

# Building Assessment Tool – Best Practice HVAC System Input Methods

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This document provides guidance to the auditor / user of the BAT for the 11 HVAC systems listed in the ASHRAE 90.1 Energy Cost Budget Method. The document provides suggested field entries for the 11 HVAC systems below for the Heating Plant (D3020), Cooling Plant (D3030), AHUs, and Terminal (D3050) user input screens.

1. VAV with parallel fan-powered boxes, chilled water cooling, and electric resistance heating
2. VAV with reheat, chilled water cooling, and hot water fossil-fuel boiler
3. Packaged VAV with parallel fan-powered boxes, direct expansion cooling, and electric resistance heating
4. Packaged VAV with reheat, direct expansion cooling, and hot water fossil fuel boiler
5. Two pipe fan coil, chilled water cooling, and electric resistance heating
6. Water source heat pump, direct expansion cooling, and hot water fossil fuel supplemental boiler
7. Four-pipe fan-coil, chilled water cooling, and hot-water fossil fuel boiler
8. Packaged terminal heat pump, direct expansion cooling, and heating from heat pump and auxiliary heat pump
9. Packaged rooftop heat pump, direct expansion cooling, and heating from heat pump and auxiliary heat pump
10. Packaged terminal air conditioner, direct expansion cooling, and hot water fossil fuel boiler
11. Packaged rooftop air conditioner, direct expansion cooling, and fossil fuel furnace

## Heating Plant (D3020) Input Screen:

The screenshot shows the 'Building Assessment Tool' interface for the 'Heating Plant (D3020)' input screen. The top header includes the 'Homeland Security' logo, the tool name, and navigation links like 'SIGN OUT', 'Main Audit', 'Help', 'Floor Plan', and 'Shortcuts'. The user is logged in as 'Sysadmin1' with 'Administrator' privileges. The main form area is titled 'HEATING PLANT' and contains several input fields and a dropdown menu. The 'Equipment Type' dropdown is currently open, showing a list of options including 'Fire Tube', 'Water Tube', 'Conventional Cast Iron Sectional', 'Condensing', 'Ground Source Heat Pump', 'Electric furnace', 'Gas-fired Furnace', 'Rooftop Units with Gas Fired Heater', 'Unit Heater', 'Air Source Heat Pump', and 'Electric Heater'. Other visible fields include 'RPUID', 'Heating Plant II', 'Agency Identifier', 'Temp Agency Identify', 'FloorName', 'Uniformat Code', 'Type of Heating Plant', 'Year Built (YYYY)', 'Visual Condition', 'Space, equipment location', 'Space, served by equipment', 'ZoneServed', 'Primary Fuel Type', 'Heating Fluid', 'Dual Fuel?', 'Output Temp (°F)', 'Output Pressure (psi)', 'Secondary Fuel Type', 'Nameplate Capacity', 'MBH Output', 'Gal/hr Input (for oil boiler)', 'De-aerator or feedwater tank?', 'Condensate return for feedwater?', and 'Accessories (select all that apply)'. A 'Take Pictures' button is also present near the 'FloorName' field.

The auditor will enter information in these fields within the Heating Plant (D3020) user input screen based upon the base 11 HVAC systems.

System #	Type of Heating Plant	Primary Fuel Type	Equipment Type	Other Items
1, 3, 5	Decentralized	Electricity	Electric Heater	No further information
2, 4, 6, 7, 10	Centralized	Natural Gas, Oil, Propane	Fire Tube, Water Tube, Cast Iron, or Condensing Boiler	Pictures of boiler(s), separate record per boiler(s), as many other fields as possible on the boiler(s)
8, 9	Decentralized	Electricity	Air Source Heat Pump	No further information
11	Decentralized	Natural Gas, Propane	Gas-fired furnace	Pictures of furnace(s), separate record per furnace, as many other fields as possible on the furnaces

Cooling Plant (D3030) Input Screen:

The auditor will enter information in these fields within the Cooling Plant (D3030) user input screen based upon the base 11 HVAC systems.

System #	Type of Heating Plant	Capacity (tons)	Equipment Type	Other Items
1, 2, 5, 7	Centralized	Enter info. for each chiller record	Reciprocating, scroll, screw, centrifugal, absorption chiller	Pictures of chiller(s), separate record per chiller, as many other fields as possible on the chiller(s)
3, 4	Decentralized	Enter total system capacity	Direct expansion split system, rooftop unit with DX cooling	No further information
6	Decentralized	Enter the total system capacity	Water or ground source heat pump	No further information
8, 10	Decentralized	Enter the total system capacity	Direct expansion split system	No further information
9, 11	Decentralized	Enter the total system capacity	Rooftop unit with DX cooling	No further information

AHUs Input Screen:

The screenshot displays the 'Building Assessment Tool' interface for 'HVAC' systems. The user is logged in as 'Sysadmin1' and is viewing the 'AIR HANDLING UNITS' input screen. The interface includes a navigation sidebar on the left with buttons for 'Heating Plant (D3020)', 'Cooling Plant (D3030)', 'Cooling Tower', 'Pumps', 'Piping & Distribution', 'AHUs', 'Terminal (D3050)', 'BAS / EMS (D3060)', 'EVHS', and 'Exhaust Fans'. The main content area is titled 'AIR HANDLING UNITS' and features several input fields and sections:

- Navigation:** 'Add New', 'Duplicate', 'Save', 'Undo', 'Previous', 'Next' buttons.
- Form Fields:**
  - RPUID: FEMA000ABCD0001
  - AHU ID: 20 (marked as Required)
  - Agency Identifier: [Text Input]
  - Temp Agency Identifier: [Text Input]
  - Floor: [Dropdown]
  - Space: [Dropdown]
  - Uniformat Code: [Dropdown]
  - AHU Type: [Dropdown]
  - AHU Controls: Dedicated outdoor air unit (i.e. makeup), Custom modular (both indoor and outdoor), Packaged unit (includes rooftop unitary)
  - Year Installed: [Text Input]
  - Zone Served: [Text Input]
  - ID / Tag #: [Text Input]
  - Manufacturer / Model #: [Text Input, 255 characters allowed]
  - Serial #: [Text Input, 255 characters allowed]
  - Visual Condition: [Text Input]
  - Supply Fan: Flow Rate (cfm), Head (Static pressure rise, in. of water), Motor HP, Motor Efficiency (%)
  - Fan VFD present?: Yes (selected), No
  - Return Fan Inc?: Yes, No
  - AHU Controls: Air Flow Modulation, Temp Control Method, Method of Reheat, Location of Reheat, Air Temp Setpoints (°F), Occupied Room, Unoccupied Room, Supply Air Temp Setpoint Reset?
- Notes Section:** A vertical 'NOTES' section on the right side of the form, currently empty.

The auditor will enter information in these fields within the AHUs (Air Handling Units) user input screen based upon the base 11 HVAC systems.

System #	AHU Type	Other Items
1, 2	Custom modular	Pictures of AHU(s), separate record per AHU, as many other fields as possible on the AHU(s)
3, 4	Packaged unit	Pictures of AHU(s), separate record per AHU, as many other fields as possible on the AHU(s)
5, 6, 7	Potential for dedicated outdoor air unit coupled to fan coil units (otherwise leave blank)	Pictures of AHU(s), separate record per AHU, as many other fields as possible on the AHU(s)
8, 10	Potential for either custom modular or packaged unit (supplemental)	Pictures of AHU(s), separate record per AHU, as many other fields as possible on the AHU(s)
9, 11	Packaged unit	Pictures of AHU(s), separate record per AHU, as many other fields as possible on the AHU(s)

Terminal (D3050) Input Screen:

The screenshot displays the 'Terminal Units' input screen within the 'Building Assessment Tool'. The interface is organized into several sections:

- Navigation Menu (Left):** A vertical list of HVAC system categories: Heating Plant (D3020), Cooling Plant (D3030), Cooling Tower, Pumps, Piping & Distribution, AHUs, Terminal (D3050) (highlighted), BAS / EMS (D3060), EVHS, and Exhaust Fans.
- Header:** 'Homeland Security Building Assessment Tool' with 'SIGN OUT', 'Main Audit', 'Help', 'Floor Plan', and 'Shortcuts' links.
- User Info:** 'Sysadmin1 logged on as Administrator'.
- Form Fields:**
  - RPUID: FEMA000ABCD0001
  - Building Address: 168-01 Union Turnpike, Queens, NY 11366, USA
  - Terminal Unit IC: 26 (marked as required)
  - Agency Identifier: [Empty]
  - Temp Agency Identifier: [Empty]
  - Floor: [Empty]
  - Space: [Empty]
  - Unit Type: A dropdown menu is open, showing options such as '(D3051) Packaged Terminal Air Conditioner (PTAC)', '(D3051) Packaged Terminal Heat Pump (PTHP)', '(D3052) Packaged rooftop air conditioner (PSZ)', '(D3052) Packaged rooftop heat pump (PSZ-HP)', '(D3052) Packaged rooftop VAV with reheat', and '(D3052) Packaged rooftop VAV with parallel fan-powered boxes and reheat'.
  - Condensing Unit: Fields for Year Built (YYYY), Manufacturer / Model # (255 characters allowed), and Serial # (255 characters allowed).
  - Terminal Unit Control: Heating Coil
  - Room: [Empty]
  - Thermostat: [Empty]
  - Medium Type: [Empty]
  - Type: [Empty]
  - Controls Type: [Empty]
  - Capacity (MBH): [Empty]
- Buttons:** 'Add New', 'Duplicate', 'Save', 'Undo', 'Previous', 'Next', 'Take Pictures', and 'Notes Contain Resiliency Info' (checkbox).

The auditor will enter information in these fields within the Terminal (D3050) user input screen based upon the base 11 HVAC systems.

<b>System #</b>	<b>Unit Type</b>	<b>Other Items</b>
1, 3	VAV with parallel fan-powered boxes	Pictures of box(es), separate record per box, as many other fields as possible on the box(es)
2, 4	VAV with reheat	Pictures of box(es), separate record per box, as many other fields as possible on the box(es)
5, 7	Fan coil units	Pictures of FCU(s), separate record per FCU, as many other fields as possible on the FCU(s)
6	Water source heat pumps	Pictures of heat pump(s), separate record per heat pump, as many other fields as possible on the heat pump(s)
8	Packaged terminal heat pump (PTHP)	Pictures of heat pump(s), separate record per heat pump, as many other fields as possible on the heat pump(s)
9	Packaged rooftop heat pump	Pictures of heat pump(s), separate record per heat pump, as many other fields as possible on the heat pump(s)
10	Packaged terminal air conditioner (PTAC)	Pictures of PTAC(s), separate record per PTAC, as many other fields as possible on the PTAC(s)
11	Packaged rooftop air conditioner (PRAC)	Pictures of PRAC(s), separate record per PRAC, as many other fields as possible on the PRAC(s)