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Building Science for Everyone, Everywhere

Supply Ventilation Strategies for Climate Zone 2 – Hot Dry Climates

Furnace / AHU – Mechanical equipment overview

1. All furnaces and air handlers shall be equipped with an Electronically Commutated Motor; or Constant Torque blower motor, sized for the correct cooling load on the building.
2. Constant Airflow regulator in lieu of manual balancing damper - It is well understood that duct length and type, tap in connection/location on the air handler return, furnace/AHU fan size lead to issues balancing the incoming supply airflow from house plans and therefore quite difficult to consistently deliver in field applications.
3. Filtration is required for incoming air due to filter locations at return air grilles. Filter box to be installed in-line with supply ventilation duct between outdoor intake hood and connection to return air plenum.
4. Exhaust fans that are capable of continuous low speed operation with a “boost” or high-speed setting. These fans are widely available today from manufacturers, which feature very quiet operation at the low speed setting. We would not recommend a high capacity fan to run for intervals (e.g. 20 on and 40 off) due to the noise generated from the fans, due to the fact, homeowners will disable.
5. If using exhaust fans for continuous ventilation it may be important to consider the model/manufacturer when considering correct duct sizes and exterior termination fittings to install for consistent and quiet operation. Models are listed below in the specification, suitable for this purpose.
6. In a balanced ventilation solution, the bath fan specification may be revisited to a more economical model that maintains American Society of Heating and Refrigeration Engineer’s (ASHRAE) ventilation standards; or Home Ventilating Institute (HVI) standards for effective spot ventilation in wet locations. Additionally, a balanced ventilation solution may replace one or two spot ventilation fans from locations in the home.

Basic Ventilation System

1. A minimum of 6” diameter, insulated flexible duct ((Minimum R-4) connected to the return plenum of the air handling unit (AHU) with the following components: *(see fig. 2 for details)*
2. Outside fresh air hood shall not be located be within 10’ feet horizontal any exhaust source. If within 10’ feet horizontal, then the intake hood shall be offset vertically be at least 3” feet. Preferred location is on a wall or area where homeowner can access/clean the intake screen.
3. American Aldes Constant Airflow Regulator (CAR II-LP) to regulate the volume of outside air, sized for ventilation requirement on building. If the calculated ventilation rate from the ASHRAE 62.2 table, below is 60 CFM, then a 6” CAR II with a max of 65 cfm at the inlet is selected and represented the maximum airflow allowed into the building under any condition using this device. *(See figure 1, below for basic airflow requirements)*
4. *Filter box with access port located at connection point to return air plenum box off the air handler. Filter box to contain common 14” x 14” x 1” air filter with a minimum MERV 6 rating.*

(Alternate location of filter box - connection to one return air filter grille assembly with access door for filter changes located inside return air filter grill assembly.)

5. Exhaust from bathroom, utility room or area with an EnergyStar Certified fan capable of continuous operation with a sound rating of </= 0.5 Sones with ECM Motor. The fan shall be equipped with integrated controls low speed operation within the required ventilation rates for the building. A separate switch for the fan shall be labeled as “Whole House Ventilation” for the occupants. Bath fan models with built in controls are:
    a. Panasonic WhisperGreen Select, Model FV-05-11VSK1
    b. Broan Ultra Green, Model ZB80
    c. Broan Ultra Green , Model ZB110
    d. Air King, Model EVD
6. The fresh inlet air duct shall be connected on the furnace/AHU air handler main return “vertical drop” or return plenum box on the furnace/AHU in horizontal attic applications. Additionally, make certain there is a minimum 5’ between fresh air duct tap in location and any return grille.

<u>Upgraded Ventilation – Variation 1</u>

Air Handler Fan Integrated and Controlled mechanical supply ventilation system

1. A minimum of 6” diameter, insulated flexible duct ((Minimum R-4) connected to the return plenum of the air handling unit (AHU) with the following components: *(<u>see fig. 3 for details)</u>*
2. Outside fresh air hood shall not be located be within 10’ feet horizontal any exhaust source. If within 10’ feet horizontal, then the intake hood shall be offset vertically be at least 3” feet.
3. Exterior wall hood with intake screen located not within 10 feet horizontally of a garage or combustion outlet on the building. Preferred location is on a wall or area where homeowner can access/clean the intake screen.
4. American Aldes Constant Airflow Regulator (CAR II-LP) to regulate the volume of outside air, sized for ventilation requirement on building. If the calculated ventilation rate from the ASHRAE 62.2 table, below is 60 CFM, then a 6” CAR II-LP with a max of 65 cfm at the inlet is selected and represented the maximum airflow allowed into the building under any condition. *(See figure 1, below for basic airflow requirements)*
5. Filter box with access port located at connection point to return air plenum box off the air handler. Filter box to contain common 14” x 14” x 1” air filter with a minimum MERV 6 rating. *(Alternate location of filter box - connection to one return air filter grille assembly with access door for filter changes located inside return air filter grill assembly.)*
6. Motorized Damper – Install motorized damper in outside air intake to close after ventilation cycle with additional warm air sensor to hold damper in closed position when the outside temperature is above 95F. This also serves to disconnect outside air from the house when the furnace/AHU fan is not operating, and to limit ventilation air flow if the fan is operating for long continuous periods; or during weather conditions that are not conducive to ventilation.
7. Install cycling supply ventilation controller unit and transformer on furnace (connected in series with the fan on the furnace/AHU). Acceptable systems with high temperature limit shut-offs are listed below:
    a. Aircycler G2-K Series with TempGuard (hot sensor only, model ACTG-HO1) and fan light switch to modulate and syncrhronize bathroom intermittent fan operation with ventilation cycles.
    b. Aprilaire 8126-A ventilation control system –System includes a temperature and humidity sensor to limit ventilation flows in extreme weather conditions. Integrated *bathroom fan controls not available at this time. Bath fan used for continuous ventilation would have to be set to operate on desired low speed.*

    c. Field Controls HHSC+ with additional intake air temperature sensor – *(bathroom controls have a complex current sensing apparatus)*
7. Exhaust from bathroom, utility room or area with an EnergyStar Certified fan capable of continuous operation with a sound rating of </= 0.5 Sones with ECM motor. The fan shall be equipped with integrated controls for low speed operation. Bath fan models with built in controls are:
    a. Panasonic WhisperGreen Select, Model FV-05-11VSK1
    b. Broan Ultra Green, Model ZB80
    c. Broan Ultra Green , Model ZB110
    d. Air King, Model EVD

<u>Upgraded Ventilation - Varialtion 2 - Balanced</u>
Provide and install balanced ventilation solution

1. Install ceiling or attic mounted balanced ventilation device. *(See figure 4 for details)*
2. Install minimum of 6" diameter, insulated flexible duct ((Minimum R-4) for stale air from building and fresh air from outdoors.
    d. Outside fresh air hood shall not be located be within 10' feet horizontal any exhaust source. If within 10' feet horizontal, then the intake hood shall be offset vertically be at least 3" feet.
3. Install/connect house local exhaust to unit via duct from main floor powder or ½ bath, hall bathroom or both locations, depending on home size (this can eliminate the installation of individual bathroom fans) to ERV unit.
4. Duct fresh air to house from ERV unit into the return duct on the furnace/AHU
5. *Optional – Wall mounted controls to "boost" exhaust airflow if desired from bathrooms/wet locations for prescribed time intervals. (e.g 20min boost)*
6. *Optional – Use low/continuous fan speed on ECM Furnace/AHU for additional home air circulation, continuous filtration and interior air temperature de-stratification.*
7. Consideration of effective units for slab on grade construction with attic place HVAC systems:
    a. Broan ERVS-100s – ceiling mount
    b. Broan ERV100SP
    c. Panasonic Intelli-balance 100 ERV

Continuous Ventilation Rate Table – All Applications

Fig. 1

CFA (ft^2)	ASHRAE 62.2-2010 flow requirement if continuous			
	2 bedrm Vent. rate (cfm)	3 bedrm Vent. rate (cfm)	4 bedrm Vent. rate (cfm)	5 bedrm Vent. rate (cfm)
1500	**38**	**45**		
2000	**43**	**50**	**58**	
2500	**48**	**55**	**63**	**70**
3000	**53**	**60**	**68**	**75**
3500	**58**	**65**	**73**	**80**
4000	**63**	**70**	**78**	**85**
4500	**68**	**75**	**83**	**90**
5000	**73**	**80**	**88**	**95**
5500	**78**	**85**	**93**	**100**

Figure 2 – SA system w/ airflow regulator – in attic (see fig 3 for filter location)

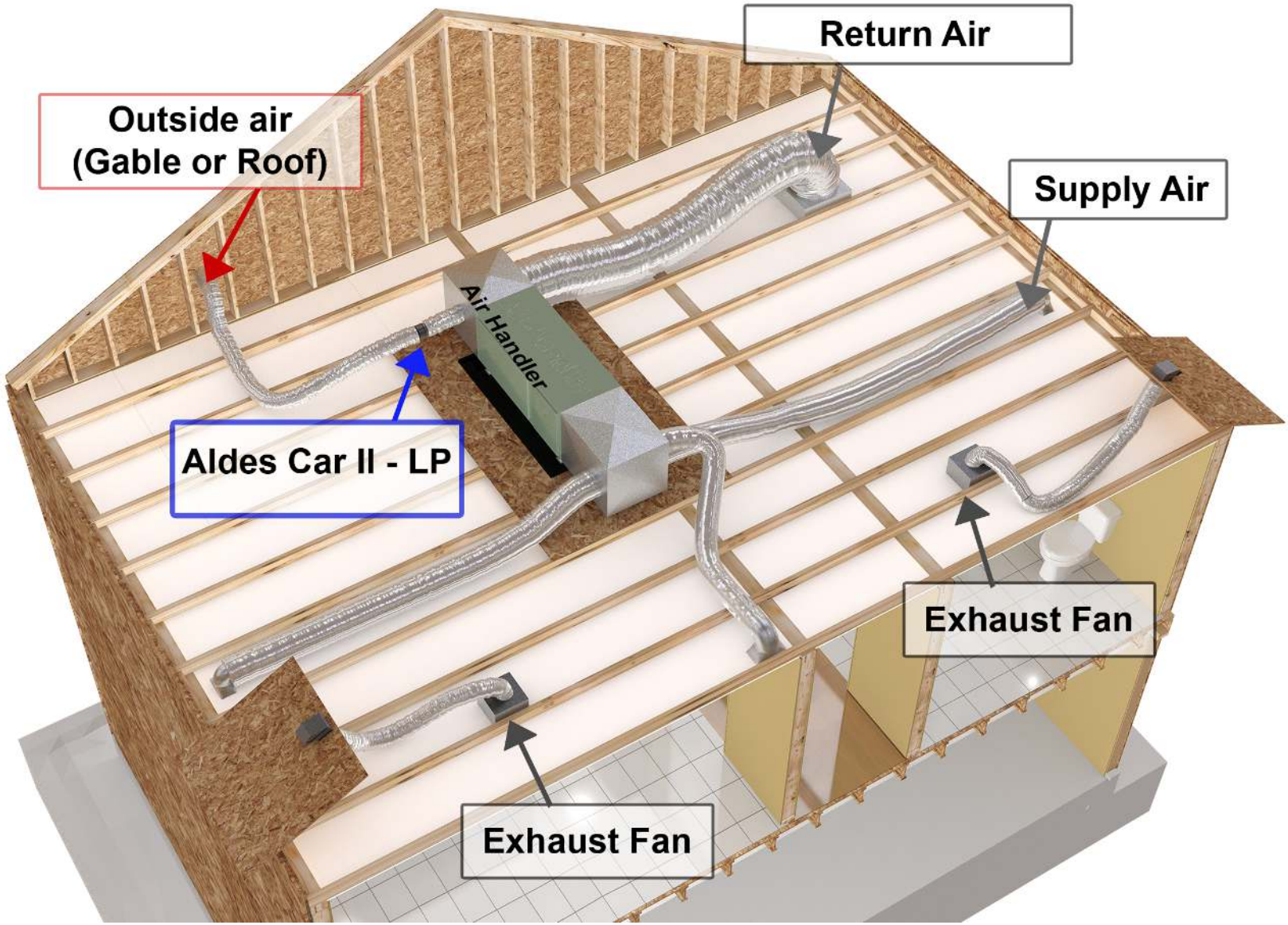

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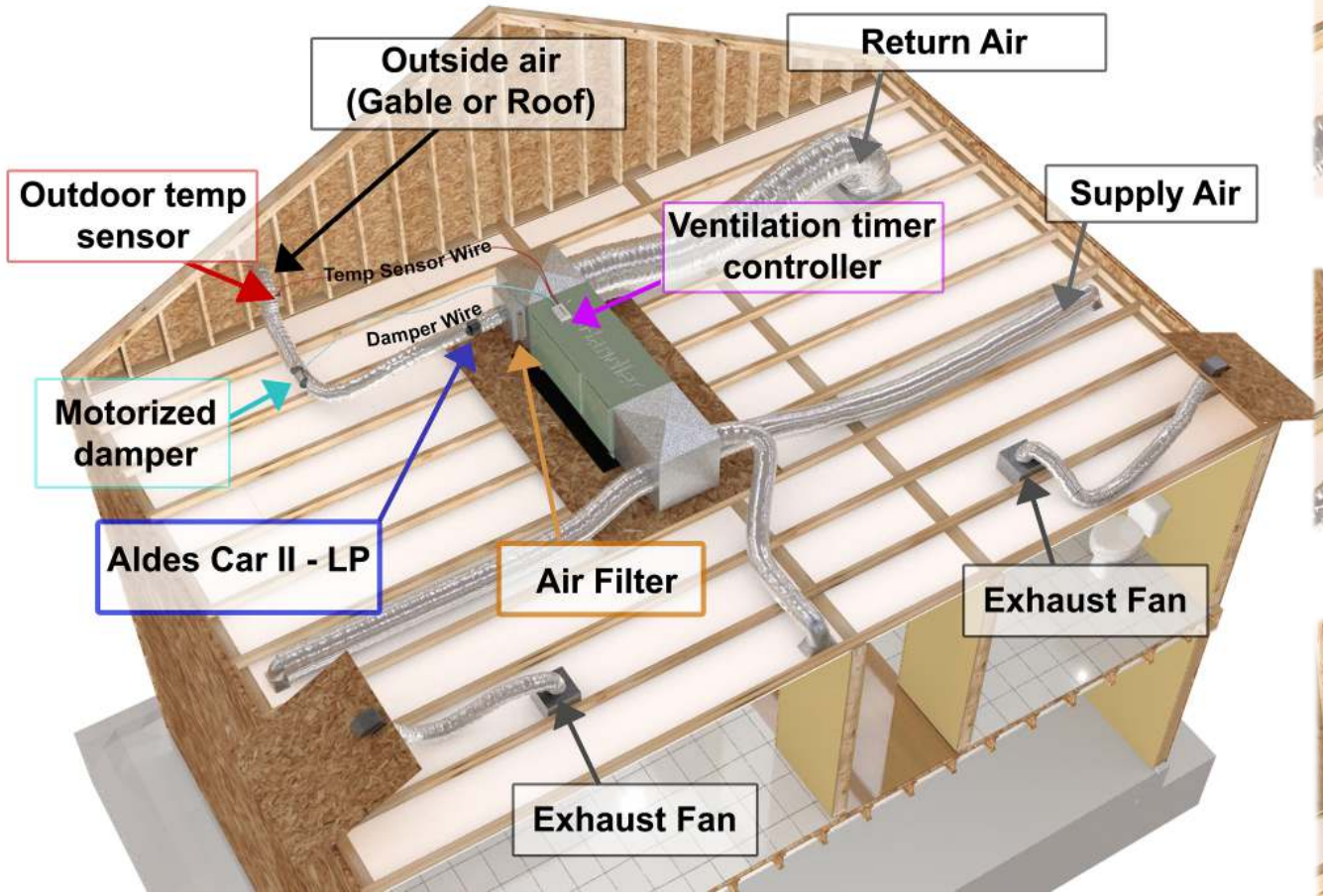
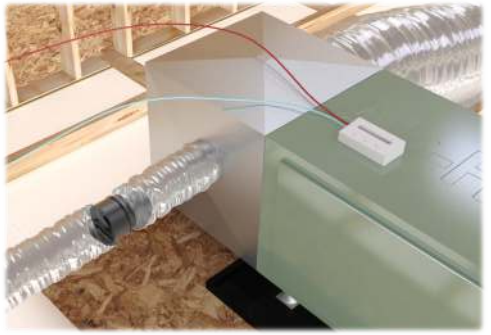
Figure 3 – SA system w/ Airflow regulator, vent. controller, motorized damper and temp control - in attic



Aldes CAR-II-LP



Filter Box Location

Motorized damper and temp. sensor

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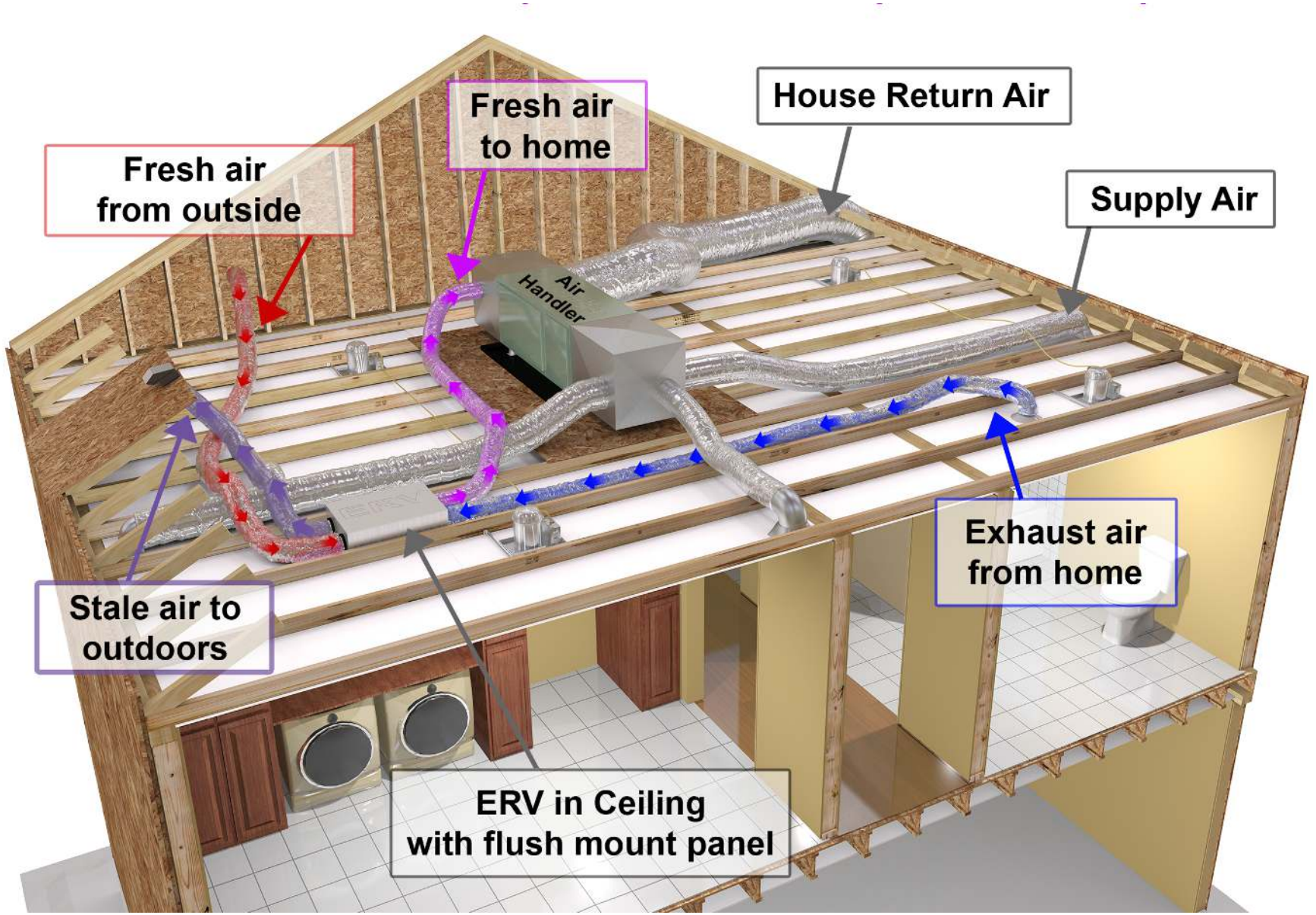
Figure 4 – ERV in attic configuration



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