	1	x (	1,15	x	0,36	+		-		) -	0,0	=	0,4	01ud MurOB	0,135	0	90	North	0,90	0,80	0,90
57	Wall_357143_N	8	External wall - Ambient	1	x (	1,15	x	0,36	+		-		) -	0,0	=	0,4	01ud MurOB	0,135	0	90	North	0,90	0,80	0,90
58	Wall_357199_N	8	External wall - Ambient	1	x (	1,15	x	0,36	+		-		) -	0,0	=	0,4	01ud MurOB	0,135	0	90	North	0,90	0,80	0,90
59	Wall_315124_E	8	External wall - Ambient	1	x (	1,25	x	0,29	+		-		) -	0,0	=	0,4	01ud MurOB	0,135	90	90	East	0,90	0,80	0,90
60	Wall_161412_E	8	External wall - Ambient	0	x (	2,09	x	0,09	+		-		) -	0,0	=	0,0	02ud MurBetonEntree	0,129	90	90	East	0,90	0,80	0,90
61	Wall_161480_W	8	External wall - Ambient	0	x (	2,09	x	0,09	+		-		) -	0,0	=	0,0	02ud MurBetonEntree	0,129	270	90	West	0,90	0,80	0,90
62					x (		x		+		-		) -	0,0	=				85	180	Hor	1,00	0,80	0,90
63					x (		x		+		-		) -	0,0	=				78	180	Hor	1,00	0,80	0,90
64	Wall_313078_S	8	External wall - Ambient	1	x (	0,36	x	0,21	+		-		) -	0,0	=	0,1	01ud MurOB	0,135	180	90	South	0,90	0,80	0,90
65	Wall_314298_N	8	External wall - Ambient	1	x (	0,36	x	0,21	+		-		) -	0,0	=	0,1	01ud MurOB	0,135	0	90	North	0,90	0,80	0,90
66	Wall_314360_S	8	External wall - Ambient	1	x (	0,36	x	0,21	+		-		) -	0,0	=	0,1	01ud MurOB	0,135	180	90	South	0,90	0,80	0,90
67	Wall_313121_N	8	External wall - Ambient	1	x (	0,36	x	0,21	+		-		) -	0,0	=	0,1	01ud MurOB	0,135	0	90	North	0,90	0,80	0,90
68	Wall_357151_N	8	External wall - Ambient	1	x (	0,36	x	0,10	+		-		) -	0,0	=	0,0	01ud MurOB	0,135	0	90	North	0,90	0,80	0,90

Areas determination

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 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	**163,00**	m²	*Treated floor area according to PHPP manual*				9 Months	12 Months
A	**North windows**	2	**13,66**	m²	Results come from the 'Windows' worksheet.		**North windows**	**0,890**	**655**	**631**
A	**East windows**	3	**15,63**	m²	Window areas are subtracted from individual opaque areas.		**East windows**	**0,877**	**2011**	**1932**
A	**South windows**	4	**29,57**	m²	which is displayed in the 'Windows' worksheet.		**South windows**	**0,845**	**6028**	**3100**
A	**West windows**	5	**15,54**	m²			**West windows**	**0,884**	**1787**	**1648**
A	**Horizontal windows**	6	**0,00**	m²			**Horizontal windows**			
A	**Exterior door**	7	**0,00**	m²	*Please subtract area of door from respective building assembly*		**Exterior door**			
A	**External wall - Ambient**	8	**70,49**	m²	*Temperature zone "A" is ambient air*		**External wall - Ambient**	**0,117**	**16**	**109**
B	**External wall - Ground**	9	**0,00**	m²	*Temperature zone "B" is the ground*		**External wall - Ground**			
A	**Roof/Ceiling - Ambient**	10	**231,58**	m²			**Roof/Ceiling - Ambient**	**0,177**	**430**	**1105**
B	**Floor slab / Basement ceiling**	11	**97,79**	m²			**Floor slab / Basement ceiling**	**0,228**		
		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	**159,30**	m	*Units in m*		**Thermal bridges Ambient**	**0,021**
P	**Perimeter thermal bridges**	16	**35,65**	m	*Units in m; temperature zone "P" is perimeter (see 'Ground' worksheet)*		**Perimeter thermal bridges**	**0,000**
B	**Thermal bridges FS/BC**	17	**9,00**	m	*Units in m*		**Thermal bridges FS/BC**	**0,211**
I	**Building element towards neighbour**	18	**0,00**	m²	*No heat losses, only considered for the heating load calculation*		**Building element towards neighbour**	
Total thermal envelope			**474,27**	**m²**			**Average therm. envelope**	**0,298**

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69	**Wall_357191_N**	**8**	External wall - Ambient	**1**	x (	**0,36**	x	**0,10**	+		-		) -	**0,0**	=	0,0	**01ud MurOB**	**0,135**	**0**	**90**	**North**	**0,90**	**0,80**	**0,90**
70	**Wall_357079_N**	**8**	External wall - Ambient	**1**	x (	**0,36**	x	**0,10**	+		-		) -	**0,0**	=	0,0	**01ud MurOB**	**0,135**	**0**	**90**	**North**	**0,90**	**0,80**	**0,90**
71	**Wall_357111_N**	**8**	External wall - Ambient	**1**	x (	**0,36**	x	**0,10**	+		-		) -	**0,0**	=	0,0	**01ud MurOB**	**0,135**	**0**	**90**	**North**	**0,90**	**0,80**	**0,90**
72	**Wall_311793_S**	**8**	External wall - Ambient	**1**	x (	**0,36**	x	**0,05**	+		-		) -	**0,0**	=	0,0	**01ud MurOB**	**0,135**	**180**	**90**	**South**	**0,90**	**0,80**	**0,90**
73	**Wall_311704_N**	**8**	External wall - Ambient	**1**	x (	**0,36**	x	**0,05**	+		-		) -	**0,0**	=	0,0	**01ud MurOB**	**0,135**	**0**	**90**	**North**	**0,90**	**0,80**	**0,90**
74	**Wall_311630_S**	**8**	External wall - Ambient	**1**	x (	**0,36**	x	**0,05**	+		-		) -	**0,0**	=	0,0	**01ud MurOB**	**0,135**	**180**	**90**	**South**	**0,90**	**0,80**	**0,90**
75	**Wall_311569_N**	**8**	External wall - Ambient	**1**	x (	**0,36**	x	**0,05**	+		-		) -	**0,0**	=	0,0	**01ud MurOB**	**0,135**	**0**	**90**	**North**	**0,90**	**0,80**	**0,90**
76	**Wall_357183_S**	**8**	External wall - Ambient	**1**	x (	**0,36**	x	**0,05**	+		-		) -	**0,0**	=	0,0	**01ud MurOB**	**0,135**	**180**	**90**	**South**	**0,90**	**0,80**	**0,90**
77	**Wall_357103_S**	**8**	External wall - Ambient	**1**	x (	**0,36**	x	**0,05**	+		-		) -	**0,0**	=	0,0	**01ud MurOB**	**0,135**	**180**	**90**	**South**	**0,90**	**0,80**	**0,90**
78	**Wall_357135_N**	**8**	External wall - Ambient	**1**	x (	**0,36**	x	**0,05**	+		-		) -	**0,0**	=	0,0	**01ud MurOB**	**0,135**	**0**	**90**	**North**	**0,90**	**0,80**	**0,90**
79	**Wall_357167_S**	**8**	External wall - Ambient	**1**	x (	**0,36**	x	**0,05**	+		-		) -	**0,0**	=	0,0	**01ud MurOB**	**0,135**	**180**	**90**	**South**	**0,90**	**0,80**	**0,90**
80	**Wall_314117_E**	**8**	External wall - Ambient	**1**	x (	**3,00**	x	**1,25**	+		-		) -	**3,9**	=	-0,1	**01ud MurOB**	**0,135**	**90**	**90**	**East**	**0,90**	**0,80**	**0,90**
81	**Wall_312587_N**	**8**	External wall - Ambient	**1**	x (		x		+	**0,11**	-		) -	**0,8**	=	-0,7	**01ud MurOB**	**0,135**	**0**	**90**	**North**	**0,90**	**0,80**	**0,90**
82	**Wall_311667_S**	**8**	External wall - Ambient	**1**	x (	**2,50**	x	**0,36**	+		-		) -	**1,7**	=	-0,8	**06ud VR**	**0,704**	**180**	**90**	**South**	**0,90**	**0,80**	**0,90**
83	**Wall_311802_S**	**8**	External wall - Ambient	**1**	x (	**2,50**	x	**0,36**	+		-		) -	**1,7**	=	-0,8	**06ud VR**	**0,704**	**180**	**90**	**South**	**0,90**	**0,80**	**0,90**
84	**Wall_311647_S**	**8**	External wall - Ambient	**1**	x (	**2,50**	x	**0,36**	+		-		) -	**1,8**	=	-0,9	**06ud VR**	**0,704**	**180**	**90**	**South**	**0,90**	**0,80**	**0,90**
85	**Wall_315282_E**	**8**	External wall - Ambient	**1**	x (	**1,25**	x	**0,29**	+		-		) -	**1,4**	=	-1,0	**01ud MurOB**	**0,135**	**90**	**90**	**East**	**0,90**	**0,80**	**0,90**
86	**Wall_315022_S**	**8**	External wall - Ambient	**1**	x (	**1,25**	x	**0,29**	+		-		) -	**1,4**	=	-1,0	**01ud MurOB**	**0,135**	**180**	**90**	**South**	**0,90**	**0,80**	**0,90**
87	**Wall_314928_S**	**8**	External wall - Ambient	**1**	x (	**1,25**	x	**0,29**	+		-		) -	**1,4**	=	-1,0	**01ud MurOB**	**0,135**	**180**	**90**	**South**	**0,90**	**0,80**	**0,90**
88	**Wall_314591_S**	**8**	External wall - Ambient	**1**	x (	**1,25**	x	**0,29**	+		-		) -	**1,4**	=	-1,0	**01ud MurOB**	**0,135**	**180**	**90**	**South**	**0,90**	**0,80**	**0,90**
89	**Wall_314429_S**	**8**	External wall - Ambient	**1**	x (	**1,25**	x	**0,29**	+		-		) -	**1,4**	=	-1,0	**01ud MurOB**	**0,135**	**180**	**90**	**South**	**0,90**	**0,80**	**0,90**
90	**Wall_315626_W**	**8**	External wall - Ambient	**1**	x (	**1,25**	x	**0,29**	+		-		) -	**1,4**	=	-1,0	**01ud MurOB**	**0,135**	**270**	**90**	**West**	**0,90**	**0,80**	**0,90**
91	**Wall_313130_W**	**8**	External wall - Ambient	**1**	x (	**3,75**	x	**0,36**	+		-		) -	**2,6**	=	-1,3	**01ud MurOB**	**0,135**	**270**	**90**	**West**	**0,90**	**0,80**	**0,90**
92	**Wall_314329_E**	**8**	External wall - Ambient	**1**	x (	**3,75**	x	**0,36**	+		-		) -	**2,6**	=	-1,3	**06ud VR**	**0,704**	**90**	**90**	**East**	**0,90**	**0,80**	**0,90**
93	**Wall_311560_S**	**8**	External wall - Ambient	**1**	x (	**2,50**	x	**0,36**	+		-		) -	**3,4**	=	-2,5	**06ud VR**	**0,704**	**180**	**90**	**South**	**0,90**	**0,80**	**0,90**
94	**Wall_314508_S**	**8**	External wall - Ambient	**1**	x (	**1,25**	x	**0,29**	+		-		) -	**2,9**	=	-2,5	**01ud MurOB**	**0,135**	**180**	**90**	**South**	**0,90**	**0,80**	**0,90**
95	**Wall_314670_S**	**8**	External wall - Ambient	**1**	x (	**1,25**	x	**0,29**	+		-		) -	**2,9**	=	-2,5	**01ud MurOB**	**0,135**	**180**	**90**	**South**	**0,90**	**0,80**	**0,90**
96	**Wall_315497_W**	**8**	External wall - Ambient	**1**	x (	**1,25**	x	**0,29**	+		-		) -	**2,9**	=	-2,5	**01ud MurOB**	**0,135**	**270**	**90**	**West**	**0,90**	**0,80**	**0,90**
97	**Wall_314821_S**	**8**	External wall - Ambient	**1**	x (	**1,25**	x	**0,29**	+		-		) -	**2,9**	=	-2,5	**01ud MurOB**	**0,135**	**180**	**90**	**South**	**0,90**	**0,80**	**0,90**
98	**Wall_315454_W**	**8**	External wall - Ambient	**1**	x (	**1,25**	x	**0,29**	+		-		) -	**2,9**	=	-2,6	**01ud MurOB**	**0,135**	**270**	**90**	**West**	**0,90**	**0,80**	**0,90**
99	**Wall_314753_S**	**8**	External wall - Ambient	**1**	x (	**1,25**	x	**0,29**	+		-		) -	**2,9**	=	-2,6	**01ud MurOB**	**0,135**	**180**	**90**	**South**	**0,90**	**0,80**	**0,90**
100	**Wall_315269_E**	**8**	External wall - Ambient	**1**	x (	**1,25**	x	**0,29**	+		-		) -	**3,0**	=	-2,6	**01ud MurOB**	**0,135**	**90**	**90**	**East**	**0,90**	**0,80**	**0,90**
101	**MurPorteEntree**	**8**	External wall - Ambient	**1**	x (	**2,34**	x	**2,60**	+		-		) -	**6,1**	=	0,0	**01ud MurOB**	**0,135**	**0**	**90**	**North**	**0,90**	**0,80**	**0,90**
102					x (		x		+		-		) -	**0,0**	=									
103	**PlancherBas_PorteFaux**	**10**	Roof/Ceiling - Ambient	**1**	x (	**10,62**	x	**15,62**	+		-	**97,79**	) -	**0,0**	=	68,1	**04ud-PorteFaux**	**0,127**	**180**	**0**	**Hor**	**0,90**	**0,80**	**0,90**
104	**PlancherBas_R-1**	**11**	Floor slab / Basement ceiling	**1**	x (	**7,70**	x	**12,70**	+		-		) -	**0,0**	=	97,8	**11ud-PlancherBasBois**	**0,228**						
105	**PlancherBas_Entree**	**11**	Floor slab / Basement ceiling	**0**	x (		x		+	**16,51**	-		) -	**0,0**	=	0,0	**10ud-PlancherBetonEntree**	**2,349**						
106					x (		x		+		-		) -	**0,0**	=									

Areas determination

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 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]
									9 Months	12 Months
	Treated floor area	1	**163,00**	m²	*Treated floor area according to PHPP manual*					
A	**North windows**	2	**13,66**	m²			**North windows**	**0,890**	**655**	**631**
A	**East windows**	3	**15,63**	m²	Results come from the 'Windows' worksheet.		**East windows**	**0,877**	**2011**	**1932**
A	**South windows**	4	**29,57**	m²	Window areas are subtracted from individual opaque areas.		**South windows**	**0,845**	**6028**	**3100**
A	**West windows**	5	**15,54**	m²	which is displayed in the 'Windows' worksheet.		**West windows**	**0,884**	**1787**	**1648**
A	**Horizontal windows**	6	**0,00**	m²			**Horizontal windows**			
A	**Exterior door**	7	**0,00**	m²	*Please subtract area of door from respective building assembly*		**Exterior door**			
A	**External wall - Ambient**	8	**70,49**	m²	*Temperature zone "A" is ambient air*		**External wall - Ambient**	**0,117**	**16**	**109**
B	**External wall - Ground**	9	**0,00**	m²	*Temperature zone "B" is the ground*		**External wall - Ground**			
A	**Roof/Ceiling - Ambient**	10	**231,58**	m²			**Roof/Ceiling - Ambient**	**0,177**	**430**	**1105**
B	**Floor slab / Basement ceiling**	11	**97,79**	m²			**Floor slab / Basement ceiling**	**0,228**		
		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	**159,30**	m	*Units in m*		**Thermal bridges Ambient**	**0,021**
P	**Perimeter thermal bridges**	16	**35,65**	m	*Units in m; temperature zone "P" is perimeter (see 'Ground' worksheet)*		**Perimeter thermal bridges**	**0,000**
B	**Thermal bridges FS/BC**	17	**9,00**	m	*Units in m*		**Thermal bridges FS/BC**	**0,211**
I	**Building element towards neighbour**	18	**0,00**	m²	*No heat losses, only considered for the heating load calculation*		**Building element towards neighbour**	
Total thermal envelope			**474,27**	**m²**			**Average therm. envelope**	**0,298**

Go to building components list

107					x (		x		+		-		) -	0,0	=													
108					x (		x		+		-		) -	0,0	=													
109					x (		x		+		-		) -	0,0	=													
110					x (		x		+		-		) -	0,0	=													
Aend																												

Areas determination

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 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]
	Treated floor area	1	**163,00**	m²	*Treated floor area according to PHPP manual*				9 Months
A	**North windows**	2	**13,66**	m²	Results come from the 'Windows' worksheet.		**North windows**	**0,890**	**655**
A	**East windows**	3	**15,63**	m²	Window areas are subtracted from individual opaque areas.		**East windows**	**0,877**	**2011**
A	**South windows**	4	**29,57**	m²	which is displayed in the 'Windows' worksheet.		**South windows**	**0,845**	**6028**
A	**West windows**	5	**15,54**	m²			**West windows**	**0,884**	**1787**
A	**Horizontal windows**	6	**0,00**	m²			**Horizontal windows**		
A	**Exterior door**	7	**0,00**	m²	*Please subtract area of door from respective building assembly*		**Exterior door**		
A	**External wall - Ambient**	8	**70,49**	m²	*Temperature zone "A" is ambient air*		**External wall - Ambient**	**0,117**	**16**
B	**External wall - Ground**	9	**0,00**	m²	*Temperature zone "B" is the ground*		**External wall - Ground**		
A	**Roof/Ceiling - Ambient**	10	**231,58**	m²			**Roof/Ceiling - Ambient**	**0,177**	**430**
B	**Floor slab / Basement ceiling**	11	**97,79**	m²			**Floor slab / Basement ceiling**	**0,228**	
		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	**159,30**	m	*Units in m*		**Thermal bridges Ambient**	**0,021**	
P	**Perimeter thermal bridges**	16	**35,65**	m	*Units in m; temperature zone "P" is perimeter (see 'Ground' worksheet)*		**Perimeter thermal bridges**	**0,000**	
B	**Thermal bridges FS/BC**	17	**9,00**	m	*Units in m*		**Thermal bridges FS/BC**	**0,211**	
I	**Building element towards neighbour**	18	**0,00**	m²	*No heat losses, only considered for the heating load calculation*		**Building element towards neighbour**		
Total thermal envelope			**474,27**	**m²**			**Average therm. envelope**	**0,298**	

Go to building components list

Thermal bridge inputs

No.	Thermal bridge - denomination	Group No.	Assigned to group	Quantity	x (	Length [m]	-	Subtraction length [m]	)=	Length ℓ [m]	User determined Ψ-Wert [W/(mK)]	User determined $f_{Rsi=0,25}$ (optional)	or	Selection building system	Ψ-Value [W/(mK)]	f_{Rsi}-Requirement met?
1	**PorteFaux/MurExt**	**15**	Thermal bridges Ambient	**1**	x (	**51,72**	-	**7,66**	) =	44,06	**0,020**		or		**0,020**	
2	**PlancherEntree/MurExt**	**16**	Perimeter thermal bridges	**0**	x (	**12,20**	-		) =	0,00	**0,500**		or		**0,500**	
3	**AnglesExtSortants**	**15**	Thermal bridges Ambient	**4**	x (	**3,72**	-		) =	14,88	**-0,020**		or		**-0,020**	
4	**AnglesExtRentrants**	**15**	Thermal bridges Ambient	**2**	x (	**3,72**	-		) =	7,44	**0,050**		or		**0,050**	
5	**Auvent/MurExt**	**15**	Thermal bridges Ambient	**1**	x (	**51,72**	-		) =	51,72	**0,020**		or		**0,020**	
6	**Auvent/Pignons**	**15**	Thermal bridges Ambient	**1**	x (	**16,00**	-		) =	16,00	**0,050**		or		**0,050**	
7	**Auvent/Rampants**	**15**	Thermal bridges Ambient	**1**	x (	**25,20**	-		) =	25,20	**0,020**		or		**0,020**	
8	**RefendsR-1/PlancherBas**	**17**	Thermal bridges FS/BC	**1**	x (	**7,00**	-		) =	7,00	**0,100**		or		**0,100**	
9	**MursR-1/PlancherBas**	**16**	Perimeter thermal bridges	**1**	x (	**40,80**	-	**5,15**	) =	35,65	**0,000**		or		**0,000**	
10	**PiliersRefend/Plancherbas**	**17**	Thermal bridges FS/BC	**2**	x (	**1,00**	-		) =	2,00	**0,600**		or		**0,600**	
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			
33					x (		-		) =				or			
34					x (		-		) =				or			

Areas determination

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 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]
	Treated floor area	1	**163,00**	m²	*Treated floor area according to PHPP manual*				9 Months
A	**North windows**	2	**13,66**	m²			**North windows**	**0,890**	**655**
A	**East windows**	3	**15,63**	m²	Results come from the 'Windows' worksheet.		**East windows**	**0,877**	**2011**
A	**South windows**	4	**29,57**	m²	Window areas are subtracted from individual opaque areas.		**South windows**	**0,845**	**6028**
A	**West windows**	5	**15,54**	m²	which is displayed in the 'Windows' worksheet.		**West windows**	**0,884**	**1787**
A	**Horizontal windows**	6	**0,00**	m²			**Horizontal windows**		
A	**Exterior door**	7	**0,00**	m²	*Please subtract area of door from respective building assembly*		**Exterior door**		
A	**External wall - Ambient**	8	**70,49**	m²	*Temperature zone "A" is ambient air*		**External wall - Ambient**	**0,117**	**16**
B	**External wall - Ground**	9	**0,00**	m²	*Temperature zone "B" is the ground*		**External wall - Ground**		
A	**Roof/Ceiling - Ambient**	10	**231,58**	m²			**Roof/Ceiling - Ambient**	**0,177**	**430**
B	**Floor slab / Basement ceiling**	11	**97,79**	m²			**Floor slab / Basement ceiling**	**0,228**	
		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	**159,30**	m	*Units in m*		**Thermal bridges Ambient**	**0,021**	
P	**Perimeter thermal bridges**	16	**35,65**	m	*Units in m; temperature zone "P" is perimeter (see 'Ground' worksheet)*		**Perimeter thermal bridges**	**0,000**	
B	**Thermal bridges FS/BC**	17	**9,00**	m	*Units in m*		**Thermal bridges FS/BC**	**0,211**	
I	**Building element towards neighbour**	18	**0,00**	m²	*No heat losses, only considered for the heating load calculation*		**Building element towards neighbour**		
Total thermal envelope			**474,27**	**m²**			**Average therm. envelope**	**0,298**	

Go to building components list

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					
51					x (		-		) =							or					
52					x (		-		) =							or					
53					x (		-		) =							or					
54					x (		-		) =							or					
55					x (		-		) =							or					
56					x (		-		) =							or					
57					x (		-		) =							or					
58					x (		-		) =							or					
59					x (		-		) =							or					
60					x (		-		) =							or					
61					x (		-		) =							or					
62					x (		-		) =							or					
63					x (		-		) =							or					
64					x (		-		) =							or					
65					x (		-		) =							or					
66					x (		-		) =							or					
67					x (		-		) =							or					
68					x (		-		) =							or					
69					x (		-		) =							or					
70					x (		-		) =							or					
71					x (		-		) =							or					
72					x (		-		) =							or					

Areas determination

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 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]
	Treated floor area	1	**163,00**	m²	*Treated floor area according to PHPP manual*				9 Months
A	**North windows**	2	**13,66**	m²			**North windows**	**0,890**	**655**
A	**East windows**	3	**15,63**	m²	Results come from the 'Windows' worksheet.		**East windows**	**0,877**	**2011**
A	**South windows**	4	**29,57**	m²	Window areas are subtracted from individual opaque areas.		**South windows**	**0,845**	**6028**
A	**West windows**	5	**15,54**	m²	which is displayed in the 'Windows' worksheet.		**West windows**	**0,884**	**1787**
A	**Horizontal windows**	6	**0,00**	m²			**Horizontal windows**		
A	**Exterior door**	7	**0,00**	m²	*Please subtract area of door from respective building assembly*		**Exterior door**		
A	**External wall - Ambient**	8	**70,49**	m²	*Temperature zone "A" is ambient air*		**External wall - Ambient**	**0,117**	**16**
B	**External wall - Ground**	9	**0,00**	m²	*Temperature zone "B" is the ground*		**External wall - Ground**		
A	**Roof/Ceiling - Ambient**	10	**231,58**	m²			**Roof/Ceiling - Ambient**	**0,177**	**430**
B	**Floor slab / Basement ceiling**	11	**97,79**	m²			**Floor slab / Basement ceiling**	**0,228**	
		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	**159,30**	m	*Units in m*		**Thermal bridges Ambient**	**0,021**	
P	**Perimeter thermal bridges**	16	**35,65**	m	*Units in m; temperature zone "P" is perimeter (see 'Ground' worksheet)*		**Perimeter thermal bridges**	**0,000**	
B	**Thermal bridges FS/BC**	17	**9,00**	m	*Units in m*		**Thermal bridges FS/BC**	**0,211**	
I	**Building element towards neighbour**	18	**0,00**	m²	*No heat losses, only considered for the heating load calculation*		**Building element towards neighbour**		
Total thermal envelope			**474,27**	**m²**			**Average therm. envelope**	**0,298**	

Go to building components list

73					x (		-		) =								or				
74					x (		-		) =								or				
75					x (		-		) =								or				
76					x (		-		) =								or				
77					x (		-		) =								or				
78					x (		-		) =								or				
79					x (		-		) =								or				
80					x (		-		) =								or				
81					x (		-		) =								or				
82					x (		-		) =								or				
83					x (		-		) =								or				
84					x (		-		) =								or				
85					x (		-		) =								or				
86					x (		-		) =								or				
87					x (		-		) =								or				
88					x (		-		) =								or				
89					x (		-		) =								or				
90					x (		-		) =								or				
91					x (		-		) =								or				
92					x (		-		) =								or				
93					x (		-		) =								or				
94					x (		-		) =								or				
95					x (		-		) =								or				
96					x (		-		) =								or				
97					x (		-		) =								or				
98					x (		-		) =								or				
99					x (		-		) =								or				
100					x (		-		) =								or				
TBend																					

Heat losses through the ground

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 kWh/(m²a)

Building section 1

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

Climate data			
Avg indoor temp. winter	T_i	20,0	°C
Avg indoor temp. summer	T_i	25,0	°C
Avg ground surface temperature	$T_{g,ave}$	13,3	°C
Amplitude of $T_{g,ave}$	$T_{g,\wedge}$	7,6	°C
Phase shifting of $T_{e,m}$	τ	1,1	Months
Length of the heating period	n	5,9	Months
Heating degree hours - exterior	G_t	57,2	kKh/a

Building data							
Area of ground floor slab / basement ceilin	A	114,3	m²	U-value floor slab/basement ceiling	U_f	0,671	W/(m²K)
Perimeter length	P	35,7	m	TBs floor slab / basement ceiling	Ψ_B*l	1,90	W/K
Charact. dimension of floor slab	B'	6,41	m	U-value floor slab / basement ceiling i	U_f'	0,688	W/(m²K)
				Equivalent thickness floor	d_t	2,91	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 level	z	m	U-Value wall below ground	U_{wB}		W/(m²K)
x	**Unheated basement**						
	Height aboveground wall	h	2,70 m	U-Value wall above ground	U_W	0,360	W/(m²K)
	Basement wall height below ground level	z	1,97 m	U-Value wall below ground	U_{WB}	0,360	W/(m²K)
	Air change unheated basement	n	0,20 h^{-1}	U-Value basement floor slab	U_{fB}	1,000	W/(m²K)
	Air flow basement	V	264 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	εP		m²
	Height of crawl space wall	h	m	Wind velocity at 10 m height	v	4,0	m/s
	U-Value crawl space wall	U_W	W/(m²K)	Wind shield factor	f_W	0,05	-

Additional thermal bridge heat losses at perimeter						
				Steady-state fraction	$\Psi_{P,stat}$*l	6,100 W/K
Phase shift	β		Months	Harmonic fraction	$\Psi_{P,harm}$*l	6,100 W/K

Groundwater correction							
Depth of the groundwater table	z_w	3,0	m	Groundwater correction factor	G_w	1,03457249	-
Groundwater flow rate	q_w	0,05	m/d				

Interim results

Phase shift	β	1,10	Months	Steady-state heat flow	Φ_{stat}	351,5	W
Steady-state transmittance	L_S	52,27	W/K	Periodic heat flow	Φ_{harm}	125,7	W
Exterior periodic transmittance	L_{pe}	30,46	W/K	Heat losses during heating period	Q_{tot}	2059	kWh
Transmittance building	L_0	84,73	W/K				

Monthly average temperatures in the ground for monthly method (building assembly 1)

Month	1	2	3	4	5	6	7	8	9	10	11	12	Avg. value
Winter	13,6	13,1	13,4	14,3	15,6	17,0	18,1	18,6	18,3	17,4	16,1	14,7	15,9
Summer	15,5	15,0	15,3	16,2	17,5	18,9	20,0	20,5	20,3	19,3	18,0	16,6	17,8

Design ground temperature for 'Heating load' worksheet 13,1 — **For 'Cooling load' worksheet** 20,5

Reduction factor for 'Annual heating' worksheet 0,43

Total result (all building parts)

Phase shift	β	1,10	Months	Steady-state heat flow	Φ_{stat}	351,5	W
Steady-state transmittance	L_S	52,27	W/K	Periodic heat flow	Φ_{harm}	125,7	W
Exterior periodic transmittance	L_{pe}	30,46	W/K	Heat losses during heating period	Q_{tot}	2059	kWh
Transmittance building	L_0	84,73	W/K	Charact. dimension of floor slab	B'	6,41	m

Monthly Average temperatures in the ground for monthly method (all building assemblies)

Month	1	2	3	4	5	6	7	8	9	10	11	12	Avg. value
Winter	**13,6**	**13,1**	**13,4**	**14,3**	**15,6**	**17,0**	**18,1**	**18,6**	**18,3**	**17,4**	**16,1**	**14,7**	**15,9**
Summer	**15,5**	**15,0**	**15,3**	**16,2**	**17,5**	**18,9**	**20,0**	**20,5**	**20,3**	**19,3**	**18,0**	**16,6**	**17,8**

Design ground temperature for 'Heating load' worksheet 13,1 — **For 'Cooling load' worksheet** 20,5

Reduction factor for 'Annual heating' worksheet 0,43

Passive House Components

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 kWh/(m²a)

Go to: 'AREAS' | www.passivehouse.com/component-database
Thermal bridges (Psi-values) | Ventilation units
Glazing | Compact units
Window frame | Heat recovery DHW

Building assemblies (U-Values)

Recommended starting values for optimisation: U-values for walls and roofs | Floor slabs: 0,3 W/(m²K) | 0,45 W/(m²K)

		1			
ID	**Building system**	**Building assembly**	**Total thickness**	**U-Value**	**Interior insulation**
	Summary of the constructions calculated in 'U values' worksheet		m	W/(m²K)	-
01ud	**MurOB**	**MurOB**	**0,313**	**0,135**	**1**
02ud	**MurBetonEntree**	**MurBetonEntree**	**0,473**	**0,129**	**1**
03ud	**Auvent**	**Auvent**	**0,130**	**0,286**	**1**
04ud	**PorteFaux**	**PorteFaux**	**0,360**	**0,127**	**1**
05ud	**IsolantSousSol**	**IsolantSousSol**	**0,215**	**0,196**	**1**
06ud	**VR**	**VR**	**0,050**	**0,704**	**1**
07ud	**Rampant**	**Rampant**	**0,304**	**0,144**	**1**
08ud	**SolivesSousSol**	**SolivesSousSol**	**0,180**	**0,580**	**1**
09ud	**ToitureEntree**	**ToitureEntree**	**0,190**	**0,259**	**1**
10ud	**PlancherBetonEntree**	**PlancherBetonEntree**	**0,180**	**2,349**	**1**
11ud	**PlancherBasBois**	**PlancherBasBois**	**0,260**	**0,228**	**1**
12ud					
13ud					
14ud					
15ud					
16ud					
17ud					
18ud					
19ud					
20ud					
21ud					
22ud					
23ud					
24ud					
25ud					
26ud					
27ud					
28ud					
29ud					
30ud					
31ud					
32ud					
33ud					
34ud					
35ud					
36ud					
37ud					
38ud					
39ud					
40ud					
41ud					
42ud					
43ud					
44ud					
45ud					
46ud					
47ud					
48ud					
49ud					
50ud					
51ud					
52ud					

Building assemblies (U-Values)

Recommended starting values for optimisation: U-values for walls and roofs | Floor slabs: 0,3 W/(m²K) | 0,45 W/(m²K)

		1			
ID	**Building system**	**Building assembly**	**Total thickness**	**U-Value**	**Interior insulation**
	Summary of the constructions calculated in 'U values' worksheet		m	W/(m²K)	-
53ud					
54ud					
55ud					
56ud					
57ud					
58ud					
59ud					
60ud					
61ud					
62ud					
63ud					
64ud					
65ud					
66ud					
67ud					
68ud					
69ud					
70ud					
71ud					
72ud					
73ud					
74ud					
75ud					
76ud					
77ud					
78ud					
79ud					
80ud					
81ud					
82ud					
83ud	**PH Wall**	**PH Wall**	**0,500**	**0,100**	**0**
84ud	**PH Roof**	**PH Roof**	**0,500**	**0,100**	**0**
85ud	**PH Floor**	**PH Floor**	**0,500**	**0,150**	**0**
86ud	**PH Basement wall**	**PH Basement wall**	**0,500**	**0,150**	**0**
87ud			**0,000**	**0,000**	**0**
88ud			**0,000**	**0,000**	**0**
89ud			**0,000**	**0,000**	**0**
90ud			**0,000**	**0,000**	**0**
91ud			**0,000**	**0,000**	**0**
92ud			**0,000**	**0,000**	**0**
93ud	**Brickwork 24 years old**	**Brickwork 24 years old**	**0,275**	**1,440**	**0**
94ud	**Solid Brick 38-old**	**Solid Brick 38-old**	**0,415**	**1,640**	**0**
95ud	**Half timbered 18-old**	**Half timbered 18-old**	**0,210**	**1,800**	**0**
96ud	**Brickwork 30 years old**	**Brickwork 30 years old**	**0,335**	**1,230**	**0**
97ud	**Precast concrete-old**	**Precast concrete-old**	**0,275**	**1,300**	**0**
98ud	**Wooden joist ceiling-old**	**Wooden joist ceiling-old**	**0,284**	**0,990**	**0**
99ud	**Basement ceiling-old**	**Basement ceiling-old**	**0,242**	**1,230**	**0**

Glazing

Glazing

	Recommended glazing type to start planning: Triple thermally insulated glazing (Please consider the comfort criterion!)		
ID	Description	g-Value	U_g-Value
			W/(m²K)
01ud	**PH Glazing**	0,50	0,80
02ud	**Vitrage RT Ex**	0,70	2,00
03ud		0,00	0,00
04ud		0,00	0,00
05ud		0,00	0,00
06ud		0,00	0,00
07ud		0,00	0,00
08ud		0,00	0,00
09ud		0,00	0,00
10ud		0,00	0,00
11ud		0,00	0,00
12ud		0,00	0,00
13ud		0,00	0,00
14ud		0,00	0,00
15ud		0,00	0,00
16ud		0,00	0,00
17ud		0,00	0,00
18ud		0,00	0,00
19ud		0,00	0,00
20ud		0,00	0,00
21ud		0,00	0,00
22ud		0,00	0,00
23ud		0,00	0,00
24ud		0,00	0,00
25ud		0,00	0,00
26ud		0,00	0,00
27ud		0,00	0,00
28ud		0,00	0,00
29ud		0,00	0,00
30ud		0,00	0,00
31ud		0,00	0,00
32ud		0,00	0,00
33ud		0,00	0,00
34ud		0,00	0,00
35ud		0,00	0,00
36ud		0,00	0,00
37ud		0,00	0,00
38ud		0,00	0,00
39ud		0,00	0,00
40ud		0,00	0,00
41ud		0,00	0,00
42ud		0,00	0,00
43ud		0,00	0,00
44ud		0,00	0,00
45ud		0,00	0,00
46ud		0,00	0,00
47ud		0,00	0,00
48ud		0,00	0,00
49ud		0,00	0,00
50ud		0,00	0,00
51ud		0,00	0,00
52ud		0,00	0,00
53ud		0,00	0,00
54ud		0,00	0,00
55ud		0,00	0,00
56ud		0,00	0,00
57ud		0,00	0,00
58ud		0,00	0,00
59ud		0,00	0,00
60ud		0,00	0,00

Glazing			Glazing
	Recommended glazing type to start planning: Triple thermally insulated glazing (Please consider the comfort criterion!)		
ID	Description	g-Value	U_g-Value
			W/(m²K)
61ud		0,00	0,00
62ud		0,00	0,00
63ud		0,00	0,00
64ud		0,00	0,00
65ud		0,00	0,00
66ud		0,00	0,00
67ud		0,00	0,00
68ud		0,00	0,00
69ud		0,00	0,00
70ud		0,00	0,00
71ud		0,00	0,00
72ud		0,00	0,00
73ud		0,00	0,00
74ud		0,00	0,00
75ud		0,00	0,00
76ud		0,00	0,00
77ud		0,00	0,00
78ud		0,00	0,00
79ud		0,00	0,00
80ud		0,00	0,00
81ud		0,00	0,00
82ud		0,00	0,00
83ud		0,00	0,00
84ud		0,00	0,00
85ud		0,00	0,00
86ud		0,00	0,00
87ud		0,00	0,00
88ud		0,00	0,00
89ud		0,00	0,00
90ud		0,00	0,00
91ud		0,00	0,00
92ud	Single glazing	0,87	5,80
93ud	Double glazing 4/12mm air/4	0,77	2,90
94ud	Double glazing 4/16mm air/4	0,77	2,70
95ud	Double glazing 4/20mm air/4	0,77	2,80
96ud	Double glazing 4/25mm air/4	0,77	2,80
97ud	Double glazing 4/30mm air/4	0,77	2,80
98ud	Triple glazing 4/10 air/4/10 air/4	0,70	2,00
99ud	Double low-e 4/16Argon90%/4 Epsilon=0.1	0,64	1,30

Window frame

ID	Description	U_f-Value				Frame width				Glazing edge thermal bridge				Installation thermal bridge				Curtain wall facades:
		left	right	bottom	above	left	right	bottom	above	$\Psi_{Glazing\ edge}$ left	$\Psi_{Glazing\ edge}$ right	$\Psi_{Glazing\ edge}$ bottom	$\Psi_{Glazing\ edge}$ top	$\Psi_{Installation}$ left	$\Psi_{Installation}$ right	$\Psi_{Installation}$ bottom	$\Psi_{Installation}$ top	χ_{GC} -value Glass carrier
		W/(m²K)	W/(m²K)	W/(m²K)	W/(m²K)	m	m	m	m	W/(mK)	W/(mK)	W/(mK)	W/(mK)	W/(mK)	W/(mK)	W/(mK)	W/(mK)	W/K
01ud	PH-FRAMES: average thermal quality	0,75	0,75	0,75	0,75	0,140	0,140	0,140	0,140	0,040	0,040	0,040	0,040	0,040	0,040	0,040	0,040	0,000
02ud	ChassisBoisAlu	1,50	0,00	0,00	0,00	0,060	0,000	0,000	0,000	0,040	0,000	0,000	0,000	0,040	0,000	0,000	0,000	0,000
03ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
04ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
05ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
06ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
07ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
08ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
09ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
10ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
11ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
12ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
13ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
14ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
15ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
16ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
17ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
18ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
19ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
20ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
21ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
22ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
23ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
24ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
25ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
26ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
27ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
28ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
29ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
30ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
31ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
32ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
33ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
34ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
35ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
36ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
37ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
38ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
39ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
40ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
41ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
42ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
43ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
44ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
45ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
46ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
47ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
48ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
49ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
50ud		0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
51ud	PH-FRAMES: average thermal quality	0,75	0,75	0,75	0,75	0,140	0,140	0,140	0,140	0,040	0,040	0,040	0,040	0,040	0,040	0,040	0,040	0,000
52ud	PH-FRAMES: good thermal quality	0,72	0,72	0,72	0,72	0,140	0,140	0,140	0,140	0,035	0,035	0,035	0,035	0,040	0,040	0,040	0,040	0,000
53ud	EXISTING: timber 45 mm	2,50	2,50	2,50	2,50	0,140	0,140	0,140	0,140	0,050	0,050	0,050	0,050	0,040	0,040	0,040	0,040	0,000
54ud	EXISTING: timber 68 mm	1,60	1,60	1,60	1,60	0,140	0,140	0,140	0,140	0,040	0,040	0,040	0,040	0,040	0,040	0,040	0,040	0,000
55ud	EXISTING: synthetic, good	1,60	1,60	1,60	1,60	0,140	0,140	0,140	0,140	0,040	0,040	0,040	0,040	0,040	0,040	0,040	0,040	0,000
56ud	EXISTING: synthetic before 1998	1,80	1,80	1,80	1,80	0,140	0,140	0,140	0,140	0,050	0,050	0,050	0,050	0,040	0,040	0,040	0,040	0,000
57ud	EXISTING: synthetic, before 1972	2,20	2,20	2,20	2,20	0,140	0,140	0,140	0,140	0,050	0,050	0,050	0,050	0,040	0,040	0,040	0,040	0,000
58ud	EXISTING: metal, thermal break	2,40	2,40	2,40	2,40	0,140	0,140	0,140	0,140	0,040	0,040	0,040	0,040	0,040	0,040	0,040	0,040	0,000
59ud	EXISTING: metal, no thermal break	4,50	4,50	4,50	4,50	0,140	0,140	0,140	0,140	0,030	0,030	0,030	0,030	0,040	0,040	0,040	0,040	0,000
60ud	EXISTING: metal, no thermal break, paint finish	5,50	5,50	5,50	5,50	0,140	0,140	0,140	0,140	0,030	0,030	0,030	0,030	0,040	0,040	0,040	0,040	0,000

Window frame

		U_f-Value				Frame width				Glazing edge thermal bridge				Installation thermal bridge				Curtain wall facades:
ID	Description	left	right	bottom	above	left	right	bottom	above	$\Psi_{Glazing\ edge}$ left	$\Psi_{Glazing\ edge}$ right	$\Psi_{Glazing\ edge}$ bottom	$\Psi_{Glazing\ edge}$ top	$\Psi_{installation}$ left	$\Psi_{installation}$ right	$\Psi_{installation}$ bottom	$\Psi_{installation}$ top	χ_{GC} -value Glass carrier
		W/(m²K)	W/(m²K)	W/(m²K)	W/(m²K)	m	m	m	m	W/(mK)	W/(mK)	W/(mK)	W/(mK)	W/(mK)	W/(mK)	W/(mK)	W/(mK)	W/K
61ud	INSTALLATION SITUATION: timber, not insulated, masonry, not insulated	0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,088	0,000	0,000	0,000	0,000
62ud	INSTALLATION SITUATION: timber, not insulated, covered with 60 mm EIFS	0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,002	0,000	0,000	0,000	0,000
63ud	INSTALLATION SITUATION: PVC, not insulated, masonry, not insulated	0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,088	0,000	0,000	0,000	0,000
64ud	INSTALLATION SITUATION: PVC, not insulated,insulated with EIFS 6cm WDVS 6 cm	0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,002	0,000	0,000	0,000	0,000
65ud	INSTALLATION SITUATION: Metal, no thermal break, masonry wall, not insulated	0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,088	0,000	0,000	0,000	0,000
66ud	INSTALLATION SITUATION: insulated timber, EIFS, in insulation layer	0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,009	0,000	0,000	0,000	0,000
67ud	INSTALLATION SITUATION: insulated timber, EIFS, partially on masonry wall	0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,021	0,000	0,000	0,000	0,000
68ud	INSTALLATION SITUATION: insulated timber, EIFS, flush with the masonry wall on the outside	0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,076	0,000	0,000	0,000	0,000
69ud	INSTALLATION SITUATION: insulated timber, lightweight wall (optimal)	0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,009	0,000	0,000	0,000	0,000
70ud	INSTALLATION SITUATION: insulated timber, insulated concrete formwork (optimal)	0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,001	0,000	0,000	0,000	0,000
71ud	INSTALLATION SITUATION: insulated PVC, EIFS, insulation layer	0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,009	0,000	0,000	0,000	0,000
72ud	INSTALLATION SITUATION: insulated PVC, EIFS, partially on masonry wall	0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,021	0,000	0,000	0,000	0,000
73ud	INSTALLATION SITUATION: insulated PVC, EIFS, flush with the masonry wall on the outside	0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,076	0,000	0,000	0,000	0,000
74ud	INSTALLATION SITUATION: insulated PVC, lightweight wall (optimal)	0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,009	0,000	0,000	0,000	0,000
75ud	INSTALLATION SITUATION: insulated PVC, insulated concrete formwork (optimal)	0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,001	0,000	0,000	0,000	0,000
76ud	INSTALLATION SITUATION: insulated timber-aluminium, EIFS, insulation layer	0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,013	0,000	0,000	0,000	0,000
77ud	INSTALLATION SITUATION: insulated timber-aluminium, EIFS, partially on masonry wall	0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,023	0,000	0,000	0,000	0,000
78ud	INSTALLATION SITUATION: insulated timber-aluminium, lightweight wall (centre)	0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,013	0,000	0,000	0,000	0,000
79ud	INSTALLATION SITUATION: insulated timber-aluminium, insulated concrete formwork (optimal	0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,002	0,000	0,000	0,000	0,000
80ud	INSTALLATION SITUATION: insulated timber-aluminium, insulated concrete formwork (inside i	0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,013	0,000	0,000	0,000	0,000
81ud	INSTALLATION SITUATION: insulated timber-aluminium, short alum casing, EIFS, insulation la	0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,002	0,000	0,000	0,000	0,000
82ud	INSTALLATION SITUATION: insulated timber-aluminium, short alum casing, lightweight wall (c	0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,010	0,000	0,000	0,000	0,000
83ud	INSTALLATION SITUATION: insulated timber-aluminium, short alum casing, insulated concrete	0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,006	0,000	0,000	0,000	0,000
84ud	INSTALLATION SITUATION: insulated timber-aluminium, short alum casing, insulated concrete	0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,013	0,000	0,000	0,000	0,000
85ud	INSTALLATION SITUATION MULLION-TRANSOM: timber, outside, in front of the facade	0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,343	0,000	0,000	0,000	0,000
86ud	INSTALLATION SITUATION MULLION-TRANSOM: timber, flush with the facade on the outside	0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,036	0,000	0,000	0,000	0,000
87ud	INSTALLATION SITUATION MULLION-TRANSOM: timber, in the insulation layer	0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,034	0,000	0,000	0,000	0,000
88ud	INSTALLATION SITUATION MULLION-TRANSOM: timber, between insulation layer and wall	0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,059	0,000	0,000	0,000	0,000
89ud	INSTALLATION SITUATION MULLION-TRANSOM: timber, flush with the insulation layer on the	0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,397	0,000	0,000	0,000	0,000
90ud	INSTALLATION SITUATION MULLION-TRANSOM: steel, outside, in front of the facade	0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,666	0,000	0,000	0,000	0,000
91ud	INSTALLATION SITUATION MULLION-TRANSOM: steel, flush with the insulation layer on the ou	0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,047	0,000	0,000	0,000	0,000
92ud	INSTALLATION SITUATION MULLION-TRANSOM: steel, in the insulation layer	0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,044	0,000	0,000	0,000	0,000
93ud	INSTALLATION SITUATION MULLION-TRANSOM: steel, between insulation layer and wall	0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,062	0,000	0,000	0,000	0,000
94ud	INSTALLATION SITUATION MULLION-TRANSOM: steel, flush with the insulation layer on the in	0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,409	0,000	0,000	0,000	0,000
95ud	INSTALLATION SITUATION MULLION-TRANSOM: Alum, outside, in front of the facade	0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,747	0,000	0,000	0,000	0,000
96ud	INSTALLATION SITUATION MULLION-TRANSOM: Alum, flush with the insulation layer on the o	0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,056	0,000	0,000	0,000	0,000
97ud	INSTALLATION SITUATION MULLION-TRANSOM: Alum, in the insulation layer	0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,053	0,000	0,000	0,000	0,000
98ud	INSTALLATION SITUATION MULLION-TRANSOM: Alum, between insulation layer and wall	0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,070	0,000	0,000	0,000	0,000
99ud	INSTALLATION SITUATION MULLION-TRANSOM: Alum, flush with the insulation layer on the in	0,00	0,00	0,00	0,00	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,421	0,000	0,000	0,000	0,000

Ventilation units with heat recovery

Ventilation units with heat recovery

	Recommended specifications to start planning: Frost protection: Yes; Humidity recovery: Yes	75 %		0,45	Additional Device Data								
ID	Description	Effective heat recovery efficiency	Energy recovery value η_{ER}	Electric efficiency	Application range		External pressure per section	Fittings Dp_{Intern}	Frost protection necessary	Noise protection			Additional info
	User defined area	%	%	Wh/m³	m³/h	m³/h	Pa	Pa		35 dB(A)	Supply air dB(A)	Extract air dB(A)	
01ud			0%										
02ud			0%										
03ud													
04ud													
05ud													
06ud													
07ud													
08ud													
09ud													
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Ventilation units with heat recovery

Ventilation units with heat recovery

	Recommended specifications to start planning: Frost protection: Yes; Humidity recovery: Yes	75 %		0,45	Additional Device Data								
ID	Description	Effective heat recovery efficiency	Energy recovery value η_{ER}	Electric efficiency	Application range		External pressure per section	Fittings Dp_{intern}	Frost protection necessary	Noise protection			Additional info
	User defined area	%	%	Wh/m³	m³/h	m³/h	Pa	Pa		35 dB(A)	Supply air dB(A)	Extract air dB(A)	
61ud													
62ud													
63ud													
64ud													
65ud													
66ud													
67ud													
68ud													
69ud													
70ud													
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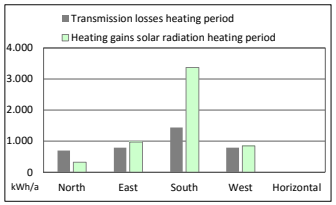
88ud													
89ud													
90ud													
91ud													
92ud													
93ud													
94ud													
95ud													
96ud													
97ud	**Default**	**75%**		**0,45**									
98ud	**Extract air system**	**0%**		**0,25**									
99ud	Compact unit selected in 'Compact' worksheet												

Windows

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 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	91	0,72	0,95	0,85	0,73	0,61	0,42	13,66	0,89	10,03	91	North	695	321
East	201	0,88	0,95	0,85	0,71	0,61	0,51	15,63	0,88	11,14	201	East	784	970
South	378	0,84	0,95	0,85	0,73	0,61	0,49	29,57	0,85	21,57	378	South	1429	3370
West	202	0,77	0,95	0,85	0,71	0,61	0,44	15,54	0,88	11,05	202	West	785	842
Horizontal	372	1,00	0,95	0,85	0,00	0,00	0,00	0,00	0,00	0,00	372	Horizontal	0	0
Total or average value for all windows.						0,61	0,47	74,40	0,87	53,79			3693	5502



Heating degree hours [kKh/a]: 57,2

Go to glazing list Go to window frames list

Qua n-tity	Description	Window rough openings: Deviation from north	Window rough openings: Angle of inclination from the horizontal	Window rough openings: Orien- tation	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: Perpen-dicular radiation	U-Value: Glazing	U-Value: Frames (avg.)	Ψ Glazing edge (Avg.)	Installation situation: left	right	bottom	top	Ψinstallation (Avg.)	Results: Window Area	Glazing area	Uw installed	Glazed fraction per window
		°	°		m	m		Sort: AS LIST	Sort: AS LIST	-	W/(m²K)	W/(m²K)	W/(mK)	W/(mK) or 1/0				W/(mK)	m²	m²	W/(m²K)	%
1	Win_536295_N	0	90	North	2,460	0,488	8-Wall_161399_N	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,79	0,026	0	0	1	1	0,040	1,2	0,72	1,01	60%
1	Win_536070_N	0	90	North	2,460	0,488	9-Wall_161577_N	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,79	0,026	0	0	1	1	0,040	1,2	0,72	1,01	60%
1	Win_536482_E	90	90	East	2,146	0,488	12-Wall_534934_E	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,79	0,026	0	0	1	1	0,040	1,0	0,62	1,01	60%
1	Win_312965_N	360	90	North	1,423	0,662	13-Wall_312786_N	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,78	0,026	0	0	1	1	0,040	0,9	0,61	0,94	65%
1	Win_312421_N	0	90	North	1,451	0,655	14-Wall_312383_N	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,78	0,026	0	0	1	1	0,040	1,0	0,62	0,94	65%
1	Win_538095_W	270	90	West	2,145	0,503	15-Wall_534926_W	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,79	0,026	0	0	1	1	0,040	1,1	0,65	1,00	61%
1	Win_313824_S	180	90	South	1,427	0,698	16-Wall_313691_S	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,78	0,026	0	0	1	1	0,040	1,0	0,66	0,93	66%
1	Win_314262_E	90	90	East	1,427	0,698	17-Wall_313865_E	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,78	0,026	0	0	1	1	0,040	1,0	0,66	0,93	66%
1	Win_313490_W	270	90	West	1,439	0,696	18-Wall_313427_W	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,78	0,026	0	0	1	1	0,040	1,0	0,66	0,93	66%
1	Win_313059_W	270	90	West	1,439	0,696	19-Wall_312998_W	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,78	0,026	0	0	1	1	0,040	1,0	0,66	0,93	66%
1	Win_313641_S	180	90	South	1,439	0,696	20-Wall_313517_S	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,78	0,026	0	0	1	1	0,040	1,0	0,66	0,93	66%
1	Win_314380_E	90	90	East	1,451	0,698	21-Wall_314198_E	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,78	0,026	0	0	1	1	0,040	1,0	0,67	0,93	66%
1	Win_312542_N	1,27898E-13	90	North	1,242	0,655	23-Wall_312507_N	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,78	0,026	0	0	1	1	0,040	0,8	0,52	0,94	64%
1	Win_312961_N	0	90	North	1,248	0,662	24-Wall_312701_N	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,78	0,026	0	0	1	1	0,040	0,8	0,53	0,94	64%
1	Win_313645_S	180	90	South	1,230	0,698	25-Wall_313591_S	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,77	0,026	0	0	1	1	0,040	0,9	0,56	0,93	65%
1	Win_314270_E	90	90	East	1,242	0,698	26-Wall_314031_E	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,77	0,026	0	0	1	1	0,040	0,9	0,56	0,93	65%
1	Win_313482_W	270	90	West	1,252	0,696	27-Wall_313282_W	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,77	0,026	0	0	1	1	0,040	0,9	0,57	0,93	65%
1	Win_313486_W	270	90	West	1,252	0,696	28-Wall_313355_W	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,77	0,026	0	0	1	1	0,040	0,9	0,57	0,93	65%
1	Win_313478_W	270	90	West	1,252	0,696	29-Wall_313201_W	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,77	0,026	0	0	1	1	0,040	0,9	0,57	0,93	65%
1	Win_314266_E	90	90	East	1,255	0,698	30-Wall_313949_E	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,77	0,026	0	0	1	1	0,040	0,9	0,57	0,93	65%
1	Win_313820_S	180	90	South	1,255	0,698	31-Wall_313770_S	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,77	0,026	0	0	1	1	0,040	0,9	0,57	0,93	65%
1	Win_312957_N	0	90	North	1,248	0,662	32-Wall_312880_N	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,78	0,026	0	0	1	1	0,040	0,8	0,53	0,94	64%
1	Win_314274_E	90	90	East	1,255	0,698	80-Wall_314117_E	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,77	0,026	0	0	1	1	0,040	0,9	0,57	0,93	65%
1	Win_315202_E	90	90	East	1,267	2,370	80-Wall_314117_E	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,74	0,026	1	0	1	0	0,040	3,0	2,41	0,80	80%
1	Win_312662_N	2,27374E-13	90	North	1,242	0,655	81-Wall_312587_N	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,78	0,026	0	0	1	1	0,040	0,8	0,52	0,94	64%
1	Win_313665_S	180	90	South	1,230	0,698	82-Wall_311667_S	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,77	0,026	0	0	1	1	0,040	0,9	0,56	0,93	65%
1	Win_313669_S	180	90	South	1,267	0,698	82-Wall_311667_S	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,77	0,026	0	0	1	1	0,040	0,9	0,58	0,93	65%
1	Win_313673_S	180	90	South	1,230	0,698	83-Wall_311802_S	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,77	0,026	0	0	1	1	0,040	0,9	0,56	0,93	65%

Heating degree hours [kKh/a] 57,2

Quan-tity	Description	Deviation from north	Angle of inclination from the horizontal	Orien- tation	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: Perpen-dicular 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		Sort: AS LIST	Sort: AS LIST	-	W/(m²K)	W/(m²K)	W/(mK)	W/(mK) or 1/0				W/(mK)	m²	m²	W/(m²K)	%
1	Win_313677_S	180	90	South	1,267	0,698	83-Wall_311802_S	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,77	0,026	0	0	1	1	0,040	0,9	0,58	0,93	65%
1	Win_313657_S	180	90	South	1,230	0,698	84-Wall_311647_S	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,77	0,026	0	0	1	1	0,040	0,9	0,56	0,93	65%
1	Win_313661_S	180	90	South	1,279	0,698	84-Wall_311647_S	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,77	0,026	0	0	1	1	0,040	0,9	0,58	0,93	65%
1	Win_315400_E	90	90	East	1,242	1,110	85-Wall_315282_E	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,76	0,026	0	0	1	0	0,040	1,4	1,00	0,82	73%
1	Win_315069_S	180	90	South	1,250	1,110	86-Wall_315022_S	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,76	0,026	0	1	1	0	0,040	1,4	1,01	0,85	73%
1	Win_314981_S	180	90	South	1,267	1,110	87-Wall_314928_S	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,76	0,026	0	0	1	0	0,040	1,4	1,03	0,82	73%
1	Win_314628_S	180	90	South	1,267	1,110	88-Wall_314591_S	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,76	0,026	0	0	1	0	0,040	1,4	1,03	0,82	73%
1	Win_314466_S	180	90	South	1,267	1,110	89-Wall_314429_S	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,76	0,026	1	0	1	0	0,040	1,4	1,03	0,85	73%
1	Win_315643_W	270	90	West	1,267	1,110	90-Wall_315626_W	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,76	0,026	0	0	1	0	0,040	1,4	1,03	0,82	73%
1	Win_313163_W	270	90	West	1,238	0,696	91-Wall_313130_W	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,77	0,026	0	0	1	1	0,040	0,9	0,56	0,93	65%
1	Win_313167_W	270	90	West	1,209	0,696	91-Wall_313130_W	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,77	0,026	0	0	1	1	0,040	0,8	0,54	0,93	65%
1	Win_313171_W	270	90	West	1,292	0,696	91-Wall_313130_W	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,77	0,026	0	0	1	1	0,040	0,9	0,59	0,93	65%
1	Win_314368_E	90	90	East	1,230	0,698	92-Wall_314329_E	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,77	0,026	0	0	1	1	0,040	0,9	0,56	0,93	65%
1	Win_314372_E	90	90	East	1,267	0,698	92-Wall_314329_E	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,77	0,026	0	0	1	1	0,040	0,9	0,58	0,93	65%
1	Win_314376_E	90	90	East	1,255	0,698	92-Wall_314329_E	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,77	0,026	0	0	1	1	0,040	0,9	0,57	0,93	65%
1	Win_313649_S	180	90	South	1,230	0,698	93-Wall_311560_S	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,77	0,026	0	0	1	1	0,040	0,9	0,56	0,93	65%
1	Win_313653_S	180	90	South	1,279	0,698	93-Wall_311560_S	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,77	0,026	0	0	1	1	0,040	0,9	0,58	0,93	65%
1	Win_315073_S	180	90	South	1,280	1,270	93-Wall_311560_S	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,76	0,026	1	0	0	1	0,040	1,6	1,22	0,84	75%
1	Win_314545_S	180	90	South	1,220	2,350	94-Wall_314508_S	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,74	0,026	0	0	1	0	0,040	2,9	2,28	0,77	80%
1	Win_314707_S	180	90	South	1,233	2,350	95-Wall_314670_S	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,74	0,026	0	0	1	0	0,040	2,9	2,31	0,77	80%
1	Win_315558_W	270	90	West	1,237	2,346	96-Wall_315497_W	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,74	0,026	0	1	1	1	0,040	2,9	2,32	0,82	80%
1	Win_314977_S	180	90	South	1,229	2,370	97-Wall_314821_S	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,74	0,026	0	0	1	0	0,040	2,9	2,32	0,77	80%
1	Win_315480_W	270	90	West	1,249	2,350	98-Wall_315454_W	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,74	0,026	1	0	1	1	0,040	2,9	2,35	0,82	80%
1	Win_314790_S	180	90	South	1,254	2,350	99-Wall_314753_S	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,74	0,026	0	0	1	0	0,040	2,9	2,36	0,77	80%
1	Win_315278_E	90	90	East	1,250	2,370	100-Wall_315269_E	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,74	0,026	0	1	1	0	0,040	3,0	2,37	0,81	80%
1	PorteEntree	0	90	North	2,340	2,600	101-MurPorteEntree	0422gl03-Interpane - iplus 3 LS und LST (4/16/:4/16/:4 Ar 90%)	0076wi03-pro Passivhausfenster - smartwin - SuperSp. Tri-Seal	0,61	0,69	0,75	0,026	1	1	1	1	0,040	6,1	5,26	0,80	87%

Heating degree hours [kKh/ 57,2

					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		Sort: AS LIST	Sort: AS LIST	-	$W/(m^2K)$	$W/(m^2K)$	W/(mK)	W/(mK) or 1/0				W/(mK)	m^2	m^2	$W/(m^2K)$	%

Heating degree hours [kKh/ **57,2**

					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		Sort: AS LIST	Sort: AS LIST	-	W/(m²K)	W/(m²K)	W/(mK)	W/(mK) or 1/0				W/(mK)	m²	m²	W/(m²K)	%

Calculation of shading coefficients

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 kWh/(m²a)

Latitude: 45,59 °

Orientation	Glazing area [m²]	Reduction factor winter r_v	Reduction factor cooling $r_{v,1}$	Reduction factor cooling load $r_{v,2}$	Solar load [kWh/(m²$_{glazing}$a)]
North	10,03	72%	37%	27%	63
East	11,14	88%	47%	33%	174
South	21,57	84%	29%	20%	144
West	11,05	77%	39%	28%	149
Horizontal	0,00	100%	100%	100%	0

								Horizon		Lateral reveal		Reveal / Overhang						Reduction factors for shading in winter				Reduction factors for shading in summer				
Quan-tity	Description	Deviation from North	Angle of inclination from the horizontal	Orientation	Glazing width	Glazing height	Glazing area	Height of the shading object	Horizontal distance	Window reveal depth	Distance from glazing edge to reveal	Overhang depth	Distance from upper glazing edge to overhang	Additional reduction factor winter shading	Additional reduction factor summer shading	Reduction factor z for temporary sun protection	Regulated / transparent	Horizon	Reveal	Overhang	Total for heating case	Horizon	Reveal	Overhang	Total for cooling case	Total for cooling load
		[Degree]	[Degree]		w_G [m]	h_G [m]	A_G [m²]	h_{Hori} [m]	d_{Hori} [m]	o_{Reveal} [m]	d_{Reveal} [m]	o_{over} [m]	d_{over} [m]	$r_{other,w}$ [%]	$r_{other,s}$ [%]	z [%]		r_H [%]	r_R [%]	r_O [%]	r_S [%]	r_H [%]	r_R [%]	r_O [%]	$r_{S,1}$ [%]	$r_{S,2}$ [%]
1	Win_536295_N	0	90	North	2,29	0,32	0,7			0,00	0,050	0,29	0,05			29%			100%	70%	70%		100%	70%	35%	25%
1	Win_536070_N	0	90	North	2,29	0,32	0,7			0,00	0,050	0,29	0,05			29%			100%	70%	70%		100%	70%	35%	25%
1	Win_536482_E	90	90	East	1,97	0,32	0,6	0,47	0,67	2,06	1,275	0,02	0,05			29%		55%	69%	97%	37%	63%	88%	99%	28%	20%
1	Win_312965_N	360	90	North	1,25	0,49	0,6	0,00	0,15	0,01	4,000	0,02	0,05			29%		99%	100%	98%	97%	99%	100%	100%	49%	35%
1	Win_312421_N	0	90	North	1,28	0,48	0,6	0,83	1,12	0,10	4,000	0,02	0,05			29%		59%	99%	98%	58%	63%	99%	100%	31%	22%
1	Win_538095_W	270	90	West	1,97	0,33	0,7	0,48	0,74	2,06	1,275	0,02	0,05			29%		58%	69%	97%	39%	66%	88%	99%	29%	20%
1	Win_313824_S	180	90	South	1,25	0,53	0,7	0,02	0,15	0,02	0,050	0,02	0,05			29%		97%	99%	99%	95%	96%	99%	99%	47%	34%
1	Win_314262_E	90	90	East	1,25	0,53	0,7	0,02	0,15	0,02	4,447	0,02	0,05			29%		96%	100%	98%	94%	96%	100%	100%	48%	34%
1	Win_313490_W	270	90	West	1,27	0,52	0,7	0,00	0,15	0,03	0,050	0,20	0,05			29%		100%	98%	83%	81%	100%	99%	86%	43%	30%
1	Win_313059_W	270	90	West	1,27	0,52	0,7	0,00	0,15	0,03	4,465	0,20	0,05			29%		100%	100%	83%	83%	100%	100%	86%	43%	31%
1	Win_313641_S	180	90	South	1,27	0,52	0,7	0,02	0,15	0,03	6,968	0,02	0,05			29%		97%	100%	99%	96%	96%	100%	99%	48%	34%
1	Win_314380_E	90	90	East	1,28	0,53	0,7	0,02	0,15	0,03	0,050	0,02	0,05			29%		96%	98%	98%	92%	96%	99%	100%	48%	34%
1	Win_312542_N	0	90	North	1,07	0,48	0,5	0,83	1,12	0,10	1,366	0,02	0,05			29%		59%	98%	98%	57%	63%	98%	100%	31%	22%
1	Win_312961_N	0	90	North	1,08	0,49	0,5	0,00	0,15	0,09	1,363	0,02	0,05			29%		99%	99%	98%	95%	99%	99%	100%	49%	35%
1	Win_313645_S	180	90	South	1,06	0,53	0,6	0,02	0,16	0,03	7,045	0,02	0,05			29%		97%	100%	99%	96%	96%	100%	99%	48%	34%
1	Win_314270_E	90	90	East	1,07	0,53	0,6	0,02	0,15	0,02	4,564	0,02	0,05			29%		96%	100%	98%	94%	96%	100%	100%	48%	34%
1	Win_313482_W	270	90	West	1,08	0,52	0,6	0,00	0,15	0,03	4,549	0,02	0,05			29%		100%	100%	98%	97%	100%	100%	100%	50%	35%
1	Win_313486_W	270	90	West	1,08	0,52	0,6	0,00	0,15	0,03	4,538	0,02	0,05			29%		100%	100%	98%	97%	100%	100%	100%	50%	35%
1	Win_313478_W	270	90	West	1,08	0,52	0,6	0,00	0,15	0,03	4,559	0,20	0,05			29%		100%	100%	83%	83%	100%	100%	86%	43%	31%
1	Win_314266_E	90	90	East	1,08	0,53	0,6	0,02	0,15	0,02	4,583	0,02	0,05			29%		96%	100%	98%	94%	96%	100%	100%	48%	34%
1	Win_313820_S	180	90	South	1,08	0,53	0,6	0,02	0,15	0,03	7,058	0,02	0,05			29%		97%	100%	99%	96%	96%	100%	99%	48%	34%
1	Win_312957_N	0	90	North	1,08	0,49	0,5	0,00	0,15	0,09	1,370	0,02	0,05			29%		99%	99%	98%	95%	99%	99%	100%	49%	35%
1	Win_314274_E	90	90	East	1,08	0,53	0,6	0,02	0,15	0,02	4,533	0,02	0,05			29%		96%	100%	98%	94%	96%	100%	100%	48%	34%
1	Win_315202_E	90	90	East	1,09	2,20	2,4	0,00	0,19	0,19	1,273	0,19	0,05			29%		100%	96%	95%	91%	100%	98%	99%	49%	35%
1	Win_312662_N	0	90	North	1,07	0,48	0,5	0,83	1,12	0,10	1,349	0,02	0,05			29%		59%	98%	98%	57%	63%	98%	100%	31%	22%
1	Win_313665_S	180	90	South	1,06	0,53	0,6	0,02	0,15	0,03	7,070	0,02	0,05			29%		97%	100%	99%	96%	96%	100%	99%	48%	34%
1	Win_313669_S	180	90	South	1,09	0,53	0,6	0,02	0,15	0,03	7,052	0,02	0,05			29%		97%	100%	99%	96%	96%	100%	99%	48%	34%
1	Win_313673_S	180	90	South	1,06	0,53	0,6	0,02	0,15	0,03	7,095	0,02	0,05			29%		97%	100%	99%	96%	96%	100%	99%	48%	34%
1	Win_313677_S	180	90	South	1,09	0,53	0,6	0,02	0,15	0,03	7,052	0,02	0,05			29%		97%	100%	99%	96%	96%	100%	99%	48%	34%
1	Win_313657_S	180	90	South	1,06	0,53	0,6	0,02	0,15	0,03	7,095	0,02	0,05			29%		97%	100%	99%	96%	96%	100%	99%	48%	34%
1	Win_313661_S	180	90	South	1,11	0,53	0,6	0,02	0,15	0,03	7,070	0,02	0,05			29%		97%	100%	99%	96%	96%	100%	99%	48%	34%
1	Win_315400_E	90	90	East	1,07	0,94	1,0	0,02	0,19	0,19	1,284	0,24	0,05			29%		98%	96%	88%	82%	98%	98%	92%	44%	32%
1	Win_315069_S	180	90	South	1,08	0,94	1,0			0,19	4,405	1,13	0,05			29%			99%	69%	68%		99%	24%	12%	8%
1	Win_314981_S	180	90	South	1,09	0,94	1,0			0,20	4,416	1,13	0,05			29%			99%	69%	68%		99%	24%	12%	8%
1	Win_314628_S	180	90	South	1,09	0,94	1,0			0,19	4,399	1,13	0,05			29%			99%	69%	68%		99%	24%	12%	8%
1	Win_314466_S	180	90	South	1,09	0,94	1,0			0,20	4,396	1,12	0,05			29%			99%	69%	68%		99%	24%	12%	9%
1	Win_315643_W	270	90	West	1,09	0,94	1,0			0,19	1,272	1,15	0,05			29%			96%	55%	53%		98%	49%	24%	17%
1	Win_313163_W	270	90	West	1,07	0,52	0,6	0,00	0,15	0,03	4,566	0,03	0,05			29%		100%	100%	98%	97%	100%	100%	100%	50%	35%
1	Win_313167_W	270	90	West	1,04	0,52	0,5	0,00	0,15	0,03	4,606	0,03	0,05			29%		100%	100%	98%	97%	100%	100%	100%	50%	35%
1	Win_313171_W	270	90	West	1,12	0,52	0,6	0,00	0,15	0,03	4,564	0,03	0,05			29%		100%	100%	98%	97%	100%	100%	100%	50%	35%
1	Win_314368_E	90	90	East	1,06	0,53	0,6	0,02	0,15	0,02	4,545	0,03	0,05			29%		96%	100%	98%	94%	96%	100%	100%	48%	34%
1	Win_314372_E	90	90	East	1,09	0,53	0,6	0,02	0,15	0,02	4,542	0,03	0,05			29%		96%	100%	98%	94%	96%	100%	100%	48%	34%
1	Win_314376_E	90	90	East	1,08	0,53	0,6	0,02	0,15	0,02	4,533	0,03	0,05			29%		96%	100%	98%	94%	96%	100%	100%	48%	34%
1	Win_313649_S	180	90	South	1,06	0,53	0,6	0,02	0,15	0,03	7,095	0,02	0,05			29%		97%	100%	99%	96%	96%	100%	99%	48%	34%
1	Win_313653_S	180	90	South	1,11	0,53	0,6	0,02	0,15	0,03	7,070	0,02	0,05			29%		97%	100%	99%	96%	96%	100%	99%	48%	34%
1	Win_315073_S	180	90	South	1,11	1,10	1,2			0,20	4,390	1,13	0,05			29%			99%	72%	72%		99%	26%	13%	9%
1	Win_314545_S	180	90	South	1,05	2,18	2,3			0,19	4,424	1,13	0,05			29%			99%	84%	83%		99%	47%	23%	17%
1	Win_314707_S	180	90	South	1,06	2,18	2,3			0,19	4,415	1,12	0,05			29%			99%	84%	84%		99%	48%	24%	17%
1	Win_315558_W	270	90	West	1,06	2,17	2,3			0,19	1,287	1,15	0,05			29%			96%	75%	72%		98%	74%	37%	26%
1	Win_314977_S	180	90	South	1,06	2,20	2,3			0,19	4,416	1,12	0,05			29%			99%	84%	84%		99%	48%	24%	17%
1	Win_315480_W	270	90	West	1,08	2,18	2,3			0,11	0,657	1,15	0,05			29%			96%	75%	73%		99%	74%	37%	26%
1	Win_314790_S	180	90	South	1,08	2,18	2,4			0,20	4,418	1,13	0,05			29%			99%	84%	83%		99%	47%	23%	17%
1	Win_315278_E	90	90	East	1,08	2,20	2,4	0,02	0,19	0,19	1,280	0,24	0,05			29%		99%	96%	94%	89%	99%	98%	98%	48%	34%
1	PorteEntree	0	90	North	2,17	2,43	5,3			0,80	0,060	0,80	0,05			29%			82%	84%	69%		83%	88%	37%	26%

Quan-tity	Description	Deviation from North	Angle of inclination from the horizontal	Orientation	Glazing width	Glazing height	Glazing area	Height of the shading object	Horizontal distance	Window reveal depth	Distance from glazing edge to reveal	Overhang depth	Distance from upper glazing edge to overhang	Additional reduction factor winter shading	Additional reduction factor summer shading	Reduction factor z for temporary sun protection	Regulated / transparent	Horizon	Reveal	Overhang	**Total for heating case**	Horizon	Reveal	Overhang	**Total for cooling case**	**Total for cooling load**
		[Degree]	[Degree]		w_G [m]	h_G [m]	A_G [m²]	h_{Hori} [m]	d_{Hori} [m]	o_{Reveal} [m]	d_{Reveal} [m]	o_{over} [m]	d_{over} [m]	$r_{other,w}$ [%]	$r_{other,s}$ [%]	**z [%]**		r_H [%]	r_R [%]	r_O [%]	r_S [%]	r_H [%]	r_R [%]	r_O [%]	$r_{S,1}$ [%]	$r_{S,2}$ [%]

Quan-tity	Description	Deviation from North	Angle of inclination from the horizontal	Orientation	Glazing width	Glazing height	Glazing area	Height of the shading object	Horizontal distance	Window reveal depth	Distance from glazing edge to reveal	Overhang depth	Distance from upper glazing edge to overhang	Additional reduction factor winter shading	Additional reduction factor summer shading	Reduction factor z for temporary sun protection	Regulated / transparent	Horizon	Reveal	Overhang	**Total for heating case**	Horizon	Reveal	Overhang	**Total for cooling case**	**Total for cooling load**
		[Degree]	[Degree]		w_G [m]	h_G [m]	A_G [m^2]	h_{Hori} [m]	d_{Hori} [m]	o_{Reveal} [m]	d_{Reveal} [m]	o_{over} [m]	d_{over} [m]	$r_{other,w}$ [%]	$r_{other,s}$ [%]	**z [%]**		r_H [%]	r_R [%]	r_O [%]	r_S [%]	r_H [%]	r_R [%]	r_O [%]	$r_{S,1}$ [%]	$r_{S,2}$ [%]

Ventilation data

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 kWh/(m²a)

Treated floor area A_{TFA}	m²	163		*('Areas' worksheet)*
Room height h	m	3,34	3,34	
Volume of ventilated space (A_{TFA}*h) : V_V	m³	544		*(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	1,00	1,00	543	m³	1,14	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	0,070	0,175

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 [-]	Energy recovery [-]	Specific power input Wh/m³	Heat recovery efficiency SHX [-]
x	Standard design	*('Ventilation' worksheet, see below)*	133	0,24	0,00	81,3%	73,0%	0,26	0,0%
	Multiple ventilation units, non-res	*('Addl vent' worksheet)*							

Cooling degree		Efficiency SHX	
		η^*_{SHX}	0%

Average interior humidity during winter operation

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
100%	100%	100%	100%	100%	-	-	-	100%	100%	100%	100%

Standard data input for balanced ventilation

Dimensioning of ventilation system with only one ventilation unit

Occupancy	m²/P	16				
Number of occupants	P	10,0				
Supply air per person	m³/(P*h)	30				
Supply air requirement	m³/h	300		Bathroom		
Extract air rooms		Kitchen	Bathroom	(shower only)	WC	Extraction
Quantity						1
Extract air requirement per room	m³/h	60	40	20	20	300
Total extract air requirement	m³/h	300				

Design air flow rate should cover at least the extract air demand according to DIN 1946!

Design air flow rate (maximum) m³/h **173** Recommended: 300 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		1,00	173	0,32
Standard	**24,0**	**0,77**	133	0,24
Grundlüftung		**0,54**	93	0,17
Minimum		**0,40**	69	0,13
	Average value	0,77	Average air flow rate (m³/h) **133**	Average air change rate (1/h) **0,24**

Selection of ventilation unit with heat recovery

Location of ventilation unit: **2-Outside of thermal envelope**

	Go to ventilation units list Sortierung: WIE LISTE	Heat recovery efficiency Unit η_{WRG}	Energy recovery η_{ERV}	Specific efficiency [Wh/m³]	Application [m³/h]	Frost power input
Ventilation unit selection	**0304vs03-PAUL - novus F 300**	**0,84**	**0,73**	**0,26**	**121 - 231**	**yes**

Conductivity supply air duct	Y	W/(mK)	**0,361**	Implementation of frost protection	**2-Elec.**
Length of supply air duct		m	**2,5**	Limit temperature [°C]	**0**
Conductivity extract air duct	Y	W/(mK)	**0,361**	Useful energy [kWh/a]	35
Length of extract air duct		m	**2,5**		
Temperature of mechanical services room		°C	**10,0**	Room temperature (°C)	**20**
(Enter only if the central unit is outside of the thermal envelope)				Avg. ambient temp. heat. period (°C)	**7,9**
				Avg. ground temp (°C)	**13,3**

Effective heat recovery efficiency $\eta_{HR,eff}$ **81,3%**

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

Nominal width	**125**	mm
Insulation thic	**50**	mm
Reflective coating?		Yes
	x	No
Thermal conductivity	**0,040**	W/(mK)
Nominal air flow rate	133	m³/h
Δϑ	10	K
Exterior duct diameter	0,125	m
Exterior diameter	0,225	m
α–Interior	14,11	W/(m²K)
α-Surface	5,65	W/(m²K)
Ψ–value	**0,361**	**W/(mK)**
Surface temperature difference	0,905	K

Secondary calculation
Ψ-value extract or exhaust air duct

Nominal width:	**125**	mm
Insulation thickness	**50**	mm
Reflective coating?		yes
	x	no
Thermal conductivity	**0,040**	W/(mK)
Nominal air flow rate	133	m³/h
Δϑ	10	K
Exterior duct diameter	0,125	m
Exterior diameter	0,225	m
α–Interior	14,11	W/(m²K)
α-Surface	5,65	W/(m²K)
Ψ–value	**0,361**	**W/(mK)**
Surface temperature difference	0,905	K

Extended input for balanced ventilation (at the moment this worksheet is inactive. Calculation takes place in the 'Ventilation' worksheet.)

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 kWh/(m²a)

Planning ventilation systems with multiple ventilation units

Ventilation unit / Heat recovery efficiency design			
In Ventilation sheet (standard design)		x	*('Ventilation' worksheet)*
In 'Addl vent worksheet (this worksheet)		0,0	*(Addl vent)*
Treated floor area A_{TFA}	m²	163	*('Areas' worksheet)*
Room height h	m	3,34	*(Worksheet 'Annual heating')*
Room air volume for ventilation (A_{TFA}*h) = V_V	m³	544	*(Worksheet 'Annual heating')*
Number of occupants	P	10,0	*('Ventilation' worksheet)*
Room temperature	°C	20	*(Worksheet 'Annual heating')*
Average external temp. heating period	°C	7,9	*('Ventilation' worksheet)*
Average ground temp.	°C	13,3	*('Ground' worksheet)*
Length of the heating period	d/a	180	*('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	Air ch.rt. 1/h	Effective heat recovery efficiency	Energy recovery efficiency	Spec. input power	Heat recov. efficiency SHX
1						---				
2						---				
3						---				
4						---				
5						---				
6						---				
7						---				
8						---				
9						---				
10						---				
Result for overall vent. syst.										

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													0	100%	100%								
2													0	100%	100%								
3													0	100%	100%								
4													0	100%	100%								
5													0	100%	100%								
6													0	100%	100%								
7													0	100%	100%								
8													0	100%	100%								
9													0	100%	100%								
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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

Ventilation unit no.	Quantity [-]	Description of ventilation units	Selection of type of ventilation unit	Design vol. flow per unit m³/h	Application range for volume flow rate from m³/h	to m³/h	Electrical efficiency Pa	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} degree	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 V_{SUP} kWh/a
			Change sorting type																				
1																					**2-Elec.**		0
2																					**2-Elec.**		0
3																					**2-Elec.**		0
4																					**2-Elec.**		0
5																					**2-Elec.**		0
6																					**2-Elec.**		0
7																					**2-Elec.**		0
8																					**2-Elec.**		0
9																					**2-Elec.**		0
10																					**2-Elec.**		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: (only enter when at least one unit is installed outside of the thermal envelope)

Quantity	Round duct ins. diameter mm	Rectangular duct Width mm	Height mm	Insulation thickness mm	Thermal conductivity W/(m K)	Reflective insulation duct (x)	Duct transmittance W/(m K)	Length of supply air duct m	Outdoor or supply air duct (1)	Exhaust or 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
												0										
												0										
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Specific energy for heating (annual method)

EnerPHit with PHPP Version 9.3

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 kWh/(m²a)

Interior temperature: 20,0 °C
Building type:
Treated floor area A_{TFA}: 163,0 m²

Building assembly	Temperature zone	Area m²		U-Value W/(m²K)		Temp. factor f_t		G_t kKh/a		kWh/a	Per m² of treated floor area
External wall - Ambient	A	70,5	*	0,117	*	1,00	*	57,2	=	472	2,90
External wall - Ground	B		*		*	0,43	*		=		
Roof/Ceiling - Ambient	A	231,6	*	0,177	*	1,00	*	57,2	=	2344	14,38
Floor slab / Basement ceiling	B	97,8	*	0,228	*	0,43	*	57,2	=	543	3,33
	A		*		*	1,00	*		=		
	A		*		*	1,00	*		=		
	X		*		*	0,75	*		=		
Windows	A	74,4	*	0,868	*	1,00	*	57,2	=	3693	22,66
Exterior door	A		*		*	1,00	*		=		
Exterior TB (length/m)	A	159,3	*	0,021	*	1,00	*	57,2	=	188	1,16
Perimeter TB (length/m)	P	35,7	*	0,000	*	0,43	*	57,2	=	0	0,00
Ground TB (length/m)	B	9,0	*	0,211	*	0,43	*	57,2	=	46	0,28
Total of all building envelope areas		474,3									kWh/(m²a)
Transmission heat losses Q_T									Total	7286	44,7

			A_{TFA} m²		Clear room height m		m³		
Ventilation system:	Effective air volume, V_V		163,0	*	3,34	=	544,4		
Effective heat recovery efficiency	η_{eff}	81%							
Efficiency of subsoil heat exchanger									
Heat recovery efficiency of SHX	η_{SHX}	0%							

	$n_{V,system}$ 1/h		η_{HR}		$n_{V,Res}$ 1/h		1/h		
Energetically effective air changes nV	0,244	* (1 -	0,81	) +	0,070	=	0,116		

	V_V m³		n_V 1/h		c_{Air} Wh/(m³K)		G_t kKh/a		kWh/a	kWh/(m²a)
Ventilation heat losses Q_V	544,4	*	0,116	*	0,33	*	57,2	=	1187	7,3

	Q_T kWh/a		Q_V kWh/a		Reduction factor night/weekend Saving		kWh/a	kWh/(m²a)
Total heat losses Q_L	(7286	+	1187	)	1,0	=	8473	**52,0**

Orientation of the area	Reduction factor See 'Windows' sheet		g-Value (perp. radiation)		Area m²		Radiation HP kWh/(m²a)		kWh/a	kWh/(m²a)
North	0,42	*	0,61	*	13,66	*	91	=	321	
East	0,51	*	0,61	*	15,63	*	201	=	970	
South	0,49	*	0,61	*	29,57	*	378	=	3370	
West	0,44	*	0,61	*	15,54	*	202	=	842	
Horizontal	0,00	*	0,00	*	0,00	*	372	=	0	
Available solar heat gains Q_S								Total	5502	33,8

	kh/d		Length heating period d/a		Spec. power q_l W/m²		A_{TFA} m²		kWh/a	kWh/(m²a)
Internal heat gains Q_I	0,024	*	180	*	3,50	*	163,0	=	2462	15,1

		kWh/a	kWh/(m²a)
Free heat Q_F	Q_S + Q_I =	7965	48,9
Ratio of free heat to losses	Q_F / Q_V =	0,94	
Utilisation factor heat gains h_G	(1 - (Q_F / Q_L)^5) / (1 - (Q_F / Q_L)^6) =	86%	
Heat gains Q_G	η_G * Q_F =	6834	**41,9**

		kWh/a	kWh/(m²a)
Annual heating demand Q_H	Q_L - Q_G =	1639	**10**

	kWh/(m²a)	(Yes/No)
Limiting value	20	**Requirement met?** **Yes**

Specific energy for heating (monthly method)

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 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:		
Treated floor area A_{TFA}:	163,0	m²
Spec. Capacity:	60	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	70,5	*	0,117	*	1,00	*	73	=	601	3,69
External wall - Ground	B		*		*	1,00	*		=		
Roof/Ceiling - Ambient	A	231,6	*	0,177	*	1,00	*	73	=	2985	18,31
Floor slab / Basement ceiling	B	97,8	*	0,228	*	1,00	*	25	=	548	3,36
	A		*		*	1,00	*		=		
	A		*		*	1,00	*		=		
	X		*		*	0,75	*		=		
Windows	A	74,4	*	0,868	*	1,00	*	73	=	4703	28,85
Exterior door	A		*		*	1,00	*		=		
Exterior TB (length/m)	A	159,3	*	0,021	*	1,00	*	73	=	240	1,47
Perimeter TB (length/m)	P	35,7	*	0,000	*	1,00	*	25	=	0	0,00
Ground TB (length/m)	B	9,0	*	0,211	*	1,00	*	25	=	47	0,29
											kWh/(m²a)
Transmission heat losses Q_T									Total	9123	56,0

	A_{TFA} m²		Clear room height m		m³
Effective air volume V_V	163	*	3,34	=	544

	$n_{V,system}$ 1/h		η^*_{SHX}		η_{HR}		$n_{V,Res}$ 1/h		$n_{V,equi,fraction}$ 1/h
Effective air change rate Ambient nV,e	0,244	*(1-	0%	)*(1-	0,81	)+	0,070	=	0,116
Effective air change rate Ground nV,g	0,244	*	0%	*(1-	0,81	)		=	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	544	*	0,116	*	0,33	*	73	=	1512	9,3
Ventilation losses ground $Q_{V,e}$	544	*	0,000	*	0,33	*	44	=	0	0,0
Ventilation heat losses Q_V								Total	1512	9,3

	Q_T kWh/a		Q_V kWh/a		Reduction factor night/weekend saving		kWh/a	kWh/(m²a)
Total heat losses Q_L	(9123	+	1512	) *	1,0	=	10635	**65,2**

Orientation of the area	Reduction factor see 'Windows' worksheet		g-Value (perp. radiation)		Area m²		Global radiation kWh/(m²a)		kWh/a
North	0,42	*	0,61	*	13,7	*	185	=	655
East	0,51	*	0,61	*	15,6	*	417	=	2011
South	0,49	*	0,61	*	29,6	*	676	=	6028
West	0,44	*	0,61	*	15,5	*	429	=	1787
Horizontal	0,00	*	0,00	*	0,0	*	747	=	0
Sum opaque areas									1358
									kWh/(m²a)
Available solar heat gains Q_S								Total	11839	72,6

	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	*	273	*	3,5	*	163,0	=	3738	22,9

			kWh/a	kWh/(m²a)
Free heat Q_F	Q_S + Q_I	=	15577	95,6
Ratio free heat to losses	Q_F / Q_L	=	1,46	
Utilisation factor heat gains h_G		=	54%	
Heat gains Q_G	η_G * Q_F	=	8390	**51,5**

			kWh/a	kWh/(m²a)
Annual heating demand Q_H	Q_L - Q_G	=	2245	**14**

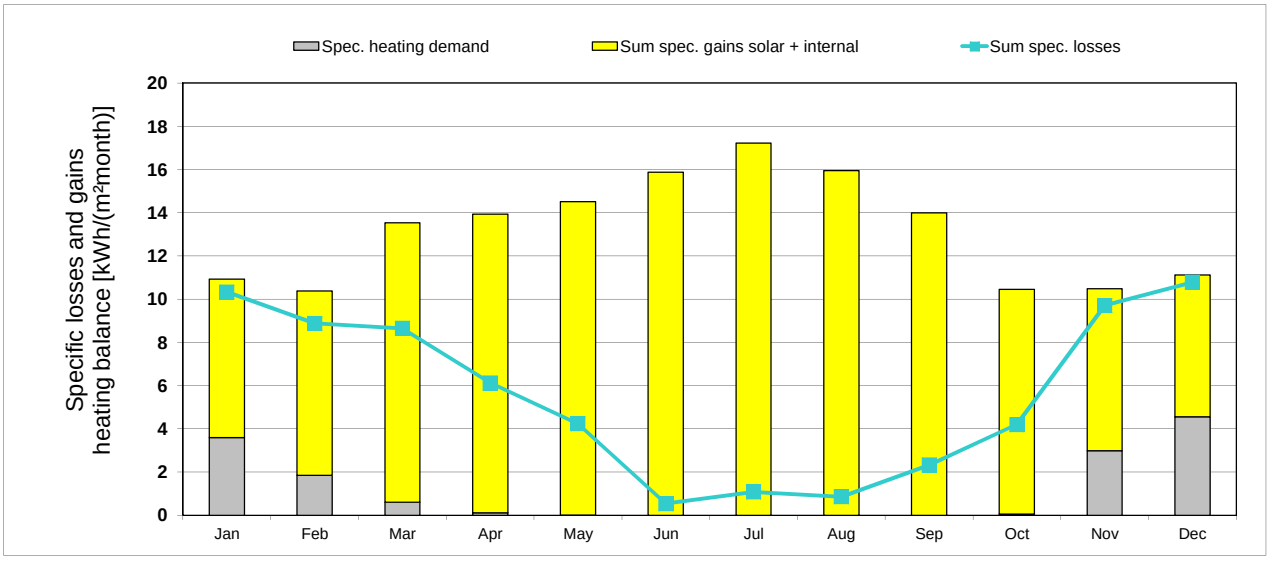
	kWh/(m²a)		(Yes/No)
Limiting value	20	**Requirement met?**	**Yes**

Specific energy for heating (monthly method)

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 kWh/(m²a)

Interior temperature: 20 °C
Building type:
Treated floor area A_{TFA}: 163 m²

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	
Heating degree hours - External	11,4	9,7	9,6	6,8	4,7	0,5	1,3	1,1	2,8	4,9	11,0	12,0	76	kKh
Heating degree hours - Ground	4,8	4,6	3,5	2,7	1,8	0,8	0,0	-0,4	-0,2	0,5	2,8	3,9	25	kKh
Losses - Exterior	1568	1336	1325	932	646	69	176	149	384	673	1514	1662	10435	kWh
Losses - Ground	115	112	85	66	45	19	0	-9	-4	12	68	96	604	kWh
Sum spec. losses	10,3	8,9	8,7	6,1	4,2	0,5	1,1	0,9	2,3	4,2	9,7	10,8	67,7	kWh/m²
Solar gains - North	35	53	85	106	149	177	177	131	92	64	42	28	1140	kWh
Solar gains - East	101	154	275	347	410	463	535	434	328	193	116	87	3444	kWh
Solar gains - South	481	571	856	802	740	785	874	927	954	713	490	419	8613	kWh
Solar gains - West	87	125	246	329	371	400	446	392	287	179	96	67	3025	kWh
Solar gains - Horiz.	0	0	0	0	0	0	0	0	0	0	0	0	0	kWh
Solar gains - Opaque	66	105	222	257	269	352	350	290	207	121	65	46	2350	kWh
Internal heat gains	424	383	424	411	424	411	424	424	411	424	411	424	4998	kWh
Sum spec. gains solar + internal	7,3	8,5	12,9	13,8	14,5	15,9	17,2	15,9	14,0	10,4	7,5	6,6	144,6	kWh/m²
Utilisation factor	92%	82%	62%	44%	29%	3%	6%	5%	17%	40%	90%	95%	37%	
Annual heating demand	586	301	98	18	3	0	0	0	0	9	488	742	2245	kWh
Spec. heating demand	**3,6**	**1,8**	**0,6**	**0,1**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,1**	**3,0**	**4,6**	**13,8**	kWh/m²



Annual heating demand: Comparison

Monthly method	*('Heating')*	**2245**	**kWh/a**	**13,8**	**kWh/(m²a)** reference to treated floor area according to PHPP
Annual method	*('Annual heating')*	**1639**	**kWh/a**	**10,1**	**kWh/(m²a)** reference to treated floor area according to PHPP

Heating load

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 kWh/(m²a)

Interior temperature: 20 °C
Building type:
Treated floor area A_{TFA}: 163,0 m²

	Design temperature		Radiation:	North	East	South	West	Horizontal	
Weather 1:	-6,0	°C		10	15	50	15	20	W/m²
Weather 2:	-2,0	°C		5	5	10	5	5	W/m²
Ground design temp.	13,1	°C							

Building assembly	Temperature zone	Area m²		U-Value W/(m²K)		Factor always 1 (except "X")		TempDiff 1 K		TempDiff 2 K		PT 1 W		PT 2 W
External wall - Ambient	A	70,5	*	0,117	*	1,00	*	26,0	or	22,0	=	215	or	182
External wall - Ground	B		*		*	1,00	*	6,9	or	6,9	=		or	
Roof/Ceiling - Ambient	A	231,6	*	0,177	*	1,00	*	26,0	or	22,0	=	1066	or	902
Floor slab / Basement ceiling	B	97,8	*	0,228	*	1,00	*	6,9	or	6,9	=	154	or	154
	A		*		*	1,00	*	26,0	or	22,0	=		or	
	A		*		*	1,00	*	26,0	or	22,0	=		or	
	X		*		*	0,75	*	26,0	or	22,0	=		or	
Windows	A	74,4	*	0,868	*	1,00	*	26,0	or	22,0	=	1679	or	1421
Exterior door	A		*		*	1,00	*	26,0	or	22,0	=		or	
Exterior TB (length/m)	A	159,3	*	0,021	*	1,00	*	26,0	or	22,0	=	86	or	72
Perimeter TB (length/m)	P	35,7	*	0,000	*	1,00	*	6,9	or	6,9	=	0	or	0
Ground TB (length/m)	B	9,0	*	0,211	*	1,00	*	6,9	or	6,9	=	13	or	13
Building element towards neighbour	I		*		*	1,00	*	3,0	or	3,0	=		or	

Transmission heat load P_T

Total = 3212 or 2743

Ventilation system:

	A_{TFA} m²		Clear room height m		m³
Effective air volume, V_V	163,0	*	3,34	=	544

			η_{SHX} 1		η_{SHX} 2
Heat recovery efficiency of the heat exchanger	η_{HR} 81%	Heat recovery efficiency SHX	0%	Heat recovery efficiency SHX	0% or 0%

		$n_{V,Res}$ (Heating Load) 1/h		$n_{V,system}$ 1/h		Φ_{HP}		Φ_{HP}		1/h		1/h
Energetically effective air changes	n_V	0,175	+	0,244	*(1-	0,81	or	0,81	) =	0,220	or	0,220

Ventilation heat load P_V

V_V m³		n_V 1/h		n_V 1/h		c_{Air} Wh/(m³K)		TempDiff 1 K		TempDiff 2 K		P_V 1 W		P_V 2 W
544,4	*	0,220	or	0,220	*	0,33	*	26,0	or	22,0	=	1029	or	871

Total heating load P_L

		PL 1 W		PL 2 W
$P_T + P_V$	=	4241	or	3614

Orientation of the area	Area m²		g-Value (perp. radiation)		Reduction factor (see 'Windows' worksheet)		Radiation 1 W/m²		Radiation 2 W/m²		P_T 1 W		P_T 2 W
North	13,7	*	0,6	*	0,42	*	10	or	5	=	35	or	18
East	15,6	*	0,6	*	0,51	*	15	or	5	=	72	or	24
South	29,6	*	0,6	*	0,49	*	50	or	10	=	446	or	89
West	15,5	*	0,6	*	0,44	*	15	or	5	=	62	or	21
Horizontal	0,0	*	0,0	*	0,40	*	20	or	5	=	0	or	0

Solar heating power P_S

Total = 616 or 152

Internal heating load P_I

Spec. power W/m²		A_{TFA} m²		P_I 1 W		P_I 2 W
3,0	*	163	=	489	or	489

Heating power (gains) P_G

		P_G 1 W		P_G 2 W
$P_T + P_I$	=	1105	or	641

$P_L - P_G$	=	3136	or	2973

Heating load P_H = **3136** **W**

Area specific space heating load P_H / A_{TFA} = **19,2** **W/m²**

Input max. supply air temperature 52 °C

		°C		°C
Max. supply air temperature $\vartheta_{Supply,Max}$ 52 °C	Supply air temperature without heating	$\vartheta_{Supply,Min}$	15,1	15,9

For comparison: heating load transportable by the supply Air $P_{Supply\ Air,Max}$ = 1619 W specific: 9,9 W/m²

Supply air heating: Sufficient? (Yes/No) **No**

Summer ventilation

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 kWh/(m²a)

Building volume:	544	m³	Building type:	
Max. indoor absolute humidity:	12	g/kg	Heat recovery η_{HRV}:	81%
Internal humidity sources:	100	g/(P*h)	Energy recovery η_{ER}:	73%
			Subsoil heat exchanger η^*_{SHX}:	0%

Results passive cooling			Results active cooling		
Frequency of overheating:	5,0%	at the overheating limit ϑ_{max} = 25 °C	Useful cooling demand:	8,9	kWh/(m²a)
max. humidity:	12,6	g/kg	Dehumidification demand:	0,1	kWh/(m²a)
Frequency of exceeded humidity:	0,3%		Frequency of exceeded humidity:	0,3%	

Summer basic ventilation to ensure adequate air quality

Air change rate via vent. system with supply air:		1/h	HRV/ERV in summer (check only one field)	
			None	
			Automatic bypass, controlled by temperature difference	
			Automatic bypass, controlled by enthalpy difference	
			Always	
Air change rate via extract air system:		1/h		
			Specific power consumption (for extract air system)	0,20 Wh/m³
Window ventilation air change rate:	3,00	1/h		

Effective air change rate

	$n_{V,system}$ 1/h		η^*_{SHX}		η_{HP}		$n_{V,equi,fraction}$ 1/h
Exterior $n_{V,e}$	0,000	*(1-	0%	)*(1-	0,81	) =	0,000
without HR	0,000	*(1-	0%	)		=	0,000
Ground $n_{L,g}$	0,000	*	0%	*(1-	0,81	) =	0,000
without HR	0,000	*	0%			=	0,000

Ventilation conductance

	V_V m³		$n_{V,equi,fraction}$ 1/h		c_{Air} Wh/(m³K)			
exterior $H_{V,e}$	544	*	0,000	*	0,33	=	0,0	W/K
without HR	544	*	0,000	*	0,33	=	0,0	W/K
ground $H_{V,g}$	544	*	0,000	*	0,33	=	0,0	W/K
without HR	544	*	0,000	*	0,33	=	0,0	W/K
Infiltration, window, extract air system	544	*	3,070	*	0,33	=	551,5	W/K

Additional summer ventilation for cooling

Additional ventilation regulation

Minimum acceptable indoor temp. 22,0 °C

Type of additional ventilation

Window night ventilation, manual	Night ventilation value	0,00	1/h
Mechanical, automatically Controlled ventilation	Corresponding air change rate during operation, in addition to basic air change		1/h
	Specific power consumption		Wh/m³
	Controlled by (please check) Temperature diff.		
	Humidity diff.	x	

Secondary calculation: Hygienic air change rate through window ventilation

Estimation for window air change rate to ensure sufficient air quality

Description								
	Open duration [h/d]							
Climate boundary conditions								
	Temperature diff interior - exterior							K
	Wind velocity							m/s
Window group 1								
	Quantity							
	Clear width							m
	Clear height							m
	Tilting window (check if appropriate)							
	Opening width (for tilting windows)							m
Window group 2 (cross ventilation)								
	Quantity							
	Clear width							m
	Clear height							m
	Tilting window (check if appropriate)							
	Opening width (for tilting windows)							m
	Difference in height to window 1							m
							Total	
Result: Air change rate		**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**1/h**

Secondary calculation: Additional night ventilation for cooling

Air change value during additional window night ventilation

Description								
	Reduction factor							
Climate boundary conditions								
	Temperature diff interior - exterior	1	1	1	1	1	1	K
	Wind velocity	0	0	0	0	0	0	m/s
Window group 1								
	Quantity							
	Clear width							m
	Clear height							m
	Tilting window (check if appropriate)							
	Opening width (for tilting windows)							m
Window group 2 (cross ventilation)								
	Quantity							
	Clear width							m
	Clear height							m
	Tilting window (check if appropriate)							
	Opening width (for tilting windows)							m
	Difference in height to window 1							m
							Total	
Result: Night ventilation values		**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**0,00**	**1/h**

Summer: Passive cooling

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 kWh/(m²a)

Building type:			Treated floor area A_{TFA}:	163,0	m²
Upper temperature limit:	25	°C	Building volume:	544	m³
Nominal humidity:	12	g/kg	Internal humidity sources:	6,1	g/(m²h)
Spec. capacity:	60	Wh/(m²K)			

Building assembly	Temperature zone	Area m²		U-Value W/(m²K)		Red. factor $f_{T,Summer}$		H_{Summer} heat conductance
External wall - Ambient	A	70,5	*	0,117	*	1,00	=	8,3
External wall - Ground	B		*		*	1,00	=	
Roof/Ceiling - Ambient	A	231,6	*	0,177	*	1,00	=	41,0
Floor slab / Basement ceiling	B	97,8	*	0,228	*	1,00	=	22,3
	A		*		*	1,00	=	
	A		*		*	1,00	=	
	X		*		*	0,75	=	
Windows	A	74,4	*	0,868	*	1,00	=	64,6
Exterior door	A		*		*	1,00	=	
Exterior TB (length/m)	A	159,3	*	0,021	*	1,00	=	3,3
Perimeter TB (length/m)	P	35,7	*	0,000	*	1,00	=	0,0
Ground TB (length/m)	B	9,0	*	0,211	*	1,00	=	1,9

Exterior thermal transmittance, $H_{T,e}$	117,1	W/K
Ground thermal transmittance, $H_{T,g}$	24,2	W/K

Summer ventilation

from 'SummVent' worksheet

Ventilation unit conductance			Ventilation parameter			Summer ventilation regulation	HRV/ERV
exterior $H_{V,e}$	0,0	W/K	Temperature amplitude summer	4,0	K		
without HR	0,0	W/K	Minimum acceptable indoor temperature	22,0	°C	None	
ground $H_{V,g}$	0,0	W/K	Heat capacity air	0,33	Wh/(m³K)	Controlled by temperature	
without HR	0,0	W/K	Supply air changes	0,00	1/h	Controlled by enthalpy	
Ventilation conductance, others			Outdoor air changes	3,07	1/h	Always	
exterior	551,5	W/K	Window night ventilation air change rate, manual @ 1K	0,00	1/h		Additional ventilation
			Air change rate due to mech. automatically controlled vent.	0,00	1/h	Controlled by temperature	
			Specific power consumption for	0,00	Wh/m³	Controlled by humidity	x
			η_{HR}	81%			
			η_{ERV}	73%			
			η^*_{SHX}	0%			

Orientation of the area	Angle factor Summer		Shading factor Summer		Shading dirt		g-Value (perp. radiation)		Area m²		Portion of glazing		**Aperture** m²	
North	0,9	*	0,27	*	0,95	*	0,61	*	13,7	*	73%	=	1,4	
East	0,9	*	0,33	*	0,95	*	0,61	*	15,6	*	71%	=	1,9	
South	0,9	*	0,20	*	0,95	*	0,61	*	29,6	*	73%	=	2,3	
West	0,9	*	0,28	*	0,95	*	0,61	*	15,5	*	71%	=	1,6	
Horizontal	0,9	*	1,00	*	0,95	*	0,00	*	0,0	*	0%	=	0,0	
Sum opaque areas													2,0	
												Total	9,2	m²/m² 0,06

Solar aperture

	Specif. power q_I W/m²		A_{TFA} m²		W	W/m²
Internal heat gains Q_I	3,5	*	163	=	571	3,5

Frequency of overheating $h_{\vartheta \geq Jmax}$ 5,0%

At the overheating limit ϑ_{max} = 25 °C

If the "frequency over 25°C" exceeds 10%, additional measures to protect against the heat during the summer are necessary.

Daily internal temperature stroke

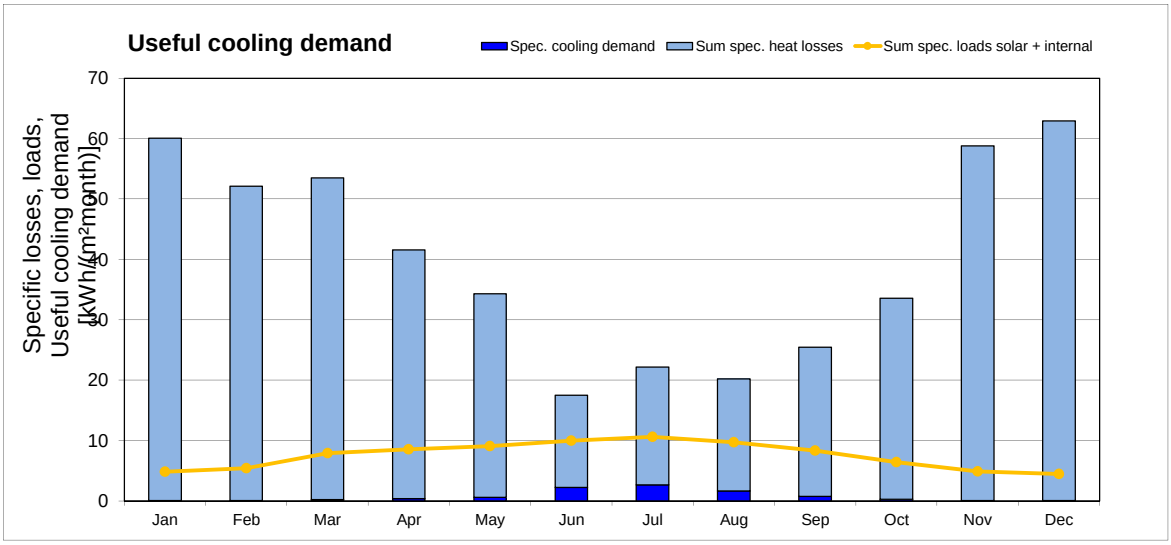
Transmission kWh/d		Ventilation kWh/d		Solar load kWh/d		1/k		Spec. capacity Wh/(m²K)		A_{TFA}: m²			
(5,6	+	26,5	+	47,0	) *	1000	/ (	60	*	163	) =	**8,1**	K

Cooling: energy value for useful cooling energy

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 kWh/(m²a)

Interior Temperature:	25	°C
Building type:		
Treated Floor Area A_{TFA}:	163	m²

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	
Heating degree hours - Exterior	15,3	13,2	13,5	10,5	8,5	4,2	5,1	4,9	6,5	8,7	14,7	15,9	121	kKh
Heating degree hours - Ground	8,5	8,0	7,2	6,3	5,6	4,4	3,7	3,4	3,4	4,2	6,4	7,7	69	kKh
Losses - Exterior	9584	8294	8515	6564	5357	2384	3090	2944	3937	5332	9424	10072	75497	kWh
Losses - Ground	205	193	175	154	135	106	90	81	83	102	155	186	1665	kWh
Losses summer ventilation	0	0	0	0	0	0	0	0	0	0	0	0	0	kWh
Sum spec. heat losses	60,1	52,1	53,3	41,2	33,7	15,3	19,5	18,6	24,7	33,3	58,8	62,9	473,4	kWh/m²
Solar load North	20	29	47	59	82	98	98	73	51	35	24	16	631	kWh
Solar load East	57	87	154	195	230	260	300	244	184	108	65	49	1932	kWh
Solar load South	173	205	308	289	266	282	315	334	343	257	177	151	3100	kWh
Solar load West	48	68	134	179	202	218	243	213	157	98	52	36	1648	kWh
Solar load Horiz.	0	0	0	0	0	0	0	0	0	0	0	0	0	kWh
Solar load Opaque	66	105	222	257	269	352	350	290	207	121	65	46	2350	kWh
Internal heat gains	424	383	424	411	424	411	424	424	411	424	411	424	4998	kWh
Sum spec. loads solar + internal	4,8	5,4	7,9	8,5	9,0	9,9	10,6	9,7	8,3	6,4	4,9	4,4	89,9	kWh/m²
Utilisation factor losses	8%	10%	14%	20%	25%	51%	41%	43%	31%	18%	8%	7%	17%	
Useful cooling energy demand	7	12	32	61	97	363	434	269	126	40	7	5	1453	kWh
Spec. cooling demand	**0,0**	**0,1**	**0,2**	**0,4**	**0,6**	**2,2**	**2,7**	**1,6**	**0,8**	**0,2**	**0,0**	**0,0**	**8,9**	kWh/m²
Specif. dehumidification demand	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,1**	**0,0**	**0,0**	**0,0**	**0,0**	**0,0**	**0,1**	kWh/m²
Sensible fraction	100%	100%	100%	100%	100%	100%	96%	100%	100%	100%	100%	100%	99%	



Cooling: energy value for useful cooling energy

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 kWh/(m²a)

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

Building type:			Treated floor area A_{TFA}:	163,0	m²
Interior temperature summer:	25	°C	Building volume:	544	m³
Nominal humidity:	12	g/kg	Internal humidity sources:	6,1	g/(m²h)
Spec. capacity:	60	Wh/(m²K)			

Building assembly	Temperature zone	Area m²		U-Value W/(m²K)		Mon. red. fac.		G_t kKh/a		kWh/a	per m² treated floor area
External wall - Ambient	A	70,5	*	0,117	*	1,00	*	121	=	998	6,12
External wall - Ground	B		*		*	1,00	*		=		
Roof/Ceiling - Ambient	A	231,6	*	0,177	*	1,00	*	121	=	4957	30,41
Floor slab / Basement ceiling	B	97,8	*	0,228	*	1,00	*	69	=	1534	9,41
	A		*		*	1,00	*		=		
	A		*		*	1,00	*		=		
	X		*		*	0,75	*		=		
Windows	A	74,4	*	0,868	*	1,00	*	121	=	7809	47,91
Exterior door	A		*		*	1,00	*		=		
Exterior TB (length/m)	A	159,3	*	0,021	*	1,00	*	121	=	398	2,44
Perimeter TB (length/m)	P	35,7	*	0,000	*	1,00	*	121	=	0	0,00
Ground TB (length/m)	B	9,0	*	0,211	*	1,00	*	69	=	131	0,80
											kWh/(m²a)
Transmission losses Q_T (negative: heat loads)									Total	15827	97,1

Summer ventilation

from 'SummVent' worksheet

Ventilation conductance, vent. unit

exterior $H_{V,e}$	0,0	W/K
without HR	0,0	W/K
ground $H_{V,g}$	0,0	W/K
without HR	0,0	W/K

Ventilation conductance, others

exterior	551,5	W/K

Ventilation parameter

Temperature amplitude summer	4,0	K
Minimum acceptable indoor temperature	22,0	°C
Heat capacity air	0,33	Wh/(m³K)
Supply air changes	0,00	1/h
Outdoor air changes	3,07	1/h
Window night vent. air change rate, manual @ 1K	0,00	1/h
Air changes rate due to mech., autom. controlled vent.	0,00	1/h
Specific power consumption for	0,00	Wh/m³
η_{HR}	81%	
η_{ERV}	73%	
η^*_{SHX}	0%	

Summer ventilation regulation

	HRV/ERV in summer
None	
Controlled by temp.	
Controlled by enthalpy	
Always	
	Additional ventilation
Controlled by temp.	
Controlled by humidity	x

	$n_{V,system}$ 1/h		η^*_{SHX}		η_{HR} (considers bypass)		$n_{V,Rest}$ 1/h		$n_{V,equi,fraction}$ 1/h
Hygienic air change									
Effective air change rate Ambient $n_{V,e}$	0,000	*(1-	0%	)*(1-	0,81	)+	3,070	=	3,070
Effective air change rate Ground $n_{V,g}$	0,000	*	0%	*(1-	0,81	)		=	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	544	*	3,070	*	0,33	*	111	=	61335	376,3
Ventilation losses ground $Q_{V,e}$	544	*	0,000	*	0,33	*	0	=	0	0,0
Heat losses summer ventilation	544	*	0,000	*	0,33	*	0	=	0	0,0
Ventilation heat losses Q_V								Total	61335	376,3

	Q_T kWh/a		Q_V kWh/a		kWh/a	kWh/(m²a)
Total heat losses Q_L	15827	+	61335	=	77162	**473,4**

Orientation of the area	Reduction factor		g-Value (perp. radiation)		Area m²		Global radiation kWh/(m²a)		kWh/a
North	0,24	*	0,61	*	13,7	*	322	=	631
East	0,28	*	0,61	*	15,6	*	714	=	1932
South	0,18	*	0,61	*	29,6	*	966	=	3100
West	0,24	*	0,61	*	15,5	*	726	=	1648
Horizontal	0,40	*	0,00	*	0,0	*	1285	=	0
Sum opaque areas									2350
									kWh/(m²a)
Available solar heat gains Q_S								Total	9661	59,3

	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	*	3,5	*	163,0	=	4998	30,7

			kWh/a	kWh/(m²a)
Sum heat loads Q_F	Q_S + Q_I	=	14659	**89,9**

Ratio of losses to free heat gains	Q_L / Q_F	=	5,26
Utilisation factor heat losses η_G		=	17%

			kWh/a	kWh/(m²a)
Useful heat losses $Q_{V,n}$	η_G * Q_L	=	13206	**81,0**
Useful cooling demand Q_K	Q_F - $Q_{V,n}$	=	1453	**9**

	kWh/(m²a)		(Yes/No)
Recommended maximum value	15	**Requirement met?**	**Yes**

Compressor - cooling units

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 kWh/(m²a)

Building type:			Treated floor area A_{TFA}:	163,0	m²
Interior temperature summer:	25,0	°C	Mechanical cooling:		
Nominal humidity:	12,0	g/kg	Air change rate via ventilation system with supply air:	0,0	
Internal humidity sources:	6,1	g/(m²h)			

☐ **Supply air cooling**
check as appropriate

On/Off mode (check as appropriate)		
Max. cooling capacity (sensible + latent)		kW
Temperature reduction dry		K
Seasonal energy efficiency ratio		

☐ **Recirculation cooling**
check as appropriate

On/Off mode (check as appropriate)		
Max. cooling capacity (sensible + latent)		kW
Volume flow rate at nominal power		m³/h
Temperature reduction dry		K
Variable air volume (check if appropriate)		
Seasonal energy efficiency ratio		

☐ **Additional dehumidification**
check as appropriate

Waste heat to room (please check if applicable)	
Seasonal energy efficiency ratio	

☐ **Panel cooling**
check as appropriate

Seasonal energy efficiency ratio	

	Sensible kWh/(m²a)		Latent kWh/(m²a)		COP		Electricity demand (kWh/a) kWh/(m²a)	Sensible fraction
Useful cooling total	8,9		0,1					99%
Cooling contribution by:								
Supply air cooling	(	+		) /	0,0	=		
Recirculation cooling	(	+		) /	0,0	=		
Dehumidification				/		=		0%
Remaining for panel cooling				/	0,0	=		100%
Cooling distribution				/		=		100%
Total	(0,0	+	0,0	) /		=	0,0	0%

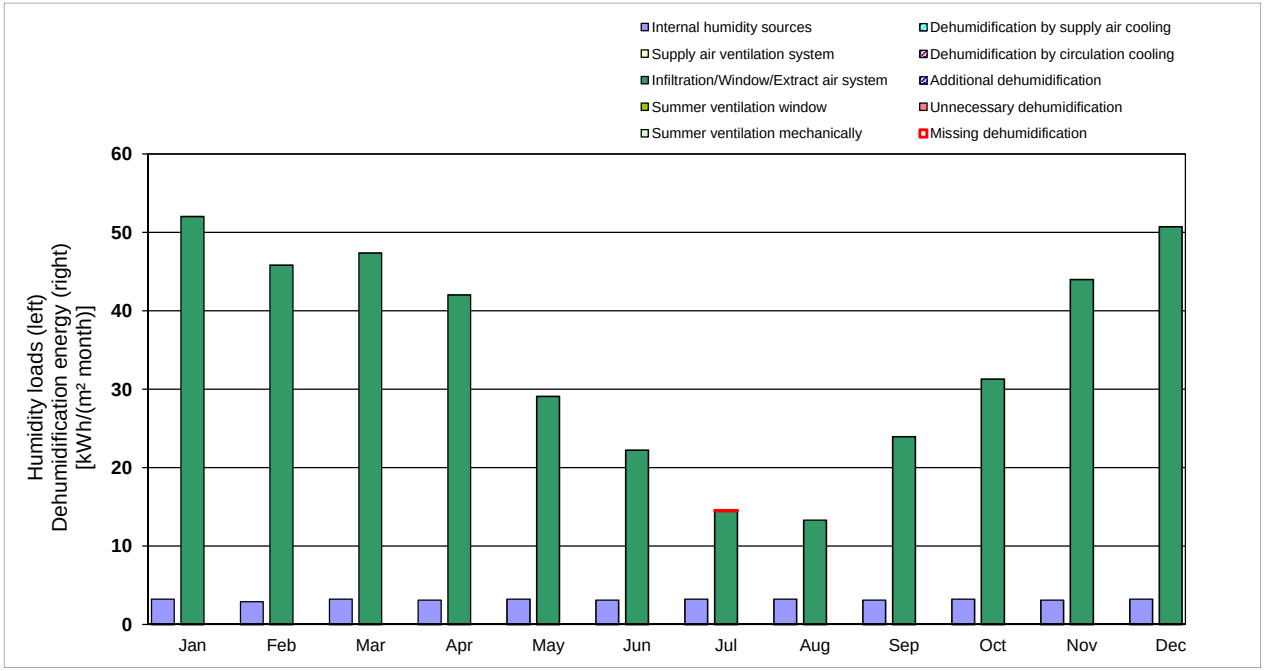
			(Yes/No)
Unsatisfied demand		**Cooling demand covered?**	

Compressor - cooling units

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 kWh/(m²a)

Humidity loads and humidity removal

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	
Internal humidity sources	3,2	2,9	3,2	3,1	3,2	3,1	3,2	3,2	3,1	3,2	3,1	3,2	38	kWh/m²
Infiltration/Window/Extract air system	-52,0	-45,8	-47,4	-42,0	-29,1	-22,3	-14,5	-13,3	-24,0	-31,3	-44,0	-50,8	-417	kWh/m²
Supply air ventilation system	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0	kWh/m²
Summer ventilation window	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0	kWh/m²
Summer ventilation mechanically	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0	kWh/m²
Total humidity load	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0	kWh/m²
Dehumidification by supply air cooling	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0	kWh/m²
Dehumidification by circulation cooling	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0	kWh/m²
Additional dehumidification	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0	kWh/m²
Total dehumidification	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0	
Unnecessary dehumidification	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0	kWh/m²
Missing dehumidification	0,0	0,0	0,0	0,0	0,0	0,0	0,1	0,0	0,0	0,0	0,0	0,0	0	kWh/m²



Cooling load

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 kWh/(m²a)

Building type:

Treated floor area A_{TFA}: 163,0 m² | Building volume: 544 m³ | Interior temperature: 25 °C

Spec. capacity: 60 Wh/(m²K) | Nominal humidity: 12,0 g/kg | Internal humidity sources: 6,1 g/kg

Temperature:	Outdoor air		Dew point		Sky	
Weather 1:	25,1	°C	16,9	°C	14,3	°C
Weather 2:	25,1	°C		°C	12,3	°C
Ground design temp.	20,5	°C		SHX	13,3	°C

Radiation:	North	East	South	West	Horizontal	
	104	185	208	207	347	W/m²
	104	185	208	207	347	W/m²

Building assembly	Temperature zone	Area m²		U-Value W/(m²K)		Factor always 1 (except "X")		TempDiff 1 K		TempDiff 2 K		P_T 1 W		P_T 2 W
External wall - Ambient	A	70,5	*	0,117	*	1,00	*	0,1	or	0,1	=	1	or	1
External wall - Ground	B		*		*	1,00	*	-4,5	or	-4,5	=		or	
Roof/Ceiling - Ambient	A	231,6	*	0,177	*	1,00	*	0,1	or	0,1	=	3	or	3
Floor slab / Basement ceiling	B	97,8	*	0,228	*	1,00	*	-4,5	or	-4,5	=	-101	or	-101
	A		*		*	1,00	*	0,1	or	0,1	=		or	
	A		*		*	1,00	*	0,1	or	0,1	=		or	
	X		*		*	0,75	*	0,1	or	0,1	=		or	
Windows	A	74,4	*	0,868	*	1,00	*	0,1	or	0,1	=	5	or	5
Exterior door	A		*		*	1,00	*	0,1	or	0,1	=		or	
Exterior TB (length/m)	A	159,3	*	0,021	*	1,00	*	0,1	or	0,1	=	0	or	0
Perimeter TB (length/m)	P	35,7	*	0,000	*	1,00	*	-4,5	or	-4,5	=	0	or	0
Ground TB (length/m)	B	9,0	*	0,211	*	1,00	*	-4,5	or	-4,5	=	-9	or	-9
Building element towards neighbour	I		*		*	1,00	*	3,0	or	3,0	=		or	
Radiation correction outdoor air				$L_{ambient}$ W/K		-10,7	*	0,1	or	0,1	=	-1	or	-1
Radiation correction sky				L_{Sky} W/K		10,6	*	-10,7	or	-12,7	=	-113	or	-134
Transmission heat load P_T										Total	=	**-214**	or	**-235**

Ventilation load	V_V m³		$n_{V,equi,fraction}$ 1/h		$n_{V,equi,fraction}$ 1/h		c_{Air} Wh/(m³K)		TempDiff 1 K		TempDiff 2 K		P_V 1 W		P_V 2 W
Exterior $P_{V,e}$	544	*	3,070	or	3,070	*	0,33	*	0,1	or	0,1	=	40	or	40
Ground $P_{L,e}$	544	*	0,000	or	0,000	*	0,33	*	-11,7	or	-11,7	=	0	or	0
Summer ventilation $P_{L,S}$	544	*	0,000	or	0,000	*	0,33	*	0,0	or	0,0	=	0	or	0
Ventilation heat load P_V												Total	**40**	or	**40**

Orientation of the area	Area m²		g-Value (perp. radiation)		Reduction factor (see 'Windows' worksheet)		Radiation 1 W/m²		Radiation 2 W/m²		P_T 1 W		P_T 2 W
North	13,7	*	0,6	*	0,17	*	104	or	104	=	145	or	145
East	15,6	*	0,6	*	0,20	*	185	or	185	=	358	or	358
South	29,6	*	0,6	*	0,13	*	208	or	208	=	476	or	476
West	15,5	*	0,6	*	0,17	*	207	or	207	=	336	or	336
Horizontal	0,0	*	0,0	*	0,40	*	347	or	347	=	0	or	0
Sum opaque areas											641	or	641
Solar load P_S										Total	**1956**	or	**1956**

Internal heating load P_I	Spec. power W/m²		A_{TFA} m²		P_I 1 W		P_I 2 W
	3,5	*	163	=	**571**	or	**571**

$P_T + P_V + P_S + P_I$	=	**2352**	or	**2331**	
Cooling load P_C	=		**2352**	**W**	
Area specific cooling load P_C / A_{TFA}	=		**14,4**	**W/m²**	

		°C		°C
Please enter the minimum supply air temperature. °C — Supply air temperature without cooling	$\vartheta_{Supply,Min}$	25,0		25,0
		W		W
For comparison: cooling load, transportable through the supply air $P_{Supply;Max}$	=	**0**		**0**
		W/m²		W/m²
	specific:	0,0		0,0

Air conditioning over the supply air possible? (yes/no)

Daily internal temperature stroke

Transmission W		Ventilation W		Solar load W		Time h/d		Spec. capacity Wh/(m²K)		A_{TFA} m²		
(-214,3	+	39,7	+	1956,5	) *	24	/ (	60	*	163	) =	**4,4** K

Dehumidific. load

from 'Cooling' worksheet

Absolute humidity exterior air	12,1	or	9,6	g/kg	Absolute humid. supply air	12,0	or	11,4	g/kg
Outdoor air mass flow	1972	or	1972	kg/h	Supply air mass flow	0	or	0	kg/h
Summer vent. air mass flow	0	or	0	kg/h	**Humid. load, supply air**	0	or	0	g/h
Humidity load, outdoor air	101	or	-4639	g/h	**Humidity load, internal**	1000	or	1000	g/h

	Enthalpy of vaporisation Wh/kg		g/kg		Humidity load g/h		Humidity load g/h		P_D 1 W		P_D 2 W
	707,639	/	1000	*	1101	or	-3639	=	**779**	or	**0**
Dehumidification load P_T								=			**W**
Area specific dehumidification load P_T / A_{TFA}								=			**W/m²**

Monthly average values

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Specific cooling demand	0,0	0,1	0,2	0,4	0,6	2,2	2,7	1,6	0,8	0,2	0,0	0,0	kWh/m²
Specific dehumidification demand	0,0	0,0	0,0	0,0	0,0	0,0	0,1	0,0	0,0	0,0	0,0	0,0	kWh/m²
Sensible fraction	100%	100%	100%	100%	100%	100%	96%	100%	100%	100%	100%	100%	

Minimum of sensible cooling load fraction occurred **100%**

Heat distribution and domestic hot water (DHW) system

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 kWh/(m²a)

Interior temperature:	20	°C	Interior temperature summer:	25	°C
Building type:					
Treated floor area A_{TFA}:	163	m²			
Occupancy:	10,0	Pers			
Number of dwelling units:	1				
Annual heating demand $q_{Heating}$	2245	kWh/a	Annual useful cooling dem. q_{Cool}	1453	kWh/a
Length of heating period:	180	d	Length cooling period:	365	d
Average heating load P_{ave}:	0,5	kW	Average cooling load $P_{Average}$:	0,2	kW
Marginal usability of additional heat gains:	48%		Marginal utility of additional heat losses:	0%	

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	40,0											
Nominal width of pipe		mm	25											
Insulation thickness		mm	20											
Insulation reflective coating?		-												
Thermal conductivity of insulation		W/(mK)	0,035											
Heat loss coefficient per m of insulated pipe		W/(mK)	0,208											
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	1-None		
Thermal bridge supplement		W/K	2,000											
Total heating loss coefficient per m of pipe	Ψ	W/(mK)	0,258											
Temp. of the room through which the pipes pass	ϑ_x	°C	20	20	20	20	20	12,3	12,3	12,3	12,3	12,3		
Design forward flow temperature	ϑ_V	°C	50,0	50,0	50,0	50,0	50,0	50,0	50,0	50,0	50,0	50,0		
Design system heating load	$P_{heating}$	kW	17,1	17,1	17,1	17,1	17,1	17,1	17,1	17,1	17,1	17,1		
Forward flow temperature control ('x' if applicable)														
Design return flow temperature	ϑ_R	°C	41,4											
Annual heat emission per m of plumbing	q^*_{HL}	kWh/(m·a)	29											
Possible utilisation factor of released heat	η_G	-	48%											
													kWh/a	kWh/(m²a)
Annual heat losses of heating distribution	Q_{HL}	kWh/a	598										598	3,7
Annual heat losses of heating storage		kWh/a											0	0,0
Annual heat losses of heating		kWh/a											598	3,7
Performance ratio of heat distribution	$ea_{,HL}$	-											127%	

DHW useful heat

DHW demand for showers, per person and day (with 60°C)		litre/person/d	0,0
DHW demand others, per person and day (with 60°C)		litre/person/d	1,0
Performance of shower drain-water heat recovery		-	0%
Effective DHW demand	V_{DHW}	litre/person/d	1
Average cold water temperature of the supply	ϑ_{TW}	°C	13,3
DHW demand for washing machines and dishwashers non-elect		kWh/a	73
Effective useful heat DHW	Q_{DHW}	kWh/a	271

kWh/a	kWh/(m²a)
271	1,7

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

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	**12,3**	12,3	12,3	12,3	12,3		
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												
Nominal width of pipe		mm												
Insulation thickness		mm												
Insulation reflective coating?		-												
Thermal conductivity of insulation		W/(mK)												
Heat loss coefficient per m of insulated pipe		W/(mK)												
Insulation quality of mountings, pipe suspensions, etc.		-	**1-None**	**1-None**	**1-None**	**1-None**	**1-None**	**1-None**	**1-None**	**1-None**	**1-None**	**1-None**		
Thermal bridge supplement		W/K												
Total heating loss coefficient per m of pipe	Ψ	W/(mK)												
Daily circulation period of operation.	td_{Circ}	h/d												
Design return flow temperature	ϑ_R	°C												
Circulation period of operation per year	t_{Circ}	h/a												
Annual heat released per m of pipe	q^*_Z	kWh/m/a												
Annual heat loss from circulation lines	QZ	kWh/a											kWh/a: **0**	kWh/(m²a): **0,0**
DHW individual pipes														
Exterior pipe diameter	d_{U_Pipe}	m						**0,016**						
Accumulated length per single pipes	L_U	m						**15,00**						
Amount of tapping points in building	$n_{tapping\ point}$	-						**5,00**						
Average pipe length per tapping point	$L_{U,\ average}$	m						3,0						
Tap openings per person per day		-						**3**						
Utilisation days per year		d						**365**						
Heat loss per tap opening	$q_{Individual}$	kWh/tap opening						0,0250						
Amount of tap openings per year and person	n_{Tap}	Tap openings per year						1095						
Annual heat loss of individual pipes	Q_U	kWh/a						**273**					kWh/a: **273**	kWh/(m²a): **1,7**
Total heat losses of DHW distribution	Q_{WL}												kWh/a: **273**	kWh/(m²a): **1,7**
Performance ratio of DHW distribution pipes	$ea_{,HL}$	-											**201%**	

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							
Heat loss rate	W/K	2,0	3,0				
Storage volume	litre	300			---		
Standby fraction	-	30%					
Location of storage tank, inside or outside of thermal envelope		2-Outside	1-Inside	2-Outside			
Temperature of mechanical room	°C	12,3					
Typical storage tank temperature	°C	60,0					
Manual entry of storage temperature	°C						
Average standby heat losses storage tank	W	29					
Additional heat losses storage tank, solar operation	W			---	---		
Possibly utilisation factor of heat losses		---	---		---		
Annual heat losses DHW storage tank	kWh/a	251		---		kWh/a: **251**	kWh/(m²a): **1,5**
Annual heat losses buffer storage tank		---	---		---		

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

Total energy demand of domestic hot water

		kWh/a	kWh/(m²a)
Heat losses of DHW distribution and storage	Q_{WL}	**524**	**3,2**
Performance ratio DHW-distribution + storage	$e_{a,WL}$	**293%**	
Total heating demand of DHW system		kWh/a	kWh/(m²a)
Including storage tank	Q_{gDHW}	**795**	**4,9**

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	$P_{heating}$	kW												
Forward flow temperature control ('x' if applicable)														
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%**	

Solar thermal system

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 kWh/(m²a)

Building type:		
Treated floor area A_{TFA}:	163,0	m²
Projected building footprint $A_{Projected}$:	97,8	m²
Latitude *('Climate' worksheet)*	45,6	°
DHW demand *('DHW+Distribution')*	795	kWh/a
Heating demand ('Heating' and 'DHW+Distribution' worksheets)	2843	kWh/a
Occupancy	10,0	Persons

Location: Selection in 'Areas' worksheet			**Collector**	
Size of selected area		m²	Heating support (please check, if applicable)	
Free area (less solar thermal and electrical systems)		m²	DHW priority (check if appropriate)	x
Deviation from North		°		
Angle of inclination from the horizontal		°		
Alternative input: Deviation from North		°		
Alternative input: Angle of inclination from the horizontal		°		

Solar collector area			m²
Specific collector area		0,0	m²/Pers
Height of the collector field			m
Height of horizon	h_{Hori}		m
Horizontal distance	a_{Hori}		m
Additional reduction factor shading	r_{other}		

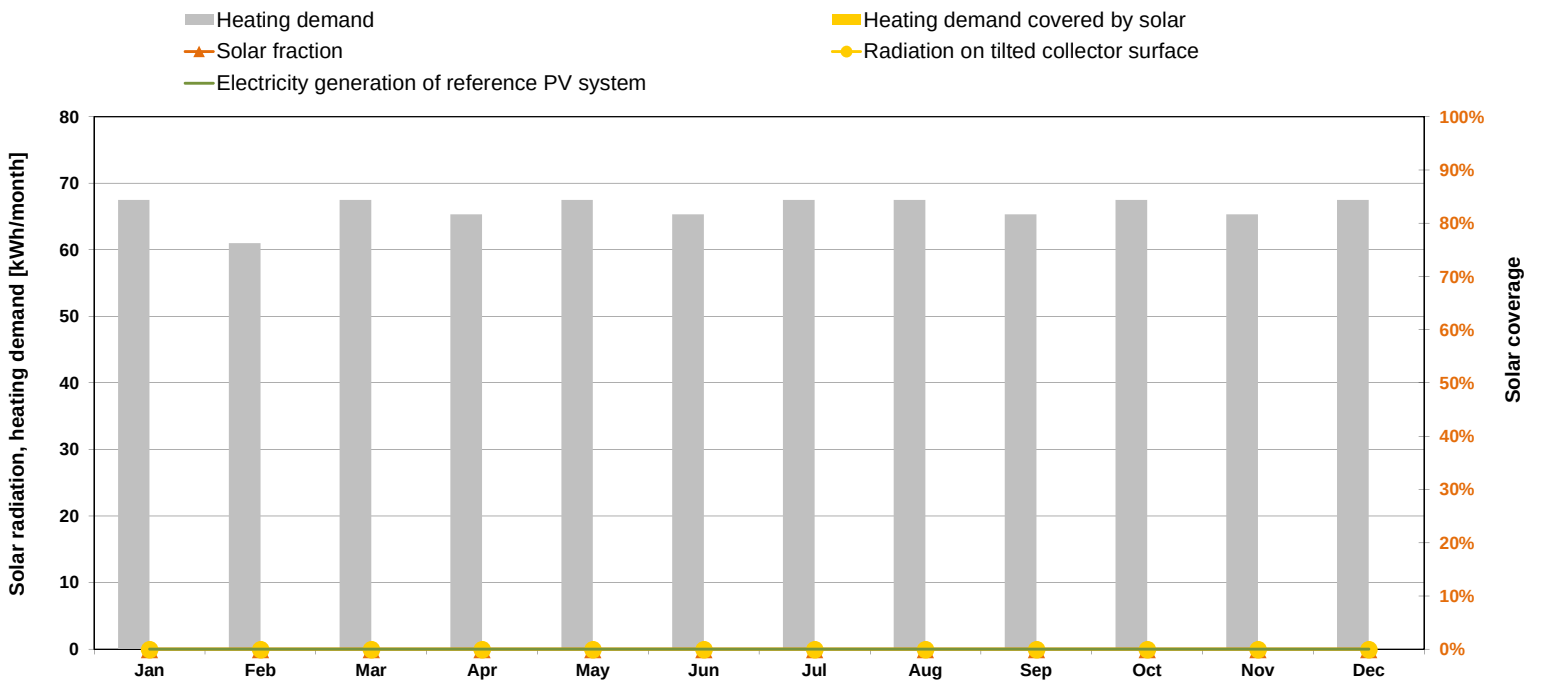
Results

	Projected building footprint area	Absolute
	kWh/($m^2_{Projected}$*a)	kWh/a
Solar contribution total	**0%**	**0,0**	**0**
Solar contribution to DHW	**0%**	**0,0**	**0**
Solar contribution to space heating	**0%**	**0,0**	**0**

Determination of PER factors

Yield reference PV syst. kWh_{el}/a	PER_{el} $kWh_{prim-el}/kWh_{el}$	**$PER_{sol.therm}$** $\frac{kWh_{el}}{kWh_{th}*kWh_{primel}/kWh_{el}}$
	1,30	
	1,80	

			$kgCO_2eq/m^2_{Projected}$*a	$kgCO_2eq/a$
1-CO2 factors GEMIS (Germany)	kgCO2eq/ kWhFinal			



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	
Heating demand DHW-preparation	68	61	68	65	68	65	68	68	65	68	65	68	795	kWh/month
Space heating demand	0	0	0	0	0	0	0	0	0	0	0	0	0	kWh/month
Heating demand	68	61	68	65	68	65	68	68	65	68	65	68	795	kWh/month
Radiation on tilted collector surface	0	0	0	0	0	0	0	0	0	0	0	0	0	kWh/month
Please enter: Solar production for DHW													0	kWh/month
Please enter: Solar production for heating													0	kWh/month
DHW heating demand covered by solar	0	0	0	0	0	0	0	0	0	0	0	0	0	kWh/month
Space heating demand covered by solar	0	0	0	0	0	0	0	0	0	0	0	0	0	kWh/month
Heating demand covered by solar	0	0	0	0	0	0	0	0	0	0	0	0	0	kWh/month
Solar fraction	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	-
Electricity generation of reference PV system														kWh/month

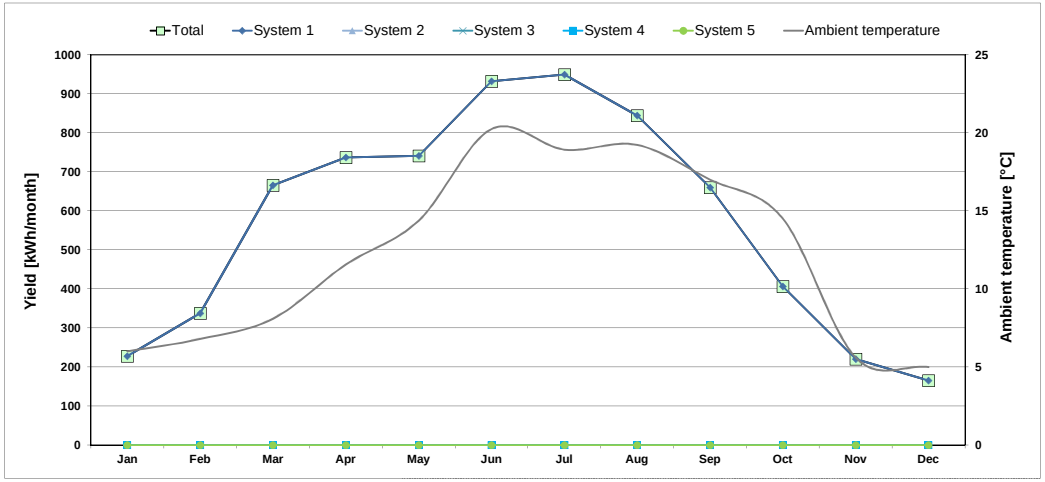
Photovoltaic systems

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 kWh/(m²a)

Climate data set: ud---00-Montbrison1314
Building type:
Projected building footprint: 97,8 m²

		System 1	System 2	System 3	System 4	System 5	Reference PV syst.	
Name of system								
Location: Selection in 'Areas' worksheet								
Size of selected area								m²
Deviation from North		180						°
Angle of inclination from horizontal		20						°
Alternative input: Deviation from North		180						°
Alternative input: Angle of inclination from the horizontal		20						°
Information from the module data sheet								
Technology		4-Mono-Si	5-Poly-Si	5-Poly-Si	5-Poly-Si	5-Poly-Si	4-Mono-Si	
Nominal current	I_{MPP0}	8,55					7,71	A
Nominal voltage	U_{MPP0}	32,00					30,50	V
Nominal power	P_n	274	0	0	0	0	235	Wp
Temperature coefficient short-circuit current	α	0,080					0,040	%/K
Temperature coefficient open-circuit voltage	β	-0,360					-0,340	%/K
Module dimensions: Height		1,641					1,658	m
Module dimensions: Width		0,989					0,994	m
							1,6	Module area [m²]
Further specifications								
Number of modules	n_M	22					0,0	
Height of module array								m
Height of horizon	h_{Hori}							m
Horizontal distance	a_{Hori}							m
Additional reduction factor shading	r_{other}							
Efficiency of the inverter	η_{HRV}	95%					95%	
Results								
Area of module field		35,7	0,0	0,0	0,0	0,0	0,0	m²
Free area on the selected building element								m²
Allocation to building element								
Annual losses due to shading		0						kWh

								Total	
Annual electricity yield of the inverter, absolute		6885						6885	kWh/a
Related to projected building footprint area		70,4						70	kWh/m²A_{Proje}
CO2-equivalent emissions according to 1-CO2 factors GEMIS (Germany)		895,1						895,1	kg/a
PE-factor according to 1-PE-factors (non-renewable) PHI Certification		0,00	0,00	0,00	0,00	0,00	0,0	0,00	kWh_{prim}/kWh_f



Information from the module data sheet

4-Mono-Si

Nominal current	I_{MPP0}	8,6	A
Nominal voltage	U_{MPP0}	32,0	V
Nominal power	P_n	273,6	Wp
Temperature coefficient short-circuit current	α	0,1	%/K
Temperature coefficient open-circuit voltage	β	-0,4	%/K

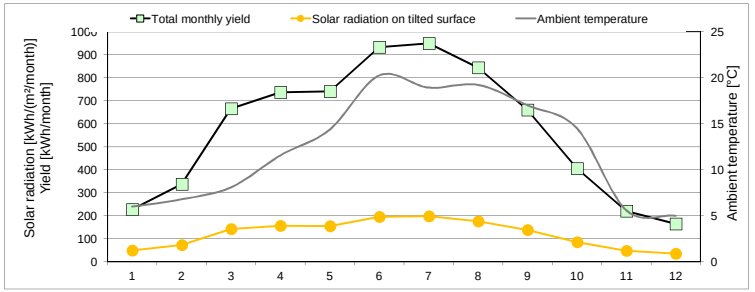
Further specifications

Latitude		45,6	°
Number of modules	n_M	22,0	
Deviation from North		180,0	°
Angle of inclination from horizontal		20,0	°
Height of module array		1,0	m
Height of horizon	h_{Horiz}	0,0	m
Horizontal distance	a_{Horiz}	1000,0	m
Additional reduction factor shading	r_{other}	1,00	
Efficiency of the inverter	η_{HRV}	0,95	
Annual losses due to shading		0	kWh

Annual yield of inverter

	Electricity	PER-factor	1-PE-factors (non-renewable) PHI Certification
		1,0	0,00
kWh/a	6885	6885	0
kWh/m²$_{Projected}$*a	70,4	70,4	0,0

1-CO2 factors GEMIS (Germany)	Specific PE value (non-renewable)	Specific value of CO_2-equivalent emissions [g/kWh]	
0,130	0,3	51,9	
895			kgCO_2eq/a (absolute)
9,2			CO_2eq/m²Projected*a (projected building footprint)



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		Year	
Solar radiation on tilted surface	49	73	143	156	156	195	198	176	138	85	48	36	kWh/(m²month)	1454,0	kWh/(m²a)
Ambient temperature	6	7	8	12	14	20	19	19	17	15	6	5	°C	12,3	°C
Total monthly yield	227	338	666	737	741	932	949	844	660	406	220	165	kWh/month	6885,1	kWh/a
Losses through shading situation	0	0	0	0	0	0	0	0	0	0	0	0	kWh/month	0,0	kWh/a

Electricity demand for residential buildings (at the moment this worksheet is inactive. Calculation takes places in the 'Electricity non-res' works

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 kWh/(m²a)

Households	1
Persons	10,0
Living area (m²)	163
Heating demand [kWh/(m²a)]	13,8

PER and PE factors (KWh/kWh)		
Electricity:	1,30	2,6
Non-electric energy carrier for cooking, drying:	1,30	2,6
Energy carrier for heating:	1,32	0,7
Energy carrier for DHW:	1,75	0,2

Solar fraction of DHW Laundry&Dish	0%
Marginal performance ratio DHW	116%
Marginal performance ratio Heating	116%

Column no.	1	2	3			4		5		6			7		8	8a		9		10		11		12		13
Application	Used ? (1/0)	Within the thermal envelope? (1/0)	Norm demand			Utilisation factor		Frequency		Reference quantity			Useful energy (kWh/a)		Electric fraction	Non-electric fraction		**Electricity demand (kWh/a)**		Additional demand		Marginal performance ratio		Solar fraction		Non-electric demand (kWh/a)
Dishwashing	1	1	1,10	kWh/Use		* 1,00	*	65	/(P*a) *	10,0	P	=	715	*	100%		=	**715**								
2-Cold water connection														*		0%			* (1+	0,30	) *	1,16	*(1-	0,00	) =	**0**
Clothes washing	1	1	1,10	kWh/Use		* **1,00**	*	57	/(P*a) *	10,0	P	=	627	*	100%		=	**627**								
2-Cold water connection														*		0%			* (1+	0,05	) *	1,16	*(1-	0,00	) =	**0**
Clothes drying with:	1	1	3,50	kWh/Use	Residual dampness	0,88	*	57	/(P*a) *	10,0	P	=	1746		100%		=	**1746**								
4-Condensation dryer					0,60							=	0			0%						1,00	*			**0**
Energy consumed by evaporation	0	1	3,13	kWh/Use		* 0,60	*	57	/(P*a) *	10,0	P	=	0	*		100%			* (1+	0,00	) *	1,16	*(1-	0,77	) =	**0**
Refrigerating	1	1	0,78	kWh/d		* 1,00	*	365	d/a *	1	HH	=	285	*	100%		=	**285**								
Freezing	1	1	0,88	kWh/d		* 1,00	*	365	d/a *	1	HH	=	321	*	100%		=	**321**								
or combination	0	1	1,00	kWh/d		* 1,00	*	365	d/a *	1	HH	=	0	*	100%		=	**0**								
Cooking with:	1	1	0,25	kWh/Use		* 1,00	*	500	/(P*a) *	10,0	P	=	1250	*	100%		=	**1250**								
1-Electricity					Average lamp efficiency [lm/W]									*		0%										**0**
Lighting	1	1	60	W	**12**	* 1,00	*	2,90	kh/(P*a *	10,0	P	=	1740	*	100%		=	**1740**								
Consumer electronics	1	1	**80**	W		* 1,00	*	**0,55**	kh/(P*a *	10,0	P	=	440	*	100%		=	**440**								
Small appliances, etc.	1	1	50	kWh		* 1,00	*	1,00	/(P*a) *	10,0	P	=	500	*	100%		=	**500**								
Total aux. electricity													859					859								
Other:																										
				kWh/a									0					**0**								
				kWh/a									0					**0**								
				kWh/a									0					**0**								
Total													8482	kWh				**8482**	kWh			0	kWh			**0**
Specific demand																		**52,0**	kWh/(m²a)			**0,0**	kWh/(m²a)			**0,0**
Recommended maximum value																		18								

DHW Non-Electric - Wash&Dish

Non-Renewable Non-Electric DHW Wash&Dish

Use non-residential buildings

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 kWh/(m²a)

Latitude [°]: 46

	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	27
	Utilisation pattern			Begin utilisation [h]	End utilisation [h]	Daily utilisation hours [h/d]	Annual utilisation days [d/a]	Annual utilisation hours [h/a]	Annual utilisation hours during daytime [h/a]	Annual utilisation hours during night-time [h/a]	Daily operating hours of heating	Daily operating hours of ventilation	Lighting	Illumination level [lux]	Height of utilisation level (0.8 or 0.0 m)	Height of utilisation level (0.8 or 0.0 m)	Relative absenteeism	Part use factor of building operating period for lighting	Average occupancy [m²/Pers.]
1						0		0	0	0	2	2				0,8			
2						0		0	0	0	2	2				0,8			
3						0		0	0	0	2	2				0,8			
4						0		0	0	0	2	2				0,8			
5						0		0	0	0	2	2				0,8			
6						0		0	0	0	2	2				0,8			
7						0		0	0	0	2	2				0,8			
8						0		0	0	0	2	2				0,8			
9						0		0	0	0	2	2				0,8			
10						0		0	0	0	2	2				0,8			
11						0		0	0	0	2	2				0,8			
12						0		0	0	0	2	2				0,8			
13						0		0	0	0	2	2				0,8			
14						0		0	0	0	2	2				0,8			
15						0		0	0	0	2	2				0,8			
16						0		0	0	0	2	2				0,8			
17						0		0	0	0	2	2				0,8			
18						0		0	0	0	2	2				0,8			
19						0		0	0	0	2	2				0,8			
20						0		0	0	0	2	2				0,8			
21	Single office			7	18	11	250	2750	2543	207	13			500	0,8	0,8	0,30	0,70	10,00
22	Group office			7	18	11	250	2750	2543	207	13			500	0,8	0,8	0,30	0,70	
23	Open-plan office			7	18	11	250	2750	2543	207	13			500	0,8	0,8	0,00	1,00	15,00
24	Meeting			7	18	11	250	2750	2543	207	13			500	0,8	0,8	0,50	1,00	2,00
25	Counter area			7	18	11	250	2750	2543	207	13			200	0,8	0,8	0,00	1,00	
26	Retail			8	20	12	300	3600	2999	601	14			300	0,8	0,8	0,00	1,00	7,00
27	Classroom			8	15	7	200	1400	1398	2	9			300	0,8	0,8	0,25	0,90	2,00
28	University auditorium			8	18	10	150	1500	1409	91	12			500	0,8	0,8	0,25	0,70	0,75
29	Bedroom			0	24	24	365	8760	4407	4353	24			300	0,8	0,8	0,00	0,50	
30	Hotel room			21	8	11	365	4015	755	3260	24			200	0,8	0,8	0,25	0,30	
31	Canteen			8	15	7	250	1750	1748	2	9			200	0,8	0,8	0,00	1,00	
32	Restaurant			10	0	14	300	4200	2404	1796	16			200	0,8	0,8	0,00	1,00	1,50
33	Kitchen non-residential			10	23	13	300	3900	2404	1496	15			500	0,8	0,8	0,00	1,00	
34	Kitchen, Storage, Preparation			7	23	16	300	3900	2404	1496	15			300	0,8	0,8	0,50	1,00	
35	WC, Sanitary			7	18	11	250	2750	2543	207	13			200	0,8	0,8	0,90	1,00	
36	Other habitable rooms			7	18	11	250	2750	2543	207	13			300	0,8	0,8	0,50	1,00	
37	Secondary areas			7	18	11	250	2750	2543	207	13			100	0,8	0,8	0,90	1,00	
38	Circulation area			7	18	11	250	2750	2543	207	13			100	0,0	0,0	0,80	1,00	
39	Storage, Services			7	18	11	250	2750	2543	207	13			100	0,8	0,8	0,98	1,00	
40	Server room			0	24	24	365	8760	4407	4353	24			500	0,8	0,8	0,50	0,50	
41	Workshop			7	16	9	250	2250	2192	58	11			500	0,8	0,8	0,00	1,00	
42	Theatre auditorium			19	23	4	250	1001	55	946	6			200	0,8	0,8	0,00	1,00	
43	Theatre foyer			19	23	4	250	1001	55	946	6			300	0,8	0,8	0,50	1,00	
44	Theatre stage			13	23	10	250	2500	1253	1247	12			1000	0,8	0,8	0,00	0,60	
45	Fair, Congress			13	18	5	150	1350	1260	90	11			300	0,8	0,8	0,50	1,00	
46	Exhibition			10	18	8	250	2001	1850	151	24			200	0,8	0,8	0,00	1,00	
47	Library reading room			8	20	12	300	3600	2999	601	14			500	0,8	0,8	0,00	1,00	
48	Open access library			8	20	12	300	3600	2999	601	14			200	0,8	0,8	0,00	1,00	
49	Library repository			8	20	12	300	3600	2999	601	14			100	0,8	0,8	0,90	1,00	
50	Gymnasium			8	23	15	300	4500	3002	1498	17			300	0,8	0,8	0,30	1,00	
51	Parking garage			7	18	11	250	2750	2543	207	0			75	0,0	0,0	0,95	1,00	
52	Public parking garage			9	0	15	365	5475	3290	2185	0			75	0,0	0,0	0,80	1,00	

Electricity demand for non-residential buildings

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 kWh/(m²a)

Treated floor area A_{TFA}:	163,0	m²	
Auxiliary electricity demand:	858,8	kWh/a	
	PER factors:	**PE factors:**	
Electricity:	1,30	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	0,72	0,95	0,85	0,73
East	0,88			0,71
South	0,84			0,73
West	0,77			0,71

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	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									
Bureau	163,0	21-Single office	500	180	South	82%	x	10,0	15,0	3,4	3,0	10,0
						69%						
						69%						
						69%						
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						69%						

Room / Zone	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))**	**PER demand**	PE demand
		W/m²	W/m²		[x]			h/a	h/a	h/a	kWh/a	kWh/(m²a)	kWh/a	kWh/a
									9					
Bureau	Low	15	15,0	4	x	Bus system	With motion detector	2750		921	2251	13,8	2927	5854
	None		0,0	1	0	Manual	Without motion detector							
	None		0,0	1	0	Manual	Without motion detector							
	None		0,0	1	0	Manual	Without motion detector							
	None		0,0	1	0	Manual	Without motion detector							
	None		0,0	1	0	Manual	Without motion detector							
	None		0,0	1	0	Manual	Without motion detector							
	None		0,0	1	0	Manual	Without motion detector							
	None		0,0	1	0	Manual	Without motion detector							
	None		0,0	1	0	Manual	Without motion detector							
	None		0,0	1	0	Manual	Without motion detector							
	None		0,0	1	0	Manual	Without motion detector							
	None		0,0	1	0	Manual	Without motion detector							
	None		0,0	1	0	Manual	Without motion detector							
	None		0,0	1	0	Manual	Without motion detector							
	None		0,0	1	0	Manual	Without motion detector							
	None		0,0	1	0	Manual	Without motion detector							
	None		0,0	1	0	Manual	Without motion detector							
	None		0,0	1	0	Manual	Without motion detector							
	None		0,0	1	0	Manual	Without motion detector							
	None		0,0	1	0	Manual	Without motion detector							
	None		0,0	1	0	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]	PER demand [kWh/a]	PE demand [kWh/a]
	2					9 20	18					
PC 1	22-Group office	1	1	10	80	1925	0,3		1078	1078,0	1401	2803
PC in energy saving mode		1		10	2,0	1925	0,3		12	11,6	15	30
Monitor 1	22-Group office	1	1	10	28	1925	0,3		377	377,3	490	981
Monitor in energy saving mode		1		10	2,0	1925	0,3		12	11,6	15	30
PC 2		1	0		80	0	0		0	0,0	0	0
PC in energy saving mode		1		0	2,0	0	0		0	0,0	0	0
Monitor 2	22-Group office	1	1	10	28	1925	0,3		377	377,3	490	981
Monitor in energy saving mode		1		10	2,0	1925	0,3		12	11,6	15	30
Copier	22-Group office	1	1	1	400	2750		2475	110	110,0	143	286
Copier in energy saving mode		1		1	30	2475			74	74,3	97	193
Printer	22-Group office	1	1	2	300	2750		2475	165	165,0	215	429
Printer in energy saving mode		1		2	2	2475			10	9,9	13	26
Server	22-Group office	1	1	1	150	2750			413	412,5	536	1073
Server in energy saving mode		1		1	2,0	8760		2750	12	12,0	16	31
Telephone system		1	1	1	50	8760			438	438,0	569	1139
									0	0,0	0	0
									0	0,0	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]	Utilisation hours per year [h/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]	PER demand	PE demand
				8		kWh / Meal										
Cooking:	22-Group office	0	1	250	5	0,25	313		0%					0,0	0	0
Electricity						kWh / Cover		0%					0		0	0
Dishwashing		0	1	250	5	0,10	125		55%					68,8	89	179
1-DHW connection						kWh/d		45%		0,30	1,20	0,00	88		154	97
Refrigerating		0	1	365		0,70	256		100%					255,5	332	664
							0		100%					0,0	0	0
							0		100%					0,0	0	0
							0		100%					0,0	0	0
							0		100%					0,0	0	0
							0		100%					0,0	0	0
							0		100%					0,0	0	0
							0		100%					0,0	0	0
							0		100%					0,0	0	0
Total auxiliary electricity							859							858,8	1545,9	2233,0

	Useful energy		Hot water non-electric dishwashing	Non-electric demand	Electricity demand		PER demand	PE demand	
Total	6892	kWh	73	87,8	6523	kWh/a	9063	17058	kW
Specific demand			0,4	0,5	40	kWh/(m²a)	56	105	kW

Aux Electricity

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 kWh/(m²a)

Treated floor area	163	m²
Heating period	180	d
Air volume	544	m³
Dwelling units	1	HH

Heat recovery efficiency ventilation unit	0,81	
Operation vent. system Winter	4,32	kh/a
Operation vent. system Summer	4,44	kh/a
Air change rate	0,24	h⁻¹

Annual space heating demand	14	kWh/(m²a)
Boiler rated power	17	kW
DHW system heating demand	795	kWh/a
Design forward flow temperature	50	°C

Column no.	1	2	3		4		5		6		7		8		9		10	11
Application	Existing [1/0]	Within the thermal envelope [1/0]	Norm demand		Utilisation factor		Period of operation		Reference size		Electricity demand [kWh/a]		Available as interior heat		Utilisation period [h/a]		Internal heat gains winter [W]	Internal heat gains summer [W]
Ventilation system																		
Winter ventilation	1		0,26	Wh/m³	* 0,24	h⁻¹	* 4,3	kh/a	* 544	m³	= **149**		considered in heat recovery efficiency					
Defroster HX	1	1	Data entries in 'Ventilation' worksheet or in 'Addl vent'								**35**	*	0,2	/	4,32	=	**2**	
Summer ventilation	0	**0,55**	0,00	Wh/m³	* 0,00	h⁻¹	* 4,4	kh/a	* 544	m³	= **0**	*	1,0	/	4,44	=		**0**
																	Internal heat sources ' Additional summer ventilation'	0,0
Additional vent. summer	0		0,00	Wh/m³	* 0,00	h⁻¹	* 4,4	kh/a	* 544	m³	= **0**	*	1,0	/	4,44	=		
Heating system			Controlled / non controlled															
Enter the rated power of the pump			**70**	W	**1**													
Circulator pump heating	**1**	**1**	70	W	* 0,8		* 4,3	kh/a	* 1		= **231**	*	1,0	/	4,32	=	**54**	
Boiler electricity consumption at 30% load				W														
Aux. energy - Heat. boiler	0	0	58	W	* 1,00		* 0,00	kh/a	* 1		= **0**	*	1,0	/	4,32	=	**0**	
Aux. energy - Wood fired/Pellet boiler	1	0	Data entries in 'Boiler' worksheet. Aux. energy demand including possible drinking water production.								**443**	*	1,0	/	4,32	=	**0**	
DHW system																		
Enter average power consumption of pump				W														
Circulation pump DHW	0		29	W	* 1,00		* 4,8	kh/a	* 1		= **0**	*	1,0	/	8,76	=	**0**	**0**
Enter the rated power of the pump				W														
Storage load pump DHW			57	W	* 1,00		* 0,0	kh/a	* 1		= **0**	*	1,0	/	8,76	=	**0**	**0**
Boiler electricity consumption at 100% load				W														
DHW boiler aux. energy	1	0	175	W	* 1,00		* 0,0	kh/a	* 1		= **0**	*	1,0	/	8,76	=	**0**	**0**
Enter the rated power of the solar DHW pump				W														
Solar aux. electricity	0		41	W	* 1,00		* 1,8	kh/a	* 1		= **0**	*	1,0	/	8,76	=	**0**	**0**
Aux. electricity cooling and dehumidification																		
Aux. electricity cooling				kWh/a	* 1,00		* 1,0		* 1		= **0**	*	1,0	/	4,44	=		**0**
Aux. electricity dehum.				kWh/a	* 1,00		* 1,0		* 1		= **0**	*	1,0	/	4,44	=		**0**
Misc. aux. electricity																		
Misc. aux. electricity				kWh/a	* 1,00		* 1,0		* 1		= **0**	*	1,0	/	8,76	=	**0**	**0**
Total											**859**						**55**	**0**
Specific demand	kWh/(m²a) (treated floor area)										**5,3**							

Internal heat gains for residential buildings (at the moment this worksheet is inactive)

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 kWh/(m²a)

Utilisation: 20-Office / Admin. building

Type of values used: 2-Standard

IHG heating 3,50 W/m²

IHG cooling 4,34 W/m²

No input is necessary

Go to utilisation pattern selection

Persons	10,0	P
Living area	163	m²

Heating demand	14	kWh/(m²a)
Heating period	180	d/a

Application	Existing [1/0] or occupancy	Within the thermal envelope [1/0]	Norm consumption		Utilisation factor	Frequency		Useful energy [kWh/a]		Included in electricity balance?		Availability		Utilisation period [h/a]		Internal heat gains [W]
Dishwashing	1	1	1,1	kWh/Use	1,00	65	/(P*a)	715	*			0,30	/	8,76	=	24
Clothes washing	1	1	1,1	kWh/Use	1,00	57	/(P*a)	627	*			0,30	/	8,76	=	21
Clothes drying with:	1	1	3,5	kWh/Use	0,88	57	/(P*a)	1746	*			0,70	/	8,76	=	139
4-Condensation dryer		1	0,0					0				0,80				
Energy consumed by evaporation	0	1	-3,1	kWh/Use	0,60	57	/(P*a)	0	* (1-	0	) *	0,00	/	8,76	=	0
Refrigerating	1	1	0,8	kWh/d	1,00	365	d/a	285	*			1,00	/	8,76	=	33
Freezing	1	1	0,9	kWh/d	1,00	365	d/a	321	*			1,00	/	8,76	=	37
or combination	0	1	1,0	kWh/d	1,00	365	d/a	0	*			1,00	/	8,76	=	0
Cooking	1	1	0,3	kWh/Use	1,00	500	/(P*a)	1250	*			0,50	/	8,76	=	71
Lighting	1	1	60,0	W	1,00	2,9	kh/(P*a)	1740	*			1,00	/	8,76	=	199
Consumer electronics	1	1	80,0	W	1,00	0,55	kh/(P*a)	440	*			1,00	/	8,76	=	50
Household appliances/Other	1	1	50,0	kWh	1,00	1,0	/(P*a)	500	*			1,00	/	8,76	=	57
Auxiliary appliances (cf. aux Electricity sheet)															=	55
Other applications (cf. Electricity sheet)	0	0,0						0	*			0	/	8,76	=	0
Persons	10	1	80,0	W/P	1,00	8,76	kh/a	7008	*			0,55	/	8,76	=	440
Cold water	10	1	-11,4	W/P	1,00	8,76	kh/a								=	-114
DHW - circulation	0	0	0,0	W	1,00	8,76	kh/a	0	*			1,00	/	8,76	=	0
DHW - individual pipes	1	1	0,0	W	1,00	8,76	kh/a	0	*			1,00	/	8,76	=	0
DHW storage tank heating case	1	0	0,0	W	1,00	8,76	kh/a	0	*			1,00	/	8,76	=	0
DHW storage tank cooling case	1	0	0,0	W	1,00	8,76	kh/a	0	*			1,00	/	8,76	=	0
Evaporation	10	1	-25,0	W/P	1,00	8,76	kh/a	-2190	*			1,00	/	8,76	=	-250
Total IHG														W		763
Specific IHG														W/m²		4,68
Heat available from internal sources										180	d/a			kWh/(m²a)		20,2

Internal heat gains for non residential buildings (at the moment this worksheet is inactive)

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 kWh/(m²a)

Utilisation: 20-Office / Admin. building — IHG 3,50 W/m²

Type of values used: 2-Standard — No input is necessary 5,87 W/m²

Persons: 10,0 P — Treated floor area: 163 m² — Heating period: 180 d/a — Room temperature: 20 °C — Internal heat gains aux. electricity: 55 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			Invalid input		{	}* or	{	* Not a standard value	} * 0	* 0	* 1,00	/ 8760	=	0
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)					0	*			-15	* 0	* 1,00	/ 8760	=	0

Lighting / Equipment / Aux. electricity	Useful energy [kWh/a]		Availability		Utilisation period [h/a]		Average heat release
Lighting	2251	*	1	/	8,76	=	257
Office applications (within therm. envelope)	3089	*	1	/	8,76	=	353
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)	0	*	1	/	8,76	=	0
Auxiliary appliances (see 'Aux Electricity' worksheet)						=	55

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 2	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] 8	Loss daytime [W]	Loss night-time [W]	Availability	Utilisation period [d/a]		Average power cold water
Cold water due to flushing WC		22	Group office			0	-6,7	250	* (-13	+ -2	) * 1	/ 365	=	0

Total IHG		W	665
Specific IHG		W/m²	4,1
Heat available from internal sources	180 d/a	kWh/(m²a)	18

Primary Energy Renewable PER

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 kWh/(m²a)

Selection of heat generation system	Contribution margin (useful energy)	
Primary heat generator	Heating	DHW
4-Heating boiler	100%	100%
Secondary heat generator (optional)		
-	0%	0%

Addl. input in following worksheets: Boiler

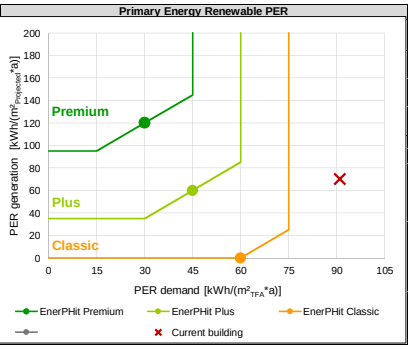
Building type:		
Treated floor area A_{TFA}:	163	m²
Projected building footprint $A_{Projected}$:	98	m²
Heating demand incl. distribution & hydr. frost protection	17	kWh/(m²a)
Cooling energy dem. incl. dehumidification		kWh/(m²a)
DHW demand including distribution:	5	kWh/(m²a)

Energy demand	Final energy		PER			PE		CO_2	
Reference: Treated floor area	Contribution (final energy)	Final energy demand	PER factor	Effective PER factor (including biomass	PER specific value	PE factor	PE Value	CO_2 emissions factor (CO_2-eq)	CO_2eq emissions
		kWh/(m²a)	kWh/kWh	kWh/kWh	kWh/(m²a)	kWh/kWh	kWh/(m²a)	kg/kWh	kg/(m²a)
						1-PE-factors (non-renewable) PHI Certification		1-CO2 factors GEMIS (Germany)	
					90,9		109,5		22,0
Heating				1,32	**35,2**	0,67	**18,0**		**3,3**
Electricity (HP compact unit)			1,80			2,60		0,532	
Electricity (heat pump)			1,80			2,60		0,532	
District heating: 20-Gas CGS 70% PHC			2,8|4,5|3,3			0,70		-0,070	
Pelletfeuerung indirekt: 50-Pellets	100%	21,5	1,10	1,20	25,7	0,20	4,3	0,025	0,5
Natural gas / RE gas			1,75			1,10		0,250	
Heating oil / RE methanol			2,30			1,10		0,320	
Solar thermal system									
Electricity (direct through DHW storage tank)			1,80			2,60		0,532	
Electricity (direct through heating resistance)			1,80			2,60		0,532	
Aux. electricity (vent.winter, frost protection, circ.pump, boiler, wood / pellets)		5,3	1,80	1,80	9,5	2,60	13,7	0,532	2,8
Cooling and dehumidification					**0,0**		**0,0**		**0,0**
Electricity cooling (heat pump)			1,10			2,60		0,532	
Auxiliary electricity cooling, ventilation summer			1,10			2,60		0,532	
Electricity dehumidification (heat pump)			1,15			2,60		0,532	
Auxiliary electricity (dehumidification)			1,15			2,60		0,532	
DHW generation				1,75	**10,5**	0,20	**1,2**		**0,1**
Electricity (HP compact unit)			1,30			2,60		0,532	
Electricity (heat pump)			1,30			2,60		0,532	
District heating: 20-Gas CGS 70% PHC			2,8|4,5|3,3			0,70		-0,070	
Pelletfeuerung indirekt: 50-Pellets	100%	6,0	1,10	1,75	10,5	0,20	1,2	0,025	0,1
Natural gas / RE gas			1,75			1,10		0,250	
Heating oil / Methanol			2,30			1,10		0,320	
Solar thermal system									
Electricity (direct)			1,30			2,60		0,532	
Aux. electricity (circ.pump + storage charge, aux.energy DHW + solar DHW)			1,30			2,60		0,532	
Household electricity		**34,8**		1,30	**45,2**		**90,4**		**18,5**
Electricity (household or non-residential lighting, etc.)		34,8	1,30	1,30	45,2	2,60	90,4	0,532	18,5
Auxiliary electricity (other)			1,30			2,60		0,532	
Gas / RE gas dry/cook		**0,0**	1,75		**0,0**	2,60	**0,0**	0,270	**0,0**

Energy generation	Final energy		PER		PE		CO_2	
Reference: Projected building footprint area	Final energy generation	Final energy generation	PER factor	PER specific value	PE factor	PE Value	Emission factor (CO_2-eq)	CO_2eq emissions
	kWh/a	kWh/(m²$A_{Projected}$*a)	kWh/kWh	kWh/(m²$A_{Projected}$a)	kWh/kWh	kWh/(m²a)	kg/kWh	kg/a
				70,4		**0,0**		**895,1**
PV electricity	6885	70,4	1,00	70,4	0,0	0,0	0,130	895,1
Solar thermal system	0	0,0	1,00	0,0	1,2	0,0		
		0,0						

PE demand requirement in case of verification through PE (non-renewable) [kWh/(m²a)]	120	Current building reaches following class for aspect	110	Requirement met?	yes

Achievable energy standard through the verification of renewable primary energy (assessment of individual aspects)	Useful energy, performance				Airtightness
	Annual heat. dem. Treated floor area	Heating load Treated floor area	Useful cool. energy Treated floor area	Cooling load Treated floor area	n_{50}
	kWh/(m²a)	W/m²	kWh/(m²a)	W/m²	1/h
Requirement EnerPHit Premium Requirement EnerPHit Plus Requirement EnerPHit Classic	20		-	-	1,00
Requirement					
Current building reaches following class for aspect	14 Premium	19	- Unachieved	-	1,0 Premium



Summary	Final energy	PER specific value	PE Value	CO2eq emissions	CO_2eq substitution balance
Though, from the scientific point of view, not entirely correct, different energy carriers will be added together here. This is done to meet the criteria of other energy standards such as Effizienzhaus Plus.			1-PE-factors (non-renewable) PHI Certification	1-CO2 factors GEMIS (Germany)	1-CO2 factors GEMIS (Germany)
	MWh/a	MWh/a	MWh/a	kg/a	kg/a
Demand	**11,0**	**14,8**	17,86	3582	3582
Generation	**-6,9**	**-6,9**	0,00	87528	-2768
Demand, cumulative generation (annual balance)	4,11	7,93	17,86	91111	815
Demand w/o household electricity	**5,3**	**7,5**	3,13	569	569
Demand w/o household electricity, cum. generation	-1,55	0,57	3,13	88097	-2199

Passive House compact unit with exhaust air heat pump

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 kWh/(m²a)

Calculation based on measured values of the laboratory evaluation for component certification

Building type:

Treated floor area A_{TFA}: 163 m²

				Including DHW connection for washing machines & dishwa	
Covered fraction of space heating demand	*('PER' worksheet)*	0%			
Space heating demand + distribution losses	Q_H+Q_{HL}: *(DHW+Distribution)*	2843	kWh		
Solar contribution for space heating	$\eta_{Solar,\ H}$ *('SolarDHW' worksheet)*	0%			
Effective annual heating demand	$Q_{H,WI}=Q_H*(1-\eta_{Solar,\ H})$	0	kWh		
Covered fraction of DHW demand	*('PER' worksheet)*	0%			
Total heating demand of DHW system	Q_{gDHW} *(DHW+Distribution)*	722	kWh	795	kWh
Solar contribution for DHW	$\eta_{Solar,\ DHW}$ *('SolarDHW' worksheet)*	0%		0%	
Effective DHW demand	$Q_{DHW-WI}=Q_{DHW}*(1-\eta_{Solar,\ DHW})$	0	kWh	0	kWh

Sort: AS LIST

Compact unit selection: — Go to list of compact units

Measured values from laboratory test

Ventilation

Effective heat recovery efficiency	η_{eff} *(Test stand)*		
Electric efficiency	*(Test stand)*		Wh/m³

Heating

		Test point 1	Test point 2	Test point 3	Test point 4	
Outdoor air temperature	T_{amb}					°C
Measured thermal power heat pump Heating	$P_{HP,Heating}$					kW
Measured COP Heating	$COP_{Heating}$					-

Domestic hot water

		Test point 1	Test point 2	Test point 3	Test point 4	
Outdoor air temperature	T_{amb}					°C
Measured thermal power DHW storage heating-up	$P_{DHW,Heating-Up}$					kW
Measured thermal power DHW storage reload	$P_{DHW,Reload}$					kW
Measured COP DHW storage heating-up	$COP_{DHW,Heating-Up}$					-
Measured COP DHW storage reload	$COP_{DHW,Reload}$					-

Standby (inputs required only if different from storage reload)

		Test point 1	Test point 2	Test point 3	Test point 4	
Outdoor air temperature	T_{amb}					°C
Measured thermal power heat pump Standby	$P_{HP,Standby}$					kW
Measured COP Standby	$COP_{Standby}$					-

0%

Specific heat loss storage incl. connections	$U * A_{Storage}$ *(Test stand)*		W/K
Average storage temperature in standby mode	$T_{DHW,Standby}$ *(Test stand)*		°C

Heat pump priority — separate heat pumps | DHW priority | Heating priority

Room temperature (°C)	20	
Av. ambient temp. Heating P. (°C)	8	
Av. Ground temp (°C)	13	
Efficiency SHX exhaust air mixing	η^*_{SHX}	
Heat recovery efficiency SHX exhaust air mixing (if applicable)	$\eta_{SHX,add}$ *(Design Value)*	0%
Volume flow rate of added exhaust air (if applicable)	V_{add} *(Test stand)*	m³/h
Hydraulic frost protection		

					Including DHW connection for washing machines & dishwa	
Heat supplied by direct electricity	$Q_{E,dir}$		kWh/a			kWh/a
Space heat supplied by HP	$Q_{HP,Heating}$		kWh/a			kWh/a
Winter DHW supplied by HP	$Q_{HP,DHW,Winter}$	0	kWh/a		0	kWh/a
Winter standby heat supplied by HP	$Q_{HP,Standby,Winter}$		kWh/a			kWh/a
Summer DHW supplied by HP	$Q_{HP,DHW,Summer}$	0	kWh/a		0	kWh/a
Summer standby heat supplied by HP	$Q_{HP,Standby,Summer}$		kWh/a			kWh/a
Performance factor of heat generator, DHW & space heating						
Seasonal performance factor	SPF_{H-3}					
			kWh/a	kWh/(m²a)	kWh/a	kWh/(m²a)
Final energy demand heat generation	Q_{final}					
Annual PE demand (non-renewable primary energy)						
			kg/a	kg/(m²a)	kg/a	kg/(m²a)
Annual CO_2-equivalent emissions						

Heat pump

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 kWh/(m²a)

			Building type:		
			Treated floor area A_{TFA}:	163	m²
	Covered fraction of space heating demand		*('PER' worksheet)*	0%	
	Space heating demand + distribution losses	Q_H+Q_{HL}:	*(DHW+Distribution)*	2843	kWh/a
	Solar fraction for space heat	$\eta_{Solar,\ H}$	*('SolarDHW' worksheet)*	0%	
	Effective annual heating demand	$Q_{H,Wi}=Q_H*(1-\eta_{Solar,\ H})$		**0**	kWh/a
	Covered fraction of DHW demand		*('PER' worksheet)*	0%	
	Total heating demand of DHW system	Q_{gDHW}	*(DHW+Distribution)*	471	kWh/a
	Solar fraction for DHW	$\eta_{Solar,\ DHW}$	*('SolarDHW' worksheet)*	0%	
	Effective DHW demand	$Q_{DHW,Wi}=Q_{DHW}*(1-\eta_{Solar,\ DHW})$		**0**	kWh/a
	Number of heat pumps in the system			1	
	Functionality			Heating & DHW	
Heating					
	Selection of HP: 2-Standard brine/water heat pump	Heat source:		3-Ground probes	
	Selection of distribution system			3-Supply air heating	
	Design distribution temperature	θ_{design}	*(DHW+Distribution)*	55,00	°C
	Nominal power of distribution system	P_{nom}		0,00	kW
	Distribution system (to be completed by experienced users only)				
	Nominal power of distribution system	P_{nom}			kW
	Radiator exponent	n			
	Heat storage tank (buffer storage tank 'DHW+Distribution' worksheet)			0-No	
	Specific heat losses storage	U * A $_{Storage}$			W/K
	Storage location in thermal envelope			2-Outside	
	Room temperature (storage location: outside of thermal envelope)		*(DHW+Distribution)*		°C
	Sink temperature of heat pump for heating	θ_{snk}		61,50	°C
Entries in relation to the domestic hot water system					
	Selection of HP: 0-None	Heat source:			
	DHW temperature		*(DHW+Distribution)*	60,00	°C
	Orientation of DHW storage tank ('storage 1' in 'DHW+Distribution' worksheet)			2-Outside	
	Specific heat losses storage	U * A $_{Storage}$		2,0	W/K
	Room temperature (storage location: outside of thermal envelope)		*(DHW+Distribution)*	12,30	°C
	Type of backup heater				
	Δθ of electric continuous flow water heater				K
Additional options in case of <u>one</u> heat pump for both functions: Heating & DHW					
	Same heat pump's sink temperature for Heating and for DHW			1-Yes	
	Heat pump priority		*(Manufacturer, tech. data)*		
Control strategy					
	Heat pump control strategy				
Heating					
	Depth ground water / Ground collector / Ground probe	z			m
	Power of pump for ground heat exchanger	P_{pump}			kW

-

Heating

Heat pump: Standard brine/water heat pump

Source: 3-

	θ_source °C	θ_sink °C	Heating capacity kW	COP
Test point 1	-5,0	35,0	5,3	3,7
Test point 2	0,0	35,0	6,0	4,3
Test point 3	5,0	35,0	6,7	4,9
Test point 4	-5,0	50,0	5,1	2,6
Test point 5	0,0	50,0	5,9	3,0
Test point 6	5,0	50,0	6,5	3,4
Test point 7				
Test point 8				
Test point 9				
Test point 10				
Test point 11				
Test point 12				
Test point 13				
Test point 14				
Test point 15				

Temperature difference in sink $\Delta\theta_{Sink}$ 5,0 K

DHW

Heat pump: Standard brine/water heat pump

Source: 3-

	θ_source °C	θ_sink °C	Heating capacity kW	COP
Test point 1	-5,0	35,0	5,3	3,7
Test point 2	0,0	35,0	6,0	4,3
Test point 3	5,0	35,0	6,7	4,9
Test point 4	-5,0	50,0	5,1	2,6
Test point 5	0,0	50,0	5,9	3,0
Test point 6	5,0	50,0	6,5	3,4
Test point 7				
Test point 8				
Test point 9				
Test point 10				
Test point 11				
Test point 12				
Test point 13				
Test point 14				
Test point 15				

Temperature difference in sink $\Delta\theta_{Sink}$ 5,0 K

Electr. energy consumption pump (grnd. water / ground)	$Q_{El,Pump}$		kWh/a
Energy by direct electricity	$Q_{El,dir}$	0	kWh/a
Space heat supplied by HP	$Q_{HP,Heating}$	0	kWh/a
Winter DHW supplied by HP	$Q_{HP,DHW,Winter}$	0	kWh/a
Summer DHW supplied by HP	$Q_{HP,DHW,Summer}$	0	kWh/a
Space heating supplied by HP without storage losses	$Q_{HP,Heating}$	0	kWh/a
Winter DHW supplied by HP without storage losses	$Q_{HP,DHW,Winter}$	0	kWh/a
Summer DHW supplied by HP without storage losses	$Q_{HP,DHW,Summer}$	0	kWh/a
Electrical consumption of HP	Qel_{HP}		kWh/a

		1. HP: Heating or heating & DHW	2. HP: Domestic hot
Seasonal performance factor of heat pump	SPF_{H-1}		
		kWh/a	kWh/(m²a)
Final electrical energy demand heat generation	Q_{final}		
Annual primary energy demand			
		kg/a	kg/(m²a)
Annual CO_2-equivalent emissions			

Heat pump ground (ground collectors / ground probes)

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 kWh/(m²a)

Building type:

Treated floor area A_{TFA}: 163 m²

Ground probes

Probe field configuration			A	Individual probe
Length of probe	*('HP' worksheet)*	H	0	m
Probes spacing/distance		B		m
Depth (z=H/2)		z	0	m
Type of probe			A	Double-U
Borehole radius		r_b		m
Inner radius of pipe		r_i		m
Exterior pipe radius		r_a		m
Distance between pipes		B_U		m
Inner radius of pipe casing (only coaxial)		r_{i2}		m
Exterior radius casing pipe (only coaxial)		r_{a2}		m
Thermal conductivity of pipe		λ_R		W/(mK)
Thermal conductivity of back fill		λ_F		W/(mK)
Probe time constant		t_p	0	d
Internal borehole resistance		R_a		Km/W
Borehole resistance		R_b		Km/W

Ground

Soil type	A	Sand, 9% moisture	
Density of the ground	ρ_E	1440	kg/m³
Thermal capacity of ground	cp_E	1507	J/(kgK)
Thermal conductivity of ground	λ_E	1,0	W/(mK)
Soil temperature conductivity	a_E	4,516E-07	m/s²
Ground temperature gradient	Δ_{TG}	0,022	K/m

Brine

Brine (characteristics at 2 °C)	A	Ethylene glycol 25%	
Density of the brine	ρ_S	1052	kg/m³
dynamic viscosity of the brine	η_S	0,0052	kg/(ms)
Heat capacity brine	c_{pS}	3950	J/(kgK)
Thermal conductivity of brine	λ_S	0,48	W/(mK)
Brine - mass flow	m_S		kg/s

Operation type

Waste heat from active cooling to ground probe? Please check, if applicable.

Heat pump operation duration		h/a
Specific heat extraction rate as an annual average	q_{ex}	W/m
	H/R_b	W/K

Ground collectors

Inner radius of pipe	r_i		m
Exterior pipe radius	r_a		m
Thermal conductivity of pipe	λ_r		W/(mK)
Pipe depth	z_{pipe}	0	m
Ground water depth	z_{gw}		m
Pipe spacing	D		m
Base area			m²
Pipe outer surface		#DIV/0!	m²
Pipe length	L	#DIV/0!	m

Brine

Brine (characteristics at 2 °C)	A	Ethylene glycol 25%	
Density of the brine	ρ_S	1052	kg/m³
dynamic viscosity of the brine	η_S	0,0052	kg/(ms)
Heat capacity brine	c_{pS}	3950	J/(kgK)
Thermal conductivity of brine	λ_S	0,48	W/(mK)
Brine - mass flow	m_S		kg/s
Specific heat extraction rate	q_{ex}		W/m²
U * A			W/K

Climate

Period duration		365	d
Average ground surface temp.	T_{m0}	13,3	°C
Surface temperature amplitude	T_1	7,6	°C
Phase shifting surface	t_{02}	33	d

Ground characteristics

		Thermal conductivity [W/(mK)]	Density [kg/m³]	Heat capacity [J/(kg K)]	Heat capacity [MJ/(m³ K)]	Thermal conductivity [10^{-7} m²/s]	Source
A	Sand, 9% moisture	0,980	1440	1507	2,170	4,520	[Neiß 1977]
B	Sand, 13% moisture	1,500	1600	1800	2,880	5,210	[Neiß 1977]
C	Ground, coarse gravel	0,520	2000	1840	3,680	1,410	[VDI 1984]
D	Loam, 36% moisture	2,300	1650	2847	4,700	4,900	[Neiß 1977]
E	Clay	1,280	1500	880	1,320	9,700	[VDI 1984]
F	Clay / Silt	2,200	2550	882	2,250	9,780	[VDI 2000]
G	Slate	2,100	2700	870	2,350	8,940	[VDI 2000]
H	Silt	1,500	1920	2938	5,640	2,660	[ISO 13370]
I	Rock	3,500	2500	2500	6,250	5,600	[ISO 13370]
J							

Result ground probe calculation

Month	Borehole temperature °C
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	

Properties of the brine

		Temperature [°C]	Density [kg/m³]	Heat capacity [J/(kg K)]	Thermal conductivity [W/(mK)]	Dynamic viscosity [kg/(ms)]
A	Ethylene glycol 25%	2	1052	3950	0,480	0,0052
B	Potassium carbonate	2	1265	2941	0,544	0,0031
C	Potassium formate	2	1226	3190	0,534	0,00237
D	Water	2	997	4190	0,590	0,001307
E						

Boiler (gas, oil and wood)

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 kWh/(m²a)

Building type:			
Treated floor area A_{TFA}:		163	m²
Covered fraction of space heating demand	*('PER' worksheet)*	100%	
Space heating demand + distribution losses	Q_H+Q_{HS}: *(DHW+Distribution)*	2843	kWh
Solar contribution for space heating	$\eta_{Solar,\ H}$ *('SolarDHW' worksheet)*	0%	
Effective annual heating demand	$Q_{H,Wi}=Q_H*(1-\eta_{Solar,\ H})$	**2843**	kWh
Space heating demand without distribution losses	Q_H *('Verification' worksheet)*	2245	kWh
Covered fraction of DHW demand	*('PER' worksheet)*	100%	
Total heating demand of DHW system	Q_{gDHW} *(DHW+Distribution)*	795	kWh
Solar contribution for DHW	$\eta_{Solar,\ DHW}$ *('SolarDHW' worksheet)*	0%	
Effective DHW demand	$Q_{DHW,Wi}=Q_{DHW}*(1-\eta_{Solar,\ DHW})$	**795**	kWh

Boiler type		32-Wood pellets (only indirect heat emission)	
Fuel		50-Pellets	
PER factors (renewable primary energy)	*('Data' worksheet)*	1,10	kWh_{PER}/kWh_{Final}
PE factor (non-renewable primary energy)	*('Data' worksheet)*	0,20	kWh_{PE}/kWh_{Final}
CO_2 emissions factor (CO_2-equivalent)	*('Data' worksheet)*	0,025	g/kWh
Useful heat provided	Q_{Use}	3638	kWh/a
Max. heating power required for heating the building	P_{BH} *('Heating load' worksheet)*	3,14	kW
Length of the heating period	t_{HP}	4316	h
Length of DHW heating period	t_{DHW}	8760	h

Use characteristic values entered (check if appropriate)? x

		Project data		Standard values		Input field	
Design output	P_{nom} *(Rating plate)*	17	kW	15	kW	17	
Installation of boiler (Outdoor: 0, Indoor: 1)		0		0		0	
Input values (oil and gas boiler)		Project data		Standard values		Input field	
Boiler efficiency at 30% load	$\eta_{30\%}$ *(Manufacturer)*						
Boiler efficiency at nominal output	$\eta_{100\%}$ *(Manufacturer)*						
Standby heat loss boiler at 70 °C	$q_{B,70}$ *(Manufacturer)*						
Average return flow temperature measured at 30% load	$\vartheta_{30\%}$ *(Manufacturer)*		°C				
Input values (biomass heat generator)		Project data		Standard values		Input field	
Efficiency of heat generator in basic cycle	η_{GZ} *(Manufacturer)*	81%		77%		81%	
Efficiency of heat generator in steady-state operation	η_{SO} *(Manufacturer)*	86%		80%		86%	
Average fraction of heat output released to heating circuit	$z_{HC,m}$ *(Manufacturer)*	1,0		1,0			
Temperature difference betw. power-on and power-off	$\Delta\vartheta$ *(Manufacturer)*	10	K	10	K		
In case of inside installation: area of installation room	$A_{install}$ *(Project)*	0	m²	0	m²		
Useful heat output per basic cycle	$Q_{N,GZ}$ *(Manufacturer)*	15,3	kWh	15,3	kWh		
Average power output of the heat generator	$Q_{N,m}$ *(Manufacturer)*	8,5	kW	8,5	kW		
Heat generator with built in conveyor for pellets							
Unit only with regulation (no fan / no starting aid)							
Auxiliary energy demand for a basic cycle	$Q_{HE,GZ}$ *(Manufacturer)*	0,53	kWh	0,53	kWh		kWh
Power consumption in steady-state operation	$P_{el,SB}$ *(Manufacturer)*	265	W	265	W		W

Utilisation factor of heat generator space heating	$\eta_{H,g,K}$ $=f_j*h_{k^*}$	81%	
Utilisation factor heat generator DHW	$\eta_{DW,g,K}$ $=h_{100\%}/f_{j,DW}$	81%	
Utilisation factor heat generator DHW & space heating	$\eta_{g,K}$	81%	

		kWh/a	kWh/(m²a)
Final energy demand space heating	$Q_{Final,HE}$ $= Q_{H,wi}* e_{H,g,K}$	3497	
Final energy demand DHW	$Q_{Final,TW}$ $= Q_{DHW,wi}* e_{TW,g,K}$	978	
Total final energy demand	Q_{Final} $= Q_{End,HE} + Q_{End,TW}$	4475	27,5
Annual PE demand (non-renewable primary energy)		895	5,5
		kg/a	kg/(m²a)
Annual CO_2-equivalent emissions		112	0,7

District heating and combined heat power (CHP)

Archipente / Climate: Montbrison1314 / TFA: 163 m² / Heating: 13,8 kWh/(m²a) / Freq. overheating: 5 % / PER: 90,9 kWh/(m²a)

	Building type:		
	Treated floor area A_{TFA}:	163	m²
Covered fraction of space heating demand	*('PER' worksheet)*	0%	
Annual heating demand kWh/a	Q_H *(DHW+Distribution)*	2843	kWh
Solar contribution for space heating	$\eta_{Solar,\ H}$ *('SolarDHW' worksheet)*	0%	
Effective annual heating demand	$Q_{H,Wi}=Q_H*(1-\eta_{Solar,\ H})$	**0**	kWh
Covered fraction of DHW demand	*('PER' worksheet)*	0%	
DHW demand	Q_{DHW} *(DHW+Distribution)*	795	kWh
Solar contribution for DHW	$\eta_{Solar,\ DHW}$ *('SolarDHW' worksheet)*	0%	
Effective DHW demand	$Q_{DHW,Wi}=Q_{DHW}*(1-\eta_{Solar,\ DHW})$	**0**	kWh

		PE factor (non-renewable)	CO_2 emissions factor (CO_2-eq)
		kWh_{PE}/kWh_{Final}	kg/kWh
Definition of heat source for PE factor and CO_2 emissions	20-Gas CGS 70% PHC	0,70	-0,070

Definition of heat source for calculation of PER factor

Heat net

Efficiency district heating net

PHC complex & boiler for peak loads	Fraction	Efficiency Electricity	Efficiency Heat		PER factors	PER factors
PHC complex				**Within biomass budget**	1,10	2,80
Boiler for peak loads	100%			**Excess of biomass budget**	1,80	4,50
Total	100%			**DHW Summer**	1,30	3,30

Performance ratio of heat transfer station	$h_{a,HX}$	
Utilisation factor of heat transfer station	$\eta_{a,SHX}$	0%

		kWh/a	kWh/(m²a)
Final energy demand heat generation	Q_{final} = Q_{Use}* $e_{a,DH}$	0	0,0
Annual PE demand (non-renewable primary energy)		0	0,0
		kg/a	kg/(m²a)
Annual CO_2-equivalent emissions		0	0,0

Table of PER and PE factors as well as CO_2-equivalent emission factors of different energy carriers and uses from different sources

			Transfer to 'PER' works	
Energy type	Number	Energy carrier	PER-factor	1-PE-factors (non-renewable) PHI Certification
			$kWh_{prim-el}$/ kWh_{Final}	kWh_{prim}/ kWh_{Final}
	10	None		
Fuel source	20	Heating oil	*2,30*	1,10
	30	Natural gas	*1,75*	1,10
	31	LPG	*1,75*	1,10
	41	Hard coal	*2,30*	1,10
	42	Brown coal	*2,30*	1,20
	32	Biogas	*1,10*	1,10
	21	Pyrolysis oil or bio oil	*1,10*	1,10
	43	Wood	*1,10*	0,20
	44	Wood logs	*1,10*	0,20
	50	Pellets	*1,10*	0,20
	46	Forest woodchips	*1,10*	0,20
	47	Poplar woodchips	*1,10*	0,20
	33	RE-Gas	1,75	
	22	RE-Methanol	2,30	
	48	Biomass	1,10	
Electricity	60	Electricity-mix		2,60
	61	Electricity mix from CHC		2,50
	00	Primary electricity	1,00	
	01	Household electricity	1,30	2,60
	02	Electricity for DHW	1,30	2,60
	03	Electricity for heating	1,80	2,60
	04	Electricity for cooling	1,10	2,60
	05	Electricity for dehumidification	1,15	2,60
	06	Platzhalter_EE-Stromanwendung	-	2,60
	62	Electricity from photovoltaics	*1,00*	0,00
	63	Monocrystalline photovoltaic electric	*1,00*	0,00
	64	Polycrystalline photovoltaic electric s	*1,00*	0,00
	65	Onshore wind power	*1,00*	0,00
	66	Offshore wind power	*1,00*	0,00
	67	Hydroelectric power station > 10MW	*1,00*	0,00
Environmental energy, solar thermal energy	71	Ground heat, geothermal energy	0,00	0,00
	72	Ambient high temperature	0,00	0,00
	73	Ambient low temperature	0,00	0,00
	80	Solar thermal flat plate collector (ger	*1,00*	0,00
	81	Solar thermal evacuated tube collect	*1,00*	0,00
	74	Waste heat	0,00	0,00
User defined energy carrier (for generation, please enter	98	**Eigener Energieträger**		
user defined factords for demand in columns N and O)	99			
	1	1-None		0,00
District heat	10	10-Hard coal CGS 70% PHC		0,80
	11	11-Hard coal CGS 35% PHC		1,10
	12	12-Hard coal CGS 0% PHC		1,50
Gas CGS	20	20-Gas CGS 70% PHC	Calculation	0,70
	21	21-Gas CGS 35% KWK	in	1,10
	22	22-Gas HS 0% PHC	'District	1,50
Heating oil-EL CGS	30	30-Oil CGS 70% PHC	heating'	0,80
	31	31-Oil CGS 35% PHC	worksheet	1,10
	32	32-Oil CGS 0% PHC		1,50
District heating: User determined	40	**40-Eigene Eingabe: 90% KWK**		0,80
District heating combined heat power (CHP)	13	Fossil fuel		0,70
	14	Renewable fuel		0,00
District heating from heating station	15	Fossil fuel		1,30
	16	Renewable fuel		0,10

Heat generator			x) Gas will be used
No.	Type	Fuel ('Comparison' worksheet)	
1	1-None		
10	10-Improved gas condensing boiler	1	x
11	11-Improved oil condensing boiler	2	
12	12-Gas condensing boiler	1	x
13	13-Oil condensing boiler	2	
20	20-Low temperature boiler gas	1	x
21	21-Low temperature boiler oil	2	
30	30-Firewood pieces (direct and indirect heat emission)	3	
31	31-Wood pellets (direct and indirect heat emission)	4	
32	32-Wood pellets (only indirect heat emission)	4	
40	40-Reserve		

Dishwashers and washing machines
1-DHW connection
2-Cold water connection

Clothes drying	Availability electricity	Availability evaporation
1-Clothes line	1	1
2-Drying closet (cold!)	1	1
3-Drying closet (cold!) in extract air	0,9	0,9
4-Condensation dryer	0,7	0
5-Electric exhaust air dryer	1	1
6-Gas exhaust air dryer	1	1

Cooking	Electric fraction	PE factor	CO_2 factor	PER-factor
1-Electricity	100%	2,60	0,53	1,30
2-Natural gas	0%	1,10	0,25	1,75
3-LPG	0%	1,10	0,27	1,75