

Project:	Example 1 Office building	Date:	2013-12-30
Description:	Zone calculation administration		
Performed by:	User name	Sign:	Signature
Project file:	C:\Projekt\VIPENERGY.NET\Beräkningsexempel\Example 1 Office building\Example 1 Office building Adm zone calculation.VIP	Company:	<b>Company name</b>

## COMMENTARIES

At the start of VIP-Energy text strings about Signature, User and Comment is loaded from the file Title\_Eng.vpd. Text strings can be updated under Catalog Data -> Update Catalogs. The check box "User Data" should be checked.

Projekt name and Description is loaded från the input file (VIP-file) and is updated when the file is saved.

## Input file zone

Zone	Input file zone
Office west	C:\Projekt\VIPENERGY.NET\Beräkningsexempel\Example 1 Office building\Example 1 Office building Office zone west.VIP
Basement	C:\Projekt\VIPENERGY.NET\Beräkningsexempel\Example 1 Office building\Example 1 Office building basement zone.VIP
Office east	C:\Projekt\VIPENERGY.NET\Beräkningsexempel\Example 1 Office building\Example 1 Office building office zone east.VIP

## Zones

Zone A	Build part name	Area	Zone B	Zone A	Build part name	Area	Zone B
		m <sup>2</sup>				m <sup>2</sup>	
Office west	Basement flooring	432.0	Office west	Office east	Light inner	130.0	Office west
Office east	Basement flooring	432.0	Basement				

## Office west

Project: Example 1 Office building    Description: Office zone west

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## INDATA

### Generic

Calculation period - Day	1 - 365
Solar reflection from ground	20.00 %
Wind velocity % of climate data	S:60 SW:60 W:60 NW:60 N:60 NE:60 EO:60 SE:60 °
Air pressure	1013 hPa
Horizontal angle to ground	S:20 SW:20 W:20 NW:20 N:20 NE:20 EO:20 SE:20 ° °
Form factor for wind pressure	0:0.70 45:0.50 90:-0.60 135:-0.50 180:-0.50 ROOF:-0.00
'South facade' angle to south	0 °
Activity	Residential
Ventilation volume	0.0 [m³]
Heated floor area	2736.0 [m²]
Ground properties Heat conductance: Clay, drained sand and gravel.	1.4 [W/m²K]

### Climate data

STOCKHOLM 1996-2005	Latitude	59.4	degrees	
	Highest value	Average value	Lowest value	
Outside temperature	30.2	7.5	-18.2	°C
Wind velocity	13.5	3.3	0.0	m/s
Solar radiation	905.0	111.8	0.0	W/m²

# Example 1 Office building Adm zone calculation

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## Climate data

Relative humidity 100.0 74.3 0.0 %

## Building part types 1-dimensional - Catalog

Build part name	Material From outside to inside	Layer thickness m	Heat conduct. W/m,K	Density kg/m³	Heat capacity J/kgK	U-value W/m²K	Delta U-value W/m²K	Permeability q50 l/sm²	Solar absorption %
Wall type 1	Granit	0.020	3.400	2700	800	0.209	0.010	0.80	50.00
	Bars s600	0.200	0.045	87	961				
	Plywood	0.012	0.140	500	1500				
	Gypsum board	0.013	0.220	900	1100				
Terrace roof	Concrete Normal RH	0.050	1.700	2300	800	0.197	0.010	0.50	70.00
	Exp. Plastics 21	0.100	0.021	25	1400				
	Concrete Normal RH	0.200	1.700	2300	800				
Roof type 1	Wood Pine	0.020	0.140	500	2300	0.100	0.010	0.50	70.00
	Blower wool	0.400	0.042	40	800				
	Concrete Normal RH	0.200	1.700	2300	800				
Light inner	Gypsum board	0.013	0.220	900	1100	0.326	0.000	0.80	50.00
	Exp. Plastics 36	0.100	0.036	25	1400				
	Gypsum board	0.013	0.220	900	1100				
Flooring under	Wood Pine	0.020	0.140	500	2300	0.847	0.010	0.50	70.00
	Concrete Normal RH	0.200	1.700	2300	800				
	Mineralwool 40	0.030	0.040	80	840				
Flooring over	Mineralwool 40	0.030	0.040	80	840	0.847	0.010	0.10	0.00
	Concrete Normal RH	0.200	1.700	2300	800				
	Wood Pine	0.020	0.140	500	2300				
OUTSIDE_Light inner	BORDER_Gypsum board	0.013	0.220	900	1100	0.326	0.000	0.80	50.00
	BORDER_Exp. Plastics 36	0.100	0.036	25	1400				
	BORDER_Gypsum board	0.013	0.220	900	1100				
INSIDE_Basement flooring	BORDER_Woodwoolboard	0.100	0.075	200	1510	0.227	0.010	0.50	70.00
	BORDER_Exp. Plastics 36	0.100	0.036	25	1400				
	BORDER_Concrete Normal RH	0.200	1.700	2300	800				
OUTSIDE_Basement flooring	BORDER_Concrete Normal RH	0.200	1.700	2300	800	0.227	0.010	0.50	70.00

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### Building part types 1-dimensional - Catalog

Build part name	Material From outside to inside	Layer thickness m	Heat conduct. W/m,K	Density kg/m³	Heat capacity J/kgK	U-value W/m²K	Delta U-value W/m²K	Permeability q50 l/sm²	Solar absorption %
	BORDER_Exp. Plastics 36	0.100	0.036	25	1400				
	BORDER_Woodwoolboard	0.100	0.075	200	1510				

### Building part types 2- dimensional - Catalog

Build part name	Psi-value W/m	Width m	Permeability q50 l/sm²	Solar absorption %	Build part name	Psi-value W/m	Width m	Permeability q50 l/sm²	Solar absorption %
Window splay	0.072	0.100	0.50	50.00	Flooring edge	0.210	0.600	0.50	50.00
Outer corner	0.098	0.200	0.50	50.00	Steel column	0.094	0.300	0.50	50.00

### Building part - Walls, slabs

Description	Build part name	Orientation	Amount Area m² Length m	Lowest level m	Highest level m	Adjacent temperature °C	Share of effect demand %	U-value with ground and D-U W/m²K
	Wall type 1	EAST	153.6m²	0.0	19.0		0	0.219 W/m²K
	Wall type 1	WEST	255.5m²	0.0	19.0		0	0.219 W/m²K
	Wall type 1	SOUTH	32.8m²	0.0	19.0		0	0.219 W/m²K
	Wall type 1	NORTH	133.7m²	0.0	19.0		0	0.219 W/m²K
	Roof type 1	ROOF	576.0m²	19.0	19.0		0	0.110 W/m²K
	Terrace roof	ROOF	288.0m²	16.0	16.0		0	0.207 W/m²K
	Light inner	INNER	2594.7m²				0	
	Flooring under	INNER	1728.0m²				0	
	Flooring over	INNER	1728.0m²				0	
	Window splay	WEST	711.6m	0.0	19.0		0	0.072 W/mK
	Window splay	SOUTH	51.5m	0.0	19.0		0	0.072 W/mK
	Flooring edge	SOUTH	45.0m	0.0	19.0		0	0.210 W/mK
	Flooring edge	WEST	90.0m	0.0	19.0		0	0.210 W/mK
	Flooring edge	NORTH	3.0m	0.0	19.0		0	0.210 W/mK
	Steel column	SOUTH	16.0m	0.0	19.0		0	0.094 W/mK
	Steel column	NORTH	16.0m	0.0	19.0		0	0.094 W/mK
	Steel column	WEST	134.4m	0.0	19.0		0	0.094 W/mK
	Outer corner	WEST	19.0m	0.0	19.0		0	0.098 W/mK
	Outer corner	SOUTH	9.5m	0.0	19.0		0	0.098 W/mK
	Outer corner	NORTH	9.5m	0.0	19.0		0	0.098 W/mK
	INSIDE_Basement flooring	Zone 1	432.0m²	0.0	0.0		0	0.237 W/m²K
	OUTSIDE_Basement flooring	Zone 1	432.0m²	0.0	0.0		0	0.237 W/m²K
	OUTSIDE_Light inner	Zone 3	130.0m²	0.0	0.0		0	0.326 W/m²K

### Solar shading types

Name	Funktion	Values	Activated at out temperature over:	Activated at room temperature over:	Activated at solar effect over:	Inactivated at wind speed over:
Overhang	Upper fin	90.0 // 45.0			0.0	
Automatic awning	Upper fin	90.0 // 30.0			200.0	5.0

## Example 1 Office building Adm zone calculation

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### Building part - Window, door, valves

Description	Build part name	Orientation	Area m²	Glass share %	Solar transm. Total %	Solar transm. Direct %	U-value W/m²K	Lowest level m	Highest level m	Permeability q50 l/sm²	Solar protection name
	Window type 1	WEST	473.8	70	50	40	1.20	0.0	19.0	0.50	Automatic awning
	Entrence 1	WEST	13.4	80	60	50	1.50	0.0	19.0	0.50	Overhang
	Window type 1	SOUTH	70.6	70	50	40	1.20	0.0	19.0	0.50	Automatic awning

### Operating data

Operating case name	Activity energy W/m²	Activity energy W/lgh	Activity energy external W/m²	Building - energy to room W/m²	Building- energy external W/m²	Person energy W/m²	Hot tap water W/m²	Hot tap water W/lgh	Moist added mg/s,m²	Highest room temp °C	Lowest room temp °C	Room-temp passive forc °C
Office 22 Day	15.00	0.00	0.00	1.00	0.40	1.00	1.00	0.00	0.80	24.00	22.00	0.00
Office 22 Night	1.00	0.00	0.00	0.20	0.00	1.00	1.00	0.00	0.80	27.00	22.00	0.00

### Operating hours

Operating case name	Week-days	Week number	Time	Operating case name	Week-days	Week number	Time
Office 22 Night	Mondays	Remaining time	----		Thursdays	==	Mondays
Office 22 Day	Mondays	1 - 53	6 - 18		Fridays	==	Mondays
	Tuesdays	==	Mondays	Office 22 Night	Saturdays	Remaining time	----
	Wednesdays	==	Mondays		Sundays	==	Saturdays

### Ventilation unit

Unit name	Inlet air Fan pressure Pa	Inlet air effc. %	Exhaust air Fan pressure Pa	Exhaust air effc. %	Control case
VU01	600.00	70.00	500.00	70.00	VU01
OF1	0.00	0.00	0.00	0.00	OF1

### Control case

Control case	Control type	Outside temperature L	Control value L	Outside temperature H	Control value H
VU01	Low temperature	0.00 °C	18.00 °C	20.00 °C	18.00 °C
VU01	High temperature	-20.00 °C	20.00 °C	20.00 °C	20.00 °C
VU01	Återvinning	-20.00 °C	75.00 %	0.00 °C	85.00 %
VU01	Cool recovery				
VU01	Heat supply room				
OF1	Cool recovery				

### Ventilation unit - Operating hour and flow

Unit name	Week-days	Inlet air l/s	Exhaust air l/s	Week number	Starttime-Endtime
VU01					
	Mondays	2736.0	2336.0	1 - 53	6 - 18
	Mondays	547.0	467.0	1 - 53	0 - 6
	Mondays	547.0	467.0	1 - 53	18 - 24
	Tuesdays	==	Mondays		
	Wednesdays	==	Mondays		

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## Ventilation unit - Operating hour and flow

Unit name	Week-days	Inlet air l/s	Exhaust air l/s	Week number	Starttime-Endtime
	Thursdays	==	Mondays		
	Fridays	==	Mondays		
	Saturdays	400.0	320.0	1 - 53	0 - 24
	Sundays	==	Saturdays		
OF1					
	Mondays	0.0	400.0	1 - 53	6 - 18
	Mondays	0.0	80.0	1 - 53	0 - 6
	Mondays	0.0	80.0	1 - 53	18 - 24
	Tuesdays	==	Mondays		
	Wednesdays	==	Mondays		
	Thursdays	==	Mondays		
	Fridays	==	Mondays		
	Saturdays	0.0	80.0	1 - 53	0 - 24
	Sundays	==	Saturdays		

## Heating and cooling

Heating system	Op. point 1	Op. point 2
Outside temperature	-20.0	20.0
Supply pipe temperature	55.0	20.0
Drain pipe temperature	45.0	20.0
HOT TAP WATER SYSTEM		
Cold water temperature	8.0	[°C]
Hot tap water temperature	55.0	[°C]

## Cooling machine

Heat pump Operation point	1	2	
Outside temperature	10.0	20.0	[°C]
Cooling factor	3.0	2.0	
Limit temperature för free cooling	10.0		[°C]
Max RH in room air	75.0		[%]
Power to circulation pump	2.00		% of cooling power

## Temperature controlled ventilation

Passive forc			
Room temperature thermostat level	0.0		[°C]
VAV-system Aktive cooling			
Lowest supply air temp at cooling	15.0		[°C]
<b>Temperature controlled ventilation</b>	<b>Inlet fans</b>	<b>Exhaust fans</b>	
Total force flow	5472.0	5072.0	l/s
Fan pressure force flow	600.0	500.0	[Pa]
Efficiency fan	70.0	70.0	[%]

## OTHER

Power circulation pump room heating 20.00 % of energy supply to room and air  
Lowest dimensioning outside temperature for heating -20.0 °C

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## OTHER

Highest dimensioning temperature for comfort cooling 27.0 °C

Supply air from zone Zone 1: 50%

Power for heat supply is constrained to 0 W

Power for cooling supply is constrained to 0 W

## RESULT

Calculation date 2013-12-30 23:52:41

### Time detailed energy balance Supplied energy

Period	Supplied energy kWh									
	(27)	(20)	(19)	(29)	(18)	(25)	(45)	(33)	(34)	(52)
	Solar energy window	Re-covery vent.	Re-covery HP	Re-covery sewer	Solar collector	Person heat	Process-energy	Heat supply	El supply	Latent energy
Mon 1	345	13751	0	0	0	2036	13619	6581	3157	3806
Mon 2	957	10264	0	0	0	1839	11925	5946	3114	3220
Mon 3	4491	12655	0	0	0	2036	13133	5442	2692	4047
Mon 4	7635	5294	0	0	0	1970	12568	2903	1811	3940
Mon 5	10302	2400	0	0	0	2036	13619	2140	2189	4071
Mon 6	10534	1180	0	0	0	1970	12568	1970	2729	3940
Mon 7	10659	484	0	0	0	2036	13133	2036	3274	4071
Mon 8	9180	586	0	0	0	2036	13619	2036	3116	4065
Mon 9	5140	1871	0	0	0	1970	12082	2033	1878	3940
Mon 10	1588	6941	0	0	0	2036	13619	3996	2142	4071
Mon 11	436	12896	0	0	0	1970	13054	5593	2632	3940
Mon 12	242	12835	0	0	0	1970	12082	6538	3128	3639
Period	61508	81617	0	0	0	23967	155584	47429	31958	46872

### Time detailed energy balance Emitted energy

Period	Emitted energy kWh				
	(23)	(24)	(21)	(28)	(17)
	Trans-mis-sion	Air-infil-tration	Venti-lation	Waste-water	Con-denser cooling
Mon 1	11809	2168	29377	134	0
Mon 2	9053	1653	26397	70	0
Mon 3	13210	2723	27633	443	0
Mon 4	11069	2330	21475	1313	0
Mon 5	8441	1756	23480	1861	4
Mon 6	6172	1247	24164	1970	99
Mon 7	5210	962	25242	2036	435
Mon 8	5847	1030	24385	2036	332
Mon 9	7478	1363	18540	1863	49
Mon 10	10780	2012	20880	1052	0
Mon 11	12626	2442	25102	431	0
Mon 12	12242	2374	27646	106	0
Period	114221	22105	295107	13314	919

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## Key values

Inner heat capacity	60.85	[Wh/m <sup>2</sup> °C]
Outer heat capacity	27.69	[Wh/m <sup>2</sup> °C]
Avg temperature	22.00	[°C]
Avg ventilation	1287.76	l/s
Process energy avg	6.63	[W/m <sup>2</sup> ]
Person energy avg	1.00	[W/m <sup>2</sup> ]
Shell area	2214.00	[m <sup>2</sup> ]
Inside pressure avg	-7.6	[Pa]
Specific fan power	1.5	[kW/(m <sup>3</sup> /s)]
VAV	0.0	[%]
Shell/Floor area	0.81	
Area windows+doors/Floor area	0.20	

## Energy balance

### Emitted energy

(23)Transmission	114221	41.75
(24)Infiltration	22105	8.08
(21)Ventilation	295107	107.86
(28)Sewer	13314	4.87
(17)Condenser cooling	919	0.34

### Supplied energy

(27)Solar energy trough window	61508	22.48
(20)Heat recovery ventilation	81617	29.83
(29)Heat recovery to hot tap water	0	0.00
(19)Heat recovery Heat pump	0	0.00
(18)Heat recovery Solar collector	0	0.00
(45)Process energy	155584	56.87
(25)Person heat	23967	8.76
(34)El supply	31958	11.68
(33)Heat supply	47429	17.34
(52)Latent energy	46872	17.13

## Specification of energy flows

(33)HEAT SUPPLY	47429	17.34	(15)Cirk.pump heating	7047	2.58
(1)Ventilation unit	5928	2.17	(11)Cooling machine	306	0.11
(2)Heating system	28187	10.30			
(3)Hot tap water	13314	4.87			
			(20)HEAT RECOVERY VENTILATION	81617	29.83
(47+48)BUILDING COOLING	5556	2.03	(51)Ventilation heat exchange kWh	81617	29.83
(47)Cooling in ventilation unit	2667	0.97	(51+)Exchange of heat	81617	29.83
(47S)Sensibel cooling in supply air	2666	0.97			
(47L)Sensibel cooling in supply air	2	0.00	(26)PROCESSENERGY	159012	58.12
(48)Cooling in room air	2888	1.06	(40)Activity energy internal	143935	52.61
(48S)Sensibel cooling in room air	2869	1.05	(39)Operation energy internal	11649	4.26
(48L)Latent cooling in room air	20	0.01	(46)Operation energy external	3428	1.25
(34)EL SUPPLY	31958	11.68	(42)VENTILATION UNIT	101629	37.15
(14)Inlet fans	14084	5.15	(43)HEATING SYSTEM	35234	12.88
(13)Exhaust fans	10520	3.85	(44)HOT TAP WATER SYSTEM	13314	4.87

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## Basement

Project: Example 1 Office building Description: Basement zone

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## INDATA

### Generic

Calculation period - Day	1 - 365
Solar reflection from ground	20.00 %
Wind velocity % of climate data	S:60 SW:60 W:60 NW:60 N:60 NE:60 EO:60 SE:60 °
Air pressure	1000 hPa
Horizontal angle to ground	S:20 SW:20 W:20 NW:20 N:20 NE:20 EO:20 SE:20 ° °
Form factor for wind pressure	0:0.70 45:0.50 90:-0.60 135:-0.50 180:-0.50 ROOF:-0.00
'South facade' angle to south"	0 °
Activity	Residential
Ventilation volume	0.0 [m³]
Heated floor area	864.0 [m²]
Ground properties Heat conductance: Clay, drained sand and gravel.	1.4 [W/m²K]

### Climate data

STOCKHOLM 1996-2005	Latitude	59.4	degrees	
	Highest value	Average value	Lowest value	
Outside temperature	30.2	7.5	-18.2	°C
Wind velocity	13.5	3.3	0.0	m/s
Solar radiation	905.0	111.8	0.0	W/m²
Relative humidity	100.0	74.3	0.0	%

### Building part types 1-dimensional - Catalog

Build part name	Material From outside to inside	Layer thickness m	Heat conduct. W/m,K	Density kg/m³	Heat capacity J/kgK	U-value W/m²K	Delta U-value W/m²K	Permeability q50 l/sm²	Solar absorption %
Wall type 2	Drain isol 60	0.100	0.042	55	1400	0.375	0.010	0.80	0.00
	Concrete Normal RH	0.200	1.700	2300	800				
Floor type 1	Exp. Plastics 36	0.100	0.036	25	1400	0.333	0.010	0.10	0.00
	Concrete Normal RH	0.100	1.700	2300	800				
OUTSIDE_B asement flooring	BORDER_C oncrete Normal RH	0.200	1.700	2300	800	0.227	0.010	0.50	70.00
	BORDER_E xp. Plastics 36	0.100	0.036	25	1400				



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Build part name	Material From outside to inside	Layer thickness m	Heat conduct. W/m,K	Density kg/m³	Heat capacity J/kgK	U-value W/m²K	Delta U-value W/m²K	Permeability q50 l/sm²	Solar absorption %
	BORDER_ Woodwoolboard	0.100	0.075	200	1510				

## Building part - Walls, slabs

Description	Build part name	Orientation	Amount Area m² Length m	Lowest level m	Highest level m	Adjacent temperature °C	Share of effect demand %	U-value with ground and D-U W/m²K
	Wall type 2	BW 0-1 m	128.0m²	0.0	3.0		0	0.317 W/m²K
	Wall type 2	BW 1-2 m	128.0m²	0.0	3.0		0	0.234 W/m²K
	Wall type 2	BW >2 m	217.6m²	0.0	3.0		0	0.170 W/m²K
	Floor type 1	BF 0-6 m	864.0m²	0.0	3.0		0	0.162 W/m²K
	OUTSIDE_Basement flooring	Zone 3	432.0m²	0.0	0.0		0	0.237 W/m²K

## Operating data

Operating case name	Activity energy W/m²	Activity energy W/lgh	Activity energy external W/m²	Building - energy to room W/m²	Build- ing- energy external W/m²	Person energy W/m²	Hot tap water W/m²	Hot tap water W/lgh	Moist added mg/s,m²	Highest room temp °C	Lowest room temp °C	Room- temp passive forc °C
Garage	0.00	0.00	0.00	5.00	0.00	0.00	0.00	0.00	0.00	35.00	12.00	23.00

## Operating hours

Operating case name	Week-days	Week number	Time	Operating case name	Week-days	Week number	Time
Garage	Mondays	Remaining time	----		Fridays	==	Mondays
	Tuesdays	==	Mondays	Garage	Saturdays	Remaining time	----
	Wednesdays	==	Mondays		Sundays	==	Saturdays
	Thursdays	==	Mondays				

## Ventilation unit

Unit name	Inlet air Fan pressure Pa	Inlet air effc. %	Exhaust air Fan pressure Pa	Exhaust air effc. %	Control case
TF 1	500.00	70.00	500.00	70.00	Trans vent
EF 1	500.00	70.00	500.00	70.00	Inaktive

## Control case

Control case	Control type	Outside temperature L	Control value L	Outside temperature H	Control value H
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## Ventilation unit - Operating hour and flow

Unit name	Week-days	Inlet air l/s	Exhaust air l/s	Week number	Starttime-Endtime
TF 1					
	Mondays	800.0	0.0	1 - 53	6 - 18
	Mondays	160.0	0.0	1 - 53	0 - 6
	Mondays	160.0	0.0	1 - 53	18 - 24

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### Ventilation unit - Operating hour and flow

Unit name	Week-days	Inlet air l/s	Exhaust air l/s	Week number	Starttime-Endtime
	Tuesdays	==	Mondays		
	Wednesdays	==	Mondays		
	Thursdays	==	Mondays		
	Fridays	==	Mondays		
	Saturdays	160.0	0.0	1 - 53	0 - 24
	Sundays	==	Saturdays		

#### EF 1

	Mondays	0.0	800.0	1 - 53	6 - 18
	Mondays	0.0	160.0	1 - 53	0 - 6
	Mondays	0.0	160.0	1 - 53	18 - 24
	Tuesdays	==	Mondays		
	Wednesdays	==	Mondays		
	Thursdays	==	Mondays		
	Fridays	==	Mondays		
	Saturdays	0.0	160.0	1 - 53	0 - 24
	Sundays	==	Saturdays		

### Heating and cooling

Heating system	Op. point 1	Op. point 2
Outside temperature	-20.0	20.0
Supply pipe temperature	55.0	20.0
Drain pipe temperature	45.0	20.0
HOT TAP WATER SYSTEM		
Cold water temperature	8.0	[°C]
Hot tap water temperature	55.0	[°C]

### Cooling machine

Heat pump Operation point	1	2	
Outside temperature	10.0	20.0	[°C]
Cooling factor	3.0	2.0	
Limit temperature för free cooling	10.0		[°C]
Max RH in room air	75.0		[%]
Power to circulation pump	0.00		% of cooling power

### OTHER

Power circulation pump room heating 0.00 % of energy supply to room and air  
Lowest dimensioning outside temperature for heating -20.0 °C  
Highest dimensioning temperature for comfort cooling 27.0 °C  
Supply air from zone Zone 3: 50%  
Power for heat supply is constrained to 0 W  
Power for cooling supply is constrained to 0 W

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## RESULT

Calculation date 2013-12-30 23:52:41

### Key values

Inner heat capacity	91.85	[Wh/m²°C]
Outer heat capacity	42.06	[Wh/m²°C]
Avg temperature	12.00	[°C]
Avg ventilation	388.82	l/s
Process energy avg	5.00	[W/m²]
Person energy avg	0.00	[W/m²]
Shell area	1337.60	[m²]
Inside pressure avg	-0.8	[Pa]
Specific fan power	1.4	[kW/(m³/s)]
Shell/Floor area	1.55	
Area windows+doors/Floor area	0.00	

### Energy balance

#### Emitted energy

(23)Transmission	22733	26.31
(24)Infiltration	1534	1.78
(21)Ventilation	19514	22.59
(28)Sewer	0	0.00

#### Supplied energy

(27)Solar energy trough window	0	0.00
(20)Heat recovery ventilation	0	0.00
(29)Heat recovery to hot tap water	0	0.00
(19)Heat recovery Heat pump	0	0.00
(18)Heat recovery Solar collector	0	0.00
(45)Process energy	37843	43.80
(25)Person heat	0	0.00
(34)El supply	4866	5.63
(33)Heat supply	645	0.75
(52)Latent energy	0	0.00

### Specification of energy flows

(33)HEAT SUPPLY	645	0.75	(14)Inlet fans	2433	2.82	(39)Operation energy internal	37843	43.80
(2)Heating system	645	0.75	(13)Exhaust fans	2433	2.82			
						(42)VENTILATION UNIT	2433	2.82
						(43)HEATING SYSTEM	645	0.75
(34)EL SUPPLY	4866	5.63	(26)PROCESSENERGY	37843	43.80			

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**Temperatures****Office east**

Project: Example 1 Office building Description: Office zone east

**COMMENTARIES**

At the start of VIP-Energy text strings about Signature, User and Comment is loaded from the file Title\_Eng.vpd. Text strings can be updated under Catalog Data -> Update Catalogs. The check box "User Data" should be checked.

Projekt name and Description is loaded från the input file (VIP-file) an is updated when the file is saved.

**INDATA****Generic**

Calculation period - Day	1 - 365
Solar reflection from ground	20.00 %
Wind velocity % of climate data	S:60 SW:60 W:60 NW:60 N:60 NE:60 EO:60 SE:60 °
Air pressure	1000 hPa
Horizontal angle to ground	S:20 SW:20 W:20 NW:20 N:20 NE:20 EO:20 SE:20 ° °
Form factor for wind pressure	0:0.70 45:0.50 90:-0.60 135:-0.50 180:-0.50 ROOF:-0.00
'South facade' angle to south	0 °
Activity	Residential
Ventilation volume	0.0 [m³]
Heated floor area	2160.0 [m²]
Ground properties Heat conductance:	1.4 [W/m²K]
Clay, drained sand and gravel.	

**Climate data**

STOCKHOLM 1996-2005	Latitude	59.4	degrees	
	Highest value	Average value	Lowest value	
Outside temperature	30.2	7.5	-18.2	°C
Wind velocity	13.5	3.3	0.0	m/s

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## Climate data

Solar radiation	905.0	111.8	0.0	W/m²
Relative humidity	100.0	74.3	0.0	%

## Building part types 1-dimensional - Catalog

Build part name	Material From outside to inside	Layer thicknes m	Heat conduct. W/m,K	Density kg/m³	Heat capacity J/kgK	U-value W/m²K	Delta U-value W/m²K	Permea- bility q50 l/sm²	Solar absorp- tion %
Wall type 1	Granit	0.020	3.400	2700	800	0.209	0.010	0.80	50.00
	Bars s600	0.200	0.045	87	961				
	Plywood	0.012	0.140	500	1500				
	Gypsum board	0.013	0.220	900	1100				
Roof type 1	Wood Pine	0.020	0.140	500	2300	0.100	0.010	0.50	70.00
	Blower wool	0.400	0.042	40	800				
	Concrete Normal RH	0.200	1.700	2300	800				
Light inner	Gypsum board	0.013	0.220	900	1100	0.326	0.000	0.80	50.00
	Exp. Plastics 36	0.100	0.036	25	1400				
	Gypsum board	0.013	0.220	900	1100				
Flooring under	Wood Pine	0.020	0.140	500	2300	0.847	0.010	0.50	70.00
	Concrete Normal RH	0.200	1.700	2300	800				
	Mineralwool 40	0.030	0.040	80	840				
Flooring over	Mineralwool 40	0.030	0.040	80	840	0.847	0.010	0.10	0.00
	Concrete Normal RH	0.200	1.700	2300	800				
	Wood Pine	0.020	0.140	500	2300				
INSIDE_Light inner	BORDER_Gypsum board	0.013	0.220	900	1100	0.326	0.000	0.80	50.00
	BORDER_Exp. Plastics 36	0.100	0.036	25	1400				
	BORDER_Gypsum board	0.013	0.220	900	1100				
INSIDE_Basement flooring	BORDER_Woodwoolboard	0.100	0.075	200	1510	0.227	0.010	0.50	70.00
	BORDER_Exp. Plastics 36	0.100	0.036	25	1400				
	BORDER_Concrete Normal RH	0.200	1.700	2300	800				

## Building part types 2- dimensional - Catalog

Build part name	Psi- value W/m	Width m	Permea- bility q50 l/sm²	Solar absorp- tion %	Build part name	Psi- value W/m	Width m	Permea- bility q50 l/sm²	Solar absorp- tion %
Window splay	0.072	0.100	0.50	50.00	Outer corner	0.098	0.200	0.50	50.00
Flooring edge	0.210	0.600	0.50	50.00	Steel column	0.094	0.300	0.50	50.00

## Building part - Walls, slabs

Description	Build part name	Orien- tation	Amount Area m² Length m	Lowest level m	Highest level m	Adjacent tempera- ture °C	Share of effect demand %	U-value with ground and D-U W/m²K
	Wall type 1	EAST	241.5m²	0.0	19.0		0	0.219 W/m²K
	Wall type 1	SOUTH	24.7m²	0.0	19.0		0	0.219 W/m²K
	Wall type 1	NORTH	102.0m²	0.0	19.0		0	0.219 W/m²K
	Roof type 1	ROOF	432.0m²	16.0	16.0		0	0.110 W/m²K
	Light inner	INNER	2594.7m²				0	
	Flooring under	INNER	1728.0m²				0	
	Flooring over	INNER	1728.0m²				0	
	Window splay	EAST	695.6m	0.0	19.0		0	0.072 W/mK
	Window splay	SOUTH	55.5m	0.0	19.0		0	0.072 W/mK

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### Building part - Walls, slabs

Description	Build part name	Orien- tation	Amount Area m² Length m	Lowest level m	Highest level m	Adjacent tempera- ture °C	Share of effect demand %	U-value with ground and D-U W/m²K
	Flooring edge	SOUTH	51.0m	0.0	19.0		0	0.210 W/mK
	Flooring edge	NORTH	51.0m	0.0	19.0		0	0.210 W/mK
	Steel column	SOUTH	19.2m	0.0	19.0		0	0.094 W/mK
	Steel column	NORTH	19.2m	0.0	19.0		0	0.094 W/mK
	Steel column	EAST	134.4m	0.0	19.0		0	0.094 W/mK
	Outer corner	NORTH	19.0m	0.0	19.0		0	0.098 W/mK
	Outer corner	EAST	19.0m	0.0	19.0		0	0.098 W/mK
	INSIDE_Basement flooring	Zone 2	432.0m²	0.0	0.0		0	0.237 W/m²K
	INSIDE_Light inner	Zone 1	130.0m²	0.0	0.0		0	0.326 W/m²K

### Solar shading types

Name	Funktion	Values	Activated at out temperature over:	Activated at room temperature over:	Activated at solar effect over:	Inactivated at wind speed over:
Automatic awning	Upper fin	90.0 // 30.0			200.0	5.0

### Building part - Window, door, valves

Description	Build part name	Orien- tation	Area m²	Glass share %	Solar transm. Total %	Solar transm. Direct %	U-value W/m²K	Lowest level m	Highest level m	Permea- bility q50 l/sm²	Solar protection name
	Window type 1	EAST	403.2	70	50	40	1.20	0.0	19.0	0.50	Automatic awning
	Window type 1	SOUTH	75.6	70	50	40	1.20	0.0	19.0	0.50	Automatic awning

### Operating data

Operatin g case name	Activity energy W/m²	Activity energy W/lgh	Activity energy external W/m²	Building - energy to room W/m²	Build- ing- energy external W/m²	Person energy W/m²	Hot tap water W/m²	Hot tap water W/lgh	Moist added mg/s,m²	Highest room temp °C	Lowest room temp °C	Room- temp passive forc °C
Office 22 Day	15.00	0.00	0.00	1.00	0.40	1.00	1.00	0.00	0.80	24.00	22.00	0.00
Office 22 Night	1.00	0.00	0.00	0.20	0.00	1.00	1.00	0.00	0.80	27.00	22.00	0.00

### Operating hours

Operating case name	Week- days	Week number	Time	Operating case name	Week- days	Week number	Time
Office 22 Night	Mondays	Remaining time	----		Thursdays	==	Mondays
Office 22 Day	Mondays	1 - 53	6 - 18		Fridays	==	Mondays
	Tuesdays	==	Mondays	Office 22 Night	Saturdays	Remaining time	----
	Wednesdays	==	Mondays		Sundays	==	Saturdays

### Ventilation unit

Unit name	Inlet air Fan pressure Pa	Inlet air effc. %	Exhaust air Fan pressure Pa	Exhaust air effc. %	Control case
VU01	600.00	70.00	500.00	70.00	VU01
OF1	0.00	0.00	0.00	0.00	OF1

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## Control case

Control case	Control type	Outside temperature L	Control value L	Outside temperature H	Control value H
VU01	Low temperature	0.00 °C	18.00 °C	20.00 °C	18.00 °C
VU01	High temperature	-20.00 °C	20.00 °C	20.00 °C	20.00 °C
VU01	Återvinning	-20.00 °C	75.00 %	0.00 °C	85.00 %
VU01	Cool recovery				
VU01	Heat supply room				

## Ventilation unit - Operating hour and flow

Unit name	Week-days	Inlet air l/s	Exhaust air l/s	Week number	Starttime-Endtime
VU01					
	Mondays	2160.0	1760.0	1 - 53	6 - 18
	Mondays	432.0	352.0	1 - 53	0 - 6
	Mondays	432.0	352.0	1 - 53	18 - 24
	Tuesdays	==	Mondays		
	Wednesdays	==	Mondays		
	Thursdays	==	Mondays		
	Fridays	==	Mondays		
	Saturdays	400.0	320.0	1 - 53	0 - 24
	Sundays	==	Saturdays		
OF1					
	Mondays	0.0	400.0	1 - 53	6 - 18
	Mondays	0.0	80.0	1 - 53	0 - 6
	Mondays	0.0	80.0	1 - 53	18 - 24
	Tuesdays	==	Mondays		
	Wednesdays	==	Mondays		
	Thursdays	==	Mondays		
	Fridays	==	Mondays		
	Saturdays	0.0	80.0	1 - 53	0 - 24
	Sundays	==	Saturdays		

## Heating and cooling

<b>Heating system</b>	<b>Op. point 1</b>	<b>Op. point 2</b>
Outside temperature	-20.0	20.0
Supply pipe temperature	55.0	20.0
Drain pipe temperature	45.0	20.0
HOT TAP WATER SYSTEM		
Cold water temperature	8.0	[°C]
Hot tap water temperature	55.0	[°C]

## Cooling machine

<b>Heat pump Operation point</b>	<b>1</b>	<b>2</b>	
Outside temperature	10.0	20.0	[°C]
Cooling factor	3.0	2.0	
Limit temperature för free cooling	10.0		[°C]
Max RH in room air	75.0		[%]
Power to circulation pump	2.00		% of cooling power

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## Temperature controlled ventilation

Passive forc			
Room temperature thermostat level	23.0		[°C]
VAV-system Aktive cooling			
Lowest supply air temp at cooling	15.0		[°C]
<b>Temperature controlled ventilation</b>	<b>Inlet fans</b>	<b>Exhaust fans</b>	
Total force flow	4320.0	3920.0	l/s
Fan pressure force flow	600.0	500.0	[Pa]
Efficiency fan	70.0	70.0	[%]

## OTHER

Power circulation pump room heating 0.00 % of energy supply to room and air  
 Lowest dimensioning outside temperature for heating -20.0 °C  
 Highest dimensioning temperature for comfort cooling 27.0 °C  
 Power for heat supply is constrained to 0 W  
 Power for cooling supply is constrained to 0 W

## RESULT

Calculation date 2013-12-30 23:52:41

## Key values

Inner heat capacity	62.54	[Wh/m²°C]
Outer heat capacity	12.26	[Wh/m²°C]
Avg temperature	22.00	[°C]
Avg ventilation	1040.70	l/s
Process energy avg	6.63	[W/m²]
Person energy avg	1.00	[W/m²]
Shell area	1474.80	[m²]
Inside pressure avg	-7.3	[Pa]
Specific fan power	1.5	[kW/(m³/s)]
VAV	0.0	[%]
Shell/Floor area	0.68	
Area windows+doors/Floor area	0.22	

## Energy balance

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### Emitted energy

(23)Transmission	93413	43.25
(24)Infiltration	13325	6.17
(21)Ventilation	241194	111.66
(28)Sewer	10418	4.82
(17)Condenser cooling	610	0.28

### Supplied energy

(27)Solar energy trough window	59419	27.51
(20)Heat recovery ventilation	62572	28.97
(29)Heat recovery to hot tap water	0	0.00
(19)Heat recovery Heat pump	0	0.00
(18)Heat recovery Solar collector	0	0.00
(45)Process energy	122830	56.87



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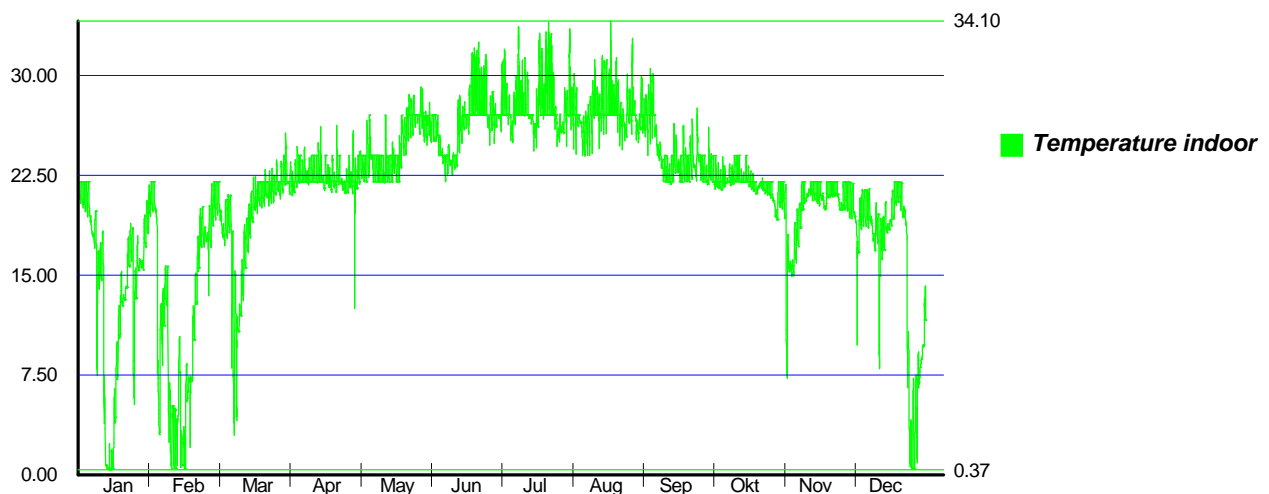
## Energy balance

(25)Person heat	18922	8.76
(34)El supply	20165	9.34
(33)Heat supply	41764	19.34
(52)Latent energy	37087	17.17

## Specification of energy flows

(33)HEAT SUPPLY	41764	19.34	(11)Cooling machine	203	0.09
(1)Ventilation unit	6644	3.08			
(2)Heating system	24703	11.44			
(3)Hot tap water	10418	4.82	(20)HEAT RECOVERY VENTILATION	62572	28.97
			(51)Ventilation heat exchange kWh	62572	28.97
(47+48)BUILDING COOLING	5534	2.56	(51+)Exchange of heat	62572	28.97
(47)Cooling in ventilation unit	2100	0.97			
(47S)Sensibel cooling in supply air	2100	0.97	(26)PROCESSENERGY	125536	58.12
(47L)Sensibel cooling in supply air	0	0.00	(40)Activity energy internal	113633	52.61
(48)Cooling in room air	3434	1.59	(39)Operation energy internal	9196	4.26
(48S)Sensibel cooling in room air	3428	1.59	(46)Operation energy external	2706	1.25
(48L)Latent cooling in room air	7	0.00			
(34)EL SUPPLY	20165	9.34	(42)VENTILATION UNIT	80767	37.39
(14)Inlet fans	11552	5.35	(43)HEATING SYSTEM	24703	11.44
(13)Exhaust fans	8410	3.89	(44)HOT TAP WATER SYSTEM	10418	4.82

## Temperatures



## RESULTS ALL ZONES

Calculation date

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### Time detailed energy balance Supplied energy

Period	Supplied energy kWh									
	(27)	(20)	(19)	(29)	(18)	(25)	(45)	(33)	(34)	(52)
	Solar energy window	Recovery vent.	Recovery HP	Recovery sewer	Solar collector	Person heat	Process-energy	Heat supply	El supply	Latent energy
Mon 1	641	24174	0	0	0	3643	27584	12832	5129	6817
Mon 2	1777	18213	0	0	0	3290	24242	11697	5160	5804
Mon 3	8581	22211	0	0	0	3643	26715	10421	4374	7252
Mon 4	14888	9024	0	0	0	3525	25601	5335	3362	7050
Mon 5	21108	4455	0	0	0	3643	27584	3815	4376	7285
Mon 6	21537	2197	0	0	0	3525	25601	3525	5435	7050
Mon 7	20738	878	0	0	0	3643	26715	3643	6300	7285
Mon 8	17288	1071	0	0	0	3643	27584	3643	6035	7279
Mon 9	10099	3384	0	0	0	3525	24731	3648	3788	7050
Mon 10	3015	12264	0	0	0	3643	27584	7444	3708	7285
Mon 11	810	22801	0	0	0	3525	26470	10750	4195	7050
Mon 12	448	22705	0	0	0	3525	24731	12663	4969	6529
Period	120927	144189	0	0	0	42889	316257	89838	56988	83958

### Time detailed energy balance Emitted energy

Period	Emitted energy kWh				
	(23)	(24)	(21)	(28)	( )
	Trans-mission	Air-infil-tration	Venti-lation	Waste-water	Cooling
Mon 1	22201	3684	55307	230	0
Mon 2	17342	2775	49785	115	0
Mon 3	25575	4523	51174	793	0
Mon 4	22482	3866	40203	2308	0
Mon 5	18338	2921	44594	3377	11
Mon 6	14506	2059	46058	3525	146
Mon 7	12769	1619	46851	3643	710
Mon 8	13435	1717	45135	3643	589
Mon 9	15612	2300	35680	3345	72
Mon 10	20895	3366	39847	1834	0
Mon 11	23697	4096	47329	751	0
Mon 12	22981	3957	52346	169	0
Period	230367	36964	555815	23732	1529

### Key values

Inner heat capacity	66.13	[Wh/m²°C]
Outer heat capacity	24.06	[Wh/m²°C]
Avg temperature	20.50	[°C]
Avg ventilation	2717.28	l/s
Process energy avg	6.39	[W/m²]
Person energy avg	0.85	[W/m²]
Shell area	5026.40	[m²]
Inside pressure avg	-5.7	[Pa]
Specific fan power	1.5	[kW/(m³/s)]
Total floor area	5760.00	[m²]
Shell/Floor area	0.87	
Area windows+doors/Floor area	0.18	

Project:	Example 1 Office building	Date:	2013-12-30
Description:	Zone calculation administration		
Performed by:	User name	Sign:	Signature
Project file:	C:\Projekt\VIPENERGY.NET\Beräkningsexempel\Example 1 Office building\Example 1 Office building Adm zone calculation.VIP	Company:	<b>Company name</b>

## Comparison to demands according to BBR

Max power for heating is limited.  
Lowest calculated room temperature is 21.7 °C  
under demand according to operating data.

Max power for cooling is limited.  
Highest calculated room temperature is 11.2 °C  
over demand according to operating data.

## Energy balance

### Emitted energy

(23)Transmission	230367	39.99
(24)Infiltration	36964	6.42
(21)Ventilation	555815	96.50
(28)Sewer	23732	4.12
(17)Condenser cooling	1529	0.27

### Supplied energy

(27)Solar energy trough window	120927	20.99
(20)Heat recovery ventilation	144189	25.03
(29)Heat recovery to hot tap water	0	0.00
(19)Heat recovery Heat pump	0	0.00
(18)Heat recovery Solar collector	0	0.00
(45)Process energy	316257	54.91
(25)Person heat	42889	7.45
(34)EI supply	56988	9.89
(33)Heat supply	89838	15.60
(52)Latent energy	83958	14.58

## Specification of energy flows

(33)HEAT SUPPLY	89838	15.60	(15)Cirk.pump heating	7047	1.22
(1)Ventilation unit	12571	2.18	(11)Cooling machine	510	0.09
(2)Heating system	53535	9.29			
(3)Hot tap water	23732	4.12			
(47+48)BUILDING COOLING	11090	1.93	(20)HEAT RECOVERY VENTILATION	144189	25.03
(47)Cooling in ventilation unit	4767	0.83	(51)Ventilation heat exchange kWh	144189	25.03
(47S)Sensibel cooling in supply air	4765	0.83	(26)PROCESSENERGY	322391	55.97
(47L)Sensibel cooling in supply air	2	0.00	(40)Activity energy internal	257569	44.72
(48)Cooling in room air	6323	1.10	(39)Operation energy internal	58688	10.19
(48S)Sensibel cooling in room air	6297	1.09	(46)Operation energy external	6134	1.06
(48L)Latent cooling in room air	26	0.00			
(34)EL SUPPLY	56988	9.89	(42)VENTILATION UNIT	184829	32.09
(14)Inlet fans	28069	4.87	(43)HEATING SYSTEM	60581	10.52
(13)Exhaust fans	21363	3.71	(44)HOT TAP WATER SYSTEM	23732	4.12