

hvac

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Hvac

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1. Core HVAC System Components

- **Heating Unit:** Furnace (gas, electric, or oil), or heat pump (increasingly common and required to meet new standards).
 - **Cooling Unit:** Central air conditioner or heat pump.
 - **Air Handler/Blower:** Circulates air through the system.
 - **Ductwork:** Supply and return ducts for distributing conditioned air.
 - **Thermostat:** Smart or programmable, required by code for energy efficiency.
 - **Vents and Registers:** For air distribution in each room.
 - **Refrigerant Lines:** Copper tubing connecting outdoor and indoor units.
 - **Condensate Drain Line:** Removes moisture from the system.
 - **Electrical Connections:** Dedicated circuits and disconnects for HVAC.
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2. New 2025 HVAC Regulations

- **Refrigerant:** All new residential air conditioners and heat pumps must use A2L refrigerants (such as R-454B or R-32), which have a lower global warming potential. Older refrigerants like R-410A are being phased out, and new systems must be compliant starting January 1, 2025¹²³.
- **Efficiency Standards:** Systems must meet higher SEER2 (Seasonal Energy Efficiency Ratio) ratings, which are stricter than previous SEER requirements. Minimums have increased nationwide, making new units more energy-efficient⁴⁶⁷.
- **Heat Pump Ready:** New builds must include a dedicated 240V circuit for future heat pump installation, even if a gas furnace is initially installed⁵.
- **Smart Thermostats:** Required for most new systems to maximize efficiency and meet code requirements⁵.
- **Proper Insulation and Duct Sealing:** To meet energy codes and ensure efficiency⁴⁵.
- **Certified Equipment:** All HVAC equipment must be certified to meet federal and state energy standards⁵.

3. Additional Required Elements

- **Ventilation:** Mechanical ventilation (HRV/ERV) for fresh air and humidity control, meeting ASHRAE

62.2 standards⁴.

- **Air Filtration:** MERV-rated filters or higher for improved indoor air quality.
- **Surge Protection:** For sensitive electronic components.
- **Condensate Pump:** If gravity drainage is not possible.
- **Pad or Mounting Bracket:** For outdoor condenser unit.

4. Installation and Compliance

- **Manual J, S, and D Calculations:** For proper system sizing, equipment selection, and duct design⁴.
- **Permits and Inspections:** Required to ensure code compliance and safe operation.
- **Licensed HVAC Contractor:** Professional installation is essential for safety, warranty, and efficiency.

5. Modern Upgrades (2025)

- **Variable-speed compressors and blowers**
- **Zoned HVAC systems** for room-by-room control
- **Integrated smart home controls**
- **Ductless mini-split systems** for additions or specific rooms

Summary Table: 2025 HVAC Hookup Essentials

Component/Requirement	2025 Standard/Note
Furnace/Heat Pump	Must use A2L refrigerant (R-454B, R-32); higher SEER2 efficiency
Central AC/Heat Pump	Same as above
Ductwork	Properly sized/sealed; insulated to code
Thermostat	Smart/programmable required
Ventilation (HRV/ERV)	Required for fresh air, humidity control (ASHRAE 62.2)
Electrical	Dedicated circuits, exterior disconnect, surge protection
Refrigerant Lines	Compatible with A2L refrigerants
Permits/Inspections	Mandatory for code compliance
Air Filtration	MERV-rated or higher
Heat Pump Ready Circuit	Dedicated 240V circuit for future upgrades

Key Takeaways:

- All new HVAC installs in 2025 must use low-GWP A2L refrigerants and meet tougher efficiency standards.
- Smart thermostats, proper ventilation, and duct sealing are required for compliance and comfort.
- Professional installation and code compliance are essential for safety, efficiency, and warranty coverage.

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