

EXTENDED DATA INPUT FOR BALANCED VENTILATION

Planning ventilation systems with multiple ventilation units

Building: Primary School 8 "Sveti Sveti Kiril I Metodi" - Section C

Ventilation unit / Heat recovery efficiency design		
In Ventilation worksheet (standard design)		
In Additional Vent (this worksheet)		
		(Ventilation worksheet)
	x	(Additional vent)
Treated Floor Area A <sub>TFA</sub>		
m²	719	(Areas worksheet)
Room Height h		
m	2,50	(Worksheet Annual heating)
Room air volume for ventilation (A <sub>TFA</sub> ·h) = V <sub>V</sub>		
m³	1798	(Worksheet Annual heating)
Number of Occupants		
P	60,0	(Ventilation worksheet)
Room temperature		
°C	18	(Worksheet Annual heating)
Average external temp. heating period		
°C	4,5	(Ventilation worksheet)
Average ground temp.		
°C	11,4	(Ground worksheet)
Ventilation type		
Balanced PH-Ventilation with HR		(Ventilation worksheet)

Results of ventilation design and unit selection:

Ventilation Unit no.	Description of the unit	Design		Average value / yr.		Air ch.rt.
		V <sub>SUP</sub> m³/h	V <sub>ETA</sub> m³/h	V <sub>SUP</sub> m³/h	V <sub>ETA</sub> m³/h	
1	Floor -1	300	300	42	42	---
2	Gym F-1	1000	1000	144	144	---
3	Floor 1	550	550	167	167	---
4	Gym F 1	1200	1200	404	404	---
5						---
6						---
7						---
8						---
9						---
10						---

Result for overall vent. syst.	3050	3050	756	756	0,42
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Effective heat recovery efficiency	Energy recovery value	spec. Input power	Heat recov. efficiency SHX	Cross check
78%	0%	0,40	0%	
80%	0%	0,40	0%	
81%	0%	0,40	0%	
82%	0%	0,40	0%	
81%	0%	0,40	0%	

Recommendations for dimensioning air quantities

Use of low odour and low-emission building materials/ furnishings: It is strongly recommended to use building materials that cause no or only little pollution instead of increasing the outdoor air volume flow in order to reduce preventable pollution. This holds true independently from the chosen approach for the air quality determination; 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 the amounts of 20 to 30 m³/h/person are completely 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 purge ventilation is carried out during breaks anyway. For typical external air CO₂ concentrations of around 400-500 ppm, it is possible to comply even with 1500 ppm. Exceeding this figure temporarily is permissible.

- Fresh 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)

Purging phase for intermittent ventilation operation Due to the purge ventilation phase, the ventilation operation period is extended accordingly (utilisation time + purge ventilation phase). Please consider this for the ventilation design. Emissions have to be removed. Flushing the building prolongs the utilization time of the ventilation system (utilization time + flushing phase). Please consider this at design stage.

Design of air quantities

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

Room Nr.	Amount a	Room name	Assignment to ventilation unit	Area A m <sup>2</sup>	Clear height h m	Room vol. A x h m <sup>3</sup>	Volume flow per room			Air change rate per room n 1/h	Utilisation times			Reduction Red.1	Operation Red. 1	Reduction Red.2	Operation Red.2	Reduction Red.3	Operation Red. 3	Cross check	Average volume flows			Average air change rate 1/h
							V <sub>SUP</sub> m <sup>3</sup> /h	V <sub>ETA</sub> m <sup>3</sup> /h	V <sub>TRANS</sub> m <sup>3</sup> /h		h/d h	d/week d	weeks/yr Weeks								V <sub>SUP</sub> m <sup>3</sup> /h	V <sub>ETA</sub> m <sup>3</sup> /h	V <sub>TRANS</sub> m <sup>3</sup> /h	
1	1	Entrance	1	14,8	3,00	44	50		100	2,26	14	5	32	100%	0%	60%	70%	40%	30%		7		14	0,31
2	1	Antechamber	1	16,0	3,00	48	125		100	2,61	14	5	32	100%	0%	60%	70%	40%	30%		17		14	0,36
3	1	Changing-room	1	10,3	3,00	31	125			4,05	14	5	32	100%	0%	60%	70%	40%	30%		17			0,56
4	1	WC	1	9,8	3,00	29		150		5,10	14	5	32	100%	0%	60%	70%	40%	30%			21		0,71
5	1	Walkway	1	19,8	3,00	59		150		2,53	14	5	32	100%	0%	60%	70%	40%	30%			21		0,35
6	1	Gym 1 - UG	2	271,4	4,90	1330	1000	1000		0,75	14	5	32	100%	0%	60%	80%	40%	20%		144	144		0,11
7	1	Entrance	3	14,1	3,30	47	50		100	2,14	14	7	50	100%	0%	60%	70%	40%	30%		15		30	0,65
8	1	Changing-room	3	16,4	3,30	54	200			3,70	14	7	50	100%	0%	60%	70%	40%	30%		61			1,12
9	1	WC	3	10,8	3,30	36		100		2,81	14	7	50	100%	0%	60%	70%	40%	30%			30		0,85
10	1	Walkway	3	21,2	3,30	70		150		2,15	14	7	50	100%	0%	60%	70%	40%	30%			45		0,65
11	1	Corridor	3	9,2	3,30	30		100		3,28	14	7	50	100%	0%	60%	70%	40%	30%			30		0,99
12	1	Changing-room	3	12,6	3,30	41	150			3,62	14	7	50	100%	0%	60%	70%	40%	30%		45			1,10
13	1	Changing-room	3	11,0	3,30	36	150			4,15	14	7	50	100%	0%	60%	70%	40%	30%		45			1,26
14	1	WC	3	10,8	3,30	36		100		2,81	14	7	50	100%	0%	60%	70%	40%	30%			30		0,85
15	1	Others	3	8,8	3,30	29		100		3,45	14	7	50	100%	0%	60%	70%	40%	30%			30		1,04
16	1	Gym	4	280,3	5,30	1485	1150	1200		0,81	14	7	50	100%	20%	60%	40%	40%	40%		387	404		0,27
17	1	Teachers room	4	10,7	3,30	35	50			1,42	14	7	50	100%	20%	60%	40%	40%	40%		17			0,48
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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]

### 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, both for interior as for exterior location of the ventilation unit. These duct sections can be entered here. The heat losses of the overlying duct section will be considered for the effective heat recovery efficiency.

An entered duct section can also be used for multiple ventilation units.

If in the section "Ventilation unit - selection" in one line 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).

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[illegible]

PHPP, Additional vent