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Mitigation Enabling Energy Transition in the MEDiterranean region

MECHANICALLY CONTROLLED VENTILATION– EDE4B

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Training on GRASSMED – meetMED II

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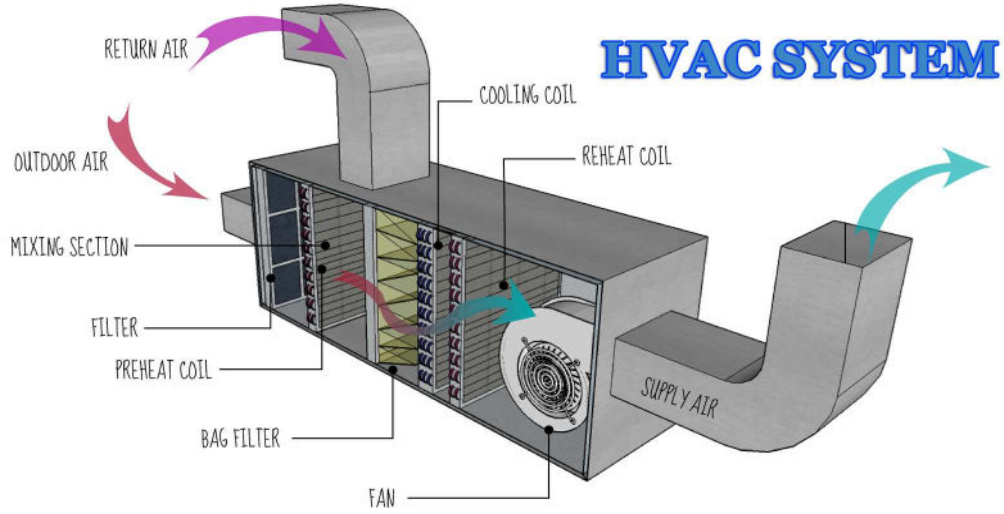
OUTLINE

- ✓ What is MECHANICALLY CONTROLLED VENTILATION?
- ✓ What are the types of MECHANICALLY CONTROLLED VENTILATION?
  - Heat Recovery Ventilation - HRV
  - Energy Recovery Ventilation - ERV
- ✓ What are the design considerations for integrating MECHANICALLY CONTROLLED VENTILATION?
- ✓ How to comply with GRASSMED?

What is MECHANICALLY CONTROLLED VENTILATION?

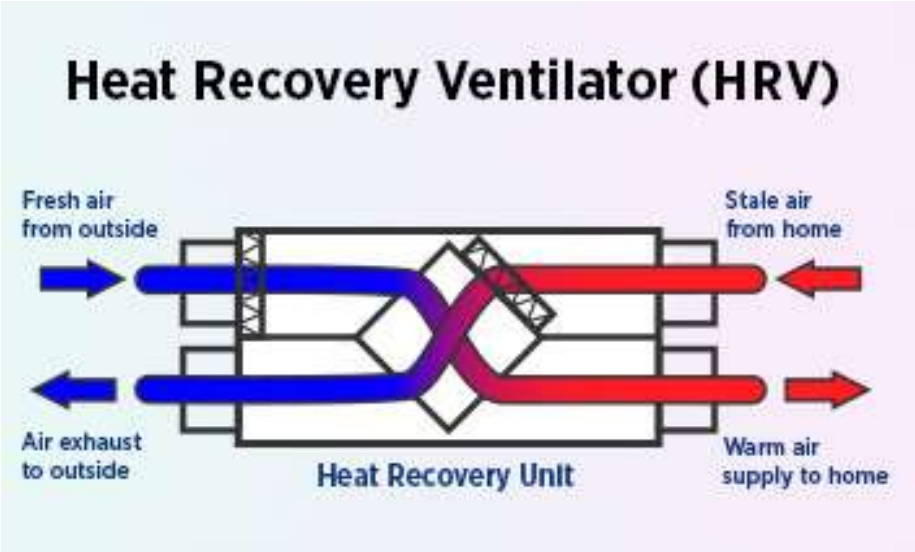
Just like natural ventilation, **mechanically controlled ventilation** is when creating air movement which improves the comfort of occupants, in addition to helping moderate internal temperatures and internal humidity. Unlike natural ventilation which is driven by pressure differences between the inside and outside, Mechanical (or forced) ventilation is **driven in general by fans.**

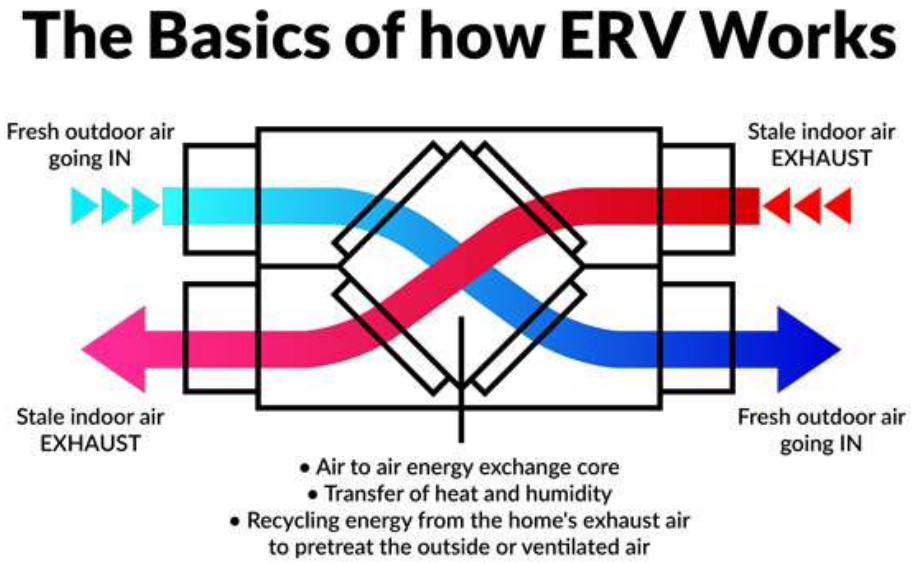


Mechanical HVAC systems are the most prevalent approach to conditioning modern buildings. While often scorned for their energy consumption, well-designed mechanical systems can be very energy efficient.

What Are the Types of Mechanically Controlled Ventilation?

Mechanical ventilation can help overcome the shortfalls that occur from natural ventilation. The two most energy efficient systems **are "heat recovery" ventilation** (commonly referred to as HRV) and "**energy recovery" ventilation (**commonly referred to as ERV).





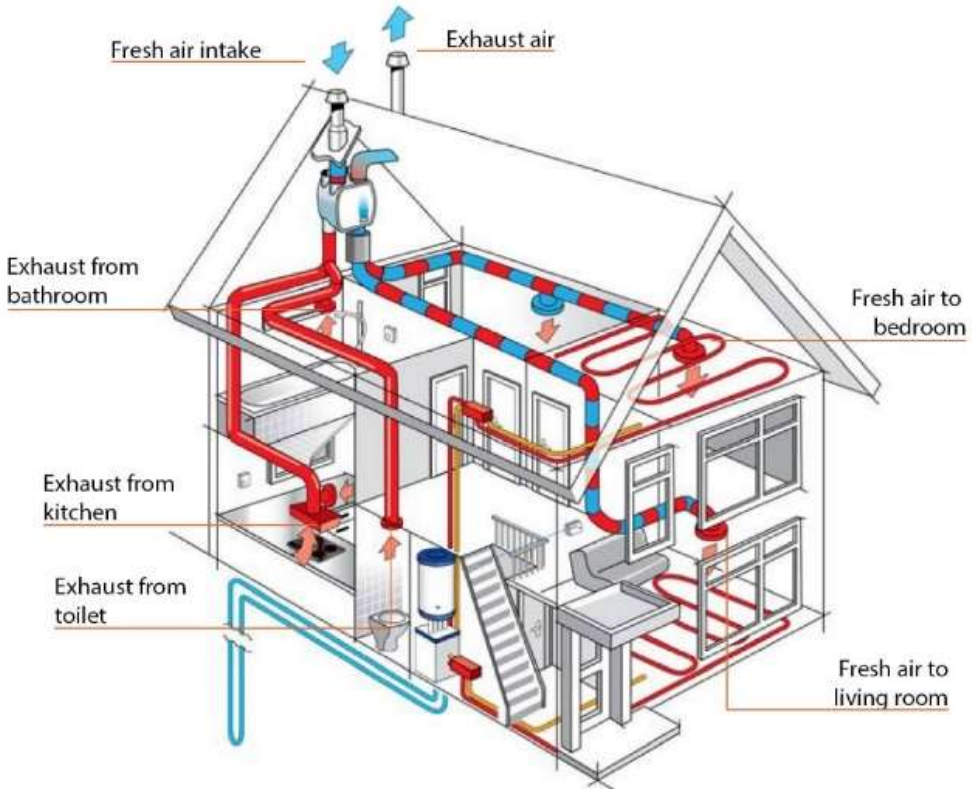
What Are the Types of Mechanically Controlled Ventilation?

Heat Recovery Ventilation – HRV

This system works via a heat recovery ventilation unit which is usually located in the attic, roof space or plant room of a building. Rather than just extracting air and replacing it with the air from outside, it draws the heat from exhaust air to incoming air during the heating season and from incoming air to exhaust air in the air conditioning season to reduce the heating and cooling load and imp

- Heat recovery ventilators are about 95% efficient, conserving energy. This also helps decrease the volume and size of the HVAC.

- HRV systems utilize filters to take away many pollutants from the air prior to entering homes and business places



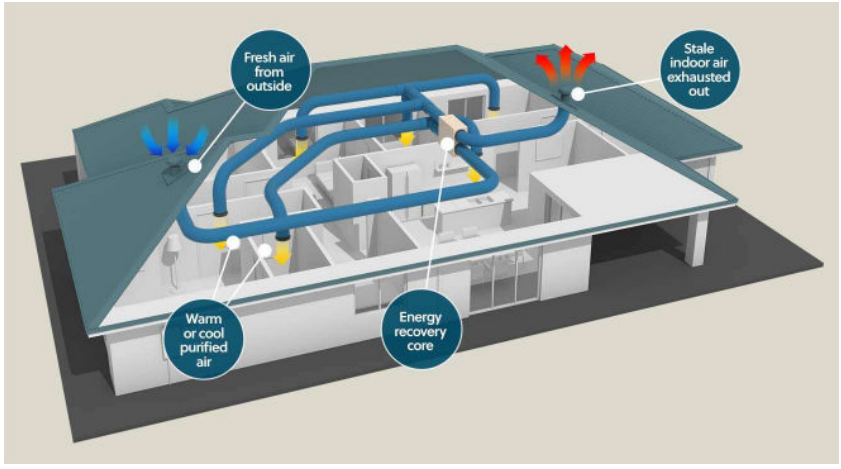
What Are the Types of Mechanically Controlled Ventilation?

Energy Recovery Ventilation – ERV

1.An ERV presents a method of transferring new, temperature-controlled air into the house while taking out musty, poisonous air. RVs are systems designed to be joint to the channels that are sections of the HVAC .

2.It features a heat exchanger combined with a ventilation system for providing controlled ventilation into a building. By way of two fans, ERVs draw clean, fresh air into a home or office and remove stale air.

3.This provides additional savings in the summer by reducing the moisture content of the incoming air that would otherwise have to be dehumidified with the cooling equipment or a dehumidifier.



4.An ERV can be a most effective option as it helps keep humidity, removing the need and cost to produce it within other means (Sensible and Latent Heat exchange).

What are the Design Considerations for Integrating Mechanical Ventilation?

Residential Building's Ventilation Requirements

- The residential standards of ASHRAE 62.2 “. All low-rise residential buildings must have a whole house dwelling unit ventilation system that provides a calculated minimum amount of outdoor air by using either a continuously running bathroom fan or a supply or return air ventilation thru a central HVAC system".
- The minimum ventilation volume must be a minimum of **1 cfm for each 100 sq. ft. of floor area plus 7.5 cfm for each occupant**. Asf represents area of bedroom, and Nbr number of bedrooms.

$$C_{fm} = 0.01(A_{sf}) + 7.5(N_{br} + 1)$$

What are the Design Considerations for Integrating Mechanical Ventilation?

Mechanical Ventilation Control

- The amount of outdoor air could be controlled by carbon dioxide sensors that measure the change in carbon dioxide levels in a zone relative to the levels in the outdoor air.
- Given a predictable activity level, such as might occur in an office, people will exhale CO2 at a predictable level, thus CO2 production in the space will very closely track occupancy.

Occupancy Category	cfm/person
Correctional facility cell	10 - 20
Educational classroom	13 - 15
Public assembly space or theater auditorium	5 - 15
General or office conference room	6 - 20
Office building office space	17 - 20
Hotel, motel, resort, and dormitory lobbies	10 - 15

- A controller will operate the outdoor air, return air, and relief air dampers to maintain proper ventilation
- To comply with GRASSMED, designing building ventilation system should meet the minimum requirement specified in ASHRAE 62.2, as per this table.

How To Comply With GRASSMED?

	Maximum value of carbon dioxide concentration (ppm)	Minimum value of carbon dioxide concentration (ppm)
Living room	1348	656
Adult bedroom	3787	725
Children room	4420	739
Kitchen	2534	558
Bathroom	1675	560
Hallway	1978	705

How To Comply With GRASSMED?

To be fully compliant, the assessor must receive the design drawings and calculations regarding ventilation system installed. The mechanical ventilation system is evaluated separately from heating and cooling systems based on the below criteria:

Mechanical Ventilation requirement	Scoring Point
Maximum Scoring for Residential Buildings	**10**
Maximum Scoring for Commercial Buildings	**10**
Prerequisite Conformity of Ventilation Rate in CFM is achieved,	Prerequisite + 4 pts
Ventilation Control as carbon dioxide sensors are installed (CO_2 sensors)	2
Energy Recovery unit (ERV), or Heat Recovery unit (HRV) are installed	4

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