

# Choosing Heating and Cooling Systems



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# Ducted Systems vs. Radiant Systems

- **Radiant hot water systems use boilers - Ducted systems can use boilers or furnaces for heat**
- **Radiant systems can distribute heat through baseboard fin-tubes, radiant panels or radiators, or floors - Ducted systems can move conditioned air through ductwork located within the conditioned enclosure**
- **Ducted systems allow for conditioned air to be continually mixed for more homogeneous interior temperatures and accommodate outside air change, filtration, and dehumidification of air - **this can be good****
- **Ducted systems provide the opportunity for unbalanced airflows - **this can be bad****



# Ducted Systems

## Things to Avoid

- **Air handlers or ducts in vented (to the outside) spaces - why?**
- **Building cavities used as ducts - why?**
- **Air handlers or return ducts in garage - why?**

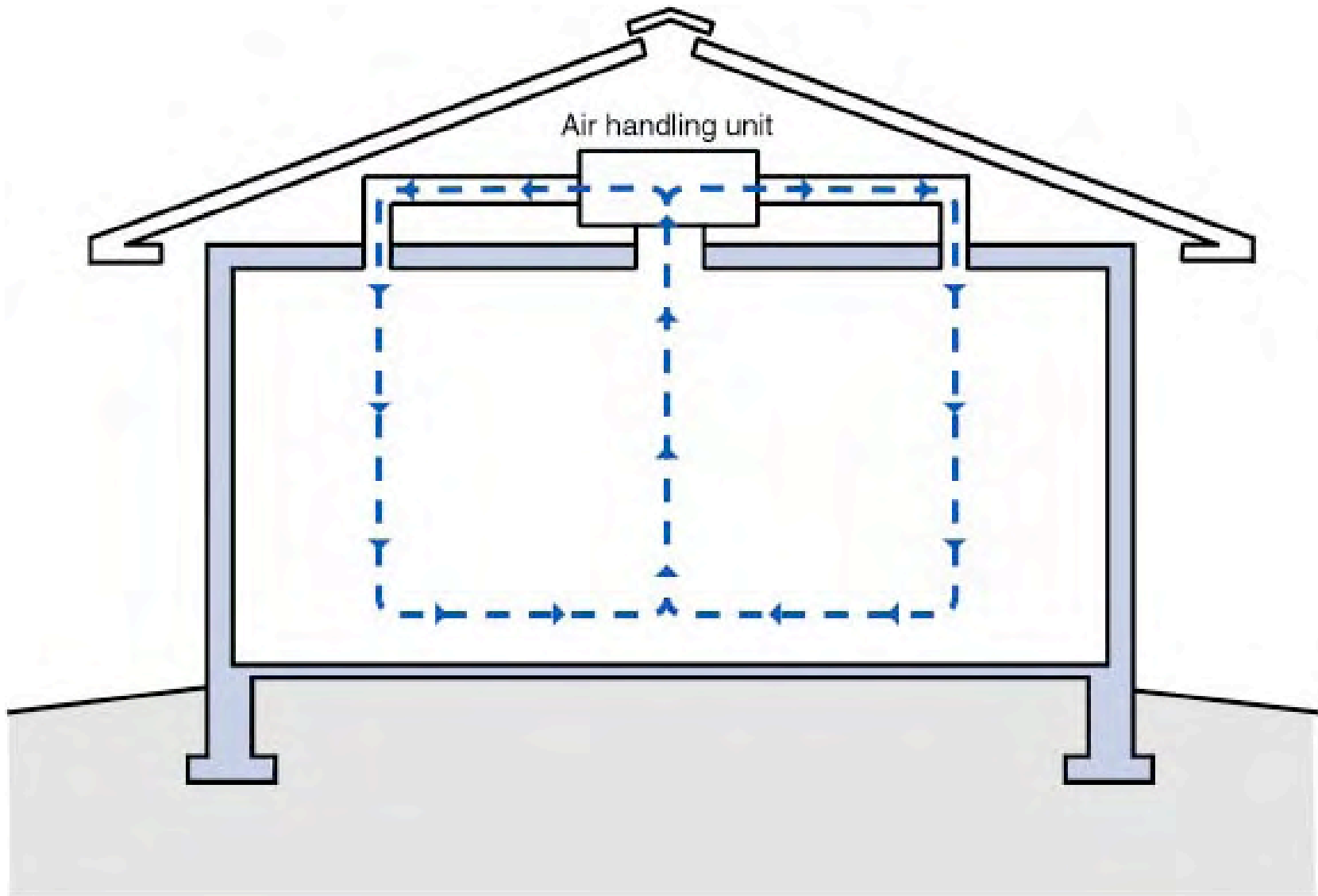




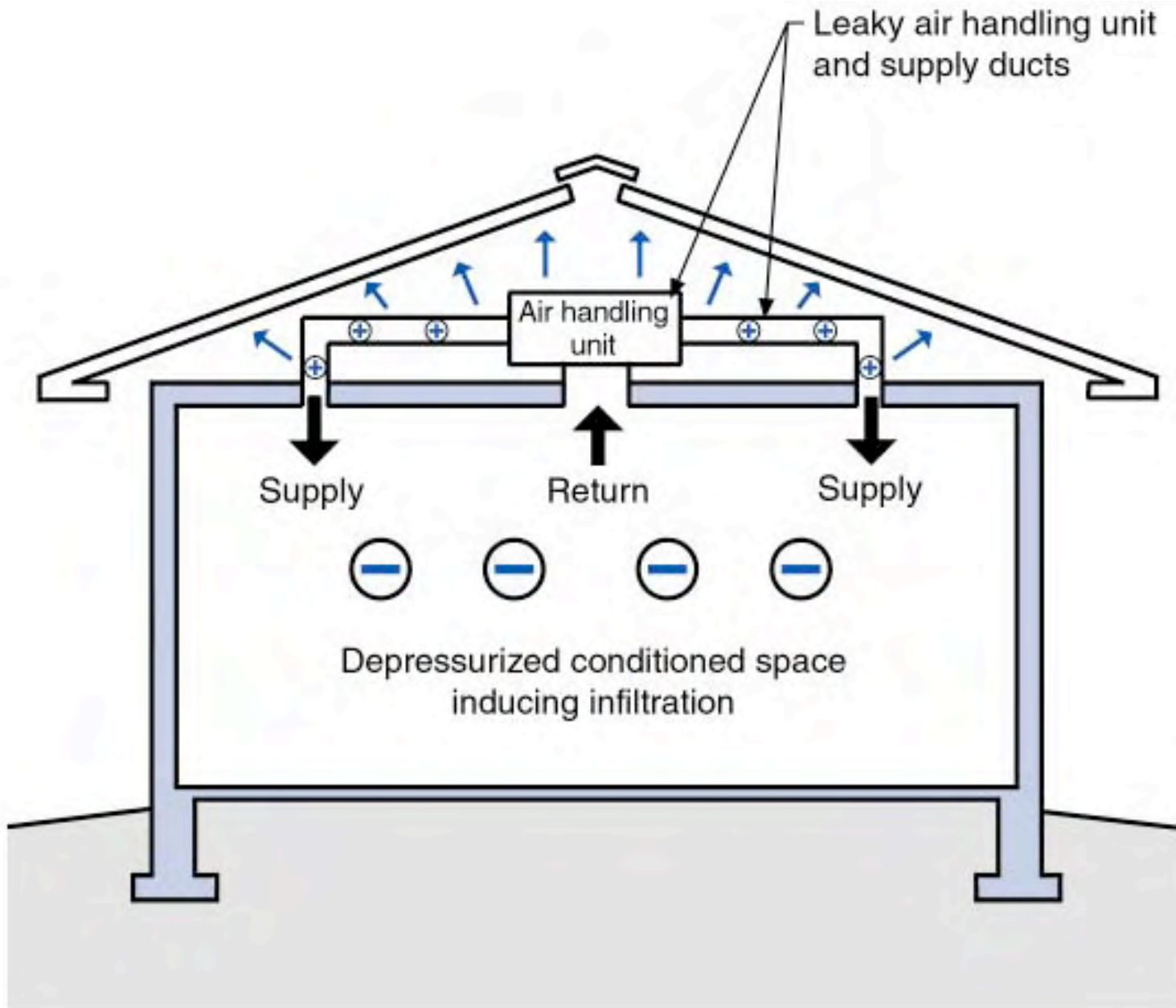
# Mechanical System Interactions that Lead to Moisture Problems



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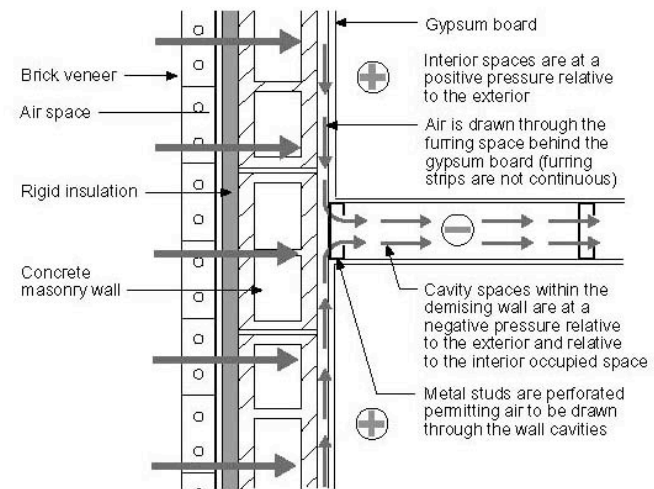
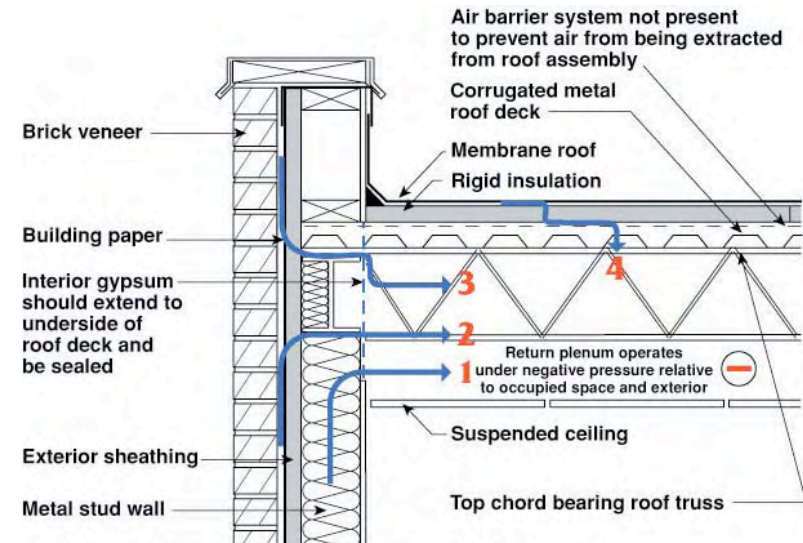


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# Building Enclosure - Mechanical System Interaction

- **Buildings are hollow and more interconnected with complex air distribution systems that leak.**
- **Building mechanical systems inadvertently connect the building enclosure to the breathing zone of the occupant.**
- **The building enclosure is the pollutant.**
- **The HVAC system is the pollutant interstate.**



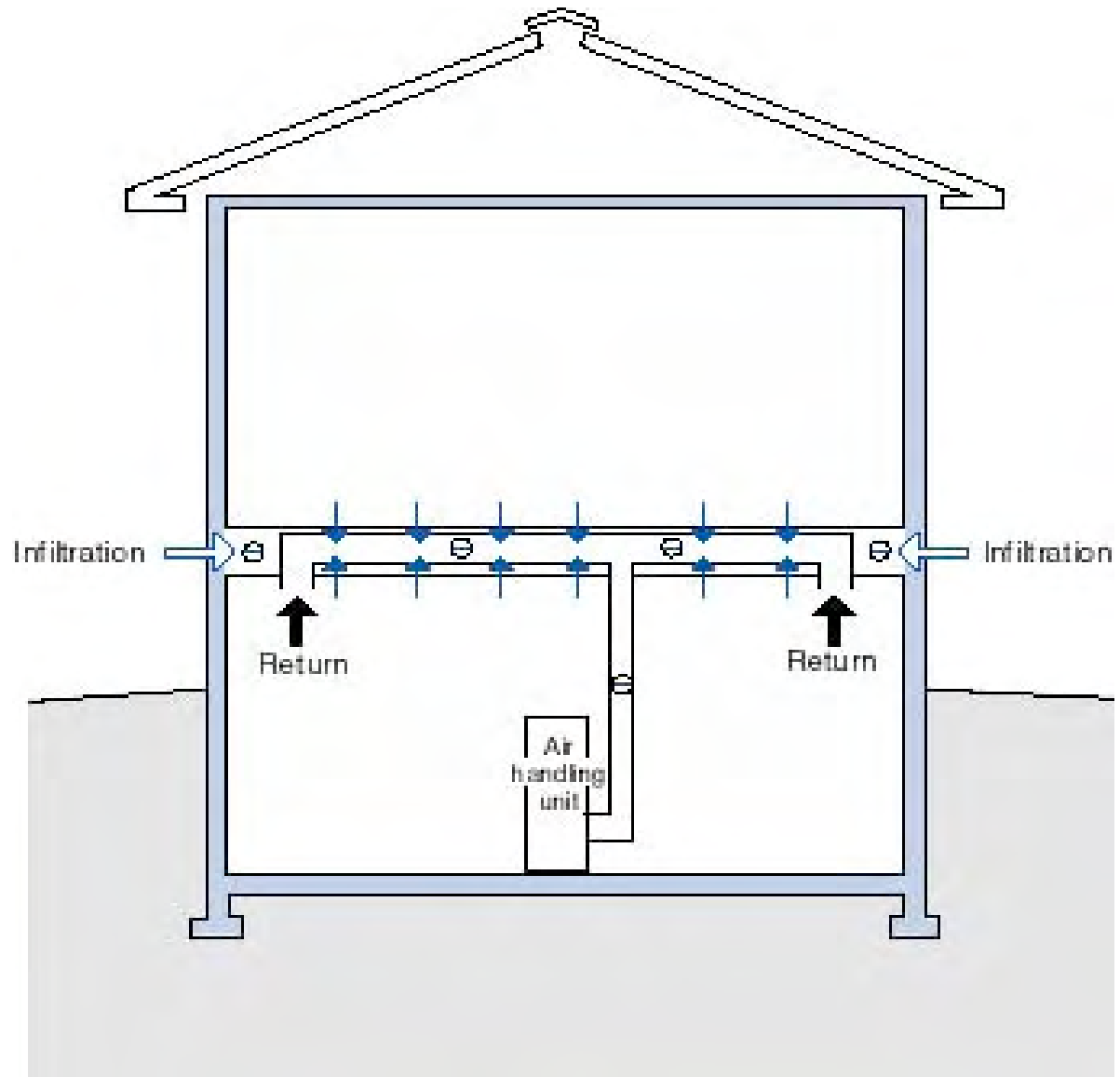
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# Efficient Distribution of Pollutants

- **The enclosure is now the pollutant**
  - **And ducts in the enclosure efficiently distribute the pollutant**



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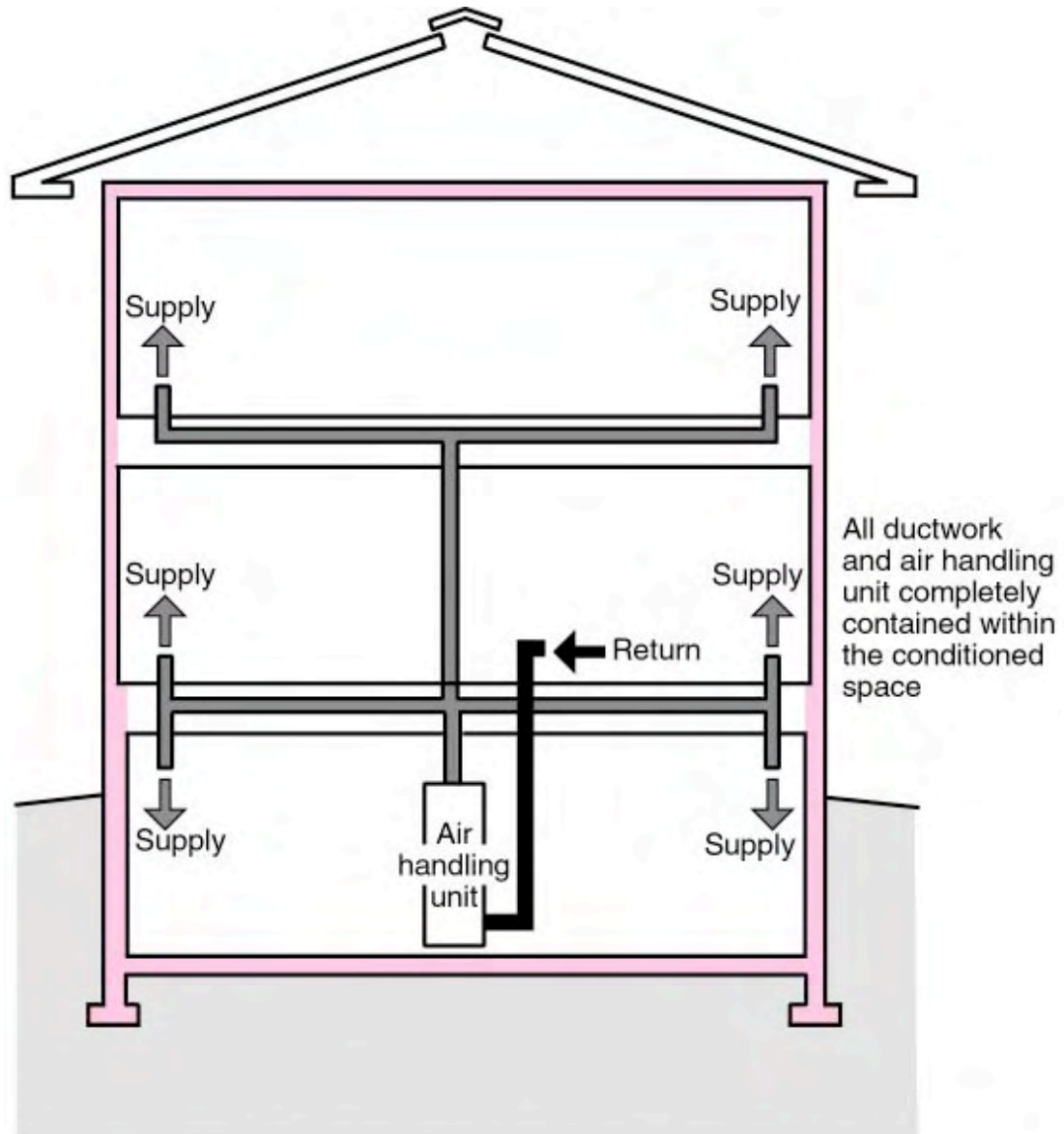


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# Panned Floor Joist or Stud Cavity Returns



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Note: Colored shading depicts the building's thermal barrier and pressure boundary. The thermal barrier and pressure boundary enclose the conditioned space.

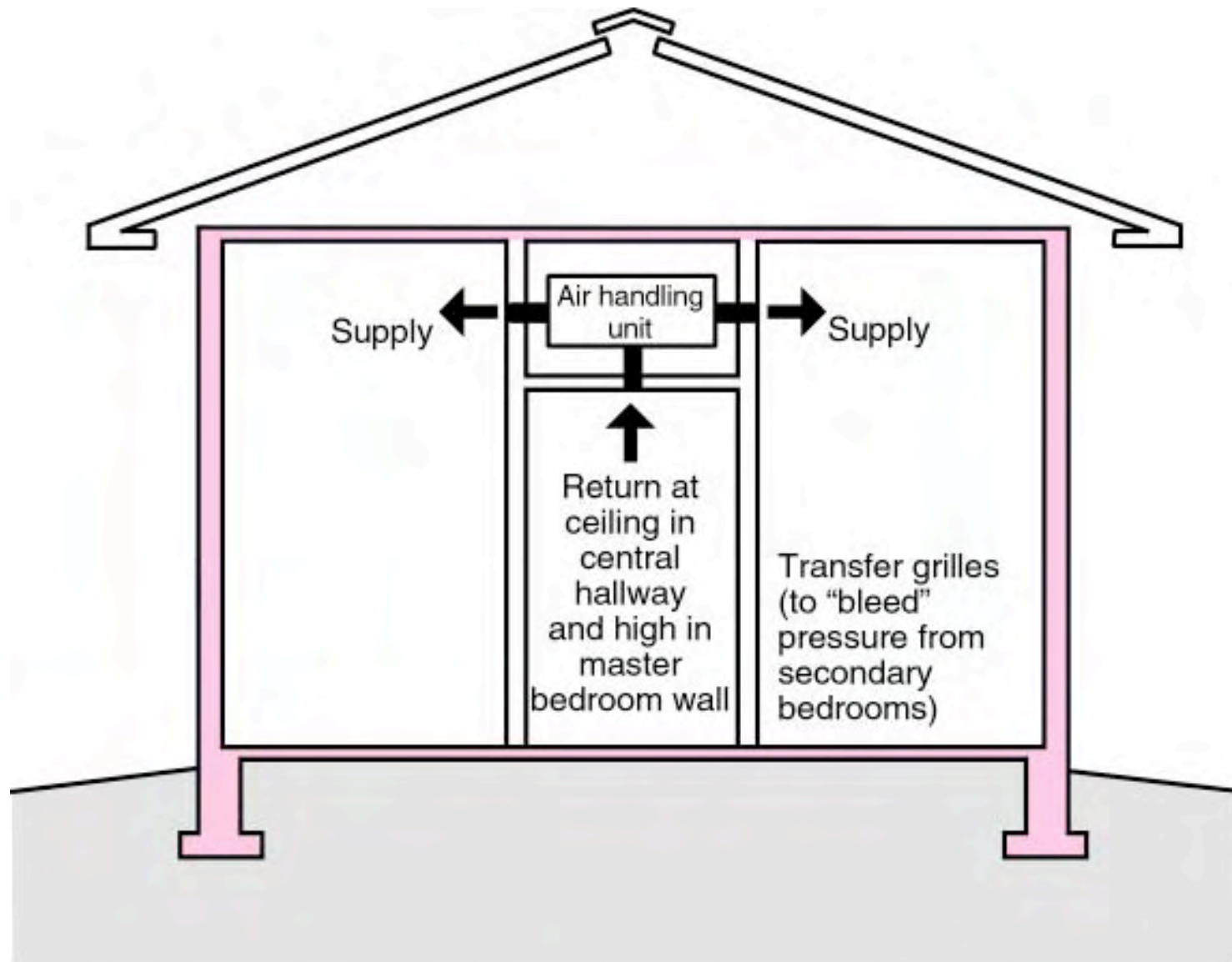


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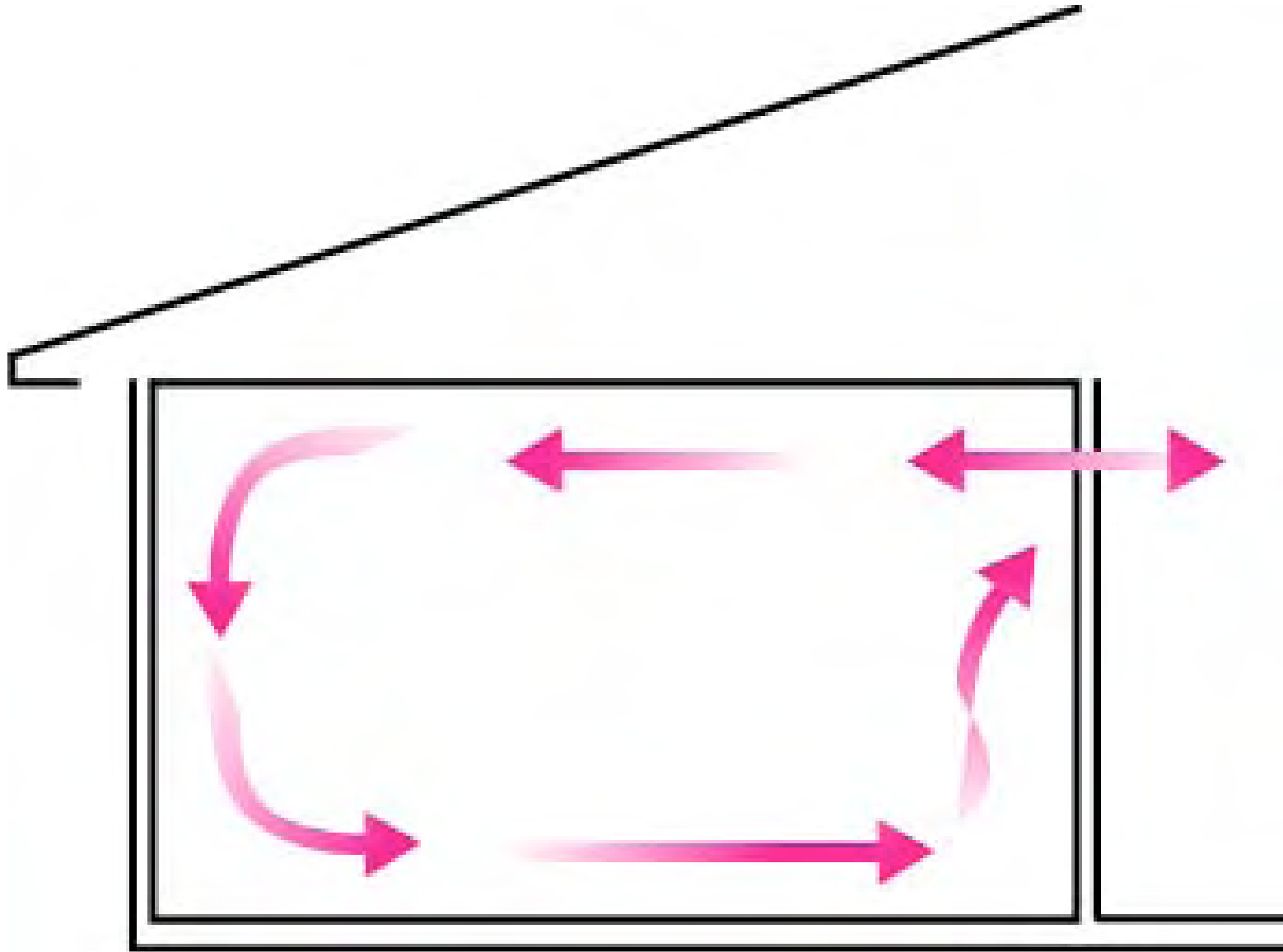
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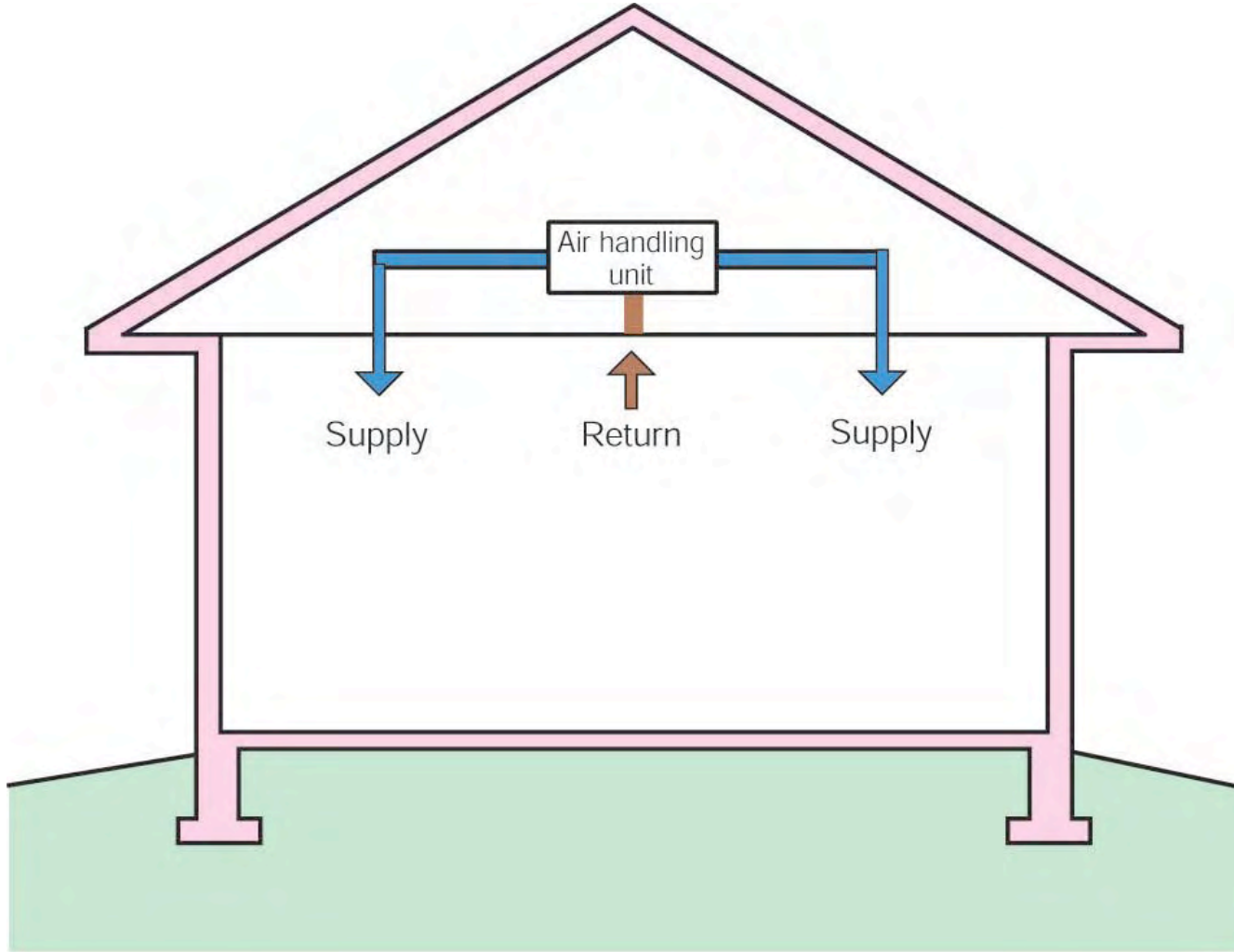


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# Mechanical Systems

## Top Ten Improvements

- 1. Fan powered exhaust and general ventilation**
- 2. Sealed-combustion/fan powered combustion device exhaust**
- 3. Use MERV 11 or better filters**
- 4. Seal ducts with mastic (<5%)**
- 5. Size heating and cooling equipment using Manual J**
- 6. External duct insulation**
- 7. Pressure balance distribution**
- 8. Provide access for inspecting and cleaning coils and ductwork downstream of coils**
- 9. Locate air handlers in conditioned space**
- 10. Dehumidification during part-load and in damp spaces**

