Lossnay Presentation (Energy recovery ventilator)

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Agenda

- Necessity of Ventilation
- Energy loss caused by Ventilation
- What is Lossnay?
- Features and Benefits of Lossnay
- Comparison of Ventilation Method
- Range of Products
- Precaution of Installation

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Lossnay- Necessity of Ventilation

Importance of **Indoor Air Quality** (IAQ)

- Affects Health and Well Being
- Reduce Comfort level
- Sick building syndrome
- Related to poor work performance and productivity

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Lossnay- Necessity of Ventilation

Regulations

In many countries, IAQ control is regulated or recommended.

World	WHO limits CO_2 concentration
Japan	Building Control Law limits CO_2 concentration
U.S.	ASHRAE recommends minimum fresh air rate for each applications and limits CO_2 concentration
Italy	UNI10339 recommends minimum fresh air rate for each applications
U.K.	CIBSE recommends minimum fresh air rate

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Lossnay- Necessity of Ventilation

Based on SS553:2009

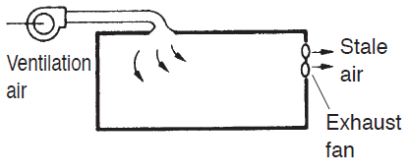
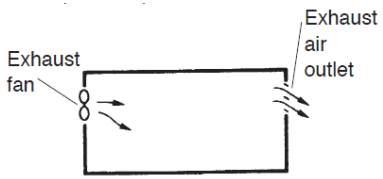
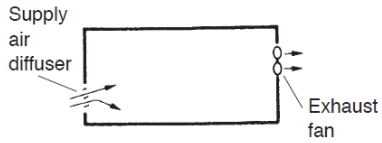
Table 1 – Outdoor air supply requirement for comfort air-conditioning

Type of building/ Occupancy	Minimum outdoor air supply			
	l/s per m^2 floor area	m^3 /h per m^2 floor area	l/s per person	Air class [1]
Restaurants	3.4	12.2	5.1	2
(i) Dance halls	7.0	25.0	10.5	1
Offices	0.6	2.0	5.5	1
(ii) Shops, supermarkets and department stores	1.1	3.8	5.5	1 or 2
Theatres and cinemas seating area	2.0	7.3	3.0	1
Lobbies and corridors	0.3	1.1	3.3	1
Concourses	1.1	4.0	3.3	1
(iii) Hotel guest rooms	15.0 l/s per room	54.0 m^3 /h per room	5.5	1
(iv) Classrooms				
Primary school children and above	2.8	10.0	4.2	1
Childcare centres	2.8	10.0	8.4	1

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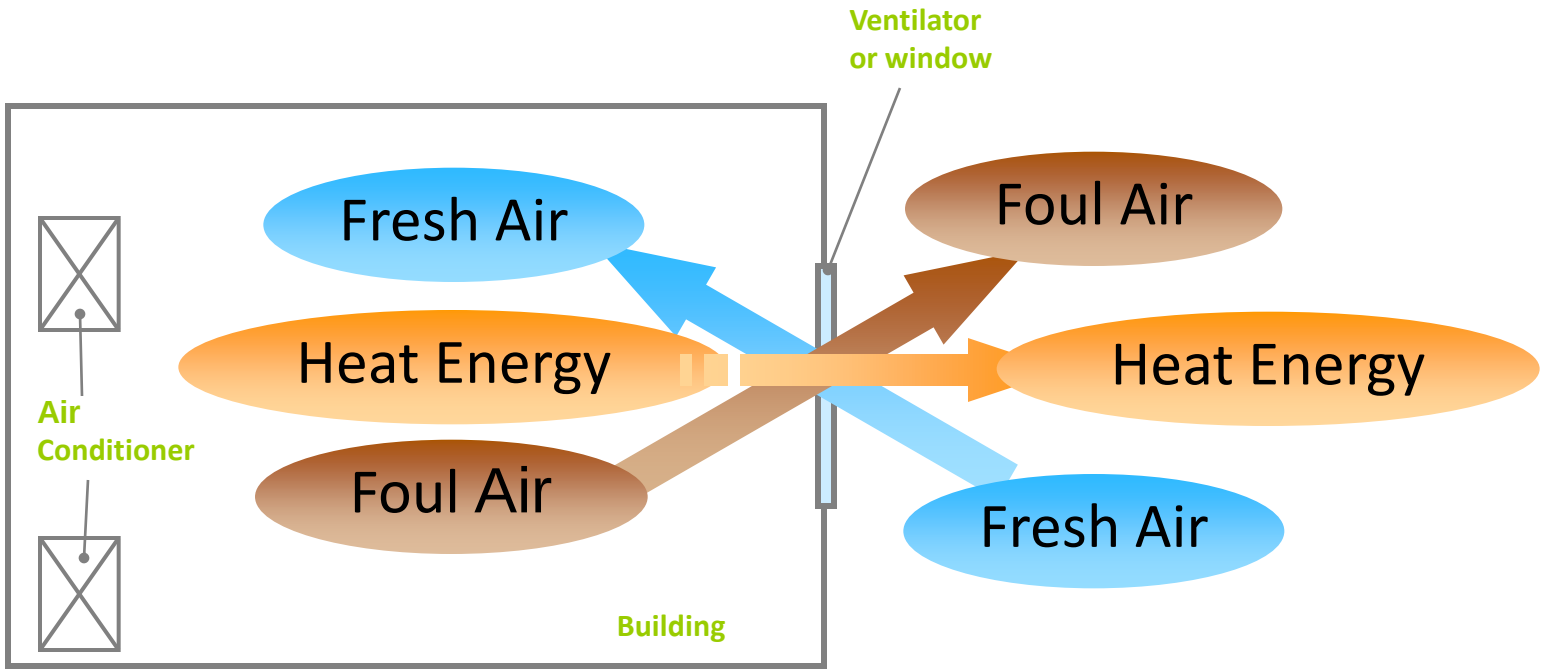
Lossnay- Necessity of Ventilation

Mechanical ventilation classification

Class 1  	• By changing the balance of the supply fan and exhaust fan's air volumes, the pressure in the room can be balanced. • An ideal design in which the supply air diffuser and exhaust air outlet position relation and air volume, etc., can be set.
Class 2  	• Surgery theater, Clean rooms, Food processing factories •The pressure is positive. • As the room is pressurized, odors and dust, etc., from neighboring areas can be prevented from entering.
Class 3  	• Local ventilation in kitchens, machine rooms, indoor pools, bathrooms, etc. •The room pressure is negative. • The relation of the exhaust air outlet to the supply air diffuser is important.

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Lossnay- Energy Loss by Ventilation

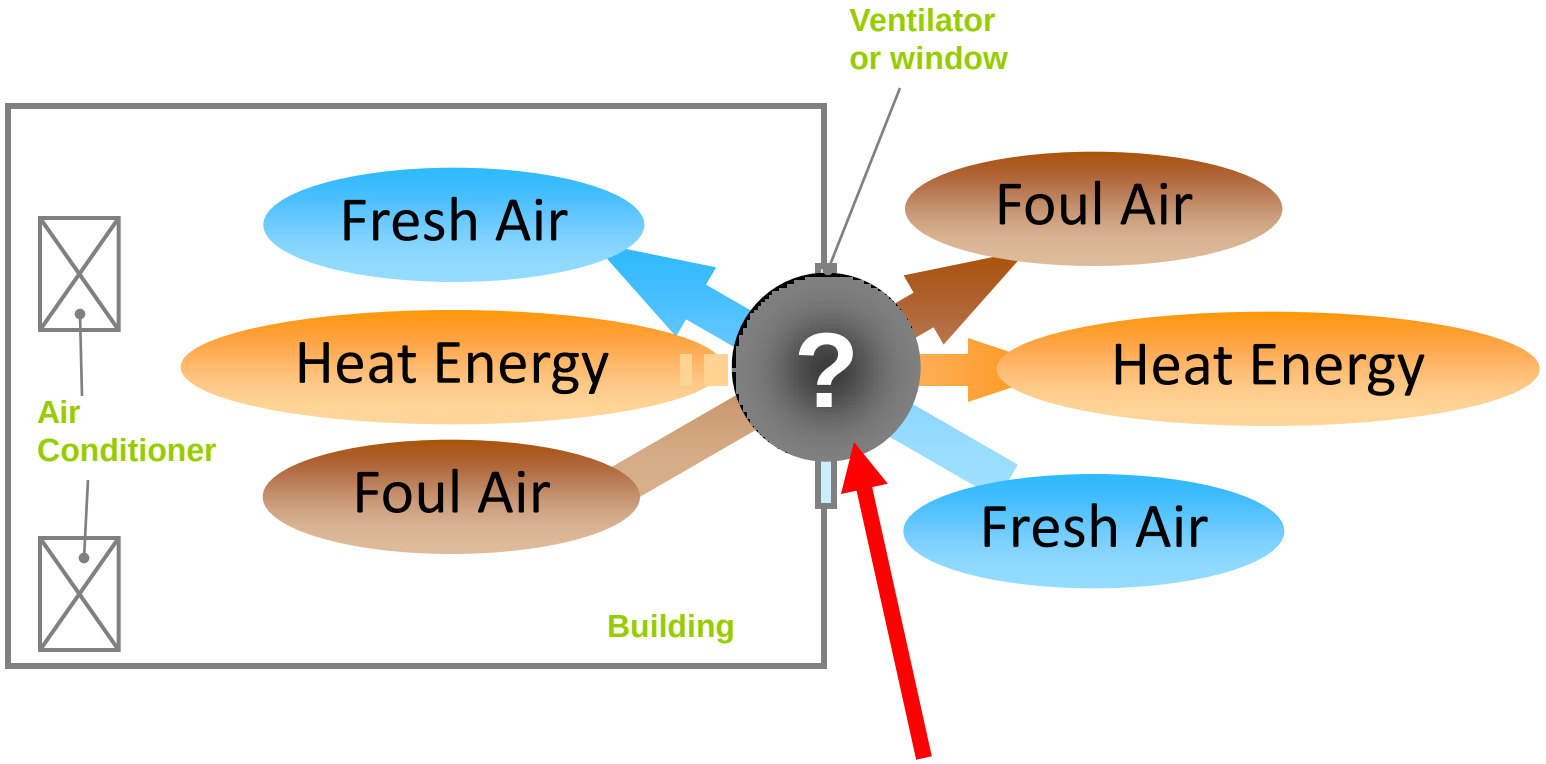


Wasting Energy!

Mechanical ventilation is very effective for air-tight buildings.
But it causes loss of energy (heating, air-conditioning load).

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Lossnay- Energy Loss by Ventilation



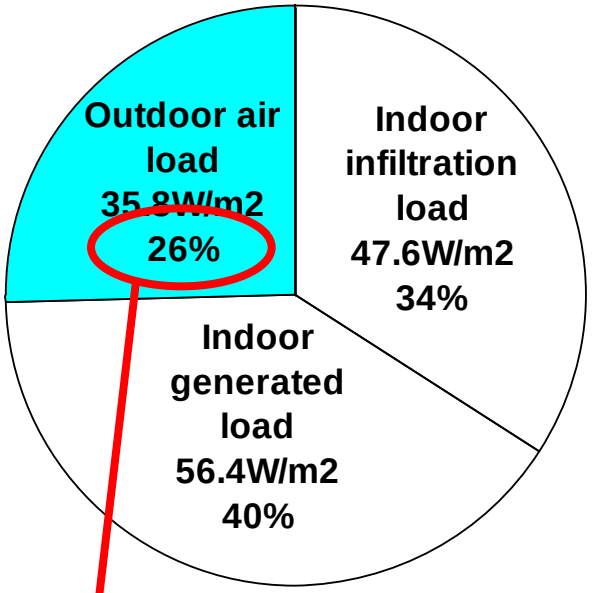
Need something to prevent Energy Loss!

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Lossnay- Energy Loss by Ventilation

Heat load example in summer

Type of Load		Estimated Load [W/m²]
Indoor infiltration load	Heat from walls Heat from glass -from direct sunlight -from conduction & convection Accumulated heat load in walls	47.6
Indoor generated load	Generated heat from people -Sensible heat -Latent heat	24.6
	Generated heat from electrical equipment (lighting etc.) -Sensible heat -Latent heat	30.0
Outdoor air load	Sensible heat Latent heat	35.8
Total	------	139.8



Energy loss caused by ventilation

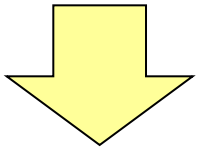
Conditions
Outdoor air: DB 27 °C, RH 50%
Indoor air: DB 21 °C, RH 50%
Ventilation volume: 36m3/Hr/person (10l/s/p)
Middle floor of a general office building facing south

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Lossnay- Energy Loss by Ventilation

IAQ (Indoor Air Quality) and Energy Conservation

- IAQ must be considered and ventilation is an efficient solution.
- However, ventilation causes waste of energy.

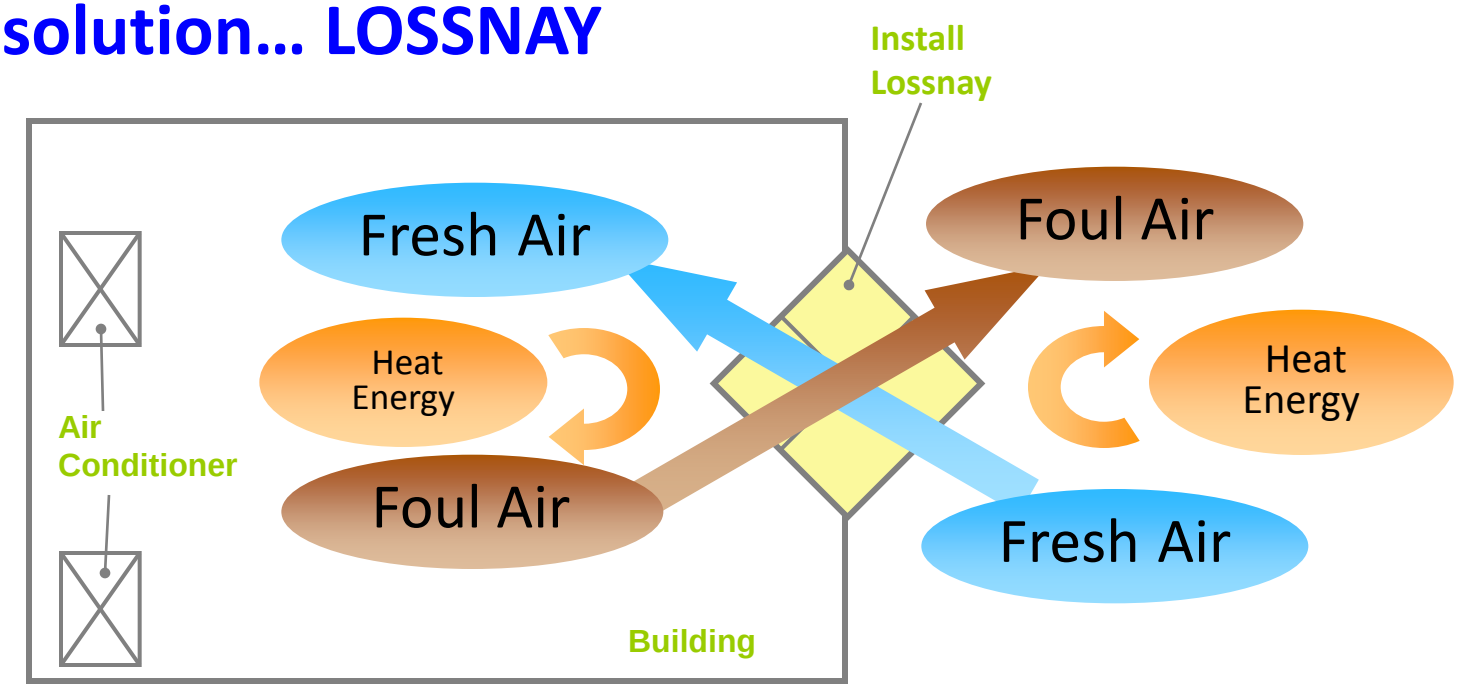


How can a building be designed to have both good IAQ and energy conservation?

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Lossnay- Energy Loss by Ventilation

The solution… LOSSNAY



Energy Recovered !!

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Lossnay- What is Lossnay?

What is ERV/HRV?

ERV = Energy Recovery Ventilator

HRV = Heat Recovery Ventilator

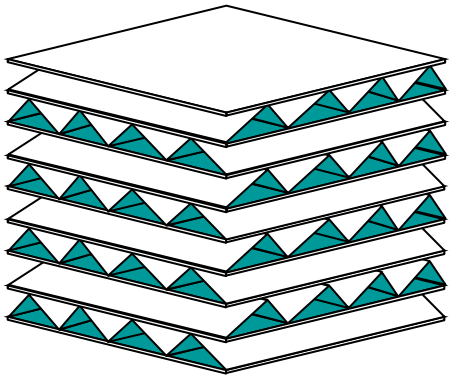
Construction type	Method	Air flow	Country of development
Static	Conductive transmission type	Cross-flow	Japan
Rotary	Heat accumulation / humidity accumulation type	Counter-flow	Sweden

LOSSNAY is …

- A static type ERV
- MITSUBISHI is the origin of static type
- LOSS = "Energy loss", NAY = "Nothing in Japanese"

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Lossnay- What is Lossnay?







In 1969, Mr. Masataka Yoshino invented the principle of Lossnay.

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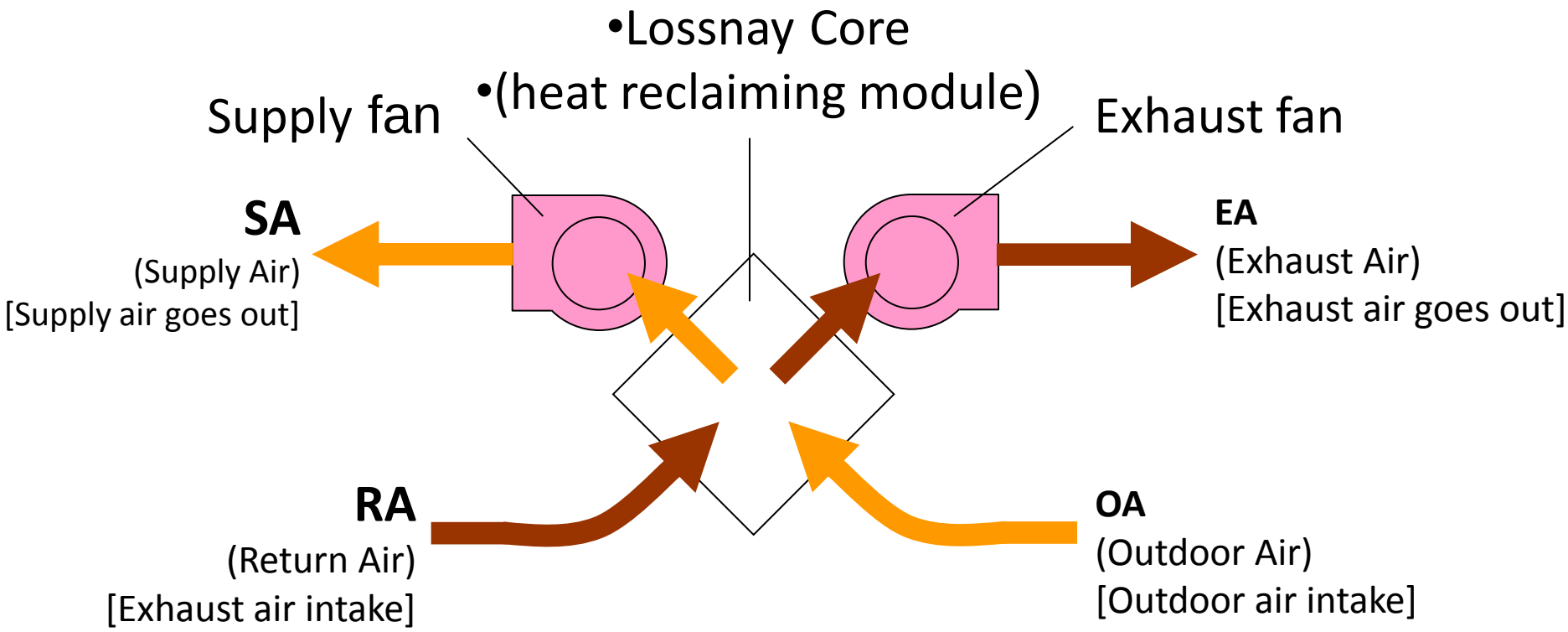
Lossnay- What is Lossnay?

The trigger of invention



Lossnay- What is Lossnay?

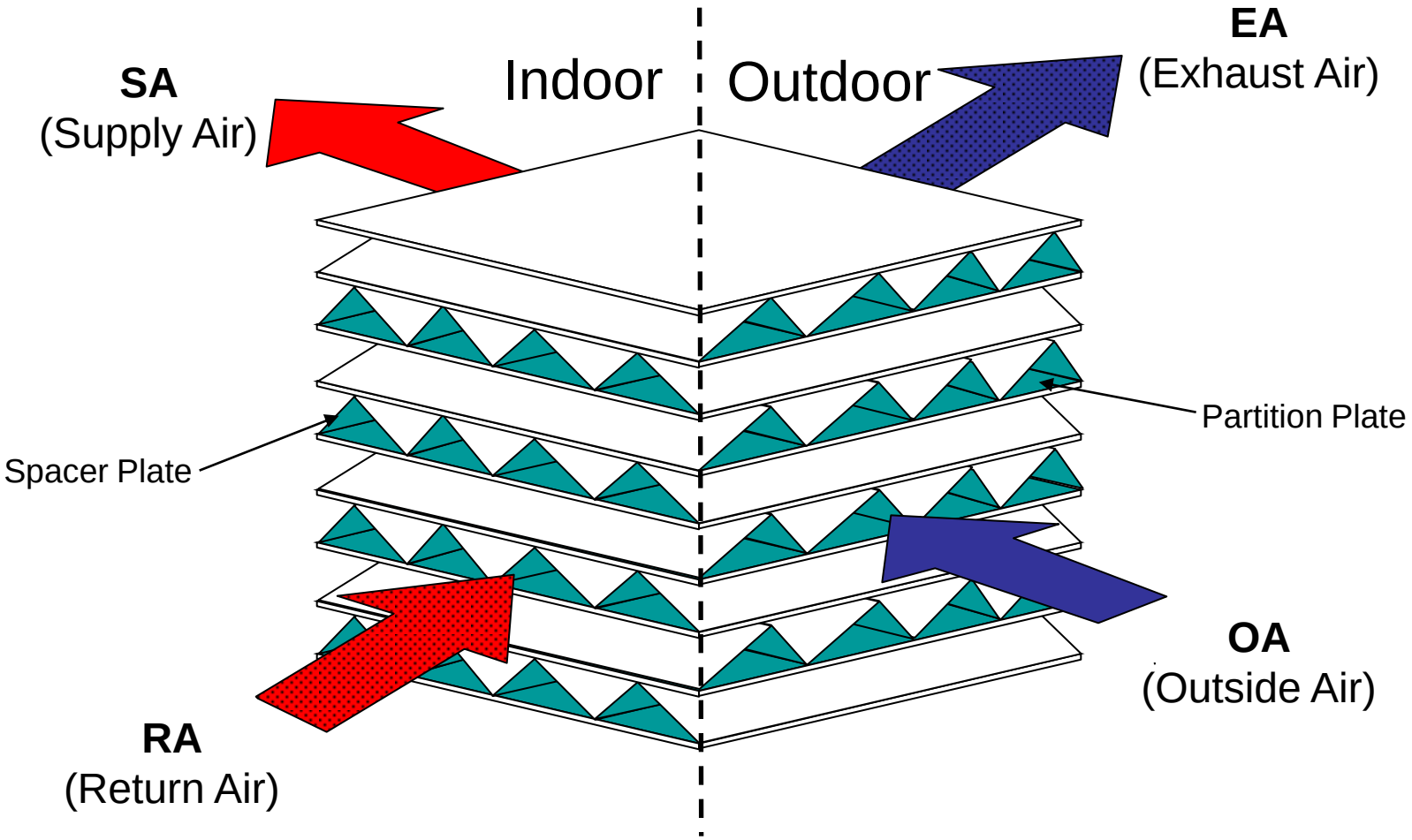
Lossnay principle



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Lossnay- What is Lossnay?

Lossnay core construction

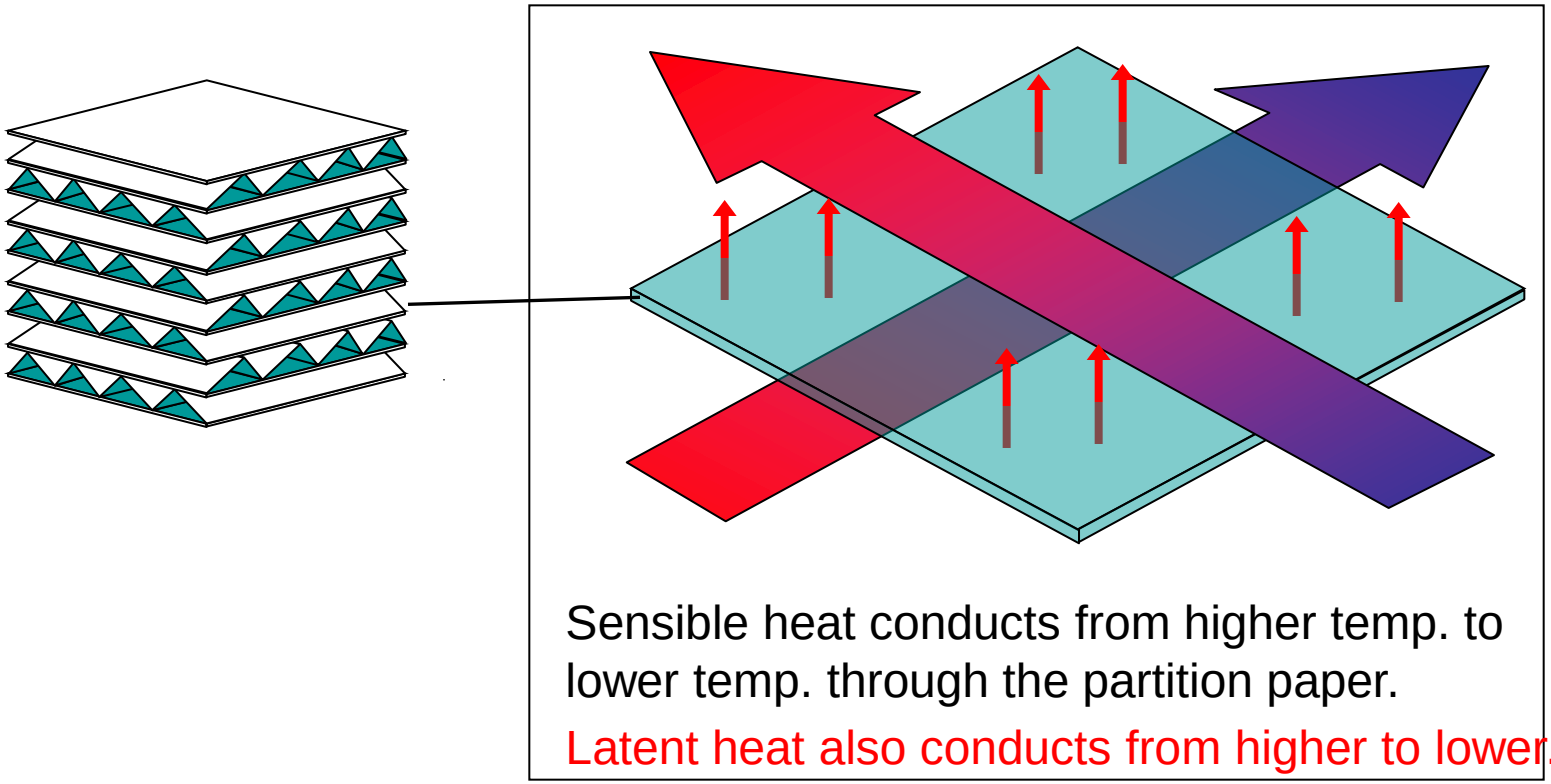


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Lossnay- What is Lossnay?

Energy Recovery Principle

Total Heat Recovery = Sensible Heat (Temperature)
+ Latent Heat (Humidity)



Sensible heat conducts from higher temp. to lower temp. through the partition paper.

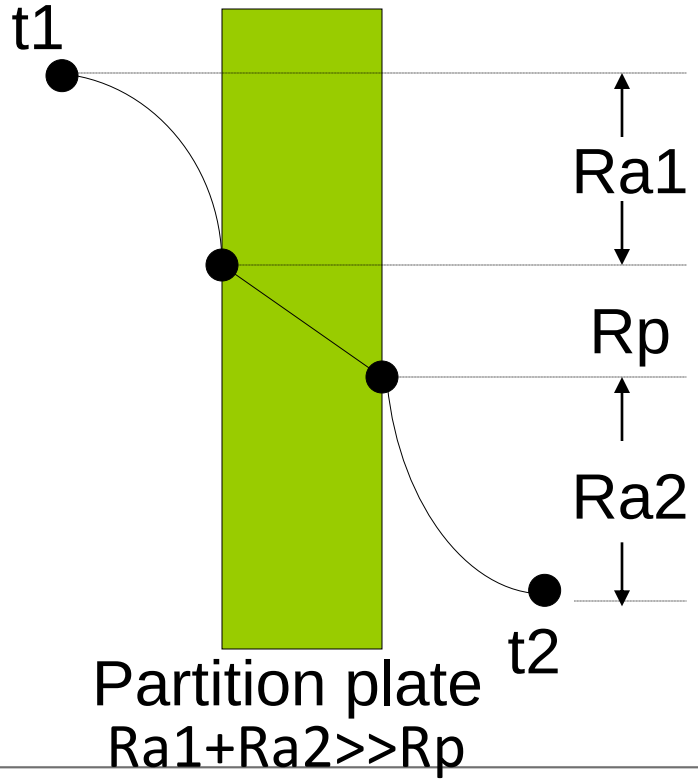
Latent heat also conducts from higher to lower.

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Lossnay- What is Lossnay?

Temperature recovery mechanism

Heat conduction and heat passage is performed through a partition plate form the high temperature to low temperature side. As shown on the right, the heat recovery layer, and for the Lossnay there is little difference when compared to materials such as copper or aluminum which also have high thermal conductive.



<Heat resistance coefficients>

	Treated paper	Cu	Al
Ra1	10	10	10
Rp	1	0.00036	0.0006
Ra2	10	10	10
TOTAL	21	20.00036	20.0006

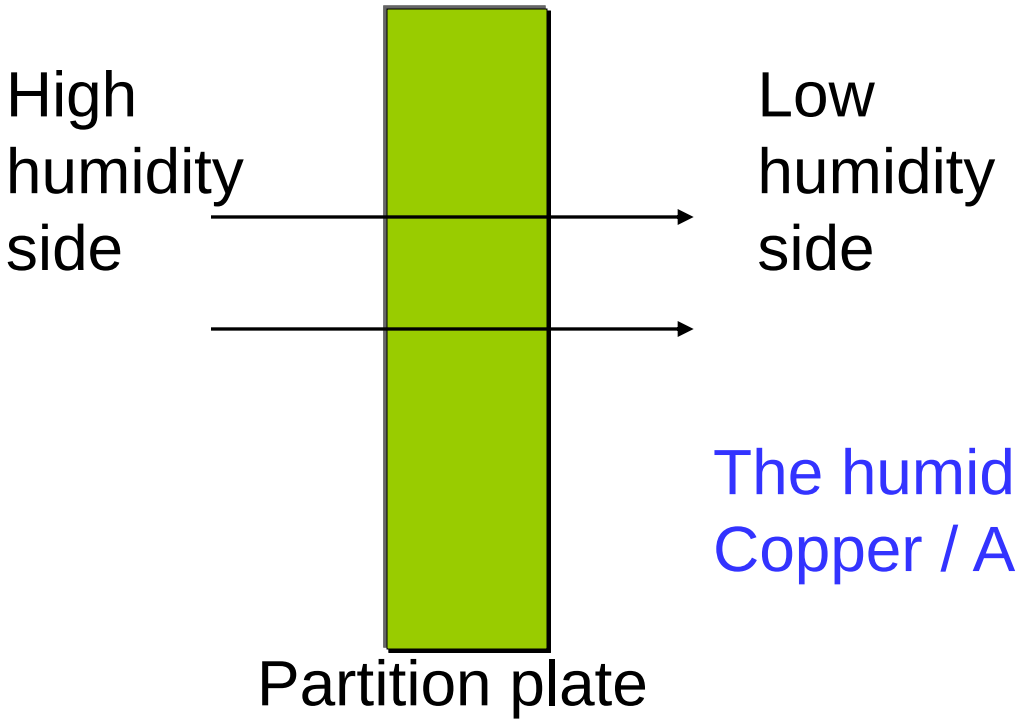
Almost same!

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Lossnay- What is Lossnay?

Humidity recovery mechanism

Water vapor is moved through the partition plate from the form the high humidity to low humidity side by means of the differential pressure in the vapor.



The humidity can not move through Copper / Aluminum plate

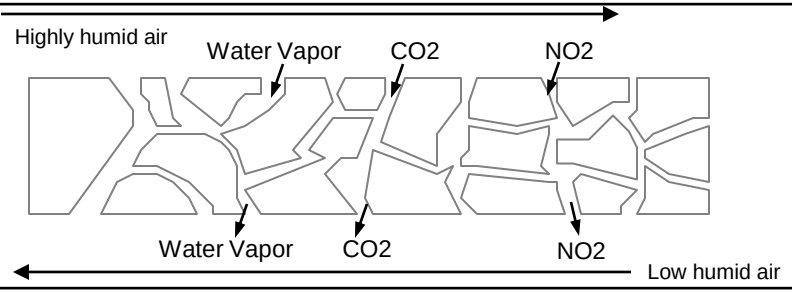
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Lossnay- What is Lossnay?

Ordinary paper

Water vapor is transferred, but gas elements that are easily dissolved in water such as CO2, NO2 are also transferred.

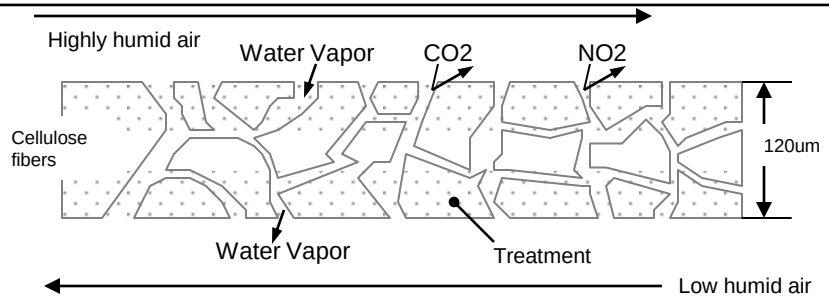
The contaminated air passed through the plates during ventilation and returns to the room.



Treated paper

Water vapor is transferred, but gas elements such as CO2, NO2 are not transferred.

The contaminated air does not almost return to the room when ventilated.

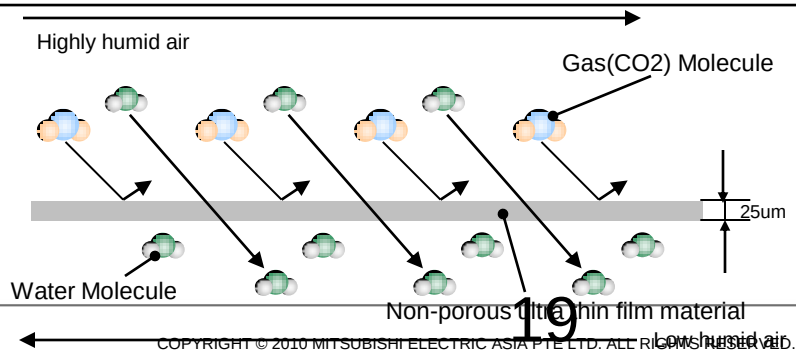


Hyper ECO core

Water vapor is transfer rate has increased with further reduction of gas transfer.

The rate at which the contaminated air returns to the room has been reduced to less than 1%*, and the total heat exchange performance has also been improved.

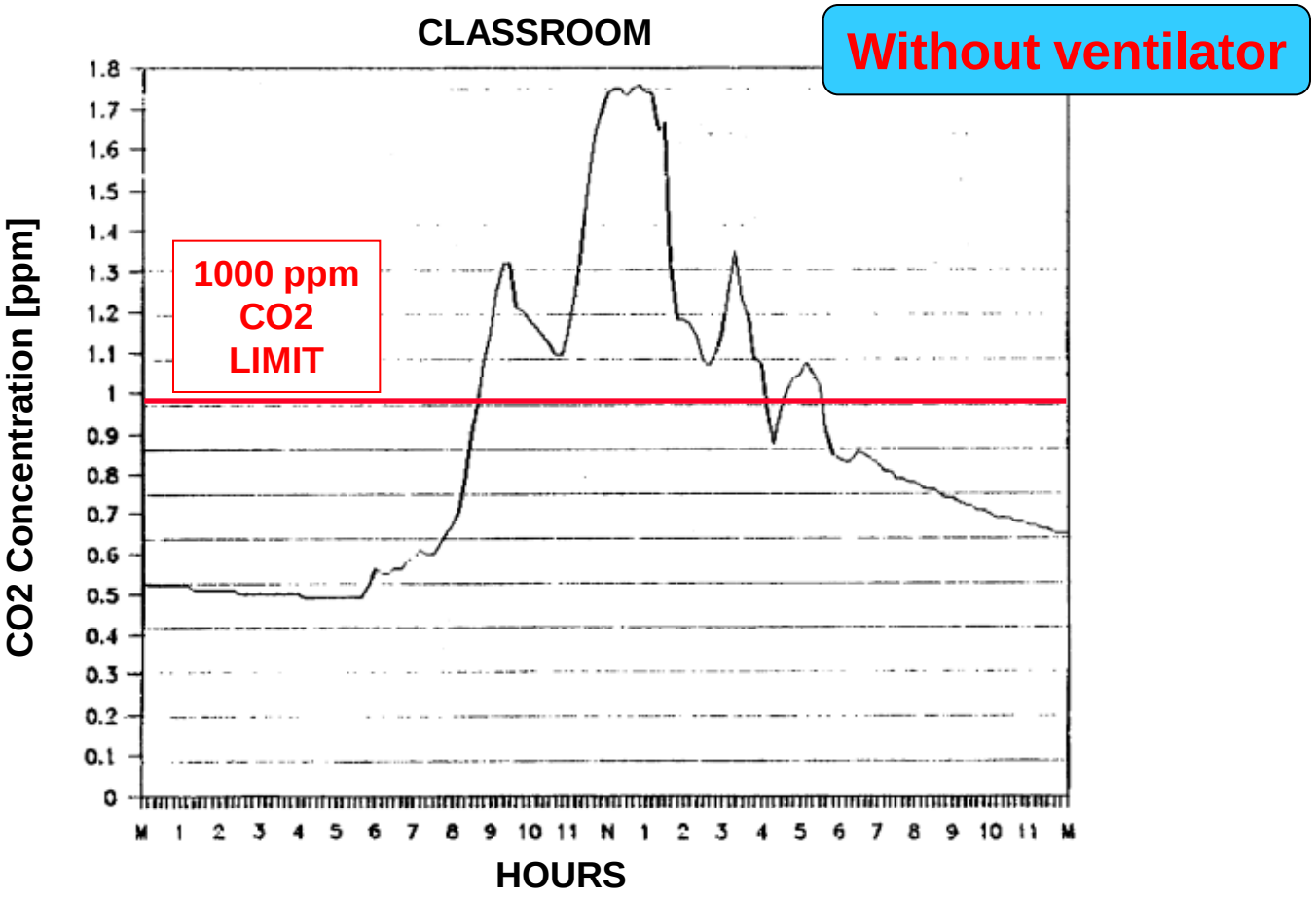
(*Based on data measured by Mitsubishi using a single core unit)



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Lossnay- Benefits of Lossnay

Simultaneous ventilation = Effective ventilation

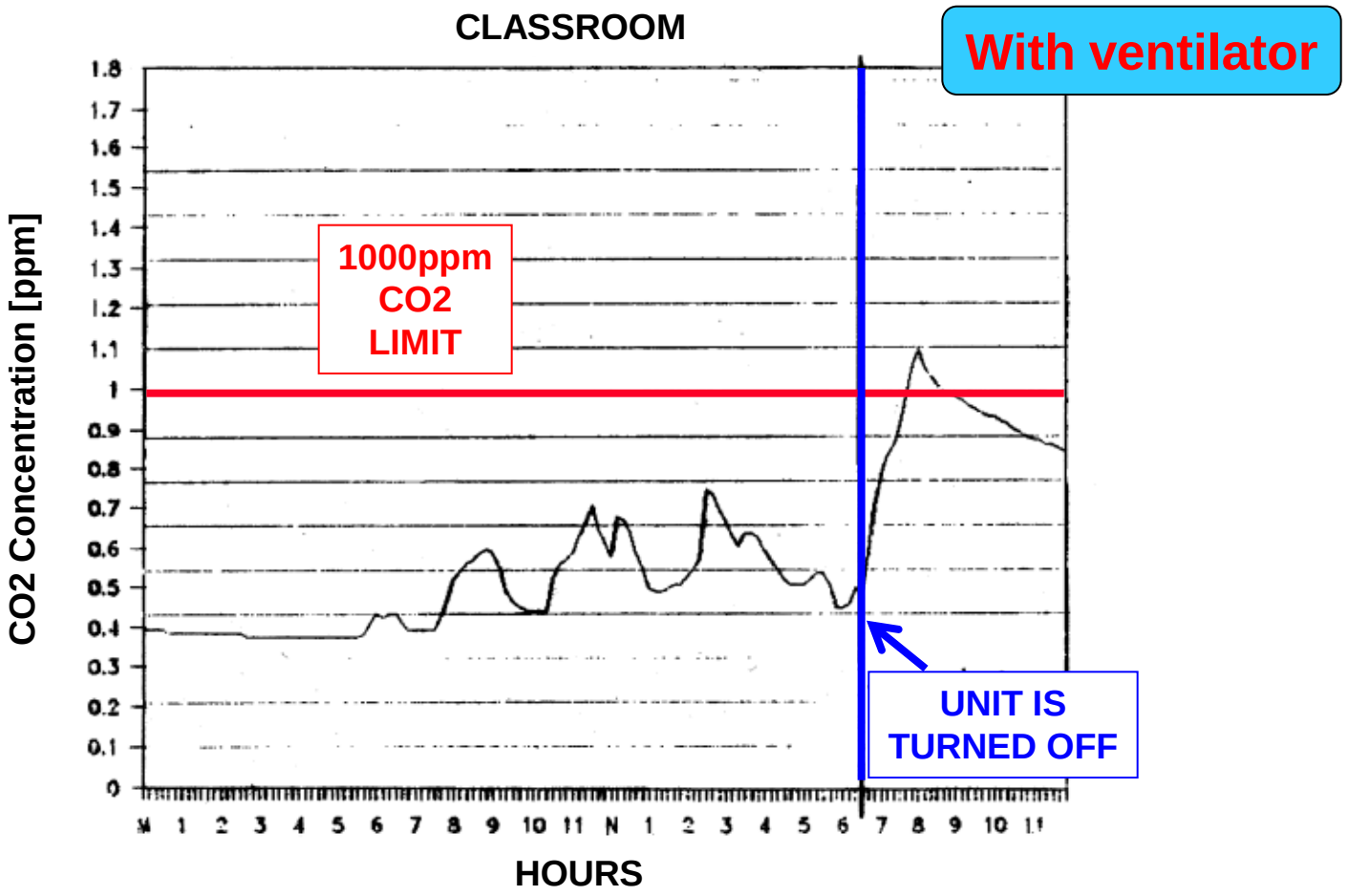


Test location: Madison Public School, Wisconsin, USA

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Lossnay- Benefits of Lossnay

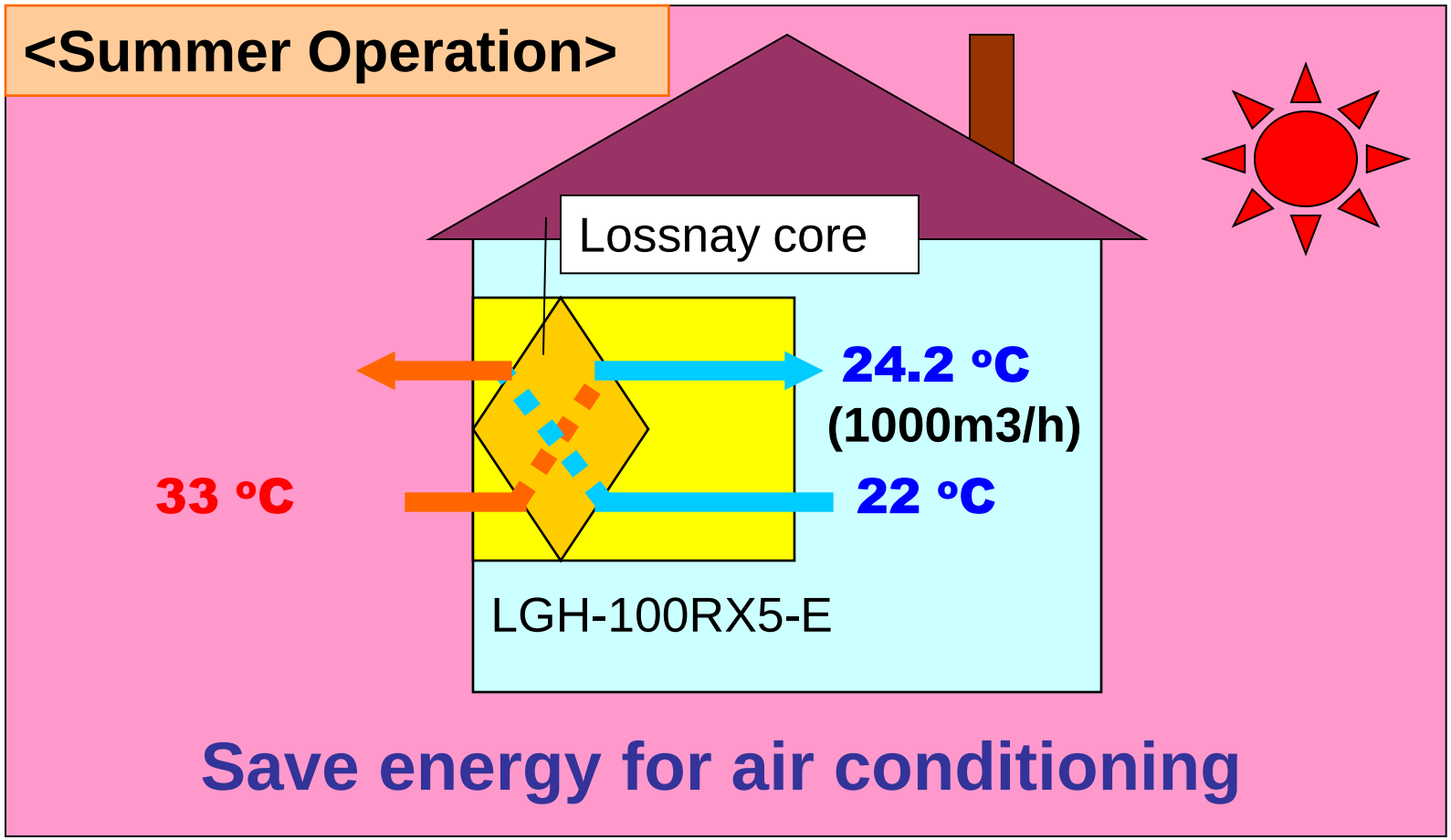
Simultaneous ventilation = Effective ventilation



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Lossnay- Benefits of Lossnay

Energy recovery ventilation

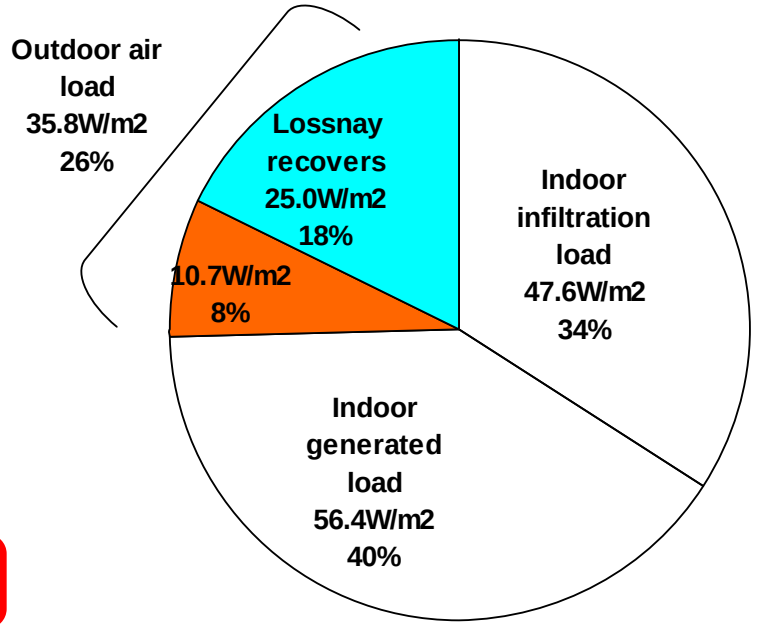


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Lossnay- Benefits of Lossnay

Energy recovery ventilation

Type of Load		Estimated Load [W/m²]	
		Without Lossnay	With Lossnay
Indoor infiltration load	Heat from walls Heat from glass -from direct sunlight -from conduction & convection Accumulated heat load in walls	47.6	47.6
Indoor generated load	Generated heat from people -Sensible heat -Latent heat	24.6	24.6
	Generated heat from electrical equipment (lighting etc.) -Sensible heat -Latent heat	30.0	30.0
Outdoor air load	Sensible heat Latent heat	35.8	10.7
Total	------	139.8	114.7

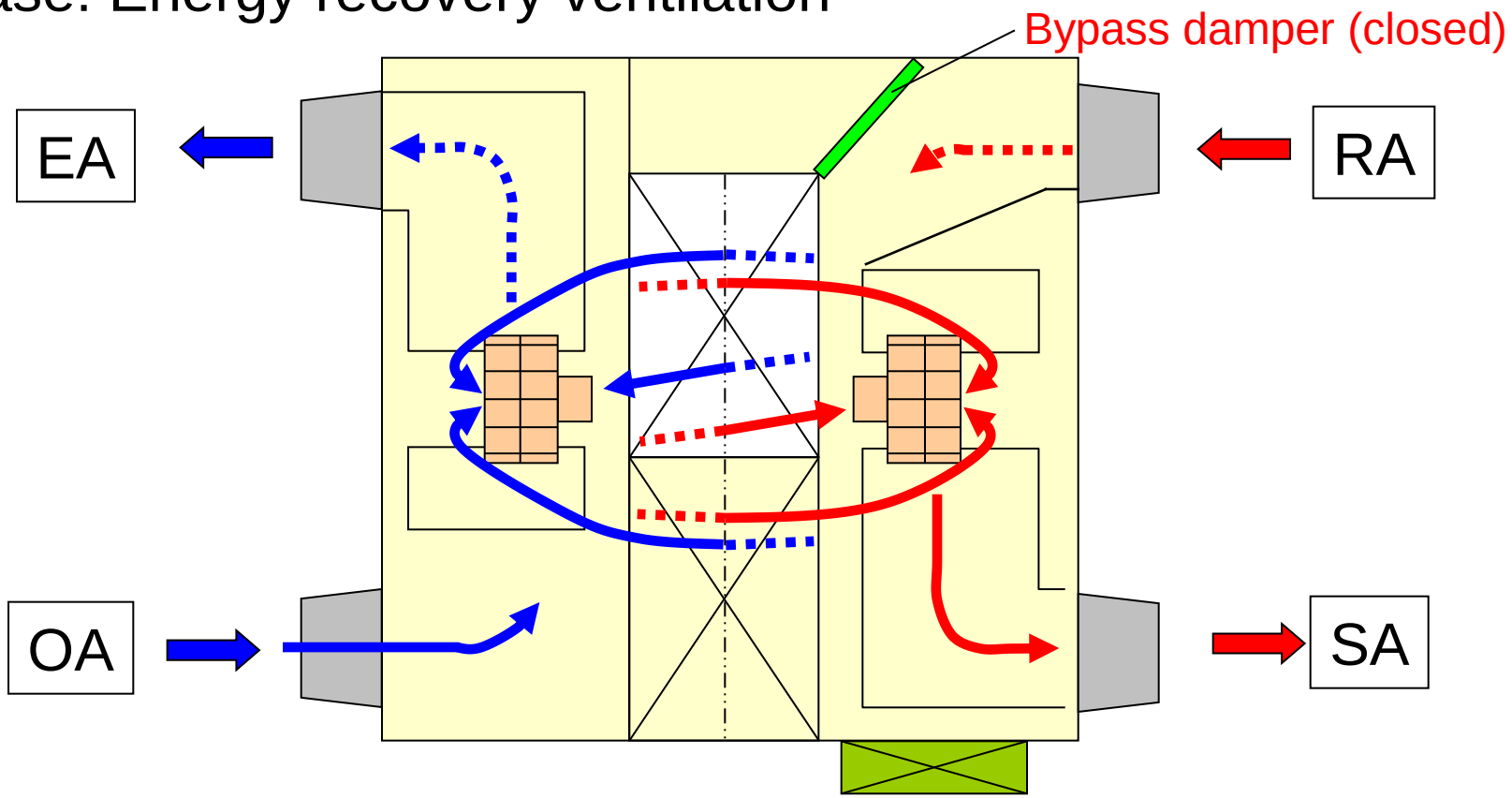


Conditions
Outdoor air: DB 27 °C, RH 50%
Indoor air: DB 21 °C, RH 50%
Ventilation volume: 36m3/Hr/person (10l/s/p)
Middle floor of a general office building facing south

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Lossnay- Benefits of Lossnay

case: Energy recovery ventilation

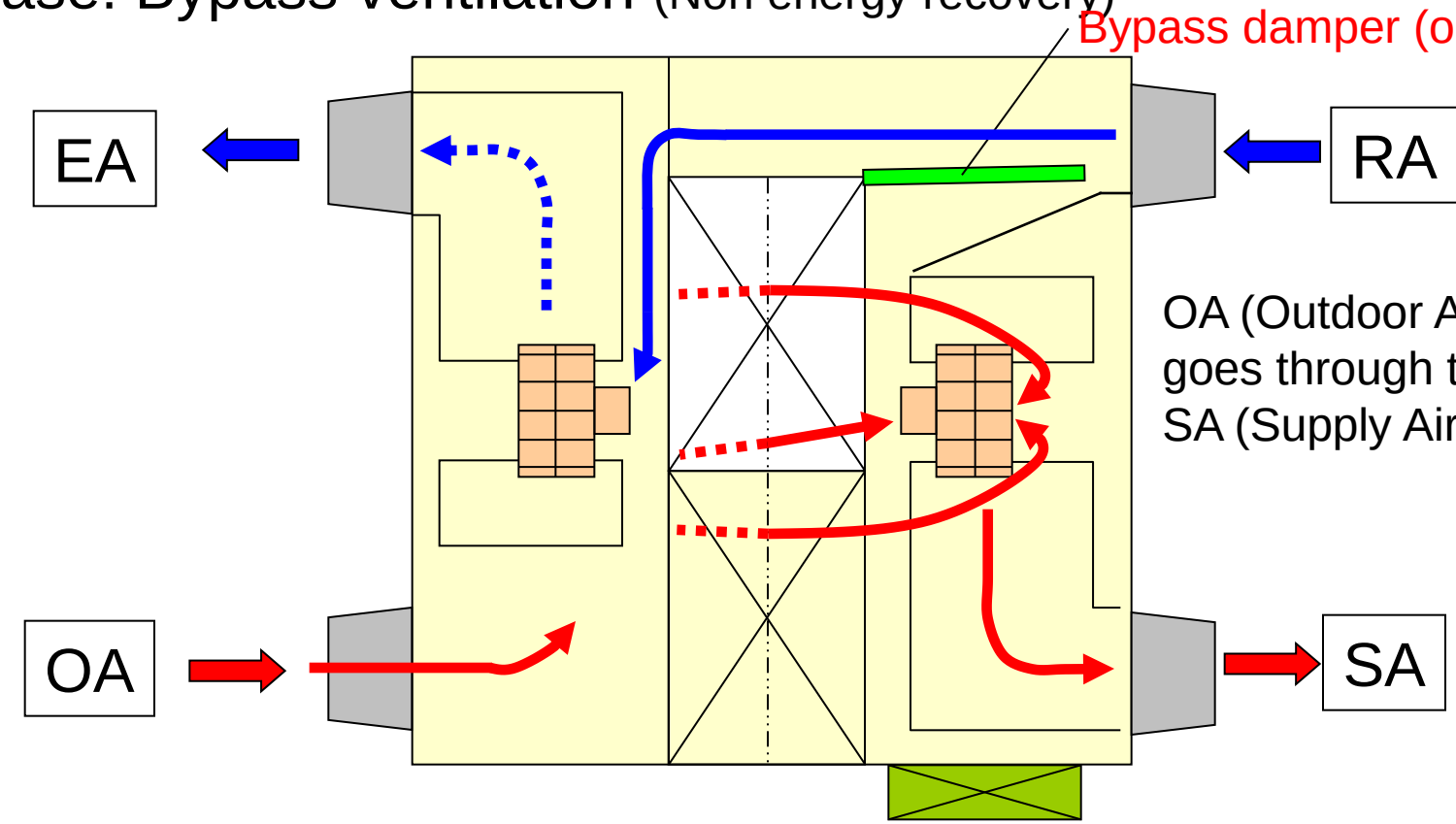


Main use when outdoor temperature is much higher/colder than indoor air-conditioned air.

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Lossnay- Benefits of Lossnay

case: Bypass ventilation (Non energy recovery)



OA (Outdoor Air) always goes through the filter, so SA (Supply Air) is clean.

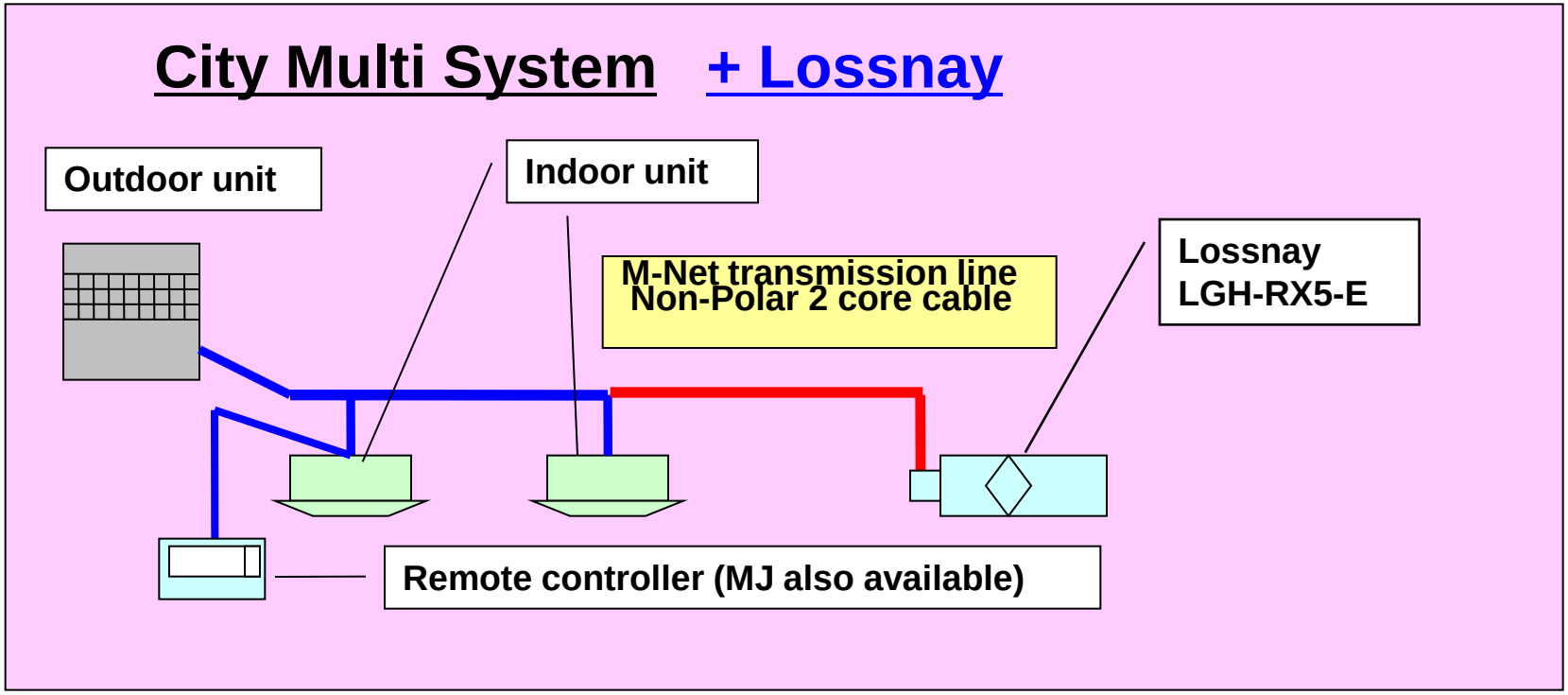
In summer especially night time, when outdoor temperature is lower than indoor cooled air, bypass ventilation provides cool air and reduces the indoor temperature.

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Lossnay- Benefits of Lossnay

Interlocked with City Multi

1. Lossnay LGH can be interlocked with City Multi System.
2. Lossnay operation is available even when I/U is stopped.

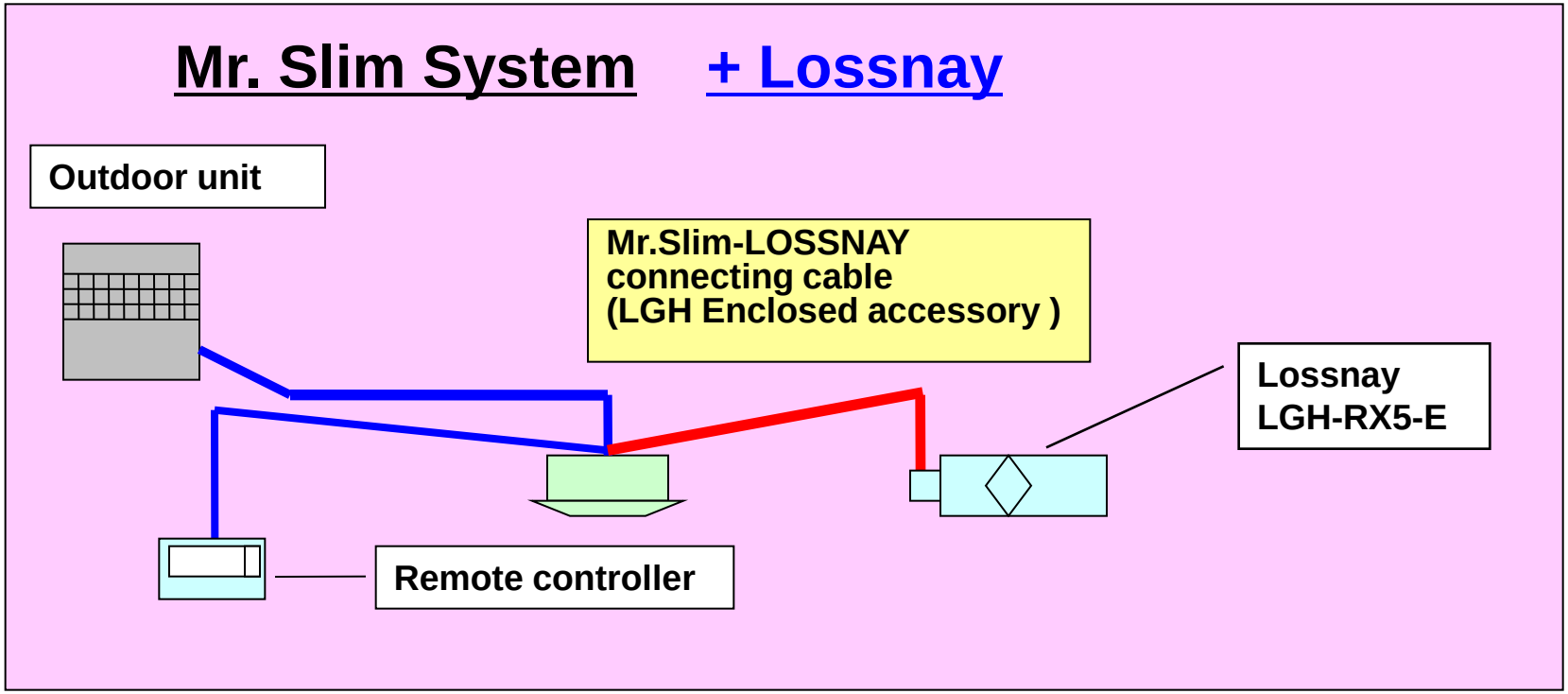


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Lossnay- Benefits of Lossnay

Interlocked with Mr. Slim

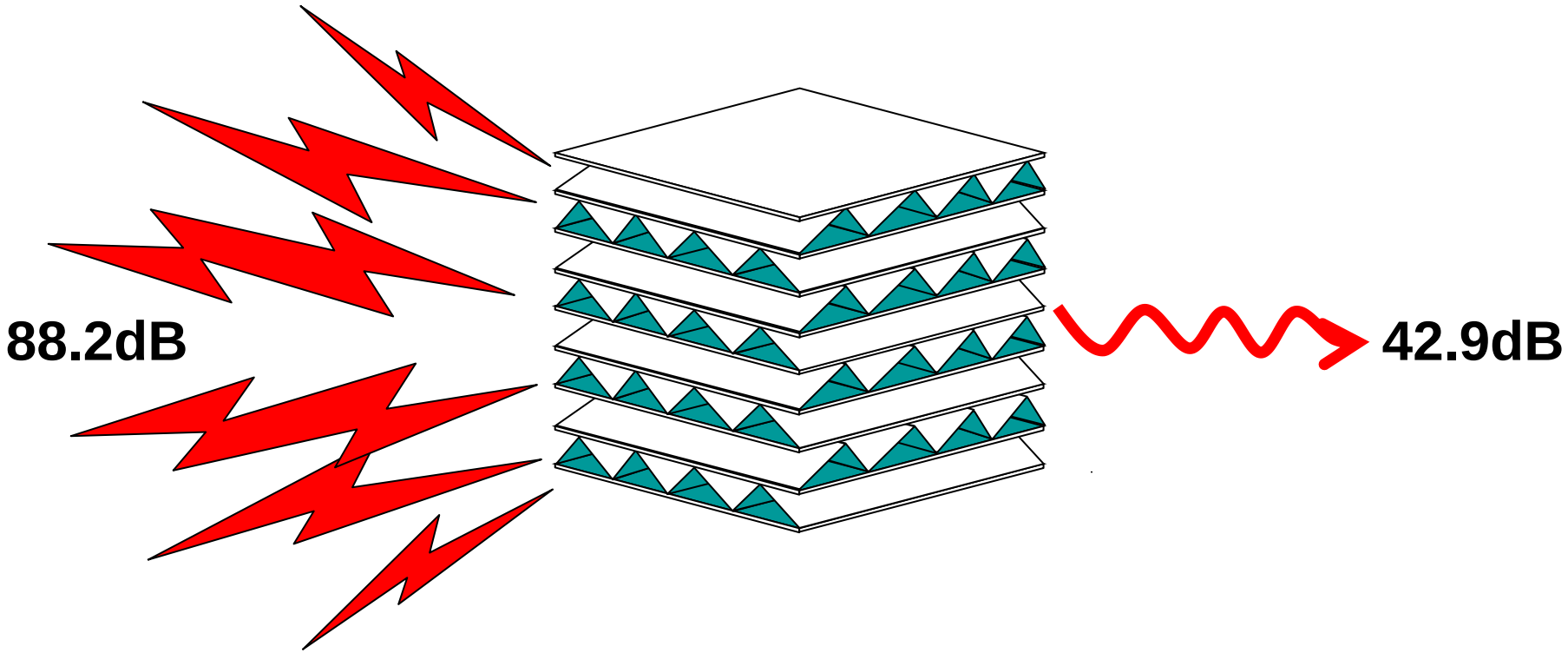
1. Lossnay LGH can be interlocked with Mr. Slim system (A, K control).
2. Lossnay operation is available even when I/U is stopped.



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Lossnay- Benefits of Lossnay

Sound Attenuation

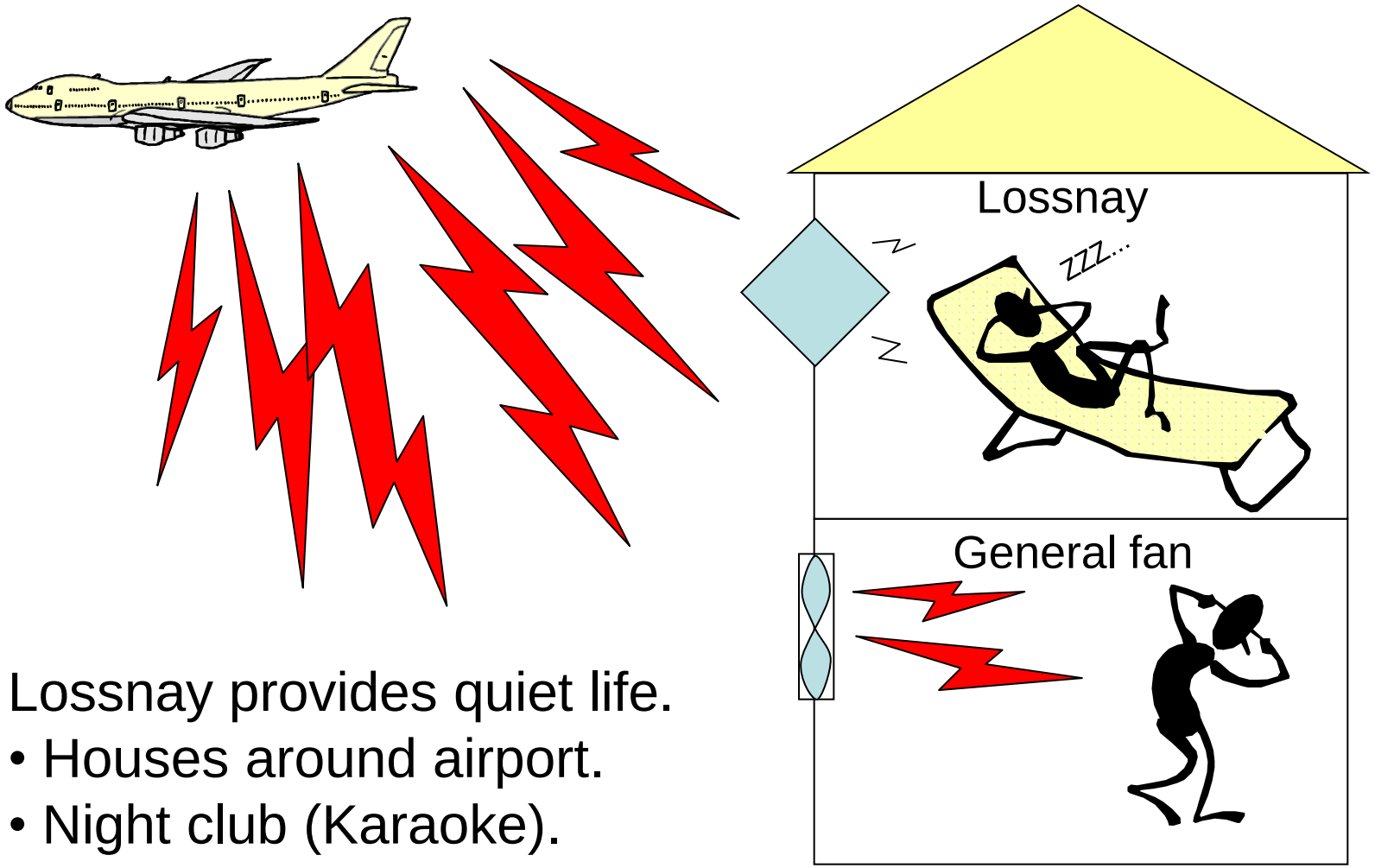


Reduced noise 45.3dB through the Lossnay core!

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Lossnay- Benefits of Lossnay

Sound Attenuation



Lossnay provides quiet life.

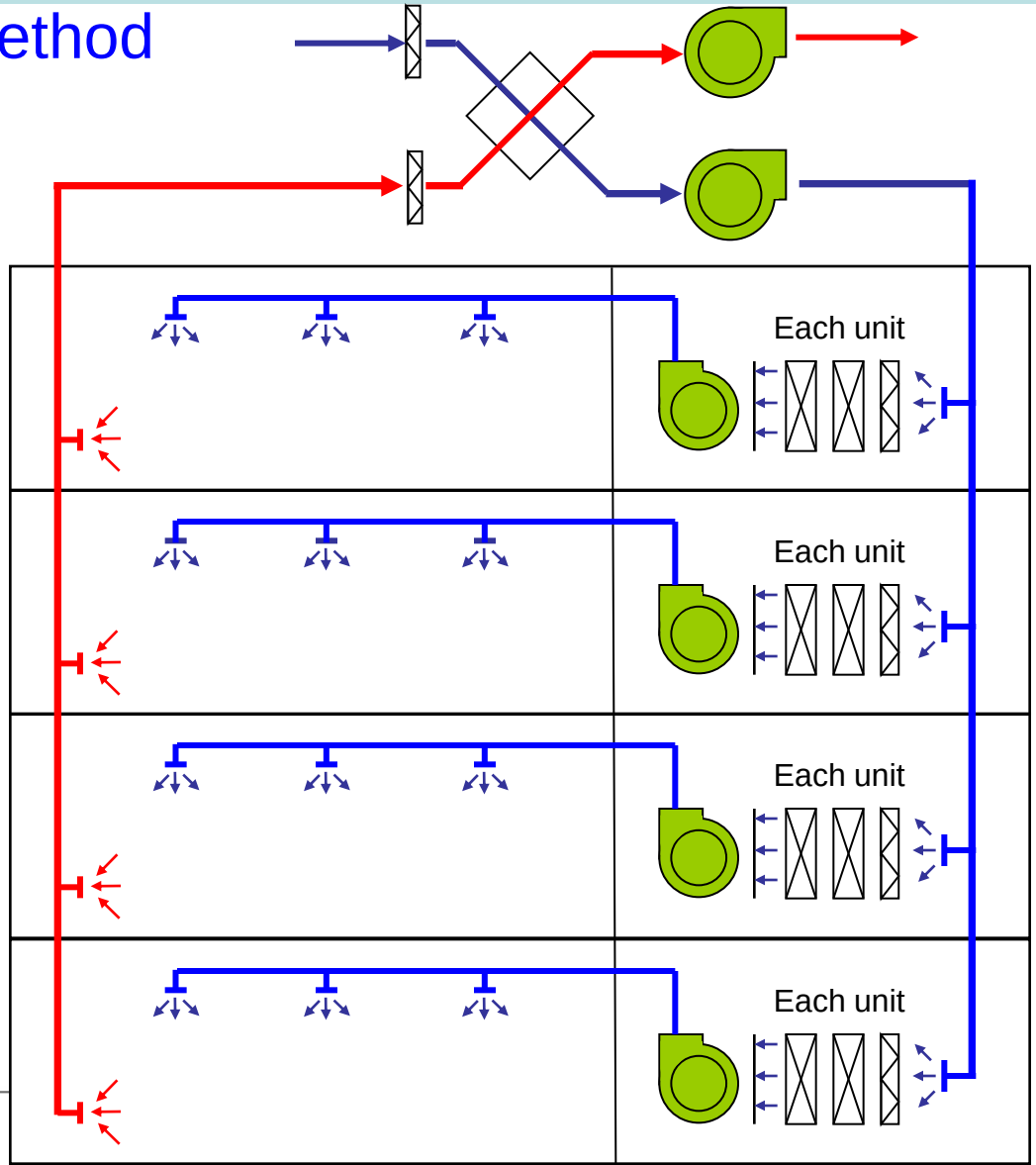
- Houses around airport.
- Night club (Karaoke).

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Lossnay- Comparison of Ventilation Method

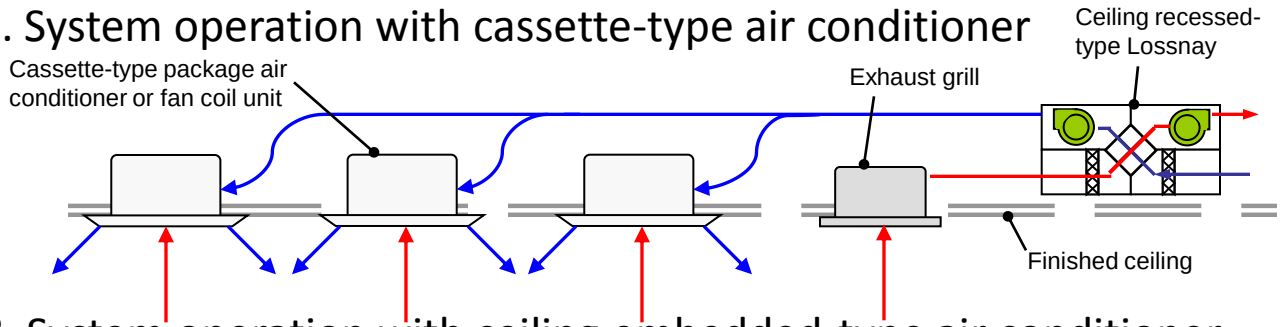
(1) Centralized ventilation method

This is mainly used in large buildings, with the fresh air outdoor air intake being installed in one machine room. For this method, primary treatment of the fresh outdoor air, such as heat recovery to the intake air and dust removal is performed being distribution to the building by ducts.

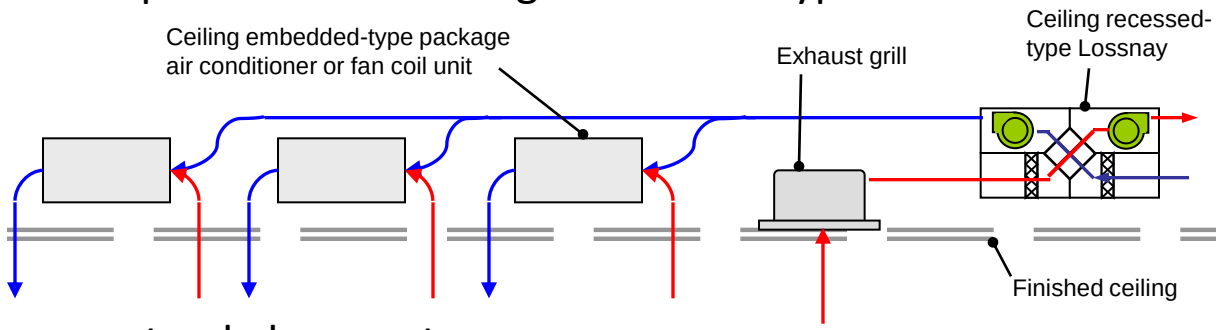


(2) Independent zoned ventilation method

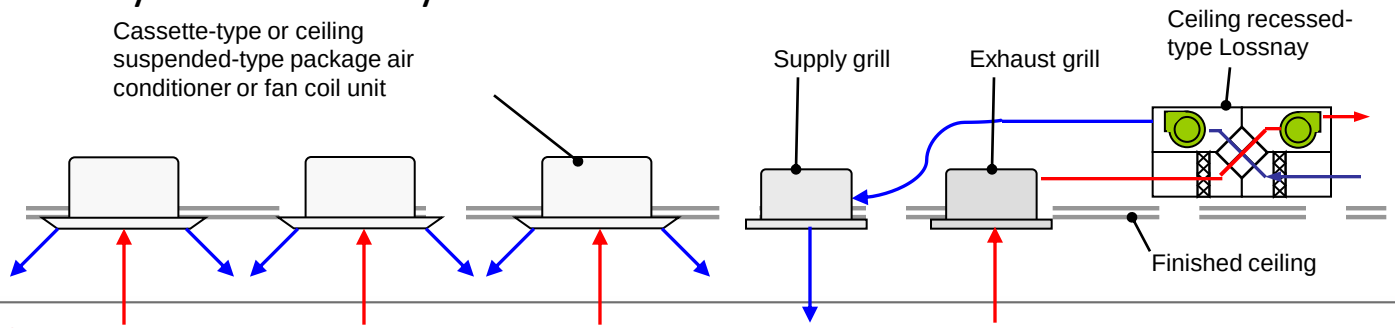
1. System operation with cassette-type air conditioner



2. System operation with ceiling embedded-type air conditioner



3. Lossnay stand alone system



This is mainly used in small to medium sized building, with areas being ventilated using outdoor air intakes formed of independent ventilation devices. The rate of use of this method has recently increased as independent control is becoming ever more feasible.

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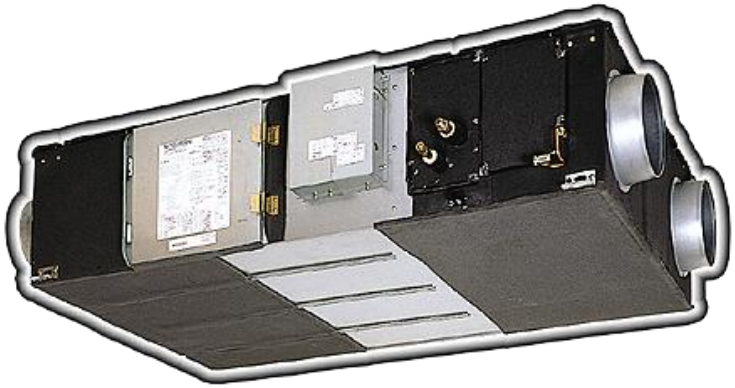
Lossnay- Range of Products

LGH-15~200RX5-E (9 models)



- 150 ~ 2,000 m^3/h
- Commercial use

GUF-50,100RD3,RDH3 (4 models)



- 500 ~ 1,000 m^3/h
- Commercial use
- A kind of City Multi Indoor

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Lossnay- Range of Products

Exterior

LGH-15~100RX5-E



LGH-150, 200RX5-E



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Lossnay- Range of Products

PZ-60DR-E
(Lossnay remote controller)



For LGH-RX5-E

PZ-41SLB-E
(Lossnay remote controller)



For LGH-RX5-E

PZ-52SLB-E
(M-NET remote controller)



For LGH & GUF

*Features and functions are referred to the other part.

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Filters for LGH & GUF

Standard filter (6 models)
PZ-25~100RF8-E
PZ-50,100RF7-E



- Optional parts for LGH & GUF series
- Washable & cleanable
- Once a year / 3,000 hrs
- G3 class (EU standard)

High efficiency filter (6 models)
PZ-25~100RFM-E



- Optional parts for LGH & GUF series
- Disposable
- Once a year / 3,000 hrs
- F7 class (EU standard)

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Lossnay- Precaution of Installation

Operating air conditions (temp. and humidity)

Please keep the air conditions in the table below to prevent freezing or damage to the Lossnay Core and condensation inside/outside the unit.

Model	Main unit installation conditions	OA (Outdoor Air) conditions	RA (Return Air) conditions
LGH-RX5-E GUF-RD(H)3 LU-500	-10 °C to 40 °C RH80% or less	-15 °C to 40 °C RH80% or less	-10 °C to 40 °C RH80% or less
VL-100U-E	*Room condition	-10 °C or more	40% or less *Room conditions

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Lossnay- Precaution of Installation

Operating in high humidity (RH80% or more)

When using the system in high humidity conditions such as heated indoor pools, bathrooms, mushroom cultivation houses, high-foggy areas etc., moisture will condense inside the Core, and drainage will occur.

General-purpose Lossnay units that use treated paper core are not permitted to be installed in those types of environments.

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Lossnay- Precaution of Installation

Operating in other special condition

- Lossnay units cannot be installed in locations where toxic gases and corrosive elements such as acids, alkalis, organic solvents, oil mist or paints exist.
- Cannot be installed in bad-smell-air area such as toilet. Smell may transfer from RA to SA.
- Avoid installing in a location where unit could be damaged by salt (sea) or hot spring.

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Lossnay- Precaution of Installation

Sound level

The sound levels specified for Lossnay units are generated from tests conducted in an anechoic chamber. The sound levels may increase by 8 to 11 dB according to the installation construction material and room contents.

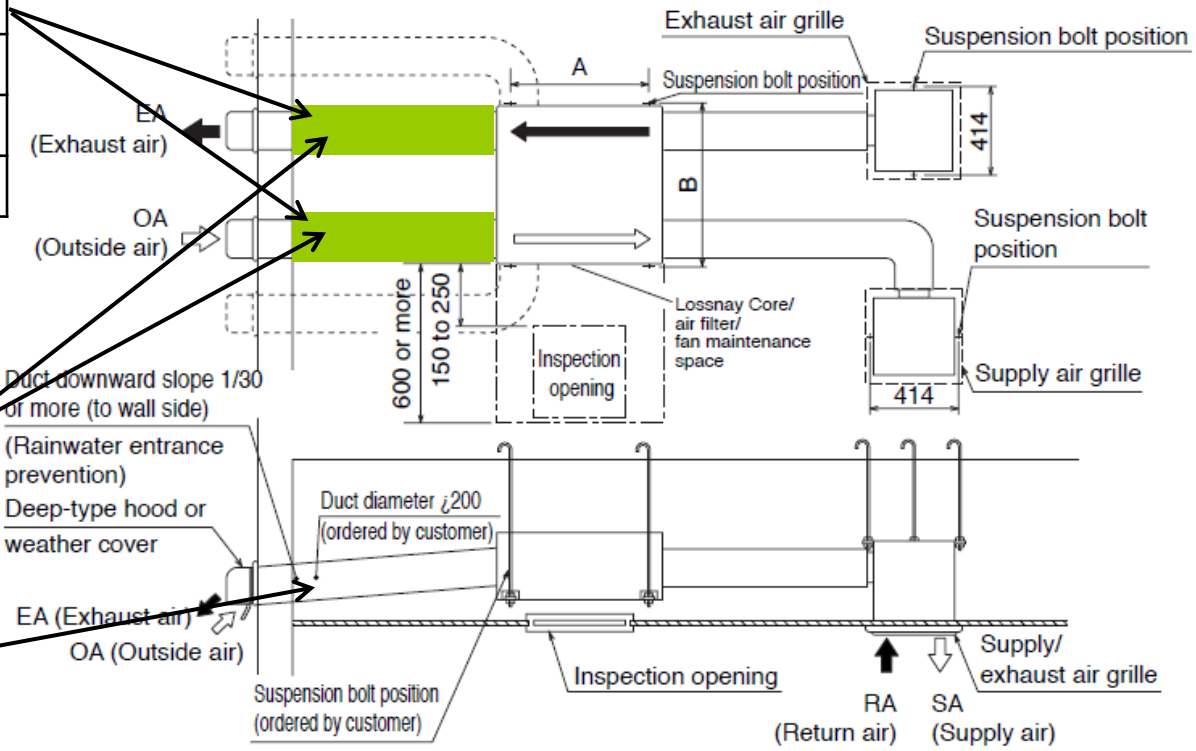
When using Lossnay units in a quiet room, it is recommended silencer duct, silencer intake/exhaust grill or silencer box to be installed.

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Constructing the ductwork

- Always add insulation to the two ducts on the outdoor side to prevent frost or condensation from forming.
- The outdoor duct gradient must be 1/30 or more (to wall side) to prevent rain water going into the system.
- The outdoor duct length must be followed the table below.

Model	Duct length
LGH-15 to 65RX5-E	1m or more
LGH-80 and 100RX5-E	2.5m or more
LGH-150 and 200RX5-E	3m or more



Insulation

Slope 1/30 or more

Q & A

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