

Certification Documentation

Building quality		This building		Criteria	Alternative criteria
Heating					
	Heating demand [kWh/(m²a)]	13	≤	15	-
	Heating load [W/m²]	15	≤	-	10
Cooling					
	Cooling + dehumidification demand [kWh/(m²a)]	13	≤	19	19
	Cooling load [W/m²]	14	≤	-	12
	Frequency of excessively high humidity [%]	6	≤	10	
Airtightness					
	Pressurization test result (n ₅₀) [1/h]	0.4	≤	0.6	
Non-renewable primary energy (PE)					
	PE demand [kWh/(m²a)]	115	≤	120	

This building has been awarded the

Quality Approved Passive House

certificate by Passive House Academy LLC.

This certification is based solely on the design data and specifications provided to PHA by the client for the purpose of certification. PHA has checked and approved the building's energy balances according to these data.

This certification does not cover quality assurance of the construction work or design implementation. PHA hereby takes no responsibility for any faults in the above.

Certificate

Certified Passive House Classic



30 Jericho Executive Plaza,
Suite 500W, Jericho
NY11753

Authorised
by:


**Passive House
Institute**
Dr. Wolfgang Feist
64283 Darmstadt
Germany

HANAC Corona Gardens (Senior Residence) 54-17 101st Street, Corona, 11368 New York, USA



Client	HANAC 27-40 Hoyt Ave S., Astoria 11102 New York, USA
Architect	Think 1 Metrotech Center North, 6th Floor, Brooklyn 11201 New York, USA
Building Services	NY Engineers 3 East 54th Street, 7th Floor 10022 New York, USA
Energy Consultant	Association for Energy Affordability 105 Bruckner Blvd, Bronx 10454 New York, USA

Passive House buildings offer excellent thermal comfort and very good air quality all year round. Due to their high energy efficiency, energy costs as well as greenhouse gas emissions are extremely low.

The design of the above-mentioned building meets the criteria defined by the Passive House Institute for the 'Passive House Classic' standard:

Building quality			This building		Criteria	Alternative criteria
Heating	Heating demand	[kWh/(m ² a)]	13	≤	15	-
	Heating load	[W/m ²]	15	≤	-	10
Cooling	Cooling + dehumidification demand	[kWh/(m ² a)]	13	≤	19	19
	Cooling load	[W/m ²]	14	≤	-	12
	Frequency of excessively high humidity	[%]	6	≤	10	
Airtightness						
	Pressurization test result	(n ₅₀) [1/h]	0.4	≤	0.6	
Non-renewable primary energy (PE)						
	PE demand	[kWh/(m ² a)]	115	≤	120	

The associated certification booklet contains more characteristic values for this building.

Certifier: Tomas O'Leary, Passive House Academy

HANAC CORONA PASSIVE HOUSE
 AREA WEIGHTED AVERAGES CALCULATION

	Treated Floor Area	Heating Demand	Heating Demand * Area	Heating Load	Heating Load * Area	Cooling & Dehum Load	Cooling & Dehum Load * Area	Cooling Load	Cooling Load * Area	High Humidity	High Humidity * Area	Press. Test	Press. Test * Area	Primary Energy	Primary Energy * Area
	m²	kWh/(m²a)		W/m²		kWh/(m²a)		W/m²		%		ach		kWh/(m²a)	
RESIDENTIAL	3526.32	13.282	46836.582	14.390	50743.745	13.220	46617.950	13.069	46085.476	6.505	22938.712	0.430	1516.318	113.365	399761.267
SCHOOL	380.70	7.552	2875.046	21.304	8110.433	13.861	5276.883	22.151	8432.886	1.835	698.585	0.430	163.701	124.740	47488.518
AREA-WEIGHTED	3907.02	12.724	49711.629	15.064	58854.178	13.282	51894.833	13.954	54518.362	6.050	23637.296	0.430	1680.019	114.473	447249.785

Passive House Verification



Architecture: **Think**
 Street: **1 Metrotech Center North, 6th Floor, Brooklyn**
 Postcode/City: **11201 New York**
 Province/Country: **NY US-United States of America**

Energy consultancy: **Association for Energy Affordability**
 Street: **105 Bruckner Blvd, Bronx**
 Postcode/City: **10454 New York**
 Province/Country: **NY US-United States of America**

Year of construction: **2018**
 No. of dwelling units: **68**
 No. of occupants: **101.3**

Building: **HANAC Corona Gardens (Senior Residence)**
 Street: **54-17 101st Street, Corona**
 Postcode/City: **11368 New York**
 Province/Country: **NY US-United States of America**
 Building type: **Residential portion of mixed-use building**
 Climate data set: **US0055b-New York**
 Climate zone: **4: Warm-temperate** Altitude of location: **40 m**

Home owner / Client: **HANAC**
 Street: **27-40 Hoyt Ave S., Astoria**
 Postcode/City: **11102 New York**
 Province/Country: **NY US-United States of America**

Mechanical engineer: **NY Engineers**
 Street: **3 East 54th Street, 7th Floor**
 Postcode/City: **10022 New York**
 Province/Country: **NY USA**

Certification: **Passive House Academy**
 Street: **Wicklow County Campus, Clermont House**
 Postcode/City: **A67 X566 Rathnew**
 Province/Country: **County Wicklow Ireland**

Interior temperature winter [°C]: **20.0** Interior temp. summer [°C]: **25.0**
 Internal heat gains (IHG) heating case [W/m²]: **4.1** IHG cooling case [W/m²]: **4.1**
 Specific capacity [Wh/K per m² TFA]: **132** Mechanical cooling: **x**

Specific building characteristics with reference to the treated floor area

		Treated floor area m²		Criteria	Alternative criteria	Fulfilled?²
Space heating	Heating demand kWh/(m²a)	3526.3		15	-	yes
	Heating load W/m²	13	≤	-	10	
Space cooling	Cooling & dehum. demand kWh/(m²a)	14	≤	19	19	yes
	Cooling load W/m²	13	≤	-	12	
	Frequency of overheating (> 25 °C) %	-	≤	-	-	-
	Frequency of excessively high humidity (> 12 g/kg) %	6.5	≤	10	-	yes
Airtightness	Pressurization test result n ₅₀ 1/h	0.43	≤	0.6	-	yes
Non-renewable Primary Energy (PE)	PE demand kWh/(m²a)	113	≤	120	-	yes
Primary Energy Renewable (PER)	PER demand kWh/(m²a)	81	≤	-	-	-
	Generation of renewable energy (in relation to projected building footprint area)	0	≥	-	-	

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.

Task: **2-Certifier** First name: **Tomas** Surname: **O'Leary**
 Certificate ID: **13/10/20** Issued on: **Wicklow**

Passive House Classic? **yes**

Signature:

Climate data

Passive House with PHPP Version 9.6a

HANAC Corona Gardens (Senior Residence) / Climate: New York / TFA: 3526 m² / Heating: 13.3 kWh/(m²a) / Cooling: 13.2 kWh/(m²a) / PER: 80.6 kWh/(m²a)



Month	1	2	3	4	5	6	7	8	9	10	11	12	Heating load		Cooling load		PER factors	
Days	31	28	31	30	31	30	31	31	30	31	30	31	Weather 1	Weather 2	Weather 1	Weather 2		
US0055b-New York	Latitude °	40.8	Longitude °	-74.0	Altitude [m]	40	Daily temperature swing Summer [K]					8.0	Radiation: [W/m²]		Radiation: [W/m²]			
° C	Exterior temperature	0.3	1.8	5.8	11.7	16.9	21.9	24.7	24.0	20.0	13.8	8.7	3.1	-9.9	-4.4	30.3	27.4	1.20
kWh/(m²month)	Radiation North	16	19	29	37	46	51	49	42	32	24	17	14	25	15	85	55	1.15
kWh/(m²month)	Radiation East	44	54	77	83	90	103	104	98	76	66	41	40	60	20	215	175	1.50
kWh/(m²month)	Radiation South	98	104	120	96	85	85	92	101	109	121	98	89	115	25	200	220	1.55
kWh/(m²month)	Radiation West	40	47	75	89	92	100	102	98	80	63	46	32	50	20	205	175	1.90
kWh/(m²month)	Horizontal radiation	57	78	124	148	168	192	193	168	131	99	64	50	70	30	325	290	
° C	Dew point temperature	-6.1	-5.5	-2.4	2.9	9.0	14.7	17.6	17.3	13.9	7.7	1.9	-3.3			22.4	20.0	
° C	Sky temperature	-14.4	-15.3	-10.1	-3.4	2.7	10.1	12.1	13.5	9.0	1.5	-3.8	-12.0			21.3	20.0	
° C	Ground temperature	12.9	11.8	11.6	12.5	15.5	17.5	19.3	20.4	20.6	18.3	16.6	14.7	11.6	11.6	20.6	20.6	
Comment:		Temp = 1981-2010; Other derived from Meteonom and TMY3																

Household electri

Domestic hot wat

Heating

Cooling

Dehumidification

U-value of building assemblies

Passive House with PHPP Version 9.6a

HANAC Corona Gardens (Senior Residence) / Climate: New York / TFA: 3526 m² / Heating: 13.3 kWh/(m²a) / Cooling: 13.2 kWh/(m²a) / PER: 80.6 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	Main Roof Main Roof					
Heat transmission resistance [m²K/W]						
Orientation of building element	1-Roof	interior R _{si}	0.13			
Adjacent to	1-Outdoor air	exterior R _{se}	0.04			
Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
concrete - normal	2.300					229
Polyiso	0.030					203
Percentage of sec. 1		Percentage of sec. 2		Percentage of sec. 3		Total
100%						43.2 cm
U-value supplement		W/(m²K)		U-value:		0.142 W/(m²K)

Assembly no.	Building assembly description					Interior insulation?
02ud	Bulkhead R Bulkhead Roof					
Heat transmission resistance [m²K/W]						
Orientation of building element	1-Roof	interior R _{si}	0.13			
Adjacent to	1-Outdoor air	exterior R _{se}	0.04			
Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
concrete - normal	2.300					152
Polyiso	0.030					203
Percentage of sec. 1		Percentage of sec. 2		Percentage of sec. 3		Total
100%						35.5 cm
U-value supplement		W/(m²K)		U-value:		0.143 W/(m²K)

Assembly no.						Interior insulation?
03ud		Terrace Ro Terrace Roof				
		Heat transmission resistance [m²K/W]				
Orientation of building element		1-Roof		interior R _{si}	0.13	
Adjacent to		1-Outdoor air		exterior R _{se}	0.04	
Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
concrete - normal	2.300					229
Polyiso	0.030					203
Percentage of sec. 1		Percentage of sec. 2		Percentage of sec. 3		Total
100%						43.2 cm
U-value supplement				U-value: 0.142 W/(m²K)		

Assembly no.						Interior insulation?
04ud		Front Wall Front Wall Lower				
		Heat transmission resistance [m²K/W]				
Orientation of building element		2-Wall		interior R _{si}	0.13	
Adjacent to		1-Outdoor air		exterior R _{se}	0.04	
Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
4" Roxul per flexo	0.272					1000
Percentage of sec. 1		Percentage of sec. 2		Percentage of sec. 3		Total
100%						100.0 cm
U-value supplement				U-value: 0.260 W/(m²K)		

Assembly no.						Interior insulation?
05ud		Front Wall Front Wall Upper				
		Heat transmission resistance [m²K/W]				
Orientation of building element		2-Wall		interior R _{si}	0.13	
Adjacent to		1-Outdoor air		exterior R _{se}	0.04	
Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
4" Roxul per flexo	0.272					1000
Percentage of sec. 1		Percentage of sec. 2		Percentage of sec. 3		Total
100%						100.0 cm
U-value supplement				U-value: 0.260 W/(m²K)		

Assembly no.						Interior insulation?
06ud		Rear Wall Rear Wall				
		Heat transmission resistance [m²K/W]				
Orientation of building element		2-Wall		interior R _{si}	0.13	
Adjacent to		1-Outdoor air		exterior R _{se}	0.04	
Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
per flixo	0.208					1000
Percentage of sec. 1		Percentage of sec. 2		Percentage of sec. 3		Total
100%						100.0 cm
U-value supplement		0.00 W/(m²K)		U-value:		0.201 W/(m²K)

Assembly no.						Interior insulation?
07ud		Bulkhead V Bulkhead Wall				
		Heat transmission resistance [m²K/W]				
Orientation of building element		2-Wall		interior R _{si}	0.13	
Adjacent to		1-Outdoor air		exterior R _{se}	0.04	
Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
Concrete	2.100					203
EPS	0.036					125
Percentage of sec. 1		Percentage of sec. 2		Percentage of sec. 3		Total
100%						32.8 cm
U-value supplement				U-value:		0.267 W/(m²K)

Assembly no.						Interior insulation?
08ud		Side Wall Side Wall				
		Heat transmission resistance [m²K/W]				
Orientation of building element		2-Wall		interior R _{si}	0.13	
Adjacent to		1-Outdoor air		exterior R _{se}	0.04	
Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
Per THERM	0.310					1000
	0.000					0
	0.000					0
	0.000					0
Percentage of sec. 1		Percentage of sec. 2		Percentage of sec. 3		Total
100%						100.0 cm
U-value supplement				U-value:		0.294 W/(m²K)

Assembly no.						Interior insulation?
09ud		Party Wall / Party Wall Above Grade				
		Heat transmission resistance [m²K/W]				
Orientation of building element		2-Wall		interior R _{si}	0.13	
Adjacent to		3-Ventilated		exterior R _{se}	0.13	
Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
Gyp Bd US	0.160					16
Air Gap 1.5" 38 mm	0.210					25
Concrete	2.100					203
Roxul IS	0.036					100
Percentage of sec. 1		Percentage of sec. 2		Percentage of sec. 3		Total
100%						34.4 cm
U-value supplement		0.02 W/(m²K)		U-value:		0.318 W/(m²K)

Assembly no.						Interior insulation?
10ud	Ground Floor Ceiling					
Heat transmission resistance [m²K/W]						
Orientation of building element		interior R _{si}		0.13		
Adjacent to		exterior R _{se}		0.13		
Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
Concrete	2.100					229
Percentage of sec. 1		Percentage of sec. 2		Percentage of sec. 3		Total
100%						22.9 cm
U-value supplement		W/(m²K)		U-value: 2.711		W/(m²K)

Assembly no.						Interior insulation?
11ud	Floor Slab					
Heat transmission resistance [m²K/W]						
Orientation of building element		interior R _{si}		0.13		
Adjacent to		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]
concrete - normal	2.300					152
gravel	4.000					356
concrete - normal	2.300					762
XPS	0.030					152
Percentage of sec. 1		Percentage of sec. 2		Percentage of sec. 3		Total
100%						142.2 cm
U-value supplement		0.04		W/(m²K)		U-value: 0.216
						W/(m²K)

Areas determination

HANAC Corona Gardens (Senior Residence) / Climate: New York / TFA: 3526 m² / Heating: 13.3 kWh/(m²a) / Cooling: 13.2 kWh/(m²a) / PER: 80.6 kWh/(m²a)

Summary						Building assembly overview	Average U-value [W/(m²K)]	Radiation-gains heating season [kWh/a]	Radiation-load cooling period [kWh/a]
Temp.-zone	Area group	Group no.	Area / Length	Unit	Comment				
	Treated floor area	1	3526.32	m²	<i>Treated floor area according to PHPP manual</i>			7 Months	8 Months
A	North windows	2	241.70	m²	Results come from the 'Windows' worksheet. Window areas are subtracted from individual opaque areas, which is displayed in the 'Windows' worksheet.	North windows	0.922	5204	10366
A	East windows	3	19.89	m²		East windows	0.846	450	543
A	South windows	4	243.55	m²		South windows	0.903	16060	19701
A	West windows	5	40.04	m²		West windows	0.901	488	1020
A	Horizontal windows	6	3.13	m²		Horizontal windows	2.980	0	0
A	Exterior door	7	10.52	m²	<i>Please subtract area of door from respective building assembly</i>	Exterior door	2.000		
A	External wall - Ambient	8	1877.52	m²	<i>Temperature zone "A" is ambient air</i>	External wall - Ambient	0.252	1020	2058
B	External wall - Ground	9	0.00	m²	<i>Temperature zone "B" is the ground</i>	External wall - Ground			
A	Roof/Ceiling - Ambient	10	710.57	m²		Roof/Ceiling - Ambient	0.143	-232	708
B	Floor slab / Basement ceiling	11	310.00	m²		Floor slab / Basement ceiling	0.216		
		12	0.00	m²	<i>Temperature zones "A", "B", "P" and "X" may be used. NOT "I"</i>				
		13	0.00	m²	<i>Temperature zones "A", "B", "P" and "X" may be used. NOT "I"</i>				
X	Gas Meter Room	14	41.60	m²	<i>Temperature zone "X": Please provide user-defined reduction factor (0 < f < 1):</i>	Gas Meter Room	2.711		
						Factor for X			
						75%			
						Thermal bridges - Overview	Ψ [W/(mK)]		
A	Thermal bridges Ambient	15	792.41	m	<i>Units in m</i>	Thermal bridges Ambient	0.075		
P	Perimeter thermal bridges	16	59.49	m	<i>Units in m; temperature zone "P" is perimeter (see 'Ground' worksheet)</i>	Perimeter thermal bridges	-0.160		
B	Thermal bridges FS/BC	17	0.00	m	<i>Units in m</i>	Thermal bridges FS/BC			
I	Building element towards neigh	18	1302.10	m²	<i>No heat losses, only considered for the heating load calculation</i>	Building element towards neighbour	1.003		
Total thermal envelope						Average therm. envelope	0.380		

[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		+	709.00	-		)		=	709.0									
	Treated floor area	1	Treated floor area	1	x (		x		+	3526.32	-		)		=	3526.3									
	Exterior door	7	Exterior door	5	x (	0.92	x	2.30	+		-		)	-		=	10.5	Exterior door	2.00						
1	Main Roof	10	Roof/Ceiling - Ambient	1	x (		x		+	474.40	-		)	0.0	=	474.4	01ud Main Roof	0.142	0	0	Hor	0.90	0.40	0.90	
2	Bulkhead Roof	10	Roof/Ceiling - Ambient	1	x (		x		+	102.90	-		)	3.1	=	99.8	02ud Bulkhead Roof	0.143	0	0	Hor	1.00	0.60	0.90	
3	Terrace Roof	10	Roof/Ceiling - Ambient	1	x (		x		+	131.30	-		)	0.0	=	131.3	03ud Terrace Roof	0.142	0	0	Hor	0.03	0.60	0.90	
4	Party Wall Above Grade	18	Building element towards neigh	1	x (		x		+	84.80	-		)	0.0	=	84.8	09ud Party Wall Above Grade	0.318	133	90	East	0.00	0.60	0.90	
5	Front Wall Lower	8	External wall - Ambient	1	x (		x		+	291.70	-		)	83.2	=	208.5	04ud Front Wall Lower	0.260	223	90	South	0.40	0.60	0.90	
6	Front Wall Upper	8	External wall - Ambient	1	x (		x		+	470.10	-		)	148.3	=	321.8	05ud Front Wall Upper	0.260	223	90	South	0.40	0.60	0.90	
7	Rear Wall	8	External wall - Ambient	1	x (		x		+	761.80	-		)	222.3	=	539.5	06ud-Rear Wall	0.201	43	90	North	0.40	0.60	0.90	
8	Side Wall	8	External wall - Ambient	1	x (		x		+	288.70	-		)	19.9	=	268.8	08ud Side Wall	0.294	133	90	East	0.40	0.60	0.90	
9	Side Wall	8	External wall - Ambient	1	x (		x		+	283.60	-		)	40.0	=	243.6	08ud Side Wall	0.294	313	90	West	0.40	0.60	0.90	
10	Bulkhead Wall	8	External wall - Ambient	1	x (		x		+	16.20	-		)	0.0	=	16.2	07ud Bulkhead Wall	0.267	313	90	West	0.40	0.60	0.90	
11	Bulkhead Wall	8	External wall - Ambient	1	x (		x		+	5.20	-		)	0.0	=	5.2	07ud Bulkhead Wall	0.267	313	90	West	0.40	0.60	0.90	
12	Bulkhead Wall	8	External wall - Ambient	1	x (		x		+	47.80	-		)	0.0	=	47.8	07ud Bulkhead Wall	0.267	223	90	South	0.40	0.60	0.90	
13	Bulkhead Wall	8	External wall - Ambient	1	x (		x		+	5.20	-		)	0.0	=	5.2	07ud Bulkhead Wall	0.267	133	90	East	0.40	0.60	0.90	
14	Bulkhead Wall	8	External wall - Ambient	1	x (		x		+	14.80	-		)	0.0	=	14.8	07ud Bulkhead Wall	0.267	133	90	East	0.40	0.60	0.90	
15	Bulkhead Wall	8	External wall - Ambient	1	x (		x		+	8.90	-		)	0.0	=	8.9	07ud Bulkhead Wall	0.267	223	90	South	0.40	0.60	0.90	
16	Bulkhead Wall	8	External wall - Ambient	1	x (		x		+	12.20	-		)	0.0	=	12.2	07ud Bulkhead Wall	0.267	223	90	South	0.40	0.60	0.90	
17	Bulkhead Wall	8	External wall - Ambient	1	x (		x		+	1.40	-		)	0.0	=	1.4	07ud Bulkhead Wall	0.267	133	90	East	0.40	0.60	0.90	
18	Bulkhead Wall	8	External wall - Ambient	1	x (		x		+	9.00	-		)	0.0	=	9.0	07ud Bulkhead Wall	0.267	43	90	North	0.40	0.60	0.90	
19	Bulkhead Wall	8	External wall - Ambient	1	x (		x		+	50.90	-		)	0.0	=	50.9	07ud Bulkhead Wall	0.267	43	90	North	0.40	0.60	0.90	
20	Bulkhead Wall	8	External wall - Ambient	1	x (		x		+	8.90	-		)	0.0	=	8.9	07ud Bulkhead Wall	0.267	43	90	North	0.40	0.60	0.90	
21	Party Wall Above Grade	18	Building element towards neigh	1	x (		x		+	89.90	-		)	0.0	=	89.9	09ud Party Wall Above Grade	0.318	313	90	West	0.00	0.60	0.90	
22	<GROUND FLOOR>				x (		x		+		-		)	0.0	=										
23	Floor Slab	11	Floor slab / Basement ceiling	1	x (		x		+	310.00	-		)	0.0	=	310.0	11ud-Floor Slab	0.216	0	0	Hor	0.00	0.40	0.90	
24	Rear Wall 6	8	External wall - Ambient	1	x (		x		+	54.00	-		)	19.4	=	34.6	06ud-Rear Wall	0.201	43	90	North	0.40	0.60	0.90	
25	Rear Wall 10	8	External wall - Ambient	1	x (		x		+	14.70	-		)	0.0	=	14.7	06ud-Rear Wall	0.201	313	90	West	0.40	0.60	0.90	
26	Front Wall Lower 11	8	External wall - Ambient	1	x (		x		+	39.70	-		)	12.0	=	27.7	04ud-Front Wall Lower	0.260	223	90	South	0.40	0.60	0.90	
27	Party Wall Above Grade 14	18	Building element towards neigh	1	x (		x		+	66.00	-		)	0.0	=	66.0	09ud-Party Wall Above Grade	0.318	0	90	North	0.40	0.60	0.90	
28	Party Wall Above Grade 15	18	Building element towards neigh	1	x (		x		+	689.00	-		)	0.0	=	689.0	09ud-Party Wall Above Grade	0.318	223	90	South	0.40	0.60	0.90	
29	Front Wall Lower 18	8	External wall - Ambient	1	x (		x		+	37.90	-		)	0.0	=	37.9	04ud-Front Wall Lower	0.260	223	90	South	0.40	0.60	0.90	

Areas determination

HANAC Corona Gardens (Senior Residence) / Climate: New York / TFA: 3526 m² / Heating: 13.3 kWh/(m²a) / Cooling: 13.2 kWh/(m²a) / PER: 80.6 kWh/(m²a)

Summary						Building assembly overview	Average U-value [W/(m²K)]	Radiation-gains heating season [kWh/a]	Radiation-load cooling period [kWh/a]
Temp.-zone	Area group	Group no.	Area / Length	Unit	Comment				
	Treated floor area	1	3526.32	m²	<i>Treated floor area according to PHPP manual</i>				
A	North windows	2	241.70	m²	Results come from the 'Windows' worksheet. Window areas are subtracted from individual opaque areas, which is displayed in the 'Windows' worksheet.	North windows	0.922	5204	10366
A	East windows	3	19.89	m²		East windows	0.846	450	543
A	South windows	4	243.55	m²		South windows	0.903	16060	19701
A	West windows	5	40.04	m²		West windows	0.901	488	1020
A	Horizontal windows	6	3.13	m²		Horizontal windows	2.980	0	0
A	Exterior door	7	10.52	m²	<i>Please subtract area of door from respective building assembly</i>	Exterior door	2.000		
A	External wall - Ambient	8	1877.52	m²	<i>Temperature zone "A" is ambient air</i>	External wall - Ambient	0.252	1020	2058
B	External wall - Ground	9	0.00	m²	<i>Temperature zone "B" is the ground</i>	External wall - Ground			
A	Roof/Ceiling - Ambient	10	710.57	m²		Roof/Ceiling - Ambient	0.143	-232	708
B	Floor slab / Basement ceiling	11	310.00	m²		Floor slab / Basement ceiling	0.216		
		12	0.00	m²	<i>Temperature zones "A", "B", "P" and "X" may be used. NOT "I"</i>				
		13	0.00	m²	<i>Temperature zones "A", "B", "P" and "X" may be used. NOT "I"</i>				
X	Gas Meter Room	14	41.60	m²	<i>Temperature zone "X": Please provide user-defined reduction factor (0 < f < 1):</i>	Gas Meter Room	2.711		
					Factor for X				
A	Thermal bridges Ambient	15	792.41	m	<i>Units in m</i>	Thermal bridges - Overview	Ψ [W/(mK)]		
P	Perimeter thermal bridges	16	59.49	m	<i>Units in m; temperature zone "P" is perimeter (see 'Ground' worksheet)</i>	Thermal bridges Ambient	0.075		
B	Thermal bridges FS/BC	17	0.00	m	<i>Units in m</i>	Perimeter thermal bridges	-0.160		
						Thermal bridges FS/BC			
I	Building element towards neighbour	18	1302.10	m²	<i>No heat losses, only considered for the heating load calculation</i>	Building element towards neighbour	1.003		
Total thermal envelope			3498.52	m²		Average therm. envelope	0.380		

[Go to building components list](#)

30				x (	x	+	-	) -	0.0	=											
31	Ground Floor Ceiling	18	Building element towards neigh	1	x (	x	+	372.40	-	) -	0.0	=	372.4	10ud-Ground Floor Ceiling	2.711	0	0	Hor	0.00	0.40	0.90
32	Suspended Floor	10	Roof/Ceiling - Ambient	1	x (	x	+	5.10	-	) -	0.0	=	5.1	04ud-Front Wall Lower	0.260	0	0	Hor	0.00	0.40	0.90
33	Gas Meter Room Walls	14	Gas Meter Room	1	x (	x	+	28.70	-	) -	0.0	=	28.7	10ud-Ground Floor Ceiling	2.711	0	0	Hor	0.00	0.40	0.90
34	Gas Meter Room Ceiling	14	Gas Meter Room	1	x (	x	+	12.90	-	) -	0.0	=	12.9	10ud-Ground Floor Ceiling	2.711	0	0	Hor	0.00	0.40	0.90
35				x (	x	+	-	) -	0.0	=											
36				x (	x	+	-	) -	0.0	=											
37				x (	x	+	-	) -	0.0	=											
38				x (	x	+	-	) -	0.0	=											
39				x (	x	+	-	) -	0.0	=											
40				x (	x	+	-	) -	0.0	=											
41				x (	x	+	-	) -	0.0	=											
42				x (	x	+	-	) -	0.0	=											
43				x (	x	+	-	) -	0.0	=											
44				x (	x	+	-	) -	0.0	=											
45				x (	x	+	-	) -	0.0	=											
46				x (	x	+	-	) -	0.0	=											
47				x (	x	+	-	) -	0.0	=											
48				x (	x	+	-	) -	0.0	=											
49				x (	x	+	-	) -	0.0	=											
50				x (	x	+	-	) -	0.0	=											
Aend																					

Areas determination

HANAC Corona Gardens (Senior Residence) / Climate: New York / TFA: 3526 m² / Heating: 13.3 kWh/(m²a) / Cooling: 13.2 kWh/(m²a) / PER: 80.6 kWh/(m²a)

Summary						Building assembly overview	Average U-value [W/(m ² K)]	Radiation-gains heating season [kWh/a] 7 Months
Temp.-zone	Area group	Group no.	Area / Length	Unit	Comment			
	Treated floor area	1	3526.32	m ²	<i>Treated floor area according to PHPP manual</i>			
A	North windows	2	241.70	m ²	Results come from the 'Windows' worksheet. Window areas are subtracted from individual opaque areas, which is displayed in the 'Windows' worksheet.	North windows	0.922	5204
A	East windows	3	19.89	m ²		East windows	0.846	450
A	South windows	4	243.55	m ²		South windows	0.903	16060
A	West windows	5	40.04	m ²		West windows	0.901	488
A	Horizontal windows	6	3.13	m ²		Horizontal windows	2.980	0
A	Exterior door	7	10.52	m ²	<i>Please subtract area of door from respective building assembly</i>	Exterior door	2.000	
A	External wall - Ambient	8	1877.52	m ²	<i>Temperature zone "A" is ambient air</i>	External wall - Ambient	0.252	1020
B	External wall - Ground	9	0.00	m ²	<i>Temperature zone "B" is the ground</i>	External wall - Ground		
A	Roof/Ceiling - Ambient	10	710.57	m ²		Roof/Ceiling - Ambient	0.143	-232
B	Floor slab / Basement ceiling	11	310.00	m ²		Floor slab / Basement ceiling	0.216	
		12	0.00	m ²	<i>Temperature zones "A", "B", "P" and "X" may be used. NOT "I"</i>			
		13	0.00	m ²	<i>Temperature zones "A", "B", "P" and "X" may be used. NOT "I"</i>			
X	Gas Meter Room	14	41.60	m ²	<i>Temperature zone "X": Please provide user-defined reduction factor (0 < f_t < 1):</i>	Gas Meter Room	2.711	
						Factor for X		
						75%		
						Thermal bridges - Overview	Ψ [W/(mK)]	
A	Thermal bridges Ambient	15	792.41	m	<i>Units in m</i>	Thermal bridges Ambient	0.075	
P	Perimeter thermal bridges	16	59.49	m	<i>Units in m; temperature zone "P" is perimeter (see 'Ground' worksheet)</i>	Perimeter thermal bridges	-0.160	
B	Thermal bridges FS/BC	17	0.00	m	<i>Units in m</i>	Thermal bridges FS/BC		
I	Building element towards neighbour	18	1302.10	m ²	<i>No heat losses, only considered for the heating load calculation</i>	Building element towards neighbour	1.003	
Total thermal envelope			3498.52	m²		Average therm. envelope	0.380	

[Go to building components list](#)

Thermal bridge inputs																	Sortierung ändern	
No.	Thermal bridge - denomination	Group No.	Assigned to group	Quan- tity	x (	Length [m]	-	Subtraction length [m]	)=	Length ℓ [m]	User determined psi value [W/(mK)]	User determined f _{RSI} =0.25 (optional)	or	Selection building system	Ψ-Value [W/(mK)]	f _{RSI} -Requirement met?		
1	Wall - Vertical	15	Thermal bridges Ambient	1	x (	112.16	-		)=	112.16	0.020		or		0.020			
2	Wall Corner - Vertical	15	Thermal bridges Ambient	1	x (	76.15	-		)=	76.15	-0.080		or		-0.080			
3	Wall Corner - Vertical	15	Thermal bridges Ambient	1	x (	11.58	-		)=	11.58	-0.060		or		-0.060			
4	Wall Corner - Vertical	15	Thermal bridges Ambient	1	x (	20.58	-		)=	20.58	-0.060		or		-0.060			
5	Wall - Horizontal	15	Thermal bridges Ambient	1	x (	29.72	-		)=	29.72	0.080		or		0.080			
6	Wall - Horizontal	15	Thermal bridges Ambient	1	x (	35.16	-		)=	35.16	0.080		or		0.080			
7	Parapet	15	Thermal bridges Ambient	1	x (	63.19	-		)=	63.19	0.100		or		0.100			
8	Parapet - Low	15	Thermal bridges Ambient	1	x (	39.18	-		)=	39.18	-0.030		or		-0.030			
9	Parapet - Low	15	Thermal bridges Ambient	1	x (	65.66	-		)=	65.66	0.260		or		0.260			
10	Parapet - Low	15	Thermal bridges Ambient	1	x (	11.21	-		)=	11.21	0.260		or		0.260			
11	Wall/Roof at Bulkhead - Horizontal	15	Thermal bridges Ambient	1	x (	50.34	-		)=	50.34	0.030		or		0.030			
12	Parapet - Planter	15	Thermal bridges Ambient	1	x (	27.67	-		)=	27.67	0.330		or		0.330			
13	Parapet - Planter	15	Thermal bridges Ambient	1	x (	7.19	-		)=	7.19	0.350		or		0.350			
14	Wall/Roof at Terrace	15	Thermal bridges Ambient	1	x (	36.58	-		)=	36.58	0.070		or		0.070			
15	Wall/Roof at Bulkhead - Horizontal	15	Thermal bridges Ambient	1	x (	15.32	-		)=	15.32	0.030		or		0.030			
16	Wall Corner at Bulkhead - Vertical	15	Thermal bridges Ambient	1	x (	2.90	-		)=	2.90	0.060		or		0.060			
17	0.0				x (		-		)=				or					
18					x (		-		)=				or					
19	Leaders (Rain Water Pipes)	15	Thermal bridges Ambient	6	x (	24.00	-		)=	144.00	0.124		or		0.124			
20	Water Heater Direct Vent	15	Thermal bridges Ambient	4	x (	1.50	-		)=	6.00	0.124		or		0.124			
21					x (		-		)=				or					
22	G1 Wall/Ceiling between Ground Floor and 2nd Floor	15	Thermal bridges Ambient	1	x (	6.90	-		)=	6.90	0.030		or		0.030			
23	G2 Wall/Ceiling between Ground Floor and 2nd Floor	15	Thermal bridges Ambient	1	x (	2.67	-		)=	2.67	0.010		or		0.010			
24	G3 Wall/Ceiling between Ground Floor and 2nd Floor	15	Thermal bridges Ambient	1	x (	9.82	-		)=	9.82	0.030		or		0.030			
25	G4 Wall/Roof/Ceiling between Ground Floor and 2nd Floor	15	Thermal bridges Ambient	0	x (	26.73	-		)=	0.00	-0.120		or		-0.120			
26	G5 G2 Sim	15	Thermal bridges Ambient	0	x (	2.74	-		)=	0.00	0.010		or		0.010			
27	G6 G2 Sim	15	Thermal bridges Ambient	1	x (	0.85	-		)=	0.85	0.010		or		0.010			

Areas determination

HANAC Corona Gardens (Senior Residence) / Climate: New York / TFA: 3526 m² / Heating: 13.3 kWh/(m²a) / Cooling: 13.2 kWh/(m²a) / PER: 80.6 kWh/(m²a)

Summary						Building assembly overview	Average U-value [W/(m ² K)]	Radiation-gains heating season [kWh/a] 7 Months
Temp.-zone	Area group	Group no.	Area / Length	Unit	Comment			
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A	East windows	3	19.89	m ²		East windows	0.846	450
A	South windows	4	243.55	m ²		South windows	0.903	16060
A	West windows	5	40.04	m ²		West windows	0.901	488
A	Horizontal windows	6	3.13	m ²		Horizontal windows	2.980	0
A	Exterior door	7	10.52	m ²	<i>Please subtract area of door from respective building assembly</i>	Exterior door	2.000	
A	External wall - Ambient	8	1877.52	m ²	<i>Temperature zone "A" is ambient air</i>	External wall - Ambient	0.252	1020
B	External wall - Ground	9	0.00	m ²	<i>Temperature zone "B" is the ground</i>	External wall - Ground		
A	Roof/Ceiling - Ambient	10	710.57	m ²		Roof/Ceiling - Ambient	0.143	-232
B	Floor slab / Basement ceiling	11	310.00	m ²		Floor slab / Basement ceiling	0.216	
		12	0.00	m ²	<i>Temperature zones "A", "B", "P" and "X" may be used. NOT "I"</i>			
		13	0.00	m ²	<i>Temperature zones "A", "B", "P" and "X" may be used. NOT "I"</i>			
X	Gas Meter Room	14	41.60	m ²	<i>Temperature zone "X": Please provide user-defined reduction factor (0 < f_t < 1):</i>	Gas Meter Room	2.711	
					Factor for X			
A	Thermal bridges Ambient	15	792.41	m	<i>Units in m</i>	Thermal bridges - Overview	Ψ [W/(mK)]	
P	Perimeter thermal bridges	16	59.49	m	<i>Units in m; temperature zone "P" is perimeter (see 'Ground' worksheet)</i>	Thermal bridges Ambient	0.075	
B	Thermal bridges FS/BC	17	0.00	m	<i>Units in m</i>	Perimeter thermal bridges	-0.160	
						Thermal bridges FS/BC		
I	Building element towards neighbour	18	1302.10	m ²	<i>No heat losses, only considered for the heating load calculation</i>	Building element towards neighbour	1.003	
Total thermal envelope			3498.52	m²		Average therm. envelope	0.380	

[Go to building components list](#)

28	G7 Wall/Roof at Ground Floor (TB 8 Sim)	15	Thermal bridges Ambient	0	x (32.79	-	) =	0.00	-0.030		or	-0.030	
29	G8 Wall/Roof at Ground Floor (TB 8 Sim)	15	Thermal bridges Ambient	0	x (4.33	-	) =	0.00	-0.030		or	-0.030	
30	G9 Wall/Ground Typ	16	Perimeter thermal bridges	1	x (6.91	-	) =	6.91	-0.160		or	-0.160	
31	G10 Wall/Ground at Side Wall	16	Perimeter thermal bridges	0	x (9.78	-	) =	0.00	-0.270		or	-0.270	
32	G11 Wall/Ground (G9 Sim)	16	Perimeter thermal bridges	1	x (42.57	-	) =	42.57	-0.160		or	-0.160	
33	G12 Wall/Ground at Side Wall	16	Perimeter thermal bridges	0	x (0.85	-	) =	0.00	-0.270		or	-0.270	
34	G13 Wall Corner - Vertical (TB 2 Sim)	15	Thermal bridges Ambient	1	x (3.76	-	) =	3.76	-0.080		or	-0.080	
35	G14 Wall between Party Wall and Ambient	15	Thermal bridges Ambient	0	x (3.81	-	) =	0.00	0.000		or	0.000	
36	G15 Wall Corner - Vertical (TB 2 Sim)	15	Thermal bridges Ambient	1	x (3.81	-	) =	3.81	-0.080		or	-0.080	
37	G16 Wall Corner (inverse of G17)	15	Thermal bridges Ambient	0	x (3.76	-	) =	0.00	0.040		or	0.040	
38	G17 Wall Corner - Vertical	15	Thermal bridges Ambient	0	x (11.29	-	) =	0.00	-0.040		or	-0.040	
39	G18 Wall Corner (inverse of G17)	15	Thermal bridges Ambient	0	x (7.52	-	) =	0.00	0.040		or	0.040	
40	G19 Wall Corner - Vertical (TB 2 Sim)	15	Thermal bridges Ambient	0	x (3.76	-	) =	0.00	-0.080		or	-0.080	
41	G20 Wall Corner - Vertical (TB 2 Sim)	15	Thermal bridges Ambient	0	x (7.53	-	) =	0.00	-0.080		or	-0.080	
42	G21	15	Thermal bridges Ambient	0	x (16.54	-	) =	0.00	0.030		or	0.030	
43	G22	15	Thermal bridges Ambient	1	x (10.01	-	) =	10.01	0.030		or	0.030	
44	G23	16	Perimeter thermal bridges	0	x (16.54	-	) =	0.00	-0.160		or	-0.160	
45	G24	16	Perimeter thermal bridges	1	x (10.01	-	) =	10.01	-0.160		or	-0.160	
46					x (	-	) =				or		
47					x (	-	) =				or		
48					x (	-	) =				or		
49					x (	-	) =				or		
50					x (	-	) =				or		

Heat losses through the ground

HANAC Corona Gardens (Senior Residence) / Climate: New York / TFA: 3526 m² / Heating: 13.3 kWh/(m²a) / Cooling: 13.2 kWh/(m²a) / PER: 80.6 kWh/(m²a)

Building section 1

Ground characteristics

Thermal conductivity	λ	2.0	W/(mK)
Heat capacity	ρC	2.0	MJ/(m ³ K)
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	$T_{g,ave}$	13.7	°C
Amplitude of $T_{g,ave}$	$T_{g,\Delta}$	12.2	°C
Phase shifting of $T_{e,m}$	τ	1.2	Months
Length of the heating period	n	5.7	Months
Heating degree hours - exterior	G_e	64.4	kKh/a

Building data

Area of ground floor slab / basement (A)	310.0	m ²
Perimeter length	114.0	m
Charact. dimension of floor slab	5.44	m

U-value floor slab/basement ceiling	U_f	0.216	W/(m ² K)
TBs floor slab / basement ceiling	$\Psi_{B,*I}$	-0.16	W/K
U-value floor slab / basement ceiling ii U_f'		0.215	W/(m ² K)
Equivalent thickness floor	d_f	9.28	m

Floor slab type (select only one)

☒ Slab on grade					
Perimeter insulation width/depth	D	1.00	m	Orientation of perimeter insulation	horizontal
Perimeter insulation thickness	d_n	0.10	m	(check only one field)	vertical
Conductivity perimeter insulation	λ_n	0.040	W/(mK)		☒

Heated basement or floor slab completely / partially below ground level

Basement wall height below ground le Z		m	U-Value wall below ground	U_{WB}		W/(m ² K)
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Unheated basement

Height aboveground wall	h		m	U-Value wall above ground	U_W		W/(m ² K)
Basement wall height below ground le Z			m	U-Value wall below ground	U_{WB}		W/(m ² K)
Air change unheated basement	n	0.20	h ⁻¹	U-Value basement floor slab	U_{fB}		W/(m ² K)
Air volume basement	V		m ³				

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

U-Value crawl space	U_{Crawl}		W/(m ² K)	Area of ventilation openings	εP		m ²
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/(m ² K)	Wind shield factor	f_W	0.05	-

Additional thermal bridge heat losses at perimeter

Phase shift	β		Months	Steady-state fraction	$\Psi_{P,stat,*I}$	0.000	W/K
				Harmonic fraction	$\Psi_{P,harm,*I}$	0.000	W/K

Groundwater correction

Depth of the groundwater table	z_w	3.0	m	Groundwater correction factor	G_w	1.00636632	-
Groundwater flow rate	q_w	0.05	m/d				

Interim results

Phase shift	β	1.38	Months	Steady-state heat flow	Φ_{stat}	305.9	W
Steady-state transmittance	L_S	48.75	W/K	Periodic heat flow	Φ_{harm}	128.4	W
Exterior periodic transmittance	L_{pe}	21.14	W/K	Heat losses during heating period	Q_{tot}	1823	kWh
Transmittance building	L_0	66.79	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	12.9	11.8	11.6	12.5	14.2	16.2	18.0	19.1	19.2	18.3	16.6	14.7	15.4
Summer	14.2	13.1	13.0	13.9	15.5	17.5	19.3	20.4	20.6	19.7	18.0	16.0	16.8

Design ground temperature for 'Heating load' worksheet

11.6

For 'Cooling load' worksheet

20.6

Reduction factor for 'Annual heating' worksheet

0.42

Total result (all building parts)

Phase shift	β	1.38	Months	Steady-state heat flow	Φ_{stat}	305.9	W
Steady-state transmittance	L_S	48.75	W/K	Periodic heat flow	Φ_{harm}	128.4	W
Exterior periodic transmittance	L_{pe}	21.14	W/K	Heat losses during heating period	Q_{tot}	1823	kWh
Transmittance building	L_0	66.79	W/K	Charact. dimension of floor slab	B'	5.44	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	12.9	11.8	11.6	12.5	14.2	16.2	18.0	19.1	19.2	18.3	16.6	14.7	15.4
Summer	14.2	13.1	13.0	13.9	15.5	17.5	19.3	20.4	20.6	19.7	18.0	16.0	16.8

Design ground temperature for 'Heating load' worksheet

11.6

For 'Cooling load' worksheet

20.6

Reduction factor for 'Annual heating' worksheet

0.42

HANAC Corona Gardens (Senior Residence) / Climate: New York / TFA: 3526 m² / Heating: 13.3 kWh/(m²a) / Cooling: 13.2 kWh/(m²a) / PER: 80.6 kWh/(m²a)

- Go to: [AREAS](#)
[Thermal bridges \(Psi-values\)](#)
[Glazing](#)
[Window frames](#)
- [www.passivehouse.com/component-database](#)
[Ventilation units](#)
[Compact units](#)
[Heat recovery DHW](#)

Building assemblies (U-Values)					
Recommended starting values for optimisation: U-values for walls and roofs Floor slabs: 0.3 W/(m²K) 0.5 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	Main Roof	Main Roof	0.432	0.142	0
02ud	Bulkhead Roof	Bulkhead Roof	0.355	0.143	0
03ud	Terrace Roof	Terrace Roof	0.432	0.142	0
04ud	Front Wall Lower	Front Wall Lower	1.000	0.260	0
05ud	Front Wall Upper	Front Wall Upper	1.000	0.260	0
06ud	Rear Wall	Rear Wall	1.000	0.201	0
07ud	Bulkhead Wall	Bulkhead Wall	0.328	0.267	0
08ud	Side Wall	Side Wall	1.000	0.294	0
09ud	Party Wall Above Grade	Party Wall Above Grade	0.344	0.318	0
10ud	Ground Floor Ceiling	Ground Floor Ceiling	0.229	2.711	0
11ud	Floor Slab	Floor Slab	1.422	0.216	0
12ud					
13ud					
14ud					
15ud					
16ud					
17ud					
18ud					
19ud					
20ud			0.200	3.846	0
21ud					
22ud					
23ud					
24ud					
25ud					
26ud					
27ud					
28ud					
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50ud					
51ud					
52ud					

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	opaque panel	0.00	0.50
02ud	Design	0.30	0.50
03ud	Guardian for AT 790 SI	0.33	0.50
04ud	CW	0.33	0.50
05ud	Intus CG4x20Arx4x18ArxCg4	0.37	0.50
06ud	Kawneer 3x Glaz	0.20	0.50
07ud	Bilco Insul Panel	0.00	0.28
08ud			
09ud			
10ud			
11ud			
12ud			
13ud			
14ud			
15ud			
16ud			
17ud			
18ud			
19ud			
20ud			
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59ud			
60ud			

Window frames										Window frames									
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	Ψ _{Glazing edge left}	Ψ _{Glazing edge right}	Ψ _{Glazing edge bottom}	Ψ _{Glazing edge top}	Ψ _{Installation left}	Ψ _{Installation right}	Ψ _{Installation bottom}	Ψ _{Installation top}	X _{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	AT 790 SI Single Tilt and Turn	1.06	1.06	1.06	1.06	0.114	0.114	0.114	0.114	0.030	0.030	0.030	0.030	0.020	0.020	0.030	0.020		
02ud	AT 790 SI Operable at Left	1.06	0.99	1.06	1.06	0.114	0.069	0.114	0.114	0.030	0.030	0.030	0.030	0.040	0.040	0.040	0.040		
03ud	AT 790 SI Fixed at Right	0.99	0.66	0.66	0.66	0.069	0.062	0.062	0.062	0.030	0.030	0.030	0.030	0.040	0.040	0.040	0.040		
04ud	AT 790 SI Operable at Right	0.99	1.06	1.06	1.06	0.069	0.114	0.114	0.114	0.030	0.030	0.030	0.030	0.040	0.040	0.040	0.040		
05ud	AT 790 SI Fixed at Left	0.66	0.99	0.66	0.66	0.062	0.069	0.062	0.062	0.030	0.030	0.030	0.030	0.040	0.040	0.040	0.040		
06ud	AT 790 SI Operable middle at CW	0.99	0.99	1.06	1.06	0.069	0.069	0.114	0.114	0.030	0.030	0.030	0.030	0.050	0.050	0.050	0.050		
07ud	AT 500 CC fixed middle	0.61	0.61	0.62	0.62	0.025	0.025	0.050	0.050	0.030	0.030	0.030	0.030	0.070	0.070	0.070	0.070		
08ud	AT 500 CC fixed left	0.61	0.61	0.62	0.62	0.050	0.025	0.050	0.050	0.030	0.030	0.030	0.030	0.070	0.070	0.070	0.070		
09ud	AT 500 CC fixed right	0.61	0.61	0.62	0.62	0.025	0.050	0.050	0.050	0.030	0.030	0.030	0.030	0.070	0.070	0.070	0.070		
10ud																			
11ud	Intus Single Tilt and Turn EIFS	0.95	0.95	0.95	0.95	0.120	0.120	0.120	0.120	0.037	0.037	0.037	0.037	0.024	0.024	0.107	0.152		
12ud	Intus Operable at Left EIFS	0.95	0.95	0.95	0.95	0.120	0.073	0.120	0.120	0.037	0.037	0.037	0.037	0.024	0.024	0.107	0.152		
13ud	Intus Fixed at Right EIFS	0.95	0.95	0.95	0.95	0.073	0.070	0.070	0.070	0.037	0.037	0.037	0.037	0.024	0.024	0.098	0.152		
14ud	Intus Operable at Right EIFS	0.95	0.95	0.95	0.95	0.073	0.120	0.120	0.120	0.037	0.037	0.037	0.037	0.024	0.024	0.107	0.152		
15ud	Intus Fixed at Left EIFS	0.95	0.95	0.95	0.95	0.070	0.073	0.070	0.070	0.037	0.037	0.037	0.037	0.024	0.024	0.098	0.152		
16ud	Intus Operable Middle at Storefront EIFS	0.95	0.95	0.95	0.95	0.120	0.120	0.070	0.070	0.037	0.037	0.037	0.037	0.024	0.024	0.107	0.152		
17ud	Intus Fixed Middle at Storefront EIFS	0.95	0.95	0.95	0.95	0.076	0.076	0.070	0.070	0.037	0.037	0.037	0.037	0.024	0.024	0.107	0.152		
18ud	Intus Fixed Left at Storefront EIFS	0.95	0.95	0.95	0.95	0.076	0.070	0.070	0.070	0.037	0.037	0.037	0.037	0.024	0.024	0.107	0.152		
19ud	Intus Fixed Right at Storefront EIFS	0.95	0.95	0.95	0.95	0.070	0.076	0.070	0.070	0.037	0.037	0.037	0.037	0.024	0.024	0.107	0.152		
20ud																			
21ud	Intus Single Tilt and Turn Roxul	0.95	0.95	0.95	0.95	0.120	0.120	0.120	0.120	0.037	0.037	0.037	0.037	0.077	0.077	0.076	0.057		
22ud	Intus Operable at Left Roxul	0.95	0.95	0.95	0.95	0.120	0.073	0.120	0.120	0.037	0.037	0.037	0.037	0.077	0.077	0.076	0.057		
23ud	Intus Fixed at Right Roxul	0.95	0.95	0.95	0.95	0.073	0.070	0.070	0.070	0.037	0.037	0.037	0.037	0.057	0.057	0.076	0.051		
24ud	Intus Operable at Right Roxul	0.95	0.95	0.95	0.95	0.073	0.120	0.120	0.120	0.037	0.037	0.037	0.037	0.077	0.077	0.076	0.057		
25ud	Intus Fixed at Left Roxul	0.95	0.95	0.95	0.95	0.070	0.073	0.070	0.070	0.037	0.037	0.037	0.037	0.057	0.057	0.076	0.051		
26ud	Intus Operable Middle at Storefront Roxul	0.95	0.95	0.95	0.95	0.120	0.120	0.070	0.070	0.037	0.037	0.037	0.037	0.077	0.077	0.076	0.057		
27ud	Intus Fixed Middle at Storefront Roxul	0.95	0.95	0.95	0.95	0.076	0.076	0.070	0.070	0.037	0.037	0.037	0.037	0.057	0.057	0.076	0.051		
28ud	Intus Fixed Left at Storefront Roxul	0.95	0.95	0.95	0.95	0.076	0.070	0.070	0.070	0.037	0.037	0.037	0.037	0.057	0.057	0.076	0.051		
29ud	Intus Fixed Right at Storefront Roxul	0.95	0.95	0.95	0.95	0.070	0.076	0.070	0.070	0.037	0.037	0.037	0.037	0.057	0.057	0.076	0.051		
30ud																			
31ud	Intus Single Tilt and Turn Roxul-Alt	0.96	0.96	0.96	0.96	0.120	0.120	0.120	0.120	0.037	0.037	0.037	0.037	0.064	0.064	0.063	0.040		
32ud	Intus Single Tilt and Turn EIFS with Int Insul	0.95	0.95	0.95	0.95	0.120	0.120	0.120	0.120	0.037	0.037	0.037	0.037	-0.015	-0.015	0.070	0.152		
33ud	Intus Single Tilt and Turn Roxul with Int Insul	0.95	0.95	0.95	0.95	0.120	0.120	0.120	0.120	0.037	0.037	0.037	0.037	0.010	0.010	0.028	0.057		
34ud	Intus Single Tilt and Turn Roxul with Int Insul and st stl screws	0.95	0.95	0.95	0.95	0.120	0.120	0.120	0.120	0.037	0.037	0.037	0.037	-0.008	-0.008	0.006	0.045		
35ud	Intus Single Tilt and Turn Roxul with st stl screws	0.95	0.95	0.95	0.95	0.120	0.120	0.120	0.120	0.037	0.037	0.037	0.037	0.050	0.050	0.076	0.045		
36ud																			
37ud																			
38ud																			
39ud																			
40ud	Kawneer Door	2.40	2.40	2.40	2.40	0.108	0.108	0.165	0.108	0.037	0.037	0.037	0.037	0.140	0.140	0.101	0.166		
41ud	Roof Hatch	0.28	0.28	0.28	0.28	0.075	0.075	0.075	0.075	0.000	0.000	0.000	0.000	0.845	0.845	0.845	0.845		
42ud																			
43ud																			
44ud																			
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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	Humidity recovery efficiency	Electric efficiency	Application range		External pressure per section	Fittings D _{pintern}	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	Zehnder - ComfoAir200 ERV	85%	64%	0.42	60	150	100	incl.	yes	/	57	54	
02ud	Swegon - GOLD RX 14	84%	0%	0.45	1800	4285	316	60	no	-	0	0	
03ud	Laundry MUA No Heat Recovery	0%	0%	0.45	375	375	100						
04ud	MUA	0%	0%	0.45	375	375	100						
05ud	open louver	0%	0%	0.45	1	100	101	incl.	yes	/	57	54	
06ud	Swegon - GOLD RX 07	86%	0%	0.45	540	1820	265	51	no	-	0	0	
07ud	Zehnder - ComfoAir200 ERV	85%	64%	0.42	60	150	100	incl.	yes	/	57	54	
08ud													
09ud													
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Windows

HANAC Corona Gardens (Senior Residence) / Climate: New York / TFA: 3526 m² / Heating: 13.3 kWh/(m²a) / Cooling: 13.2 kWh/(m²a) / PER: 80.6 kWh/(m²a)

Window area orientation		Global radiation (main orientations) kWh/(m ² a)	Shading	Dirt	Non-vertical radiation incidence	Glazing fraction	g-Value	Solar irradiation reduction factor	Window area m ²	Window U-Value W/(m ² K)	Glazing area m ²	Average global radiation kWh/(m ² a)	Transmission losses heating period kWh/a	Heating gains solar radiation heating period kWh/a
Standard values →			0.75	0.95	0.85									
North		115	0.55	0.95	0.85	0.70	0.32	0.31	241.70	0.92	170.37	159	14354	3812
East		303	0.64	0.95	0.85	0.74	0.10	0.38	19.89	0.85	14.70	479	1083	349
South		572	0.58	0.95	0.85	0.70	0.32	0.33	243.55	0.90	171.55	484	14170	12429
West		289	0.63	0.95	0.85	0.70	0.16	0.36	40.04	0.90	28.08	157	2323	350
Horizontal		453	1.00	0.95	0.85	0.77	0.00	0.63	3.13	2.98	2.42	453	600	0
Total or average value for all windows.							0.30	0.33	548.30	0.92	387.11		32530	16940

Heating degree hours [kKWh/a]:

64.4

Go to glazing list

Go to window frames list

■ Transmission losses heating period

■ Heating gains solar radiation heating period

20,000

15,000

10,000

5,000

0

kWh/a

North

East

South

West

Horizontal

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

0.87

1.04

1.14

0.48

Quantity	Description	Deviation from north	Angle of inclination from the horizontal	Orientation	Window rough openings		Installed in	Glazing	Frame	g-Value	U-Value		Ψ Glazing edge (Avg.)	Installation situation				Results												
					Width	Height					Glazing	Frames (avg.)		user determined value for Ψ _{W,installation} OR "1": Ψ _{W,installation} from 'Components' worksheet "0": in the case of abutting windows				Window Area	Glazing area	U _{W,installed}	Glazed fraction per window									
														left	right	bottom	top													
		°				m		Sort: AS LIST		Sort: AS LIST		°		W/(mK) or 1/0				W/(mK)		m ²										
5	Window Type 1&3 - Left Orientation - Schuco: T1-Left-5'-6" X 6'	43	90	North	1.118	1.651	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	13ud-Intus Fixed at Right EIFS	0.37	0.50	0.95	0.037	0	1	1	1	0.082	9.2	7.36	0.86	80%								
5	Tilt and Turn at Left	43	90	North	0.686	1.651	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	12ud-Intus Operable at Left EIFS	0.37	0.50	0.95	0.037	1	0	1	1	0.072	5.7	3.48	0.99	61%								
2	Window Type 2&4 - Right Orientation - Schuco: T2-Right-5'-6" X 6'	43	90	North	1.118	1.651	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	15ud-Intus Fixed at Left EIFS	0.37	0.50	0.95	0.037	1	0	1	1	0.082	3.7	2.95	0.86	80%								
2	Tilt and Turn at Right	43	90	North	0.686	1.651	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	14ud-Intus Operable at Right EIFS	0.37	0.50	0.95	0.037	0	1	1	1	0.072	2.3	1.39	0.99	61%								
4	Window Type 5&6 - Single - Schuco: T5 - 5'-6" X 2'-0"	43	90	North	0.686	1.651	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	11ud-Intus Single Tilt and Turn EIFS	0.37	0.50	0.95	0.037	1	1	1	1	0.055	4.5	2.52	1.05	56%								
2	T5:B	43	90	North	0.787	1.753	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	32ud-Intus Single Tilt and Turn EIFS with Int Insul	0.37	0.50	0.95	0.037	1	1	1	1	0.024	2.8	1.66	0.88	60%								
4	Window Type 1&3 - Left Orientation - Schuco: T1-Left-5'-6" X 6'	223	90	South	1.118	1.651	5-Front Wall Lower	05ud-Intus CG4x20Arx4x18ArxCG4	23ud-Intus Fixed at Right Roxul	0.37	0.50	0.95	0.037	0	1	1	1	0.061	7.4	5.89	0.82	80%								
4	Tilt and Turn at Left	223	90	South	0.686	1.651	5-Front Wall Lower	05ud-Intus CG4x20Arx4x18ArxCG4	22ud-Intus Operable at Left Roxul	0.37	0.50	0.95	0.037	1	0	1	1	0.072	4.5	2.78	0.99	61%								
2	Window Type 2&4 - Right Orientation - Schuco: T2-Right-5'-6" X 6'	223	90	South	1.118	1.651	5-Front Wall Lower	05ud-Intus CG4x20Arx4x18ArxCG4	25ud-Intus Fixed at Left Roxul	0.37	0.50	0.95	0.037	1	0	1	1	0.061	3.7	2.95	0.82	80%								
2	Tilt and Turn at Right	223	90	South	0.686	1.651	5-Front Wall Lower	05ud-Intus CG4x20Arx4x18ArxCG4	24ud-Intus Operable at Right Roxul	0.37	0.50	0.95	0.037	0	1	1	1	0.072	2.3	1.39	0.99	61%								
6	Window Type 5&6 - Single - Schuco: T5 - 5'-6" X 2'-0"	223	90	South	0.686	1.651	5-Front Wall Lower	05ud-Intus CG4x20Arx4x18ArxCG4	21ud-Intus Single Tilt and Turn Roxul	0.37	0.50	0.95	0.037	1	1	1	1	0.074	6.8	3.78	1.13	56%								
2	T5:B	223	90	South	0.787	1.753	5-Front Wall Lower	05ud-Intus CG4x20Arx4x18ArxCG4	33ud-Intus Single Tilt and Turn Roxul with Int Insul	0.37	0.50	0.95	0.037	1	1	1	1	0.020	2.8	1.66	0.86	60%								
4	Window Type 1&3 - Left Orientation - Schuco: T1-Left-5'-6" X 6'	43	90	North	1.118	1.651	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	13ud-Intus Fixed at Right EIFS	0.37	0.50	0.95	0.037	0	1	1	1	0.082	7.4	5.89	0.86	80%								
4	Tilt and Turn at Left	43	90	North	0.686	1.651	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	12ud-Intus Operable at Left EIFS	0.37	0.50	0.95	0.037	1	0	1	1	0.072	4.5	2.78	0.99	61%								
5	Window Type 2&4 - Right Orientation - Schuco: T2-Right-5'-6" X 6'	43	90	North	1.118	1.651	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	15ud-Intus Fixed at Left EIFS	0.37	0.50	0.95	0.037	1	0	1	1	0.082	9.2	7.36	0.86	80%								
5	Tilt and Turn at Right	43	90	North	0.686	1.651	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	14ud-Intus Operable at Right EIFS	0.37	0.50	0.95	0.037	0	1	1	1	0.072	5.7	3.48	0.99	61%								
3	Window Type 5&6 - Single - Schuco: T5 - 5'-6" X 2'-0"	43	90	North	0.686	1.651	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	11ud-Intus Single Tilt and Turn EIFS	0.37	0.50	0.95	0.037	1	1	1	1	0.055	3.4	1.89	1.05	56%								
4	Window Type 1&3 - Left Orientation - Schuco: T1-Left-5'-6" X 6'	223	90	South	1.118	1.651	5-Front Wall Lower	05ud-Intus CG4x20Arx4x18ArxCG4	23ud-Intus Fixed at Right Roxul	0.37	0.50	0.95	0.037	0	1	1	1	0.061	7.4	5.89	0.82	80%								
4	Tilt and Turn at Left	223	90	South	0.686	1.651	5-Front Wall Lower	05ud-Intus CG4x20Arx4x18ArxCG4	22ud-Intus Operable at Left Roxul	0.37	0.50	0.95	0.037	1	0	1	1	0.072	4.5	2.78	0.99	61%								
1	Window Type 2&4 - Right Orientation - Schuco: T2-Right-5'-6" X 6'	223	90	South	1.118	1.651	5-Front Wall Lower	05ud-Intus CG4x20Arx4x18ArxCG4	25ud-Intus Fixed at Left Roxul	0.37	0.50	0.95	0.037	1	0	1	1	0.061	1.8	1.47	0.82	80%								
1	Tilt and Turn at Right	223	90	South	0.686	1.651	5-Front Wall Lower	05ud-Intus CG4x20Arx4x18ArxCG4	24ud-Intus Operable at Right Roxul	0.37	0.50	0.95	0.037	0	1	1	1	0.072	1.1	0.70	0.99	61%								
4	Window Type 5&6 - Single - Schuco: T5 - 5'-6" X 2'-0"	223	90	South	0.686	1.651	5-Front Wall Lower	05ud-Intus CG4x20Arx4x18ArxCG4	21ud-Intus Single Tilt and Turn Roxul	0.37	0.50	0.95	0.037	1	1	1	1	0.074	4.5	2.52	1.13	56%								
6	T5:B	223	90	South	0.787	1.753	5-Front Wall Lower	05ud-Intus CG4x20Arx4x18ArxCG4	33ud-Intus Single Tilt and Turn Roxul with Int Insul	0.37	0.50	0.95	0.037	1	1	1	1	0.020	8.3	4.97	0.86	60%								
3	Window Type 1&3 - Left Orientation - Schuco: T1-Left-5'-6" X 6'	43	90	North	1.118	1.651	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	13ud-Intus Fixed at Right EIFS	0.37	0.50	0.95	0.037	0	1	1	1	0.082	5.5	4.42	0.86	80%								
3	Tilt and Turn at Left	43	90	North	0.686	1.651	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	12ud-Intus Operable at Left EIFS	0.37	0.50	0.95	0.037	1	0	1	1	0.072	3.4	2.09	0.99	61%								
4	Window Type 2&4 - Right Orientation - Schuco: T2-Right-5'-6" X 6'	43	90	North	1.118	1.651	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	15ud-Intus Fixed at Left EIFS	0.37	0.50	0.95	0.037	1	0	1	1	0.082	7.4	5.89	0.86	80%								
4	Tilt and Turn at Right	43	90	North	0.686	1.651	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	14ud-Intus Operable at Right EIFS	0.37	0.50	0.95	0.037	0	1	1	1	0.072	4.5	2.78	0.99	61%								
3	Window Type 5&6 - Single - Schuco: T5 - 5'-6" X 2'-0"	43	90	North	0.686	1.651	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	11ud-Intus Single Tilt and Turn EIFS	0.37	0.50	0.95	0.037	1	1	1	1	0.055	3.4	1.89	1.05	56%								
2	T5:B	43	90	North	0.787	1.753	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	32ud-Intus Single Tilt and Turn EIFS with Int Insul	0.37	0.50	0.95	0.037	1	1	1	1	0.024	2.8	1.66	0.88	60%								
4	Window Type 1&3 - Left Orientation - Schuco: T1-Left-5'-6" X 6'	223	90	South	1.118	1.651	5-Front Wall Lower	05ud-Intus CG4x20Arx4x18ArxCG4	23ud-Intus Fixed at Right Roxul	0.37	0.50	0.95	0.037	0	1	1	1	0.061	7.4	5.89	0.82	80%								
4	Tilt and Turn at Left	223	90	South	0.686	1.651	5-Front Wall Lower	05ud-Intus CG4x20Arx4x18ArxCG4	22ud-Intus Operable at Left Roxul	0.37	0.50	0.95	0.037	1	0	1	1	0.072	4.5	2.78	0.99	61%								
3	Window Type 2&4 - Right Orientation - Schuco: T2-Right-5'-6" X 6'	223	90	South	1.118	1.651	5-Front Wall Lower	05ud-Intus CG4x20Arx4x18ArxCG4	25ud-Intus Fixed at Left Roxul	0.37	0.50	0.95	0.037	1	0	1	1	0.061	5.5	4.42	0.82	80%								
3	Tilt and Turn at Right	223	90	South	0.686	1.651	5-Front Wall Lower	05ud-Intus CG4x20Arx4x18ArxCG4	24ud-Intus Operable at Right Roxul	0.37	0.50	0.95	0.037	0	1	1	1	0.072	3.4	2.09	0.99	61%								
4	Window Type 5&6 - Single - Schuco: T5 - 5'-6" X 2'-0"	223	90	South	0.686	1.651	5-Front Wall Lower	05ud-Intus CG4x20Arx4x18ArxCG4	21ud-Intus Single Tilt and Turn Roxul	0.37	0.50	0.95	0.037	1	1	1	1	0.074	4.5	2.52	1.13	56%								
2	T5:B	223	90	South	0.787	1.753	5-Front Wall Lower	05ud-Intus CG4x20Arx4x18ArxCG4	33ud-Intus Single Tilt and Turn Roxul with Int Insul	0.37	0.50	0.95	0.037	1	1	1	1	0.020	2.8	1.66	0.86	60%								
2	Window Type 1&3 - Left Orientation - Schuco: T3-Left-6' X 6'	43	90	North	1.118	1.651	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	13ud-Intus Fixed at Right EIFS	0.37	0.50	0.95	0.037	0	1	1	1	0.082	3.7	2.95	0.86	80%								
2	Tilt and Turn at Left	43	90	North	0.686	1.651	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	12ud-Intus Operable at Left EIFS	0.37	0.50	0.95	0.037	1	0	1	1	0.072	2.3	1.39	0.99	61%								
5	Window Type 2&4 - Right Orientation - Schuco: T4-Right-6' X 6'	43	90	North	1.118	1.651	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	15ud-Intus Fixed at Left EIFS	0.37	0.50	0.95	0.037	1	0	1	1	0.082	9.2	7.36	0.86	80%								
5	Tilt and Turn at Right	43	90	North	0.686	1.651	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	14ud-Intus Operable at Right EIFS	0.37	0.50	0.95	0.037	0	1	1	1	0.072	5.7	3.48										

Heating degree hours [Kk/hv]:				64.4				Window rough openings		Installed in	Glazing	Frame	g-Value	U-Value		Ψ Glazing edge	Installation situation user determined value for Ψ _{installation} or 1°: Ψ _{installation} from 'Components' worksheet 0°: in the case of abutting windows				Results			
Quantity	Description	Deviation from north	Angle of inclination from the horizontal	Orientation	Width	Height	Selection from 'Areas' worksheet	Selection from 'Components' worksheet	Selection from 'Components' worksheet	Perpendicular radiation	Glazing	Frames (avg.)	Ψ _{glazing edge} (Avg.)	left	right	bottom	top	Ψ _{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)	%		
2	Window Type 2&4 - Right Orientation - Schuco: T4-Right-6' X 6'	223	90	South	1.118	1.651	6-Front Wall Upper	05ud-Intus CG4x20Arx4x18ArxCg4	25ud-Intus Fixed at Left Roxul	0.37	0.50	0.95	0.037	1	0	1	1	0.061	3.7	2.95	0.82	80%		
2	Tilt and Turn at Right	223	90	South	0.686	1.651	6-Front Wall Upper	05ud-Intus CG4x20Arx4x18ArxCg4	24ud-Intus Operable at Right Roxul	0.37	0.50	0.95	0.037	0	1	1	1	0.072	2.3	1.39	0.99	61%		
6	Window Type 5&6 - Single - Schuco: T6 - 6'-0" X 2'-0"	223	90	South	0.686	1.651	6-Front Wall Upper	05ud-Intus CG4x20Arx4x18ArxCg4	21ud-Intus Single Tilt and Turn Roxul	0.37	0.50	0.95	0.037	1	1	1	1	0.074	6.8	3.78	1.13	56%		
1	Window Type 5&6 - Single - Schuco: T6 - 6'-0" X 2'-0"	313	90	West	0.686	1.803	9-Side Wall	05ud-Intus CG4x20Arx4x18ArxCg4	11ud-Intus Single Tilt and Turn EIFS	0.37	0.50	0.95	0.037	1	1	1	1	0.053	1.2	0.70	1.03	56%		
1	Window Type 5&6 - Single - Schuco: T6 - 6'-0" X 2'-0"	313	90	West	0.686	1.803	9-Side Wall	05ud-Intus CG4x20Arx4x18ArxCg4	21ud-Intus Single Tilt and Turn Roxul	0.37	0.50	0.95	0.037	1	1	1	1	0.074	1.2	0.70	1.11	56%		
3	Window Type 1&3 - Left Orientation - Schuco: T3-Left-6' X 6'	43	90	North	1.118	1.651	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCg4	13ud-Intus Fixed at Right EIFS	0.37	0.50	0.95	0.037	0	1	1	1	0.082	5.5	4.42	0.86	80%		
3	Tilt and Turn at Left	43	90	North	0.686	1.651	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCg4	12ud-Intus Operable at Left EIFS	0.37	0.50	0.95	0.037	1	0	1	1	0.072	3.4	2.09	0.99	61%		
5	Window Type 2&4 - Right Orientation - Schuco: T4-Right-6' X 6'	43	90	North	1.118	1.651	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCg4	15ud-Intus Fixed at Left EIFS	0.37	0.50	0.95	0.037	1	0	1	1	0.082	9.2	7.36	0.86	80%		
5	Tilt and Turn at Right	43	90	North	0.686	1.651	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCg4	14ud-Intus Operable at Right EIFS	0.37	0.50	0.95	0.037	0	1	1	1	0.072	5.7	3.48	0.99	61%		
3	Window Type 5&6 - Single - Schuco: T6 - 6'-0" X 2'-0"	43	90	North	0.686	1.651	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCg4	11ud-Intus Single Tilt and Turn EIFS	0.37	0.50	0.95	0.037	1	1	1	1	0.055	3.4	1.89	1.05	56%		
1	Window Type 5&6 - Single - Schuco: T6 - 6'-0" X 2'-0"	313	90	West	0.686	1.803	9-Side Wall	05ud-Intus CG4x20Arx4x18ArxCg4	11ud-Intus Single Tilt and Turn EIFS	0.37	0.50	0.95	0.037	1	1	1	1	0.053	1.2	0.70	1.03	56%		
1	Window Type 5&6 - Single - Schuco: T6 - 6'-0" X 2'-0"	313	90	West	0.686	1.803	9-Side Wall	05ud-Intus CG4x20Arx4x18ArxCg4	21ud-Intus Single Tilt and Turn Roxul	0.37	0.50	0.95	0.037	1	1	1	1	0.053	1.2	0.70	1.03	56%		
2	Window Type 1&3 - Left Orientation - Schuco: T3-Left-6' X 6'	223	90	South	1.118	1.651	6-Front Wall Upper	05ud-Intus CG4x20Arx4x18ArxCg4	23ud-Intus Fixed at Right Roxul	0.37	0.50	0.95	0.037	0	1	1	1	0.061	3.7	2.95	0.82	80%		
2	Tilt and Turn at Left	223	90	South	0.686	1.651	6-Front Wall Upper	05ud-Intus CG4x20Arx4x18ArxCg4	22ud-Intus Operable at Left Roxul	0.37	0.50	0.95	0.037	1	0	1	1	0.072	2.3	1.39	0.99	61%		
4	Window Type 2&4 - Right Orientation - Schuco: T4-Right-6' X 6'	223	90	South	1.118	1.651	6-Front Wall Upper	05ud-Intus CG4x20Arx4x18ArxCg4	25ud-Intus Fixed at Left Roxul	0.37	0.50	0.95	0.037	1	0	1	1	0.061	7.4	5.89	0.82	80%		
4	Tilt and Turn at Right	223	90	South	0.686	1.651	6-Front Wall Upper	05ud-Intus CG4x20Arx4x18ArxCg4	24ud-Intus Operable at Right Roxul	0.37	0.50	0.95	0.037	0	1	1	1	0.072	4.5	2.78	0.99	61%		
6	Window Type 5&6 - Single - Schuco: T6 - 6'-0" X 2'-0"	223	90	South	0.686	1.651	6-Front Wall Upper	05ud-Intus CG4x20Arx4x18ArxCg4	21ud-Intus Single Tilt and Turn Roxul	0.37	0.50	0.95	0.037	1	1	1	1	0.074	6.8	3.78	1.13	56%		
2	T7 Corner	223	90	South	1.219	1.803	6-Front Wall Upper	05ud-Intus CG4x20Arx4x18ArxCg4	23ud-Intus Fixed at Right Roxul	0.37	0.50	0.95	0.037	0	1	1	1	0.061	4.4	3.58	0.79	81%		
1	Window Type 5&6 - Single - Schuco: T6 - 6'-0" X 2'-0"	313	90	West	0.686	1.803	9-Side Wall	05ud-Intus CG4x20Arx4x18ArxCg4	11ud-Intus Single Tilt and Turn EIFS	0.37	0.50	0.95	0.037	1	1	1	1	0.053	1.2	0.70	1.03	56%		
1	Window Type 5&6 - Single - Schuco: T6 - 6'-0" X 2'-0"	313	90	West	0.686	1.803	9-Side Wall	05ud-Intus CG4x20Arx4x18ArxCg4	21ud-Intus Single Tilt and Turn Roxul	0.37	0.50	0.95	0.037	1	1	1	1	0.074	1.2	0.70	1.11	56%		
3	Window Type 1&3 - Left Orientation - Schuco: T3-Left-6' X 6'	43	90	North	1.118	1.651	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCg4	13ud-Intus Fixed at Right EIFS	0.37	0.50	0.95	0.037	0	1	1	1	0.082	5.5	4.42	0.86	80%		
3	Tilt and Turn at Left	43	90	North	0.686	1.651	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCg4	12ud-Intus Operable at Left EIFS	0.37	0.50	0.95	0.037	1	0	1	1	0.072	3.4	2.09	0.99	61%		
4	Window Type 2&4 - Right Orientation - Schuco: T4-Right-6' X 6'	43	90	North	1.118	1.651	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCg4	15ud-Intus Fixed at Left EIFS	0.37	0.50	0.95	0.037	1	0	1	1	0.082	7.4	5.89	0.86	80%		
4	Tilt and Turn at Right	43	90	North	0.686	1.651	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCg4	14ud-Intus Operable at Right EIFS	0.37	0.50	0.95	0.037	0	1	1	1	0.072	4.5	2.78	0.99	61%		
6	Window Type 5&6 - Single - Schuco: T6 - 6'-0" X 2'-0"	43	90	North	0.686	1.651	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCg4	11ud-Intus Single Tilt and Turn EIFS	0.37	0.50	0.95	0.037	1	1	1	1	0.055	6.8	3.78	1.05	56%		
2	Window Type 5&6 - Single - Schuco: T6 - 6'-0" X 2'-0"	133	90	East	0.686	1.803	8-Side Wall	05ud-Intus CG4x20Arx4x18ArxCg4	11ud-Intus Single Tilt and Turn EIFS	0.37	0.50	0.95	0.037	1	1	1	1	0.053	2.5	1.39	1.03	56%		
5	Window Type 1&3 - Left Orientation - Schuco: T3-Left-6' X 6'	223	90	South	1.118	1.651	6-Front Wall Upper	05ud-Intus CG4x20Arx4x18ArxCg4	23ud-Intus Fixed at Right Roxul	0.37	0.50	0.95	0.037	0	1	1	1	0.061	9.2	7.36	0.82	80%		
5	Tilt and Turn at Left	223	90	South	0.686	1.651	6-Front Wall Upper	05ud-Intus CG4x20Arx4x18ArxCg4	22ud-Intus Operable at Left Roxul	0.37	0.50	0.95	0.037	1	0	1	1	0.072	5.7	3.48	0.99	61%		
3	Window Type 2&4 - Right Orientation - Schuco: T4-Right-6' X 6'	223	90	South	1.118	1.651	6-Front Wall Upper	05ud-Intus CG4x20Arx4x18ArxCg4	25ud-Intus Fixed at Left Roxul	0.37	0.50	0.95	0.037	1	0	1	1	0.061	5.5	4.42	0.82	80%		
3	Tilt and Turn at Right	223	90	South	0.686	1.651	6-Front Wall Upper	05ud-Intus CG4x20Arx4x18ArxCg4	24ud-Intus Operable at Right Roxul	0.37	0.50	0.95	0.037	0	1	1	1	0.072	3.4	2.09	0.99	61%		
4	Window Type 5&6 - Single - Schuco: T6 - 6'-0" X 2'-0"	223	90	South	0.686	1.651	6-Front Wall Upper	05ud-Intus CG4x20Arx4x18ArxCg4	21ud-Intus Single Tilt and Turn Roxul	0.37	0.50	0.95	0.037	1	1	1	1	0.074	4.5	2.52	1.13	56%		
1	Window Type 5&6 - Single - Schuco: T6 - 6'-0" X 2'-0"	313	90	West	0.686	1.803	9-Side Wall	05ud-Intus CG4x20Arx4x18ArxCg4	11ud-Intus Single Tilt and Turn EIFS	0.37	0.50	0.95	0.037	1	1	1	1	0.053	1.2	0.70	1.03	56%		
1	Window Type 5&6 - Single - Schuco: T6 - 6'-0" X 2'-0"	313	90	West	0.686	1.803	9-Side Wall	05ud-Intus CG4x20Arx4x18ArxCg4	21ud-Intus Single Tilt and Turn Roxul	0.37	0.50	0.95	0.037	1	1	1	1	0.074	1.2	0.70	1.11	56%		
1	Kawneer Door Left	223	90	South	0.915	1.829	6-Front Wall Upper	06ud-Kawneer 3x Glaz	40ud-Kawneer Door	0.20	0.50	2.40	0.037	0.025	0	1	1	0.079	1.7	1.09	1.44	65%		
1	Kawneer Door Right	223	90	South	0.915	1.829	6-Front Wall Upper	06ud-Kawneer 3x Glaz	40ud-Kawneer Door	0.20	0.50	2.40	0.037	0.025	0	1	1	0.079	1.7	1.09	1.44	65%		
2	Roof Hatch	0	0	Horizontal	1.250	1.250	2-Bulkhead Roof	07ud-Bilco Insul Panel	41ud-Roof Hatch	0.00	0.28	0.28	0.000	1	1	1	1	0.845	3.1	2.42	2.98	77%		
1	T8A south opaque	223	90	South	1.206	1.803	6-Front Wall Upper	01ud-opaque panel	0ud-Intus Fixed Left at Storefront R	0.00	0.50	0.95	0.037	0	0	1	1	0.064	2.2	1.76	0.75	81%		
1	T8A south operable	223	90	South	0.686	1.803	6-Front Wall Upper	05ud-Intus CG4x20Arx4x18ArxCg4	Intus Operable Middle at Storefront R	0.37	0.50	0.95	0.037	0	0	1	1	0.067	1.2	0.74	0.88	60%		
1	T8A south fix	223	90	South	0.765	1.803	6-Front Wall Upper	05ud-Intus CG4x20Arx4x18ArxCg4	0-Intus Fixed Middle at Storefront R	0.37	0.50	0.95	0.037	0	0	1	1	0.064	1.4	1.02	0.81	74%		
1	T8B south fix	223	90	South	1.202	1.803	6-Front Wall Upper	05ud-Intus CG4x20Arx4x18ArxCg4	0-Intus Fixed Middle at Storefront R	0.37	0.50	0.95	0.037	0	0	1	1	0.064	2.2	1.75	0.75	81%		
1	T8B south opaque	223	90	South	1.315	1.803	6-Front Wall Upper	01ud-opaque panel	0-Intus Fixed Middle at Storefront R	0.00	0.50	0.95	0.037	0	0	1	1	0.064	2.4	1.93	0.74	82%		
1	T8B south fix	223	90	South	1.189	1.803	6-Front Wall Upper	05ud-Intus CG4x20Arx4x18ArxCg4	0-Intus Fixed Middle at Storefront R	0.37	0.50	0.95	0.037	0	0	1	1	0.064	2.1	1.72	0.75	80%		
1	T8B south operable	223	90	South	0.686	1.803	6-Front Wall Upper	05ud-Intus CG4x20Arx4x18ArxCg4	0-Intus Fixed Middle at Storefront R	0.37	0.50	0.95	0.037	0	0	1	1	0.064	1.2	0.89	0.83	72%		
1	T8B south opaque	223	90	South	0.885	1.803	6-Front Wall Upper	01ud-opaque panel	0-Intus Fixed Middle at Storefront R	0.00	0.50	0.95	0.037	0	0	1	1	0.064	1.6	1.22	0.79	76%		
1	T8B south opaque	223	90	South	0.856	1.803	6-Front Wall Upper	01ud-opaque panel	0-Intus Fixed Middle at Storefront R	0.00	0.50	0.95	0.037	0	0	1	1	0.064	1.5	1.17	0.79	76%		
1	T8C south fix	223	90	South	1.198	1.803	6-Front Wall Upper	05ud-Intus CG4x20Arx4x18ArxCg4	0-Intus Fixed Middle at Storefront R	0.37	0.50	0.95	0.037	0	0	1	1	0.064	2.2	1.74	0.75	81%		
1	T8C south operable	223	90	South	0.686	1.803	6-Front Wall Upper	05ud-Intus CG4x20Arx4x18ArxCg4	0-Intus Fixed Middle at Storefront R	0.37	0.50	0.95	0.037	0	0	1	1	0.064	1.2	0.89	0.83	72%		
1	T8C south opaque	223	90	South	1.007	1.803	6-Front Wall Upper	01ud-opaque panel	0-Intus Fixed Middle at Storefront R	0.00	0.50	0.95	0.037	0	0	1	1	0.064	1.8	1.42	0.77	78%		
1	T8C south opaque	223	90	South	1.016	1.803	6-Front Wall Upper	01ud-opaque panel	0-Intus Fixed Middle at Storefront R	0.00	0.50	0.95	0.037	0	0	1	1	0.064	1.8	1.44	0.77	78%		
1	T8C south operable	223	90	South	0.686	1.803	6-Front Wall Upper	05ud-Intus CG4x20Arx4x18ArxCg4	Intus Operable Middle at Storefront R	0.37	0.50	0.95	0.037	0	0	1	1	0.067	1.2	0.74	0.88	60%		
1	T8C south fix	223	90	South	1.190	1.803	6-Front Wall Upper	05ud-Intus CG4x20Arx4x18ArxCg4	0-Intus Fixed Middle at Storefront R	0.37	0.50	0.95	0.037	0	0	1	1	0.064	2.1	1.73	0.75	80%		
1	T8D south opaque	223	90	South	0.886	1.803	6-Front Wall Upper	01ud-opaque panel	0-Intus Fixed Middle at Storefront R	0.00	0.50	0.95	0.037	0	0	1	1	0.064	1.6	1.22	0.79	76%		
1	T8D south opaque	223	90	South	0.885	1.803	6-Front Wall Upper	01ud-opaque panel																

Heating degree hours [K/hv]:				64.4				Window rough openings		Installed in	Glazing	Frame	g-Value	U-Value		Ψ Glazing edge	Installation situation user determined value for Ψ _{installation} or '1': Ψ _{installation} from 'Components' worksheet '0': in the case of abutting windows				Results			
Quantity	Description	Deviation from north	Angle of inclination from the horizontal	Orientation	Width	Height	Selection from 'Areas' worksheet	Selection from 'Components' worksheet	Selection from 'Components' worksheet	Perpendicular radiation	Glazing	Frames (avg.)	Ψ _{glazing edge} (Avg.)	left	right	bottom	top	Ψ _{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)	%		
1	T8F south fix	223	90	South	1.168	1.803	6-Front Wall Upper	05ud-Intus CG4x20Arx4x18ArxCG4	8-Intus Fixed Middle at Storefront R	0.37	0.50	0.95	0.037	0	0	1	1	0.064	2.1	1.69	0.75	80%		
1	T8F south opaque	223	90	South	0.865	1.803	6-Front Wall Upper	01ud-opaque panel	8-Intus Fixed Middle at Storefront R	0.00	0.50	0.95	0.037	0	0	1	1	0.064	1.6	1.18	0.79	76%		
1	T8F south opaque	223	90	South	0.847	1.803	6-Front Wall Upper	01ud-opaque panel	8-Intus Fixed Middle at Storefront R	0.00	0.50	0.95	0.037	0	0	1	1	0.064	1.5	1.16	0.79	76%		
1	T8F south operable	223	90	South	0.686	1.803	6-Front Wall Upper	05ud-Intus CG4x20Arx4x18ArxCG4	Intus Operable Middle at Storefront	0.37	0.50	0.95	0.037	0	0	1	1	0.067	1.2	0.74	0.88	60%		
1	T8F south fix	223	90	South	1.189	1.803	6-Front Wall Upper	05ud-Intus CG4x20Arx4x18ArxCG4	8-Intus Fixed Middle at Storefront R	0.37	0.50	0.95	0.037	0	0	1	1	0.064	2.1	1.73	0.75	80%		
1	T8F south opaque	223	90	South	0.825	1.803	6-Front Wall Upper	01ud-opaque panel	8-Intus Fixed Middle at Storefront R	0.00	0.50	0.95	0.037	0	0	1	1	0.064	1.5	1.12	0.80	75%		
1	T8G east opaque	133	90	East	0.842	1.803	8-Side Wall	01ud-opaque panel	8-Intus Fixed Middle at Storefront R	0.00	0.50	0.95	0.037	0	0	0.081	1	0.066	1.5	1.15	0.80	76%		
1	T8G east opaque	133	90	East	0.871	1.803	8-Side Wall	01ud-opaque panel	8-Intus Fixed Middle at Storefront R	0.00	0.50	0.95	0.037	0	0	0.081	1	0.066	1.6	1.20	0.79	76%		
1	T8G east fix	133	90	East	0.871	1.803	8-Side Wall	05ud-Intus CG4x20Arx4x18ArxCG4	8-Intus Fixed Middle at Storefront R	0.37	0.50	0.95	0.037	0	0	0.081	1	0.066	1.6	1.20	0.79	76%		
1	T8G east opaque	133	90	East	0.871	1.803	8-Side Wall	01ud-opaque panel	27ud-Intus Fixed Middle at Storefront Roxul	0.00	0.50	0.95	0.037	0	0	0.081	1	0.066	1.6	1.20	0.79	76%		
1	T8G east opaque	133	90	East	0.871	1.803	8-Side Wall	01ud-opaque panel	27ud-Intus Fixed Middle at Storefront Roxul	0.00	0.50	0.95	0.037	0	0	0.081	1	0.066	1.6	1.20	0.79	76%		
1	T8G east opaque	133	90	East	0.871	1.803	8-Side Wall	01ud-opaque panel	27ud-Intus Fixed Middle at Storefront Roxul	0.00	0.50	0.95	0.037	0	0	0.081	1	0.066	1.6	1.20	0.79	76%		
1	T8G east opaque	133	90	East	0.922	1.803	8-Side Wall	01ud-opaque panel	29ud-Intus Fixed Right at Storefront Roxul	0.00	0.50	0.95	0.037	0	1	0.081	1	0.062	1.7	1.29	0.84	78%		
1	T8H east opaque	133	90	East	0.877	1.803	8-Side Wall	01ud-opaque panel	18ud-Intus Fixed Left at Storefront EIFS	0.00	0.50	0.95	0.037	1	0	0.081	1	0.070	1.6	1.22	0.87	77%		
1	T8H east opaque	133	90	East	0.895	1.803	8-Side Wall	01ud-opaque panel	17ud-Intus Fixed Middle at Storefront EIFS	0.00	0.50	0.95	0.037	0	0	0.081	1	0.117	1.6	1.24	0.84	77%		
1	T8H east fix	133	90	East	0.895	1.803	8-Side Wall	05ud-Intus CG4x20Arx4x18ArxCG4	17ud-Intus Fixed Middle at Storefront EIFS	0.37	0.50	0.95	0.037	0	0	0.081	1	0.117	1.6	1.24	0.84	77%		
1	T8H east opaque	133	90	East	0.875	1.803	8-Side Wall	01ud-opaque panel	17ud-Intus Fixed Middle at Storefront EIFS	0.00	0.50	0.95	0.037	0	0	0.081	1	0.117	1.6	1.20	0.85	76%		
1	T8I north opaque	43	90	North	0.864	1.803	7-Rear Wall	01ud-opaque panel	17ud-Intus Fixed Middle at Storefront EIFS	0.00	0.50	0.95	0.037	0	0	1	1	0.130	1.6	1.18	0.86	76%		
1	T8I north opaque	43	90	North	0.892	1.803	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	17ud-Intus Fixed Middle at Storefront EIFS	0.37	0.50	0.95	0.037	0	0	1	1	0.130	1.6	1.23	0.86	77%		
1	T8I north fix	43	90	North	0.866	1.803	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	17ud-Intus Fixed Middle at Storefront EIFS	0.37	0.50	0.95	0.037	0	0	1	1	0.130	1.6	1.19	0.86	76%		
1	T8I north operable	43	90	North	0.686	1.803	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	16ud-Intus Operable Middle at Storefront EIFS	0.37	0.50	0.95	0.037	0	0	1	1	0.130	1.2	0.74	0.95	60%		
1	T8I north opaque	43	90	North	0.866	1.803	7-Rear Wall	01ud-opaque panel	17ud-Intus Fixed Middle at Storefront EIFS	0.00	0.50	0.95	0.037	0	0	1	1	0.130	1.6	1.19	0.86	76%		
1	T8I north opaque	43	90	North	0.907	1.803	7-Rear Wall	01ud-opaque panel	17ud-Intus Fixed Middle at Storefront EIFS	0.00	0.50	0.95	0.037	0	0	1	1	0.130	1.6	1.26	0.86	77%		
1	T8I north fix	43	90	North	0.866	1.803	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	17ud-Intus Fixed Middle at Storefront EIFS	0.37	0.50	0.95	0.037	0	0	1	1	0.130	1.6	1.19	0.86	76%		
1	T8I north operable	43	90	North	0.686	1.803	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	16ud-Intus Operable Middle at Storefront EIFS	0.37	0.50	0.95	0.037	0	0	1	1	0.130	1.2	0.74	0.95	60%		
1	T8J north opaque	43	90	North	0.861	1.803	7-Rear Wall	01ud-opaque panel	17ud-Intus Fixed Middle at Storefront EIFS	0.00	0.50	0.95	0.037	0	0	1	1	0.130	1.6	1.18	0.86	76%		
1	T8J north opaque	43	90	North	0.907	1.803	7-Rear Wall	01ud-opaque panel	17ud-Intus Fixed Middle at Storefront EIFS	0.00	0.50	0.95	0.037	0	0	1	1	0.130	1.6	1.26	0.86	77%		
1	T8J north opaque	43	90	North	0.866	1.803	7-Rear Wall	01ud-opaque panel	17ud-Intus Fixed Middle at Storefront EIFS	0.00	0.50	0.95	0.037	0	0	1	1	0.130	1.6	1.19	0.86	76%		
1	T8J north operable	43	90	North	0.686	1.803	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	16ud-Intus Operable Middle at Storefront EIFS	0.37	0.50	0.95	0.037	0	0	1	1	0.130	1.2	0.74	0.95	60%		
1	T8J north fix	43	90	North	0.866	1.803	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	17ud-Intus Fixed Middle at Storefront EIFS	0.37	0.50	0.95	0.037	0	0	1	1	0.130	1.6	1.19	0.86	76%		
1	T8J north opaque	43	90	North	0.907	1.803	7-Rear Wall	01ud-opaque panel	17ud-Intus Fixed Middle at Storefront EIFS	0.00	0.50	0.95	0.037	0	0	1	1	0.130	1.6	1.26	0.86	77%		
1	T8J north opaque	43	90	North	0.855	1.803	7-Rear Wall	01ud-opaque panel	17ud-Intus Fixed Middle at Storefront EIFS	0.00	0.50	0.95	0.037	0	0	1	1	0.130	1.5	1.17	0.87	76%		
1	T8J north operable	43	90	North	0.686	1.803	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	16ud-Intus Operable Middle at Storefront EIFS	0.37	0.50	0.95	0.037	0	0	1	1	0.130	1.2	0.74	0.95	60%		
1	T8K north fix	43	90	North	0.872	1.803	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	17ud-Intus Fixed Middle at Storefront EIFS	0.37	0.50	0.95	0.037	0	0	1	1	0.130	1.6	1.20	0.86	76%		
1	T8K north opaque	43	90	North	0.905	1.803	7-Rear Wall	01ud-opaque panel	17ud-Intus Fixed Middle at Storefront EIFS	0.00	0.50	0.95	0.037	0	0	1	1	0.130	1.6	1.25	0.86	77%		
1	T8K north opaque	43	90	North	0.863	1.803	7-Rear Wall	01ud-opaque panel	17ud-Intus Fixed Middle at Storefront EIFS	0.00	0.50	0.95	0.037	0	0	1	1	0.130	1.6	1.18	0.86	76%		
1	T8K north operable	43	90	North	0.686	1.803	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	16ud-Intus Operable Middle at Storefront EIFS	0.37	0.50	0.95	0.037	0	0	1	1	0.130	1.2	0.74	0.95	60%		
1	T8K north fix	43	90	North	0.865	1.803	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	17ud-Intus Fixed Middle at Storefront EIFS	0.37	0.50	0.95	0.037	0	0	1	1	0.130	1.6	1.19	0.86	76%		
1	T8K north opaque	43	90	North	0.906	1.803	7-Rear Wall	01ud-opaque panel	17ud-Intus Fixed Middle at Storefront EIFS	0.00	0.50	0.95	0.037	0	0	1	1	0.130	1.6	1.25	0.86	77%		
1	T8K north opaque	43	90	North	0.867	1.803	7-Rear Wall	01ud-opaque panel	17ud-Intus Fixed Middle at Storefront EIFS	0.00	0.50	0.95	0.037	0	0	1	1	0.130	1.6	1.19	0.86	76%		
1	T8K north operable	43	90	North	0.686	1.803	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	16ud-Intus Operable Middle at Storefront EIFS	0.37	0.50	0.95	0.037	0	0	1	1	0.130	1.2	0.74	0.95	60%		
1	T8L north fix	43	90	North	0.860	1.803	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	17ud-Intus Fixed Middle at Storefront EIFS	0.37	0.50	0.95	0.037	0	0	1	1	0.130	1.5	1.18	0.86	76%		
1	T8L north opaque	43	90	North	0.907	1.803	7-Rear Wall	01ud-opaque panel	17ud-Intus Fixed Middle at Storefront EIFS	0.00	0.50	0.95	0.037	0	0	1	1	0.130	1.6	1.26	0.86	77%		
1	T8L north opaque	43	90	North	0.952	1.803	7-Rear Wall	01ud-opaque panel	17ud-Intus Fixed Middle at Storefront EIFS	0.00	0.50	0.95	0.037	0	0	1	1	0.130	1.7	1.33	0.85	78%		
1	T8L north operable	43	90	North	0.686	1.803	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	16ud-Intus Operable Middle at Storefront EIFS	0.37	0.50	0.95	0.037	0	0	1	1	0.130	1.2	0.74	0.95	60%		
1	T8L north fix	43	90	North	0.866	1.803	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	17ud-Intus Fixed Middle at Storefront EIFS	0.37	0.50	0.95	0.037	0	0	1	1	0.130	1.6	1.19	0.86	76%		
1	T8L north opaque	43	90	North	0.903	1.803	7-Rear Wall	01ud-opaque panel	17ud-Intus Fixed Middle at Storefront EIFS	0.00	0.50	0.95	0.037	0	0	1	1	0.130	1.6	1.25	0.86	77%		

Heating degree hours [kKh/a]:				64.4				Window rough openings		Installed in	Glazing	Frame	g-Value	U-Value		Ψ Glazing edge	Installation situation user determined value for Ψ _{Installation} Or "1": Ψ _{Installation} from 'Components' worksheet "0": in the case of abutting windows				Results			
Qna n- 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.)	Ψ _{Glazing edge (Avg.)}	left	right	bottom	top	Ψ _{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)	%	
1	T8M north opaque	43	90	North	0.836	1.803	7-Rear Wall	01ud-opaque panel	17ud-Intus Fixed Middle at Storefront EIFS	0.00	0.50	0.95	0.037	0	0	1	1	0.130	1.5	1.14	0.87	75%		
1	T8M north opaque	43	90	North	0.931	1.803	7-Rear Wall	01ud-opaque panel	17ud-Intus Fixed Middle at Storefront EIFS	0.00	0.50	0.95	0.037	0	0	1	1	0.130	1.7	1.29	0.85	77%		
1	T8M north opaque	43	90	North	0.882	1.803	7-Rear Wall	01ud-opaque panel	17ud-Intus Fixed Middle at Storefront EIFS	0.00	0.50	0.95	0.037	0	0	1	1	0.130	1.6	1.21	0.86	76%		
1	T8M north opaque	43	90	North	0.907	1.803	7-Rear Wall	01ud-opaque panel	17ud-Intus Fixed Middle at Storefront EIFS	0.00	0.50	0.95	0.037	0	0	1	1	0.130	1.6	1.26	0.86	77%		
1	T8M north opaque	43	90	North	0.822	1.803	7-Rear Wall	01ud-opaque panel	17ud-Intus Fixed Middle at Storefront EIFS	0.00	0.50	0.95	0.037	0	0	1	1	0.130	1.5	1.11	0.87	75%		
1	T8M north operable	43	90	North	0.686	1.803	7-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	16ud-Intus Operable Middle at Storefront EIFS	0.37	0.50	0.95	0.037	0	0	1	1	0.130	1.2	0.74	0.95	60%		
1	T8N west fix	313	90	West	0.904	1.803	9-Side Wall	05ud-Intus CG4x20Arx4x18ArxCG4	17ud-Intus Fixed Middle at Storefront EIFS	0.37	0.50	0.95	0.037	0	0	0.081	1	0.117	1.6	1.25	0.84	77%		
1	T8N west opaque	313	90	West	0.866	1.803	9-Side Wall	01ud-opaque panel	17ud-Intus Fixed Middle at Storefront EIFS	0.00	0.50	0.95	0.037	0	0	0.081	1	0.117	1.6	1.19	0.85	76%		
1	T8N west operable	313	90	West	0.686	1.803	9-Side Wall	05ud-Intus CG4x20Arx4x18ArxCG4	16ud-Intus Operable Middle at Storefront EIFS	0.37	0.50	0.95	0.037	0	0	0.089	1	0.121	1.2	0.74	0.94	60%		
1	T8N west fix	313	90	West	1.054	1.803	9-Side Wall	05ud-Intus CG4x20Arx4x18ArxCG4	17ud-Intus Fixed Middle at Storefront EIFS	0.37	0.50	0.95	0.037	0	0	0.081	1	0.117	1.9	1.50	0.82	79%		
1	T8N west opaque	313	90	West	1.096	1.803	9-Side Wall	01ud-opaque panel	17ud-Intus Fixed Middle at Storefront EIFS	0.00	0.50	0.95	0.037	0	0	0.081	1	0.117	2.0	1.57	0.82	79%		
1	T8N west opaque	313	90	West	1.078	1.803	9-Side Wall	01ud-opaque panel	17ud-Intus Fixed Middle at Storefront EIFS	0.00	0.50	0.95	0.037	0	0	0.081	1	0.117	1.9	1.54	0.82	79%		
1	T8O west opaque	313	90	West	0.925	1.803	9-Side Wall	01ud-opaque panel	17ud-Intus Fixed Middle at Storefront EIFS	0.00	0.50	0.95	0.037	0	0	0.081	1	0.117	1.7	1.29	0.84	77%		
1	T8O west fix	313	90	West	0.942	1.803	9-Side Wall	05ud-Intus CG4x20Arx4x18ArxCG4	17ud-Intus Fixed Middle at Storefront EIFS	0.37	0.50	0.95	0.037	0	0	0.081	1	0.117	1.7	1.31	0.84	77%		
1	T8O west opaque	313	90	West	0.942	1.803	9-Side Wall	01ud-opaque panel	17ud-Intus Fixed Middle at Storefront EIFS	0.00	0.50	0.95	0.037	0	0	0.081	1	0.117	1.7	1.31	0.84	77%		
1	T8O west opaque	313	90	West	0.840	1.803	9-Side Wall	01ud-opaque panel	19ud-Intus Fixed Right at Storefront EIFS	0.00	0.50	0.95	0.037	0	1	0.081	1	0.069	1.5	1.15	0.88	76%		
1	T8P west opaque	313	90	West	0.894	1.803	9-Side Wall	01ud-opaque panel	28ud-Intus Fixed Left at Storefront Roxul	0.00	0.50	0.95	0.037	1	0	0.081	1	0.061	1.6	1.24	0.85	77%		
1	T8P west opaque	313	90	West	0.835	1.803	9-Side Wall	01ud-opaque panel	27ud-Intus Fixed Middle at Storefront Roxul	0.00	0.50	0.95	0.037	0	0	0.081	1	0.066	1.5	1.14	0.80	75%		
1	T8P west opaque	313	90	West	0.835	1.803	9-Side Wall	01ud-opaque panel	27ud-Intus Fixed Middle at Storefront Roxul	0.00	0.50	0.95	0.037	0	0	0.081	1	0.066	1.5	1.14	0.80	75%		
1	T8P west opaque	313	90	West	0.835	1.803	9-Side Wall	01ud-opaque panel	27ud-Intus Fixed Middle at Storefront Roxul	0.00	0.50	0.95	0.037	0	0	0.081	1	0.066	1.5	1.14	0.80	75%		
1	T8P west opaque	313	90	West	0.903	1.803	9-Side Wall	01ud-opaque panel	27ud-Intus Fixed Middle at Storefront Roxul	0.00	0.50	0.95	0.037	0	0	0.081	1	0.066	1.6	1.25	0.79	77%		
1	T8P west opaque	313	90	West	0.881	1.803	9-Side Wall	01ud-opaque panel	27ud-Intus Fixed Middle at Storefront Roxul	0.00	0.50	0.95	0.037	0	0	0.081	1	0.066	1.6	1.21	0.79	76%		
	<GROUND FLOOR WINDOWS>																				#VALUE!	#VALUE!		
																					#VALUE!	#VALUE!		
1	SF 4 NORTH LOWER LEFT	43	90	North	0.869	1.794	24-Rear Wall 6	05ud-Intus CG4x20Arx4x18ArxCG4	18ud-Intus Fixed Left at Storefront EIFS	0.37	0.50	0.95	0.037	1	0	1	0	0.051	1.6	1.20	0.80	77%		
1	SF 4 NORTH UPPER LEFT	43	90	North	0.869	0.601	24-Rear Wall 6	05ud-Intus CG4x20Arx4x18ArxCG4	18ud-Intus Fixed Left at Storefront EIFS	0.37	0.50	0.95	0.037	1	0	0	1	0.100	0.5	0.33	1.11	64%		
5	SF 4 NORTH LOWER MIDDLE	43	90	North	0.869	1.794	24-Rear Wall 6	05ud-Intus CG4x20Arx4x18ArxCG4	17ud-Intus Fixed Middle at Storefront EIFS	0.37	0.50	0.95	0.037	0	0	1	0	0.107	7.8	5.93	0.78	76%		
5	SF 4 NORTH UPPER MIDDLE	43	90	North	0.869	0.601	24-Rear Wall 6	05ud-Intus CG4x20Arx4x18ArxCG4	17ud-Intus Fixed Middle at Storefront EIFS	0.37	0.50	0.95	0.037	0	0	0	1	0.152	2.6	1.65	1.08	63%		
1	SF 4 NORTH TRANSOM	43	90	North	0.869	0.601	24-Rear Wall 6	05ud-Intus CG4x20Arx4x18ArxCG4	17ud-Intus Fixed Middle at Storefront EIFS	0.37	0.50	0.95	0.037	0	0	0	1	0.152	0.5	0.33	1.08	63%		
1	SF 4 NORTH LOWER RIGHT	43	90	North	0.828	1.794	24-Rear Wall 6	05ud-Intus CG4x20Arx4x18ArxCG4	19ud-Intus Fixed Right at Storefront EIFS	0.37	0.50	0.95	0.037	0	1	1	0	0.050	1.5	1.13	0.81	76%		
1	SF 4 NORTH UPPER RIGHT	43	90	North	0.828	0.601	24-Rear Wall 6	05ud-Intus CG4x20Arx4x18ArxCG4	19ud-Intus Fixed Right at Storefront EIFS	0.37	0.50	0.95	0.037	0	1	0	1	0.098	0.5	0.31	1.12	63%		
1	SF 5 SOUTH TRANSOM LEFT	43	90	North	0.915	0.572	24-Rear Wall 6	05ud-Intus CG4x20Arx4x18ArxCG4	28ud-Intus Fixed Left at Storefront Roxul	0.37	0.50	0.95	0.037	1	0	0	1	0.053	0.5	0.33	0.98	63%		
1	SF 5 SOUTH TRANSOM RIGHT	223	90	South	0.915	0.572	26-Front Wall Lower 11	05ud-Intus CG4x20Arx4x18ArxCG4	27ud-Intus Fixed Middle at Storefront Roxul	0.37	0.50	0.95	0.037	0	1	0	1	0.053	0.5	0.33	0.99	63%		
1	SF 5 SOUTH LOWER RIGHT	223	90	South	1.069	2.450	26-Front Wall Lower 11	05ud-Intus CG4x20Arx4x18ArxCG4	29ud-Intus Fixed Right at Storefront Roxul	0.37	0.50	0.95	0.037	0	1	1	0	0.063	2.6	2.13	0.76	81%		
1	SF 5 SOUTH UPPER RIGHT	223	90	South	1.069	0.573	26-Front Wall Lower 11	05ud-Intus CG4x20Arx4x18ArxCG4	29ud-Intus Fixed Right at Storefront Roxul	0.37	0.50	0.95	0.037	0	1	0	1	0.053	0.6	0.40	0.96	65%		
1	SF 6 SOUTH LOWER LEFT	223	90	South	0.923	1.769	26-Front Wall Lower 11	05ud-Intus CG4x20Arx4x18ArxCG4	28ud-Intus Fixed Left at Storefront Roxul	0.37	0.50	0.95	0.037	1	0	1	0	0.064	1.6	1.27	0.81	78%		
1	SF 6 SOUTH UPPER LEFT	223	90	South	0.923	0.576	26-Front Wall Lower 11	05ud-Intus CG4x20Arx4x18ArxCG4	28ud-Intus Fixed Left at Storefront Roxul	0.37	0.50	0.95	0.037	1	0	0	1	0.053	0.5	0.34	0.98	64%		
1	SF 6 SOUTH LOWER RIGHT	223	90	South	0.923	1.769	26-Front Wall Lower 11	05ud-Intus CG4x20Arx4x18ArxCG4	27ud-Intus Fixed Middle at Storefront Roxul	0.37	0.50	0.95	0.037	0	0	1	0	0.076	1.6	1.26	0.76	77%		
1	SF 6 SOUTH UPPER RIGHT	223	90	South	0.923	0.576	26-Front Wall Lower 11	05ud-Intus CG4x20Arx4x18ArxCG4	27ud-Intus Fixed Middle at Storefront Roxul	0.37	0.50	0.95	0.037	0	0	0	1	0.051	0.5	0.34	0.92	63%		
1	Kawneer Door at SF 5 Left	223	90	South	0.915	2.134	26-Front Wall Lower 11	05ud-Intus CG4x20Arx4x18ArxCG4	40ud-Kawneer Door	0.37	0.50	2.40	0.037	1	0	1	0	0.128	2.0	1.30	1.43	67%		
1	Kawneer Door at SF 5 Right	223	90	South	0.915	2.134	26-Front Wall Lower 11	05ud-Intus CG4x20Arx4x18ArxCG4	40ud-Kawneer Door	0.37	0.50	2.40	0.037	0	0	1	0	0.101	2.0	1.30	1.28	67%		
1	Kawneer Door at SF 4 Left	43	90	North	0.915	2.134	24-Rear Wall 6	05ud-Intus CG4x20Arx4x18ArxCG4	40ud-Kawneer Door	0.37	0.50	2.40	0.037	0	0	1	0	0.101	2.0	1.30	1.28	67%		
1	Kawneer Door at SF 4 Right	43	90	North	0.915	2.134	24-Rear Wall 6	05ud-Intus CG4x20Arx4x18ArxCG4	40ud-Kawneer Door	0.37	0.50	2.40	0.037	0	0	1	0	0.101	2.0	1.30	1.28	67%		
0	Kawneer at Standard Dimension	43	90	North	1.920	2.090	24-Rear Wall 6	05ud-Intus CG4x20Arx4x18ArxCG4	40ud-Kawneer Door	0.37	0.50	2.40	0.037	0	0	0	0	0.000						

Passive House with PHPP Version 9.6a

Latitude	40.78 °				
Orientation	Glazing area [m²]	Reduction factor winter $r_{f,w}$	Reduction factor cooling $r_{f,c}$	Reduction factor cooling load $r_{f,cl}$	Solar load [kWh/(m² _{glazing})]
North	170.37	55%	54%	50%	71
East	14.70	64%	58%	54%	142
South	171.55	58%	54%	50%	132
West	28.08	63%	62%	57%	87
Horizontal	2.42	100%	100%	100%	0

40.78

Quantity	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 ₀ [m]	h ₀ [m]	A ₀ [m ²]	h _{shad} [m]	d _{horiz} [m]	o _{reveal} [m]	d _{reveal} [m]	o _{over} [m]	d _{over} [m]	F _{winter} [%]	F _{summer} [%]	z [%]		r _h [%]	r _v [%]	r _o [%]	r _z [%]	r _h [%]	r _v [%]	r _o [%]	r _{s,1} [%]	r _{s,2} [%]
1	Window Type 5&6 - S	313	90	West	0.45	1.56	0.7	8.40	0.00	0.31	0.03	0.31	0.31	100%	100%	73%			67%	92%	62%	100%	79%	97%	62%	58%
1	Window Type 5&6 - S	313	90	West	0.45	1.56	0.7	8.40	0.00	0.31	0.03	0.31	0.31	100%	100%	73%			67%	92%	62%	100%	79%	97%	62%	58%
3	Window Type 1&3 - L	43	90	North	0.97	1.51	4.4			0.31	0.03	0.31	0.31	100%	100%	73%			82%	92%	75%	100%	88%	97%	69%	64%
3	Tilt and Turn at Left	43	90	North	0.49	1.41	2.1			0.31	0.03	0.31	0.31	100%	100%	73%			70%	92%	64%	100%	80%	96%	62%	58%
4	Window Type 2&4 - R	43	90	North	0.97	1.51	5.9			0.31	0.03	0.31	0.31	100%	100%	73%			82%	92%	75%	100%	88%	97%	69%	64%
4	Tilt and Turn at Right	43	90	North	0.49	1.41	2.8			0.31	0.03	0.31	0.31	100%	100%	73%			70%	92%	64%	100%	80%	96%	62%	58%
6	Window Type 5&6 - S	43	90	North	0.45	1.41	3.8			0.31	0.03	0.31	0.31	100%	100%	73%			68%	92%	62%	100%	78%	96%	61%	57%
2	Window Type 5&6 - S	133	90	East	0.45	1.56	1.4	5.40	0.00	0.31	0.03	0.31	0.31	100%	100%	73%			68%	93%	63%		77%	93%	59%	55%
5	Window Type 1&3 - L	223	90	South	0.97	1.51	7.4	5.40	39.00	0.31	0.03	0.31	0.31	100%	100%	73%		94%	83%	93%	72%	94%	87%	92%	61%	57%
5	Tilt and Turn at Left	223	90	South	0.49	1.41	3.5	5.40	39.00	0.31	0.03	0.31	0.31	100%	100%	73%		94%	71%	93%	61%	94%	78%	92%	54%	51%
3	Window Type 2&4 - R	223	90	South	0.97	1.51	4.4	5.40	39.00	0.31	0.03	0.31	0.31	100%	100%	73%		94%	83%	93%	72%	94%	87%	92%	61%	57%
3	Tilt and Turn at Right	223	90	South	0.49	1.41	2.1	5.40	39.00	0.31	0.03	0.31	0.31	100%	100%	73%		94%	71%	93%	61%	94%	78%	92%	54%	51%
4	Window Type 5&6 - S	223	90	South	0.45	1.41	2.5	5.40	39.00	0.31	0.03	0.31	0.31	100%	100%	73%		94%	69%	93%	59%	94%	76%	92%	53%	50%
1	Window Type 5&6 - S	313	90	West	0.45	1.56	0.7	5.40	0.00	0.31	0.03	0.31	0.31	100%	100%	73%			67%	92%	62%		79%	97%	62%	58%
1	Window Type 5&6 - S	313	90	West	0.45	1.56	0.7	5.40	0.00	0.31	0.03	0.31	0.31	100%	100%	73%			67%	92%	62%		79%	97%	62%	58%
1	Kawneer Door Left	223	90	South	0.70	1.56	1.1													75%					100%	100%
1	Kawneer Door Right	223	90	South	0.70	1.56	1.1													75%					100%	100%
2	Roof Hatch	0	0	Horizontal	1.10	1.10	2.4													75%					100%	100%
1	TSA south opaque	223	90	South	1.06	1.66	1.8	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		89%	84%	93%	70%	91%	88%	93%	60%	56%
	(Mechanical Louver F							8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%										
1	TSA south operable	223	90	South	0.45	1.66	0.7	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		89%	69%	93%	57%	91%	76%	93%	52%	49%
1	TSA south fix	223	90	South	0.61	1.66	1.0	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		89%	75%	93%	63%	91%	81%	93%	56%	52%
1	T8B south fix	223	90	South	1.05	1.66	1.7	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		89%	84%	93%	70%	91%	88%	93%	60%	56%
1	T8B south opaque	223	90	South	1.16	1.66	1.9	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		89%	85%	93%	71%	91%	89%	93%	61%	57%
1	T8B south fix	223	90	South	1.04	1.66	1.7	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		89%	84%	93%	70%	91%	88%	93%	60%	56%
1	T8B south operable	223	90	South	0.53	1.66	0.9	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		89%	72%	93%	60%	91%	79%	93%	54%	51%
1	T8B south opaque	223	90	South	0.73	1.66	1.2	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		89%	78%	93%	65%	91%	84%	93%	57%	54%
1	T8B south opaque	223	90	South	0.70	1.66	1.2	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		89%	78%	93%	65%	91%	83%	93%	57%	53%
1	T8C south fix	223	90	South	1.05	1.66	1.7	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		89%	84%	93%	70%	91%	88%	93%	60%	56%
1	T8C south operable	223	90	South	0.53	1.66	0.9	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		89%	72%	93%	60%	91%	79%	93%	54%	51%
1	T8C south opaque	223	90	South	0.86	1.66	1.4	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		89%	81%	93%	67%	91%	85%	93%	59%	55%
1	T8C south opaque	223	90	South	0.86	1.66	1.4	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		89%	81%	93%	67%	91%	86%	93%	59%	55%
1	T8C south operable	223	90	South	0.45	1.66	0.7	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		89%	69%	93%	57%	91%	76%	93%	52%	49%
1	T8C south fix	223	90	South	1.04	1.66	1.7	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		89%	84%	93%	70%	91%	88%	93%	60%	56%
1	T8D south opaque	223	90	South	0.73	1.66	1.2	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		89%	78%	93%	65%	91%	84%	93%	57%	54%
1	T8D south opaque	223	90	South	0.73	1.66	1.2	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		89%	78%	93%	65%	91%	84%	93%	57%	54%
1	T8D south operable	223	90	South	0.45	1.66	0.7	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		89%	69%	93%	57%	91%	76%	93%	52%	49%
1	T8D south fix	223	90	South	1.04	1.66	1.7	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		89%	84%	93%	70%	91%	88%	93%	60%	56%
1	T8D south opaque	223	90	South	1.03	1.66	1.7	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		89%	84%	93%	70%	91%	88%	93%	60%	56%
1	T8D south operable	223	90	South	0.45	1.66	0.7	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		89%	69%	93%	57%	91%	76%	93%	52%	49%
1	T8D south fix	223	90	South	1.03	1.66	1.7	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		89%	84%	93%	70%	91%	88%	93%	60%	56%
1	T8E south opaque	223	90	South	0.76	1.66	1.3	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		89%	79%	93%	66%	91%	84%	93%	58%	54%
1	T8E south opaque	223	90	South	0.76	1.66	1.3	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		89%	79%	93%	66%	91%	84%	93%	58%	54%
1	T8E south fix	223	90	South	1.04	1.66	1.7	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		89%	84%	93%	70%	91%	88%	93%	60%	56%
1	T8E south operable	223	90	South	0.45	1.66	0.7	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		89%	69%	93%	57%	91%	76%	93%	52%	49%
1	T8E south opaque	223	90	South	0.82	1.66	1.4	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		89%	80%	93%	67%	91%	85%	93%	59%	54%
1	T8E south opaque	223	90	South	0.88	1.66	1.5	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		89%	81%	93%	68%	91%	86%	93%	59%	55%
1	T8F south operable	223	90	South	0.45	1.66	0.7	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		89%	69%	93%	57%	91%	76%	93%	52%	49%
1	T8F south fix	223	90	South	1.02	1.66	1.7	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		89%	83%	93%	69%	91%	87%	93%	60%	56%
1	T8F south opaque	223	90	South	0.71	1.66	1.2	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		89%	77%	93%	65%	91%	83%	93%	57%	53%
1	T8F south opaque	223	90	South	0.70	1.66	1.2	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		89%	77%	93%	64%	91%	83%	93%	57%	53%
1	T8F south operable	223	90	South	0.45	1.66	0.7	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		89%	69%	93%	57%	91%	76%	93%	52%	49%
1	T8F south fix	223	90	South	1.04	1.66	1.7	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		89%	84%	93%	70%	91%	88%	93%	60%	56%
1	T8F south opaque	223	90	South	0.67	1.66	1.1	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		89%	77%	93%	64%	91%	82%	93%	57%	53%
1	T8G east opaque	133	90	East	0.69	1.66	1.1	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		89%	77%	93%	63%	90%	84%	94%	57%	54%
1	T8G east opaque	133	90	East	0.72	1.66	1.2	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		89%	77%	93%	64%	90%	84%	94%	58%	54%
1	T8G east fix	133	90	East	0.72	1.66	1.2	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		89%	77%	93%	64%	90%	84%	94%	58%	54%

Quantity	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 ₀ [m]	h ₀ [m]	A ₀ [m ²]	h _{shad} [m]	d _{hor} [m]	o _{reveal} [m]	d _{reveal} [m]	o _{over} [m]	d _{over} [m]	F _{winter} [%]	F _{summer} [%]	z [%]		r _{v1} [%]	r _{v2} [%]	r _o [%]	r _{s1} [%]	r _{v1} [%]	r _{v2} [%]	r _o [%]	r _{s1} [%]	r _{s2} [%]
1	T8J north opaque	43	90	North	0.70	1.66	1.2	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		83%	77%	93%	59%	86%	84%	97%	57%	53%
1	T8J north operable	43	90	North	0.45	1.66	0.7	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		83%	68%	93%	53%	86%	78%	97%	53%	49%
1	T8K north fix	43	90	North	0.72	1.66	1.2	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		83%	77%	93%	60%	86%	85%	97%	57%	53%
1	T8K north opaque	43	90	North	0.75	1.66	1.3	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		83%	78%	93%	60%	86%	85%	97%	57%	54%
1	T8K north opaque	43	90	North	0.71	1.66	1.2	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		83%	77%	93%	59%	86%	84%	97%	57%	53%
1	T8K north operable	43	90	North	0.45	1.66	0.7	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		83%	68%	93%	52%	86%	78%	97%	53%	49%
1	T8K north fix	43	90	North	0.71	1.66	1.2	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		83%	77%	93%	59%	86%	85%	97%	57%	53%
1	T8K north opaque	43	90	North	0.75	1.66	1.3	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		83%	78%	93%	60%	86%	85%	97%	57%	54%
1	T8K north opaque	43	90	North	0.71	1.66	1.2	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		83%	77%	93%	59%	86%	85%	97%	57%	53%
1	T8K north operable	43	90	North	0.45	1.66	0.7	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		83%	68%	93%	53%	86%	78%	97%	53%	49%
1	T8L north fix	43	90	North	0.71	1.66	1.2	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		83%	77%	93%	59%	86%	84%	97%	57%	53%
1	T8L north opaque	43	90	North	0.76	1.66	1.3	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		83%	78%	93%	60%	86%	85%	97%	57%	54%
1	T8L north opaque	43	90	North	0.80	1.66	1.3	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		83%	79%	93%	61%	86%	86%	97%	58%	54%
1	T8L north operable	43	90	North	0.45	1.66	0.7	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		83%	68%	93%	52%	86%	78%	97%	53%	49%
1	T8L north fix	43	90	North	0.71	1.66	1.2	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		83%	77%	93%	59%	86%	85%	97%	57%	53%
1	T8L north opaque	43	90	North	0.75	1.66	1.2	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		83%	78%	93%	60%	86%	85%	97%	57%	54%
1	T8M north opaque	43	90	North	0.68	1.66	1.1	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		83%	76%	93%	59%	86%	84%	97%	57%	53%
1	T8M north opaque	43	90	North	0.78	1.66	1.3	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		83%	78%	93%	61%	86%	86%	97%	58%	54%
1	T8M north opaque	43	90	North	0.73	1.66	1.2	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		83%	77%	93%	60%	86%	85%	97%	57%	53%
1	T8M north opaque	43	90	North	0.76	1.66	1.3	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		83%	78%	93%	60%	86%	85%	97%	57%	54%
1	T8M north opaque	43	90	North	0.67	1.66	1.1	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		83%	76%	93%	59%	86%	84%	97%	56%	53%
1	T8M north operable	43	90	North	0.45	1.66	0.7	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		83%	68%	93%	53%	86%	78%	97%	53%	49%
1	T8N west fix	313	90	West	0.75	1.66	1.2	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		83%	77%	93%	60%	86%	86%	97%	58%	54%
1	T8N west opaque	313	90	West	0.71	1.66	1.2	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		83%	76%	93%	59%	86%	85%	97%	58%	54%
1	T8N west operable	313	90	West	0.45	1.66	0.7	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		83%	67%	93%	52%	86%	79%	97%	53%	50%
1	T8N west fix	313	90	West	0.90	1.66	1.5	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		83%	80%	93%	62%	86%	88%	97%	59%	55%
1	T8N west opaque	313	90	West	0.94	1.66	1.6	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		83%	81%	93%	63%	86%	88%	97%	59%	56%
1	T8N west opaque	313	90	West	0.93	1.66	1.5	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		83%	81%	93%	62%	86%	88%	97%	59%	55%
1	T8O west opaque	313	90	West	0.77	1.66	1.3	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		83%	78%	93%	60%	86%	86%	97%	58%	54%
1	T8O west fix	313	90	West	0.79	1.66	1.3	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		83%	78%	93%	60%	86%	86%	97%	58%	54%
1	T8O west opaque	313	90	West	0.79	1.66	1.3	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		83%	78%	93%	60%	86%	86%	97%	58%	54%
1	T8O west opaque	313	90	West	0.69	1.66	1.2	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		83%	76%	93%	59%	86%	85%	97%	57%	53%
1	T8P west opaque	313	90	West	0.75	1.66	1.2	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		83%	77%	93%	60%	86%	86%	97%	58%	54%
1	T8P west opaque	313	90	West	0.68	1.66	1.1	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		83%	76%	93%	58%	86%	85%	97%	57%	53%
1	T8P west opaque	313	90	West	0.68	1.66	1.1	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		83%	76%	93%	58%	86%	85%	97%	57%	53%
1	T8P west opaque	313	90	West	0.68	1.66	1.1	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		83%	76%	93%	58%	86%	85%	97%	57%	53%
1	T8P west opaque	313	90	West	0.75	1.66	1.2	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		83%	77%	93%	60%	86%	86%	97%	58%	54%
1	T8P west opaque	313	90	West	0.73	1.66	1.2	8.40	39.00	0.31	0.030	0.31	0.31	100%	100%	73%		83%	77%	93%	59%	86%	85%	97%	58%	54%
	<GROUND FLOOR W																									
1	SF 4 NORTH LOWER	43	90	North	0.72	1.65	1.2	18.00	20.00	0.31	0.030	0.31	0.31	90%	80%			53%	77%	93%	34%	59%	85%	97%	39%	39%
1	SF 4 NORTH UPPER	43	90	North	0.72	0.46	0.3	18.00	20.00	0.31	0.030	0.31	0.31	90%	80%			53%	77%	85%	31%	59%	85%	89%	36%	36%
5	SF 4 NORTH LOWER	43	90	North	0.72	1.65	5.9	18.00	20.00	0.31	0.030	0.31	0.31	90%	80%			53%	77%	93%	34%	59%	85%	97%	39%	39%
5	SF 4 NORTH UPPER	43	90	North	0.72	0.46	1.7	18.00	20.00	0.31	0.030	0.31	0.31	90%	80%			53%	77%	85%	31%	59%	85%	89%	36%	36%
1	SF 4 NORTH TRANS	43	90	North	0.72	0.46	0.3	18.00	20.00	0.31	0.030	0.31	0.31	90%	80%			53%	77%	85%	31%	59%	85%	89%	36%	36%
1	SF 4 NORTH LOWER	43	90	North	0.68	1.65	1.1	18.00	20.00	0.31	0.030	0.31	0.31	90%	80%			53%	76%	93%	34%	59%	84%	97%	39%	39%
1	SF 4 NORTH UPPER	43	90	North	0.68	0.46	0.3	18.00	20.00	0.31	0.030	0.31	0.31	90%	80%			53%	76%	85%	31%	59%	84%	89%	35%	35%
1	SF 5 SOUTH TRANS	43	90	North	0.77	0.43	0.3	26.00	39.00	0.31	0.030	0.31	0.31	90%	80%			60%	78%	85%	36%	66%	85%	89%	40%	40%
1	SF 5 SOUTH TRANS	223	90	South	0.76	0.43	0.3	26.00	39.00	0.31	0.030	0.31	0.31	90%	80%			62%	79%	86%	38%	75%	84%	76%	39%	39%
1	SF 5 SOUTH LOWER	223	90	South	0.92	2.31	2.1	26.00	39.00	0.31	0.030	0.31	0.31	90%	80%			62%	82%	95%	43%	75%	86%	96%	50%	50%
1	SF 5 SOUTH UPPER	223	90	South	0.92	0.43	0.4	26.00	39.00	0.31	0.030	0.31	0.31	90%	80%			62%	82%	85%	39%	75%	86%	76%	40%	40%
1	SF 6 SOUTH LOWER	223	90	South	0.78	1.63	1.3	26.00	39.00	0.31	0.030	0.31	0.31	90%	80%			62%	79%	93%	41%	75%	84%	93%	47%	47%
1	SF 6 SOUTH UPPER	223	90	South	0.78	0.44	0.3	26.00	39.00	0.31	0.030	0.31	0.31	90%	80%			62%	79%	86%	38%	75%	84%	77%	39%	39%
1	SF 6 SOUTH LOWER	223	90	South	0.77	1.63	1.3	26.00	39.00	0.31	0.030	0.31	0.31	90%	80%			62%	79%	93%	41%	75%	84%	93%	47%	47%
1	SF 6 SOUTH UPPER	223	90	South	0.77	0.44	0.3	26.00	39.00	0.31	0.030	0.31	0.31	90%	80%			62%	79%	86%	38%	75%	84%	77%	39%	39%
1	Kawneer Door at SF	223	90	South	0.70	1.86	1.3	26.00	39.00	0.31	0.030	0.31	0.31	90%	80%			62%	77%	94%	40%	75%	83%	94%	47%	47%
1	Kawneer Door at SF	223	90	South	0.70	1.86	1.3	26.00	39.00	0.31	0.030	0.31	0.31	90%	80%			62%	77%	94%	40%	75%	83%	94%	47%	47%
1	Kawneer Door at SF	43	90	North	0.70	1.86	1.3	18.00	20.00	0.31	0.03															

Ventilation data

Passive House with PHPP Version 9.6a

HANAC Corona Gardens (Senior Residence) / Climate: New York / TFA: 3526 m² / Heating: 13.3 kWh/(m²a) / Cooling: 13.2 kWh/(m²a) / PER: 80.6 kWh/(m²a)

Treated floor area A_{TFA}	m²	3526	(Areas' worksheet)
Room height h	m	2.50	
Volume of ventilated space ($A_{TFA} \cdot h$) V_V	m³	8816	(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		
Wind protection coefficient, e		For annual demand: 0.07	For heating load: 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	0.43	0.43		
				m³	m³/(hm²)
Excess extract air		For annual demand:	For heating load:		
Infiltration air change rate n _{V,Rest}		1/h	0.00	0.00	
		1/h	0.035	0.087	

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 m^3/h	Average air change rate $1/h$	Extract air excess (extract air system) $1/h$	Effective heat recovery efficiency unit $[-]$	Humidity recovery efficiency $[-]$	Specific power input Wh/m^3	Heat recovery efficiency SHX $[-]$
☐	Standard design	(Ventilation' worksheet, see below)						
☒	Multiple ventilation units, non-res	(Addl vent' worksheet)						
		7872	0.89	0.00	77.4%	47.0%	0.43	0.0%
					Cooling recovery			
						η_{SHX}	0%	

Average interior humidity during winter operation

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
30%	31%	35%	45%	-	-	-	-	-	58%	43%	34%

Passive House with PHPP Version 9.6e

HANAC Corona Gardens (Senior Residence) / Climate: New York / TFA: 3526 m² / Heating: 13.3 kWh/(m²a) / Cooling: 13.2 kWh/(m²a) / PER: 80.6 kWh/(m²a)

Planning ventilation systems with multiple ventilation units

Ventilation unit / Heat recovery efficiency design
In Ventilation sheet (standard design)
In 'Addl vent worksheet (this worksheet)

	(Ventilation) worksheet
x	(Add vent)
A	3526 (Areas' worksheet)
	2.50 (Worksheet 'Annual heating')
B	8816 (Worksheet 'Annual heating')
D	101.3 (Ventilation) worksheet
C	20 (Worksheet 'Annual heating')
	5.6 (Ventilation) worksheet
A	13.7 (Ground) worksheet
	175 (Heating) worksheet
	(Ventilation) worksheet

Ventilation unit no.	Description of the unit	Design		Annual average value		Air ch.f.
		V_{exp} m³/h	V_{ext} m³/h	V_{exp} m³/h	V_{ext} m³/h	
1	ERV-02A-ERV-08K	6973	6932	5369	5338	---
2	ERV-R-1	1545	1325	1545	1325	---
3	EXHAUST	2243	2243	296	296	---
4	ERV-R-2	255	255	255	255	---
5	ERV-G-02	119	119	119	119	---
6	ERV-S-01	144	144	144	144	---
7	ERV-S-02	144	144	144	144	---
8	---	---	---	---	---	---
9	---	---	---	---	---	---
10	---	---	---	---	---	---

Result for overall vent. syst.

11423	11161	7872	7620	0.89
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Effective vat recovery efficiency	Humidity recovery efficiency	Spec. input power	Heat recov. efficiency SHX
79%	64%	0.42	0%
86%	0%	0.45	0%
0%	0%	0.45	0%
86%	0%	0.45	0%
75%	64%	0.42	0%
82%	64%	0.42	0%
82%	64%	0.42	0%

77%	47%	0.43	0%
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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 CO₂ 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

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	Room name	Allocation to ventilation unit (No.)	Area A m ²	Clear height h m	Room vol V _h m ³	Volume flow per room V _{h,RA} m ³ /h	V _{h,RA} m ³ /h	Air chng. r _n per hour	Utilisation times t _u d	Duration of holiday d	Reduction factor 1	Reduction factor 2	Reduction factor 3	Operation factor 2	Operation factor 3	Operation factor 3	V _{h,RA} m ³ /h	Annual average value V _{h,RA} m ³ /h	V _{h,RA} m ³ /h	Change rate	Total area A _{tot} m ²	Total room vol. V _{h,tot} m ³	Design volume air flow V _{h,RA} m ³ /h		
1	27	2nd floor / Living Room	1	16	2.50	39	61	1.55	24	7		77%	100%					1272	1272	1.19	426.42	1066.06	1661			
2	27	2nd floor / Bedroom	1	11	2.50	28	41	1.46	24	7		77%	100%					848	848	1.13	301.01	752.51	1101			
3	27	2nd floor / Kitchen	1	17	2.50	42	61	1.46	24	7		77%	100%					1272	1272	1.19	451.51	1128.77	1661			
4	27	2nd floor / Bathroom	1	4	2.50	10	41	1.90	24	7		100%	100%					848	848	3.00	112.88	282.19	1101			
5	3	2nd floor / Living Room	1	18	2.50	45	102	2.25	24	7		77%	100%					235	235	1.13	54.35	135.87	306			
6	3	2nd floor / Kitchen	1	17	2.50	42	61	1.46	24	7		77%	100%					141	141	1.13	50.17	125.42	183			
7	3	2nd floor / Bathroom	1	4	2.50	10	41	1.90	24	7		77%	100%					94	94	3.00	12.54	31.35	357			
8	3	2nd floor / Corridor	2	62	2.50	154	119	0.77	24	7		100%	100%					357	357	1.19	185.34	483.35	1101			
9	3	2nd floor / Refuse Rm	2	5	2.50	12	34	2.93	24	7		150%	100%					102	102	2.93	13.94	34.94	102			
10	3	2nd floor / Janitor C	2	3	2.50	7	85	12.19	24	7		100%	100%					205	205	12.19	8.36	20.90	255			
11	8	5th floor / Living Room	1	16	2.50	39	61	1.55	24	7		77%	100%					377	377	1.19	126.35	315.87	489			
12	8	5th floor / Bedroom	1	11	2.50	28	41	1.46	24	7		77%	100%					251	251	1.13	89.19	222.97	326			
13	8	5th floor / Bathroom	1	4	2.50	10	41	1.90	24	7		77%	100%					31	31	3.00	9.26	23.23	41			
14	8	5th floor / Kitchen	1	17	2.50	42	61	1.46	24	7		77%	100%					377	377	1.13	133.78	334.45	489			
15	8	5th floor / Bathroom	1	4	2.50	10	41	1.90	24	7		77%	100%					251	251	3.00	33.45	83.61	326			
16	1	6th floor / Corridor	2	73	2.50	183	240	1.86	24	7		100%	100%					340	340	1.86	73.02	182.55	340			
17	1	6th floor / Refuse Rm	2	5	2.50	12	34	2.93	24	7		100%	100%					34	34	2.93	4.66	11.61	34			
18	1	6th floor / Janitor C	2	3	2.50	7	85	12.19	24	7		100%	100%					85	85	12.19	2.79	6.97	85			
19	27	6th floor / Living Room	1	16	2.50	39	61	1.55	24	7		77%	100%					1272	1272	1.19	426.42	1066.06	1661			
20	27	6th floor / Bedroom	1	11	2.50	28	41	1.46	24	7		77%	100%					848	848	1.13	301.01	752.51	1101			
21	27	6th floor / Kitchen	1	17	2.50	42	61	1.46	24	7		77%	100%					1272	1272	1.19	451.51	1128.77	1661			
22	27	6th floor / Bathroom	1	4	2.50	10	41	1.90	24	7		77%	100%					848	848	3.00	112.88	282.19	1101			
23	3	6th floor / Living Room	1	18	2.50	45	102	2.25	24	7		77%	100%					235	235	1.13	54.35	135.87	306			
24	3	6th floor / Kitchen	1	17	2.50	42	61	1.46	24	7		77%	100%					141	141	1.13	50.17	125.42	183			
25	3	6th floor / Bathroom	1	4	2.50	10	41	1.90	24	7		77%	100%					94	94	3.00	12.54	31.35	357			
26	3	6th floor / Corridor	2	62	2.50	154	119	0.77	24	7		100%	100%					357	357	1.19	185.34	483.35	1101			
27	3	6th floor / Refuse Rm	2	5	2.50	12	34	2.93	24	7		150%	100%					102	102	2.93	13.94	34.94	102			
28	3	6th floor / Janitor C	2	3	2.50	7	85	12.19	24	7		100%	100%					205	205	12.19	8.36	20.90	255			
29	1	Laundry w/ Dryers	5	15	2.50	38	2243	2243	59.81	3.166667		7	100%	100%				296	296	7.89	15.00	37.50	2243			
30	1	Laundry Taps	3	10	2.50	25	150	150	1.50	3.0		7	100%	100%				150	150	3.00	15.00	37.50	2243			
31	1	Basinal Ground Floor	2	133	2.75	366	442	442	1.21	24	7		100%	100%				442	442	1.21	133.00	366.75	442			
32	1	Ground Floor Elev	5	65	2.75	179	119	119	0.67	24	7		100%	100%				119	119	0.67	65.00	178.75	119			
33	1	Idor & Trash Compac	4	40	2.75	109	255	255	2.34	24	7		100%	100%				255	255	2.34	39.60	108.90	255			
34	1	Stair A	7	12	22.75	273	144	144	0.53	24	7		100%	100%				144	144	0.53	12.00	273.00	144			
35	1	Stair B	7	12	22.75	273	144	144	0.53	24	7		100%	100%				144	144	0.53	12.00	273.00	144			
Additional Notes: Please mark complete lines above, copy and paste multiple times																			6768	6516	---	0.72	3725.5	9338.8	10319	10057

Additional lines: Please mark complete lines above, copy and paste multiple times

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	Design vol. flow per unit	Application range for volume flow rate	Electrical efficiency	Pressure loss calculation	Application range	Interior location	Exterior location	Heat recovery efficiency	Energy recovery efficiency	Frost protection necessary	Subtotal H ₂ O Effective recovery	Efficiency of heat recovery	Frost protection (limit temperature)	Design volume flow rate	Annual average value	Average value in use		
[1]	[2]			m ³ /unit	m ³ /h	Wh/m ³	Pa _{tot}	Pa _{sub}	Pa _{add}	Pa _{line}	Unit	[12]	[13]	[14]	[15]	[16]	V _{max}	V _{avg}	V _{use}		
Change sorting table																					
1	68	ERV-02A - ERV-02K	Heat-Exchanger - Comfort200 ERV	103	60	120	0.42			100	-	x	0.85	79%	64%	yes	0%	2-Elec.	-5	1159	
2	1	ERV-R-1	Heat-Exchanger - GOLD RX R7	155	540	1820	0.45	187	187	265	53		x	1.00	86%	no	0%	1-No	0	0	
3	1	EXHAUST	Bad-Dry Exhaust	2243	375	375	0.45	50	50	50	100	-	x	0.00	0%	0%	N/A	0%	1-No	5	0
4	1	ERV-R-2	GOLD RX R7	255	540	1820	0.45	187	187	265	53	x	0.86	85%	0%	no	0%	1-No	0	0	
5	1	ERV-G-02	Heat-Exchanger - Comfort200 ERV	119	60	150	0.42			100	-	x	0.85	79%	64%	yes	0%	2-Elec.	-5	1159	
6	1	ERV-S-01	Heat-Exchanger - Comfort200 ERV	144	60	150	0.42			100	-	x	0.85	82%	64%	yes	0%	2-Elec.	-5	1159	
7	1	ERV-S-02	Heat-Exchanger - Comfort200 ERV	144	60	150	0.42			100	-	x	0.85	82%	64%	yes	0%	2-Elec.	-5	1159	
8																	0	0	0	0	
																	0	0	0	0	
10																	0	0	0	0	
Total (directly electric)																1247					
Total (hydraulic and heat exchanger)																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	4.7	(only enter when at least one unit is installed outside of the thermal envelope)
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[illegible]

Specific energy for heating (annual method)

Passive House with PHPP Version 9.6a

HANAC Corona Gardens (Senior Residence) / Climate: New York / TFA: 3526 m² / Heating: 13.3 kWh/(m²a) / Cooling: 13.2 kWh/(m²a) / PER: 80.6 kWh/(m²a)

Interior temperature: 20.0 °C

Building type: Residential portion of mixed-use building

Treated floor area A_{TFA}: 3526.3 m²

Building assembly	Temperature zone	Area m²	U-Value W/(m²K)	Temp. factor f _t	G _i kWh/a	Per m² of treated floor area
External wall - Ambient	A	1877.5	0.252	1.00	64.4	8.63
External wall - Ground	B			0.42		
Roof/Ceiling - Ambient	A	710.6	0.143	1.00	64.4	1.86
Floor slab / Basement ceiling	B	310.0	0.216	0.42	64.4	0.52
	A			1.00		
	A			1.00		
Gas Meter Room	X	41.6	2.711	0.75	64.4	1.54
Windows	A	548.3	0.921	1.00	64.4	9.22
Exterior door	A	10.5	2.000	1.00	64.4	0.38
Exterior TB (length/m)	A	792.4	0.075	1.00	64.4	1.09
Perimeter TB (length/m)	P	59.5	-0.160	0.42	64.4	-0.07
Ground TB (length/m)	B			0.42		0.00
Total of all building envelope areas		3498.5				

Transmission heat losses Q_T

Total 81710 kWh/a

23.2 kWh/(m²a)

Ventilation system:		Effective air volume, V _V	A _{TFA} m²	Clear room height m	
Effective heat recovery efficiency	η _{eff}	77%	3526.3	2.50	8815.8
Efficiency of subsoil heat exchanger					
Heat recovery efficiency of SHX	η _{SHX}	0%			
Energetically effective air changes n _V		n _{V,system} 1/h	η _{HR}	n _{V,Res} 1/h	
		0.893	0.77	0.035	0.237
V _V	n _V	C _{Air}	G _i		
8815.8	0.237	0.33	64.4	44393	12.6

Ventilation heat losses Q_V

Total heat losses Q _L		Q _T	Q _V	Reduction factor night/weekend	
		81710	44393	1.0	126103
					35.8

Orientation of the area	Reduction factor See 'Windows' sheet	g-Value (perp. radiation)	Area m²	Radiation HP kWh/(m²a)	
North	0.31	0.32	241.70	159	3812
East	0.38	0.10	19.89	479	349
South	0.33	0.32	243.55	484	12429
West	0.36	0.16	40.04	157	350
Horizontal	0.63	0.00	3.13	453	0
Available solar heat gains Q _S				Total	16940
					4.8

Internal heat gains Q _I		Length heating period d/a	Spec. power q _i W/m²	A _{TFA} m²	
		0.024	175	4.10	60680
					17.2
Free heat Q _F		Q _S + Q _I			77620
					22.0
Ratio of free heat to losses		Q _F / Q _V			0.62
Utilisation factor heat gains h _G		(1 - (Q _F / Q _L) ⁵) / (1 - (Q _F / Q _L) ⁶)			96%
Heat gains Q _G		η _G * Q _F			74831
					21.2

Annual heating demand Q _H		Q _L - Q _G		
		51271		15
Limiting value		15	Requirement met?	Yes

Specific energy for heating (monthly method)

Passive House with PHPP Version 9.6a

HANAC Corona Gardens (Senior Residence) / Climate: New York / TFA: 3526 m² / Heating: 13.3 kWh/(m²a) / Cooling: 13.2 kWh/(m²a) / PER: 80.6 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: **Residential portion of mixed-u**

Treated floor area A_{TFA}: **3526.3** m²

Spec. Capacity: **132** Wh/(m²K)

Building assembly	Temperature zone	Area m²	U-Value W/(m²K)	Month. red. fac.	G _i kWh/a	kWh/a	Per m² of treated floor area
External wall - Ambient	A	1877.5	0.252	1.00	70	33164	9.40
External wall - Ground	B			1.00			
Roof/Ceiling - Ambient	A	710.6	0.143	1.00	70	7132	2.02
Floor slab / Basement ceiling	B	310.0	0.216	1.00	30	2015	0.57
	A			1.00			
	A			1.00			
Gas Meter Room	X	41.6	2.711	0.75	70	5938	1.68
Windows	A	548.3	0.921	1.00	70	35463	10.06
Exterior door	A	10.5	2.000	1.00	70	1477	0.42
Exterior TB (length/m)	A	792.4	0.075	1.00	70	4193	1.19
Perimeter TB (length/m)	P	59.5	-0.160	1.00	30	-287	-0.08
Ground TB (length/m)	B			1.00			0.00
						Total	89097
							25.3

Transmission heat losses Q_T

		Effective air volume V _V		A _{TFA}		Clear room height			
				m²		m		m³	
				3526		2.50		8816	
		n _{V,system}		η*SHX		η _{HR}		n _{V,Res}	
		1/h				1/h		1/h	
		0.893		0%		0.77		0.035	
		0.893		0%		0.77		0.000	
		V _V		n _{V,equi,fraction}		C _{Air}		G _i	
		m³		1/h		Wh/(m³K)		kWh/a	
		8816		0.237		0.33		70	
		8816		0.000		0.33		32	
								48396	
								0	
								48396	
								13.7	
								0.0	
								13.7	

Ventilation losses ambient Q_V

Ventilation losses ground Q_{V,g}

Ventilation heat losses Q_V

		Q _T		Q _V		Reduction factor night/weekend saving			
		kWh/a		kWh/a				kWh/a	
		89097		48396		1.0		137494	
								39.0	

Total heat losses Q_L

Orientation of the area	Reduction factor see 'Windows' worksheet	g-Value (perp. radiation)	Area	Global radiation					
			m²	kWh/(m²a)	kWh/a				
North	0.31	0.32	241.7	217	=	5204			
East	0.38	0.10	19.9	617	=	450			
South	0.33	0.32	243.5	625	=	16060			
West	0.36	0.16	40.0	219	=	488			
Horizontal	0.63	0.00	3.1	620	=	0			
Sum opaque areas						3598			
Available solar heat gains Q _s						Total	25799	kWh/(m²a)	7.3

Available solar heat gains Q_S

		Length Heat. Period	Spec. Power q_i	A_{TFA}								
		kh/d	d/a	W/m²	m²	kWh/a	kWh/(m²a)					
Internal heat gains Q_i		0.024	*	212	*	4.1	*	3526.3	=	73562		20.9
Free heat Q_F					$Q_S + Q_i =$		99361		28.2			
Ratio free heat to losses					$Q_F / Q_L =$		0.72					
Utilisation factor heat gains h_G							91%					
Heat gains Q_G					$\eta_G * Q_F =$		90655		25.7			

Heat gains Q_G

		Annual heating demand Q _H		Q _L - Q _G		46838	13
		Limiting value		kWh/(m²a)		15	
		Requirement met?		(Yes/No)		Yes	

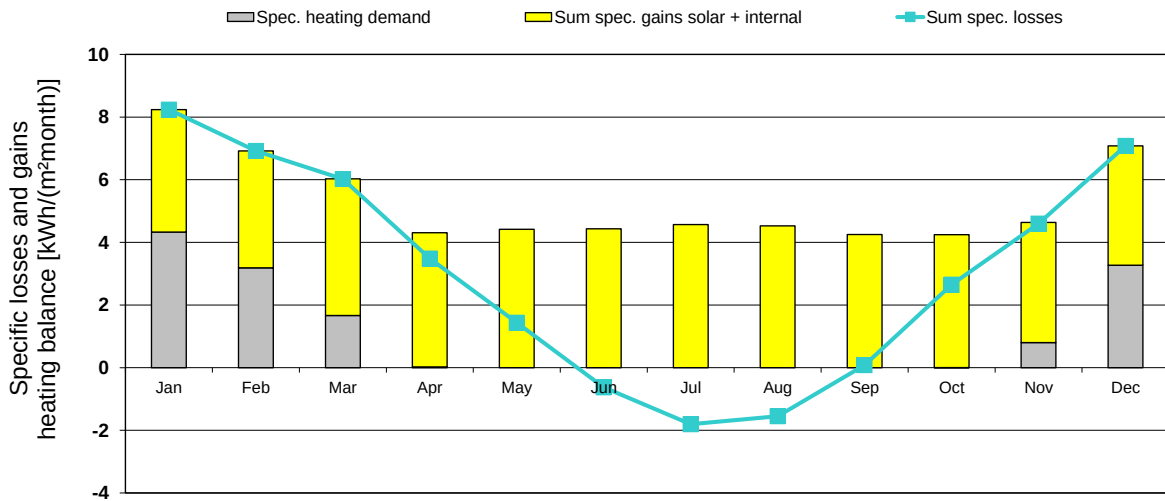
Specific energy for heating (monthly method)

Passive House with PHPP Version 9.6a

HANAC Corona Gardens (Senior Residence) / Climate: New York / TFA: 3526 m² / Heating: 13.3 kWh/(m²a) / Cooling: 13.2 kWh/(m²a) / PER: 80.6 kWh/(m²a)

Interior temperature: **20** °C
 Building type: **Residential portion of mixed-use building**
 Treated floor area A_{TFA}: **3526** m²

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	
Heating degree hours - External	14.9	12.5	10.8	6.2	2.5	-1.2	-3.3	-2.8	0.2	4.8	8.3	12.8	66	kKh
Heating degree hours - Ground	5.3	5.5	6.2	5.4	3.3	1.8	0.5	-0.3	-0.4	1.3	2.4	4.0	35	kKh
Losses - Exterior	28750	24083	20878	11973	4870	-2311	-6390	-5445	310	9272	16074	24736	126798	kWh
Losses - Ground	305	318	357	309	190	102	29	-18	-23	72	139	229	2008	kWh
Sum spec. losses	8.2	6.9	6.0	3.5	1.4	-0.6	-1.8	-1.5	0.1	2.6	4.6	7.1	36.5	kWh/m²
Solar gains - North	513	663	1021	1245	1495	1729	1691	1491	1065	823	471	469	12676	kWh
Solar gains - East	57	63	78	69	67	72	75	77	72	75	55	52	813	kWh
Solar gains - South	2020	2185	2769	2548	2371	2440	2585	2707	2659	2651	2114	1772	28822	kWh
Solar gains - West	44	54	97	131	148	163	161	146	111	76	54	33	1217	kWh
Solar gains - Horiz.	0	0	0	0	0	0	0	0	0	0	0	0	0	kWh
Solar gains - Opaque	400	473	664	704	745	821	837	786	668	584	419	353	7455	kWh
Internal heat gains	10757	9716	10757	10410	10757	10410	10757	10757	10410	10757	10410	10757	126651	kWh
Sum spec. gains solar + internal	3.9	3.7	4.4	4.3	4.4	4.4	4.6	4.5	4.2	4.2	3.8	3.8	50.4	kWh/m²
Utilisation factor	100%	100%	100%	81%	32%	100%	100%	100%	2%	62%	99%	100%	46%	
Annual heating demand	15265	11247	5877	92	0	0	0	0	0	2	2826	11529	46838	kWh
Spec. heating demand	4.3	3.2	1.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	3.3	13.3	kWh/m²



Annual heating demand: Comparison

Monthly method	(Heating)	46838	kWh/a	13.3	kWh/(m²a) reference to treated floor area according to PHPP
Annual method	(Annual heating)	51271	kWh/a	14.5	kWh/(m²a) reference to treated floor area according to PHPP
		#REF!	kWh/a	#REF!	

Heating load

Passive House with PHPP Version 9.6a

HANAC Corona Gardens (Senior Residence) / Climate: New York / TFA: 3526 m² / Heating: 13.3 kWh/(m²a) / Cooling: 13.2 kWh/(m²a) / PER: 80.6 kWh/(m²a)

Interior temperature: **20** °C
 Building type: **Residential portion of mixed-use building**
 Treated floor area A_{TFA}: **3526.3** m²

Design temperature		Radiation:	North	East	South	West	Horizontal	
Weather 1:	-9.9 °C		25	60	115	50	70	W/m²
Weather 2:	-4.4 °C		15	20	25	20	30	W/m²
Ground design temp.	11.6 °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	1877.5	* 0.252	* 1.00	* 29.9	or 24.4	= 14125	or 11527
External wall - Ground	B		* 0.143	* 1.00	* 8.4	or 8.4	= 3038	or 2479
Roof/Ceiling - Ambient	A	710.6	* 0.216	* 1.00	* 8.4	or 8.4	= 560	or 560
Floor slab / Basement ceiling	A		* 1.00	* 1.00	* 29.9	or 24.4	= 2529	or 2064
	A		* 1.00	* 1.00	* 29.9	or 24.4	= 15104	or 12326
Gas Meter Room	X	41.6	* 2.711	* 0.75	* 29.9	or 24.4	= 629	or 513
Windows	A	548.3	* 0.921	* 1.00	* 29.9	or 24.4	= 1786	or 1457
Exterior door	A	10.5	* 2.000	* 1.00	* 29.9	or 24.4	= -80	or -80
Exterior TB (length/m)	A	792.4	* 0.075	* 1.00	* 8.4	or 8.4	= 3916	or 3916
Perimeter TB (length/m)	P	59.5	* -0.160	* 1.00	* 8.4	or 8.4	= 3916	or 3916
Ground TB (length/m)	B		* 1.00	* 1.00	* 8.4	or 8.4	= 3916	or 3916
Building element towards neighbour	I	1302.1	* 1.003	* 1.00	* 3.0	or 3.0	= 3916	or 3916

Transmission heat load P_T

Total = **41607** or **34763**

Ventilation system:	A _{TFA} m²	Clear room height m	m³
	3526.3	* 2.50	= 8816
Heat recovery efficiency of the heat exchanger	η _{HR} 77%	Heat recovery efficiency SHX	η _{SHX} 1 0% or η _{SHX} 2 0%
	n _{V,Res} (Heating Load) 1/h	n _{V,system} 1/h	Φ _{HR} or Φ _{HR}
	0.087	+ 0.893	*(1- 0.77) or 0.77
Energetically effective air changes n _V			= 0.289 or 0.289

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
8815.8	* 0.289	or 0.289	* 0.33	* 29.9	or 24.4	= 25143	or 20518

Total heating load P_L

P_T + P_V = **66750** or **55281**

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	241.7	* 0.3	* 0.31	* 34	or 16	= 803	or 392
East	19.9	* 0.1	* 0.38	* 96	or 23	= 70	or 17
South	243.5	* 0.3	* 0.33	* 93	or 24	= 2377	or 608
West	40.0	* 0.2	* 0.36	* 28	or 17	= 62	or 37
Horizontal	3.1	* 0.0	* 0.63	* 70	or 30	= 0	or 0

Solar heating power P_S

Total = **3311** or **1053**

Internal heating load P_I

Spec. power W/m²	A _{TFA} m²	P _I 1 W	P _I 2 W
3.6	* 3526	= 12695	or 12695

Heating power (gains) P_G

P_T + P_I = **16006** or **13748**

Heating load P_H

P_L - P_G = **50744** or **41533**

= **50744** W

Area specific space heating load P_H / A_{TFA}

= **14.4** W/m²

Input max. supply air temperature	52 °C	°C
Max. supply air temperature θ _{Supply,Max}	52 °C	Supply air temperature without heating
		θ _{Supply,Min} 13.2 °C or 14.5 °C

For comparison: heating load transportable by the supply Air P_{Supply Air,Max}

= **100724** W specific: **28.6** W/m²

Supply air heating: Sufficient? **Yes**

Cooling: energy value for useful cooling energy

Passive House with PHPP Version 9.6a

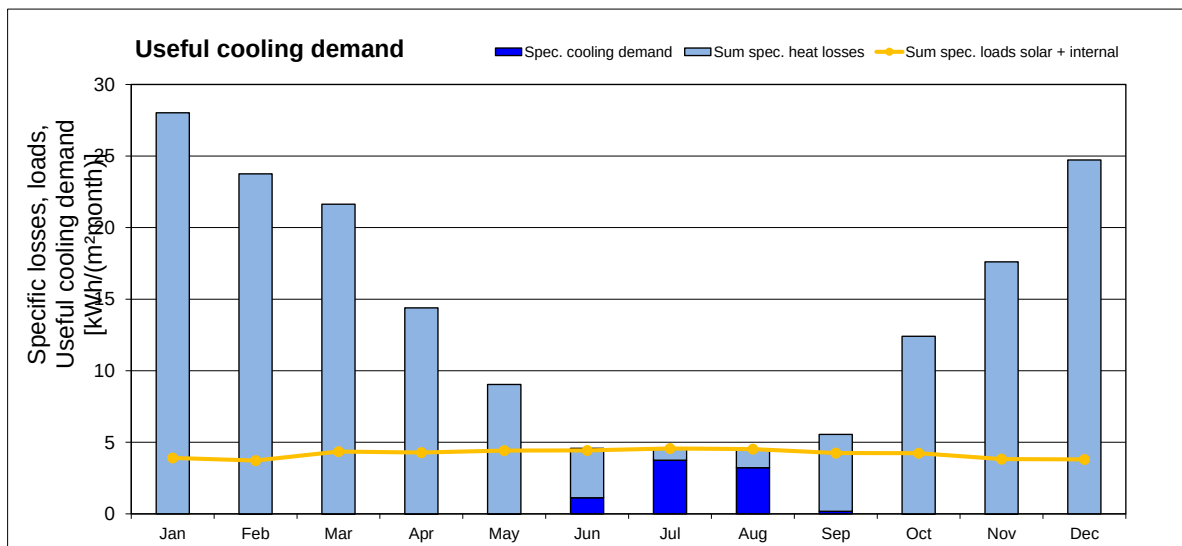
HANAC Corona Gardens (Senior Residence) / Climate: New York / TFA: 3526 m² / Heating: 13.3 kWh/(m²a) / Cooling: 13.2 kWh/(m²a) / PER: 80.6 kWh/(m²a)

Interior Temperature: **25** °C

Building type: **Residential portion of mixed-use building**

Treated Floor Area A_{TFA}: **3526** m²

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	
Heating degree hours - Exterior	18.7	15.9	14.6	9.9	6.4	2.5	0.5	1.0	3.8	8.6	12.0	16.6	111	kKh
Heating degree hours - Ground	9.0	8.9	9.9	9.0	7.0	5.4	4.2	3.4	3.2	5.0	6.0	7.7	79	kKh
Losses - Exterior	83760	71146	65239	43849	27741	10454	2148	3679	16634	38144	53570	74325	490689	kWh
Losses - Ground	605	596	666	601	471	360	282	228	214	333	403	515	5273	kWh
Losses summer ventilation	14469	12024	10383	6300	3615	1366	571	707	2101	5277	8137	12336	77285	kWh
Sum spec. heat losses	28.0	23.8	21.6	14.4	9.0	3.5	0.9	1.3	5.4	12.4	17.6	24.7	162.6	kWh/m ²
Solar load North	531	687	1057	1289	1549	1791	1751	1544	1103	852	488	486	13127	kWh
Solar load East	55	61	75	67	65	69	73	74	70	72	53	50	785	kWh
Solar load South	1982	2145	2717	2500	2327	2394	2537	2657	2609	2602	2075	1739	28284	kWh
Solar load West	45	55	100	135	153	168	166	150	114	78	56	34	1253	kWh
Solar load Horiz.	0	0	0	0	0	0	0	0	0	0	0	0	0	kWh
Solar load Opaque	400	473	664	704	745	821	837	786	668	584	419	353	7455	kWh
Internal heat gains	10757	9716	10757	10410	10757	10410	10757	10757	10410	10757	10410	10757	126651	kWh
Sum spec. loads solar + internal	3.9	3.7	4.4	4.3	4.4	4.4	4.6	4.5	4.2	4.2	3.8	3.8	50.4	kWh/m ²
Utilisation factor losses	14%	16%	20%	30%	49%	96%	96%	100%	76%	34%	22%	15%	26%	
Useful cooling energy demand	0	0	0	1	42	3962	13242	11356	648	4	0	0	29255	kWh
Spec. cooling demand	0.0	0.0	0.0	0.0	0.0	1.1	3.8	3.2	0.2	0.0	0.0	0.0	8.3	kWh/m ²
Specif. dehumidification demand	0.0	0.0	0.0	0.0	0.0	0.0	2.7	2.2	0.0	0.0	0.0	0.0	4.9	kWh/m ²
Sensible fraction	100%	100%	100%	100%	100%	100%	58%	59%	100%	100%	100%	100%	63%	



Cooling: energy value for useful cooling energy

Passive House with PHPP Version 9.6a

HANAC Corona Gardens (Senior Residence) / Climate: New York / TFA: 3526 m² / Heating: 13.3 kWh/(m²a) / Cooling: 13.2 kWh/(m²a) / PER: 80.6 kWh/(m²a)

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

Building type:	Residential portion of mixed-use building		Treated floor area A _{TFA} :	3526.3	m²
Interior temperature summer:	25	°C	Building volume:	8816	m³
Nominal humidity:	12	g/kg	Internal humidity sources:	2.9	g/(m²h)
Spec. capacity:	132	Wh/(m²K)			

Building assembly	Temperature zone	Area m²	U-Value W/(m²K)	Mon. red. fac.	G _i kWh/a	kWh/a	per m² treated floor area
External wall - Ambient	A	1877.5	0.252	1.00	45	21134	5.99
External wall - Ground	B			1.00			
Roof/Ceiling - Ambient	A	710.6	0.143	1.00	45	4545	1.29
Floor slab / Basement ceiling	B	310.0	0.216	1.00	43	2892	0.82
	A			1.00			
	A			1.00			
Gas Meter Room	X	41.6	2.711	0.75	45	3784	1.07
Windows	A	548.3	0.921	1.00	45	22599	6.41
Exterior door	A	10.5	2.000	1.00	45	941	0.27
Exterior TB (length/m)	A	792.4	0.075	1.00	45	2672	0.76
Perimeter TB (length/m)	P	59.5	-0.160	1.00	45	-426	-0.12
Ground TB (length/m)	B			1.00			0.00

Transmission losses Q_T (negative: heat loads)

Total 58141 kWh/(m²a) 16.5

Summer ventilation

from 'SummVent' worksheet

Ventilation conductance, vent. unit

exterior H _{V,e}	329.4	W/K
without HR	1454.6	W/K
ground H _{V,g}	0.0	W/K
without HR	0.0	W/K

Ventilation conductance, others

exterior	1846.5	W/K
----------	--------	-----

Ventilation parameter

Temperature amplitude summer	8.0	K
Minimum acceptable indoor temperature	20.0	°C
Heat capacity air	0.33	Wh/(m³K)
Supply air changes	0.50	1/h
Outdoor air changes	0.63	1/h
Window night vent. air change rate, manual @ 1K	0.10	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}	77%	
η _{ERV}	47%	
η*SHX	0%	

Summer ventilation regulation

None	HR/ERV in summer
Controlled by temp.	x
Controlled by enthalpy	
Always	
Controlled by temp.	
Controlled by humidity	x

Hygienic air change

Effective air change rate Ambient n _{V,e}	0.500	1/h
Effective air change rate Ground n _{V,g}	0.000	1/h

n _{V,system}	1/h	η*SHX	η _{HR}	n _{V,Rest}	n _{V,equi.fraction}
0.500	1/h	0%	0.05	0.635	1.108
0.500	1/h	0%	0.05		0.000

Ventilation losses ambient Q_V

Ventilation losses ground Q_{V,g}

Heat losses summer ventilation

V _V m³	n _{V,equi.fraction} 1/h	C _{Air} Wh/(m³K)	G _i kWh/a	kWh/a	kWh/(m²a)
8816	1.108	0.33	44	140971	40.0
8816	0.000	0.33	0	0	0.0
8816	0.140	0.33	69	28073	8.0

Ventilation heat losses Q_V

Total 169044 kWh/(m²a) 47.9

Total heat losses Q_L

Q _T	Q _V		
58141	169044	227185	64.4

Orientation of the area	Reduction factor	g-Value (perp. radiation)	Area m²	Global radiation kWh/(m²a)	kWh/a	kWh/(m²a)
North	0.32	0.32	241.7	418	10366	
East	0.37	0.10	19.9	772	543	
South	0.32	0.32	243.5	782	19701	
West	0.37	0.16	40.0	445	1020	
Horizontal	0.66	0.00	3.1	1163	0	
Sum opaque areas					5564	

Available solar heat gains Q_S

Total 37194 kWh/(m²a) 10.5

Internal heat gains Q _I	Length heat. period d/a	Spec. power q _i W/m²	A _{TFA} m²	kWh/a	kWh/(m²a)
0.024	244	4.1	3526.3	84666	24.0

Sum heat loads Q_F

Q_S + Q_I = 121860 kWh/a 34.6

Ratio of losses to free heat gains	Q _L / Q _F	1.86
Utilisation factor heat losses η _G		41%
Useful heat losses Q _{V,n}	η _G * Q _L	92605 kWh/a 26.3
Useful cooling demand Q _K	Q _F - Q _{V,n}	29255 kWh/a 8
Recommended maximum value		15 kWh/(m²a)
Requirement met?		Yes

Compressor - cooling units

Passive House with PHPP Version 9.6a

HANAC Corona Gardens (Senior Residence) / Climate: New York / TFA: 3526 m² / Heating: 13.3 kWh/(m²a) / Cooling: 13.2 kWh/(m²a) / PER: 80.6 kWh/(m²a)

Building type:	Residential portion of mixed-use building		Treated floor area A _{TFA} :	3526.3	m²
Interior temperature summer:	25.0	°C	Mechanical cooling:	x	
Nominal humidity:	12.0	g/kg	Air change rate via ventilation system with supply air:	0.5	
Internal humidity sources:	2.9	g/(m²h)			

☐ Supply air cooling

check as appropriate

On/Off mode (check as appropriate)

Max. cooling capacity (sensible + latent)

Temperature reduction dry

Seasonal energy efficiency ratio

	kW
0.0	K

☒ Recirculation cooling

check as appropriate

On/Off mode (check as appropriate)

Max. cooling capacity (sensible + latent)

Volume flow rate at nominal power

Temperature reduction dry

Variable air volume (check if appropriate)

Seasonal energy efficiency ratio

357.0	kW
58930.0	m³/h
17.8	K
x	
4.5	

☐ Additional dehumidification

check as appropriate

Waste heat to room (check if appropriate)

Seasonal energy efficiency ratio

x
4.5

☐ Panel cooling

check as appropriate

Seasonal energy efficiency ratio

--

Useful cooling total

Cooling contribution by:

Supply air cooling

Recirculation cooling

Dehumidification

Remaining for panel cooling

Cooling distribution

Total

Unsatisfied demand

Sensible kWh/(m²a)	Latent kWh/(m²a)	COP	Electricity demand (kWh/a) kWh/(m²a)	Sensible fraction
8.3	4.9			63%
()	+	0.0	=	
(8.3	+	4.5	= 3.3	56%
		/	=	0%
		0.0	=	100%
		4.5	=	100%
(8.3	+	4.5	= 3.3	56%
0.0	0.8		Cooling demand covered?	Yes

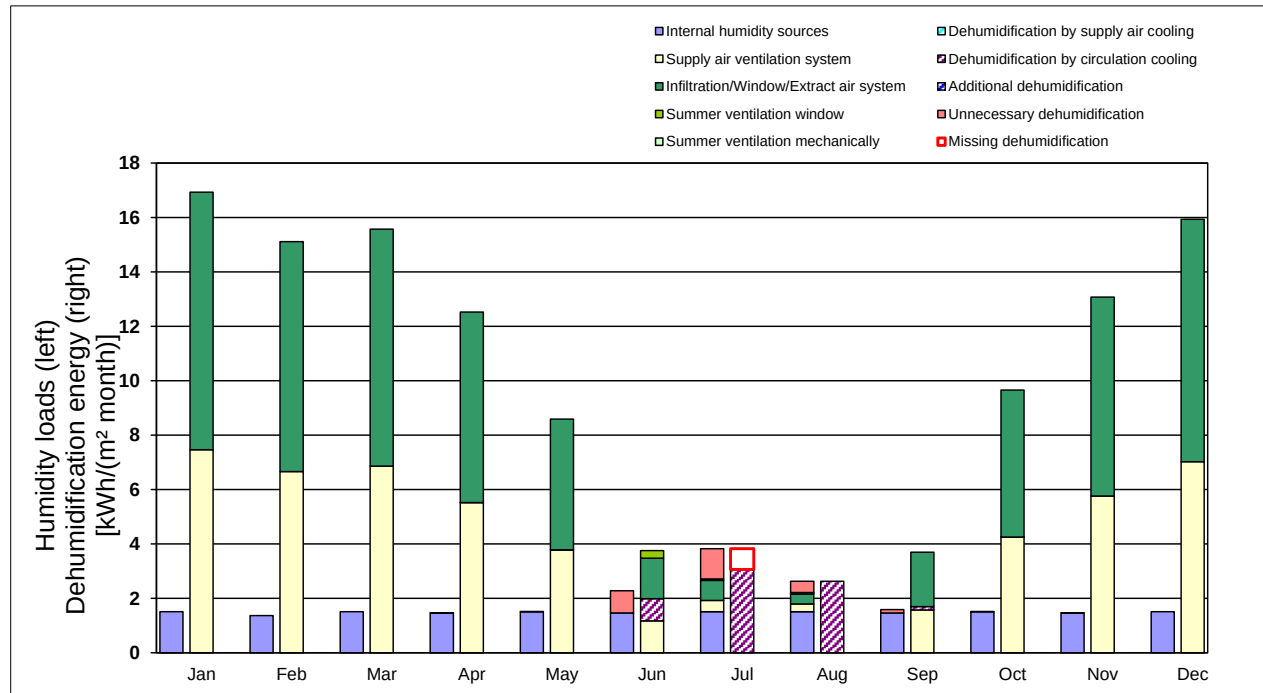
(Yes/No)

Compressor - cooling units

HANAC Corona Gardens (Senior Residence) / Climate: New York / TFA: 3526 m² / Heating: 13.3 kWh/(m²a) / Cooling: 13.2 kWh/(m²a) / PER: 80.6 kWh/(m²a)

Humidity loads and humidity removal

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	
Internal humidity sources	1.5	1.4	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	18	kWh/m ²
Infiltration/Window/Extract air system	-9.5	-8.5	-8.7	-7.0	-4.8	-1.5	0.7	0.4	-2.0	-5.4	-7.3	-8.9	-62	kWh/m ²
Supply air ventilation system	-7.5	-6.7	-6.9	-5.5	-3.8	-1.2	0.4	0.3	-1.6	-4.3	-5.8	-7.0	-49	kWh/m ²
Summer ventilation window	0.0	0.0	0.0	0.0	0.0	-0.3	0.0	0.1	0.0	0.0	0.0	0.0	0	kWh/m ²
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/m ²
Total humidity load	0.0	0.0	0.0	0.0	0.0	0.0	2.7	2.2	0.0	0.0	0.0	0.0	5	kWh/m ²
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/m ²
Dehumidification by circulation cooling	0.0	0.0	0.0	0.0	0.0	0.8	3.1	2.6	0.1	0.0	0.0	0.0	7	kWh/m ²
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/m ²
Total dehumidification	0.0	0.0	0.0	0.0	0.0	0.8	3.1	2.6	0.1	0.0	0.0	0.0	7	
Unnecessary dehumidification	0.0	0.0	0.0	0.0	0.0	0.8	1.1	0.4	0.1	0.0	0.0	0.0	2	kWh/m ²
Missing dehumidification	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	1	kWh/m ²



Cooling load

Passive House with PHPP Version 9.6a

HANAC Corona Gardens (Senior Residence) / Climate: New York / TFA: 3526 m² / Heating: 13.3 kWh/(m²a) / Cooling: 13.2 kWh/(m²a) / PER: 80.6 kWh/(m²a)

Building type: Residential portion of mixed-use building

Treated floor area A_{TFA} : 3526.3 m²
 Building volume: 8816 m³
 Interior temperature: 25 °C

Spec. capacity: 132 W/m²
 Nominal humidity: 12.0 g/kg
 Internal humidity sources: 2.9 g/(m²h)

Temperature:
 Outdoor air: 30.3 °C
 Weather 1: 27.4 °C
 Weather 2: 20.6 °C
 Dew point: 22.4 °C
 Sky: 21.3 °C
 SHX: 13.7 °C

Radiation: North East South West Horizontal
 85 215 200 205 325 W/m²
 55 175 220 175 290 W/m²

Building assembly	Temperature zone	Area m ²	U-Value W/(m ² K)	Factor always 1 (except "X")	TempDiff 1 K	TempDiff 2 K	P _T 1 W	P _T 2 W
External wall - Ambient	A	1877.5	0.252	1.00	5.3	2.4	2504	1134
External wall - Ground	B			1.00	-4.4	-4.4		
Roof/Ceiling - Ambient	A	710.6	0.143	1.00	5.3	2.4	538	244
Floor slab / Basement ceiling	B	310.0	0.216	1.00	-4.4	-4.4	-298	-298
	A			1.00	5.3	2.4		
	A			1.00	5.3	2.4		
Gas Meter Room	X	41.6	2.711	0.75	5.3	2.4	448	203
Windows	A	548.3	0.921	1.00	5.3	2.4	2677	1212
Exterior door	A	10.5	2.000	1.00	5.3	2.4	112	51
Exterior TB (length/m)	A	792.4	0.075	1.00	5.3	2.4	317	143
Perimeter TB (length/m)	P	59.5	-0.160	1.00	-4.4	-4.4	42	42
Ground TB (length/m)	B			1.00	-4.4	-4.4		
Building element towards neighbour	I	1302.1	1.003	1.00	3.0	3.0	3916	3916
Radiation correction outdoor air			L _{ambient} W/K	-40.6	5.3	2.4	-215	-98
Radiation correction sky			L _{sky} W/K	39.1	-3.7	-5.0	-144	-196

Transmission heat load P_T Total = 9898 or 6355

	V _V m ³	n _{V,equl} fraction 1/h	n _{V,equl} fraction 1/h	C _{air} Wh/(m ³ K)	TempDiff 1 K	TempDiff 2 K	P _V 1 W	P _V 2 W
Exterior P _{V,o}	8816	0.748	0.748	0.33	5.3	2.4	11533	5222
Ground P _{V,g}	8816	0.000	0.000	0.33	-11.3	-11.3	0	0
Summer ventilation P _{V,L,S}	8816	0.000	0.000	0.33	0.0	0.0	0	0

Ventilation heat load P_V Total = 11533 or 5222

Orientation of the area	Area m ²	g-Value (perp. radiation)	Reduction factor (see 'Windows' worksheet)	Radiation 1 W/m ²	Radiation 2 W/m ²	P _T 1 W	P _T 2 W
North	241.7	0.3	0.30	135	95	3147	2201
East	19.9	0.1	0.34	221	214	145	140
South	243.5	0.3	0.30	213	215	5024	5089
West	40.0	0.2	0.34	136	101	290	217
Horizontal	3.1	0.0	0.66	325	290	0	0
Sum opaque areas						1590	1428

Solar load P_S Total = 10197 or 9075

	Spec. power W/m ²	A _{TFA} m ²	P _I 1 W	P _I 2 W
Internal heating load P _I	4.1	3526	14458	14458

P_T + P_V + P_S + P_I = 46086 or 35110

Cooling load P_C = 46086 W

Area specific cooling load P_C / A_{TFA} = 13.1 W/m²

Please enter the minimum supply air temperature: °C Supply air temperature without cooling °C

For comparison: cooling load, transportable through the supply air P_{Supply:Max} = 38111 W

specific: 10.8 W/m² 10.5 W/m²

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

Daily internal temperature stroke
 Transmission W 9897.9 + Ventilation W 11532.4 + Solar load W 10197.1) * 24 / (132 * 3526) = 1.6 K

Dehumidific. load from 'Cooling' worksheet

Absolute humidity exterior air 17.1 or 14.7 g/kg
 Outdoor air mass flow 6603 or 6603 kg/h
 Summer vent. air mass flow 0 or 0 kg/h
 Humidity load, outdoor air 33633 or 17809 g/h
 Absolute humid. supply air 14.7 or 13.4 g/kg
 Supply air mass flow 5201 or 5201 kg/h
 Humid. load, supply air 14053 or 7441 g/h
 Humidity load, internal 10126 or 10126 g/h

Enthalpy of vaporisation 707.639 / g/kg 1000 * 57813 or 35377 = P_D 1 W 40911 or P_D 2 W 25034

Dehumidification load P_T = 40911 W

Area specific dehumidification load P_T / A_{TFA} = 11.6 W/m²

Monthly average values	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Specific cooling demand	0.0	0.0	0.0	0.0	0.0	1.1	3.8	3.2	0.2	0.0	0.0	0.0
Specific dehumidification demand	0.0	0.0	0.0	0.0	0.0	0.0	2.7	2.2	0.0	0.0	0.0	0.0
Sensible fraction	100%	100%	100%	100%	100%	100%	58%	59%	100%	100%	100%	100%

Minimum of sensible cooling load fraction occurred 58%

Heat distribution and domestic hot water (DHW) system

Passive House with PHPP Version 9.6a

HANAC Corona Gardens (Senior Residence) / Climate: New York / TFA: 3526 m² / Heating: 13.3 kWh/(m²a) / Cooling: 13.2 kWh/(m²a) / PER: 80.6 kWh/(m²a)

Interior temperature:	20	°C	Interior temperature summer:	25	°C
Building type:	Residential portion of mixed-use building				
Treated floor area A_{TFA} :	3526	m ²			
Occupancy:	101.3	Pers			
Number of dwelling units:	68				
Annual heating demand $q_{Heating}$	46838	kWh/a	Annual useful cooling dem. q_{Cool}	29255	kWh/a
Length of heating period:	175	d	Length cooling period:	244	d
Average heating load P_{ave} :	11.2	kW	Average cooling load $P_{Average}$:	5.0	kW
Marginal usability of additional heat gains:	83%		Marginal utility of additional heat losses:	5%	

Space heat distribution

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 of insulated pipe		W/(mK)					
Insulation quality of mountings, pipe suspensions, etc.		-	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)					
Temp. of the room through which the pipes pass	ϑ_X	°C	20	20	20	20	20
Design forward flow temperature	ϑ_V	°C	26.0	26.0	26.0	26.0	26.0
Design system heating load	P_{heating}	kW					
Forward flow temperature control ('x' if appropriate)							
Design return flow temperature	ϑ_R	°C					
Annual heat emission per m of plumbing	q_{HL}^*	kWh/(m·a)					
Possible utilisation factor of released heat	η_G	-					
Annual heat losses of heating distribution	Q_{HL}	kWh/a					
Annual heat losses of heating storage		kWh/a					
Annual heat losses of heating		kWh/a					
Performance ratio of heat distribution	ea_{HL}	-					

[illegible]

DHW useful heat

DHW demand for showers, per person and day (with 60°C)	litre/person/d	16.0
DHW demand others, per person and day (with 60°C)	litre/person/d	5.5
Performance of shower drain-water heat recovery	-	0%
Effective DHW demand	V _{DHW} litre/person/d	22
Average cold water temperature of the supply	θ _{TW} °C	13.7
DHW demand for washing machines and dishwashers non-ele	kWh/a	0
Effective useful heat DHW	Q _{DHW} kWh/a	42657

kWh/a

42657

kWh/(m²a)

12.1

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

Days of use per year [d/a]

365

l/(P*d) at 60 °C

DHW demand for showering:

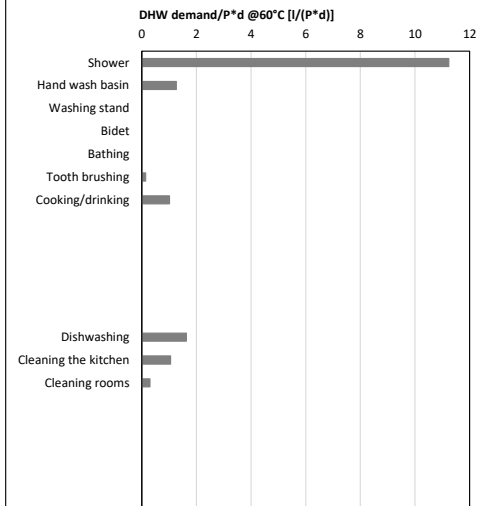
11.2

DHW demand for other uses:

5.4

Application	Used?	Single-lever mixer?	Time of use per use	Amount of uses according to type of use	Flow rate	Useful temperature	Equivalent average amount of water @ 60°C	Equivalent average amount of water @ 60°C	Useful heat @ 60°C
	-	-	min	-	l/min	°C	l/(WE*d)	l/(P*d)	kWh/a
Shower	x	x	5.0	0.7	6.0	38	17	11	22378
Hand wash basin	x	x	0.3	3.0	4.0	30	2	1	2520
Washing stand		x	1.0	0.4	8.0	38			
Bidet		x	1.0	0.1	8.0	38			
Bathing		x	10.0	0.0	15.0	38			
Tooth brushing	x	x	0.1	2.0	4.0	30	0	0	280
Cooking/drinking	x	x	0.3	1.0	6.0	45	2	1	2018
		N/A							
		N/A							
		N/A							
		N/A							
		N/A							
Dishwashing	x	x	0.6	1.0	6.0	45	2	2	3252
Cleaning the kitchen	x	x	0.5	1.0	6.0	38	2	1	2104
Cleaning rooms	x	x	1.0	0.1	6.0	38	0	0	601
		N/A							
		N/A							
		N/A							
		N/A							

DHW demand according to use



Auxiliary calculation - shower drain-water heat recovery

DHW distribution

Temp. of room through which the pipes pass
Design forward flow temperature

ϑ_x
 ϑ_{dist}

°C
°C

Inside thermal envelope				
1	2	3	4	5
20.0	20.0	20.0	20.0	20.0
60.0	60.0	60.0	60.0	60.0

Outside thermal envelope				
1	2	3	4	5
20.0	20.0	20.0	20.0	20.0
60.0	60.0	60.0	60.0	60.0

Total values	
Absolute	Specific

DHW circulation pipes
Length of circulation pipes (forward + return flow)
Nominal width of pipe
Insulation thickness
Insulative reflective coating?
Thermal conductivity of insulation
Heat loss coefficient per m of insulated pipe
Insulation quality of mountings, pipe suspensions, etc.
Thermal bridge supplement
Total heating loss coefficient per m of pipe

Daily circulation period of operation.
Design return flow temperature
Circulation period of operation per year
Annual heat released per m of pipe
Annual heat loss from circulation lines

L_{HS}

 Ψ

 td_{Circ}
 ϑ_R
 t_{Circ}
 q^*_z
 Q_Z

m
mm
mm
-
W/(mK)
W/(mK)
-
W/K
W/(mK)

h/d
°C
h/a
kWh/m/a
kWh/a

434.0				
28				
20				
x				
0.036				
0.205				
3 - Good	1-None	1-None	1-None	1-None
2.310				
0.210				
18.0				
55				
6570				
52				
22459				

1-None	1-None	1-None	1-None	1-None

kWh/a	kWh/(m²a)
22459	6.4

DHW individual pipes
Exterior pipe diameter
Accumulated length per single pipes
Amount of tapping points in building
Average pipe length per tapping point
Tap openings per person per day
Utilisation days per year
Heat loss per tap opening
Amount of tap openings per year and person
Annual heat loss of individual pipes

d_{U_Pipe}
 L_U
 $n_{tapping\ point}$
 $L_{U,\ average}$

 $q_{individual}$
 n_{tap}
 Q_U

m
m
-
m
-
d
h/tap opening
ings per year
kWh/a

0.019				
170.00				
206.00				
0.8				
6				
365				
0.0085				
2190				
1883				

kWh/a	kWh/(m²a)
1883	0.5

Total heat losses of DHW distribution

Performance ratio of DHW distribution pipes

Q_{WL}

 ea_{+HL}
-

kWh/a	kWh/(m²a)
24342	6.9
157%	

Storage heat losses

	Storage 1	Storage 2	Buffer storage tank (only heating)	Compact unit		
Selection of storage tank	2-DHW only	2-DHW only	0-No storage tank	0-No		
Storage necessary for HP			(x)			
Solar DHW connection						
Heat loss rate	W/K 2.1	W/K 2.1				
Storage volume	litre 1893	litre 1893		---		
Standby fraction	- 60%	- 60%				
Location of storage tank, inside or outside of thermal envelope	1-Inside	1-Inside	1-Inside			
Temperature of mechanical room	°C 20.0	°C 20.0				
Typical storage tank temperature	°C 60.0	°C 60.0				
Manual entry of storage temperature	°C					
Average standby heat losses storage tank	W 50	W 50				
Additional heat losses storage tank, solar operation	W		---	---		
Possibly utilisation factor of heat losses	---	---		---		
Annual heat losses DHW storage tank	kWh/a 442	kWh/a 442	---		kWh/a 883	kWh/(m²a) 0.3
Annual heat losses buffer storage tank	---	---		---		

Auxiliary calculation - heat losses through storage tank according to EU efficiency classes			
Storage tank volume	Litre	1892.5	
ErP classification	-	A	C
Maximum permissible standby heat loss	W	95	
Heat loss ratio for PHPP calculation	W/K	2.1	

Total energy demand of domestic hot water

Heat losses of DHW distribution and storage	Q_{WL}	kWh/a 25225	kWh/(m²a) 7.2
Performance ratio DHW-distribution + storage	$e_{R,WL}$	159%	
Total heating demand of DHW system		kWh/a 67882	kWh/(m²a) 19.3
Including storage tank	Q_{GDHW}		

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	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	6.0		
Dimensioning of cooling load of the system	$P_{cooling}$	kW													
Forward flow temperature control ('x' if appropriate)															
Design return flow temperature	ϑ_R	°C													
Annual heat absorption per m of pipe	q_{HL}^*	kWh/(m·a)													
Possibly utilisation factor of this heat absorption	η_G	-													
Annual heat losses of cooling distribution	Q_{HL}	kWh/a												kWh/a 0	kWh/(m²a) 0.0
Performance ratio cold water distribution pipes	ea_{HL}	-												100%	

Electricity demand for residential buildings

HANAC Corona Gardens (Senior Residence) / Climate: New York / TFA: 3526 m² / Heating: 13.3 kWh/(m²a) / Cooling: 13.2 kWh/(m²a) / PER: 80.6 kWh/(m²a)

Households	68	PER and PE factors (KWh/kWh)		Electricity:	1.20	2.6	Solar fraction of DHW Laundry&Dish							
Persons	101.3	Non-electric energy carrier for cooking, drying:		1.20	2.6	Marginal performance ratio DHW	104%							
Living area (m²)	3526	Energy carrier for heating:		1.16	2.6	Marginal performance ratio Heating	32%							
Heating demand [kWh/(m²a)]	13.3	Energy carrier for DHW:		1.74	1.1									
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	0	1	1.10 kWh/Use	1.00	65	/(P*a) * 101.3 P	0	100%	0%	0				
2-Cold water connection														
Clothes washing	1	1	1.10 kWh/Use	1.00	57	/(P*a) * 101.3 P	6349	100%	0%	6349				
2-Cold water connection														
Clothes drying with:	1	1	0.01 kWh/Use	0.88	57	/(P*a) * 101.3 P	51	2%	98%	51				
6-Gas exhaust air dryer			0.50				2525							
Energy consumed by evaporation	0	1	3.13 kWh/Use	0.60	57	/(P*a) * 101.3 P	0		100%					
Refrigerating	0	1	0.78 kWh/d	1.00	365	d/a * 68 HH	0	100%		0				
Freezing	0	1	0.88 kWh/d	1.00	365	d/a * 68 HH	0	100%		0				
or combination	1	1	0.98 kWh/d	1.00	365	d/a * 68 HH	24344	100%		24344				
Cooking with:	1	1	0.22 kWh/Use	1.00	500	/(P*a) * 101.3 P	11139	100%		11139				
1-Electricity									0%					0
Lighting	1	1	9 W	1.00	2.90	kh/(P*a) * 101.3 P	2746	100%		2746				
Consumer electronics	1	1	80 W	1.00	0.55	kh/(P*a) * 101.3 P	4456	100%		4456				
Small appliances, etc.	1	1	50 kWh	1.00	1.00	/(P*a) * 101.3 P	5063	100%		5063				
Total aux. electricity							29892			29892				
Other:														
Elevators	1	1	8958 kWh/a				8958			8958				
Offices	1	1	110 kWh/a				110			110				
Pantry	1	1	358 kWh/a				358			358				
Total							95991 kWh			93466 kWh				
Specific demand										26.5 kWh/(m²a)				
Recommended maximum value										18				

DHW Non-Electric - Wash&Dish

Non-Renewable Non-Electric DHW Wash&Dish

0 kWh

0.0 kWh/(m²a)

2525 kWh

0.7 kWh/(m²a)

Aux Electricity

HANAC Corona Gardens (Senior Residence) / Climate: New York / TFA: 3526 m² / Heating: 13.3 kWh/(m²a) / Cooling: 13.2 kWh/(m²a) / PER: 80.6 kWh/(m²a)

Treated floor area	3526	m²	Heat recovery efficiency ventilation unit		0.77		Annual space heating demand		13	kWh/(m²a)
Heating period	175	d	Operation vent. system Winter		4.20	kh/a	Boiler rated power		281	kW
Air volume	8816	m³	Operation vent. system Summer		4.56	kh/a	DHW system heating demand		67882	kWh/a
Dwelling units	68	HH	Air change rate		0.89	h⁻¹	Design forward flow temperature		26	°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		0.43	Wh/m³	* 0.89	h⁻¹	* 4.2	kh/a	* 8816	m³	= 14141	considered in heat recovery efficiency				
Defroster HX	1	1	Data entries in 'Ventilation' worksheet or in 'Addl vent'				1247	*	0.2	/	4.20	= 67				
Summer ventilation	1	0.80	0.31	Wh/m³	* 1.00	h⁻¹	* 4.6	kh/a	* 8816	m³	= 12631	* 1.0	/	4.56	=	2214
											Internal heat sources + Additional summer ventilation		0.0			
Additional vent. summer	0	0.90	0.00	Wh/m³	* 0.00	h⁻¹	* 4.6	kh/a	* 8816	m³	= 0	* 1.0	/	4.56	=	
Heating system																
Controlled / non controlled [1/0]																
Enter the rated power of the pump				W												
Circulator pump heating			768	W	* 1.0		* 4.2	kh/a	* 1		= 0	* 1.0	/	4.20	=	0
Boiler electricity consumption at 30% load				W												
Aux. energy - Heat. boiler	0	0	225	W	* 1.00		* 0.00	kh/a	* 1		= 0	* 1.0	/	4.20	=	0
Aux. energy - Wood fired/Pellet boiler	0	0	Data entries in 'Boiler' worksheet. Aux. energy demand including possible drinking water production.				0	*	1.0	/	4.20	=	0	=	0	
DHW system																
Enter average power consumption of pump			93	W												
Circulation pump DHW	1	1	93	W	* 1.00		* 8.2	kh/a	* 1		= 759	* 1.0	/	8.76	=	87
Enter the rated power of the pump				W												
Storage load pump DHW	1	1	314	W	* 1.00		* 0.2	kh/a	* 1		= 76	* 1.0	/	8.76	=	9
Boiler electricity consumption at 100% load				W												
DHW boiler aux. energy	1	0	674	W	* 1.00		* 0.2	kh/a	* 1		= 163	* 1.0	/	8.76	=	0
Enter the rated power of the solar DHW pump				W												
Solar aux. electricity	0		259	W	* 1.00		* 1.8	kh/a	* 1		= 0	* 1.0	/	8.76	=	0
Aux. electricity cooling and dehumidification																
Aux. electricity cooling				kWh/a	* 1.00		* 1.0		* 68		= 0	* 1.0	/	4.56	=	0
Aux. electricity dehum.				kWh/a	* 1.00		* 1.0		* 68		= 0	* 1.0	/	4.56	=	0
Misc. aux. electricity																
Misc. aux. electricity	1	1	13	kWh/a	* 1.00		* 1.0		* 68		= 876	* 1.0	/	8.76	=	100
Total											29892			263	2410	
Specific demand							kWh/(m²a) (treated floor area)				8.5					

Heat pump

Passive House with PHPP Version 9.6a

HANAC Corona Gardens (Senior Residence) / Climate: New York / TFA: 3526 m² / Heating: 13.3 kWh/(m²a) / Cooling: 13.2 kWh/(m²a) / PER: 80.6 kWh/(m²a)

		Building type:	Residential portion of mixed-use building
		Treated floor area A _{TFA} :	3526 m²
Covered fraction of space heating demand	(PER' worksheet)		100%
Space heating demand + distribution losses	Q _H +Q _{HL} : (DHW+Distribution)		46838 kWh/a
Solar fraction for space heat	η _{Solar, H} (SolarDHW worksheet)		0%
Effective annual heating demand	Q _{H,WI} =Q _H *(1-η _{Solar, H})		46838 kWh/a
Covered fraction of DHW demand	(PER' worksheet)		0%
Total heating demand of DHW system	Q _{gDHW} (DHW+Distribution)		67441 kWh/a
Solar fraction for DHW	η _{Solar, DHW} (SolarDHW worksheet)		0%
Effective DHW demand	Q _{DHW,WI} =Q _{DHW} *(1-η _{Solar, DHW})		0 kWh/a
Number of heat pumps in the system			1
Functionality			Heating
Heating			
Selection of HP:	1-Standard air/water heat pump	Heat source:	1-Outdoor air
Selection of distribution system			2-Radiators
Design distribution temperature	θ _{design} (DHW+Distribution)		26.00 °C
Nominal power of distribution system	P _{nom}		50.74 kW
Distribution system (to be completed by experienced users only)			
Nominal power of distribution system	P _{nom}		
Radiator exponent	n		
Heat storage tank (buffer storage tank 'DHW+Distribution' worksheet)			0-No
Specific heat losses storage	U * A _{Storage}		
Storage location in thermal envelope			1-Inside
Room temperature (storage location: outside of thermal envelope)	(DHW+Distribution)		
Sink temperature of heat pump for heating	θ _{sink}		26.00 °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)			1-Inside
Specific heat losses storage	U * A _{Storage}		2.1 W/K
Room temperature (storage location: outside of thermal envelope)	(DHW+Distribution)		20.00 °C
Type of backup heater			1-Elec. Immersion heater
Δθ of electric continuous flow water heater			
Additional options in case of one 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)		2-Heating priority
Control strategy			
Heat pump control strategy			1-On/Off
Heating			
Depth ground water / Ground collector / Ground probe	z		
Power of pump for ground heat exchanger	P _{pump}		

Heating

Heat pump:

Source:

	θ_{source} °C	θ_{sink} °C	Heating capacity kW	COP
Test point 1	1.5	23.9	43.1	3.4
Test point 2	-12.7	22.5	27.8	2.3
Test point 3	-24.3	23.7	41.1	2.5
Test point 4	4.9	22.9	21.5	4.7
Test point 5	-10.5	21.9	13.9	2.5
Test point 6	-21.0	22.8	20.6	1.8
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 $\Delta\theta_{\text{Sink}}$ K

DHW

Heat pump:

Source:

	θ_{source} °C	θ_{sink} °C	Heating capacity kW	COP
Test point 1				
Test point 2				
Test point 3				
Test point 4				
Test point 5				
Test point 6				
Test point 7	Source type number	Source type name	Wärmequelle	
Test point 8				
Test point 9	1.0	1-Outdoor air	1-Outdoor air	
Test point 10	3.0	3-Ground probes	2-Ground water	
Test point 11	2.0	2-Ground water	3-Ground probes	
Test point 12	1.0	1-Outdoor air	Horizontal ground collect	
Test point 13	1.0	1-Outdoor air		
Test point 14	1.0	1-Outdoor air		
Test point 15	1.0	1-Outdoor air		

Temperature difference in sink $\Delta\theta_{\text{Sink}}$ K

Electr. energy consumption pump (grnd. water / ground)
 Energy by direct electricity
 Space heat supplied by HP
 Winter DHW supplied by HP
 Summer DHW supplied by HP
 Space heating supplied by HP without storage losses
 Winter DHW supplied by HP without storage losses
 Summer DHW supplied by HP without storage losses
 Electrical consumption of HP

$Q_{\text{El,Pump}}$
 $Q_{\text{El,dir}}$
 $Q_{\text{HP,Heating}}$
 $Q_{\text{HP,DHW,Winter}}$
 $Q_{\text{HP,DHW,Summer}}$
 $Q_{\text{HP,Heating}}$
 $Q_{\text{HP,DHW,Winter}}$
 $Q_{\text{HP,DHW,Summer}}$
 $Q_{\text{El,HP}}$

0	kWh/a
0	kWh/a
46838	kWh/a
0	kWh/a
0	kWh/a
46838	kWh/a
0	kWh/a
0	kWh/a
15146	kWh/a

Seasonal performance factor of heat pump
 Final electrical energy demand heat generation
 Annual primary energy demand
 Annual CO₂-equivalent emissions

$\text{SPF}_{\text{H-1}}$
 Q_{final}

1. HP: Heating or heating & DHW

3.09
kWh/a
15146
39380
kg/a
8058

2. HP: Domestic hot

kWh/(m²a)
4.3
11.2
kg/(m²a)
2.3

Passive House Verification

Photo or Drawing		Building: HANAC Corona Senior Residence Street: 54-17 101st Street, Corona Postcode/City: 11368 New York Province/Country: NY US-United States of America Building type: School portion of mixed use building Climate data set: US0055b-New York Climate zone: 4: Warm-temperate Altitude of location: 40 m	
Architecture: Think Architecture Street: 1 Metrotech Center North, 6th Floor, Brooklyn Postcode/City: 11201 New York Province/Country: NY US-United States of America		Home owner / Client: HANAC Street: 27-40 Hoyt Ave S., Astoria Postcode/City: 11102 New York Province/Country: NY US-United States of America	
Energy consultancy: Association for Energy Affordability Street: 105 Bruckner Blvd, Bronx Postcode/City: 10454 New York Province/Country: NY US-United States of America		Mechanical engineer: NY Engineers Street: 3 East 54th Street, 7th Floor Postcode/City: 10022 New York Province/Country: NY US-United States of America	
Year of construction: 2018 No. of dwelling units: 1 No. of occupants: 64.0		Certification: Passive House Academy Street: Wicklow County Campus, Clermont House Postcode/City: A67 X566 Rathnew Province/Country: County Wicklow Ireland	
Interior temperature winter [°C]: 20.0 Internal heat gains (IHG) heating case [W/m²]: 5.2 Specific capacity [Wh/K per m² TFA]: 132		Interior temp. summer [°C]: 25.0 IHG cooling case [W/m²]: 5.2 Mechanical cooling: x	

Specific building characteristics with reference to the treated floor area					
	Treated floor area m²		Criteria	Alternative criteria	Fulfilled?²
Space heating	Heating demand kWh/(m²a)	8	≤	15	yes
	Heating load W/m²	21	≤	- 10	
Space cooling	Cooling & dehum. demand kWh/(m²a)	14	≤	17	yes
	Cooling load W/m²	22	≤	- 13	
	Frequency of overheating (> 25 °C) %	-	≤	-	-
	Frequency of excessively high humidity (> 12 g/kg) %	1.8	≤	10	yes
Airtightness	Pressurization test result n ₅₀ 1/h	0.43	≤	0.6	yes
Non-renewable Primary Energy (PE)	PE demand kWh/(m²a)	125	≤	120	no
Primary Energy Renewable (PER)	PER demand kWh/(m²a)	60	≤	-	
	Generation of renewable energy (in relation to projected building footprint area)	0	≥	-	

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.

Task: 2-Certifier **First name:** Tomas **Surname:** O'Leary
Certificate ID: 13/10/20 **Issued on:** Wicklow **City:**

Passive House Classic? no
Signature: 

Climate data

Passive House with PHPP Version 9.6a

HANAC Corona Senior Residence / Climate: New York / TFA: 381 m² / Heating: 7.6 kWh/(m²a) / Cooling: 13.9 kWh/(m²a) / PER: 59.7 kWh/(m²a)



U-value of building assemblies

Passive House with PHPP Version 9.6a

HANAC Corona Senior Residence / Climate: New York / TFA: 381 m² / Heating: 7.6 kWh/(m²a) / Cooling: 13.9 kWh/(m²a) / PER: 59.7 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	Main Roof					
Heat transmission resistance [m²K/W]						
Orientation of building element	1-Roof	interior R _{si}		0.13		
Adjacent to	1-Outdoor air	exterior R _{se}		0.04		
Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
concrete - normal	2.300					229
Polyiso	0.030					203
	0.000					
	0.000					
	0.000					
	0.000					
	0.000					
	0.000					
	0.000					
Percentage of sec. 1		Percentage of sec. 2		Percentage of sec. 3		Total
100%						43.2 cm
U-value supplement		W/(m²K)		U-value:		0.142 W/(m²K)

Assembly no.	Building assembly description					Interior insulation?
02ud	Bulkhead Roof					
Heat transmission resistance [m²K/W]						
Orientation of building element	1-Roof	interior R _{si}		0.13		
Adjacent to	1-Outdoor air	exterior R _{se}		0.04		
Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
not used						
Percentage of sec. 1		Percentage of sec. 2		Percentage of sec. 3		Total
100%						
U-value supplement		W/(m²K)		U-value:		5.882 W/(m²K)

Assembly no.						Interior insulation?
03ud	Terrace Roof					
		Heat transmission resistance [m²K/W]				
Orientation of building element		interior R _{si}		0.13		
Adjacent to		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]
concrete - normal	2.300					229
Polyiso	0.030					203
Percentage of sec. 1		Percentage of sec. 2		Percentage of sec. 3		Total
100%						43.2 cm
U-value supplement		W/(m²K)		U-value: 0.142		W/(m²K)

Assembly no.						Interior insulation?
04ud	Front Wall Lower					
		Heat transmission resistance [m²K/W]				
Orientation of building element		interior R _{si}		0.13		
Adjacent to		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]
4" Roxul per flexo	0.272					1000
Percentage of sec. 1		Percentage of sec. 2		Percentage of sec. 3		Total
100%						100.0 cm
U-value supplement		W/(m²K)		U-value: 0.260		W/(m²K)

Assembly no.						Interior insulation?
05ud	Front Wall Upper					
		Heat transmission resistance [m²K/W]				
Orientation of building element		interior R _{si}		0.13		
Adjacent to		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]
4" Roxul per flexo	0.272					1000
Percentage of sec. 1		Percentage of sec. 2		Percentage of sec. 3		Total
100%						100.0 cm
U-value supplement		W/(m²K)		U-value: 0.260		W/(m²K)

Assembly no.		06ud				Rear Wall		Interior insulation?	
						Heat transmission resistance [m²K/W]			
Orientation of building element		2-Wall		interior R _{si}		0.13			
Adjacent to		1-Outdoor air		exterior R _{se}		0.04			
Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]			
per flixo	0.208					1000			
Percentage of sec. 1		Percentage of sec. 2		Percentage of sec. 3		Total			
100%						100.0 cm			
U-value supplement				U-value:		0.201		W/(m²K)	

Assembly no.		07ud				Bulkhead Wall		Interior insulation?	
						Heat transmission resistance [m²K/W]			
Orientation of building element		2-Wall		interior R _{si}		0.13			
Adjacent to		1-Outdoor air		exterior R _{se}		0.04			
Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]			
not used									
Percentage of sec. 1		Percentage of sec. 2		Percentage of sec. 3		Total			
100%									
U-value supplement				U-value:		5.882		W/(m²K)	

Assembly no.		08ud				Side Wall		Interior insulation?	
						Heat transmission resistance [m²K/W]			
Orientation of building element		2-Wall		interior R _{si}		0.13			
Adjacent to		1-Outdoor air		exterior R _{se}		0.04			
Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]			
Pert THERM	0.200					1000			
Percentage of sec. 1		Percentage of sec. 2		Percentage of sec. 3		Total			
100%						100.0 cm			
U-value supplement		0.02		U-value:		0.213		W/(m²K)	

Assembly no.		09ud				Party Wall Above Grade		Interior insulation?	
						Heat transmission resistance [m ² K/W]			
Orientation of building element		2-Wall		interior R _{si}		0.13			
Adjacent to		3-Ventilated		exterior R _{se}		0.13			
Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]			
Gyp Bd US	0.160					16			
Air Gap 1.5" 38 mm	0.210					25			
Concrete	2.100					203			
Roxul IS	0.036					100			
	0.000								
	0.000								
	0.000								
	0.000								
Percentage of sec. 1		Percentage of sec. 2		Percentage of sec. 3		Total			
100%						34.4 cm			
U-value supplement		0.02 W/(m ² K)		U-value:		0.318 W/(m ² K)			

Assembly no.		10ud				Party Wall Below Grade		Interior insulation?	
						Heat transmission resistance [m ² K/W]			
Orientation of building element		2-Wall		interior R _{si}		0.13			
Adjacent to		3-Ventilated		exterior R _{se}		0.13			
Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]			
Gyp Bd US	0.160					16			
Air Gap 1.5" 38 mm	0.210					25			
Concrete	2.100					203			
Roxul IS	0.036					100			
	0.000								
	0.000								
	0.000								
	0.000								
Percentage of sec. 1		Percentage of sec. 2		Percentage of sec. 3		Total			
100%						34.4 cm			
U-value supplement		0.02 W/(m ² K)		U-value:		0.318 W/(m ² K)			

Assembly no.		11ud				Ground Floor Ceiling		Interior insulation?	
						Heat transmission resistance [m ² K/W]			
Orientation of building element		1-Roof		interior R _{si}		0.13			
Adjacent to		1-Outdoor air		exterior R _{se}		0.04			
Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]			
Concrete	2.100					229			
	0.000								
	0.000								
	0.000								
	0.000								
	0.000								
	0.000								
Percentage of sec. 1		Percentage of sec. 2		Percentage of sec. 3		Total			
100%						22.9 cm			
U-value supplement				U-value:		3.586 W/(m ² K)			

Assembly no.						Interior insulation?
12ud		Elevator Pit Wall				
		Heat transmission resistance [m ² K/W]				
Orientation of building element		2-Wall		interior R _{si}	0.13	
Adjacent to		2-Ground		exterior R _{se}	0.00	
Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
Concrete	2.100					100
	0.000					
	0.000					
	0.000					
	0.000					
	0.000					
	0.000					
Percentage of sec. 1		Percentage of sec. 2		Percentage of sec. 3		Total
100%						10.0 cm
U-value supplement				U-value: 5.630		W/(m ² K)

Assembly no.						Interior insulation?
13ud		Elevator Pit Floor				
		Heat transmission resistance [m ² K/W]				
Orientation of building element		3-Floor		interior R _{si}	0.13	
Adjacent to		2-Ground		exterior R _{se}	0.00	
Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
Concrete	2.100					100
	0.000					
	0.000					
	0.000					
	0.000					
	0.000					
	0.000					
Percentage of sec. 1		Percentage of sec. 2		Percentage of sec. 3		Total
100%						10.0 cm
U-value supplement				U-value: 5.630		W/(m ² K)

Assembly no.						Interior insulation?
14ud		Wall Below Grade				
		Heat transmission resistance [m ² K/W]				
Orientation of building element		2-Wall		interior R _{si}	0.13	
Adjacent to		2-Ground		exterior R _{se}	0.00	
Area section 1	λ [W/(mK)]	Area section 2 (optional)	λ [W/(mK)]	Area section 3 (optional)	λ [W/(mK)]	Thickness [mm]
Concrete	2.100					254
EPS	0.040					100
	0.000					
	0.000					
	0.000					
	0.000					
	0.000					
Percentage of sec. 1		Percentage of sec. 2		Percentage of sec. 3		Total
100%						35.4 cm
U-value supplement				U-value: 0.364		W/(m ² K)

Assembly no.								Interior insulation?	
15ud		Lower Terrace Roof							
		Heat transmission resistance [m²K/W]							
Orientation of building element		1-Roof		interior R _{si}		0.13			
Adjacent to		1-Outdoor air		exterior R _{se} :		0.04			
Area section 1		λ [W/(mK)]	Area section 2 (optional)		λ [W/(mK)]	Area section 3 (optional)		λ [W/(mK)]	Thickness [mm]
concrete - normal		2.300							100
Polyiso		0.030							200
Percentage of sec. 1		Percentage of sec. 2		Percentage of sec. 3		Total			
100%						30.0		cm	
U-value supplement				U-value:		0.145		W/(m²K)	

Assembly no.								Interior insulation?	
16ud		Floor Slab							
		Heat transmission resistance [m²K/W]							
Orientation of building element		3-Floor	interior R _{si}		0.13				
Adjacent to		2-Ground	exterior R _{se} :		0.00				
Area section 1		λ [W/(mK)]	Area section 2 (optional)		λ [W/(mK)]	Area section 3 (optional)		λ [W/(mK)]	Thickness [mm]
concrete - normal		2.300							152
gravel		4.000							356
concrete - normal		2.300							762
XPS		0.030							152
		0.000							
		0.000							
		0.000							
		0.000							
		0.000							
Percentage of sec. 1		Percentage of sec. 2		Percentage of sec. 3		Total			
100%						142.2 cm			
U-value supplement		0.10 W/(m²K)	U-value:		0.276 W/(m²K)				

Areas determination

HANAC Corona Senior Residence / Climate: New York / TFA: 381 m² / Heating: 7.6 kWh/(m²a) / Cooling: 13.9 kWh/(m²a) / PER: 59.7 kWh/(m²a)

Summary						Building assembly overview	Average U-value [W/(m²K)]	Radiation-gains heating season [kWh/a]	Radiation-load cooling period [kWh/a]
Temp.-zone	Area group	Group no.	Area / Length	Unit	Comment				
	Treated floor area	1	380.74	m²	Treated floor area according to PHPP manual			7 Months	9 Months
A	North windows	2	63.96	m²	Results come from the 'Windows' worksheet. Window areas are subtracted from individual opaque areas, which is displayed in the 'Windows' worksheet.	North windows	0.873	1532	3455
A	East windows	3	0.00	m²		East windows			
A	South windows	4	22.40	m²		South windows	0.978	1405	2426
A	West windows	5	0.00	m²		West windows			
A	Horizontal windows	6	0.00	m²		Horizontal windows			
A	Exterior door	7	2.24	m²	Please subtract area of door from respective building assembly	Exterior door	2.000		
A	External wall - Ambient	8	223.23	m²	Temperature zone "A" is ambient air	External wall - Ambient	0.221	101	231
B	External wall - Ground	9	0.00	m²	Temperature zone "B" is the ground	External wall - Ground			
A	Roof/Ceiling - Ambient	10	85.80	m²		Roof/Ceiling - Ambient	0.145	11	101
B	Floor slab / Basement ceiling	11	461.40	m²		Floor slab / Basement ceiling	0.276		
		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"				
X		14	0.00	m²	Temperature zone "X": Please provide user-defined reduction factor (0 < f < 1):				
					Factor for X				
					85%				
						Thermal bridges - Overview	Ψ [W/(mK)]		
A	Thermal bridges Ambient	15	120.80	m	Units in m	Thermal bridges Ambient	-0.039		
P	Perimeter thermal bridges	16	27.17	m	Units in m; temperature zone "P" is perimeter (see 'Ground' worksheet)	Perimeter thermal bridges	-0.203		
B	Thermal bridges FS/BC	17	0.00	m	Units in m	Thermal bridges FS/BC			
I	Building element towards neigh	18	379.40	m²	No heat losses, only considered for the heating load calculation	Building element towards neighbour	3.526		
Total thermal envelope						Average therm. envelope	0.304		

[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		+	547.20	-	461.40	)		=	85.8								
	Treated floor area	1	Treated floor area	1	x (		x		+	380.74	-		)		=	380.7								
	Exterior door	7	Exterior door	1	x (	0.92	x	2.45	+		-		)		=	2.2	Exterior door	2.00						
1	Lower Terrace Roof	10	Roof/Ceiling - Ambient	1	x (		x		+	85.80	-		)	0.0	=	85.8	15ud Lower Terrace Roof	0.145	0	0	Hor	0.40	0.60	0.90
2	Floor Slab	11	Floor slab / Basement ceiling	1	x (		x		+	461.40	-		)	0.0	=	461.4	16ud Floor Slab	0.276	0	0	Hor	0.00	0.60	0.90
3	Side Wall	8	External wall - Ambient	1	x (		x		+	39.00	-		)	0.0	=	39.0	08ud Side Wall	0.213	133	90	East	0.40	0.60	0.90
4	Rear Wall 4	8	External wall - Ambient	1	x (		x		+	62.60	-		)	25.6	=	37.0	06ud Rear Wall	0.201	43	90	North	0.40	0.60	0.90
5	Rear Wall 5	8	External wall - Ambient	1	x (		x		+	75.00	-		)	33.8	=	41.2	06ud Rear Wall	0.201	43	90	North	0.40	0.60	0.90
6	Rear Wall 7	8	External wall - Ambient	1	x (		x		+	9.10	-		)	0.0	=	9.1	06ud Rear Wall	0.201	43	90	North	0.40	0.60	0.90
7	Rear Wall 8	8	External wall - Ambient	1	x (		x		+	4.70	-		)	4.5	=	0.2	06ud Rear Wall	0.201	43	90	North	0.40	0.60	0.90
8	Rear Wall 9	8	External wall - Ambient	1	x (		x		+	16.40	-		)	0.0	=	16.4	06ud Rear Wall	0.201	313	90	West	0.40	0.60	0.90
9	Party Wall 16	18	Building element towards neigh	1	x (		x		+	7.00	-		)	0.0	=	7.0	09ud-Party Wall Above Grade	0.318	0	90	North	0.00	0.60	0.90
10	Front Wall 17	8	External wall - Ambient	1	x (		x		+	90.70	-		)	22.4	=	68.3	04ud-Front Wall Lower	0.260	223	90	South	0.40	0.60	0.90
11	Rear Wall 19	8	External wall - Ambient	1	x (		x		+	12.10	-		)	0.0	=	12.1	06ud-Rear Wall	0.201	313	90	West	0.40	0.60	0.90
12	Adiabatic Ceiling	18	Building element towards neigh	1	x (		x		+	372.40	-		)	0.0	=	372.4	11ud-Ground Floor Ceiling	3.586	0	0	Hor	0.00	0.60	0.90
13					x (		x		+		-		)	0.0	=									
14					x (		x		+		-		)	0.0	=									
15					x (		x		+		-		)	0.0	=									
16					x (		x		+		-		)	0.0	=									
17					x (		x		+		-		)	0.0	=									
18					x (		x		+		-		)	0.0	=									
19					x (		x		+		-		)	0.0	=									
20					x (		x		+		-		)	0.0	=									
21					x (		x		+		-		)	0.0	=									
22					x (		x		+		-		)	0.0	=									
23					x (		x		+		-		)	0.0	=									
24					x (		x		+		-		)	0.0	=									
25					x (		x		+		-		)	0.0	=									
26					x (		x		+		-		)	0.0	=									
27					x (		x		+		-		)	0.0	=									
28					x (		x		+		-		)	0.0	=									
29					x (		x		+		-		)	0.0	=									

Areas determination

HANAC Corona Senior Residence / Climate: New York / TFA: 381 m² / Heating: 7.6 kWh/(m²a) / Cooling: 13.9 kWh/(m²a) / PER: 59.7 kWh/(m²a)

Summary						Building assembly overview	Average U-value [W/(m²K)]	Radiation-gains heating season [kWh/a]	Radiation-load cooling period [kWh/a]
Temp.-zone	Area group	Group no.	Area / Length	Unit	Comment				
	Treated floor area	1	380.74	m²	Treated floor area according to PHPP manual			7 Months	9 Months
A	North windows	2	63.96	m²	Results come from the 'Windows' worksheet. Window areas are subtracted from individual opaque areas, which is displayed in the 'Windows' worksheet.	North windows	0.873	1532	3455
A	East windows	3	0.00	m²		East windows			
A	South windows	4	22.40	m²		South windows	0.978	1405	2426
A	West windows	5	0.00	m²		West windows			
A	Horizontal windows	6	0.00	m²		Horizontal windows			
A	Exterior door	7	2.24	m²	Please subtract area of door from respective building assembly	Exterior door	2.000		
A	External wall - Ambient	8	223.23	m²	Temperature zone "A" is ambient air	External wall - Ambient	0.221	101	231
B	External wall - Ground	9	0.00	m²	Temperature zone "B" is the ground	External wall - Ground			
A	Roof/Ceiling - Ambient	10	85.80	m²		Roof/Ceiling - Ambient	0.145	11	101
B	Floor slab / Basement ceiling	11	461.40	m²		Floor slab / Basement ceiling	0.276		
		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"				
X		14	0.00	m²	Temperature zone "X": Please provide user-defined reduction factor (0 < f < 1):				
					Factor for X				
					85%				
						Thermal bridges - Overview	Ψ [W/(mK)]		
A	Thermal bridges Ambient	15	120.80	m	Units in m	Thermal bridges Ambient	-0.039		
P	Perimeter thermal bridges	16	27.17	m	Units in m; temperature zone "P" is perimeter (see 'Ground' worksheet)	Perimeter thermal bridges	-0.203		
B	Thermal bridges FS/BC	17	0.00	m	Units in m	Thermal bridges FS/BC			
I	Building element towards neigh	18	379.40	m²	No heat losses, only considered for the heating load calculation	Building element towards neighbour	3.526		
Total thermal envelope			859.04	m²		Average therm. envelope	0.304		

[Go to building components list](#)

30					x (	x	+	-	) -	0.0	=								
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Areas determination

HANAC Corona Senior Residence / Climate: New York / TFA: 381 m² / Heating: 7.6 kWh/(m²a) / Cooling: 13.9 kWh/(m²a) / PER: 59.7 kWh/(m²a)

Summary						Building assembly overview	Average U-value [W/(m ² K)]	Radiation-gains heating season [kWh/a] 7 Months
Temp.-zone	Area group	Group no.	Area / Length	Unit	Comment			
	Treated floor area	1	380.74	m ²	Treated floor area according to PHPP manual			
A	North windows	2	63.96	m ²	Results come from the 'Windows' worksheet. Window areas are subtracted from individual opaque areas, which is displayed in the 'Windows' worksheet.	North windows	0.873	1532
A	East windows	3	0.00	m ²		East windows		
A	South windows	4	22.40	m ²		South windows	0.978	1405
A	West windows	5	0.00	m ²		West windows		
A	Horizontal windows	6	0.00	m ²		Horizontal windows		
A	Exterior door	7	2.24	m ²	Please subtract area of door from respective building assembly	Exterior door	2.000	
A	External wall - Ambient	8	223.23	m ²	Temperature zone "A" is ambient air	External wall - Ambient	0.221	101
B	External wall - Ground	9	0.00	m ²	Temperature zone "B" is the ground	External wall - Ground		
A	Roof/Ceiling - Ambient	10	85.80	m ²		Roof/Ceiling - Ambient	0.145	11
B	Floor slab / Basement ceiling	11	461.40	m ²		Floor slab / Basement ceiling	0.276	
		12	0.00	m ²	Temperature zones "A", "B", "P" and "X" may be used. NOT "I"			
		13	0.00	m ²	Temperature zones "A", "B", "P" and "X" may be used. NOT "I"			
X		14	0.00	m ²	Temperature zone "X": Please provide user-defined reduction factor (0 < f _t < 1):			
					Factor for X			
					85%			
						Thermal bridges - Overview	Ψ [W/(mK)]	
A	Thermal bridges Ambient	15	120.80	m	Units in m	Thermal bridges Ambient	-0.039	
P	Perimeter thermal bridges	16	27.17	m	Units in m; temperature zone "P" is perimeter (see 'Ground' worksheet)	Perimeter thermal bridges	-0.203	
B	Thermal bridges FS/BC	17	0.00	m	Units in m	Thermal bridges FS/BC		
I	Building element towards neighbour	18	379.40	m ²	No heat losses, only considered for the heating load calculation	Building element towards neighbour	3.526	
Total thermal envelope			859.04	m ²		Average therm. envelope	0.304	

[Go to building components list](#)

Thermal bridge inputs														Sortierung ändern		
No.	Thermal bridge - denomination	Group No.	Assigned to group	Quan- tity	x (	Length [m]	-	Subtraction length [m]	)=	Length ℓ [m]	User determined psi value [W/(mK)]	User determined f _{RSI} =0.25 (optional)	or	Selection building system	Ψ-Value [W/(mK)]	f _{RSI} -Requirement met?
1	G1 Wall/Ceiling between Ground Floor and 2nd Floor	15	Thermal bridges Ambient	0	x (	6.90	-		)=	0.00	0.030		or		0.030	
2	G2 Wall/Ceiling between Ground Floor and 2nd Floor	15	Thermal bridges Ambient	0	x (	2.67	-		)=	0.00	0.010		or		0.010	
3	G3 Wall/Ceiling between Ground Floor and 2nd Floor	15	Thermal bridges Ambient	0	x (	9.82	-		)=	0.00	0.030		or		0.030	
4	G4 Wall/Roof/Ceiling between Ground Floor and 2nd Floor	15	Thermal bridges Ambient	1	x (	26.73	-		)=	26.73	-0.120		or		-0.120	
5	G5 G2 Sim	15	Thermal bridges Ambient	1	x (	2.74	-		)=	2.74	0.010		or		0.010	
6	G6 G2 Sim	15	Thermal bridges Ambient	0	x (	0.85	-		)=	0.00	0.010		or		0.010	
7	G7 Wall/Roof at Ground Floor (TB 8 Sim)	15	Thermal bridges Ambient	1	x (	32.79	-		)=	32.79	-0.030		or		-0.030	
8	G8 Wall/Roof at Ground Floor (TB 8 Sim)	15	Thermal bridges Ambient	1	x (	4.33	-		)=	4.33	-0.030		or		-0.030	
9	G9 Wall/Ground Typ	16	Perimeter thermal bridges	0	x (	6.91	-		)=	0.00	-0.160		or		-0.160	
10	G10 Wall/Ground at Side Wall	16	Perimeter thermal bridges	1	x (	9.78	-		)=	9.78	-0.270		or		-0.270	
11	G11 Wall/Ground (G9 Sim)	16	Perimeter thermal bridges	0	x (	42.57	-		)=	0.00	-0.160		or		-0.160	
12	G12 Wall/Ground at Side Wall	16	Perimeter thermal bridges	1	x (	0.85	-		)=	0.85	-0.270		or		-0.270	
13	G13 Wall Corner - Vertical (TB 2 Sim)	15	Thermal bridges Ambient	0	x (	3.76	-		)=	0.00	-0.080		or		-0.080	
14	G14 Wall between Party Wall and Ambient	15	Thermal bridges Ambient	1	x (	3.81	-		)=	3.81	0.000		or		0.000	
15	G15 Wall Corner - Vertical (TB 2 Sim)	15	Thermal bridges Ambient	0	x (	3.81	-		)=	0.00	-0.080		or		-0.080	
16	G16 Wall Corner (inverse of G17)	15	Thermal bridges Ambient	1	x (	3.76	-		)=	3.76	0.040		or		0.040	
17	G17 Wall Corner - Vertical	15	Thermal bridges Ambient	1	x (	11.29	-		)=	11.29	-0.040		or		-0.040	
18	G18 Wall Corner (inverse of G17)	15	Thermal bridges Ambient	1	x (	7.52	-		)=	7.52	0.040		or		0.040	
19	G19 Wall Corner - Vertical (TB 2 Sim)	15	Thermal bridges Ambient	1	x (	3.76	-		)=	3.76	-0.080		or		-0.080	
20	G20 Wall Corner - Vertical (TB 2 Sim)	15	Thermal bridges Ambient	1	x (	7.53	-		)=	7.53	-0.080		or		-0.080	
21	G21	15	Thermal bridges Ambient	1	x (	16.54	-		)=	16.54	0.030		or		0.030	
22	G22	15	Thermal bridges Ambient	0	x (	10.01	-		)=	0.00	0.030		or		0.030	
23	G23	16	Perimeter thermal bridges	1	x (	16.54	-		)=	16.54	-0.160		or		-0.160	

Areas determination

HANAC Corona Senior Residence / Climate: New York / TFA: 381 m² / Heating: 7.6 kWh/(m²a) / Cooling: 13.9 kWh/(m²a) / PER: 59.7 kWh/(m²a)

Summary						Building assembly overview	Average U-value [W/(m ² K)]	Radiation-gains heating season [kWh/a] 7 Months
Temp.-zone	Area group	Group no.	Area / Length	Unit	Comment			
	Treated floor area	1	380.74	m ²	<i>Treated floor area according to PHPP manual</i>			
A	North windows	2	63.96	m ²	Results come from the 'Windows' worksheet. Window areas are subtracted from individual opaque areas, which is displayed in the 'Windows' worksheet.	North windows	0.873	1532
A	East windows	3	0.00	m ²		East windows		
A	South windows	4	22.40	m ²		South windows	0.978	1405
A	West windows	5	0.00	m ²		West windows		
A	Horizontal windows	6	0.00	m ²		Horizontal windows		
A	Exterior door	7	2.24	m ²	<i>Please subtract area of door from respective building assembly</i>	Exterior door	2.000	
A	External wall - Ambient	8	223.23	m ²	<i>Temperature zone "A" is ambient air</i>	External wall - Ambient	0.221	101
B	External wall - Ground	9	0.00	m ²	<i>Temperature zone "B" is the ground</i>	External wall - Ground		
A	Roof/Ceiling - Ambient	10	85.80	m ²		Roof/Ceiling - Ambient	0.145	11
B	Floor slab / Basement ceiling	11	461.40	m ²		Floor slab / Basement ceiling	0.276	
		12	0.00	m ²	<i>Temperature zones "A", "B", "P" and "X" may be used. NOT "I"</i>			
		13	0.00	m ²	<i>Temperature zones "A", "B", "P" and "X" may be used. NOT "I"</i>			
X		14	0.00	m ²	<i>Temperature zone "X": Please provide user-defined reduction factor (0 < f_t < 1):</i>			
					Factor for X			
					85%			
						Thermal bridges - Overview	Ψ [W/(mK)]	
A	Thermal bridges Ambient	15	120.80	m	<i>Units in m</i>	Thermal bridges Ambient	-0.039	
P	Perimeter thermal bridges	16	27.17	m	<i>Units in m; temperature zone "P" is perimeter (see 'Ground' worksheet)</i>	Perimeter thermal bridges	-0.203	
B	Thermal bridges FS/BC	17	0.00	m	<i>Units in m</i>	Thermal bridges FS/BC		
I	Building element towards neighbour	18	379.40	m ²	<i>No heat losses, only considered for the heating load calculation</i>	Building element towards neighbour	3.526	
Total thermal envelope			859.04	m²		Average therm. envelope	0.304	
Go to building components list								
24	G24	16	Perimeter thermal bridges	0	x (10.01 -) = 0.00	-0.160		-0.160

Heat losses through the ground

HANAC Corona Senior Residence / Climate: New York / TFA: 381 m² / Heating: 7.6 kWh/(m²a) / Cooling: 13.9 kWh/(m²a) / PER: 59.7 kWh/(m²a)

Building section 1

Ground characteristics

Thermal conductivity	λ	2.0	W/(mK)
Heat capacity	ρC	2.0	MJ/(m ³ K)
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	$T_{g,ave}$	13.7	°C
Amplitude of $T_{g,ave}$	$T_{g,\Delta}$	12.2	°C
Phase shifting of $T_{e,m}$	τ	1.2	Months
Length of the heating period	n	5.7	Months
Heating degree hours - exterior	G_e	64.4	kKh/a

Building data

Area of ground floor slab / basement (A)	461.4	m ²
Perimeter length	58.5	m
Charact. dimension of floor slab	15.77	m

U-value floor slab/basement ceiling	U_f	0.276	W/(m ² K)
TBs floor slab / basement ceiling	$\Psi_{B,*I}$	0.00	W/K
U-value floor slab / basement ceiling ii U_f'		0.276	W/(m ² K)
Equivalent thickness floor	d_f	7.25	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
Conductivity perimeter insulation	λ_n		W/(mK)		

Heated basement or floor slab completely / partially below ground level

Basement wall height below ground le Z		m	U-Value wall below ground	U_{WB}		W/(m ² K)
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Unheated basement

Height aboveground wall	h		m	U-Value wall above ground	U_W		W/(m ² K)
Basement wall height below ground le Z			m	U-Value wall below ground	U_{WB}		W/(m ² K)
Air change unheated basement	n	0.20	h ⁻¹	U-Value basement floor slab	U_{fB}		W/(m ² K)
Air volume basement	V		m ³				

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

U-Value crawl space	U_{Crawl}		W/(m ² K)	Area of ventilation openings	εP		m ²
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/(m ² K)	Wind shield factor	f_W	0.05	-

Additional thermal bridge heat losses at perimeter

Phase shift	β		Months	Steady-state fraction	$\Psi_{P,stat}^{*I}$	-15.530	W/K
				Harmonic fraction	$\Psi_{P,harm}^{*I}$	-15.530	W/K

Groundwater correction

Depth of the groundwater table	z_w	3.0	m	Groundwater correction factor	G_w	1.1558763	-
Groundwater flow rate	q_w	0.05	m/d				

Interim results

Phase shift	β	1.35	Months	Steady-state heat flow	Φ_{stat}	387.8	W
Steady-state transmittance	L_S	61.80	W/K	Periodic heat flow	Φ_{harm}	1.0	W
Exterior periodic transmittance	L_{pe}	0.17	W/K	Heat losses during heating period	Q_{tot}	1632	kWh
Transmittance building	L_0	111.80	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	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5
Summer	18.8	18.8	18.7	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8

Design ground temperature for 'Heating load' worksheet

16.5

For 'Cooling load' worksheet

18.8

Reduction factor for 'Annual heating' worksheet

0.23

Total result (all building parts)

Phase shift	β	1.35	Months	Steady-state heat flow	Φ_{stat}	387.8	W
Steady-state transmittance	L_S	61.80	W/K	Periodic heat flow	Φ_{harm}	1.0	W
Exterior periodic transmittance	L_{pe}	0.17	W/K	Heat losses during heating period	Q_{tot}	1632	kWh
Transmittance building	L_0	111.80	W/K	Charact. dimension of floor slab	B'	15.77	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	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5	16.5
Summer	18.8	18.8	18.7	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8	18.8

Design ground temperature for 'Heating load' worksheet

16.5

For 'Cooling load' worksheet

18.8

Reduction factor for 'Annual heating' worksheet

0.23

HANAC Corona Senior Residence / Climate: New York / TFA: 381 m² / Heating: 7.6 kWh/(m²a) / Cooling: 13.9 kWh/(m²a) / PER: 59.7 kWh/(m²a)

- Go to: [AREAS](#)[www.passivehouse.com/component-database](#)
- [Thermal bridges \(Psi-values\)](#)[Ventilation units](#)
- [Glazing](#)[Compact units](#)
- [Window frames](#)[Heat recovery DHW](#)

Building assemblies (U-Values)					
Recommended starting values for optimisation: U-values for walls and roofs Floor slabs: 0.3 W/(m²K) 5 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	Main Roof	Main Roof	0.432	0.142	0
02ud	Bulkhead Roof	Bulkhead Roof		5.882	0
03ud	Terrace Roof	Terrace Roof	0.432	0.142	0
04ud	Front Wall Lower	Front Wall Lower	1.000	0.260	0
05ud	Front Wall Upper	Front Wall Upper	1.000	0.260	0
06ud	Rear Wall	Rear Wall	1.000	0.201	0
07ud	Bulkhead Wall	Bulkhead Wall		5.882	0
08ud	Side Wall	Side Wall	1.000	0.213	0
09ud	Party Wall Above Grade	Party Wall Above Grade	0.344	0.318	0
10ud	Party Wall Below Grade	Party Wall Below Grade	0.344	0.318	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	opaque panel	0.00	0.50
02ud	Design	0.30	0.50
03ud	Guardian for AT 790 SI	0.33	0.50
04ud	CW	0.33	0.50
05ud	Intus CG4x20Arx4x18ArxCg4	0.37	0.50
06ud	Kawneer 3x Glaz	0.20	0.50
07ud			
08ud			
09ud			
10ud			

Window frames										Window frames									
		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	Ψ _{Glazing edge left}	Ψ _{Glazing edge right}	Ψ _{Glazing edge bottom}	Ψ _{Glazing edge top}	Ψ _{Installation left}	Ψ _{Installation right}	Ψ _{Installation bottom}	Ψ _{Installation top}	X _{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	curtain wall AT 790 St middle panel	0.85	0.85	0.85	0.85	0.095	0.095	0.062	0.062	0.040	0.040	0.040	0.040	0.070	0.070	0.070	0.070		
02ud	CW Worst Case	1.10	1.10	1.10	1.10	0.025	0.025	0.051	0.051	0.040	0.040	0.040	0.040	0.070	0.070	0.070	0.070		
03ud	CW Worst Case	0.99	0.99	0.99	0.99					0.061	0.061	0.061	0.061	0.070	0.070	0.070	0.070		
04ud	AT 500 CC fixed middle	0.61	0.61	0.62	0.62	0.025	0.025	0.050	0.050	0.030	0.030	0.030	0.030	0.070	0.070	0.070	0.070		
05ud	AT 500 CC fixed left	0.61	0.61	0.62	0.62	0.050	0.025	0.050	0.050	0.030	0.030	0.030	0.030	0.070	0.070	0.070	0.070		
06ud	AT 500 CC fixed right	0.61	0.61	0.62	0.62	0.025	0.050	0.050	0.050	0.030	0.030	0.030	0.030	0.070	0.070	0.070	0.070		
07ud																			
08ud	CW Door	2.00	2.00	2.00	2.00	0.100	0.100	0.200	0.100	0.030	0.030	0.030	0.030	0.070	0.070	0.070	0.070		
09ud	Kawneer Door	2.00	2.00	2.00	2.00	0.120	0.120	0.254	0.203	0.037	0.037	0.037	0.037	0.140	0.140	0.101	0.166		
10ud																			

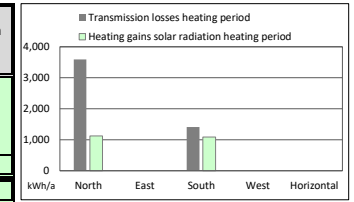
Ventilation units with heat recovery											Ventilation units with heat recovery					
	Recommended specifications to start planning: Frost protection: Yes; Humidity recovery: Yes		75 %		0.45	Additional Device Data										
ID	Description		Effective heat recovery efficiency	Humidity recovery efficiency	Electric efficiency	Application range		External pressure per section	Fittings $D_{p_{intern}}$	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	Swegon - GOLD RX 07		86%	0%	0.45	540	1820	265	51	no	-	0	0			
02ud	Swegon - GOLD RX 14		84%	0%	0.45	1800	4285	316	60	no	-	0	0	-		
03ud	Zehnder - ComfoAir200, ComfoD250, WHR920		92%	0%	0.42	60	150	100	incl.	yes	/	57	54	-		
04ud	Open Louver		0%	0%	0.00	1	100	101	incl.	yes	/	57	54			
05ud																
06ud																
07ud																
08ud																
09ud																
10ud																

Windows

HANAC Corona Senior Residence / Climate: New York / TFA: 381 m² / Heating: 7.6 kWh/(m²a) / Cooling: 13.9 kWh/(m²a) / PER: 59.7 kWh/(m²a)

Window area orientation	Global radiation (main orientations) kWh/(m ² a)	Shading	Dirt	Non-vertical radiation incidence 0.85	Glazing fraction	g-Value	Solar irradiation reduction factor	Window area m ²	Window U-Value W/(m ² K)	Glazing area m ²	Average global radiation kWh/(m ² a)
Standard values →		0.75	0.95	0.85							
North	115	0.52	0.95	0.85	0.74	0.36	0.31	63.96	0.87	47.03	159
East	303	1.00	0.95	0.85	0.00	0.00	0.00	0.00	0.00	0.00	303
South	572	0.48	0.95	0.85	0.70	0.37	0.27	22.40	0.98	15.58	484
West	289	1.00	0.95	0.85	0.00	0.00	0.00	0.00	0.00	0.00	289
Horizontal	453	1.00	0.95	0.85	0.00	0.00	0.00	0.00	0.00	0.00	453
Total or average value for all windows:						0.36	0.30	86.37	0.90	62.61	

Transmission losses heating period kWh/a	Heating gains solar radiation heating period kWh/a
3594	1122
0	0
1411	1087
0	0
0	0
5005	2210



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

0.87 1.04 1.14 0.48

Heating degree hours [Kha]: 64.4

[Go to glazing list](#)

[Go to window frames list](#)

Heating degree hours [kWh/a]: 64.4					Window rough openings		Installed in	Glazing	Frame	g-Value	U-Value		Ψ Glazing edge	Installation situation user determined value for Ψ _{Installation} Or '1': Ψ _{Installation} from 'Components' worksheet '0' in the case of abutting windows					Results			
Quantity	Description	Deviation from north	Angle of inclination from the horizontal	Orientation	Width	Height	Selection from 'Areas' worksheet	Selection from 'Components' worksheet	Selection from 'Components' worksheet	Perpendicular radiation	Glazing	Frames (avg.)	Ψ _{Glazing edge} (Avg.)	left	right	bottom	top	Ψ _{Installation} (Avg.)	Window Area	Glazing area	U _w installed	Glazed fraction per window
		°	°		m	m		Sort: AS LIST	Sort: AS LIST	-	W/(m ² K)	W/(m ² K)	W/(mK)	W/(mK) or 1/0				W/(mK)	m ²	m ²	W/(m ² K)	%
0	SF 4 NORTH LOWER LEFT	43	90	North	0.869	1.850	6-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	28ud-Intus Fixed Left at Storefront Roxul	0.37	0.50	0.95	0.037	1	0	1	0	0.063				
0	SF 4 NORTH LOWER MIDDLE	43	90	North	0.869	1.850	6-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	27ud-Intus Fixed Middle at Storefront Roxul	0.37	0.50	0.95	0.037	0	0	1	0	0.076				
0	SF 4 NORTH LOWER RIGHT	43	90	North	0.869	1.850	6-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	29ud-Intus Fixed Right at Storefront Roxul	0.37	0.50	0.95	0.037	0	1	1	0	0.063				
0	SF 4 NORTH UPPER LEFT	43	90	North	0.869	0.450	6-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	28ud-Intus Fixed Left at Storefront Roxul	0.37	0.50	0.95	0.037	1	0	0	1	0.053				
0	SF 4 NORTH UPPER MIDDLE	43	90	North	0.869	0.450	6-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	27ud-Intus Fixed Middle at Storefront Roxul	0.37	0.50	0.95	0.037	0	0	0	1	0.051				
0	SF 4 NORTH UPPER RIGHT	43	90	North	0.869	0.450	6-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	29ud-Intus Fixed Right at Storefront Roxul	0.37	0.50	0.95	0.037	0	1	0	1	0.053				
0	SF 4 NORTH TRANSOM	43	90	North	1.835	0.450	6-Rear Wall	05ud-Intus CG4x20Arx4x18ArxCG4	27ud-Intus Fixed Middle at Storefront Roxul	0.37	0.50	0.95	0.037	0	0	0	1	0.051				
0	SF 5 SOUTH TRANSOM LEFT	313	90	West	0.915	0.450	11-Front Wall Lower	05ud-Intus CG4x20Arx4x18ArxCG4	28ud-Intus Fixed Left at Storefront Roxul	0.37	0.50	0.95	0.037	1	0	0	1	0.053				
0	SF 5 SOUTH TRANSOM RIGHT	313	90	West	0.915	0.450	11-Front Wall Lower	05ud-Intus CG4x20Arx4x18ArxCG4	27ud-Intus Fixed Middle at Storefront Roxul	0.37	0.50	0.95	0.037	0	1	0	1	0.053				
0	SF 5 SOUTH LOWER RIGHT	313	90	West	1.069	2.438	11-Front Wall Lower	05ud-Intus CG4x20Arx4x18ArxCG4	29ud-Intus Fixed Right at Storefront Roxul	0.37	0.50	0.95	0.037	0	1	1	0	0.063				
0	SF 5 SOUTH UPPER RIGHT	313	90	West	1.069	0.450	11-Front Wall Lower	05ud-Intus CG4x20Arx4x18ArxCG4	29ud-Intus Fixed Right at Storefront Roxul	0.37	0.50	0.95	0.037	0	1	0	1	0.053				
0	SF 6 SOUTH LOWER LEFT	313	90	West	0.923	2.362	11-Front Wall Lower	05ud-Intus CG4x20Arx4x18ArxCG4	28ud-Intus Fixed Left at Storefront Roxul	0.37	0.50	0.95	0.037	1	0	1	0	0.062				
0	SF 6 SOUTH UPPER LEFT	313	90	West	0.923	0.576	11-Front Wall Lower	05ud-Intus CG4x20Arx4x18ArxCG4	28ud-Intus Fixed Left at Storefront Roxul	0.37	0.50	0.95	0.037	1	0	0	1	0.053				
0	SF 6 LOWER MIDDLE	313	90	West	0.923	2.362	11-Front Wall Lower	05ud-Intus CG4x20Arx4x18ArxCG4	27ud-Intus Fixed Middle at Storefront Roxul	0.37	0.50	0.95	0.037	0	0	1	0	0.076				
0	SF 6 UPPER MIDDLE	313	90	West	0.923	0.576	11-Front Wall Lower	05ud-Intus CG4x20Arx4x18ArxCG4	27ud-Intus Fixed Middle at Storefront Roxul	0.37	0.50	0.95	0.037	0	0	0	1	0.051				
	<SCHOOL BELOW>																					
1	SF 1 NORTH LOWER LEFT	43	90	North	0.885	1.871	4-Rear Wall 4	05ud-Intus CG4x20Arx4x18ArxCG4	18ud-Intus Fixed Left at Storefront EIFS	0.37	0.50	0.95	0.037	1	0	1	0	0.051	1.7	1.28	0.80	77%
1	SF 1 NORTH UPPER LEFT	43	90	North	0.885	0.542	4-Rear Wall 4	05ud-Intus CG4x20Arx4x18ArxCG4	18ud-Intus Fixed Left at Storefront EIFS	0.37	0.50	0.95	0.037	1	0	0	1	0.103	0.5	0.30	1.15	62%
10	SF 1 NORTH LOWER MIDDLE	43	90	North	0.885	1.871	4-Rear Wall 4	05ud-Intus CG4x20Arx4x18ArxCG4	17ud-Intus Fixed Middle at Storefront EIFS	0.37	0.50	0.95	0.037	0	0	1	0	0.107	16.6	12.69	0.77	77%
10	SF 1 NORTH UPPER MIDDLE	43	90	North	0.885	0.542	4-Rear Wall 4	05ud-Intus CG4x20Arx4x18ArxCG4	17ud-Intus Fixed Middle at Storefront EIFS	0.37	0.50	0.95	0.037	0	0	0	1	0.152	4.8	2.95	1.13	61%
1	SF 1 NORTH LOWER RIGHT	43	90	North	0.885	1.871	4-Rear Wall 4	05ud-Intus CG4x20Arx4x18ArxCG4	19ud-Intus Fixed Right at Storefront EIFS	0.37	0.50	0.95	0.037	0	1	1	0	0.051	1.7	1.28	0.80	77%
1	SF 1 NORTH UPPER RIGHT	43	90	North	0.885	0.542	4-Rear Wall 4	05ud-Intus CG4x20Arx4x18ArxCG4	19ud-Intus Fixed Right at Storefront EIFS	0.37	0.50	0.95	0.037	0	1	0	1	0.103	0.5	0.30	1.15	62%
1	SF 2 NORTH TRANSOM LEFT	43	90	North	0.926	0.573	7-Rear Wall 7	05ud-Intus CG4x20Arx4x18ArxCG4	18ud-Intus Fixed Left at Storefront EIFS	0.37	0.50	0.95	0.037	1	0	0	1	0.103	0.5	0.34	1.12	64%
1	SF 2 NORTH TRANSOM RIGHT	43	90	North	0.573	0.573	7-Rear Wall 7	05ud-Intus CG4x20Arx4x18ArxCG4	19ud-Intus Fixed Right at Storefront EIFS	0.37	0.50	0.95	0.037	0	1	0	1	0.088	0.3	0.18	1.20	56%
1	SF 2 LOWER RIGHT	43	90	North	0.573	2.450	7-Rear Wall 7	05ud-Intus CG4x20Arx4x18ArxCG4	19ud-Intus Fixed Right at Storefront EIFS	0.37	0.50	0.95	0.037	0	1	1	0	0.040	1.4	0.99	0.86	70%
1	SF 3 NORTH LOWER LEFT	43	90	North	1.001	1.871	5-Rear Wall 5	05ud-Intus CG4x20Arx4x18ArxCG4	18ud-Intus Fixed Left at Storefront EIFS	0.37	0.50	0.95	0.037	1	0	1	0	0.053	1.9	1.48	0.78	79%

Heating degree
hours [K h/a]: **64.4**

Quantity	Description	Deviation from north	Angle of inclination from the horizontal	Orientation	Window rough openings		Installed in	Glazing	Frame	g-Value	U-Value		Ψ Glazing edge	Installation situation user determined value for $\Psi_{\text{installation}}$ or "1": $\Psi_{\text{installation}}$ from 'Components' worksheet "0": in the case of abutting windows					Results			
					Width	Height								left	right	bottom	top	$\Psi_{\text{installation}}$ (Avg.)	Window Area	Glazing area	U_w installed	Glazed fraction per window
					m	m								W/(mK) or 1/D				W/(mK)	m ²	m ²	W/(m ² K)	%
		°	°					Sort: AS LIST	Sort: AS LIST	-	W/(m ² K)	W/(m ² K)	W/(mK)					W/(mK)	m ²	m ²	W/(m ² K)	%
1	SF 3 NORTH UPPER LEFT	43	90	North	1.001	0.542	5-Rear Wall 5	05ud-Intus CG4x20Arx4x18ArxCG4	18ud-Intus Fixed Left at Storefront EIFS	0.37	0.50	0.95	0.037	1	0	0	1	0.107	0.5	0.34	1.14	63%
11	SF 3 NORTH LOWER MIDDLE	43	90	North	1.001	1.871	5-Rear Wall 5	05ud-Intus CG4x20Arx4x18ArxCG4	17ud-Intus Fixed Middle at Storefront EIFS	0.37	0.50	0.95	0.037	0	0	1	0	0.107	20.6	16.17	0.76	78%
11	SF 3 NORTH UPPER MIDDLE	43	90	North	1.001	0.542	5-Rear Wall 5	05ud-Intus CG4x20Arx4x18ArxCG4	17ud-Intus Fixed Middle at Storefront EIFS	0.37	0.50	0.95	0.037	0	0	0	1	0.152	6.0	3.75	1.12	63%
1	SF 3 NORTH LOWER MIDDLE OPAQUE	43	90	North	1.001	1.871	5-Rear Wall 5	01ud-opaque panel	17ud-Intus Fixed Middle at Storefront EIFS	0.00	0.50	0.95	0.037	0	0	1	0	0.107	1.9	1.47	0.76	78%
1	SF 3 NORTH UPPER MIDDLE OPAQUE	43	90	North	1.001	0.542	5-Rear Wall 5	01ud-opaque panel	17ud-Intus Fixed Middle at Storefront EIFS	0.00	0.50	0.95	0.037	0	0	0	1	0.152	0.5	0.34	1.12	63%
1	SF 3 NORTH LOWER RIGHT	43	90	North	1.001	1.871	5-Rear Wall 5	05ud-Intus CG4x20Arx4x18ArxCG4	19ud-Intus Fixed Right at Storefront EIFS	0.37	0.50	0.95	0.037	0	1	1	0	0.053	1.9	1.48	0.78	79%
1	SF 3 NORTH UPPER RIGHT	43	90	North	1.001	0.542	5-Rear Wall 5	05ud-Intus CG4x20Arx4x18ArxCG4	19ud-Intus Fixed Right at Storefront EIFS	0.37	0.50	0.95	0.037	0	1	0	1	0.107	0.5	0.34	1.14	63%
1	SF 6 TRANSOM OPAQUE	223	90	South	0.923	0.576	10-Front Wall 17	05ud-Intus CG4x20Arx4x18ArxCG4	27ud-Intus Fixed Middle at Storefront Roxul	0.37	0.50	0.95	0.037	0	0	0	1	0.051	0.5	0.34	0.92	63%
3	SF 6 LOWER MIDDLE	223	90	South	0.923	1.787	10-Front Wall 17	05ud-Intus CG4x20Arx4x18ArxCG4	27ud-Intus Fixed Middle at Storefront Roxul	0.37	0.50	0.95	0.037	0	0	1	0	0.076	4.9	3.81	0.75	77%
3	SF 6 UPPER MIDDLE	223	90	South	0.923	0.576	10-Front Wall 17	05ud-Intus CG4x20Arx4x18ArxCG4	27ud-Intus Fixed Middle at Storefront Roxul	0.37	0.50	0.95	0.037	0	0	0	1	0.051	1.6	1.01	0.92	63%
1	SF 6 LOWER MIDDLE OPAQUE	223	90	South	0.923	1.787	10-Front Wall 17	05ud-Intus CG4x20Arx4x18ArxCG4	27ud-Intus Fixed Middle at Storefront Roxul	0.37	0.50	0.95	0.037	0	0	1	0	0.076	1.6	1.27	0.75	77%

Calculation of shading coefficients

Passive House with PHPP Version 9.6a

HANAC Corona Senior Residence / Climate: New York / TFA: 381 m² / Heating: 7.6 kWh/(m²a) / Cooling: 13.9 kWh/(m²a) / PER: 59.7 kWh/(m²a)

Latitude: 40.78 °

Orientation	Glazing area [m²]	Reduction factor winter $r_{f,w}$	Reduction factor cooling $r_{f,c}$	Reduction factor cooling load $r_{f,cl}$	Solar load [kWh/(m² _{glazing} a)]
North	47.03	52%	52%	52%	76
East	0.00	100%	100%	100%	0
South	15.58	48%	55%	55%	156
West	0.00	100%	100%	100%	0
Horizontal	0.00	100%	100%	100%	0

Quantity	Description	Deviation from North	Angle of inclination from the horizontal	Orientation	Glazing width	Glazing height	Glazing area	Horizon		Lateral reveal		Reveal / Overhang		Additional reduction factor winter shading	Additional reduction factor summer shading	Reduction factor z for temporary sun protection	Regulated / transparent	Reduction factors for shading in winter				Reduction factors for shading in summer				
								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					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]	$A_{g,0}$ [m²]	$h_{s,01}$ [m]	$d_{s,01}$ [m]	o_{reveal} [m]	$d_{s,reveal}$ [m]	o_{over} [m]	$d_{s,over}$ [m]	$r_{f,w,01}$ [%]	$r_{f,w,cl}$ [%]	z [%]		$r_{f,0}$ [%]	$r_{f,R}$ [%]	$r_{f,O}$ [%]	$r_{f,S}$ [%]	$r_{f,0}$ [%]	$r_{f,R}$ [%]	$r_{f,O}$ [%]	$r_{f,S,1}$ [%]	$r_{f,S,2}$ [%]
0	SF 4 NORTH LOWER	43	90	North	0.72	1.71																				
0	SF 4 NORTH LOWER	43	90	North	0.72	1.71																				
0	SF 4 NORTH LOWER	43	90	North	0.72	1.71																				
0	SF 4 NORTH UPPER	43	90	North	0.72	0.31																				
0	SF 4 NORTH UPPER	43	90	North	0.72	0.31																				
0	SF 4 NORTH UPPER	43	90	North	0.72	0.31																				
0	SF 4 NORTH TRANSOM	43	90	North	1.68	0.31																				
0	SF 5 SOUTH TRANSOM	313	90	West	0.77	0.31																				
0	SF 5 SOUTH TRANSOM	313	90	West	0.76	0.31																				
0	SF 5 SOUTH LOWER	313	90	West	0.92	2.30																				
0	SF 5 SOUTH UPPER	313	90	West	0.92	0.31																				
0	SF 6 SOUTH LOWER	313	90	West	0.98	2.22																				
0	SF 6 SOUTH UPPER	313	90	West	0.78	0.44																				
0	SF 6 LOWER MIDDLE	313	90	West	0.77	2.22																				
0	SF 6 UPPER MIDDLE	313	90	West	0.77	0.44																				
	<SCHOOL BELOW>																									
1	SF 1 NORTH LOWER	43	90	North	0.74	1.73	1.3	12.00	20.00	0.05	0.100	0.10	0.10	90%	80%			63%	96%	97%	53%	68%	98%	100%	53%	53%
1	SF 1 NORTH UPPER	43	90	North	0.74	0.40	0.3	12.00	20.00	0.05	0.100	0.10	0.10	90%	80%			63%	96%	91%	50%	68%	98%	96%	51%	51%
10	SF 1 NORTH LOWER	43	90	North	0.73	1.73	12.7	12.00	20.00	0.05	0.100	0.10	0.10	90%	80%			63%	96%	97%	53%	68%	98%	100%	53%	53%
10	SF 1 NORTH UPPER	43	90	North	0.73	0.40	2.9	12.00	20.00	0.05	0.100	0.10	0.10	90%	80%			63%	96%	91%	50%	68%	98%	96%	51%	51%
1	SF 1 NORTH LOWER	43	90	North	0.74	1.73	1.3	12.00	20.00	0.05	0.100	0.10	0.10	90%	80%			63%	96%	97%	53%	68%	98%	100%	53%	53%
1	SF 1 NORTH UPPER	43	90	North	0.74	0.40	0.3	12.00	20.00	0.05	0.100	0.10	0.10	90%	80%			63%	96%	91%	50%	68%	98%	96%	51%	51%
1	SF 2 NORTH TRANSOM	43	90	North	0.78	0.43	0.3	12.00	20.00	0.05	0.100	0.10	0.10	90%	80%			63%	97%	91%	50%	68%	98%	96%	51%	51%
1	SF 2 NORTH TRANSOM	43	90	North	0.43	0.43	0.2	12.00	20.00	0.05	0.100	0.10	0.10	90%	80%			63%	95%	91%	49%	68%	96%	96%	51%	51%
1	SF 2 LOWER RIGHT	43	90	North	0.43	2.31	1.0	12.00	20.00	0.05	0.100	0.10	0.10	90%	80%			63%	95%	98%	53%	68%	96%	100%	52%	52%
1	SF 3 NORTH LOWER	43	90	North	0.86	1.73	1.5	12.00	20.00	0.05	0.100	0.10	0.10	90%	80%			63%	97%	97%	53%	68%	98%	100%	53%	53%
1	SF 3 NORTH UPPER	43	90	North	0.86	0.40	0.3	12.00	20.00	0.05	0.100	0.10	0.10	90%	80%			63%	97%	91%	50%	68%	98%	96%	51%	51%
11	SF 3 NORTH LOWER	43	90	North	0.85	1.73	16.2	12.00	20.00	0.05	0.100	0.10	0.10	90%	80%			63%	97%	97%	53%	68%	98%	100%	53%	53%
11	SF 3 NORTH UPPER	43	90	North	0.85	0.40	3.8	12.00	20.00	0.05	0.100	0.10	0.10	90%	80%			63%	97%	91%	50%	68%	98%	96%	51%	51%
1	SF 3 NORTH LOWER	43	90	North	0.85	1.73	1.5	12.00	20.00	0.05	0.100	0.10	0.10	90%	80%			63%	97%	97%	53%	68%	98%	100%	53%	53%
1	SF 3 NORTH UPPER	43	90	North	0.85	0.40	0.3	12.00	20.00	0.05	0.100	0.10	0.10	90%	80%			63%	97%	91%	50%	68%	98%	96%	51%	51%
1	SF 3 NORTH LOWER	43	90	North	0.86	1.73	1.5	12.00	20.00	0.05	0.100	0.10	0.10	90%	80%			63%	97%	97%	53%	68%	98%	100%	53%	53%
1	SF 3 NORTH UPPER	43	90	North	0.86	0.40	0.3	12.00	20.00	0.05	0.100	0.10	0.10	90%	80%			63%	97%	91%	50%	68%	98%	96%	51%	51%
1	SF 6 TRANSOM OPPOSITE	223	90	South	0.77	0.44	0.3	26.00	39.00	0.05	0.100	0.10	0.10	90%	80%			62%	97%	92%	50%	75%	98%	91%	54%	54%
1	SF 6 LOWER MIDDLE	223	90	South	0.77	1.65	3.8	26.00	39.00	0.05	0.100	0.10	0.10	90%	80%			62%	97%	97%	52%	75%	98%	99%	58%	58%
3	SF 6 UPPER MIDDLE	223	90	South	0.77	0.44	1.0	26.00	39.00	0.05	0.100	0.10	0.10	90%	80%			62%	97%	92%	50%	75%	98%	91%	54%	54%
1	SF 6 LOWER MIDDLE	223	90	South	0.77	1.65	1.3	26.00	39.00	0.05	0.100	0.10	0.10	90%	80%			62%	97%	97%	52%	75%	98%	99%	58%	58%

Ventilation data

Passive House with PHPP Version 9.6a

HANAC Corona Senior Residence / Climate: New York / TFA: 381 m² / Heating: 7.6 kWh/(m²a) / Cooling: 13.9 kWh/(m²a) / PER: 59.7 kWh/(m²a)

Treated floor area A_{TFA}	m²	381	(Areas' worksheet)
Room height h	m	2.75	2.75
Volume of ventilated space ($A_{TFA} \cdot h$) V_V	m³	1047	(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	0.43		
				m³	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	0.043	0.108	

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 m^3/h	Average air change rate $1/h$	Extract air excess (extract air system) $1/h$	Effective heat recovery efficiency unit $[-]$	Humidity recovery efficiency $[-]$	Specific power input Wh/m^3	Heat recovery efficiency SHX $[-]$
☐	Standard design	(Ventilation' worksheet, see below)						
☒	Multiple ventilation units, non-res	(Addl vent' worksheet)						
		408	0.39	0.00	85.0%	0.0%	0.45	0.0%
Cooling recovery						Efficiency SHX η_{SHX}		
						0%		

Average interior humidity during winter operation

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
25%	26%	30%	40%	-	-	-	-	-	53%	38%	29%

Extended input for balanced ventilation

Passive House with PHPP Version 9.6a

HANAC Corona Senior Residence / Climate: New York / TFA: 381 m² / Heating: 7.6 kWh/(m²a) / Cooling: 13.9 kWh/(m²a) / PER: 59.7 kWh/(m²a)

Planning ventilation systems with multiple ventilation units

Ventilation unit / Heat recovery efficiency design
In Ventilation sheet (standard design)
In 'Addl vent worksheet (this worksheet)

	(Ventilation' worksheet)
x	(Addl vent)

Treated floor area A_{TFA}

m² **381** (Areas' worksheet)

Room height h

m **2.75** (Worksheet 'Annual heating')

Room air volume for ventilation ($A_{TFA} \cdot h$) = V_V

m³ **1047** (Worksheet 'Annual heating')

Number of occupants

P **64.0** (Ventilation' worksheet)

Room temperature

°C **20** (Worksheet 'Annual heating')

Average external temp. heating period

°C **5.6** (Ventilation' worksheet)

Average ground temp.

°C **13.7** (Ground' worksheet)

Length of the heating period

d/a **175** (Heating' worksheet)

Ventilation type

1-Balanced PH ventilation with HR (Ventilation' worksheet)

Results of ventilation design and unit selection:

Ventilation unit no.	Description of the unit	Design		Annual average value		
		V_{SUP} m³/h	V_{ETA} m³/h	V_{SUP} m³/h	V_{ETA} m³/h	Air ch.rt. 1/h
1	ERV-R-2	1775	1367	408	314	---
2						---
3						---
4						---
5						---
6						---
7						---
8						---
9						---
10						---

Result for overall vent. syst

1775	1367	408	314	0.39
-------------	-------------	------------	------------	-------------

Effective heat recovery efficiency	Humidity recovery efficiency	Spec. input power	Heat recov. efficiency SHX
85%	0%	0.45	0%

85%	0%	0.45	0%
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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 CO₂ 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 m ²	Clear height h m	Room vol. A x h m ³	Volume flow per room			Air chng. rt. per room n 1/h	Utilisation times h/d	d/week	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} m ³ /h	V _{ETA} m ³ /h	V _{TRANS} m ³ /h											V _{SUP} m ³ /h	V _{ETA} m ³ /h	V _{TRANS} m ³ /h	Change rate 1/h
1	1	Classroom 102	1	83	2.75	227	493	297		2.17	24	5	40	100%	42%	0%	58%			113	68		0.50
2	1	Classroom 112	1	77	2.75	211	493	246		2.34	24	5	40	100%	42%	0%	58%			113	57		0.54
3	1	Classroom 113	1	75	2.75	207	493	280		2.38	24	5	40	100%	42%	0%	58%			113	64		0.55
4	1	AC-T-04	1				136				24	5	40	100%	42%	0%	58%			31			#VALUE!
5	1	AC-T-05	1				85				24	5	40	100%	42%	0%	58%			19			#VALUE!
6	1	AC-T-06	1				76				24	5	40	100%	42%	0%	58%			18			#VALUE!
7																							
8																							
9																							
10																							
11																							
12																							
13	1	Toilet 102A	1	6	2.75	17		161		9.70	24	5	40	100%	42%	0%	58%				37		2.23
14	1	Toilet 112A	1	6	2.75	17		161		9.70	24	5	40	100%	42%	0%	58%				37		2.23
15	1	Toilet 113A	1	6	2.75	17		153		9.21	24	5	40	100%	42%	0%	58%				35		2.11
16	1	Janitor Closet 109	1	3	2.75	8		34		4.42	24	5	40	100%	42%	0%	58%				8		1.01
17	1	Refuse 106	1	5	2.75	14		34		2.47	24	5	40	100%	42%	0%	58%				8		0.57
18																							
19																							
20																							
21																							
22																							
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26																							
27																							
28																							
29																							
30																							
Additional lines: Please mark complete lines above, copy and paste multiple times																				408	314	---	0.57

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.

[illegible]

Total (hydraulic and heat generator)	0
--------------------------------------	---

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).

[illegible]

PHPP, Additional Vent

Specific energy for heating (annual method)

Passive House with PHPP Version 9.6a

HANAC Corona Senior Residence / Climate: New York / TFA: 381 m² / Heating: 7.6 kWh/(m²a) / Cooling: 13.9 kWh/(m²a) / PER: 59.7 kWh/(m²a)

Interior temperature: **20.0** °C
 Building type: **School portion of mixed use buildir**
 Treated floor area A_{TFA}: **380.7** m²

Building assembly	Temperature zone	Area m²	U-Value W/(m²K)	Temp. factor f _t	G _i kWh/a	Per m² of treated floor area
External wall - Ambient	A	223.2	0.221	1.00	64.4	8.35
External wall - Ground	B			0.23		
Roof/Ceiling - Ambient	A	85.8	0.145	1.00	64.4	2.11
Floor slab / Basement ceiling	B	461.4	0.276	0.23	64.4	4.88
	A			1.00		
	A			1.00		
	X			0.85		
Windows	A	86.4	0.900	1.00	64.4	13.15
Exterior door	A	2.2	2.000	1.00	64.4	0.76
Exterior TB (length/m)	A	120.8	-0.039	1.00	64.4	-0.80
Perimeter TB (length/m)	P	27.2	-0.203	0.23	64.4	-0.21
Ground TB (length/m)	B			0.23		0.00
Total of all building envelope areas		859.0				kWh/(m²a)

Transmission heat losses Q_T Total **10752** kWh/a **28.2** kWh/(m²a)

Ventilation system:		Effective air volume, V _V	A _{TFA} m²	Clear room height m	
Effective heat recovery efficiency	η _{eff}	85%	380.7	2.75	1047.0
Efficiency of subsoil heat exchanger					
Heat recovery efficiency of SHX	η _{SHX}	0%			
Energetically effective air changes nV		n _{V,system} 1/h	η _{HR}	n _{V,Res} 1/h	
		0.389	(1 - 0.85)	0.043	0.102
V _V	n _V	1047.0	0.102	C _{Air} Wh/(m³K)	G _i kWh/a
				0.33	2264

Ventilation heat losses Q_V **2264** kWh/a **5.9** kWh/(m²a)

Total heat losses Q_L		Q _T kWh/a	Q _V kWh/a	Reduction factor night/weekend Saving	
		10752	2264	1.0	13016
					34.2

Orientation of the area	Reduction factor See 'Windows' sheet	g-Value (perp. radiation)	Area m²	Radiation HP kWh/(m²a)	kWh/a
North	0.31	0.36	63.96	159	1122
East	0.00	0.00	0.00	303	0
South	0.27	0.37	22.40	484	1087
West	0.00	0.00	0.00	289	0
Horizontal	0.00	0.00	0.00	453	0
Total					2210

Available solar heat gains Q_S **2210** kWh/a **5.8** kWh/(m²a)

Internal heat gains Q_I		Length heating period d/a	Spec. power q _i W/m²	A _{TFA} m²	kWh/a
		0.024	175	380.7	8230

Free heat Q_F Q_S + Q_I = **10439** kWh/a **27.4** kWh/(m²a)

Ratio of free heat to losses Q_F / Q_V = **0.80**

Utilisation factor heat gains h_G (1 - (Q_F / Q_L)⁵) / (1 - (Q_F / Q_L)⁶) = **91%**

Heat gains Q_G η_G * Q_F = **9505** kWh/a **25.0** kWh/(m²a)

Annual heating demand Q_H Q_L - Q_G = **3511** kWh/a **9** kWh/(m²a)

Limiting value **15** kWh/(m²a) Requirement met? **Yes**

Passive House with PHPP Version 9.6a

HANAC Corona Senior Residence / Climate: New York / TFA: 381 m² / Heating: 7.6 kWh/(m²a) / Cooling: 13.9 kWh/(m²a) / PER: 59.7 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:	School portion of mixed used b	
Treated floor area A_{TFA} :	380.7	m ²
Spec. Capacity:	132	Wh/(m ² K)

Temperature zone		Area		U-Value		Month. red. fac.		G _t			Per m ² of treated floor area
Building assembly		m ²		W/(m ² K)				kK/h/a		kWh/a	
External wall - Ambient	A	223.2	*	0.221	*	1.00	*	70	=	3464	9.10
External wall - Ground	B		*		*	1.00	*		=		
Roof/Ceiling - Ambient	A	85.8	*	0.145	*	1.00	*	70	=	875	2.30
Floor slab / Basement ceiling	B	461.4	*	0.276	*	1.00	*	18	=	2251	5.91
	A		*		*	1.00	*		=		
	A		*		*	1.00	*		=		
	X		*		*	0.85	*		=		
Windows	A	86.4	*	0.900	*	1.00	*	70	=	5453	14.32
Exterior door	A	2.2	*	2.000	*	1.00	*	70	=	315	0.83
Exterior TB (length/m)	A	120.8	*	-0.039	*	1.00	*	70	=	-330	-0.87
Perimeter TB (length/m)	P	27.2	*	-0.203	*	1.00	*	18	=	-98	-0.26
Ground TB (length/m)	B		*		*	1.00	*		=		0.00

Transmission heat losses Q_T

Total

11930

31.3

		Effective air volume V_V		Clear room height			
		A_{TFA} m ²	m		m ³		
		381	2.75		1047		
		$n_{V,system}$ 1/h	η_{SHX}	η_{HR}	$n_{V,Res}$ 1/h	$n_{V,equi}$ fraction 1/h	
Effective air change rate Ambient $n_{V,e}$		0.389	0%	0.85	0.043	0.102	
Effective air change rate Ground $n_{V,g}$		0.389	0%	0.85		0.000	
		V_V m ³	$n_{V,equi}$ fraction 1/h	C_{Air} Wh/(m ³ K)	G_L kWh/a	kWh/a	kWh/(m ² a)
Ventilation losses ambient Q_V		1047	0.102	0.33	70	2466	6.5
Ventilation losses ground $Q_{V,g}$		1047	0.000	0.33	32	0	0.0
Ventilation heat losses Q_{Vg}						Total	2466
							6.5
		Q_T kWh/a	Q_V kWh/a	Reduction factor night/weekend saving		kWh/a	kWh/(m ² a)
Total heat losses Q_{Tg}		11930	2466	1.0		14396	37.8

Orientation of the area	Reduction factor see 'Windows' worksheet	g-Value (perp. radiation)	Area m ²	Global radiation kWh/(m ² a)	=	kWh/a
North	0.31	0.36	64.0	217	=	1532
East	0.00	0.00	0.0	405	=	0
South	0.27	0.37	22.4	625	=	1405
West	0.00	0.00	0.0	392	=	0
Horizontal	0.00	0.00	0.0	620	=	0
Sum opaque areas						357

Available solar heat gains Q _s	kWh/(m ² a)
Total	3294
	8.7

	kh/d	Length d/a	Heat. Period	Spec. Power q_i	A_{TFA}				
				W/m ²	m ²		kWh/a	kWh/(m ² a)	
Internal heat gains Q_i	0.024	*	212	*	5.2	*	380.7	= 9977	26.2
							kWh/a	kWh/(m ² a)	
Free heat Q_F						$Q_S + Q_i =$	13270	34.9	
Ratio free heat to losses						$Q_F / Q_L =$	0.92		
Utilisation factor heat gains h_G							87%		
Heat gains Q_G						$\eta_G * Q_F =$	11521	30.3	
							kWh/a	kWh/(m ² a)	

Annual heating demand Q_H		$Q_L - Q_G =$	kWh/a 2875	kWh/(m²a) 8
Limiting value	kWh/(m²a) 15	Requirement met?	(Yes/No) Yes	

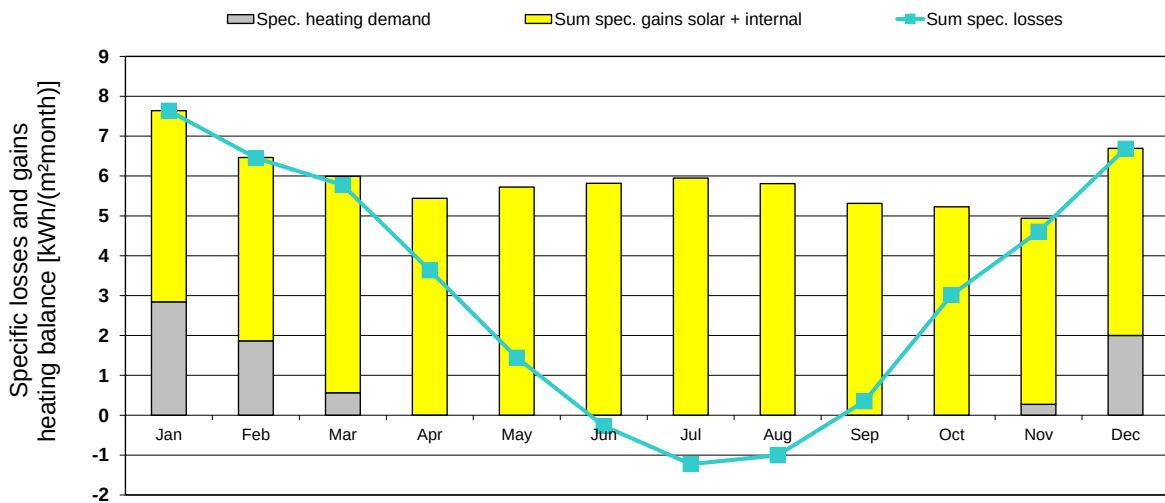
Specific energy for heating (monthly method)

Passive House with PHPP Version 9.6a

HANAC Corona Senior Residence / Climate: New York / TFA: 381 m² / Heating: 7.6 kWh/(m²a) / Cooling: 13.9 kWh/(m²a) / PER: 59.7 kWh/(m²a)

Interior temperature: **20** °C
 Building type: **School portion of mixed use building**
 Treated floor area A_{TFA}: **381** m²

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	
Heating degree hours - Exterior	14.9	12.4	10.8	6.2	2.5	-1.2	-3.3	-2.8	0.2	4.8	8.3	12.8	65	kKh
Heating degree hours - Ground	2.6	2.3	2.6	2.5	0.9	0.9	0.9	0.9	0.9	2.6	2.5	2.6	22	kKh
Losses - Exterior	2593	2172	1883	1079	438	-209	-578	-492	27	836	1449	2231	11429	kWh
Losses - Ground	315	285	316	305	112	108	111	110	106	313	304	315	2701	kWh
Sum spec. losses	7.6	6.5	5.8	3.6	1.4	-0.3	-1.2	-1.0	0.4	3.0	4.6	6.7	37.1	kWh/m²
Solar gains - North	151	195	301	366	440	509	498	439	314	242	139	138	3733	kWh
Solar gains - East	0	0	0	0	0	0	0	0	0	0	0	0	0	kWh
Solar gains - South	177	191	242	223	207	213	226	237	233	232	185	155	2521	kWh
Solar gains - West	0	0	0	0	0	0	0	0	0	0	0	0	0	kWh
Solar gains - Horiz.	0	0	0	0	0	0	0	0	0	0	0	0	0	kWh
Solar gains - Opaque	40	47	66	69	73	81	82	78	66	58	41	35	737	kWh
Internal heat gains	1459	1318	1459	1412	1459	1412	1459	1459	1412	1459	1412	1459	17177	kWh
Sum spec. gains solar + internal	4.8	4.6	5.4	5.4	5.7	5.8	5.9	5.8	5.3	5.2	4.7	4.7	63.5	kWh/m²
Utilisation factor	100%	100%	96%	67%	25%	100%	100%	100%	7%	58%	93%	100%	47%	
Annual heating demand	1083	710	215	1	0	0	0	0	0	0	104	762	2875	kWh
Spec. heating demand	2.8	1.9	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	2.0	7.6	kWh/m²



Annual heating demand: Comparison

Monthly method	(Heating)	2875 kWh/a	7.6 kWh/(m²a) reference to treated floor area according to PHPP
Annual method	(Annual heating)	3511 kWh/a	9.2 kWh/(m²a) reference to treated floor area according to PHPP
		- kWh/a	- kWh/(m²a)

Heating load

Passive House with PHPP Version 9.6a

HANAC Corona Senior Residence / Climate: New York / TFA: 381 m² / Heating: 7.6 kWh/(m²a) / Cooling: 13.9 kWh/(m²a) / PER: 59.7 kWh/(m²a)

Interior temperature: 20 °C
Building type: School portion of mixed use building
Treated floor area A_{TFA}: 380.7 m²

Design temperature		Radiation:	North	East	South	West	Horizontal	
Weather 1:	-9.9 °C		25	60	115	50	70	W/m²
Weather 2:	-4.4 °C		15	20	25	20	30	W/m²
Ground design temp.	16.5 °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	223.2	0.221	1.00	29.9	24.4	1476	1205
External wall - Ground	B		0.145	1.00	3.5	3.5		
Roof/Ceiling - Ambient	A	85.8	0.145	1.00	29.9	24.4	373	304
Floor slab / Basement ceiling	B	461.4	0.276	1.00	3.5	3.5	444	444
	A			1.00	29.9	24.4		
	A			1.00	29.9	24.4		
	X			0.85	29.9	24.4		
Windows	A	86.4	0.900	1.00	29.9	24.4	2324	1896
Exterior door	A	2.2	2.000	1.00	29.9	24.4	134	109
Exterior TB (length/m)	A	120.8	-0.039	1.00	29.9	24.4	-141	-115
Perimeter TB (length/m)	P	27.2	-0.203	1.00	3.5	3.5	-19	-19
Ground TB (length/m)	B			1.00	3.5	3.5		
Building element towards neighbour	I	379.4	3.526	1.00	3.0	3.0	4013	4013

Transmission heat load P_T

Total = 8605 or 7838

Ventilation system:	A _{TFA} m²	Clear room height m	m³
	380.7	2.75	1047
Heat recovery efficiency of the heat exchanger	η _{HR} 85%	Heat recovery efficiency SHX	0%
		Heat recovery efficiency SHX	0%
	n _{V,Res} (Heating Load) 1/h	n _{V,system} 1/h	Φ _{HR}
	0.108	0.389	0.85
Energetically effective air changes n _V			0.85

Ventilation heat load P_V

V _V m³	n _V 1/h	n _V 1/h	c _{Air} Wh/(m²K)	TempDiff 1 K	TempDiff 2 K	P _V 1 W	P _V 2 W
1047.0	0.167	0.167	0.33	29.9	24.4	1721	1405

Total heating load P_L

P_T + P_V = 10326 or 9243

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	64.0	0.4	0.31	34	16	236	115
East	0.0	0.0	0.40	60	20	0	0
South	22.4	0.4	0.27	93	24	208	53
West	0.0	0.0	0.40	50	20	0	0
Horizontal	0.0	0.0	0.40	70	30	0	0

Solar heating power P_S

Total = 444 or 168

Internal heating load P_I

Spec. power W/m²	A _{TFA} m²	P _I 1 W	P _I 2 W
4.7	381	1770	1770

Heating power (gains) P_G

P_T + P_I = 2215 or 1939

Heating load P_H

P_L - P_G = 8111 or 7304

Area specific space heating load P_H / A_{TFA}

= 8111 W

= 21.3 W/m²

Input max. supply air temperature	52 °C	Supply air temperature without heating	°C
Max. supply air temperature θ _{Supply,Max}	52 °C	θ _{Supply,Min}	15.5 °C

For comparison: heating load transportable by the supply Air P_{Supply Air,Max}

= 4908 W specific: 12.9 W/m²

Supply air heating: Sufficient? No

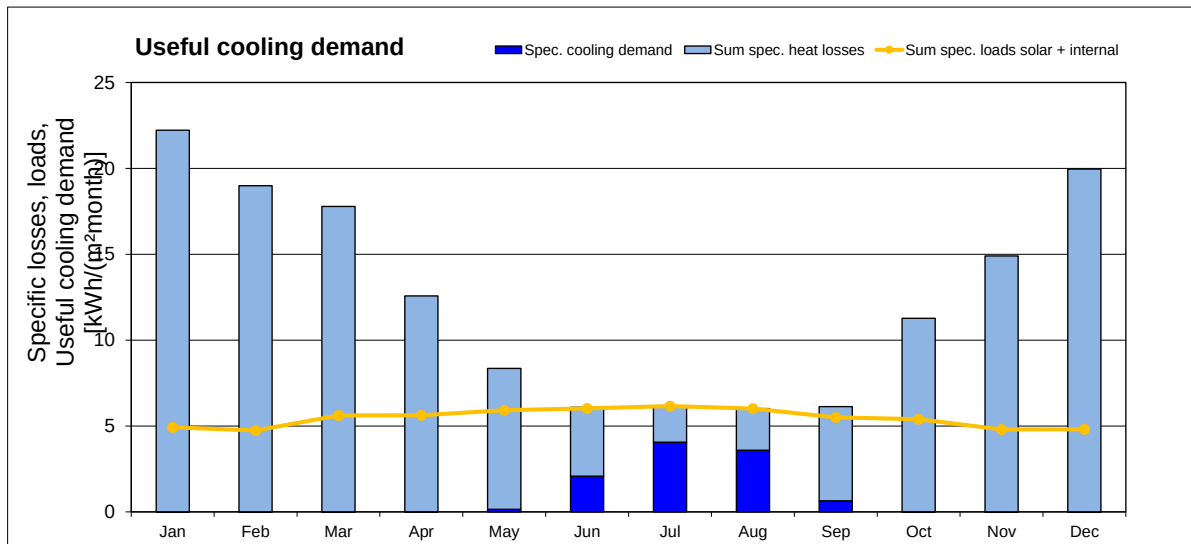
Cooling: energy value for useful cooling energy

Passive House with PHPP Version 9.6a

HANAC Corona Senior Residence / Climate: New York / TFA: 381 m² / Heating: 7.6 kWh/(m²a) / Cooling: 13.9 kWh/(m²a) / PER: 59.7 kWh/(m²a)

Interior Temperature: **25** °C
 Building type: **School portion of mixed use building**
 Treated Floor Area A_{TFA}: **381** m²

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	
Heating degree hours - Exterior	18.6	15.9	14.6	9.8	6.3	2.4	0.5	0.9	3.8	8.6	12.0	16.6	110	kKh
Heating degree hours - Ground	6.3	5.7	6.3	6.1	4.6	4.5	4.6	4.6	4.5	6.3	6.1	6.3	66	kKh
Losses - Exterior	7658	6505	5964	4008	2535	955	219	335	1520	3487	4898	6795	44879	kWh
Losses - Ground	803	726	804	778	591	571	589	589	570	801	776	803	8400	kWh
Losses summer ventilation	0	0	0	0	0	0	0	0	0	0	0	0	0	kWh
Sum spec. heat losses	22.2	19.0	17.8	12.6	8.2	4.0	2.1	2.4	5.5	11.3	14.9	20.0	139.9	kWh/m²
Solar load North	161	208	320	390	468	542	530	467	334	258	148	147	3970	kWh
Solar load East	0	0	0	0	0	0	0	0	0	0	0	0	0	kWh
Solar load South	214	232	294	271	252	259	275	287	282	282	225	188	3060	kWh
Solar load West	0	0	0	0	0	0	0	0	0	0	0	0	0	kWh
Solar load Horiz.	0	0	0	0	0	0	0	0	0	0	0	0	0	kWh
Solar load Opaque	40	47	66	69	73	81	82	78	66	58	41	35	737	kWh
Internal heat gains	1459	1318	1459	1412	1459	1412	1459	1459	1412	1459	1412	1459	17177	kWh
Sum spec. loads solar + internal	4.9	4.7	5.6	5.6	5.9	6.0	6.2	6.0	5.5	5.4	4.8	4.8	65.5	kWh/m²
Utilisation factor losses	22%	25%	32%	45%	70%	98%	99%	100%	88%	48%	32%	24%	39%	
Useful cooling energy demand	0	0	0	3	56	792	1544	1368	245	4	0	0	4012	kWh
Spec. cooling demand	0.0	0.0	0.0	0.0	0.1	2.1	4.1	3.6	0.6	0.0	0.0	0.0	10.5	kWh/m²
Specif. dehumidification demand	0.0	0.0	0.0	0.0	0.0	0.0	1.9	1.4	0.0	0.0	0.0	0.0	3.3	kWh/m²
Sensible fraction	100%	100%	100%	100%	100%	100%	68%	72%	100%	100%	100%	100%	76%	



Cooling: energy value for useful cooling energy

Passive House with PHPP Version 9.6a

HANAC Corona Senior Residence / Climate: New York / TFA: 381 m² / Heating: 7.6 kWh/(m²a) / Cooling: 13.9 kWh/(m²a) / PER: 59.7 kWh/(m²a)

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

Building type:	School portion of mixed use building		Treated floor area A _{TFA} :	380.7	m²
Interior temperature summer:	25	°C	Building volume:	1047	m³
Nominal humidity:	12	g/kg	Internal humidity sources:	1.7	g/(m³h)
Spec. capacity:	132	Wh/(m²K)			

Building assembly	Temperature zone	Area m²	U-Value W/(m²K)	Mon. red. fac.	G _i kWh/a	kWh/a	per m² treated floor area
External wall - Ambient	A	223.2	0.221	1.00	59	2907	7.63
External wall - Ground	B			1.00			
Roof/Ceiling - Ambient	A	85.8	0.145	1.00	59	734	1.93
Floor slab / Basement ceiling	B	461.4	0.276	1.00	48	6068	15.94
	A			1.00			
	A			1.00			
	X			0.85			
Windows	A	86.4	0.900	1.00	59	4575	12.02
Exterior door	A	2.2	2.000	1.00	59	264	0.69
Exterior TB (length/m)	A	120.8	-0.039	1.00	59	-277	-0.73
Perimeter TB (length/m)	P	27.2	-0.203	1.00	59	-325	-0.85
Ground TB (length/m)	B			1.00			0.00

Transmission losses Q_T (negative: heat loads)

Total 13947 kWh/(m²a) 36.6

Summer ventilation

from 'SummVent' worksheet

Ventilation conductance, vent. unit

exterior H _{V,e}	24.4	W/K
without HR	162.4	W/K
ground H _{V,g}	0.0	W/K
without HR	0.0	W/K

Ventilation conductance, others

exterior	118.6	W/K
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Ventilation parameter

Temperature amplitude summer	8.0	K
Minimum acceptable indoor temperature	22.0	°C
Heat capacity air	0.33	Wh/(m³K)
Supply air changes	0.47	1/h
Outdoor air changes	0.34	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	0.31	Wh/m³
η _{HR}	85%	
η _{ERV}	0%	
η*SHX	0%	

Summer ventilation regulation

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

Hygienic air change

Effective air change rate Ambient n _{V,e}	0.470
Effective air change rate Ground n _{V,g}	0.470

n _{V,system} 1/h	0.470	*(1 - 0%)	*(1 - 0.05)	+ 0.343	= 0.789
	0.470	* 0%	*(1 - 0.05)		= 0.000

Ventilation losses ambient Q_V

Ventilation losses ground Q_{V,g}

Heat losses summer ventilation

V _V m³	n _{V,equi} fraction 1/h	C _{Air} Wh/(m³K)	G _i kWh/a	kWh/a	kWh/(m²a)
1047	0.789	0.33	59	16043	42.1
1047	0.000	0.33	0	0	0.0
1047	0.000	0.33	0	0	0.0

Ventilation heat losses Q_V

Total 16043 kWh/a 42.1

Total heat losses Q_L

Q _T kWh/a	13947	+	Q _V kWh/a	16043	=	29989	kWh/(m²a)
							78.8

Orientation of the area	Reduction factor	g-Value (perp. radiation)	Area m²	Global radiation kWh/(m²a)	kWh/a	kWh/(m²a)
North	0.33	0.36	64.0	460	3455	
East	0.40	0.00	0.0	738	0	
South	0.33	0.37	22.4	889	2426	
West	0.40	0.00	0.0	745	0	
Horizontal	0.40	0.00	0.0	1287	0	
Sum opaque areas					615	

Available solar heat gains Q_S

Total 6495 kWh/(m²a) 17.1

kh/d	Length heat. period d/a	Spec. power q _i W/m²	A _{TFA} m²	kWh/a	kWh/(m²a)
0.024	275	5.2	380.7	12941	34.0

Internal heat gains Q _I					
Sum heat loads Q _F	Q _S + Q _I	=	19436	kWh/a	51.0 kWh/(m²a)

Ratio of losses to free heat gains	Q _L / Q _F	=	1.54	
Utilisation factor heat losses η _G		=	51%	
Useful heat losses Q _{V,n}	η _G * Q _L	=	15425	kWh/a
Useful cooling demand Q _K	Q _F - Q _{V,n}	=	4012	kWh/a
Recommended maximum value			15	kWh/(m²a)
Requirement met?			Yes	(Yes/No)

Passive House with PHPP Version 9.6a

HANAC Corona Senior Residence / Climate: New York / TFA: 381 m² / Heating: 7.6 kWh/(m²a) / Cooling: 13.9 kWh/(m²a) / PER: 59.7 kWh/(m²a)

Building type:	School portion of mixed use building	Treated floor area A _{TFA} :	380.7	m²
Interior temperature summer:	25.0 °C	Mechanical cooling:	x	
Nominal humidity:	12.0 g/kg	Air change rate via ventilation system with supply air:	0.5	
Internal humidity sources:	1.7 g/(m²h)			

☐ Supply air cooling check as appropriate		
On/Off mode (check as appropriate)		
Max. cooling capacity (sensible + latent)		kW
Temperature reduction dry	0.0	K
Seasonal energy efficiency ratio		

X	Recirculation cooling	
	check as appropriate	
	On/Off mode (check as appropriate)	
	Max. cooling capacity (sensible + latent)	13.0 kW
	Volume flow rate at nominal power	1890.0 m³/h
	Temperature reduction dry	20.2 K
	Variable air volume (check if appropriate)	x
	Seasonal energy efficiency ratio	3.7

☐	Additional dehumidification	
check as appropriate		
	Waste heat to room (check if appropriate)	x
	Seasonal energy efficiency ratio	1.0

☐ **Panel cooling**
check as appropriate

Seasonal energy efficiency ratio

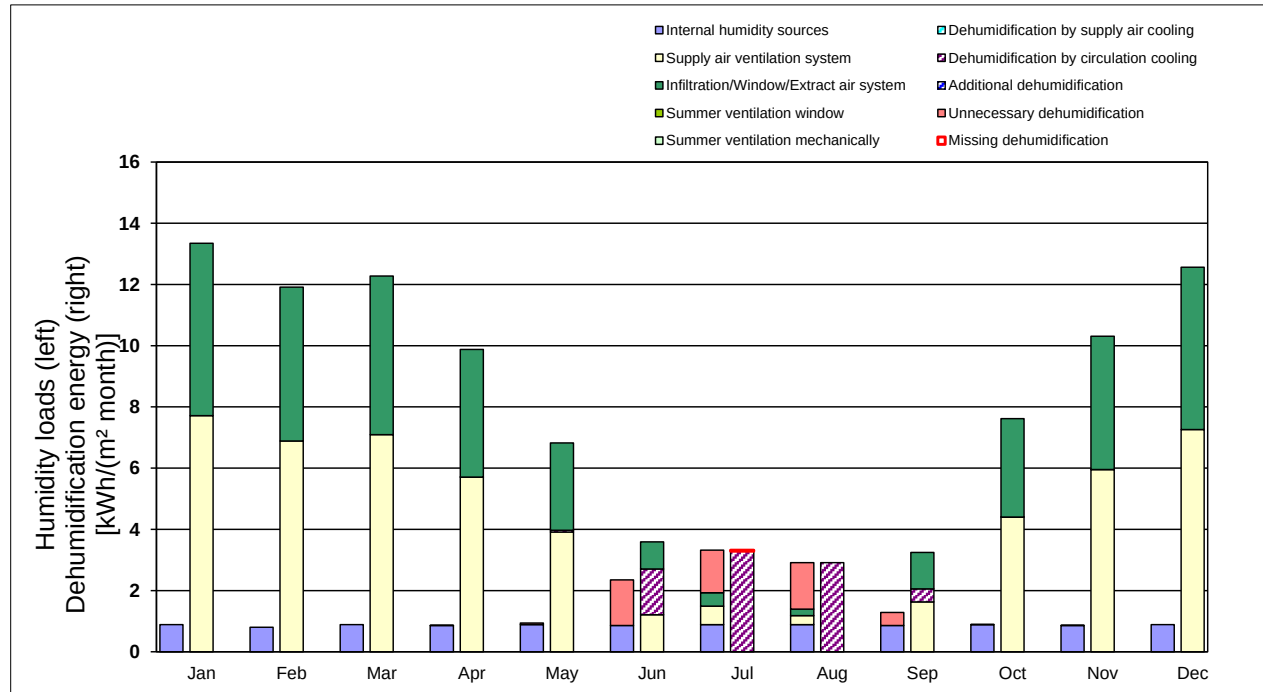
	Sensible kWh/(m ² a)	Latent kWh/(m ² a)	COP	Electricity demand (kWh/a) kWh/(m ² a)	sensible fraction
Useful cooling total	10.5	3.3			76%
Cooling contribution by:					
Supply air cooling	()	()	/ 0.0	=	
Recirculation cooling	(10.5	+ 8.2	) / 3.7	= 5.1	56%
Dehumidification			/	=	0%
Remaining for panel cooling			/ 0.0	=	100%
Cooling distribution			/ 3.7	=	100%
Total	(10.5	+ 8.2	) / 3.7	= 5.1	56%
Unsatisfied demand	0.0	0.0		Cooling demand covered?	Yes

Compressor - cooling units

HANAC Corona Senior Residence / Climate: New York / TFA: 381 m² / Heating: 7.6 kWh/(m²a) / Cooling: 13.9 kWh/(m²a) / PER: 59.7 kWh/(m²a)

Humidity loads and humidity removal

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year	
Internal humidity sources	0.9	0.8	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	10	kWh/m²
Infiltration/Window/Extract air system	-5.6	-5.0	-5.2	-4.2	-2.9	-0.9	0.4	0.2	-1.2	-3.2	-4.4	-5.3	-37	kWh/m²
Supply air ventilation system	-7.7	-6.9	-7.1	-5.7	-3.9	-1.2	0.6	0.3	-1.6	-4.4	-6.0	-7.3	-51	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	1.9	1.4	0.0	0.0	0.0	0.0	3	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	0.1	1.5	3.3	2.9	0.4	0.0	0.0	0.0	8	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	0.1	1.5	3.3	2.9	0.4	0.0	0.0	0.0	8	
Unnecessary dehumidification	0.0	0.0	0.0	0.0	0.1	1.5	1.4	1.5	0.4	0.0	0.0	0.0	5	kWh/m²
Missing 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



Cooling load

Passive House with PHPP Version 9.6a

HANAC Corona Senior Residence / Climate: New York / TFA: 381 m² / Heating: 7.6 kWh/(m²a) / Cooling: 13.9 kWh/(m²a) / PER: 59.7 kWh/(m²a)

Building type: **School portion of mixed use building**

Treated floor area A_{TFA} : **380.7** m²
Building volume: **1047** m³
Interior temperature: **25** °C

Spec. capacity: **132** W/(m²K)
Nominal humidity: **12.0** g/kg
Internal humidity sources: **1.7** g/(m²h)

Temperature:
Weather 1: **30.3** °C
Weather 2: **27.4** °C
Ground design temp. **18.8** °C
Dew point: **22.4** °C
Sky: **21.3** °C
SHX: **13.7** °C

Radiation: North East South West Horizontal
85 215 200 205 325 W/m²
55 175 220 175 290 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	223.2	0.221	1.00	5.3	2.4	262	119
External wall - Ground	B			1.00	-6.2	-6.2		
Roof/Ceiling - Ambient	A	85.8	0.145	1.00	5.3	2.4	66	30
Floor slab / Basement ceiling	B	461.4	0.276	1.00	-6.2	-6.2	-791	-791
	A			1.00	5.3	2.4		
	A			1.00	5.3	2.4		
	X			0.85	5.3	2.4		
Windows	A	86.4	0.900	1.00	5.3	2.4	412	187
Exterior door	A	2.2	2.000	1.00	5.3	2.4	24	11
Exterior TB (length/m)	A	120.8	-0.039	1.00	5.3	2.4	-25	-11
Perimeter TB (length/m)	P	27.2	-0.203	1.00	-6.2	-6.2	34	34
Ground TB (length/m)	B			1.00	-6.2	-6.2		
Building element towards neighbour	I	379.4	3.526	1.00	3.0	3.0	4013	4013
Radiation correction outdoor air			L _{ambient} W/K	-3.6	5.3	2.4	-19	-9
Radiation correction sky			L _{sky} W/K	3.4	-3.7	-5.0	-13	-17

Transmission heat load P_T Total = **3963** or **3565**

V _V	n _{V,equl} fraction 1/h	n _{V,equl} fraction 1/h	C _{air} Wh/(m³K)	TempDiff 1 K	TempDiff 2 K	P _V 1 W	P _V 2 W
Exterior P _{V,o}	1047	0.414	0.33	5.3	2.4	758	343
Ground P _{V,e}	1047	0.000	0.33	-11.3	-11.3	0	0
Summer ventilation P _{V,S}	1047	0.000	0.33	0.0	0.0	0	0

Ventilation heat load P_V Total = **758** or **343**

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	64.0	0.4	0.33	135	95	1015	710
East	0.0	0.0	0.40	215	175	0	0
South	22.4	0.4	0.33	213	215	580	587
West	0.0	0.0	0.40	205	175	0	0
Horizontal	0.0	0.0	0.40	325	290	0	0
Sum opaque areas						157	141

Solar load P_S Total = **1752** or **1438**

Spec. power W/m²	A _{TFA} m²	P _I 1 W	P _I 2 W
5.2	381	1961	1961

P_T + P_V + P_S + P_I = **8434** or **7307**

Cooling load P_C = **8434** W

Area specific cooling load P_C / A_{TFA} = **22.2** W/m²

Please enter the minimum supply air temperature. **25.8** °C Supply air temperature without cooling **25.4** °C

For comparison: cooling load, transportable through the supply air P_{Supply:Max} = **4189** W

specific: **11.0** W/m² **10.8** W/m²

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

Daily internal temperature stroke
(**3963.2** + **757.9** + **1752.0**) * **24** / (**132** * **381**) = **3.1** K

Dehumidific. load

Absolute humidity exterior air **17.1** g/kg or **14.7** g/kg
Outdoor air mass flow **424** kg/h or **424** kg/h
Summer vent. air mass flow **0** kg/h or **0** kg/h
Humidity load, outdoor air **2160** g/h or **1144** g/h
Absolute humid. supply air **17.1** g/kg or **14.7** g/kg
Supply air mass flow **581** kg/h or **581** kg/h
Humid. load, supply air **2958** g/h or **1566** g/h
Humidity load, internal **640** g/h or **640** g/h

Enthalpy of vaporisation **707.639** Wh/kg / **1000** g/kg * **5758** g/h or **3350** g/h = **4075** W or **2371** W

Dehumidification load P_T = **4075** W

Area specific dehumidification load P_T / A_{TFA} = **10.7** W/m²

Monthly average values	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Specific cooling demand	0.0	0.0	0.0	0.0	0.1	2.1	4.1	3.6	0.6	0.0	0.0	0.0
Specific dehumidification demand	0.0	0.0	0.0	0.0	0.0	0.0	1.9	1.4	0.0	0.0	0.0	0.0
Sensible fraction	100%	100%	100%	100%	100%	100%	68%	72%	100%	100%	100%	100%

Minimum of sensible cooling load fraction occurred **68%**

Space heat distribution

Outside thermal envelope				
1	2	3	4	5
1-None	1-None	1-None	1-None	1-None

28.0	28.0	28.0	28.0	28.0

Total values	
Absolute	Specific

kWh/a kWh/(m².a)

0	0.0
---	-----

0	0.0
---	-----

0	0.0
---	-----

100%	
------	--

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	1.2
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	13.7
DHW demand for washing machines and dishwashers non-ele	kWh/a	0
Effective useful heat DHW	Q_{DHW} kWh/a	1505

kWh/a

1505

kWh/(m²a)

4.0

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

Days of use per year [d/a]

180

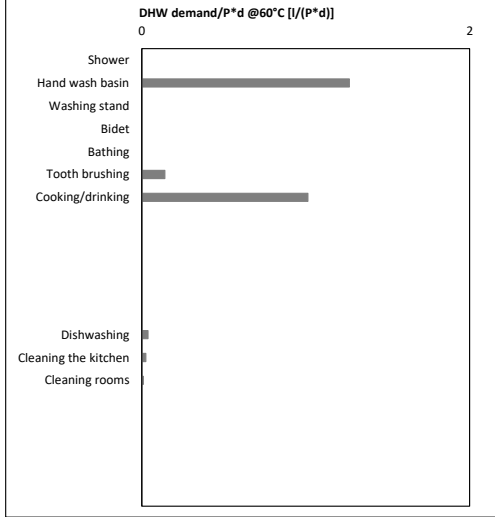
DHW demand for showering:	$l/(P \cdot d)$ at 60 °C
DHW demand for other uses:	

0.0

1.2

Application	Used?	Single-lever mixer?	Time of use per use	Amount of uses according to type of use	Flow rate	Useful temperature	Equivalent average amount of water @ 60°C	Equivalent average amount of water @ 60°C	Useful heat @ 60°C
	-	-	min	-	l/min	°C	$l/(WE \cdot d)$	$l/(P \cdot d)$	kWh/a
Shower		x	5.0	0.7	8.0	38	0	0	
Hand wash basin	x	x	0.3	3.0	4.0	30	81	1	786
Washing stand		x	1.0	0.4	8.0	38			
Bidet		x	1.0	0.1	8.0	38			
Bathing		x	10.0	0.0	15.0	38			
Tooth brushing	x	x	0.1	2.0	4.0	30	9	0	87
Cooking/drinking	x	x	0.3	1.0	6.0	45	65	1	629
		N/A							
		N/A							
		N/A							
		N/A							
		N/A							
Dishwashing	x	x	0.6	1.0	6.0	45	2	0	24
Cleaning the kitchen	x	x	0.5	1.0	6.0	38	2	0	15
Cleaning rooms	x	x	1.0	0.2	6.0	38	1	0	6
		N/A							
		N/A							
		N/A							
		N/A							
		N/A							

DHW demand according to use



Auxiliary calculation - shower drain-water heat recovery

DHW distribution

Temp. of room through which the pipes pass
Design forward flow temperature

ϑ_x
 ϑ_{dist}

°C
°C

Inside thermal envelope				
1	2	3	4	5
20.0	20.0	20.0	20.0	20.0
60.0	60.0	60.0	60.0	60.0

DHW circulation pipes

Length of circulation pipes (forward + return flow)
Nominal width of pipe
Insulation thickness
Insulative reflective coating?
Thermal conductivity of insulation
Heat loss coefficient per m of insulated pipe
Insulation quality of mountings, pipe suspensions, etc.
Thermal bridge supplement
Total heating loss coefficient per m of pipe

Daily circulation period of operation.
Design return flow temperature
Circulation period of operation per year
Annual heat released per m of pipe
Annual heat loss from circulation lines

L_{HS}

m

mm

mm

-

W/(mK)

W/(mK)

-

W/K

W/(mK)

Ψ

td_{Circ}

h/d

ϑ_R

°C

t_{Circ}

h/a

q^*_Z

kWh/m/a

QZ

kWh/a

15.7				
19				
19				
x				
0.040				
0.184				
3 - Good	1-None	1-None	1-None	1-None
0.219				
0.198				
18.0				
55				
6570				
49				
765				

DHW individual pipes

Exterior pipe diameter
Accumulated length per single pipes
Amount of tapping points in building
Average pipe length per tapping point
Tap openings per person per day
Utilisation days per year
Heat loss per tap opening
Amount of tap openings per year and person
Annual heat loss of individual pipes

d_{U_Pipe}

m

L_U

m

$n_{tapping\ point}$

-

$L_{U, average}$

m

-

d

$q_{individual}$

h/tap opening

n_{Tap}

ings per year

Q_U

kWh/a

0.019				
20.00				
10.00				
2.0				
4				
180				
0.0206				
720				
948				

Outside thermal envelope

1	2	3	4	5
20.0	20.0	20.0	20.0	20.0
60.0	60.0	60.0	60.0	60.0

1-None	1-None	1-None	1-None	1-None

Total values

Absolute	Specific
----------	----------

kWh/a

765

kWh/(m²a)

2.0

kWh/a

948

kWh/(m²a)

2.5

kWh/a

1714

kWh/(m²a)

4.5

214%

Total heat losses of DHW distribution

Q_{WL}

Performance ratio of DHW distribution pipes

ea_{+HL}

-

Storage heat losses

		Storage 1	Storage 2	Buffer storage tank (only heating)	Compact unit		
Selection of storage tank		2-DHW only	0-No storage tank	0-No storage tank	0-No		
Storage necessary for HP		x		(x)			
Solar DHW connection							
Heat loss rate	W/K	1.3	1.3				
Storage volume	litre	189	189		---		
Standby fraction	-						
Location of storage tank, inside or outside of thermal envelope		1-Inside	1-Inside	2-Outside			
Temperature of mechanical room	°C	20.0					
Typical storage tank temperature	°C	60.0					
Manual entry of storage temperature	°C						
Average standby heat losses storage tank	W	52					
Additional heat losses storage tank, solar operation	W			---	---		
Possibly utilisation factor of heat losses		---	---				
Annual heat losses DHW storage tank	kWh/a	456		---		kWh/a	kWh/(m²a)
Annual heat losses buffer storage tank		---	---		---	456	1.2

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

Total energy demand of domestic hot water

Heat losses of DHW distribution and storage	Q_{WL}	kWh/a	kWh/(m²a)
		2169	5.7
Performance ratio DHW-distribution + storage	$e_{a,WL}$	244%	
Total heating demand of DHW system		kWh/a	kWh/(m²a)
Including storage tank	Q_{gDHW}	3674	9.6

Cooling distribution

Length of distribution pipes
Nominal width of pipe
Insulation thickness
Insulation reflective coating?
Thermal conductivity of insulation
Heat loss coefficient per m pipe

Temp. of room through which the pipes pass
Design forward flow temperature
Dimensioning of cooling load of the system
Forward flow temperature control ('x' if appropriate)
Design return flow temperature
Annual heat absorption per m of pipe
Possibly utilisation factor of this heat absorption
Annual heat losses of cooling distribution

Performance ratio cold water distribution pipes

L_H m
mm
mm
-
 $W/(mK)$
 $W/(mK)$

 ϑ_x °C
 ϑ_v °C
 $P_{cooling}$ kW

 ϑ_R °C
 q^*_{HL} kWh/(m·a)
 η_G -
 Q_{HL} kWh/a

 ea_{+HL} -

Inside thermal envelope				
1	2	3	4	5
25.0	25.0	25.0	25.0	25.0
6.0	6.0	6.0	6.0	6.0

Outside thermal envelope				
1	2	3	4	5
25.0	25.0	25.0	25.0	25.0
6.0	6.0	6.0	6.0	6.0

Total values	
Absolute	Specific

kWh/a	kWh/(m²a)
0	0.0
100%	

Use non-residential buildings

Passive House with PHPP Version 9.6a

HANAC Corona Senior Residence / Climate: New York / TFA: 381 m² / Heating: 7.6 kWh/(m²a) / Cooling: 13.9 kWh/(m²a) / PER: 59.7 kWh/(m²a)

Latitude [°]:

41

	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 absence	Part use factor of building operating period for lighting	Average occupancy [m/Pers.]
1	Pre-K Classroom			8	18	10	180	1800	1721	79	12	12		300	0.8	0.8	0.25	0.9	2.0
2	Kitchen			10	16	6	180	1080	1080	0	8	8		500	0.8	0.8	0.00	1.0	5.0
3	Single office			8	18	10	180	1800	1721	79	12	12		500	0.8	0.8	0.30	0.7	10.0
4	Group office			8	18	10	180	1800	1721	79	12	12		500	0.8	0.8	0.30	0.7	10.0
5	WC, Sanitary			8	18	10	180	1800	1721	79	12	12		200	0.8	0.8	0.90	1.0	4.0
6	Lobby/Activity			8	18	10	180	1800	1721	79	12	12		300	0.8	0.8	0.50	1.0	10.0
7	Corridor			8	18	10	180	1800	1721	79	12	12		100	0.0	0.0	0.80	1.0	10.0
8	Storage, Services			8	18	10	180	1800	1721	79	12	12		100	0.8	0.8	0.98	1.0	4.0
9	Kitchen, Storage, Preparation			10	16	6	180	1080	1080	0	8	8		300	0.8	0.8	0.50	1.0	4.0
10				8	18	10	180	1800	1721	79	12	12				0.8			
11				8	18	10	180	1800	1721	79	12	12				0.8			
12				8	18	10	180	1800	1721	79	12	12				0.8			
13				8	18	10	180	1800	1721	79	12	12				0.8			
14				8	18	10	180	1800	1721	79	12	12				0.8			
15				8	18	10	180	1800	1721	79	12	12				0.8			
16				8	18	10	180	1800	1721	79	12	12				0.8			
17				8	18	10	180	1800	1721	79	12	12				0.8			
18				8	18	10	180	1800	1721	79	12	12				0.8			
19				8	18	10	180	1800	1721	79	12	12				0.8			
20				8	18	10	180	1800	1721	79	12	12				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	

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]
PC 1	21-Single office	1	0	*	80	1925	0.3		0	0.0
PC in energy saving mode		1		*	2.0	1925	0.3		0	0.0
Monitor 1	21-Single office	0	0	*	28	1925	0.3		0	0.0
Monitor in energy saving mode		0		*	2.0	1925	0.3		0	0.0
PC 2	22-Group office	1	0	*	80	1925	0.3		0	0.0
PC in energy saving mode		1		*	2.0	1925	0.3		0	0.0
Monitor 2	22-Group office	1	0	*	28	1925	0.3		0	0.0
Monitor in energy saving mode		1		*	2.0	1925	0.3		0	0.0
Copier	22-Group office	1	0	*	400	2750		1800	0	0.0
Copier in energy saving mode		1		*	30	1800			0	0.0
Printer	22-Group office	1	0	*	300	2750		1800	0	0.0
Printer in energy saving mode		1		*	2	1800			0	0.0
Server	39-Storage, Services	1	0	*	300	2750			0	0.0
Server in energy saving mode		1		*	10.0	8760		2750	0	0.0
Telephone system		1	0	*	94	8760			0	0.0
plug loads per SCA		1	1	*	2737	2750			7526	7526.0
				*					0	0.0
				*					0	0.0
				*					0	0.0
				*					0	0.0
				*					0	0.0

Kitchen / Aux. electricity	Room category (predominant utilisation pattern of building)	Within the thermal envelope [1/0]	Existing [1/0]	Days of utilisation per year [d/a]	Number of meals per day of use	Norm consumption	Useful energy [kWh/a]	Non-electric fraction	Electric fraction	Additional demand	Marginal performance ratio	Solar fraction	Non-electric demand (kWh/a)	Electricity demand [kWh/a]
Cooking:	2-Kitchen	1	0	*	180	60	0.25		0					0.0
1-Electricity													0	
Dishwashing		1	0	*	180	60	0.10		0					0.0
2-Cold water connection														
Refrigerating		1	0		365		2.87		0					0.0
microwave		1	0		180		0.60		0					0.0
cabinet heaters (food)		1	0		180		1.50		0					0.0
milk coolers		1	0		180		1.50		0					0.0
<above incl in plug loads per SCA>									0					0.0
SSDS Fan		1	1		365		7.69		2806					2806.0
SSDS Alarm Standby		1	1		365		0.24		88					88.0
									0					0.0
									0					0.0
Total auxiliary electricity									2310					2310.3
Total							14084						0.0	14084
Specific demand													0.0	37

Aux Electricity

HANAC Corona Senior Residence / Climate: New York / TFA: 381 m² / Heating: 7.6 kWh/(m²a) / Cooling: 13.9 kWh/(m²a) / PER: 59.7 kWh/(m²a)

Treated floor area	381	m²			Heat recovery efficiency ventilation unit		0.85				Annual space heating demand		8	kWh/(m²a)
Heating period	175	d			Operation vent. system Winter		4.20	kh/a			Boiler rated power		15	kW
Air volume	1047	m³			Operation vent. system Summer		4.56	kh/a			DHW system heating demand		3674	kWh/a
Dwelling units	1	HH			Air change rate		0.39	h⁻¹			Design forward flow temperature		28	°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		0.45 Wh/m³	* 0.39 h⁻¹	* 4.2 kh/a	* 1047 m³	= 770	considered in heat recovery efficiency				
Defroster HX	0	1	Data entries in 'Ventilation' worksheet or in 'Addl vent'				0	* 0.2	/ 4.20	= 0		
Summer ventilation	1	0.55	0.35 Wh/m³	* 0.77 h⁻¹	* 4.6 kh/a	* 1047 m³	= 1297	* 1.0	/ 4.56	=	156	
											Internal heat sources + Additional summer ventilation	
Additional vent. summer	0	0.55	0.31 Wh/m³	* 0.00 h⁻¹	* 4.6 kh/a	* 1047 m³	= 0	* 1.0	/ 4.56	=	0.0	
Heating system												
Controlled / non controlled [1/0]												
Enter the rated power of the pump				W								
Circulator pump heating			154	W	* 1.0	* 4.2 kh/a	* 1	= 0	* 1.0	/ 4.20	= 0	
Boiler electricity consumption at 30% load				W								
Aux. energy - Heat. boiler	0	0	55	W	* 1.00	* 0.00 kh/a	* 1	= 0	* 1.0	/ 4.20	= 0	
Aux. energy - Wood fired/Pellet boiler	0	0	Data entries in 'Boiler' worksheet. Aux. energy demand including possible drinking water production.				0	* 1.0	/ 4.20	= 0		
DHW system												
Enter average power consumption of pump			39	W								
Circulation pump DHW	1	2	39	W	* 1.00	* 5.8 kh/a	* 1	= 226	* 1.0	/ 8.76	= 52	
Enter the rated power of the pump				W								
Storage load pump DHW	1	1	73	W	* 1.00	* 0.2 kh/a	* 1	= 18	* 1.0	/ 8.76	= 2	
Boiler electricity consumption at 100% load				W								
DHW boiler aux. energy	0	0	165	W	* 1.00	* 0.0 kh/a	* 1	= 0	* 1.0	/ 8.76	= 0	
Enter the rated power of the solar DHW pump				W								
Solar aux. electricity	0		55	W	* 1.00	* 1.8 kh/a	* 1	= 0	* 1.0	/ 8.76	= 0	
Aux. electricity cooling and dehumidification												
Aux. electricity cooling				kWh/a	* 1.00	* 1.0	* 1	= 0	* 1.0	/ 4.56	= 0	
Aux. electricity dehum.				kWh/a	* 1.00	* 1.0	* 1	= 0	* 1.0	/ 4.56	= 0	
Misc. aux. electricity												
Misc. aux. electricity	0	1	1879	kWh/a	* 1.00	* 1.0	* 1	= 0	* 1.0	/ 8.76	= 0	
Total							2310			54	210	
Specific demand							kWh/(m²a) (treated floor area)		6.1			

Internal heat gains for non-residential buildings

Passive House with PHPP Version 9.6a

HANAC Corona Senior Residence / Climate: New York / TFA: 381 m² / Heating: 7.6 kWh/(m²a) / Cooling: 13.9 kWh/(m²a) / PER: 59.7 kWh/(m²a)

Utilisation: 21-School

IHG 5.15 W/m²

Calculation results from this worksheet: 5.19 W/m²

Type of values used: 4-PHPP calculation ('IHG non-res' worksheet)

Enter here results from cell above: 5.15 W/m²

Persons:		64.0		P		Treated floor area:		380.74		m²		Heating period:		175		d/a		Room temperature:		20		°C		Internal heat gains aux. electricity:		54		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]					
Persons A	1-Pre-K Classroom	1	<= 10 yr., sitting	1	Planning with occupancy	{ 60 }	*	{ }	*	27	*	0.5	*	60	*	1800	*	0.75	/	8760	=	555							
Persons B	1-Pre-K Classroom	3	>10 yr., standing or light work	1	Planning with occupancy	{ 4 }	*	{ }	*	0.5	*	100	*	1800	*	0.75	/	8760	=	62									
Persons C	21-Single office	2	> 10 yr., sitting	0	Planning by way of ground area	{ }	*	{ 36 }	*	0.1	*	80	*	2750	*	0.70	/	8760	=	63									
Persons D	38-Circulation area	3	>10 yr., standing or light work	1	Planning with occupancy	{ 3 }	*	{ }	*	Not a standard value	*	100	*	2750	*	0.20	/	8760	=	19									
Persons E			Invalid input			{ }	*	{ }	*	Not a standard value	*	0	*	0	*	1.00	/	8760	=	0									
Persons F			Invalid input			{ }	*	{ }	*	Not a standard value	*	0	*	0	*	1.00	/	8760	=	0									
Persons G			Invalid input			{ }	*	{ }	*	Not a standard value	*	0	*	0	*	1.00	/	8760	=	0									
Evaporation (person specific)						{ }	*	{ }	*		*		*		*		/	8760	=										
Lighting / Equipment / Aux. electricity							*		*		*		*		*		/	8760	=										
Lighting							*		*		*		*		*		/	8760	=										
Office applications (within therm. envelope)							*		*		*		*		*		/	8760	=										
Cooking (within therm. envelope)							*		*		*		*		*		/	8760	=										
Dishwashing (within therm. envelope)							*		*		*		*		*		/	8760	=										
Cooling (within therm. envelope)							*		*		*		*		*		/	8760	=										
Other (within thermal envelope)							*		*		*		*		*		/	8760	=										
Auxiliary appliances (see 'Aux Electricity' worksheet)							*		*		*		*		*		/	8760	=										
Heat loss due to cold water (calculation from column AJ)	On/Off [1 / 0]						*		*		*		*		*		/	8760	=										
Cold water due to flushing WC	1	2	Kitchen	4		4		-6.3		180	*	-15	+	-12	*	1	/	365	=	-13									
Total IHG																				W	1978								
Specific IHG																				W/m²	5.2								
Heat available from internal sources																				kWh/(m²a)	22								

Heat pump

Passive House with PHPP Version 9.6a

HANAC Corona Senior Residence / Climate: New York / TFA: 381 m² / Heating: 7.6 kWh/(m²a) / Cooling: 13.9 kWh/(m²a) / PER: 59.7 kWh/(m²a)

		Building type:	School portion of mixed use building
Treated floor area A _{TFA} :		381	m²
Covered fraction of space heating demand	(PER' worksheet)	100%	
Space heating demand + distribution losses	Q _H +Q _{HL} : (DHW+Distribution)	2875	kWh/a
Solar fraction for space heat	η _{Solar, H} (SolarDHW worksheet)	0%	
Effective annual heating demand	Q _{H,WI} =Q _H *(1-η _{Solar, H})	2875	kWh/a
Covered fraction of DHW demand	(PER' worksheet)	100%	
Total heating demand of DHW system	Q _{gDHW} (DHW+Distribution)	3674	kWh/a
Solar fraction for DHW	η _{Solar, DHW} (SolarDHW worksheet)	0%	
Effective DHW demand	Q _{DHW,WI} =Q _{DHW} *(1-η _{Solar, DHW})	3674	kWh/a
Number of heat pumps in the system		2	
Functionality		Heating & DHW	
Heating			
Selection of HP:	1-VRF	Heat source:	1-Outdoor air
Selection of distribution system			2-Radiators
Design distribution temperature	θ _{design} (DHW+Distribution)		28.00 °C
Nominal power of distribution system	P _{nom}		8.11 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 _{sink}		28.00 °C
Entries in relation to the domestic hot water system			
Selection of HP:	2-Room Type Heat Pump	Heat source:	1-Outdoor air
DHW temperature	(DHW+Distribution)		60.00 °C
Orientation of DHW storage tank ('storage 1' in 'DHW+Distribution' worksheet)			1-Inside
Specific heat losses storage	U * A _{Storage}		1.3 W/K
Room temperature (storage location: outside of thermal envelope)	(DHW+Distribution)		20.00 °C
Type of backup heater			1-Elec. Immersion heater
Δθ of electric continuous flow water heater			K
Additional options in case of one 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)		2-Heating priority
Control strategy			
Heat pump control strategy			1-On/Off
Heating			
Depth ground water / Ground collector / Ground probe	z		m
Power of pump for ground heat exchanger	P _{pump}		kW

Heating

Heat pump:

Source:

	θ_{source} °C	θ_{sink} °C	Heating capacity kW	COP
Test point 1	-1.2	25.5	60.4	2.9
Test point 2	-14.5	23.6	39.3	2.1
Test point 3	-24.5	23.8	42.5	2.2
Test point 4	3.6	24.1	30.2	4.2
Test point 5	-11.4	22.7	19.6	2.4
Test point 6	-21.1	22.9	21.2	1.8
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 $\Delta\theta_{\text{Sink}}$ K

DHW

Heat pump:

Source:

	θ_{source} °C	θ_{sink} °C	Heating capacity kW	COP
Test point 1	20.0	60.0	3.9	3.2
Test point 2	20.0	60.0	3.9	3.2
Test point 3	20.0	60.0	3.9	3.2
Test point 4				
Test point 5				
Test point 6				
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 $\Delta\theta_{\text{Sink}}$ K

Electr. energy consumption pump (grnd. water / ground)
 Energy by direct electricity
 Space heat supplied by HP
 Winter DHW supplied by HP
 Summer DHW supplied by HP
 Space heating supplied by HP without storage losses
 Winter DHW supplied by HP without storage losses
 Summer DHW supplied by HP without storage losses
 Electrical consumption of HP

$Q_{\text{El,Pump}}$
 $Q_{\text{El,dir}}$
 $Q_{\text{HP,Heating}}$
 $Q_{\text{HP,DHW,Winter}}$
 $Q_{\text{HP,DHW,Summer}}$
 $Q_{\text{HP,Heating}}$
 $Q_{\text{HP,DHW,Winter}}$
 $Q_{\text{HP,DHW,Summer}}$
 $Q_{\text{El,HP}}$

0	kWh/a
0	kWh/a
2838	kWh/a
297	kWh/a
3377	kWh/a
2838	kWh/a
260	kWh/a
2958	kWh/a
2247	kWh/a

Seasonal performance factor of heat pump
 Final electrical energy demand heat generation
 Annual primary energy demand
 Annual CO₂-equivalent emissions

$\text{SPF}_{\text{H-1}}$
 Q_{final}

1. HP: Heating or heating & DHW

2.94
kWh/a
2247
5842
kg/a
1195

2. HP: Domestic hot

2.86
kWh/(m²a)
5.9
15.3
kg/(m²a)
3.1

Certification Documentation

