# Ventilation system

## Individual ventilation system

### Issues to considered in the technical design

* The ventilation rates according to EN 15251 shall be considered.

Kindergarten/schools: a ventilation rate of **more than 15 m³/h and child and 25 m³/h per adult** shall be applied. The ventilation system shall be equipped with a waste heat recovery system and a control system.

Optional: controlling the ventilation according to the CO2 content in the room (CO2 sensor required).

Example: classroom with 30m² and 20 children, 1 teacher

Required ventilation rate: 20 \* 15m³/h + 1 \* 25m³/h = 325 m³/h

* The location and capacity of the ventilation units shall be indicated in the drawings, furthermore the location of the wall lead through
* The connections for electricity must be clearly defined, the electric system must be suitable for the ventilation system
* In case the ventilation unit requires a connection to the sewer system for the condensate, this connection has to be clearly defined
* The ventilation units (if installed in classrooms/sleeping rooms shall comply with national standards for noise and air velocity

### Recommended input to the tender book

The Contractor has to deliver and install “ready to work” ventilation system.

The Contractor has to deliver and install prefabricated (individual) compact ventilation units in the selected rooms of the kindergarten. The number and location of the ventilation units in the rooms are indicated in the relevant technical drawings.

The ventilation system shall cover the following functions:

Supply filtered fresh air to the connected rooms; extract exhausted air from connected rooms; waste heat recovery system; de-icing function; preheating of fresh air in case of low outside temperatures.

Each ventilation unit comprises of the following components:

* Ventilation unit (incl. heat exchanger, filters, electric preheating system, fresh air/exhaust air multi speed ventilator, motorized exhaust and fresh air damper, etc.)
* Multi speed ventilators (min. 3 steps or equipped with a variable speed drive)
* Solution for removing condensate (pump or at least a collection tray)
* Support construction for the installation of the unit
* Programmable control system for CO2 sensor and timer
* Optional: External CO2 sensor (wall mounted)
* Fresh air/exhaust air ducts from the unit to the outside of the building
* Fresh air/exhaust air ducts in the classroom (if required)
* Outlets/inlets for fresh air/exhaust air at the outside of the exterior wall
* The installation of the ventilation systems shall consider limiting noise/vibration transmission.
* Other components which will be required for the functioning of the system

Requirements of the control system:

The control system for the ventilation system shall have the following min. functionalities:

1) Timer – to set the general operation hours (i.e. 08:00 – 15:00)

2) Manual switch to select the ventilation capacity (min 3 steps required) for the ventilation system

In case a more advanced control system should be installed the following requirements are recommended:

1) Timer – to set the general operation hours (i.e. 08:00 – 15:00)

2) Automatic control of the ventilation system according to the CO2 sensor (during the general operation hours set by the timer)

3) Manual switch (ON/OFF) for the ventilation system

In the event the ventilation system comprises of more than one ventilation unit, all ventilation units should be managed by a central control system that controls all ventilation units in a room.

The control system shall manage the ventilation system fully automatically in dependence of the CO2 concentration in the classroom and a timer. It is recommended that the CO2 concentration shall not exceed the outdoor air CO2 concentration by 1,000 ppm.

Further requirements:

Recommended maximum noise level of the ventilation system in classrooms: 35 dB(A).

The Contractor has to provide an EC Declaration of Conformity.

Energy efficiency Label according to the Commission Regulation EU 1253/2014: A+ or better

Installation:

The contractor has to deliver a turnkey ventilation system incl. all required installation works and required installation materials (installation of the unit, wall lead through, electricity connection, condensate connection, etc.). The wall lead-through (duct holes) must be properly integrated and sealed into the thermal insulation system of the façade (rain or moisture must not penetrate the insulation material of the façade).

The ventilation units shall be suitable for installation either onto the ceiling/wall or the floor in the classrooms. The ventilation system must be installed in a way that students/children cannot be harmed. Furthermore the ventilation system must be sufficiently protected against mechanical damages (depending on the location of the installation).

The installation works includes also the electricity connection

The following units shall be delivered and installed:

|  |  |  |
| --- | --- | --- |
| Max flow rate per unit in m³/h (at 35 dB(A)) | No of units | Location |
| Up to xx  | 3 | Room No xx, xx, xx |
| Up to xx | 2 | Room No xx, xx |

## Centralized ventilation system

### Issues to considered in the technical design

* The ventilation rates according to EN 15251 shall be considered.

Kindergarten/schools: a ventilation rate of **more than 15 m³/h and child and 25 m³/h per adult** shall be applied. The ventilation system shall be equipped with a waste heat recovery system and a control system.

Optional: controlling the ventilation according to the CO2 content in the room (CO2 sensor required).

Example: classroom with 30m² and 20 children, 1 teacher

Required ventilation rate: 20 \* 15m³/h + 1 \* 25m³/h = 325 m³/h

* The location and capacity of the ventilation unit shall be indicated in the drawings
* The overall electric system must be suitable for the connection of the ventilation system
* For roof installation: The roof construction must be suitable for the load of the ventilation unit

### Recommended input to the tender book

Supply filtered fresh air to the connected rooms; extract exhausted air from connected rooms; waste heat recovery system; de-icing function; preheating of fresh air in case of low outside temperatures.

The ventilation system shall cover the following functions:

Supply filtered fresh air to the connected rooms; extract exhausted air from connected rooms; waste heat recovery system; de-icing function and control of preheating surface and comfort heater for unit operation at low outside temperatures.

Each ventilation unit comprises of the following components:

* Ventilation unit in a galvanized metal sheet box (incl. heat exchanger, filters, electric (or connection to the heating system) preheating system, fresh air/exhaust air ventilator with variable speed drives, motorized exhaust and fresh air damper, etc.)

In case of outdoor installation the unit must be heat insulated

* Duct system for fresh air and exhaust air incl. mechanically damper flaps (volume flow limiter) to adjust the air flow (during the start-up phase of the system).
* The ventilation unit must be suitable for outdoor installation, ventilation ducts through unheated areas or outside must be heat insulated.
* Programmable control system for automatic operation, timer and manual operation
* Outlets/inlets for fresh air/exhaust air at the outside of the exterior wall
* Other components which will be required for the functioning of the system
* Bypass for the heat exchanger

Recommended maximum noise level of the ventilation system in classrooms: 35 dB(A).

The installation of the ventilation systems shall consider limiting noise/vibration transmission.

The Contractor has to provide an EC Declaration of Conformity.

Installation:

The contractor has to deliver a turnkey ventilation system including the entire ventilation duct system. All required installation works and required installation materials (support construction, installation of the unit, wall lead through, electricity connection, condensate connection, etc.) must be provided. The wall lead-through (duct holes) must be properly integrated and sealed into the thermal insulation system of the façade (rain or moisture must not penetrate the insulation material of the façade).