The TSPR Tool includes an 'HVAC Schedule Entries' feature:

- This feature allows a user to create a 'mechanical equipment schedule' with as-designed system characteristics. The as-designed system characteristics are specified in the table for 'Schedule Entries'.
- WSEC requires a user to model systems with weighted average values when multiple systems of the same system type serve a block. The TSPR tool allows a user to identify the individual schedule entries that need to be combined and automatically calculate the weighted average efficiencies and fan power for the grouped equipment, as specified in the WSEC.

TSPR Tool Requirements

- Every building block must have a Primary Heating/Cooling System assigned to it. Primary Heating/Cooling Systems consist of either an Air Handler or Zone Equipment component that may be served by a plant loop or a VRF condenser unit.

  View the <u>HVAC System Types</u> page of the TSPR User Guide for configuration and data entry guidelines, and the <u>Technical Terms</u> page for definitions of TSPR HVAC System parameters.

- All building HVAC components must have at least one equipment schedule entry (see the <u>Mechanical Equipment</u> page for details).

Equipment schedules entries may be created using either of the following two input approach options:

- **Option #1:** Enter equipment into tables provided for the schedule entries
- **Option #2:** Enter equipment directly from within **'HVAC Component'** input screens

The following example lists the steps needed to enter an HVAC System with a **Packaged Air-source Heat Pump** and a **Dedicated Outdoor Air System** (DOAS) using both of the input approach options into the TSPR tool.

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TSPR HVAC System Data Entry Instructions and Examples

Example System: Packaged Air-source Heat Pump with DOAS

This system example includes multiple rooftop units with different capacities and different rated efficiencies

Input Option #1: Enter equipment into tables on the Mechanical Equipment screen

Step 1: Select the 'Mechanical Equipment' tab from the TSPR Toolbar

Step 2: Select the 'Air Handler' tab from the Mechanical Equipment Toolbar

VRF Condenser Units	Plant Loops	Air Handlers	Terminal Units	Zone Equipment
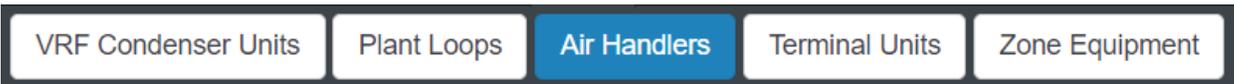
Step 3: Select the blue 'Add Equipment' button from the Equipment Schedule Entries table

Step 4: Complete all of the available input fields as highlighted in green; Select the blue 'Save' button

Note:

- Enter a descriptive name for the Equipment ID
- Enter a quantity value for the number of pieces of equipment – greater than 1 if grouping equipment with the same capacity, rated efficiency, air flow and fan power
- Repeat this step to create unique schedule entries for equipment with different capacities, efficiencies or fan power
- Required inputs with missing data will display a red 'This field is required' warning prompt
- If the '**Save**' button is not selected, new or edited entries will be lost
- After saving, the tables auto convert rated heating and cooling system units to uniform units (e.g. to COP or Et), and auto adjust efficiencies to remove fan power at rated conditions and displays the new values in the '**Calculated Efficiency**' columns, highlighted in blue.

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Input Option #1 Continued

Step 5: Repeat step 4 to add equipment schedules for DOAS equipment

- The 'System Type' should be specified as 'Dedicated Outdoor Air System'
- Note that for this example, we are assuming that the DOAS system uses no cooling or heating.

Equipment ID	Equipment Information		Cooling Information					Heating Information						Fan System
	Quantity	System Type	Cooling Source	Rated Capacity (Btu/h)	Efficiency Units	Rated Efficiency	Calculated Efficiency	Heating Source	Fuel Type	Rated Capacity (Btu/h)	Efficiency Units	Rated Efficiency	Calculated Efficiency	Design Supply Airflow (CFM)
DOAS 1	3	Dedicated Outdoor Air System	No Cooling	N/A	N/A	N/A	NA	No Heating	N/A	N/A	N/A	NA	NA	5000.0
DOAS 2	4	Dedicated Outdoor Air System	No Cooling	N/A	N/A	N/A	NA	No Heating	N/A	N/A	N/A	NA	NA	2500.0

Step 6: Create an Air Handler to Group Individual Schedule Entries

Select the green 'Add' button below the HVAC equipment summary table:

Equipment ID	Quantity	Rated Capacity	Rated Efficiency	Calculated Efficiency	Rated Capacity	Rated Efficiency	Calculated Efficiency	Design Supply Airflow	Total Fan Power	Calculated Fan Power
										Add Air Handler

Mechanical Equipment Schedule: Air Handlers

Step 7: Assign name, select System Type, Cooling Source, and Heating Source for the Air Handler

Select 'Pkgd Heat Pump' as the System Type; 'Central DX' as the Cooling Source; and 'Heat Pump' as the Heating Source. Previously entered mechanical equipment schedule entries now appear under the 'Mechanical Equipment Schedule' section.

New Air Handler

Name*	Air Handler 1
System Type	Pkgd Heat Pump

Cooling Equipment

Cooling Source*	Central DX

Heating Equipment

Heating Source*	Heat Pump
Fuel Type*	Electricity
Condenser Type*	Air

Step 8: Assign mechanical equipment entries

Click on the paper clip icons from the 'Attach' column of the available mechanical equipment entries to assign equipment to the Air Handler.

Mechanical Equipment Schedule

Enter HVAC equipment information to calculate weighted average equipment efficiency and subtract supply fan power for packaged equipment

Existing unassigned mechanical equipment applicable to this system:

Equipment ID	Quantity	Cooling Efficiency	Heating Efficiency	Attach
RTU - 1	8	3.9 COP	4.6 COP	📎
RTU - 2	12	3.8 COP	3.8 COP	📎

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Input Option #1 Continued

Step 9: Complete any remaining HVAC component required inputs and save

Select an appropriate option for Number of Stages for Cooling and Fan Control. Make checkbox selections if the system is using an economizer or energy recovery ventilation, and enter values for associated fields as needed. Select the green 'Create Air Handler' button when complete.

Step 10: Repeat steps 6-8 to add a DOAS Air Handler

Select Dedicated Outdoor Air System as the System Type; No Cooling as the Cooling Source; and No Heating as the Heating Source. The previously entered mechanical equipment DOAS entries now appear under the Mechanical Equipment Schedule section.

Note:

Newly created HVAC Components will appear in a summary table. Values for calculated weighted average cooling and heating equipment efficiencies and total system fan power for grouped equipment appear in blue. Edit components by selecting the "Edit" icon (pencil), and/or delete entries by selecting the "trash can" icon next to the component name.

Fan Systems

Calculated Fan Power: 0.425 W/CFM

Name	Design Supply Airflow (CFM)	System Fan Power (W/CFM)
RTU - 2	14000.0	0.425

☑ Economizer

☑ Energy Recovery Ventilation

ERV Sensible Effectiveness: Heating* : 0.7

☑ ERV Economizer Bypass

☑ ERV Supply Air Temperature Control

System Fan Power Reduction when ERV Bypassed* : .2 W/CFM

Fan Control* : Constant Volume

New Air Handler

Name* : DOAS - NH/NC

System Type : Dedicated Outdoor Air System

Mechanical Equipment Schedule

Enter HVAC equipment information to calculate weighted average equipment efficiency and subtract supply fan power for packaged equipment

Existing unassigned mechanical equipment applicable to this system:

Equipment ID	Quantity	Cooling Efficiency	Heating Efficiency	Attach
DOAS 1	3	NA	NA	🔗
DOAS 2	4	NA	NA	🔗

Cooling Equipment

Cooling Source* : No Cooling

Heating Equipment

Heating Source* : No Heating

Mechanical Equipment Schedule: Air Handlers										
Equipment ID	Quantity	Rated Capacity	Rated Efficiency	Calculated Efficiency	Rated Capacity	Rated Efficiency	Calculated Efficiency	Design Supply Airflow	Total Fan Power	Calculated Fan Power
Air Handler 1 - Pkgd Heat Pump ✏️ 🗑️										
		Cooling - Central DX			Heating - Heat Pump			Fan System		
RTU - 2	12	36000.0 Btu/h	14.0 SEER	3.8 COP	38000.0 Btu/h	7.9 HSPF	3.8 COP	14000.0 CFM	0.425 W/CFM	0.425 W/CFM
DOAS (NH/NC) - Dedicated Outdoor Air System ✏️ 🗑️										
		Cooling - No Cooling			Heating - No Heating			Fan System		
DOAS 1	3							5000.0 CFM	0.819 W/CFM	0.808 W/CFM
DOAS 2	4							2500.0 CFM	0.792 W/CFM	

TSPR HVAC System Data Entry Instructions and Examples

Input Option #2: Enter equipment directly within HVAC component input screens

Step 1: Create Air Handler HVAC Component entry

Select the green 'Add' button below the HVAC equipment summary table from the Mechanical Equipment screen:

				Mechanical Equipment Schedule: Air Handlers						
Equipment ID	Quantity	Rated Capacity	Rated Efficiency	Calculated Efficiency	Rated Capacity	Rated Efficiency	Calculated Efficiency	Design Supply Airflow	Total Fan Power	Calculated Fan Power
										Add Air Handler
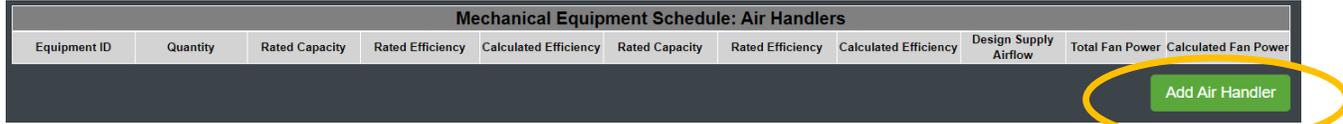
OR

Select the '+' (Add) icon from the Air Handlers sidebar option on the Heating and Cooling screen

TSPR ME Example

AIR HANDLERS +
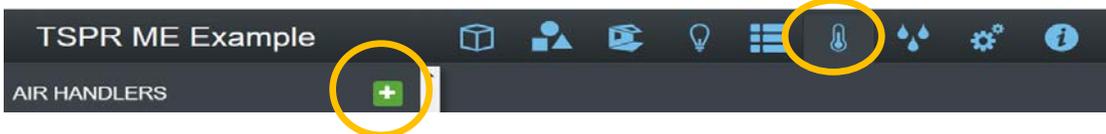
Step 2: Assign name, select System Type, Cooling Source, and Heating Source

Select Pkgd Heat Pump as the System Type; Central DX as the Cooling Source; and Heat Pump as the Heating Source. Note that the Fuel Type is auto set to Electricity, the Condenser Type is auto set to Air, and previously entered mechanical equipment entries now appear under the Mechanical Equipment Schedule section.

Step 3: Create Mechanical Equipment Schedule entries

Scroll back to the top of the screen and enter a descriptive name and number of pieces of equipment for a new equipment entry. Select the blue 'Add Equipment' button to add additional entries. Scroll down to the Cooling and Heating Equipment sections and enter rated capacity and efficiency values for each equipment entry.
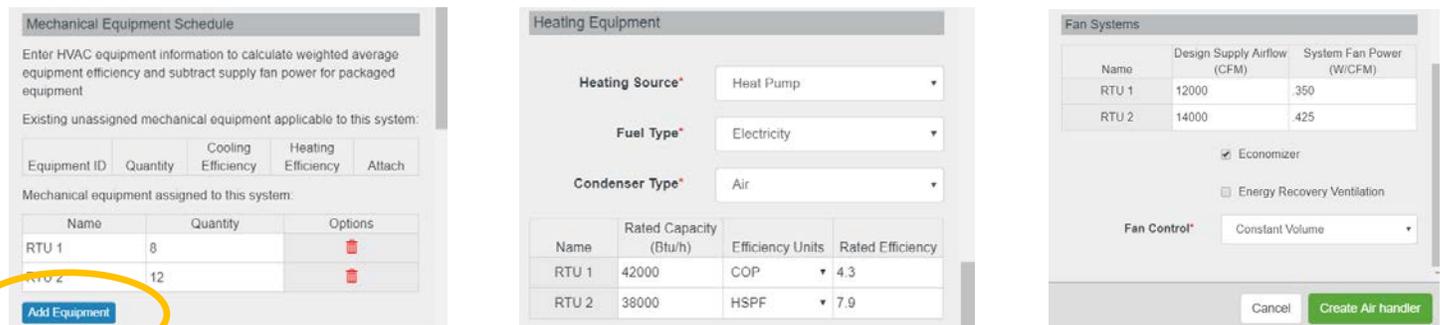
Step 4: Complete any remaining HVAC component required inputs and save

Select an appropriate option for Number of Stages for Cooling and Fan Control. Make checkbox selections if the system is using an economizer or energy recovery ventilation, and enter values for associated fields as needed. Select the green 'Create Air Handler' button when complete.

Step 5: Repeat steps 1-4 to add a DOAS Air Handler

Select Dedicated Outdoor Air System as the System Type; No Cooling as the Cooling Source; and No Heating as the Heating Source. Scroll back to the top of the screen to create DOAS equipment entries.