NY STATEWIDE CLEAN HEAT CALCULATOR
Version 2.0
USER GUIDE
JULY 11, 2022

Contents

Summary

The Statewide Clean Heat Program Savings Calculator (Clean Heat Calculator) is an excel based tool that has been developed to assist participating contractors applying to the New York State Clean Heat Program (Clean Heat Program) with calculating custom energy savings and incentives for the following heat pump technologies:

- Northeast Energy Efficiency Partnerships (NEEP) listed cold climate single package air source heat pumps
- NEEP-listed cold climate air source Mini-Splits, Single Package Vertical Heat Pumps and Package Terminal Heat Pumps
- Air-Conditioning, Heating, and Refrigeration Institute ("AHRI") Rated Large Unitary Air-to-Air Heat Pumps
- AHRI Rated Air Source Variable Refrigerant Flow (VRF) Heat Pumps
- AHRI Rated Large Closed Ground Loop Heat (Ground Source) Pumps with Centralized Pumping

Version 2.0 of the Clean Heat Calculator enables users to quantify savings for Heat Pump Upgrades, such as Heat Pumps coupled with Building Envelope Upgrades and Energy /Heat Recovery Ventilator applications. It also allows users to get a rough estimate of the savings and incentives for projects in the early stages to get a feasibility check on pursuing the project further.

The new version of the tool is **effective July 11th, 2022**, and all projects that have not received Preliminary Offer Letter (POL) before this date are subject to version 2.0.

When to Use this Calculator:

The Clean Heat Calculator should be used as the default method to calculate energy savings for the technologies mentioned above if one or more of the following statements are true:

- The project involves installing NEEP-listed cold climate air source or mini-split units in new construction or existing multi-family buildings.
- The project proposes to install a combination of the above heat pump technologies. For example, the project scope includes the installation of both NEEP-listed mini-splits and Air Source VRFs.
- The project scope of work involves installing Heat Pump technologies and Energy Recovery or Heat Recovery Ventilators (Heat Pump + ERV/HRV)
  *Provided ERV/HRV systems are not mandated by federal, state, or local code.
- The project scope of work involves installing Heat pump technologies and building envelope upgrades for new construction, existing building retrofit, or gut renovation of a facility. (Heat Pump + Envelope Upgrade)
- The project scope involves installing Heat pump technologies along with building envelope upgrade coupled with ERV/HRV. (Heat Pump + Envelope Upgrade + ERV/HRV)
  *Provided ERV/HRV systems are not mandated by federal, state, or local code

Revisions and Updates from Version 1.0:

The following are the summary of updates from the last version 1.0 of the State-Wide Clean Heat calculator:

Tab	Section	Summary of Revisions
Inputs *(Formerly named – Bldg & Data Sizing)* Mode Selection - Demo or Project Submission	Building Characteristics	• Updated to enter postal zip code, gross sq.ft area, floor height & scope of work (Heat Pump v/s Heat Pump Bundle Set (Envelope and/or ERV)
	Existing/ Proposed Building Envelope	• Updated to enter BCL/BHL values from Manual J/ ACCA 183 based on type of application - New Construction, Existing Retrofit, or Gut Renovation
	Existing/ Minimum Code Complaint HVAC System	• Updated to enter HVAC system type based on application -New Construction, Existing Retrofit, or Gut Renovation
		• Updated to enter Envelope Improvement BCL/BHL based on load reduction
	Category 4A Inputs	• Updated to select option for including ERVs based on application type
ERV	To be filled out only when installed ERVs exceed local code and are coupled with an eligible Heat Pump Technology and/or Envelope Upgrade	• New Addition-Requires information specific to ERV installed. See details in Section 1B & 2B
Results	Heat Pump Complementary Summary	• New Addition-Populates Savings (Net KWH, KW, Therms, Net MMBTU, LMMBTU) for HP+ Envelope and/or ERV
	Heat Pump Summary Project Summary	• Updated to Populate Co2 Emission Reduction, Effective Useful Life (EUL)

Exceptions to Using Calculator:

Under certain circumstances, applicants may bypass this calculator, opting instead to calculate savings using their own custom approach, even when one of the above statements is true. Justifiable reasons for doing so include, but are not limited to:

- The applicant has prepared a whole building energy model using one approved modeling software listed in the Clean Heat Program Guide.
- The project proposes installing a heat pump technology that does not fall into one of the above applicable categories available in the clean heat calculator. No prescriptive TRM methodology is available for calculating savings, i.e. Heat Recovery Chillers.
- The project involves a heat pump installation at an existing building, whose existing heating and cooling equipment types do not align with pre-programmed baselines provided in the Clean Heat Calculator. In this case, the applicant may still use the Clean Heat Calculator and should select a counter-factual baseline using pre-programmed baselines in the tool. Alternatively, the applicant may submit custom calculations comparing the proposed heat pump installation to the existing heating and cooling types currently installed at the facility. It is noted that baseline efficiencies should be based on minimum code efficiencies and not the existing equipment efficiency, except for category 4a and LMI projects

All calculation approaches must use NYS ECC code minimum efficiencies for baseline systems.

General

Users shall review the 'Input,' Eqpt Eligibility & Sched' and 'ERV' tabs and input project-specific details where needed. Cells requiring user input are highlighted in yellow. Cells in white will auto-populate based on the inputs the user enters. Red cells indicate there may be an issue with project or equipment eligibility. Users can fill in the costs and related data in the 'Results Summary Tab'

Project Information		
Building Characteristics	Zip Code	11201
	Utility	Con Edison
	Program	Multifamily
	Building Type (If Custom, fill in Custom Information in cells G4:J37)	Multifamily
	Construction Type	Existing Building - Retrofit
	Year of construction if renovation	Old (before 1950)
	Gross Building Area impacted by SOW (SF)	20,000
	LMI Building	non-LMI
	Floor to Floor Height (ft)	9

Yellow shaded cells indicate user input is required.

Heat Pump Technology	Outdoor Unit Tag(s) (OPTIONAL)	Outdoor Unit Quantity	Application	Du
NEEP Listed Cold Climate Mini-Split Heat Pump		6	Cooling and Heating	
NEEP Listed Cold Climate Mini-Split Heat Pump		22	Cooling Only	
NEEP Listed Cold Climate Mini-Split Heat Pump		5	Cooling and Heating	
NEEP Listed Cold Climate Mini-Split Heat Pump		6	Cooling and Heating	
NEEP Listed Cold Climate Mini-Split Heat Pump		1	Cooling and Heating	
Air Source Variable Refrigerant Flow Heat Pump		1	Cooling and Heating	

When a row highlights in red, there may be an eligibility issue.

Tabs should be completed in the following order:

1. Inputs
2. Eqpt Sched & Eligibility
3. ERV
4. Results Summary

Tab: Inputs

The latest version of the State-Wide Clean Heat Calculator also enables users to get a rough estimate of the savings and incentives for projects in the early stages to get a feasibility check on pursuing the project further.

Depending on the availability of appropriate required documentation, users can select options from the drop-down in cell E6 to submit a complete project application or get a rough estimate for the project by choosing the Demo Mode as shown below:

	Project Information		Select Mode
Building Characteristics	Zip Code	11201	Project Application
	Utility	Con Edison	Demo Mode (Rough Estimate)
	Program	Multifamily	Project Application Submission
	Construction Type	Existing Building - Retrofit	
	Year of construction if renovation	Old (before 1950)	
	Gross Building Area impacted by SOW (SF)	20,000	
	LMI Building	non-LMI	
	Floor to Floor Height (ft)	9	
	Scope of work - Heat Pump installation - Bundle Set: Heat Pumps with Envelope Upgrades and/or ERVs	Heat Pumps	

SECTION 1:

A) Project Application Submission Mode- Heat Pump Upgrade

Follow this section if the project application involves replacing/upgrading the heat pump system only. It includes all heat pump categories (1,2,4,5,6) except Category 4A.
Please Note: For Category 4A (Heat Pump + Building Envelope Upgrade) and or ERV/HRV combined applications, follow Section 1 B) which comes after this section on page 17 of this document.

Building Characteristics
Zip Code– Enter the exact zip code of the facility for which the application is being submitted.

Utility – Select the electric utility that services the project's territory from the drop-down menu.

Program- Select the appropriate program category based on the building type from the drop-down menu.

Building Type - Select the appropriate building type from the drop-down menu. Selection should correspond to the building type where heat pumps will be installed. Building profiles have been derived from ASHRAE 90.1 Typical Occupancy Schedule and the New York State Technical Reference Manual Appendix A for several building types.

If the listed building type is selected as Multifamily, it will prompt the user to choose whether it is an LMI or Non- LMI building

Suppose the listed building types do not align with the building type in the subject project. In that case, users may select custom from the drop-down and then use the custom HVAC schedule in cells G4-J37 to create a "custom" building profile, including HVAC schedule, temperature set points, and balance point temperatures closely align with their project application.

- Creating a Custom HVAC Schedule – Select "On" or "Off" from the drop-down menu to correspond to the hours when the building's HVAC system is expected to be operational. Periods designated "On" correlate to times when the building is occupied, while "Off" periods correlate to times when the building is unoccupied or lightly occupied.

Hour (Time of Day)	Custom HVAC Schedule		
	Weekday	Saturday	Sunday
1:00 AM (12 to 1 AM)	Off		
3:00 AM (2 to 3 AM)	Off		
4:00 AM (3 to 4 AM)	Off		
5:00 AM (4 to 5 AM)	Off		
6:00 AM (5 to 6 AM)	Off		
7:00 AM (6 to 7 AM)	On		
8:00 AM (7 to 8 AM)	On		
9:00 AM (8 to 9 AM)	On		
10:00 AM (9 to 10 AM)	On		
11:00 AM (10 to 11 AM)	On		
12:00 PM (11 to 12 PM)			
1:00 PM (12 to 1 PM)			
2:00 PM (1 to 2 PM)			
3:00 PM (2 to 3 PM)			
4:00 PM (3 to 4 PM)			
5:00 PM (4 to 5 PM)			
6:00 PM (5 to 6 PM)			
7:00 PM (6 to 7 PM)			
8:00 PM (7 to 8 PM)			
9:00 PM (8 to 9 PM)			
10:00 PM (9 to 10 PM)			
11:00 PM (10 to 11 PM)			
12:00 PM (11 to 12 AM)			

- Occupied / Unoccupied Heating and Cooling Temperature Set Points – Enter the building's heating and cooling thermostat temperature set points.
- Occupied / Unoccupied Heating and Cooling Balance Point Temperatures – Enter the building's heating and cooling balance point temperatures.

If balance points are unknown, enter the following pre-set balance point temperatures into the blank table:

- ***Custom Profile - Existing Building Default Balance Point Temperatures:***

	Occupied Hours	Unoccupied Hours
Cooling Balance Point (deg F)	58	61
Heating Balance Point (deg F)	54	51

- ***Custom Profile - New Construction Default Balance Point Temperatures:***

	Occupied Hours	Unoccupied Hours
Cooling Balance Point (deg F)	55	58
Heating Balance Point (deg F)	52	49

Gross Building Area Impacted by SOW (Sf)- Enter the appropriate sq.ft area impacted by the HVAC and/or building envelope upgrade.

Floor to Floor Height (ft)- Enter the appropriate ft measurement between 2 consecutive floors.

Construction Type – Select from the following drop-down options depending on the project facility application:

1) New Construction

2) Existing Building -Retrofit

3) Gut Renovation[1]

[1]Gut renovation is any work that could be considered an "Alteration" per the Energy Conservation Construction Code of New York State (ECCCNYS), as defined in Sections C202 and R202 of the code and as covered in Sections C503 and R503, which make alterations subject to new construction code requirements.

Construction Type: New Construction-
Selecting this option will prompt the user to fill in the following specific sections along with the other bold highlighted sections:

- Minimum Code Complaint Building Envelope- Heating & Cooling Load
- Minimum Code Complaint HVAC system type

Construction Type: Existing Building / Gut Renovation-
Selecting this option will prompt the user to fill in the following specific sections along with the other bold highlighted sections:

- Existing Building Envelope - Heating & Cooling Load
- Existing HVAC System Type
- Existing HVAC System Efficiency

Design Temperatures:

1% Dry Bulb Cooling Design Temperature: Enter 1% Dry Bulb Cooling Design Temperature from the design load calculations.

For Reference: Below are typical 1% cooling design dry bulb temperatures based on various ASHRAE 2017 weather station locations. It is expected that the load calculations submitted with the user's application align with the below temperatures, +/- 5˚F

City Name	ASHRAE 2017 1% Cooling Dry Bulb Temperature (deg F)
Albany	86.1
Binghamton	82.3
Buffalo	83.9
Central Long Island	86.3
Elmira	86.4
Fort Drum	83.6
Glens Falls	84.7
Islip	85.7
Jamestown	81.1
Massena	84.4
Monticello	82.5
New York City - Central Park	88.0
New York City - JFK	86.6
New York City - Laguardia	89.6
Niagara Falls	85.2
Poughkeepsie	88.4
Rochester	85.6
Saranac Lake	81.0
Syracuse	86.4
Utica	84.2
Watertown	83.1
Westhampton	84.0
White Plains	86.4

Design Temperatures:

99% dry bulb heating design temperature (°F) - Enter 99% Dry Bulb Heating Design Temperature from the design load calculations.

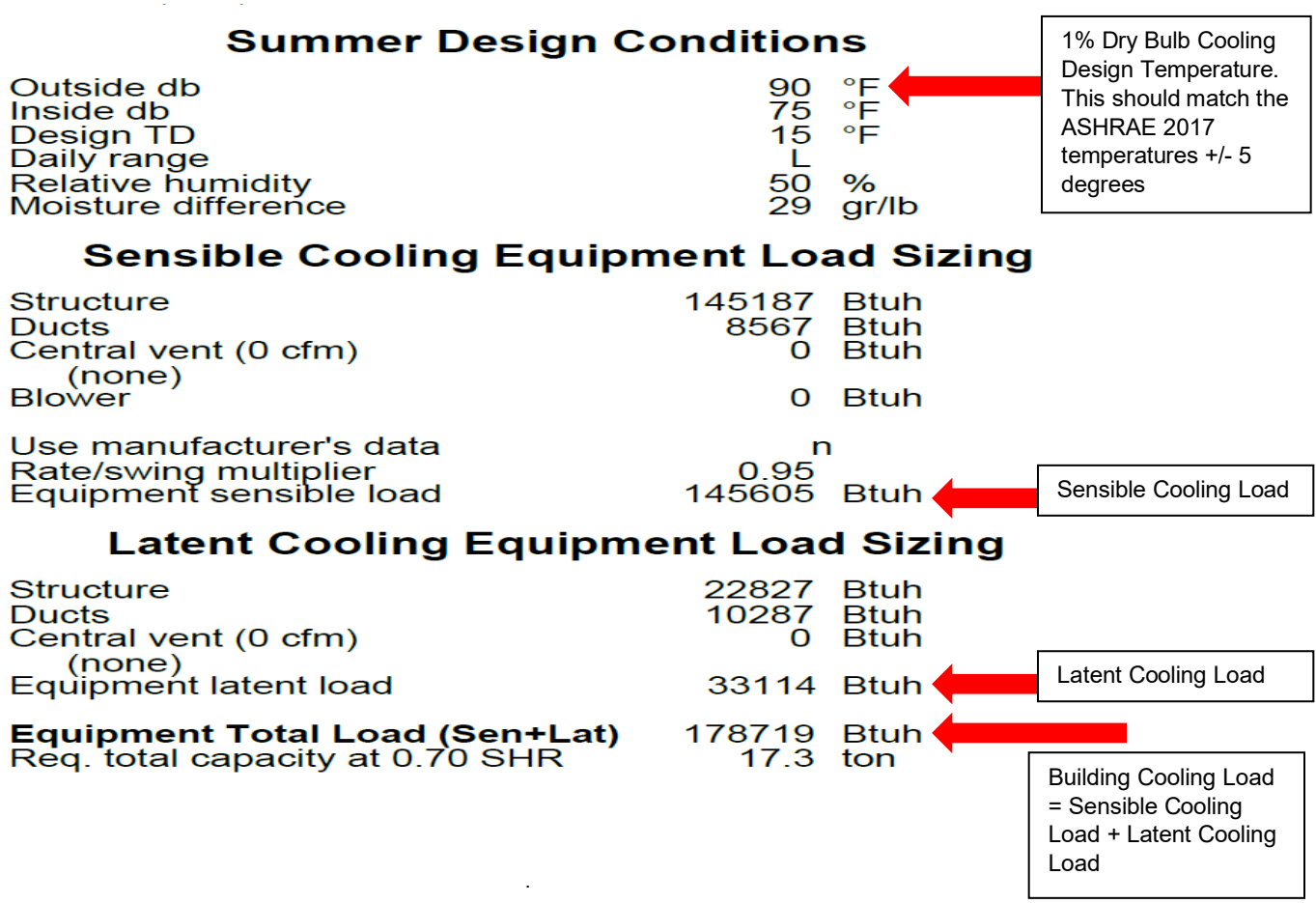
For Reference: Below are typical 99% heating design dry bulb temperatures based on various ASHRAE 2017 weather station locations. It is expected that the load calculations submitted with the user's application align with the below temperatures, +/- 5 ºF

City Name	ASHRAE 2017 99% Heating Dry Bulb Temperature (deg F)
Albany	4.7
Binghamton	4.5
Buffalo	7.4
Central Long Island	17.0
Elmira	4.8
Fort Drum	-4.4
Glens Falls	-1.8
Islip	15.9
Jamestown	4.8
Massena	-7.8
Monticello	4.7
New York City - Central Park	17.5
New York City - JFK	18.0
New York City – La guardia	18.4
Niagara Falls	6.9
Poughkeepsie	8.4
Rochester	7.1
Saranac Lake	-11.5
Syracuse	4.9
Utica	1.2
Watertown	-5.0
Westhampton	12.2
White Plains	13.5

Minimum Code Complaint/ Existing Building Envelope:

Building Cooling Load (BCL) – Enter the total design cooling load in British Thermal Units per hour (Btu/h) for the areas impacted by the clean heat project. BCL should be calculated following a code-approved methodology, including ACCA Manual J for residential buildings and ASHRAE/ACCA Standard 183 for commercial buildings. Calculating the building's design cooling load shall be at the 1% dry bulb cooling design temperature for the most relevant ASHRAE 2017 location. Below is an example of building load calculations, showing the building cooling load and cooling design temperature.

Cooling Load Calculations Example:



Building Heating Load (BHL) – Enter the total design heating load in British Thermal Units per hour (Btu/h) for the areas impacted by the clean heat project. BHL should be calculated following a code-approved methodology, such as ACCA Manual J for residential buildings and ASHRAE Standard 183 for commercial buildings. Calculating the building's design heating load shall be at the 99% dry bulb heating design temperature for the most relevant ASHRAE 2017 location. Below are examples of building load calculations, showing the building heating load and heating design temperature.

Heating Load Calculations Example:

Winter Design Conditions

Outside db	17	°F
Inside db	70	°F
Design TD	53	°F

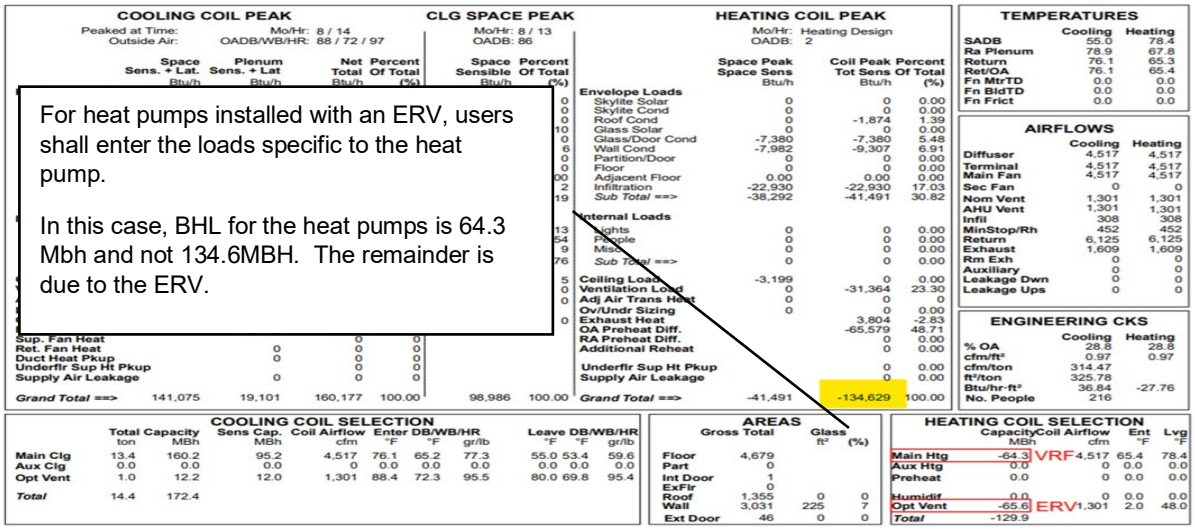
99% Dry Bulb Heating Design Temperature

Heating Summary

Structure	242341	Btuh
Ducts	25712	Btuh
Central vent (0 cfm) (none)	0	Btuh
Humidification	0	Btuh
Piping	0	Btuh
Equipment load	268053	Btuh

Building Heating Load

In cases where an existing energy recovery ventilator also serves the bildign, the user should only enter the loads relating to the heat pump installation. Refer to the below heat load calculation:

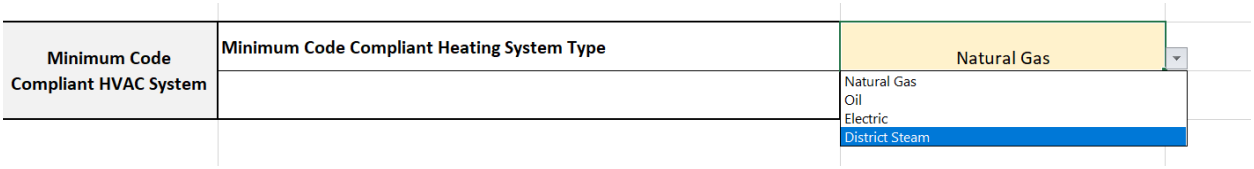


For heat pumps installed with an ERV, users shall enter the loads specific to the heat pump.

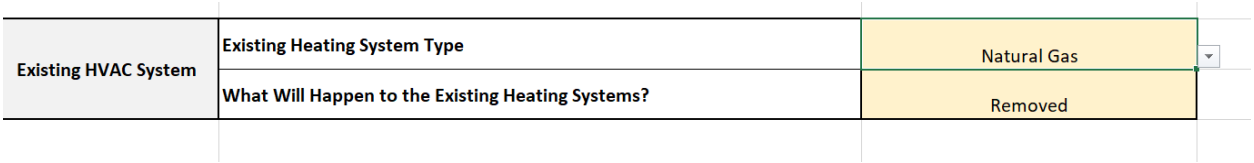
In this case, BHL for the heat pumps is 64.3 Mbh and not 134.6MBH. The remainder is due to the ERV.

Minimum Code Required/ Existing HVAC System Type

New Construction Applications – a minimum code-compliant HVAC system will have to be selected:



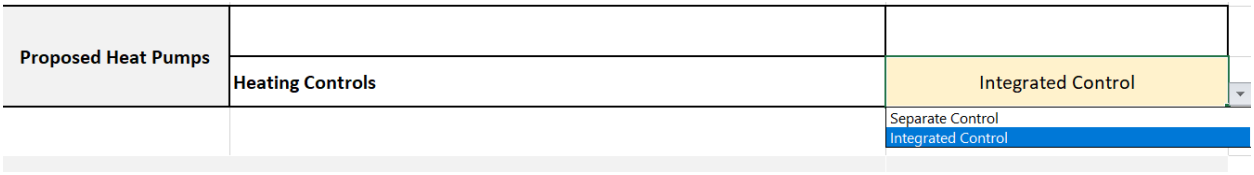
Existing or Gut Renovation Applications- The existing HVAC system will have to be selected along with the option to choose from whether the system will be decommissioned, removed, or will remain in place (active):



For New Construction, Existing-Retrofit and Gut Renovations applications, an NYCECC code minimum baseline will be used as a baseline for efficiency requirements as default, and users will not be required to make any specific selection in these scenarios for efficiency requirements.

Proposed Heat Pump System:

Heating Controls – Select heating controls strategy from the drop-down menu.



- Integrated Control – This option covers two types of control strategies:
    - Integrated/Modulating – The heat pump and backup heating system are on the same thermostat. The backup heater can modulate to meet the load without limiting the ASHP from delivering its maximum capacity.
    - Integrated/Fixed Capacity – The ASHP and backup heating system are on the same thermostat. The backup heater has a fixed capacity to meet the load. The backup heater is larger than the ASHP, so the ASHP is not always able to deliver its maximum capacity (the backup heater supplies a larger share of the load when both are running).
- Separate Control – The heat pump and backup heating system are on separate thermostats and controlled separately.

If there is no backup heating system in the proposed project, the user shall default to integrated control.

The following additional information is required for closed loop ground source systems:

Complete table below if Ground Source Heat Pump Type is selected:		
Closed Loop Ground Source Heat Pumps	**Pumping Type**	Sensorless Variable Speed
	Quantity of Duty Pumps	1
	Pump Horsepower	1
	Pump Motor Efficiency	82.5%
	Pumping Design Power (kW)	1
	Loop Type	Closed Loop
	Average Ground Temp (F)	50
	Max Entering Water Temperature (EWT) (deg F) in Cooling	90
	Min Entering Water Temperature (EWT) (deg F) in Heating	30

- Pumping Type: Select pumping design methodology from drop down menu:
  - Constant Speed: Design does not incorporate variable speed pumping.
  - Traditional Variable Speed: Install a variable speed drive (VSD) to vary pump speed in order to maintain the required pressure difference across all the heat pumps
  - Two Stage Speed: Install a two-speed motor that can operate at a lower speed (usually 60% of full speed). Usually, the change in speed is driven by a pressure difference measurement in building loop.
  - Sensor less Variable Speed: Uses a variable speed pump with internal controls to modulate speed to maintain a constant pressure difference across a range of flows. These controllers use a sensor less control approach that attempts to mimic differential-pressure control without requiring a pressure sensor out in the building loop. The controller infers the pressure difference (at the pump) from measured current and speed. These pumps are common in small and medium applications up to 300-400 gpm.

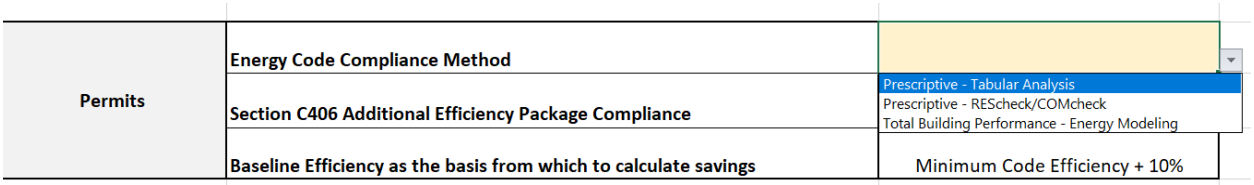
- Quantity of Duty Pumps: Enter pump quantity
- Pump Horsepower: Enter pump horsepower
- Pump Motor Efficiency: Pump motor efficiency auto-populates based on horsepower of pump entered in field above. Motor efficiencies are based on NEMA premium motor efficiencies.
- Pumping Design Power (kW): Pumping design power auto-populates based on the entered quantity, pumping horsepower, motor efficiency, as well as an assumed load factor of 1:

$$Pumping\ Design\ Power\ (kW) = \frac{Quantity\ x\ Horsepower\ x\ Load\ Factor}{Motor\ Efficiency}$$

- Average Ground Temp (F): Enter average ground temperature
- Max Entering Water Temperature (EWT) (deg F) in Cooling: Enter the maximum temperature of the water entering the heat pump from the ground source system when operating in cooling mode.
- Min Entering Water Temperature (EWT) (deg F) in Heating: Enter the temperature of the water entering the heat pump from the ground source system when operating in heating mode.

Permits

For New Construction Applications, users will be prompted to fill in the code permit requirements as required:



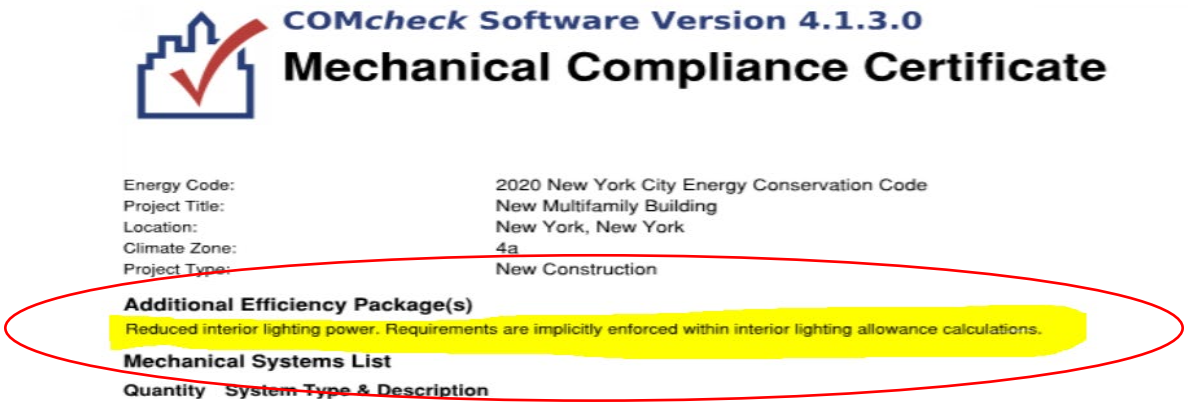
Energy Code Compliance Method – Select the applicable energy code compliance path from the drop-down menu. According to the 2020 New York City / New York State Commercial (NYC/NYS) Energy Codes, projects may comply in the following ways:

1. Prescriptive – Tabular Analysis:
2. Prescriptive – REScheck/ COMcheck
3. Total Building Performance -Energy Modeling

The prescriptive compliance path requires each building element to meet a minimum acceptable value listed by the referred energy code. In contrast, the total building performance involves building the virtual model of the project to predict energy usage against an acceptable baseline. The performance path allows the designers to make trade-offs between various components of the building envelope and the systems used for heating, cooling, and lighting. The existing building typically complies with the prescriptive path by submitting a tabular analysis or COM check. Refer to examples of a tabular analysis and COM check below.

Section C406 Additional Efficiency Package Compliance (Commercial Code Only) – The 2020 NYC/NYS Commercial Energy Codes require all projects following the prescriptive path to incorporate one of eight additional efficiency package options within their design. Users shall select which additional efficiency package option was used to comply with the code from the drop-down menu. Users may select “Not Applicable” if this requirement doesn’t apply to the project (e.g., the project is a single-family or low-rise multi-family building that complies with the residential energy code). Users can determine which energy efficiency package the design complies with by consulting with the project’s COMcheck or tabular analysis. See below.

COMcheck Example:



COMcheck Software Version 4.1.3.0

Mechanical Compliance Certificate

Energy Code:	2020 New York City Energy Conservation Code
Project Title:	New Multifamily Building
Location:	New York, New York
Climate Zone:	4a
Project Type:	New Construction

Additional Efficiency Package(s)

Reduced interior lighting power. Requirements are implicitly enforced within interior lighting allowance calculations.

Mechanical Systems List

Quantity System Type & Description

Tabular Analysis Example:

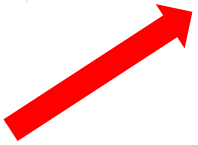
2020 NYCECC Commercial Additional Efficencies Tabular Analysis

NYCECC Citation	Provision	Item Description	Code Prescriptive Value (ECC)	Proposed Design Value	Supporting Documentation
C406.1	**Requirements** (for ADDITIONAL EFFICIENCY PACKAGE OPTIONS)	*Sample text: Choose one of six additional efficiency options*	*Buildings shall comply with at least one of the following:* *1. More efficient HVAC performance in accordance with Section C406.2.* *2. Reduced lighting power density system in accordance with Section C406.3.* *3. Enhanced digital lighting controls in accordance with Section C406.4.* *4. Provision of a dedicated outdoor air system with energy recovery ventilation for certain HVAC equipment in accordance with Section C406.5.* *5. High-efficiency service water heating in accordance with Section C406.6.* *6. Enhanced envelope performance in accordance with Section C406.7*	*Sample text: Reduced lighting power density system in accordance with Section C406.3.*	*Sample text: See note on EN-XXX*
C406.2	**More efficient HVAC equipment performance**	*More efficient HVAC equipment performance*	*Sample text:* *Equipment exceeds code min. by 10%:* *1 MBTU/hr gas-fired, hot water boiler @ 80% Et,* *300 ton air-cooled chiller @ 10.1 EER, 14 IPLV*	*Sample text:* *1000 MBH gas-fired, hot water boiler @ 96% Et,* *300 ton air-cooled chiller @ 12 EER, 16 IPLV*	*Sample text: See Mechanical schedule, drawing M-XXX*
C406.3	**Reduced lighting power density**	*Reduced lighting power density*	*Sample text:* *Lighting exceeds code min. by 10%:* *Building Area Method* *Office: 0.69 W/SF*	*Sample text:* *Building Area Method* *Office: 0.50 W/SF*	*Sample text: See RCPs, Lighting Schedule, LPD calculation, drawing A-XXX, EN-XXX*
C406.4	**Enhanced digital lighting controls**	*Enhanced digital lighting controls*	*Interior lighting in the building shall have enhanced lighting controls that shall be located, scheduled and operated in accordance with Section C405.2.2 & C406.4*	*Sample text:* *Office and lobby lighting provided as per requirements*	*Sample text: See RCPs, Lighting Schedule, LPD calculation, drawing A-XXX, EN-XXX*
C406.5	**Dedicated outdoor air system**	*Dedicated outdoor air system with energy recovery*	*Buildings covered by Section C403.4 shall be equipped with an independent ventilation system designed to provide not less than the minimum 1OO percent outdoor air to each individual occupied space, as specified by the New York City Mechanical Code, and be equipped with an energy recovery system.*	*Sample text:* *MAU-1 provides 100% outside air provided to all occupied space and is equipped with an Energy Recovery device*	*Sample text: See Mechanical schedule, drawing M-XXX*

Baseline Efficiency – cells auto-populate based on construction type, Energy Code compliance pathway, and Section C406 compliance user inputs. Suppose a new construction project complies with the 2020 NYC/NYS Commercial by providing more efficient HVAC. In that case, baseline efficiencies will be set as the minimum code efficiency for the selected baseline equipment + 10%. This field should yield 'Minimum Code Efficiency' in all other cases.

Permits	**Energy Code Compliance Method**	Prescriptive - REScheck/COMcheck
	Section C406 Additional Efficiency Package Compliance (New Construction - 2020 Commercial Energy Code Only)	Not Applicable
	Baseline Efficiency	Minimum Code Efficiency

Indicates that baseline equipment efficiencies will be equivalent to the minimum code efficient for that equipment + 10%. E.g. if minimum boiler efficiency in code is 80%, the baseline boiler efficiency used in code will be 88%.



SECTION 1

B) Project Application Submission- Heat Pump + Building Envelope Upgrade and/or Energy Recovery Ventilator (ERV)

Based on the type of application as discussed in detail under Section 1 A), the following sections will also have to be filled in for applications under Cat 4A as applicable:

1) Building Characteristics
2) Design Temperatures
3) Minimum Code/ Existing Building Loads
4) Minimum Code Complaint/ Existing HVAC System Type
5) Permits
6) Proposed Heat Pump
7) Existing HVAC System Efficiency

Refer to Section 1A for detailed guidance and steps to complete fields (1-5) listed above

Under the Building Characteristics section, select the specific type of technology

1	**Project Information**		
2	Building Characteristics	**Zip Code**	11201
4		**Utility**	Con Edison
7		**Program**	Multifamily
8		**Building Type** (If Custom, fill in Custom Information in cells G4:J37)	Multifamily
9		**Construction Type**	Existing Building - Retrofit
10		**Year of construction if renovation**	Old (before 1950)
11		**Gross Building Area impacted by SOW (SF)**	20,000
12		**LMI Building**	non-LMI
13		**Floor to Floor Height (ft)**	9
15		**Scope of work** - Heat Pump installation - Bundle Set: Heat Pumps with Envelope Upgrades and/or ERVs	Bundle Set
26			Heat Pumps Bundle Set

Please Note: For Applications installing Heat Pump +ERV- (Cat 4) – users are still prompted to select Bundle Set from the drop-down shown in the above snippet. However, they will be prompted to enter the same building heating and cooling loads in the baseline and the proposed case scenario.

Users should select 'Yes' under the Cat 4A Inputs for ERV selection. However, enter the same loads in the proposed case as in the pre or existing case scenario before installation.

6) Proposed Building Envelope Upgrade

Category 4 A Inputs		
Loads Served by Heat Pumps and ERVs after Envelope Improvements	Building Loads source:	Manual J or ACCA 183 calculations
	Insert Building Loads from Manual J or ACCA 183	Data per Manual J or ACCA 183 load calculations
	BCL Building Cooling Load (Btu/hr) [Eligible Loads Only]	750,215
	BHL Building Heating Load (Btu/hr) [Eligible Loads Only]	714,600
ERV	Proposed Heat Pump system design includes ERV or HRV	Yes
	Select Heat Pump system that uses ERV or HRV	Air Source, not NEEP listed

Based on the building & the construction type, users will be prompted to select load calculations submitted through Manual J or ACCA 183 submissions. Enter the BCL & BHL values from the load calculations in the yellow input cells- C57, C58

If the heat pump design application also involves Energy Recovery or Heat Recovery Ventilators, select Yes from the drop-down in cell C62. Users will also be filling out the information specific to the Energy Recovery Ventilation/ Heat Recovery Ventilation system by completing the Tab 'ERV'.

Refer to page 38 for guidance on how to complete the *ERV tab.*

7)Existing HVAC System Efficiency

For Existing or Gut Renovation Applications, users will also be prompted to fill in the cooling and heating efficiency. Users will be prompted to select a default option of the Existing Equipment select 'Custom' option from the yellow input drop downs from cell C69-70

Existing HVAC system efficiency		
Existing HVAC system	Existing HVAC System Cooling Efficiency (EER)	Existing Equipment
	Existing HVAC System Heating Efficiency (%)	Existing Equipment

And fill in values for cooling & heating capacity and efficiency for existing HVAC units cell G69-L88

Complete table below if Existing Equipment Custom Efficiency is selected:				
Unit #	Cooling capacity	Heating capacity	Cooling efficiency EER	Heating efficiency COP
1	1000	1000	10.6	0.8
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
Total	1000	1000		
		Weighted avg Efficiency	10.6	0.80

Existing equipment efficiencies should be based on the actual test results. Hence, supplemental documentation is required to support the existing efficiencies, i.e., combustion test results on the existing boilers.

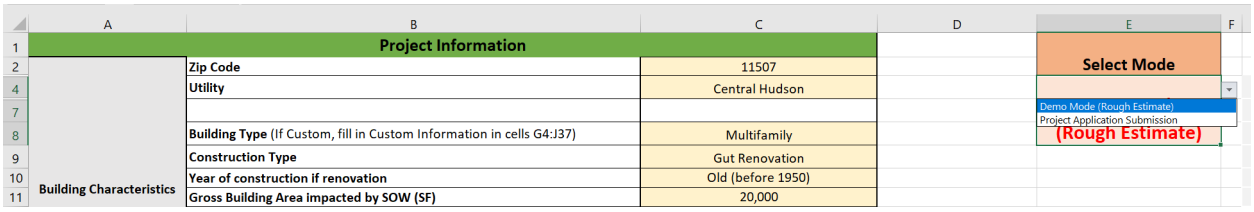
SECTION 2

A) Rough Estimate Submission- Heat Pump Upgrade

Follow this section if the project application involves replacing/upgrading the heat pump system only. It includes all heat pump categories (1,2,4,5,6) except Category 4A.

Please Note: For Category 4A (Heat Pump + Building Envelope Upgrade) and /or ERV/HRV combined project application, follow Section 2 B) which comes after this section on page 21 of this document.

Depending on the availability of appropriate required documentation, users can select options from the drop-down in cell E6 to submit a complete project application or get a rough estimate for the project by choosing the Demo Mode as shown below:



Users will be required to input fewer mandatory sections compared to the project application submission mode, which enables them to get a rough estimate of the overall savings and incentive. This rough estimate should aid users in making further feasibility decisions to pursue the project.

Following fields will have to be completed depending on the building and/or construction type:

1) Building Characteristics
2) Design Temperatures
3) Minimum Code Complaint/ Existing HVCA System type
4) Permits
5) Proposed Heat Pumps

For detailed description on 1-4, refer Section 1A listed on page 7.

5)Proposed Heat Pump System

This section will only be prompted for Demo or Rough Estimate Selection

Heat Pump Type- Select the type of heat pump system from the following options:

- Air Source
- Ground Source
- Mini-Split Air Source

Air Source Heat Pumps for Space Heating application include:

a. Cold Climate Air-to-Air Single Packaged Heat Pumps
b. Air-to-Air Large Commercial Unitary heat pumps (single packaged or split system)
c. Air Source Variable Refrigerant Flow heat pumps; and
d. Packaged Terminal Heat Pumps

SECTION 2

B) Rough Estimate Submission- Heat Pump + Building Envelope Upgrade and /or ERV/HRV

Users will be required to input fewer mandatory sections compared to the project application submission mode, which enables them to get a rough estimate of the overall savings and incentive. This rough estimate should aid users in making further feasibility decisions to pursue the project.

The Following fields will have to be completed depending on the building and/or construction type

1) Building Characteristics
2) Design Temperatures
3) Minimum Code Complaint/ Existing HVCA System type
4) Permits
5) *Existing HVAC System Efficiency
6) Proposed Building Envelope Upgrades

Refer to Section 1A for detailed guidance and steps to complete the numbered fields listed above (1-4)

Under the Building Characteristics section, select the specific option based on the scope of work. For Heat Pump + Envelope Upgrade and /or ERV, select Bundle Set from the below drop-down option:

	Project Information		
2	Building Characteristics	**Zip Code**	11201
4		**Utility**	Con Edison
7		**Program**	Multifamily
8		**Building Type** (If Custom, fill in Custom Information in cells G4:J37)	Multifamily
9		**Construction Type**	Existing Building - Retrofit
10		**Year of construction if renovation**	Old (before 1950)
11		**Gross Building Area impacted by SOW (SF)**	20,000
12		**LMI Building**	non-LMI
13		**Floor to Floor Height (ft)**	9
15		**Scope of work** - Heat Pump installation - Bundle Set: Heat Pumps with Envelope Upgrades and/or ERVs	Bundle Set
26			Heat Pumps Bundle Set

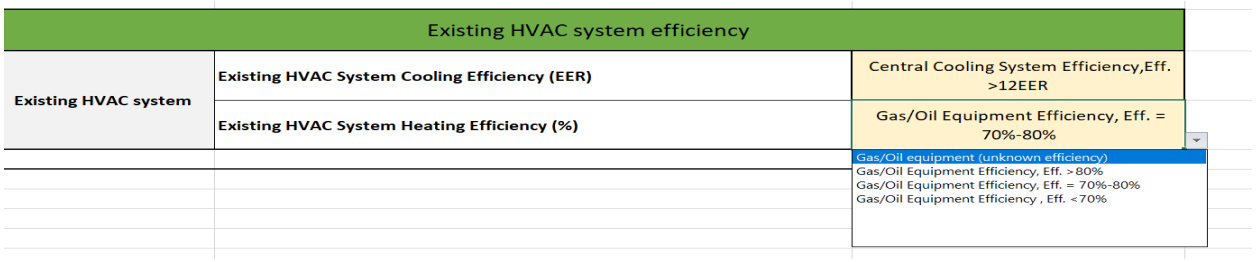
5)**** Existing HVAC System Efficiency***- Applicable only for Existing Building Retrofit/ Gut Renovations applications.

Select appropriate existing HVAC system cooling efficiency from the drop-down options based on the system type:

Existing HVAC system efficiency		
Existing HVAC system	**Existing HVAC System Cooling Efficiency (EER)**	Central Cooling System Efficiency,Eff. >12EER
	Existing HVAC System Heating Efficiency (%)	No Cooling Central Cooling System Efficiency,Eff. >12EER Central Cooling System Efficiency, Eff. <12EER Window AC units

Existing HVAC Cooling Efficiencies can be confirmed based on the type of cooling equipment and from the name /model plate.

Select appropriate existing HVAC system heating efficiency from the drop-down options based on the heating system type.



Existing equipment efficiencies should be based on the actual test results. Hence, supplemental documentation is required to support the existing efficiencies, i.e., combustion test results on the existing boilers.

New Construction applications will consider a minimum code compliant HVAC system baseline efficiency based on selected code complaint HVAC system type. Users do not have to input baseline efficiencies for new construction projects, as the calculator defaults to the code minimum efficiencies.

Please Note: For Applications installing Heat Pump +ERV- (Cat 4) – users are still prompted to select Bundle Set from the drop-down shown in the above snippet. However, they will be prompted to enter the same building heating and cooling loads in the baseline and the proposed case scenario.

Users should select ‘Yes’ under the Cat 4A Inputs for ERV selection. However, enter the same loads in the proposed case as in the pre or existing case scenario before installation.

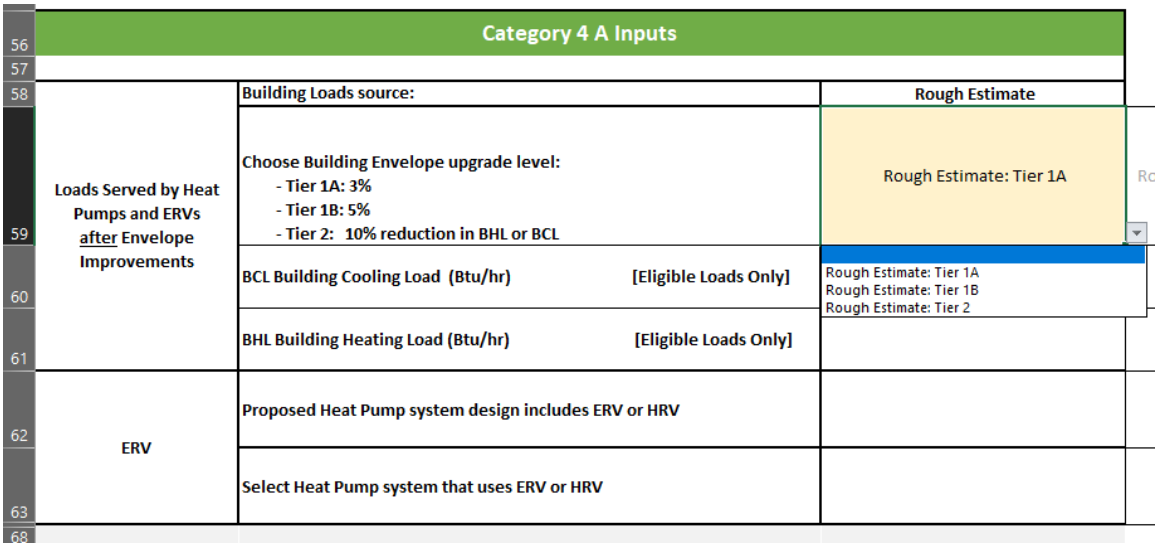
6)Proposed Building Envelope Upgrades-

Users will be asked to enter loads specific to the project type generated by the load calculations.

As this is a rough estimate, an analysis is based on a reduction in the building loads due to building envelope upgrades. Users will be prompted to select options from the drop-down based on their estimate of potential decreases in the BHL & BCL.

The following selection is recommended for New Construction Facilities:

- Tier 1A- (3% reduction in BHL/BCL)
- Tier 1B- (5% reduction in BHL/BCL)
- Tier 2-(10% reduction in BHL/BCL)



The following selection is recommended for the Existing Facilities and Gut Renovation:

- Tier 1A- (15% reduction in BHL/BCL)
- Tier 1B- (25% reduction in BHL/BCL)
- Tier 2-(35% reduction in BHL/BCL)

56	**Category 4 A Inputs**		
57			
58	**Loads Served by Heat Pumps and ERVs after Envelope Improvements**	**Building Loads source:**	**Rough Estimate**
59		**Choose Building Envelope upgrade level, % reduction in BHL or BCL:** **- Tier 1A: 15%** **- Tier 1B: 25%** **- Tier 2: 35% reduction in BHL or BCL**	Rough Estimate: Tier 1A
60		**BCL Building Cooling Load (Btu/hr) [Eligible Loads Only]**	Rough Estimate: Tier 1A Rough Estimate: Tier 1B Rough Estimate: Tier 2
61		**BHL Building Heating Load (Btu/hr) [Eligible Loads Only]**	
62	**ERV**	**Proposed Heat Pump system design includes ERV or HRV**	
63		**Select Heat Pump system that uses ERV or HRV**	

Tab: Eqpt Sched & Eligibility

This tab asks for performance details for the equipment that project proposes to install. **It is recommended that users download the AHRI certificates and NEEP product listings for all make/model units that are proposed for installation to assist with filling out project specific details.** Examples of these documents are shown below:

Example of AHRI Certificate:

AHRI CERTIFIED®
www.ahridirectory.org

Certificate of Product Ratings

AHRI Certified Reference Number : 204717989 Date : 03-01-2021 Model Status : Active

AHRI Type : HRCU-A-CB-O (Mini-Split Heat Pump, with Remote Outdoor Unit Air-Source, Free Delivery)

Outdoor Unit Brand Name : DAIKIN

Outdoor Unit Model Number : RXL12QMVJU9

Indoor Type : Mini-Splits (Non-Ducted)

Indoor Model Number(s) : FVXS12NVJU

Rated as follows in accordance with the latest edition of AHRI 210/240 with Addendum 1, Performance Rating of Unitary Air-Conditioning & Air-Source Heat Pump Equipment and subject to rating accuracy by AHRI-sponsored, independent, third party testing:

Cooling Capacity (95F) : 10200

EER (95F) : 12.00

SEER : 20.00

High Heat (47F) : 13000

Low Heat (17F) : 8300

HSPF : 11.40

Sold in? : USA, Canada

Example NEEP Product List

Mitsubishi Electric S-Series
Multizone All Ducted
AHRI Cert #: **201754639**
Outdoor Unit #: **PUMY-P60NKMU***
Indoor Unit #:
Maximum Heating Capacity (Btu/hr) @5°F: **42,000**
Rated Heating Capacity (Btu/hr) @47°F: **66,000**
Rated Cooling Capacity (Btu/hr) @95°F: **60,000**

Information Tables

Brand	Mitsubishi Electric
Series	S-Series
Ducting Configuration	Multizone All Ducted
AHRI Certificate No.	201754639
Outdoor Unit #	PUMY-P60NKMU*
Indoor Unit Type	Ducted Indoor Units
Indoor Unit #	
Furnace Unit #	
SEER	17
EER	11.1
HSPF Region IV	10.7
Energy Star	

Performance Specs

Heating / Cooling	Outdoor Dry Bulb	Indoor Dry Bulb	Unit	Min	Rated	Max
Heating	5°F	70°F	Btu/h	9,808	-	42,000
			kW	0.99	-	6.75
			COP	2.9	-	1.82
Heating	17°F	70°F	Btu/h	14,121	41,500	41,500
			kW	1.2	4.95	4.68
			COP	3.45	2.46	2.6
Heating	47°F	70°F	Btu/h	19,526	66,000	66,000
			kW	1.03	5.23	5.23
			COP	5.56	3.7	3.7
Cooling	82°F	80°F	Btu/h	15,847	-	60,300
			kW	0.9	-	4.22
			COP	5.16	-	4.19
Cooling	95°F	80°F	Btu/h	14,753	60,000	60,000

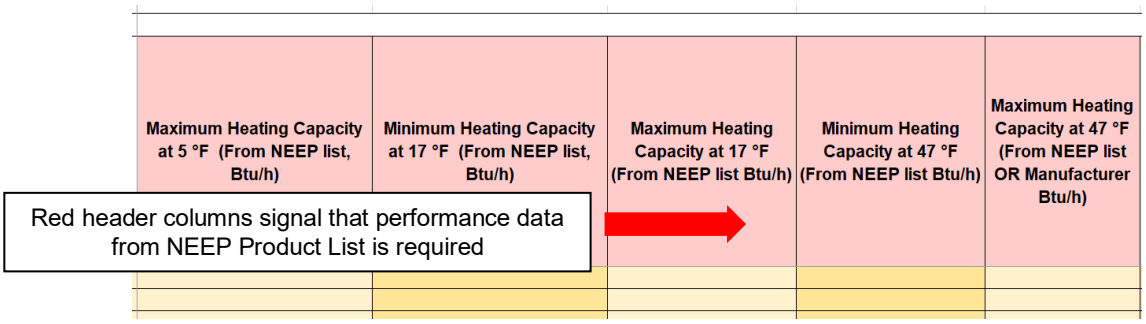
Columns on the 'Eqpt Sched & Eligibility' tab that require information from AHRI have been shaded in green. See below screenshot:

Proposed Equipment Schedule

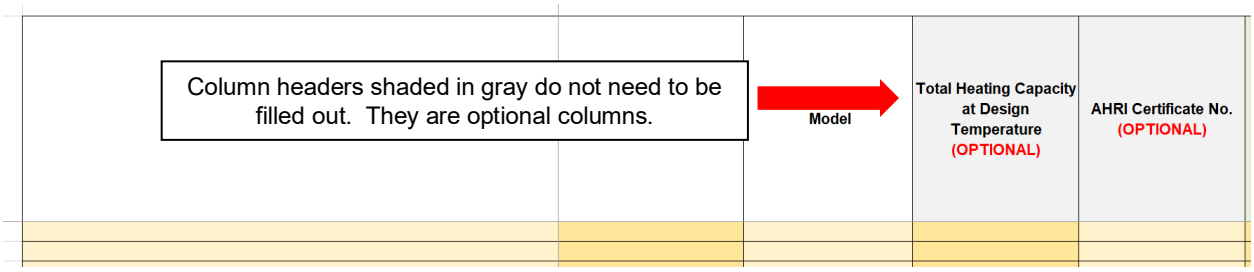
ASHP: Rated Heating Capacity from AHRI Certificate at 17 °F (Btu/h)	ASHP: Rated Heating Capacity from AHRI Certificate at 47 °F (Btu/h)	Closed Loop GSHP: Rated Heating Capcity from AHRI Certificate at 32 F (Btu/h)	

Green header columns signal that performance data from AHRI Certificate is required

Columns that require heat pump performance from the NEEP product listing have been shaded in red. See below screenshot:



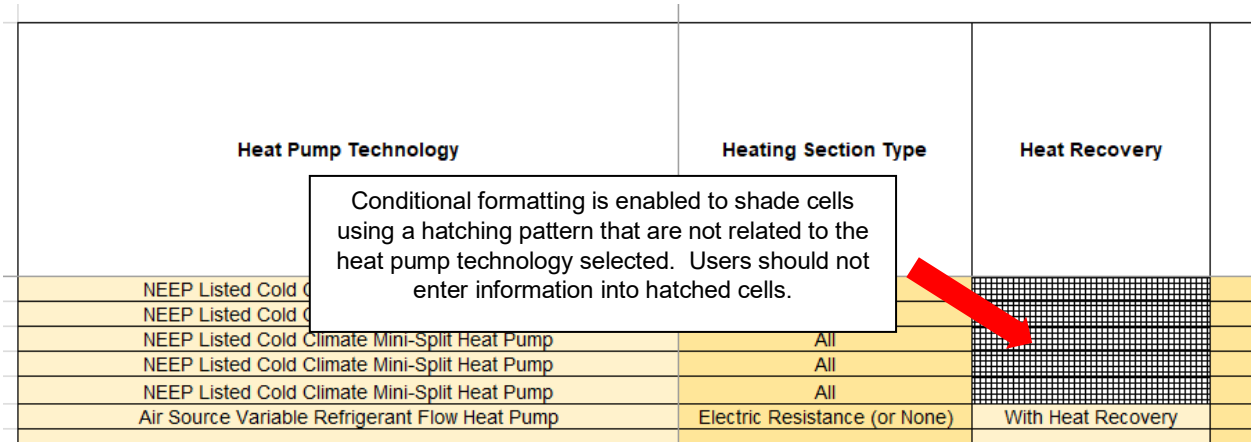
Optional cells on this tab have headers that are shaded in gray. The header column will also indicate '**OPTIONAL**' in red bold text.



Heat Pump Technology – Select applicable heat pump technology proposed for installation from the drop-down menu:

- NEEP-listed Cold Climate Single Package Air Source Heat Pump
- NEEP-listed Cold Climate Mini-Split Heat Pump
- Air Source Variable Refrigerant Flow Heat Pump
- Large Unitary Air Source Heat Pump
- Large Unitary Ground Source Heat Pump, Brine to Water Ground Loop
- Large Unitary Ground Source Heat Pump, Brine to Air Ground Loop
- Ground Source Variable Refrigerant Flow Heat Pump

Tab utilizes conditional formatting; Once a heat pump technology is selected from the drop-down menu, cells that are not applicable to the technology selected will be shaded using a hatching pattern. ***Users should not fill information into hatched cells.***

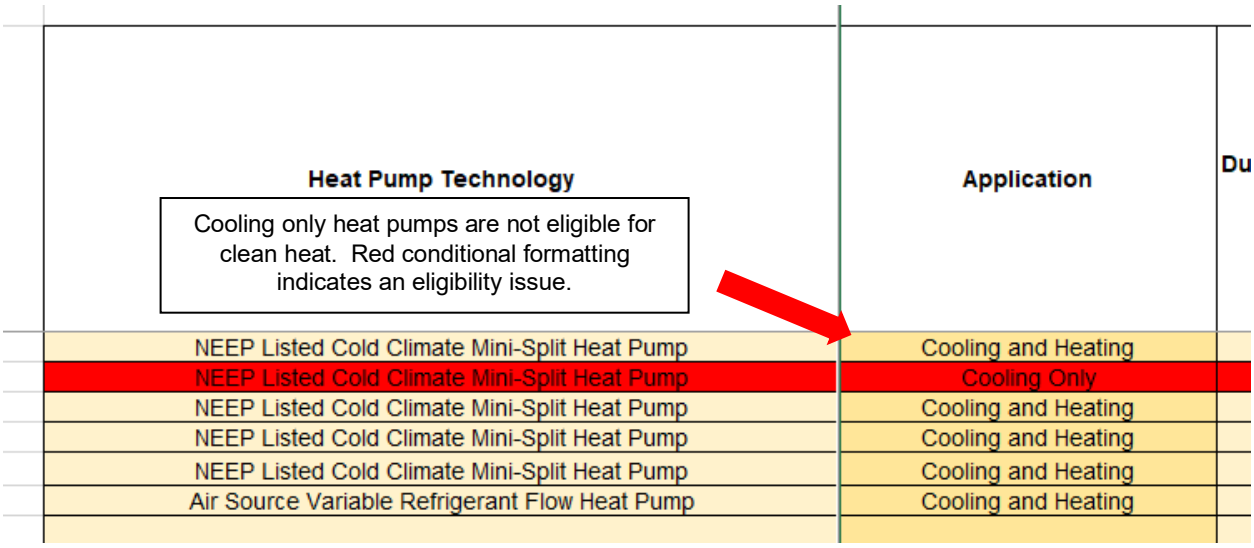


Outdoor Unit Tag(s) – Enter equipment name tag or identifier. This is an optional cell.

Outdoor Unit Quantity – Enter quantity of outdoor condensers.

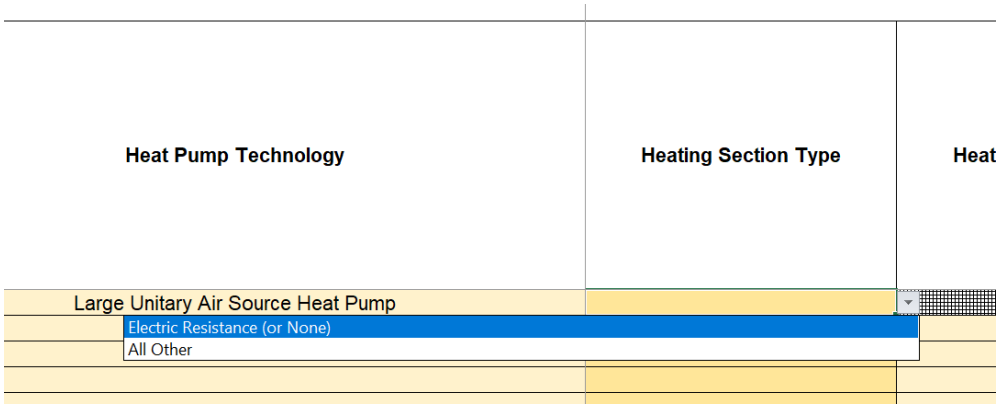
Application – Select application of heating pump installation from drop-down menu. Only heat pumps providing heating and cooling **OR** heating only are eligible for program incentives. If user selects 'cooling only' from drop down, row will highlight red to flag that equipment is not eligible for clean heat incentives.

`



Ducted / Non-Ducted / Mix – Select the ducting configuration.

Heating Section Type – Some heat pumps may have an integrated supplemental heating source such an electric resistance strip or gas furnace to assist with providing heating at low outdoor air temperatures. Select from available options in the drop-down menu. Note that only one option is available for selection for all heat pump technologies other than 'Large Unitary Air Source Heat Pumps'. For these technologies, the user shall select the one available option. For 'Large Unitary Air Source Heat Pump' user's may select from 'Electric Resistance Heating (or None)' or 'All Other'. In other words, if the Large Unitary Air Source Heat Pump has an integrated electric resistance strip or has no supplemental heating source, select 'Electric Resistance (or None)'. In all other cases, select 'All Other'.



Heat Recovery – Select whether units have heat recovery. Cell applies to VRF systems only. For all other technologies, cell will be hatched.

Make – Enter manufacturer of proposed equipment.

Model – Enter proposed equipment model.

Total Heating Capacity at Design Temperature: If known, user shall enter the manufacturer heating output for heat pump appliance at the heating design temperature. Note this is NOT the same as the rated heating capacity. If unknown, leave this cell blank.

AHRI Certificate Number: This is an optional field. Enter the AHRI Certified Reference number.

AHRI CERTIFIED®
www.ahridirectory.org

Certificate of Product Ratings

AHRI Certified Reference Number : 204717989 Date : 03-01-2021 Model Status : Active

AHRI Type : HRCU-A-CB-O (Mini-Split Heat Pump, with Remote Outdoor Unit Air-Source, Free Delivery)

Outdoor Unit Brand Name : DAIKIN

Outdoor Unit Model Number : RXL12QMVJU9

Indoor Type : Mini-Splits (Non-Ducted)

Indoor Model Number(s) : FVXS12NVJU

Rated as follows in accordance with the latest edition of AHRI 210/240 with Addendum 1, Performance Rating of Unitary Air-Conditioning & Air-Source Heat Pump Equipment and subject to rating accuracy by AHRI-sponsored, independent, third party testing:

Cooling Capacity (95F) : 10200

EER (95F) : 12.00

SEER : 20.00

High Heat (47F) : 13000

Low Heat (17F) : 8300

HSPF : 11.40

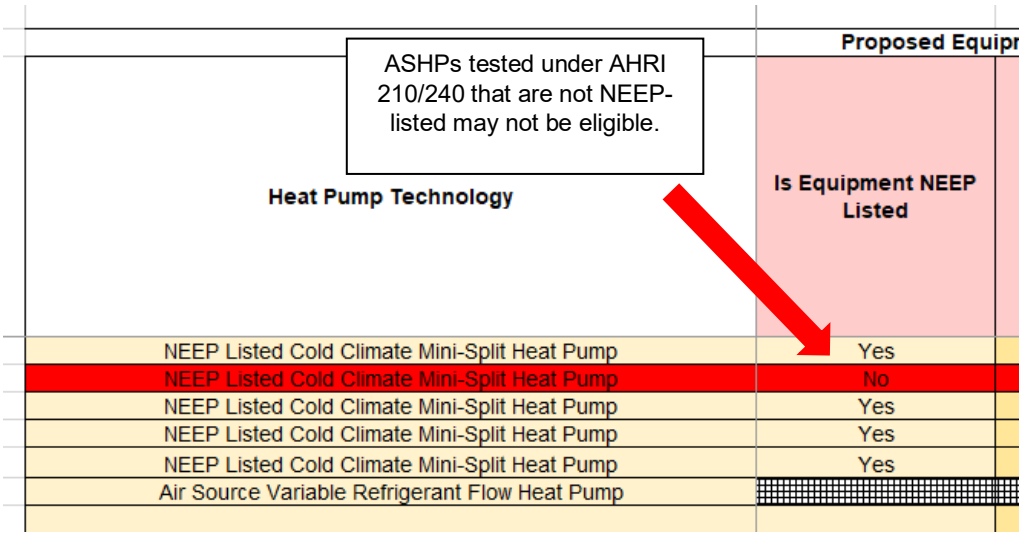
Sold in? : USA, Canada

The following cells should be filled out based on the proposed equipment's AHRI certificate; Only fill in cells related to the selected heat pump technology (i.e. cells not formatted with pattern hatching):

- ASHP: Rated Heating Capacity from AHRI Certificate at 17 °F (Btu/h): Applicable to NEEP-listed cold climate heat pumps as well as AHRI rated VRFs and large unitary air source heat pumps
- ASHP: Rated Heating Capacity from AHRI Certificate at 47 °F (Btu/h): Applicable to NEEP-listed cold climate heat pumps as well as AHRI rated VRFs and large unitary air source heat pumps
- Closed Loop GSHP: Rated Heating Capacity from AHRI Certificate at 32 F (Btu/h): Applicable to GSHPs only.

Is Equipment NEEP-listed – Cell applies to 'Cold Climate Air Source Heat Pump' and 'Cold Climate Mini-Split Heat Pump' technology types only. If 'No' is selected, row will conditionally format in red, indicating the unit may not be eligible for program incentives. Users should continue to fill in performance data for this technology, despite the unit potentially being ineligible. Data should be entered into any cells that are not hatched.

Note that per the Statewide Program Manual, air source heat pumps and mini-splits that are tested under AHRI Standard 210/240 but are not NEEP-listed are eligible for program incentives under Category 4 Custom Space Heating Applications if the Participating Contractor submits manufacturer performance data showing the units meet or exceed the NEEP ccASHP specification. This calculator, however, is not programmed to calculate savings for Non-NEEP-listed ccASHP and ccMSHPs. Therefore, if the non-NEEP-listed unit is eligible, the Participating Contractor should submit separate custom calculations for this technology.

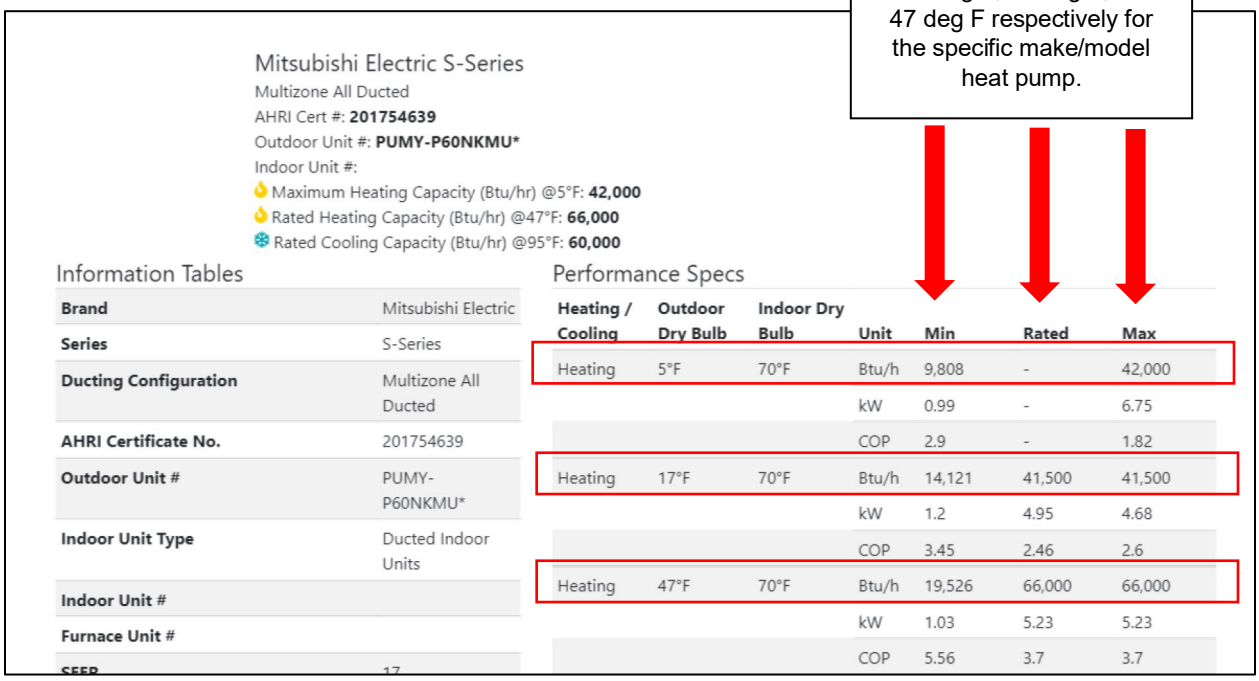


The following cells should be completed for NEEP-listed cold climate air source heat pumps and mini-splits only; for all other technologies, cells will be hatched-out.

- Minimum Heating Capacity at 5 °F (From NEEP list, Btu/h)
- Maximum Heating Capacity at 5 °F (From NEEP list, Btu/h)
- Minimum Heating Capacity at 17 °F (From NEEP list, Btu/h)
- Maximum Heating Capacity at 17 °F (From NEEP list Btu/h)
- Minimum Heating Capacity at 47 °F (From NEEP list Btu/h)
- Maximum Heating Capacity at 47 °F (From NEEP list Btu/h)

Locate the Minimum, Rated, and Max Heating Capacities at 5 deg F, 17 deg F, and 47 deg F respectively for the specific make/model heat pump.

Example for Heating Capacities:



Mitsubishi Electric S-Series
Multizone All Ducted
AHRI Cert #: **201754639**
Outdoor Unit #: **PUMY-P60NKMU***
Indoor Unit #:
Maximum Heating Capacity (Btu/hr) @5°F: **42,000**
Rated Heating Capacity (Btu/hr) @47°F: **66,000**
Rated Cooling Capacity (Btu/hr) @95°F: **60,000**

Information Tables

Brand	Mitsubishi Electric
Series	S-Series
Ducting Configuration	Multizone All Ducted
AHRI Certificate No.	201754639
Outdoor Unit #	PUMY-P60NKMU*
Indoor Unit Type	Ducted Indoor Units
Indoor Unit #	
Furnace Unit #	
SEER	17

Performance Specs

Heating / Cooling	Outdoor Dry Bulb	Indoor Dry Bulb	Unit	Min	Rated	Max
Heating	5°F	70°F	Btu/h	9,808	-	42,000
			kW	0.99	-	6.75
			COP	2.9	-	1.82
Heating	17°F	70°F	Btu/h	14,121	41,500	41,500
			kW	1.2	4.95	4.68
			COP	3.45	2.46	2.6
Heating	47°F	70°F	Btu/h	19,526	66,000	66,000
			kW	1.03	5.23	5.23
			COP	5.56	3.7	3.7

Total Cooling Capacity at Design Temperature: If known, user shall enter the manufacturer cooling output for heat pump appliance at the cooling design temperature. Note this is NOT the same as the rated cooling capacity. If unknown, leave this cell blank.

The following cells should be filled out based on the proposed equipment's AHRI certificate; Only fill in cells related to the selected heat pump technology (i.e. cells not formatted in hatching pattern):

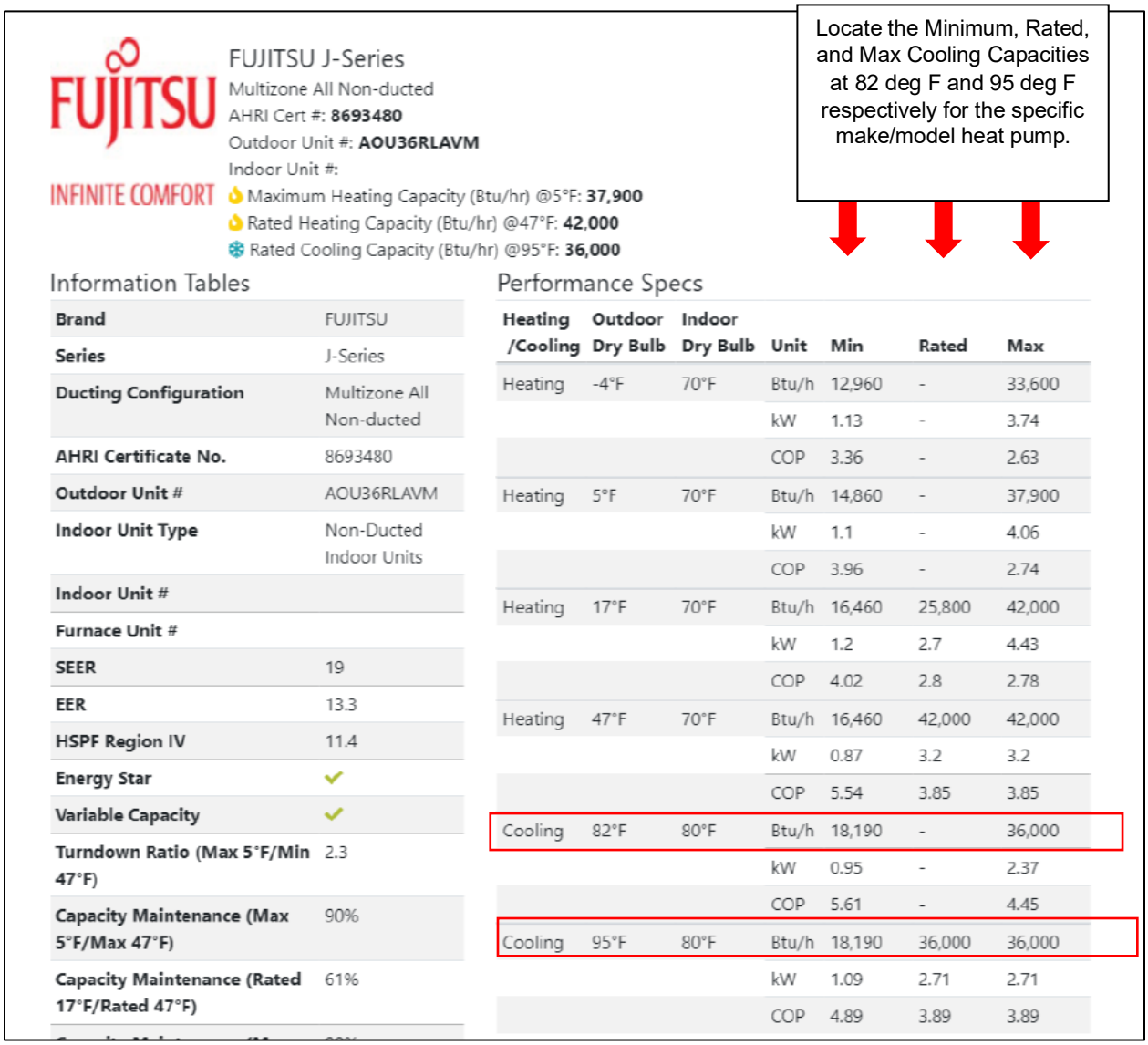
- ASHP: Rated Cooling Capacity at 95 F from AHRI Certificate (Btu/h): Applies to cold climate NEEP-listed air source heat pumps and mini-splits (tested under AHRI 210/240), air source VRFs (tested under AHRI 1230) and AHRI certified large air source heat pumps (tested under AHRI 340/360)
- Closed Loop GSHP: Rated Cooling Capacity from AHRI Certificate at 77 F (Btu/h): Applies to ground source closed loop heat pumps

Example:

The following cells should be completed for NEEP-listed cold climate air source heat pumps and mini-splits only; for all other technologies, cells will be hatched- out.

- Minimum Cooling Capacity at 82 °F (From NEEP list, Btu/h)
- Maximum Cooling Capacity at 82 °F (From NEEP list, Btu/h)
- Minimum Cooling Capacity at 95 °F (From NEEP list, Btu/h)
- Maximum Cooling Capacity at 95 °F (From NEEP list, Btu/h)

Example for Cooling Capacities from NEEP Product Listing:



FUJITSU J-Series
Multizone All Non-ducted
AHRI Cert #: **8693480**
Outdoor Unit #: **AOU36RLAVM**
Indoor Unit #:
Maximum Heating Capacity (Btu/hr) @5°F: **37,900**
Rated Heating Capacity (Btu/hr) @47°F: **42,000**
Rated Cooling Capacity (Btu/hr) @95°F: **36,000**

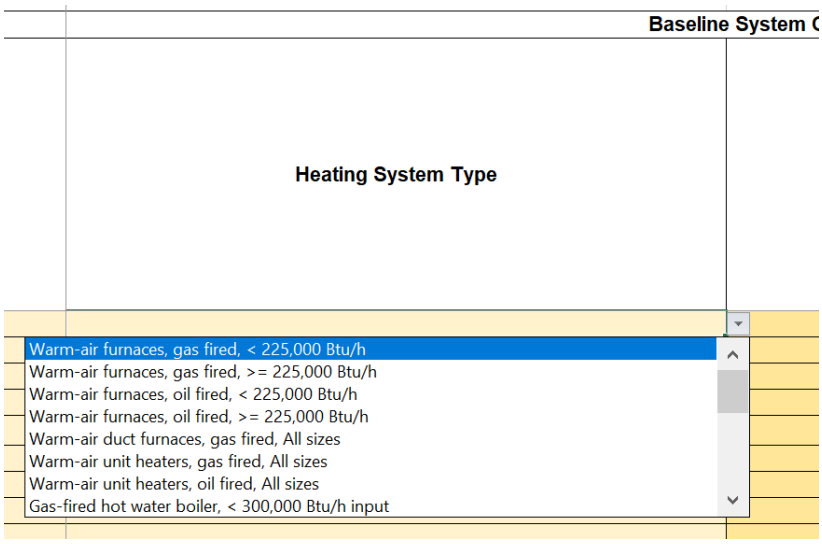
Information Tables

Brand	FUJITSU
Series	J-Series
Ducting Configuration	Multizone All Non-ducted
AHRI Certificate No.	8693480
Outdoor Unit #	AOU36RLAVM
Indoor Unit Type	Non-Ducted Indoor Units
Indoor Unit #	
Furnace Unit #	
SEER	19
EER	13.3
HSPF Region IV	11.4
Energy Star	✓
Variable Capacity	✓
Turndown Ratio (Max 5°F/Min 47°F)	2.3
Capacity Maintenance (Max 5°F/Max 47°F)	90%
Capacity Maintenance (Rated 17°F/Rated 47°F)	61%

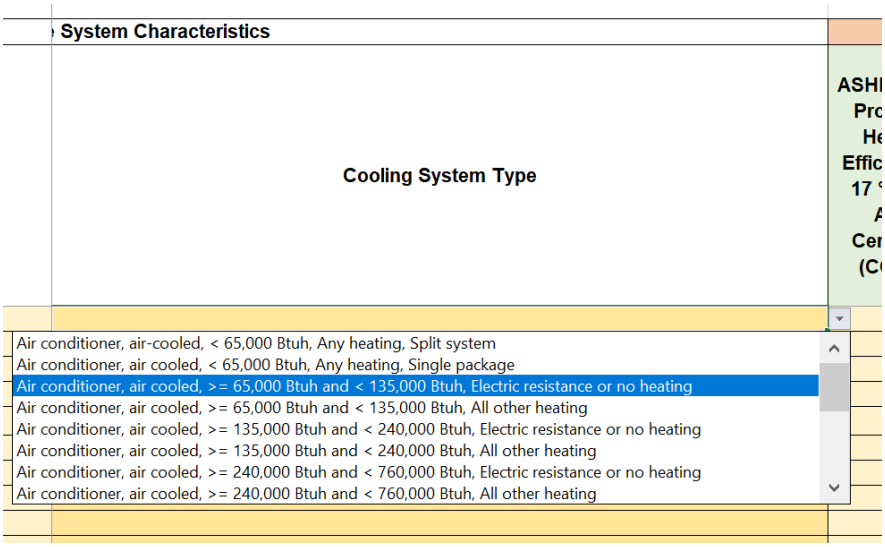
Performance Specs

Heating /Cooling	Outdoor Dry Bulb	Indoor Dry Bulb	Unit	Min	Rated	Max
Heating	-4°F	70°F	Btu/h	12,960	-	33,600
			kW	1.13	-	3.74
			COP	3.36	-	2.63
Heating	5°F	70°F	Btu/h	14,860	-	37,900
			kW	1.1	-	4.06
			COP	3.96	-	2.74
Heating	17°F	70°F	Btu/h	16,460	25,800	42,000
			kW	1.2	2.7	4.43
			COP	4.02	2.8	2.78
Heating	47°F	70°F	Btu/h	16,460	42,000	42,000
			kW	0.87	3.2	3.2
			COP	5.54	3.85	3.85
Cooling	82°F	80°F	Btu/h	18,190	-	36,000
			kW	0.95	-	2.37
			COP	5.61	-	4.45
Cooling	95°F	80°F	Btu/h	18,190	36,000	36,000
			kW	1.09	2.71	2.71
			COP	4.89	3.89	3.89

Heating System Type – Select a baseline heating equipment type from drop-down menu. For existing facilities, users should select the equipment type that most closely aligns with the equipment type installed at the site currently. If none of the options in the drop-down align with the existing heating equipment, the user shall select a counterfactual baseline or may opt to submit their own custom calculations for the project. For new construction projects, users shall select a counterfactual natural gas heating baseline from the drop-down menu.



Cooling System Type – Select a baseline cooling equipment type from drop-down menu. For existing facilities, users should select the equipment type that most closely aligns with the equipment type installed at the site currently. If none of the options in the drop-down align with the existing cooling equipment, the user shall select a counterfactual baseline or may opt to submit their own custom calculations for the project.



The following cells should be filled out based on the proposed equipment's AHRI certificate; Only fill in cells related to the selected heat pump technology (i.e. cells not formatted in hatching pattern):

- ASHP: Rated Proposed Heating Efficiency at 17 °F from AHRI Certificate (COP17): Applies to air source VRFs (tested under AHRI 1230) and AHRI certified large air source heat pumps (tested under AHRI 340/360)
- ASHP: Rated Proposed Heating Efficiency at 47 °F from AHRI Certificate (COP47)
- Closed Loop GSHP: Proposed Rated Heating Full Load Efficiency at 32 F from AHRI Certificate: Applies to ground source heat pumps only
- Closed Loop GSHP: Proposed Rated Heating Part Load Efficiency at 32 F from AHRI Certificate: Applies to ground source heat pumps only. Note that if ground source heat pump is a single stage compressor, this value will be 0.

- Proposed Heating Efficiency from AHRI Certificate (HPSF): Applies to cold climate air source heat pumps only (tested under AHRI 210/240)

Example:

AHRI CERTIFIED®
www.ahridirectory.org

Certificate of Product Ratings

AHRI Certified Reference Number : 205281459 Date : 09-16-2020 Model Status : Active

Brand Name : LG

AHRI Type : HMSR-A-CB

Indoor Type : Ducted Indoor Units

System Model Number : ARUM096BTE5

Module Model Number 1 : ARUM096BTE5

Rated as follows in accordance with the latest edition of AHRI Standard 1230 for VRF Air-Conditioning and Heat Pump Equipment and subject to rating accuracy by AHRI-sponsored, independent, third party testing:

Cooling Capacity (95F) : 92000

EER (95F) : 13.50

IEER : 25.10

SCHE : 27.00

High Heating Capacity (47F) : 103000

High COP (47F) : 3.66

Low Heating Capacity (17F) : 67000

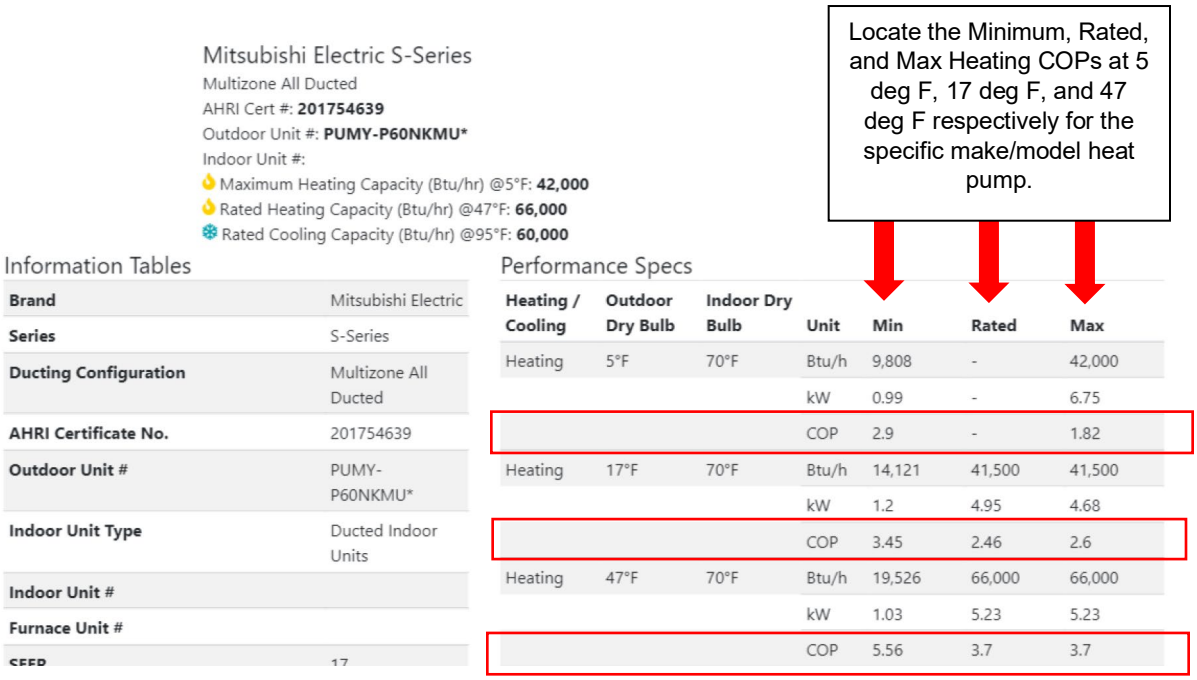
Low COP (17F) : 2.73

Rated Heating COP at 47 deg F and 17 deg F

The following cells should be completed for NEEP-listed cold climate single package air source heat pumps and mini-splits only; for all other technologies, cells will be hatched-out.

- Minimum Proposed Heating Efficiency at 5 °F from NEEP list (COP5 Min)
- Maximum Proposed Heating Efficiency at 5 °F from NEEP list (COP5 Max)
- Minimum Proposed Heating Efficiency at 17 °F from NEEP list (COP17 Min)
- Rated Proposed Heating Efficiency at 17 °F from NEEP list (COP17)
- Maximum Proposed Heating Efficiency at 17 °F from NEEP list (COP17 Max)
- Minimum Proposed Heating Efficiency at 47 °F from NEEP list (COP47 Min)
- Rated Proposed Heating Efficiency at 47 °F from NEEP list (COP47)
- Maximum Proposed Heating Efficiency at 47 °F from NEEP list (COP47 Max)

Example:



The following cells should be filled out based on the proposed equipment's AHRI certificate; Only fill in cells related to the selected heat pump technology (i.e. cells not formatted in hatching pattern):

- Proposed Cooling Efficiency from AHRI Certificate (SEER): Applies to cold climate NEEP-listed air source heat pumps and mini-splits (tested under AHRI 210/240)
- ASHP: Proposed Cooling Efficiency from AHRI Certificate (EER): Applies to cold climate NEEP-listed air source heat pumps and mini-splits (tested under AHRI 210/240), air source VRFs (tested under AHRI 1230) and AHRI certified large air source heat pumps (tested under AHRI 340/360)
- ASHP: Proposed Cooling Efficiency from AHRI Certificate (IEER): Applies to air source VRFs (tested under AHRI 1230) and AHRI certified large air source heat pumps (tested under AHRI 340/360)
- Closed Loop GSHP: Proposed Cooling Full Load Efficiency at 77F from AHRI Certificate (EER): Applies to ground source heat pumps
- Closed Loop GSHP: Proposed Cooling Part Load Efficiency at 77F from AHRI Certificate (EER): Applies to ground source heat pumps. Note that if ground source heat pump is a single stage compressor, this value will be 0.

Example:

AHRI CERTIFIED®
www.ahridirectory.org

Certificate of Product Ratings

AHRI Certified Reference Number : [illegible] **Date :** [illegible] **Model Status:** Active

Old AHRI Reference Number :

Product : Water-to-Air and Brine-to-Air

Model Number : TYV/H048

Brand Name : ClimateMaster

Full Load

Part Load

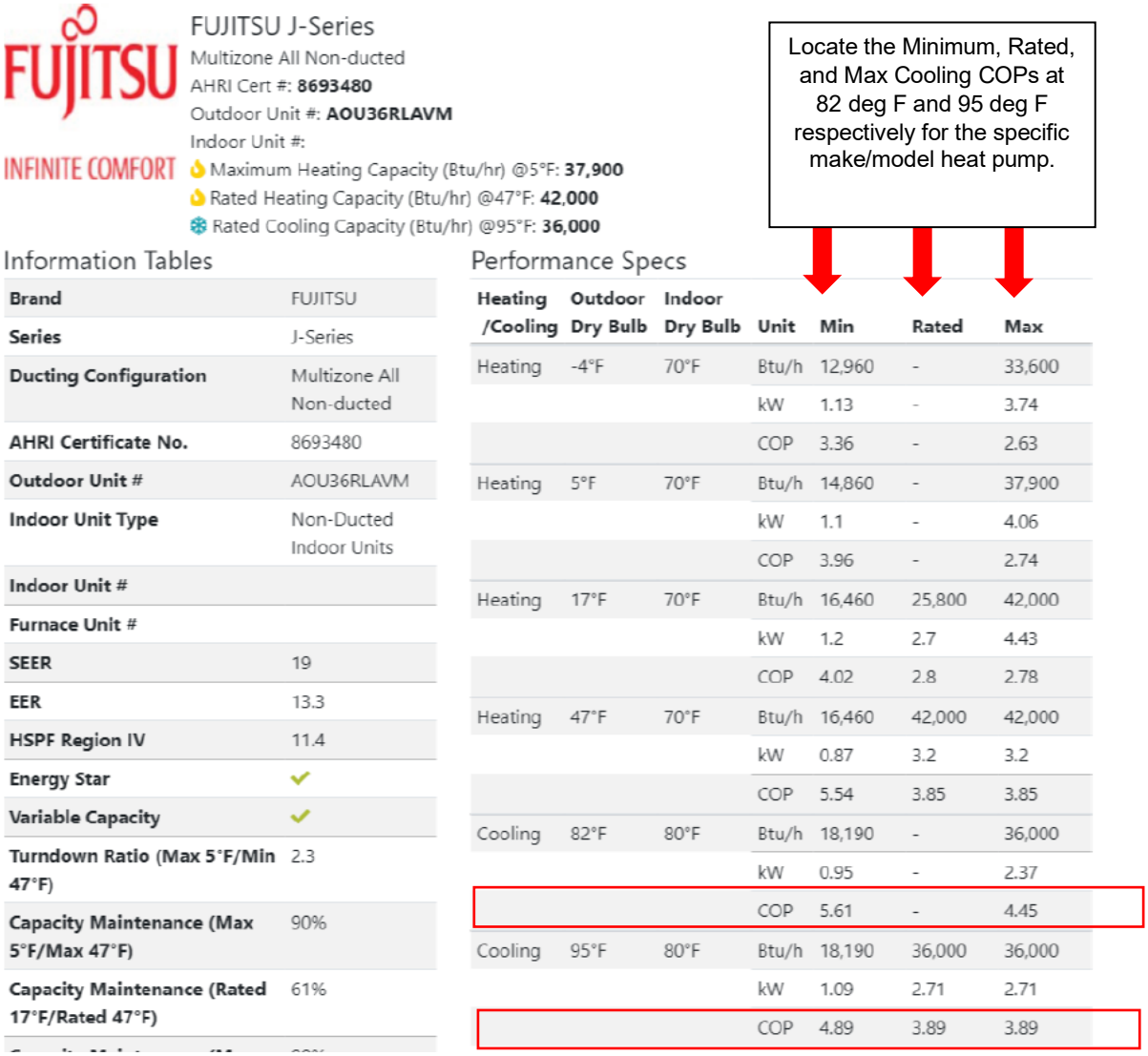
Rated as follows in accordance with ANSI/AHRI/ASHARE/ISO Standard 13256-1 Water-toAir and Brine-To-Air Heat Pumps and subject to verification of rating accuracy by AHRI-sponsored, independent third party testing:

	Full Load	Part Load1	Part Load2	Part Load3
Air Flow Rate - Cooling:	1500	1250		
Air Flow Rate - Heating:		1250		
WLHP (Water-Loop Heat Pumps)				
Cooling Capacity (Btuh)	45900/45900	34100/34100		
Cooling EER Rating (Btuh/watt)	14.00/14.00	15.20/15.20		
Cooling Fluid Flow Rate (gpm)	12.00	11.00		
Heating Capacity (Btuh)	53800/53800	39500/39500		
Heating Cop (watt/watt)	4.90/4.90	5.50/5.50		
Heating Fluid Flow Rate (gpm)	12.00	11.00		
GWHP (Ground Water-Heat Pumps)				
Cooling Capacity (Btuh)	51800/51800	39200/39200		
Cooling EER Rating (Btuh/Watt)	20.90/20.90	26.80/26.80		
Cooling Fluid Flow Rate (gpm)	12.00	11.00		
Heating Capacity (Btuh)	45000/45000	32600/32600		
Heating COP (watt/watt)	4.40/4.40	4.60/4.60		
Heating Fluid Flow Rate (gpm)	12.00	11.00		
GLHP (Ground -Loop Heat Pumps)				
Cooling Capacity (Btuh)	48100/48100	37600/37600		
Cooling EER Rating (Btuh/Watt)	15.50/15.50	21.20/21.20		
Cooling Fluid Flow Rate (gpm)	12.00	11.00		
Heating Capacity (Btuh)	35600/35600	29200/29200		
Heating COP (watt/watt)	3.70/3.70	4.10/4.10		
Heating Fluid Flow Rate (gpm)	12.00	11.00		

The following cells should be completed for NEEP-listed cold climate single package air source heat pumps and mini-splits only; for all other technologies, cells will be hatched-out.

- Minimum Proposed Cooling Efficiency at 82 °F from NEEP list (COP82 Min)
- Maximum Proposed Cooling Efficiency at 82°F from NEEP list (COP82 Max)
- Minimum Proposed Cooling Efficiency at 95 °F from NEEP list (COP95 Min)
- Rated Proposed Cooling Efficiency at 95°F from NEEP list (COP95)
- Maximum Proposed Cooling Efficiency at 95°F from NEEP list (COP95 Max)

Example:



FUJITSU J-Series
Multizone All Non-ducted
AHRI Cert #: **8693480**
Outdoor Unit #: **AOU36RLAVM**
Indoor Unit #:
Maximum Heating Capacity (Btu/hr) @5°F: **37,900**
Rated Heating Capacity (Btu/hr) @47°F: **42,000**
Rated Cooling Capacity (Btu/hr) @95°F: **36,000**

Locate the Minimum, Rated, and Max Cooling COPs at 82 deg F and 95 deg F respectively for the specific make/model heat pump.

Information Tables

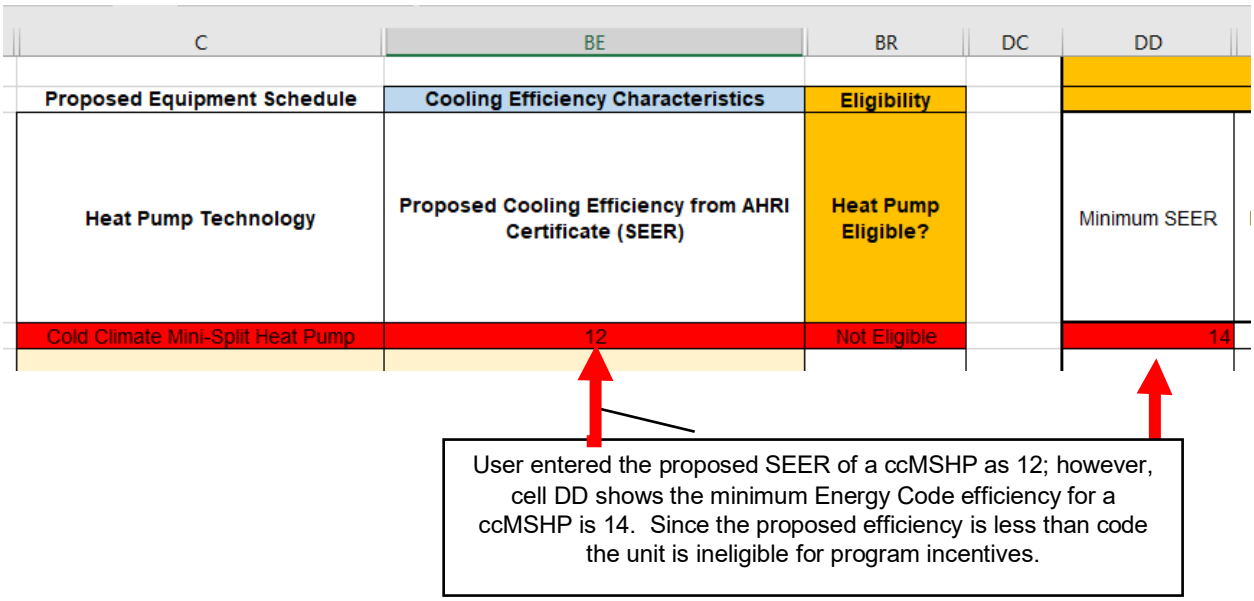
Brand	FUJITSU
Series	J-Series
Ducting Configuration	Multizone All Non-ducted
AHRI Certificate No.	8693480
Outdoor Unit #	AOU36RLAVM
Indoor Unit Type	Non-Ducted Indoor Units
Indoor Unit #	
Furnace Unit #	
SEER	19
EER	13.3
HSPF Region IV	11.4
Energy Star	✓
Variable Capacity	✓
Turndown Ratio (Max 5°F/Min 47°F)	2.3
Capacity Maintenance (Max 5°F/Max 47°F)	90%
Capacity Maintenance (Rated 17°F/Rated 47°F)	61%

Performance Specs

Heating /Cooling	Outdoor Dry Bulb	Indoor Dry Bulb	Unit	Min	Rated	Max
Heating	-4°F	70°F	Btu/h	12,960	-	33,600
			kW	1.13	-	3.74
			COP	3.36	-	2.63
Heating	5°F	70°F	Btu/h	14,860	-	37,900
			kW	1.1	-	4.06
			COP	3.96	-	2.74
Heating	17°F	70°F	Btu/h	16,460	25,800	42,000
			kW	1.2	2.7	4.43
			COP	4.02	2.8	2.78
Heating	47°F	70°F	Btu/h	16,460	42,000	42,000
			kW	0.87	3.2	3.2
			COP	5.54	3.85	3.85
Cooling	82°F	80°F	Btu/h	18,190	-	36,000
			kW	0.95	-	2.37
			COP	5.61	-	4.45
Cooling	95°F	80°F	Btu/h	18,190	36,000	36,000
			kW	1.09	2.71	2.71
			COP	4.89	3.89	3.89

Heat Pump Eligible? – Cell autofills to indicate whether technology entered by user is eligible for clean heat incentives. If cell indicates technology is ineligible, the row will format red. The calculator is configured to check eligibility against a variety of program requirements including but not limited to: Local energy code requirements, energy star requirements, heat pump application (i.e. heating and cooling, cooling only, or heating only) and NEEP certification.

Eligibility Check – Columns DR to FB perform an eligibility check of the heat pump efficiencies entered into the equipment schedule to ensure they exceed local energy code efficiencies and Energy Star requirements as applicable. If a cell in this table is highlighted in red, this means that the unit is ineligible because its efficiency fails to meet program criteria.



C	BE	BR	DC	DD
Proposed Equipment Schedule	Cooling Efficiency Characteristics	Eligibility		
Heat Pump Technology	Proposed Cooling Efficiency from AHRI Certificate (SEER)	Heat Pump Eligible?		Minimum SEER
Cold Climate Mini-Split Heat Pump	12	Not Eligible		14

User entered the proposed SEER of a ccMSHP as 12; however, cell DD shows the minimum Energy Code efficiency for a ccMSHP is 14. Since the proposed efficiency is less than code the unit is ineligible for program incentives.

Tab: Energy/Heat Recovery Ventilator (ERV/HRV)

For Heat Pump or Heat Pump + Envelope Upgrade applications coupled with installation of Energy Recovery and Heat Recovery Ventilator, users will be required to complete this Tab.

ERV or HRV	Units	Tag	Make	Model #	Is ERV/HRV Required by Code Y/N?	CFM	Supply and Exhaust Fan (provide in HP or kW)		Heat Exchanger Sensible Efficiency %	Heat Exchanger Total Efficiency %	Typical Operating Schedule
							[HP]	[kW]			
ERV	1				Yes	15000	10		65.0%	62.0%	Mon-Sun 6AM-10PM
ERV	1				No	20000	10		70.0%	50.0%	Mon-Sun 6AM-12AM
ERV	1				No	10000	20		50.0%	50.0%	Mon-Sun 6AM-12AM
HRV	2				No	10000	12		40.0%	60.0%	Mon-Sun 6AM-10PM

Fill in Yellow Cells

Basic information about the type of ventilation system and the specifications of the proposed model can be entered from columns A-E.

This measure only applies in cases where ERV/HRV functionality is not required by federal, state, local or municipal codes or standards. Hence in event of for a new construction application, claiming additional savings through ERV/HRV installation is not eligible under the Clean Heat Program.

ΔkWh	ΔkW	Δtherms
18737.51664	1.55	-
153,591.40	9.12	-
(29,824.14)	(5.23)	-
(32,157.47)	(14.04)	-

Green Cells will be auto populated

Product specific information like the CFM, Supply and Exhaust fan HP or demand, Efficiency can be found in the specification sheet for the ERV/HRV.

Colum U can be used to select the appropriate schedule for which the ERV/HRV is operating.

A	B	D	E	F	G	H	I	J	L	M	U
ERV or HRV	Units	Tag	Make	Model #	Is ERV/HRV Required by Code Y/N?	CFM	Supply and Exhaust Fan (provide in HP or kW)		Heat Exchanger Sensible Efficiency %	Heat Exchanger Total Efficiency %	Typical Operating Schedule
							[HP]	[kW]			
ERV	1				Yes	15000	10		65.0%	62.0%	Mon-Sun 6AM-10PM
ERV	1				No	20000	10		70.0%	50.0%	24/7 - 365
ERV	1				No	10000	20		50.0%	50.0%	Mon-Sun 6AM-12AM
HRV	2				No	10000	12		40.0%	60.0%	Mon-Sun 6AM-10PM
ERV	3				Yes	4555	4		60.0%	70.0%	Mon-Fri 7AM-7PM Sun 11AM-6PM
											Mon-Fri 7AM-7PM
											Mon-Fri 7AM-5PM

Green Columns AI-AK will be auto populated displaying the estimated electric, demand and therms savings.

Tab: Results Summary

This tab displays the anticipated energy savings and incentive for the proposed project based on inputs entered by the user on the previous tabs.

Depending on the type of application and upgrade category selection, results will be displayed in the following summary fields:

- Heat Pump Complementary Summary
- Heat Pumps Summary
- Project Summary

Heat Pump Complementary Summary

This summary field should get populated in any scenario based on application and/or incentive category selection

Material & Labor Costs – Enter the material and labor costs related to all eligible equipment. ***Non-eligible equipment should not be included in the project costs.***

Heat Pumps Complementary Products Summary										
Category	Material Cost	Labor Cost	Total Cost	Net MMBtu Savings	Heating Electrification Savings (kWh)	Cooling Savings (kWh)	Net kWh savings	kW Savings	Therms savings	CO_2 emissions reduction (Metric Tons/yr)
Eligible Envelope Upgrades	300,000	350,000	$ 30,000	-	#N/A	-	#N/A		-	-
ERV/HRV	10,000	50,000		-	-	-	-	-	-	-

Enter material and labor costs for each applicable category. The total cost column will auto-sum.

The following cells will populate automatically:

- Total Cost: Cell will auto-populate as the sum of the material and labor cost entered by the user.
- Net MMBtu Savings: Estimation of first-year site energy savings, which accounts for both the decreased fuel and the change in electricity consumed at the site.
- Heating Electrification Savings (kWh): Estimate of energy savings due to electrification of a fossil fuel heating system. Value is negative.
- Cooling Savings (kWh): Estimate of energy savings yielded by installing a heat pump with a higher efficiency than the cooling baseline. Value is positive.
- Net kWh Savings: Sum of the heating electrification savings and cooling savings in kWh. Value is typically negative.
- Total KW Savings- Estimate of the peak electric demand savings
- Therms Savings: Estimate of energy savings due to decreased fuel consumption.
- Co2 Emission Reduction: Net Co2 reduction based on increased efficiency of the system
- Category Incentive Rate: Depending on incentive category
- Max reduction in Dominant Load BHL/BCL: Depending on the type of Tier selection- the appropriate % is applied for reduction from the base building load
- Uncapped Measure Incentive: Calculated incentive for the proposed project measure.
- Incentive Capping based on Installation Costs: Individual measure incentives are capped at 100% of each measure cost.

All costs, savings, and incentives for individual measures are totaled in the 'TOTAL' row. The sum of the measure installation incentive capped cannot be greater than 70% of the total project cost (i.e. cost of all measures combined).

SUMMARY						
Category	Material Cost	Labor Cost	Total Cost	Uncapped Measure Incentive	Oversizing Measure Incentive Cap	Measure Installation Incentive Cap
PROJECT TOTALS	$ 19,000.00	$ 35,000.00	$ 54,000.00	$ 73,414.65		$ 37,800.00

Total uncapped incentive exceeds 70% of the total project. Project Incentive is capped at 70% of the install cost. $54,000.00 x 70% = $37,800.00

Heat Pump Summary

Applications involving Heat Pump Upgrade only can fill in the material and labor costs associated with the technologies. It is recommended that users carefully review and verify the upgrades to get to the EUL value. Examples: Weighted average EUL: Windows 20, Wall insulation 30, Infiltration 5, etc.

Heat Pumps Summary										
Technology	Material Cost	Labor Cost	Total Cost	Net MMBtu Savings	Heating Electrification Savings (kWh)	Cooling Savings (kWh)	Net kWh savings	kW Savings	Therms savings (Natural Gas)	CO_2 emissions reduction (Metric Tons/yr)
NEEP Listed Cold Climate Air Source Heat Pumps	$ 14,000	$ 7,000	$ 21,000	147.000	(17,663.392)	1,392.748	(16,270.644)	0.614	2,025.158	6.7
SPVHP's, PTHP's	$ 30,567	$ 7,000	$ 37,567	130.931	(23,213.586)	(1,895.945)	(25,109.531)	(0.844)	2,166.051	4.7
AHRI Rated Air Source Heat Pumps (VRFs, Large Unitary ASHPs)	$ 76,667	$ 38,333	$ 115,000	473.161	(39,183.937)	9,748.171	(29,435.766)	11.022	5,735.963	24.4
Closed Loop Ground Source Heat Pumps	$ 18,100	$ 9,050	$ 27,150	145.547	(14,453.269)	3,503.064	(10,950.204)	3.123	1,829.089	7.3

Fill in Yellow Cells and the White cells will already be auto populated

The following cells will populate automatically:

- Total Cost: Cell will auto-populate as the sum of the material and labor cost entered by the user.
- Net MMBtu Savings: Estimation of first-year site energy savings, which accounts for both the decreased fuel and the change in electricity consumed at the site.
- Heating Electrification Savings (kWh): Estimate of energy savings due to electrification of a fossil fuel heating system. Value is negative.
- Cooling Savings (kWh): Estimate of energy savings yielded by installing a heat pump with a higher efficiency than the cooling baseline. Value is positive.
- Net kWh Savings: Sum of the heating electrification savings and cooling savings in kWh. Value is typically negative.
- Total KW Savings- Estimate of the peak electric demand savings
- Therms Savings: Estimate of energy savings due to decreased fuel consumption.
- Co2 Emission Reduction: Net Co2 reduction based on increased efficiency of the system
- Lifetime Net MMBTU Savings: Net savings resulting during the effective useful life of the measure upgrade. Lifetime or LMMBTU savings are calculated by multiplying the EUL years to the net annual MMBTU savings resulting from the measure
- Oversizing Measure Incentive Cap: Penalty applies to over-sized category 2 cold climate air source heat pumps and mini-splits projects only. If the calculated heating sizing ratio for a ccASHP or ccMSHP system on the 'Eqpt Sched & Eligibility' tab is greater than 120%, the measure incentive will be capped as follows:

$$NEEP\ Maximum\ Heating\ Capacity\ (Btu/hr)@\ 5\deg F\ \ x\ \frac{\$}{10{,}000\ btu/hr}\ x\ \frac{1.20}{Heat\ Sizing\ Ratio}$$

Standard Category 2 Incentive Structure

Over-sizing Capping

- Category Incentive Rate: Depending on incentive category
- Uncapped Measure Incentive: Calculated incentive for the proposed project measure.

Project Summary

This summary field will auto populate for projects with different incentive category selection and submission.

Appendices

A. Definitions

- **Air-Conditioning, Heating, and Refrigeration Institute (AHRI)**: A trade association representing manufacturers of heating, ventilation, air-conditioning, refrigeration, and water heating equipment. AHRI provides the database of equipment performance specifications, which is used in this program to determine the rebate amount.
- **Air Source Heat Pump (ASHP)**: An HVAC system that provides space heating using electricity through vapor-compression refrigeration cycle. An ASHP extracts heat from outdoor air and transfers the extracted heat into the conditioned spaces via various means. ASHPs are also used to provide space cooling by reversing the cycle to extract heat from a building and transfer the heat to the outside air.
- **Air-to-Air Variable Refrigerant Flow (VRF) Heat Pumps:** Heat Pump systems that circulate refrigerant between a variable capacity compressor and multiple indoor air handlers, each capable of individual zone temperature control. VRF systems can be built with heat recovery and cooling capabilities that allow simultaneously heating to some zones and cooling to other zones.
- **Building Heating Load (BHL)**: Building heat loss in British Thermal Units per hour (Btu/h). For residential buildings, BHL shall be calculated using ACCA Manual J or another code-approved methodology. For commercial buildings, BHL shall be calculated following ANSI/ASHRAE/ACCA Standard 183-2007(RA2017), or other code-approved equivalent computational procedure. Calculation of the building's design heating load shall be at the 99% dry bulb heating design temperature for the most relevant ASHRAE 2017 location.
- **Building Cooling Load (BCL)**: Building total sensible and latent heat gain in British Thermal Units per hour (Btu/h). For residential buildings, BCL shall be calculated using ACCA Manual J or another code-approved methodology. For commercial buildings, BHL shall be calculated following ANSI/ASHRAE/ACCA Standard 183-2007 (RA2017), or other code-approved equivalent computational procedure. Calculation of the building's design cooling load shall be at the 1% dry bulb cooling design temperature for the most relevant ASHRAE 2017 location.
- **Closed Loop:** A ground heat exchange method in which the heat transfer fluid is permanently contained in a closed piping system.
- **Cold climate air source heat pump:** A heat pump product listed on the Northeast Energy Efficiency Partnership (NEEP) Cold Climate Air Source Heat Pump (ccASHP) Specification and Product List ("NEEP Product List"), designed to identify air-source heat pumps that are best suited to heat efficiently in cold climates (IECC climate zone 4 and higher).
- **Cold climate single package air source heat pump:** A NEEP-listed cold climate air source heat pump, in which all the essential components are housed inside a single cabinet or "package."
- **Cooling Balance Point Temperature:** The outdoor temperature above which the building's cooling system begins to operate.
- **Coefficient of performance (COP)**: COP is the ratio of work or useful energy output of a system versus the work or energy input, measured in the same units. It is a measure of performance often used for electrically-powered heating and cooling equipment, with the higher the system COP corresponding to the more efficient operation.
- **Energy Efficiency Ratio (EER)**: A measure of how efficiently a cooling system will operate when the outdoor temperature is 95 degrees Fahrenheit. It is calculated by dividing the rated cooling output at 95 degrees Fahrenheit by the watts used by the AC/HP system. A higher EER means the system is more efficient. It is an instantaneous measure of electrical efficiency, unlike SEER (Seasonal Energy Efficiency Rating), which is an averaged value of efficiency. This is a term applied to air conditioning equipment.
- **Full Load Heating System**: A system installed as a building's primary heating source, with a total system heating capacity that satisfies a minimum of 90% of building heating load (BHL).

- **Ground Source Closed-Loop Heat Pump.** A ground source closed-loop heat pump typically uses fluid circulated through a subsurface piping loop as a heat source/heat sink. The heat exchange loop may be placed in horizontal trenches or vertical bores, or submerged in a body of surface water. The temperature of the fluid is related to climatic and operating history conditions and usually varies from 25°F to 100°F [-3.9°C to 37.7°C]. Rated efficiencies include an allowance for power to circulate the fluid. A ground source closed-loop heat pump consists of one or more factory-made assemblies which normally include an indoor conditioning coil with air moving means, compressor(s) and refrigerant-to-fluid heat exchanger(s), including means to provide both cooling and heating, cooling only or heating only functions. When such equipment is provided in more than one assembly, the separate assemblies shall be designed to be used together, and the requirements of rating outlined in the standard are based upon the use of matched assemblies.
- **Heating Balance Point Temperature:** The outdoor temperature below which the building's heating system begins to operate.
- **Large Air-to-Air Heat Pumps:** Large commercial heat pump systems that include individual heat pump appliances that are powered by three-phase electricity or have rated cooling capacities ≥65,000 Btu/h for the individual appliance. Systems are tested under AHRI 340/360.
- **Ground Loop Heat Pump Application:** Brine-to-air or brine-to-water ground source heat pump using a brine solution circulating through a subsurface piping loop function as a heat source / heat sink.
- **Mini-Split Heat Pump (MSHP):** A type of ccASHP that can circulate refrigerant between an outdoor unit containing a variable capacity compressor and one or more indoor air handlers. MSHPs are often referred to as “ductless mini-splits” because they are typically ductless. These units can also be installed with short duct runs that enable single air handlers to serve more than one room at a time. Systems are tested under AHRI 210/240.
- **North East Energy Partnership (NEEP):** *NEEP* was founded in 1996 as a non-profit accelerating energy efficiency in the Northeast and Mid-Atlantic states. Today, it is one of six Regional Energy Efficiency Organizations (REEOs) funded, in part, by US Department of Energy to support state efficiency policies and programs.
- **Partial Load Heating System**: A partial load heating system is a system installed in addition to an existing heating system, and which has a total heat pump system heating capacity that satisfies <90% of BHL.

B. Building Profiles

The following building profiles have been programmed into the heat pump savings calculator. Profiles are derived from the following sources:

- HVAC Schedules: ASHRAE 90.1
- Temperature Set Points: Appendix A of the New York State Technical Reference Manual (v8)
- Balance Point Temperatures: ARUP Carbon Neutral Building Road Map Analysis prepared for NYSERDA

Office Building

	Office		
Hour (Time of Day)	HVAC Schedule		
	Weekday	Sat	Sunday
1:00	Off	Off	Off
2:00	Off	Off	Off
3:00	Off	Off	Off
4:00	Off	Off	Off
5:00	Off	Off	Off
6:00	On	On	Off
7:00	On	On	Off
8:00	On	On	Off
9:00	On	On	Off
10:00	On	On	Off
11:00	On	On	Off
12:00	On	On	Off
13:00	On	On	Off
14:00	On	On	Off
15:00	On	On	Off
16:00	On	On	Off
17:00	On	On	Off
18:00	On	Off	Off
19:00	On	Off	Off
20:00	On	Off	Off
21:00	On	Off	Off
22:00	Off	Off	Off
23:00	Off	Off	Off
0:00	Off	Off	Off

						Balance Point (deg F)							
Building Profiles		Setpoints (deg F)				Existing Building				New Construction			
		Occupied Hours		Unoccupied Hours		Occupied Hours		Unoccupied Hours		Occupied Hours		Unoccupied Hours	
Building Type		Cooling	Heating	Cooling	Heating	Cooling	Heating	Cooling	Heating	Cooling	Heating	Cooling	Heating
Office	1	75	70	78	67	57	53	60	50	54	51	57	48

Assembly

Hour (Time of Day)	Assembly		
	HVAC Schedule		
	Weekday	Sat	Sunday
1:00	Off	Off	Off
2:00	Off	Off	Off
3:00	Off	Off	Off
4:00	Off	Off	Off
5:00	Off	Off	Off
6:00	On	Off	Off
7:00	On	On	On
8:00	On	On	On
9:00	On	On	On
10:00	On	On	On
11:00	On	On	On
12:00	On	On	On
13:00	On	On	On
14:00	On	On	On
15:00	On	On	On
16:00	On	On	On
17:00	On	On	On
18:00	On	On	On
19:00	On	On	On
20:00	On	On	On
21:00	On	On	On
22:00	On	On	On
23:00	On	On	On
0:00	Off	Off	Off

						Balance Point (deg F)							
Building Profiles		Setpoints (deg F)				Existing Building				New Construction			
		Occupied Hours		Unoccupied Hours		Occupied Hours		Unoccupied Hours		Occupied Hours		Unoccupied Hours	
Building Type		Cooling	Heating	Cooling	Heating	Cooling	Heating	Cooling	Heating	Cooling	Heating	Cooling	Heating
Assembly	2	76	72	79	69	58	54	61	51	55	52	58	49

Health

	Health		
Hour (Time of Day)	HVAC Schedule		
	Weekday	Sat	Sunday
1:00	On	On	On
2:00	On	On	On
3:00	On	On	On
4:00	On	On	On
5:00	On	On	On
6:00	On	On	On
7:00	On	On	On
8:00	On	On	On
9:00	On	On	On
10:00	On	On	On
11:00	On	On	On
12:00	On	On	On
13:00	On	On	On
14:00	On	On	On
15:00	On	On	On
16:00	On	On	On
17:00	On	On	On
18:00	On	On	On
19:00	On	On	On
20:00	On	On	On
21:00	On	On	On
22:00	On	On	On
23:00	On	On	On
0:00	On	On	On

						Balance Point (deg F)							
Building Profiles		Setpoints (deg F)				Existing Building				New Construction			
		Occupied Hours		Unoccupied Hours		Occupied Hours		Unoccupied Hours		Occupied Hours		Unoccupied Hours	
Building Type		Cooling	Heating	Cooling	Heating	Cooling	Heating	Cooling	Heating	Cooling	Heating	Cooling	Heating
Health	3	76	72	79	69	58	54	61	51	55	52	58	49

Light Manufacturing

Hour (Time of Day)	Light Manufacturing		
	HVAC Schedule		
	Weekday	Sat	Sunday
1:00	Off	Off	Off
2:00	Off	Off	Off
3:00	Off	Off	Off
4:00	Off	Off	Off
5:00	Off	Off	Off
6:00	Off	Off	Off
7:00	On	On	Off
8:00	On	On	Off
9:00	On	On	Off
10:00	On	On	Off
11:00	On	On	Off
12:00	On	On	Off
13:00	On	On	Off
14:00	On	On	Off
15:00	On	On	Off
16:00	On	On	Off
17:00	On	On	Off
18:00	On	On	Off
19:00	On	Off	Off
20:00	On	Off	Off
21:00	On	Off	Off
22:00	On	Off	Off
23:00	Off	Off	Off
0:00	Off	Off	Off

					Balance Point (deg F)								
Building Profiles		Setpoints (deg F)				Existing Building				New Construction			
		Occupied Hours		Unoccupied Hours		Occupied Hours		Unoccupied Hours		Occupied Hours		Unoccupied Hours	
Building Type		Cooling	Heating	Cooling	Heating	Cooling	Heating	Cooling	Heating	Cooling	Heating	Cooling	Heating
Light Manufacturing	4	78	70	81	67	58	54	61	51	55	52	58	49

Restaurant

	Restaurant		
Hour (Time of Day)	HVAC Schedule		
	Weekday	Sat	Sunday
1:00	On	On	On
2:00	On	On	On
3:00	On	On	On
4:00	Off	Off	Off
5:00	Off	Off	Off
6:00	Off	Off	Off
7:00	Off	Off	Off
8:00	On	Off	Off
9:00	On	Off	Off
10:00	On	On	Off
11:00	On	On	On
12:00	On	On	On
13:00	On	On	On
14:00	On	On	On
15:00	On	On	On
16:00	On	On	On
17:00	On	On	On
18:00	On	On	On
19:00	On	On	On
20:00	On	On	On
21:00	On	On	On
22:00	On	On	On
23:00	On	On	On
0:00	On	On	On

						Balance Point (deg F)							
Building Profiles		Setpoints (deg F)				Existing Building				New Construction			
		Occupied Hours		Unoccupied Hours		Occupied Hours		Unoccupied Hours		Occupied Hours		Unoccupied Hours	
Building Type		Cooling	Heating	Cooling	Heating	Cooling	Heating	Cooling	Heating	Cooling	Heating	Cooling	Heating
Restaurant	5	77	72	80	69	61	58	64	55	59	52	62	49

Retail

Hour (Time of Day)	Retail		
	HVAC Schedule		
	Weekday	Sat	Sunday
1:00	Off	Off	Off
2:00	Off	Off	Off
3:00	Off	Off	Off
4:00	Off	Off	Off
5:00	Off	Off	Off
6:00	Off	Off	Off
7:00	On	On	Off
8:00	On	On	Off
9:00	On	On	On
10:00	On	On	On
11:00	On	On	On
12:00	On	On	On
13:00	On	On	On
14:00	On	On	On
15:00	On	On	On
16:00	On	On	On
17:00	On	On	On
18:00	On	On	Off
19:00	On	On	Off
20:00	On	On	Off
21:00	On	On	Off
22:00	Off	On	Off
23:00	Off	Off	Off
0:00	Off	Off	Off

						Balance Point (deg F)							
		Setpoints (deg F)				Existing Building				New Construction			
Building Profiles		Occupied Hours		Unoccupied Hours		Occupied Hours		Unoccupied Hours		Occupied Hours		Unoccupied Hours	
Building Type		Cooling	Heating	Cooling	Heating	Cooling	Heating	Cooling	Heating	Cooling	Heating	Cooling	Heating
Retail	6	76	72	79	69	61	54	64	51	59	52	62	49

School

Hour (Time of Day)	School		
	HVAC Schedule		
	Weekday	Sat	Sunday
1:00	Off	Off	Off
2:00	Off	Off	Off
3:00	Off	Off	Off
4:00	Off	Off	Off
5:00	Off	Off	Off
6:00	Off	Off	Off
7:00	Off	Off	Off
8:00	On	Off	Off
9:00	On	On	Off
10:00	On	On	Off
11:00	On	On	Off
12:00	On	On	Off
13:00	On	On	Off
14:00	On	Off	Off
15:00	On	Off	Off
16:00	On	Off	Off
17:00	On	Off	Off
18:00	On	Off	Off
19:00	On	Off	Off
20:00	On	Off	Off
21:00	On	Off	Off
22:00	On	Off	Off
23:00	Off	Off	Off
0:00	Off	Off	Off

						Balance Point (deg F)							
Building Profiles		Setpoints (deg F)				Existing Building				New Construction			
		Occupied Hours		Unoccupied Hours		Occupied Hours		Unoccupied Hours		Occupied Hours		Unoccupied Hours	
Building Type		Cooling	Heating	Cooling	Heating	Cooling	Heating	Cooling	Heating	Cooling	Heating	Cooling	Heating
School	7	76	72	81	67	58	56	61	53	49	48	52	45

Warehouse

Hour (Time of Day)	Warehouse		
	HVAC Schedule		
	Weekday	Sat	Sunday
1:00	Off	Off	Off
2:00	Off	Off	Off
3:00	Off	Off	Off
4:00	Off	Off	Off
5:00	Off	Off	Off
6:00	Off	Off	Off
7:00	Off	Off	Off
8:00	On	Off	Off
9:00	On	On	Off
10:00	On	On	Off
11:00	On	On	Off
12:00	On	On	Off
13:00	On	On	Off
14:00	On	On	Off
15:00	On	On	Off
16:00	On	On	Off
17:00	On	Off	Off
18:00	Off	Off	Off
19:00	Off	Off	Off
20:00	Off	Off	Off
21:00	Off	Off	Off
22:00	Off	Off	Off
23:00	Off	Off	Off
0:00	Off	Off	Off

						Balance Point (deg F)							
Building Profiles		Setpoints (deg F)				Existing Building				New Construction			
		Occupied Hours		Unoccupied Hours		Occupied Hours		Unoccupied Hours		Occupied Hours		Unoccupied Hours	
Building Type		Cooling	Heating	Cooling	Heating	Cooling	Heating	Cooling	Heating	Cooling	Heating	Cooling	Heating
Warehouse	8	80	68	85	63	65	51	68	48	62	49	65	46

Laboratory

Hour (Time of Day)	Laboratory		
	HVAC Schedule		
	Weekday	Sat	Sunday
1:00	On	On	On
2:00	On	On	On
3:00	On	On	On
4:00	On	On	On
5:00	On	On	On
6:00	On	On	On
7:00	On	On	On
8:00	On	On	On
9:00	On	On	On
10:00	On	On	On
11:00	On	On	On
12:00	On	On	On
13:00	On	On	On
14:00	On	On	On
15:00	On	On	On
16:00	On	On	On
17:00	On	On	On
18:00	On	On	On
19:00	On	On	On
20:00	On	On	On
21:00	On	On	On
22:00	On	On	On
23:00	On	On	On
0:00	On	On	On

		Balance Point (deg F)											
Building Profiles		Setpoints (deg F)				Existing Building				New Construction			
		Occupied Hours		Unoccupied Hours		Occupied Hours		Unoccupied Hours		Occupied Hours		Unoccupied Hours	
Building Type		Cooling	Heating	Cooling	Heating	Cooling	Heating	Cooling	Heating	Cooling	Heating	Cooling	Heating
Laboratory	9	76	72	79	69	58	54	61	51	55	52	58	49

Hotel

Hour (Time of Day)	Hotel		
	HVAC Schedule		
	Weekday	Sat	Sunday
1:00	On	On	On
2:00	On	On	On
3:00	On	On	On
4:00	On	On	On
5:00	On	On	On
6:00	On	On	On
7:00	On	On	On
8:00	On	On	On
9:00	On	On	On
10:00	On	On	On
11:00	On	On	On
12:00	On	On	On
13:00	On	On	On
14:00	On	On	On
15:00	On	On	On
16:00	On	On	On
17:00	On	On	On
18:00	On	On	On
19:00	On	On	On
20:00	On	On	On
21:00	On	On	On
22:00	On	On	On
23:00	On	On	On
0:00	On	On	On

						Balance Point (deg F)							
Building Profiles		Setpoints (deg F)				Existing Building				New Construction			
		Occupied Hours		Unoccupied Hours		Occupied Hours		Unoccupied Hours		Occupied Hours		Unoccupied Hours	
Hotel	10	76	72	81	67	52	51	55	48	52	50	55	47

Residential

Hour (Time of Day)	Residential		
	HVAC Schedule		
	Weekday	Sat	Sun
1:00	On	On	On
2:00	On	On	On
3:00	On	On	On
4:00	On	On	On
5:00	On	On	On
6:00	On	On	On
7:00	On	On	On
8:00	On	On	On
9:00	Off	On	On
10:00	Off	On	On
11:00	Off	On	On
12:00	Off	On	On
13:00	Off	On	On
14:00	Off	On	On
15:00	Off	On	On
16:00	On	On	On
17:00	On	On	On
18:00	On	On	On
19:00	On	On	On
20:00	On	On	On
21:00	On	On	On
22:00	On	On	On
23:00	On	On	On
0:00	On	On	On

					Balance Point (deg F)							
Building Profiles		Setpoints (deg F)			Existing Building				New Construction			
		Occupied Hours		Unoccupied Hours		Occupied Hours		Unoccupied Hours		Occupied Hours		Unoccupied Hours	
Residential	11	75	73	78	70	58	60	61	57	63	55	66	52

Multi-Family

Hour (Time of Day)	Multi-Family HVAC Schedule		
	Weekday	Sat	Sun
1:00	On	On	On
2:00	On	On	On
3:00	On	On	On
4:00	On	On	On
5:00	On	On	On
6:00	On	On	On
7:00	On	On	On
8:00	On	On	On
9:00	Off	On	On
10:00	Off	On	On
11:00	Off	On	On
12:00	Off	On	On
13:00	Off	On	On
14:00	Off	On	On
15:00	Off	On	On
16:00	On	On	On
17:00	On	On	On
18:00	On	On	On
19:00	On	On	On
20:00	On	On	On
21:00	On	On	On
22:00	On	On	On
23:00	On	On	On
0:00	On	On	On

						Balance Point (deg F)							
		Setpoints (deg F)				Existing Building				New Construction			
Building Profiles		Occupied Hours		Unoccupied Hours		Occupied Hours		Unoccupied Hours		Occupied Hours		Unoccupied Hours	
Multi-Family	12	75	70	78	67	58	60	61	57	63	55	66	52
Custom	13	0	0	0	0	0	0	0	0	0	0	0	0