California Energy Commission

STAFF REPORT

California Building Energy Code Compliance Software

CBECC 2025 | Version 2025.2.0

User Manual for Modeling Nonresidential and Multifamily Residential Performance Compliance

California Energy Commission

Gavin Newsom, Governor

Disclaimer:

This document is to assist with regulatory compliance only, reflects the views of the staff of the California Energy Commission, and does not alter the provisions of the Building Energy Efficiency Standards regulations in any way. The information contained in this documentation assists users in navigating the California Building Energy Code Compliance (CBECC) software and is intended to facilitate efficient compliance with the Building Energy Efficiency Standards. If there is a discrepancy between the regulations and this document, the regulations supersede this document.

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ABBREVIATIONS AND ACRONYMS

3D	three-dimensional
ACM	Alternative Calculation Method
AFUE	Annual Fuel Utilization Efficiency
AHRI	Air Conditioning, Heating, & Refrigeration Institute
Btu/h	British thermal unit per hour
CEC	California Energy Commission
COP	coefficient of performance
CRAC	computer room air conditioner
CRAH	computer room air handler
CRRC	Cool Roof Rating Council
DDC	direct digital controls
DHW	domestic hot water
DLL	dynamic linked libraries
DOAS	dedicated outdoor air systems
DOE	Department of Energy
DX	direct expansion
EER	energy efficiency ratio
EF	energy factor
EIR	energy input ratio
EPD	equipment power density
GUI	graphical user interface
HVAC	Heating, Ventilating, and Air Conditioning
IPLV	integrated part load value
kTDV	kilowatt time dependent value
LPD	light power density
LSC	Long-term System Cost
NMACM	Nonresidential and Multifamily Alternative Calculation Method
NFRC	National Fenestration Rating Council
OAT	outside air temperature
PAF	power adjustment factors
PDU	power distribution unit
PNNL	Pacific Northwest National Laboratory
PSZ	package single zone
PTAC	package terminal air conditioner
PTHP	package terminal heat pump
PVAV	package variable air volume
R-value	thermal resistance
SDD	Standards Data Dictionary
SEER	seasonal energy efficiency ratio
SHGC	solar heat gain coefficient

SHW	service hot water
SRI	Solar Reflectance Index
SRR	skylight-to-roof ratio
SZVAV	single zone variable air volume
TDV	time dependent value
TSP	total static pressure
UPS	universal power source
VAV	variable air volume
VCHP	variable capacity heat pump
VLT	visible light transmittance
WSHP	water source heat pump
WWR	window-to-wall ratio

About This User Manual

This user manual provides information for using CBECC 2025 to model nonresidential and multifamily buildings.

The information presented is current as of the release on the title page. Please refer to the *Quick Start Guide for CBECC* included with the installation for the latest enhancements and updates to the software.

Document Conventions

Convention	Usage
Emphasis	*For emphasis, Italic type is used.*
Menu commands, commands, options, user input, and tabs	These items found in the user interface are **bolded.**
TIP	This word in a text box indicates an important tip, reminder, or additional information about a particular item, e.g., informational notes or definitions.

Support Information

Please email cbecc@energy.ca.gov for nonresidential and multifamily support.

OVERVIEW

CBECC is an open-source software program developed by the California Energy Commission used for performing performance compliance with the 2025 Energy Code.

CBECC incorporates all occupancies covered under the 2025 Energy Code including nonresidential, multifamily residential, and single-family residential.

This user manual provides detailed descriptions of the software program's major features for the nonresidential and multifamily residential portions of CBECC. A separate manual provides details of single-family residential modeling in CBECC.

The *Quick Start Guide for CBECC* is another resource which provides information helpful for new users and what's changed in the latest version of the software.

STANDARD INPUT AND OUTPUT REPORTS

A variety of input and output reports are available to review the compliance analysis. These reports are described below.

Basic Output Results

At the completion of the analysis, the Basic Output Results screen shows the Compliance Summary tab along with other tabs reporting the energy use details. The Compliance Summary tab shows Long-term System Cost (LSC) and Source Energy use summary and compliance margins for the building. This summary shows the overall compliance metrics which include Efficiency (LSC) and Total LSC (includes photovoltaics and battery) and Source energy for both the Standard and Proposed Design, pass/fail indicating whether the building passes the individual compliance metrics. The output screen also reports a summary of unmet load hours, the overall result of whether the building passes or fails the compliance analysis and a button to view the compliance report. Building complies when all efficiency and total compliance margins are greater than or equal to zero and unmet load hour limits are not exceeded. The rest of the tabs report the breakdown by end use for the LSC, source and emission metrics. See Figure 1 for an example of the Basic Output Results screen.

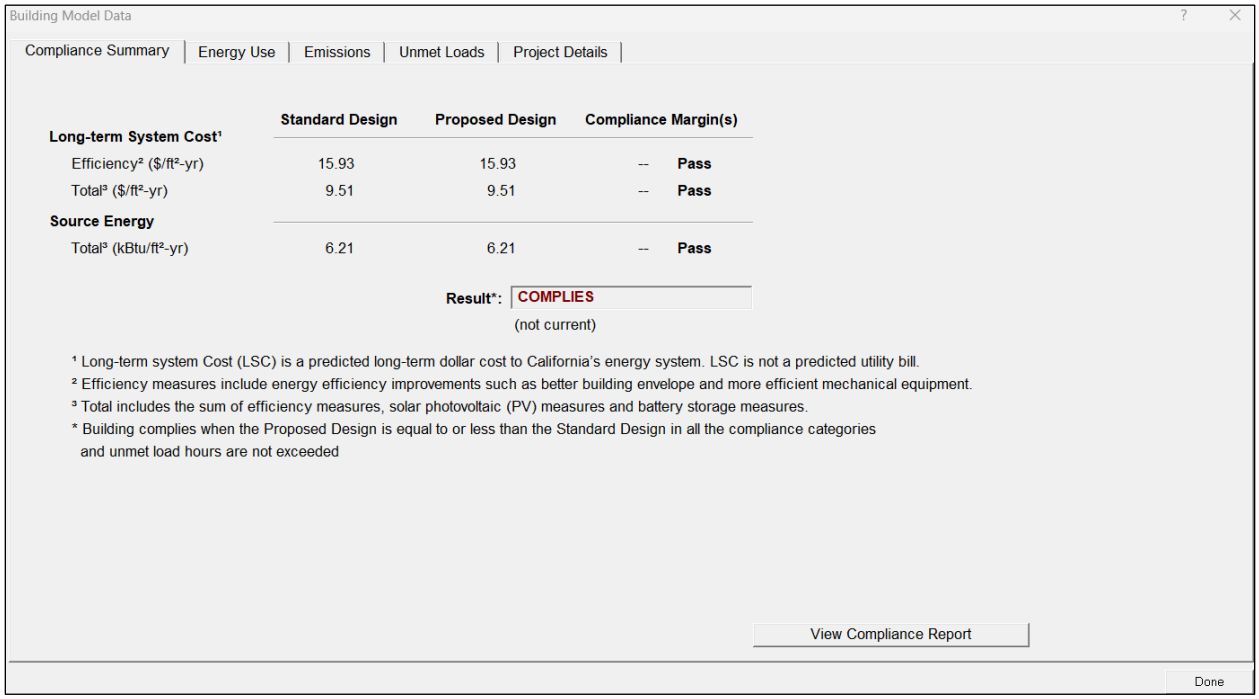
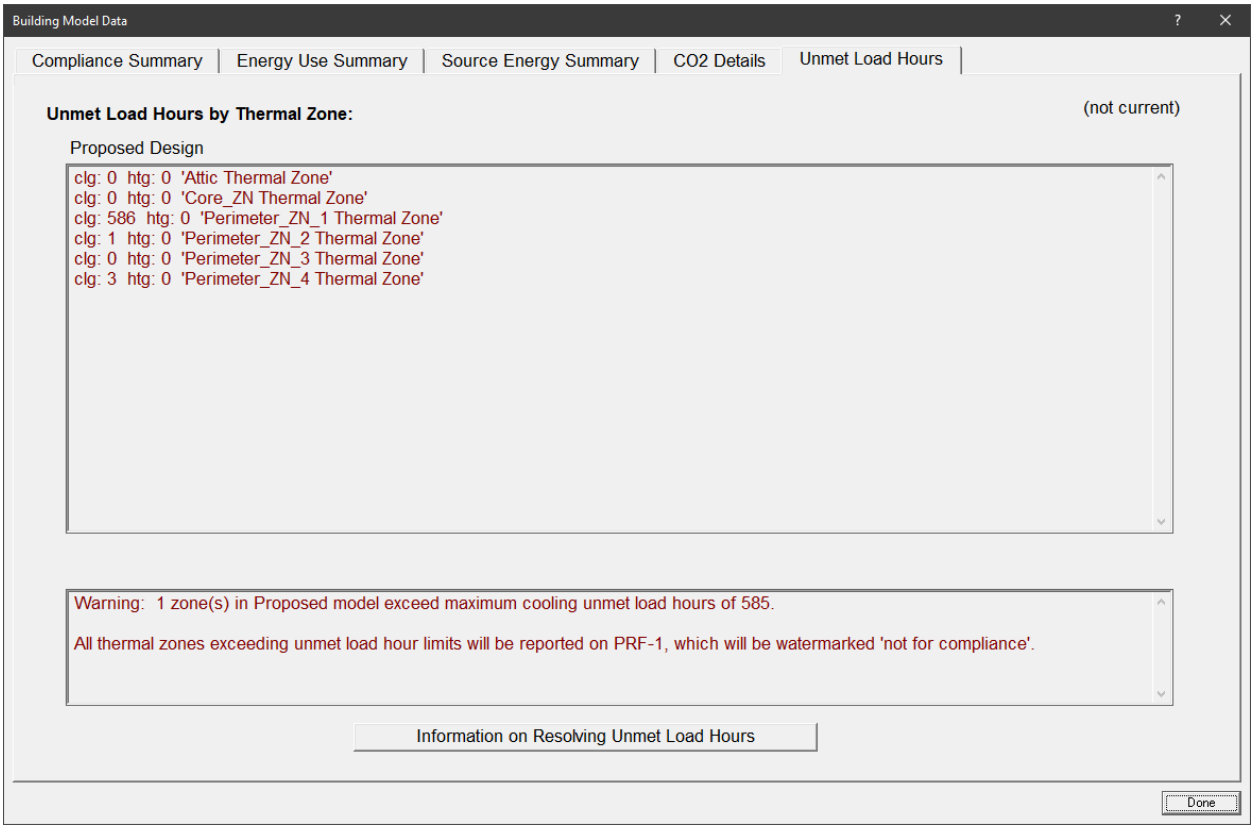


Figure 1 – Basic Output Results

Unmet Load Hours

Unmet Load Hours are reported in a separate tab on the results screen at the end of the simulation if any thermal zone in the building has more than 150 cooling or heating unmet load hours. In CBECC, thermal zones in the proposed model exceeding unmet load hour limits will not terminate compliance analysis but will generate a warning and will be included in a new table on the compliance report. The

compliance report will be watermarked if there are any unmet hours above the allowed threshold for the thermal zone(s).



Certificate of Compliance Report

CBECC produces the Certificate of Compliance for the Nonresidential Performance Compliance Method, and/or Lowrise Multifamily Performance Compliance Method. Refer to the ***Sample Compliance Documentation*** section for a detailed description of the report.

Analysis Results XML File

Additionally, a full summary of all building inputs and outputs used in the compliance analysis are generated during the analysis. This data is captured in an XML file called:

<project file name> - Analysis Results.XML

The AnalysisResults XML file is saved in the same folder location as the project CIBD file. The AnalysisResults XML file contains data for each model used in the analysis:

- The Original User Model
- The Proposed Design Model
- The Standard Design Model

Figure 2 shows the organization of the XML file containing details for each of the three analysis models.

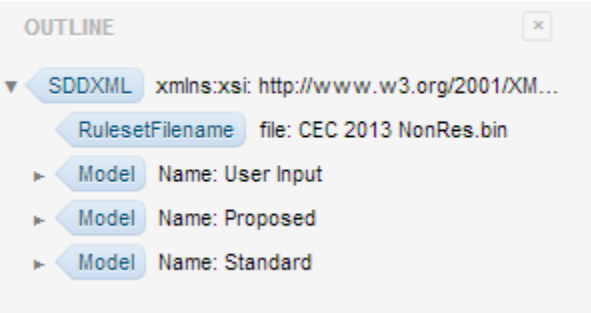


Figure 2 – AnalysisResults.XML: Three Analysis Models

Figure 3 shows an example of the analysis output results for the Proposed Model. The EUseSummary tag contains annual Long-term System Cost (LSC), Source energy results for each end use (which are reported in the respective individual tabs of the Basic Output Results screen shown in Figure 1). The EnergyUse tag shows detailed energy consumption summary for each building end-use.

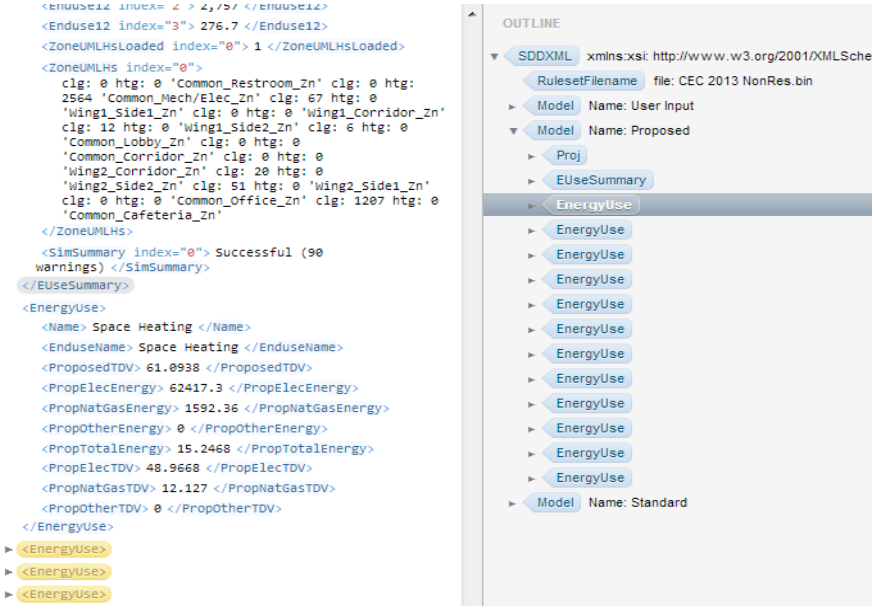


Figure 3 – Analysis Output Results for each End Use

Additionally, full reports of all building inputs for each analysis model are echoed in the AnalysisResults XML file. The organization of the input data follows the Standards Data Dictionary (SDD) data model structure. Figure 4 illustrates the XML format of the Building data.

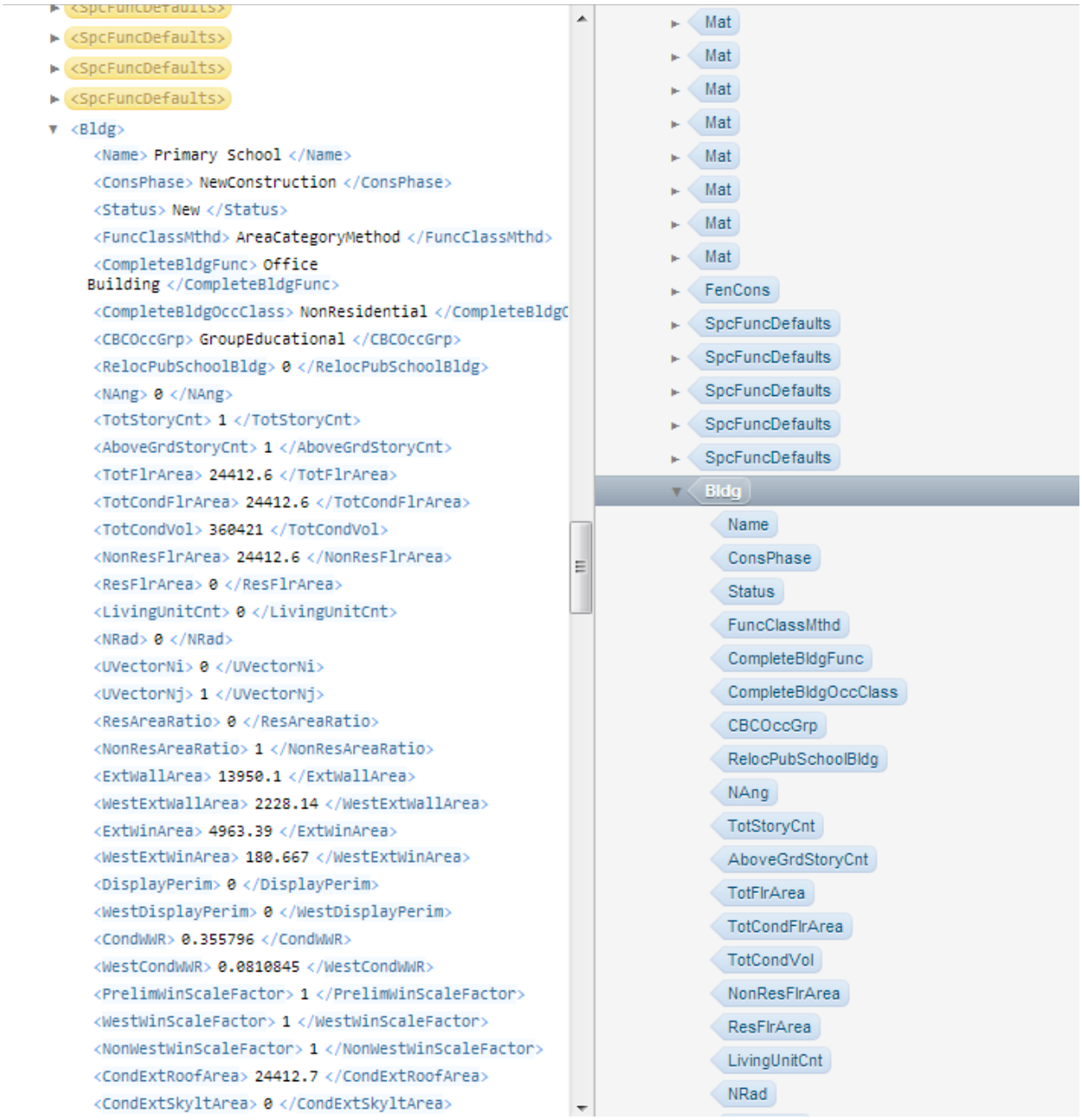


Figure 4 – Echo of All Building Inputs in the AnalysisResults XML File

Log File

A log file is associated with every CBECC project. It is located in the same folder as the project .cibd file and is named: <project name>.log. The log file contains a history of when the project was opened and saved, when an analysis was performed, and any errors or warnings that occurred during an analysis.

To view or edit a log file, in the main menu go to the **Tools** menu and click **View Project Log File**.

EnergyPlus and California Simulation Engine (CSE) Output Files

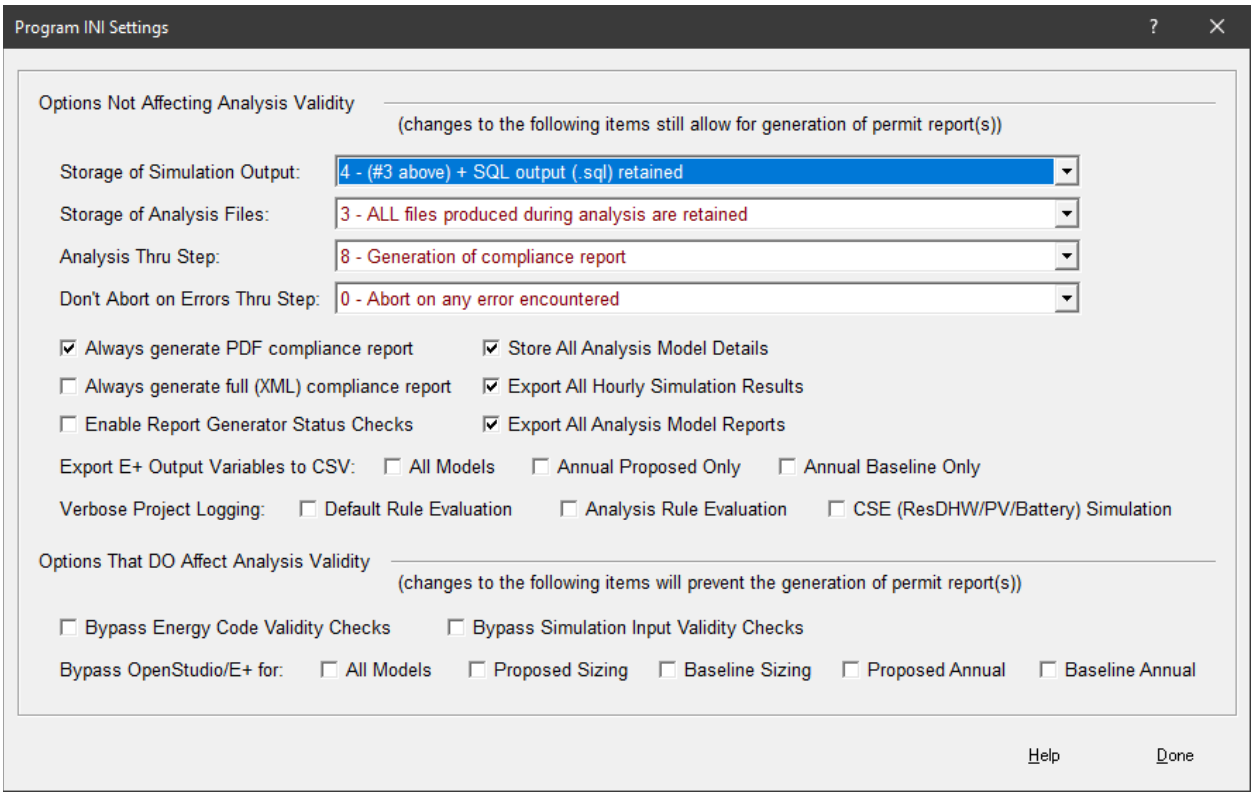
A set of EnergyPlus and California Simulation Engine (CSE) output files is generated during each simulation performed. Depending on the settings in your .ini file, these files may or may not be retained.

For details on the EnergyPlus output files, please refer to the EnergyPlus documentation that can be found here: https://energyplus.net/documentation

For details on CSE documentation please refer to: https://github.com/cse-sim/cse

From the CBECC main menu, selecting **Tools** then **Program and Analysis Options** displays the **CBECC Program INI Settings** screen shown below. The **Storage of Simulation Output** drop-down box controls the retention of EnergyPlus output files.

Note: Making a change to these options requires closing CBECC and reopening it before the changes take effect.



Error Reporting

CBECC provides error messages in the log file if the compliance analysis fails. Please email your project file and log file to cbecc.com@energy.ca.gov in as much detail to report any issues encountered during analysis.

Below is a list of error messages that may be encountered. Each error message has a numerical code listed below. Please note that this list is not comprehensive and may not contain all error messages that are reported in the log file.

1. pszBEMBasePathFile doesn't exist
2. pszRulesetPathFile doesn't
3. pszSimWeatherPath doesn't
4. pszDHWDLLPath specified, but doesn't
5. Invalid project log file name (too long)
6. Error writing to project log
7. Building model input/project file not found
8. Error reading/initializing model input/project file
9. Errors encountered evaluating input model defaulting rules
10. Errors encountered evaluating input model defaulting rules (multiple times)
11. Error(s) encountered performing required data & numeric range checks
12. Error(s) encountered checking input model for simulation compatibility
13. Error(s) encountered checking input model for code requirements
14. Error encountered initializing weather file locations and/or names
15. Error creating or accessing the analysis processing directory
16. Error generating Proposed Sizing model
17. Error generating Proposed (final) model
18. Error generating Standard Sizing model
19. Error generating Standard (final) model
20. Error initializing Standard Sizing model
21. Error initializing Standard (final) model
22. Analysis aborted - user chose not to overwrite SDD XML file
23. Error: Unable to write SDD XML file
24. Error(s) encountered simulating Proposed model
25. Error(s) encountered simulating Standard Sizing model
26. Error(s) encountered simulating Standard (final) model
27. Error(s) encountered retrieving Proposed model simulation results
28. Error(s) encountered retrieving Standard Sizing model simulation results
29. Error(s) encountered retrieving Standard (final) model simulation results
30. Proposed model zone(s) exceed unmet load hours limits
31. Error initializing building model database
32. Error loading analysis ruleset
33. User aborted analysis via progress dialog 'Cancel' button

34. Invalid results object types
35. Error copying results objects from a previous model
36. Error copying equipment sizes/flows from source model
37. Error(s) encountered reading building model (input/project) file
38. Error: EnergyPlus simulation engine not found.
39. Error: Version of EnergyPlus installed not compatible with analysis.
40. Error setting up check of weather & design day file hashes
41. DHW simulation not successful

(Return values in the range 101–200 describe issues encountered during/by simulation.)

101 : SDD XML simulation input file not found
102 : Simulation weather file not found
103 : Simulation processing path not valid
104 : Simulation executable path not valid
105 : Simulation error output path/file not valid
106 : User aborted analysis
131 : Error encountered in OpenStudio loading SDD XML file
132 : Error encountered in OpenStudio saving model to OSM file
133 : Unable to locate EnergyPlus simulation SQL output file
134 : OpenStudio Model not valid following simulation
135 : OpenStudio Facility not valid following simulation
136 : Error creating OpenStudio Model object
161 : Fatal error(s) occurred in EnergyPlus simulation
162 : EnergyPlus simulation did not complete successfully
181 : User aborted analysis during building model simulation

FIXED AND RESTRICTED INPUTS

CBECC utilizes fixed and restricted inputs for both the Standard Design, and elements of the Proposed Design as specified in the *2025 Nonresidential Alternative Calculation Method* (NACM) *Reference Manual*.

Classification of Input Types in CBECC

The user interface provides feedback on different types of inputs by displaying text in a variety of colors. The following summarizes the meaning of each text color.

Type of Input	Text Color	Meaning
Undefined	Black	Data currently has no value in the building description. The only time anything that is "undefined" is written or displayed in the user interface (UI) is when an enumeration list selection (select from a drop-down list or enter information) includes a "- none -" entry, which is displayed in this color.
Program Default	Dark Cyan	When an enumeration list is defined in the Enums.txt file (along with a valid default setting) and no DEFAULT rule expression is present in the ruleset, then the default selection displays in the GUI using this color.
Rule Defined	Dark Blue	All fields that are set via DEFAULT or other ruleset expressions
User Defined	Dark Red	Any field that was input or specified by the user. These data are all written to project (CIBD/XML) files to persist across each CBECC session. Some data that is set by the program is also characterized as User Defined whenever it is something that is important to be available in future CBECC sessions of that project.
Simulation Results	Dark Green	When simulation results are pulled directly out of sim output files and posted to the building model, then they are typically flagged as SimResults. Most of the results shown in CBECC are processed by the ruleset and therefore display as Rule Defined, but some data including zone UMLH results are displayed in green immediately following the analysis.

PREPARING BASIC INPUT

In order to start a new project, the user must first prepare basic input into a model that describes his/her building project. This model is called the ***User Model***. During the analysis calculation procedure, this model is used to automatically define the two compliance models:

1. The ***Proposed Design Model***—the Proposed Design model is very similar to the User Model; however, some inputs such as schedules, plug-loads, and others are replaced with prescribed values specified in the NACM.
2. The ***Standard (Baseline) Design Model***—the Standard Design model is generated according the Standard Design rules in the NACM. Users can think of this model as a hypothetical version of their building if it was designed to just meet the mandatory and prescriptive requirements of the Title 24 (Part 6) standards.

The workflow for preparing the User Model and performing compliance analysis is broken into several steps. While the majority of the data input and the analysis procedures take place directly in the CBECC user interface, additional free software tools (identified below) are used for some elements of the analysis. The data is captured in a data model called the Standards Data Dictionary (SDD). SDD models are represented by an XML file format that can be read and written by CBECC. CBECC converts this file to a .CIBD file extension (the software's native file extension).

- Building geometry and zone assignments can be generated within the CBECC interface or by using the **OpenStudio plug-in for Trimble SketchUp (v 8.0)**.

Building Geometry—Detailed vs. Simplified

Building geometry generated using the OpenStudio plug-in is referred to as the *Detailed Geometry* approach and geometry generated using the CBECC interface is referred to as *Simplified Geometry* approach. Using the OpenStudio plug-in, the user can export geometry to SDD XML file format for input into the CBECC user interface.

The key difference between the two approaches is that the *Detailed Geometry* approach requires the user to draw the building and all its elements using a drawing tool, in this case SketchUp with the OpenStudio plug-in. This approach accurately represents a building and its elements in three-dimensional (3D) form. Spatial relationships and properties of the building surfaces such as areas, orientation and tilt are accurately represented in the 3D drawings. The *Simplified Geometry* approach on the other hand defines the properties (areas, orientation, tilt, etc.) of the building surfaces within the CBECC interface, but the spatial relationship between surfaces is not defined. A description of the *Simplified Geometry* approach can be found in the Starting a New Project section.

Note: When modeling a multifamily residential project, the dwelling units (residential spaces) and common area spaces associated with the dwellings units need to be defined using the Simplified Geometry approach.

The workflow for compliance analysis includes the following steps:

- After the building geometry (Detailed/Simplified) has been created the remainder of the User Model building inputs is entered in the CBECC user interface.

- The compliance analysis is launched within the CBECC user interface. When the analysis is launched, CBECC automatically generates the Proposed Design model and the Standard Design (also referred to as the Baseline) model in SDD XML format and/or CSE formats.
- The SDD XML files are translated by the **OpenStudio Translator** to EnergyPlus IDF files. This process is automated by CBECC and requires no intervention by the users.
- The IDF files are simulated by the **EnergyPlus** engine and CSE files are simulated by the CSE engine. Multiple simulations occur using the EnergyPlus and/or CSE engines, depending on the Compliance Type, and whether the project includes PV/Battery:
    - The Proposed sizing simulation included determines HVAC system capacities for the Proposed Design model when the compliance type is one where the proposed design HVAC system is defined by the ACM rules.
    - The Standard Design sizing simulation determines HVAC system sizes for the Standard Design model.
    - The Proposed Design annual simulation calculates annual energy, LSC and Source energy consumption for the Proposed Design model.
    - The Standard Design annual simulation calculates annual, LSC energy consumption for the Standard Design model.
    - PV/Battery Standard Design sizing and annual simulation if required by the standards.
    - PV/Battery Proposed Design annual simulation if included.

    Note: the simulation processes are automated by CBECC and require no intervention by the user. A progress indicator provides feedback to users on the status of the simulations.
- Results from the EnergyPlus and/or CSE simulations are automatically retrieved by CBECC and presented in a results summary screen.

Where to Get Additional Software Tools

Additional software tools can be found either within CBECC or at the following websites.

Trimble SketchUp: http://www.sketchup.com/ (Note that versions of Sketchup, such as Sketchup Pro, may not be free, or may have restrictive user licences, such as with Sketchup Make.) If you would like to use SketchUp 8.0 (free version) please contact CBECC Support at cbecc@energy.ca.gov.

OpenStudio SketchUp Plug-In: https://www.openstudio.net/ (Note: Please download the compatible version of OpenStudio for the version of SketchUp that you are using)

OpenStudio Translator: No additional download is required. This functionality is included in the CBECC installation.

EnergyPlus: CBECC 2025 uses EnergyPlus 24-1; however, you do not need to install EnergyPlus 24-1 separately. EnergyPlus executables are included in the CBECC installer.

California Simulation Engine (CSE): CSE executables are included in the CBECC installer.

Creating Building Geometry Using the OpenStudio Plug-In for Trimble SketchUp

The OpenStudio plug-in for SketchUp allows users to create a representation of a building's geometry. The tool should be used for the following steps:

- Draw the building's floor plans, and generate all *Building Stories* and *Spaces* in the building.
- Draw all *Surfaces* (e.g., walls, floors, roofs) and sub-surfaces (e.g., windows, doors, skylights) and verify that they are accurately assigned as exterior or interior surfaces.
- Assign all *Spaces* to *Thermal Zones.*
- Additionally, you may wish to give the spaces and zones meaningful names (e.g., as they appear on the building floor plans).

Detailed video tutorials for creating building geometry can be found at the following link:

https://www.youtube.com/watch?v=VZUMTlTFzFk

Figure 5 shows an example of a two story building created with the OpenStudio plug-in.

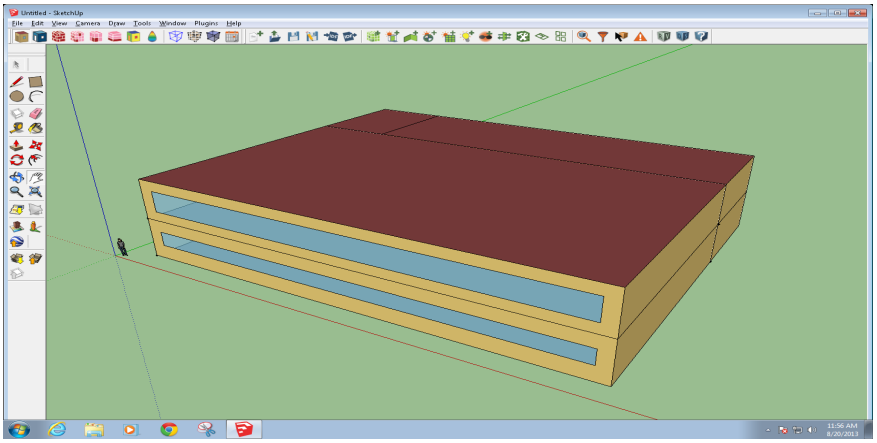


Figure 5 – Example Building Created with the OpenStudio Plug-In

Exporting the Model to SDD XML

Once the building geometry has been created, export to SDD XML. The export function is located in the **Plugins** menu (refer to Figure 6). To access this menu, click:

Plugins>Export>Export SDD Model

Save the XML file to your project folder or other desired location.

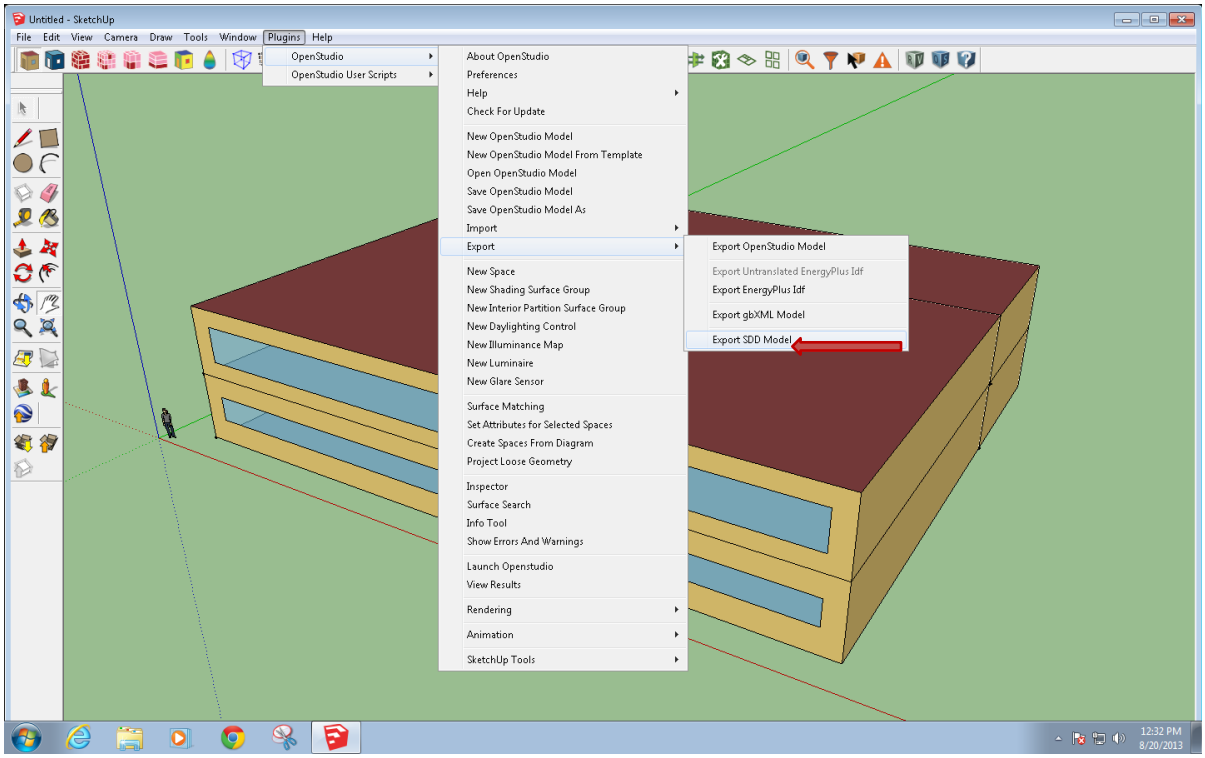


Figure 6 – Exporting the Model to SDD XML

STARTING A NEW PROJECT

When CBECC is first started, a dialog box appears with six options:

1. **Open Recent Project**

   Open a recent project from the drop-down. Defaults to the last project.

2. **Select an Existing Project to Open**

   Select this and click OK to open file explorer to find the file to open. CBECC will open either nonresidential and multifamily (.cibd or .xml) or single-family residential (.ribd) files.

3. **Import old Access DB CUAC Project**

   Select this and click OK to open file explorer to find the California Utility Allowance Calculator (CUAC) Microsoft Access database to open.

4. **Create a New Project (Single-Family or Nonres/Multifamily)**

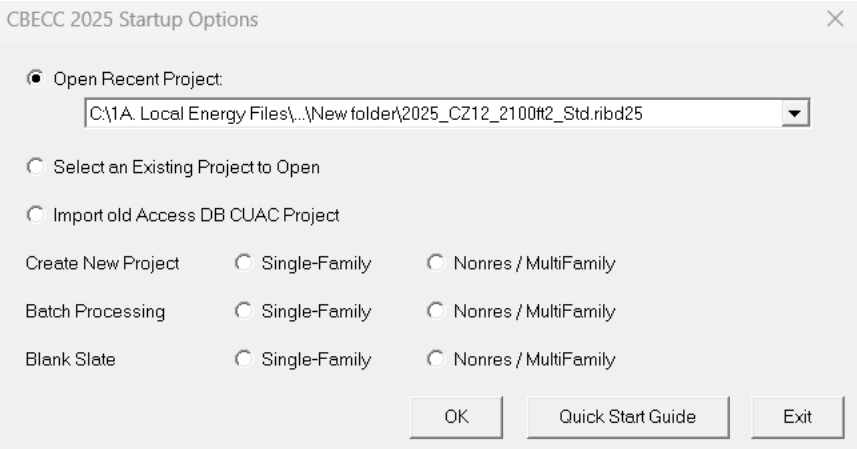
   Select either single-family or nonres/multifamily and click OK to open the new project dialogue which walks the user through setting up the initial project parameters.

5. **Batch Processing (Single-Family or Nonres/Multifamily)**

   Select either single-family or nonres/multifamily and click OK to open the batch processing dialogue box.

6. **Blank Slate (Single-Family or Nonres/Multifamily)**

   Select either single-family or nonres/multifamily and click OK to start a project from scratch.



Open recent project or open an existing project must be used when working on a *Detailed Geometry* project. The **Open Recent Project** option automatically selects the project that was being worked on the last time CBECC was open. The **Select an Existing Project to Open** option requires browsing to the desired project. If **Select an Existing Project to Open** is selected, the default file type in the browser window is a *.cibd* file. However, an .xml file type can be selected, allowing the user to open an SDD XML file.

Create new project is used when for the *Simplified Geometry* approach. The **Create a New Project** option automatically walks the user through setting up the initial project parameters and building elements.

For nonresidential projects, users can use either approach (Detailed or Simplified) to model their project; however, the preferred workflow is to use the *Detailed Geometry* approach using OpenStudio to create building model geometry using SketchUp with the OpenStudio plug-in. OpenStudio includes an option for exporting an SDD file, which CBECC can then open.

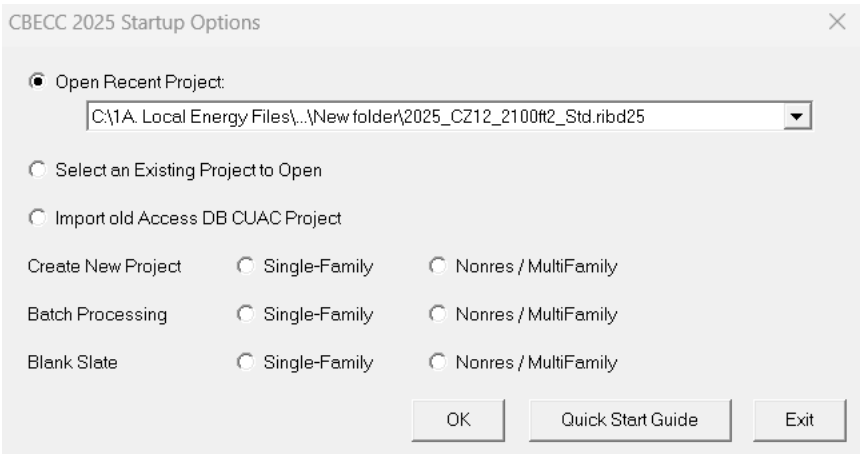
For multifamily and single-family residential, the *Simplified Geometry* approach is the only option.

Using the Detailed Geometry Approach

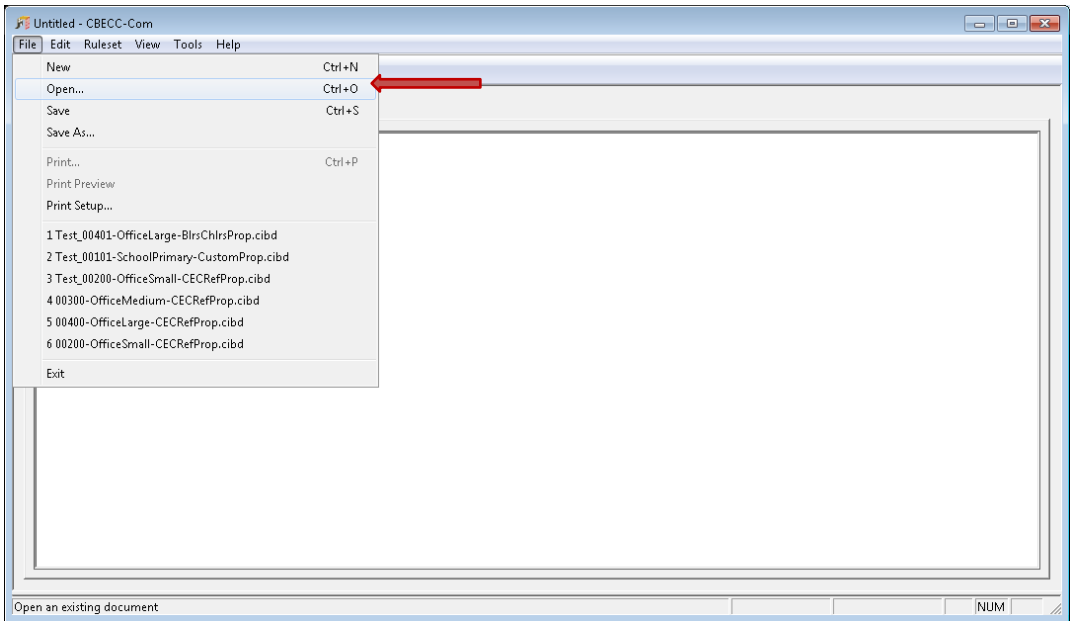
The *Detailed Geometry* approach uses the OpenStudio plug-in to generate building geometry. Through the OpenStudio plug-in, the user can export the geometry to SDD XML file format for input into the CBECC user interface.

Importing Geometry into the CBECC User Interface

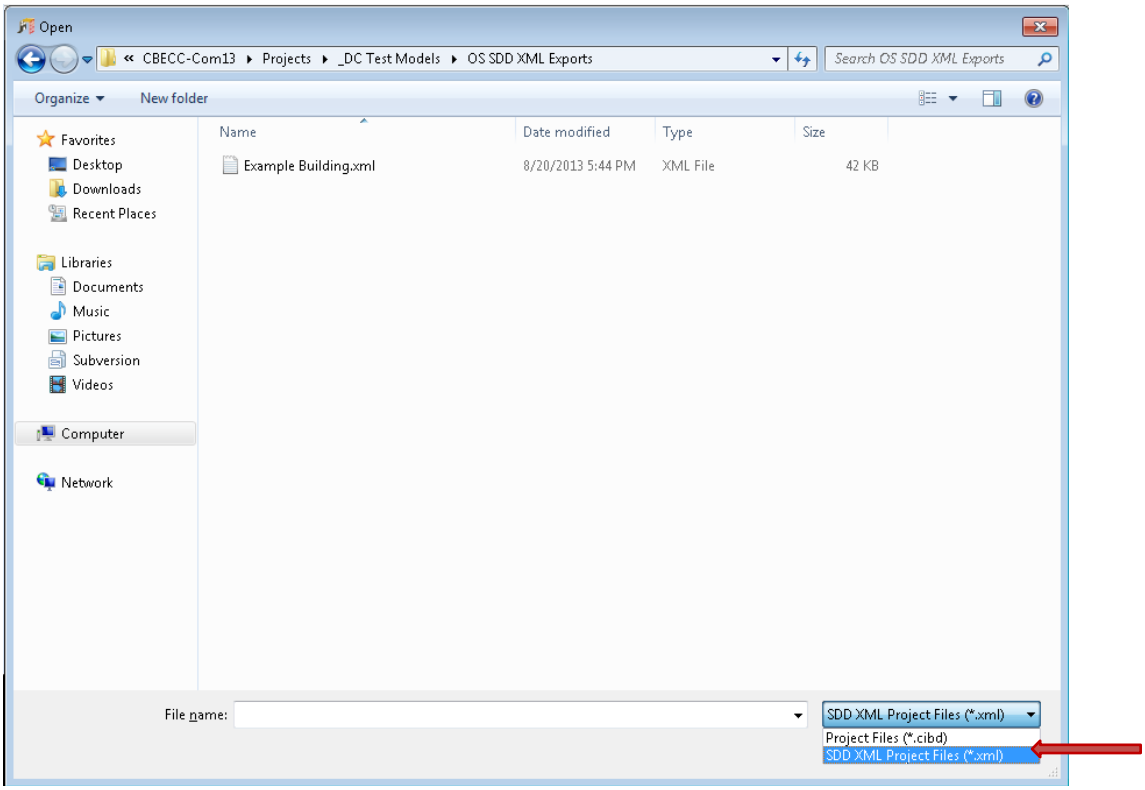
Launch CBECC. On launch, a dialog box appears showing the startup options described in the previous section. Choose the **Select an Existing Project to Open** button, and click **OK.**



Alternatively, if CBECC is already open, then go to the **File** menu and click **Open…**



Go to the folder where you saved the SDD XML file. In the example below, see the drop-down list in the lower right corner. Select the file type **SDD XML Project Files. Open** and **Cancel** buttons appear. Click **Open** to import the file.



Using the Simplified Geometry Approach

The *Simplified Geometry* approach within the CBECC graphical user interface (GUI) allows users to create a building model without specifying coordinates in space for building surfaces such as walls, roofs, and fenestration. The GUI allows a user to create building objects (surfaces) and their child objects by defining the characteristics that define that object without having to use any drawing tools such as SketchUp (with the OpenStudio plug-in). The inputs to define the building envelope components require the user to have detailed take-offs from the construction drawings for each of those components. For example, a wall is defined using area and azimuth; whereas, a roof surface is defined using area, azimuth and tilt. Fenestration is defined as a child of a wall or roof surface, and only an area is required, azimuth and tilt are taken from the parent surface.

The data used in the *Simplified Geometry* approach does not define the spatial relationships between the various surfaces, which can be found in the building geometry generated using drawing tools such as SketchUp with the OpenStudio plug-in (*Detailed Geometry* approach). As a result, using the *Simplified Geometry* approach has inherent limitations for compliance analysis.

The limitations of using the *Simplified Geometry* approach include not being able to model, or take credit for, certain features such as daylighting and daylighting controls in nonresidential spaces. Since no daylighting can be modeled using the *Simplified Geometry* approach, projects submitting compliance documents for plan check need to make sure that their projects meet all the mandatory and prescriptive daylighting requirements.

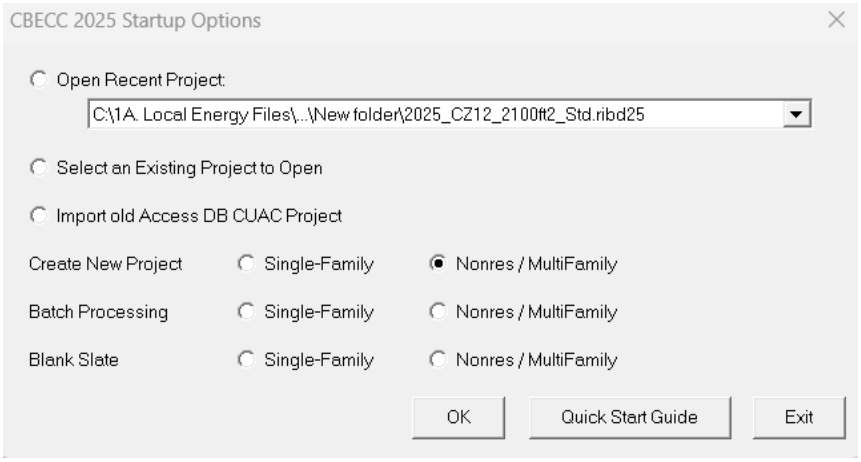
When developing a mode using the *Simplified Geometry* approach, the following requirements and recommendations for creating a valid model should be kept in mind:

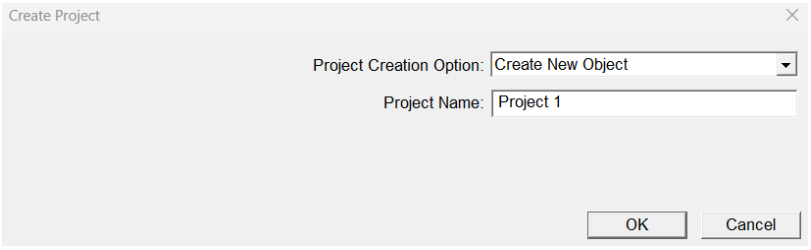
- All exterior surfaces must be modeled.
- All interior surfaces separating conditioned from unconditioned spaces must be modeled.
- It is strongly recommended that floors be modeled for all spaces, including floors between conditioned spaces.
- If surfaces between spaces are included, the translation will create the corresponding surface in the adjacent space.
- It is not necessary to include interior walls between conditioned spaces, but it is allowed, and the additional thermal mass may affect model results.

Creating a New Simplified Geometry Project

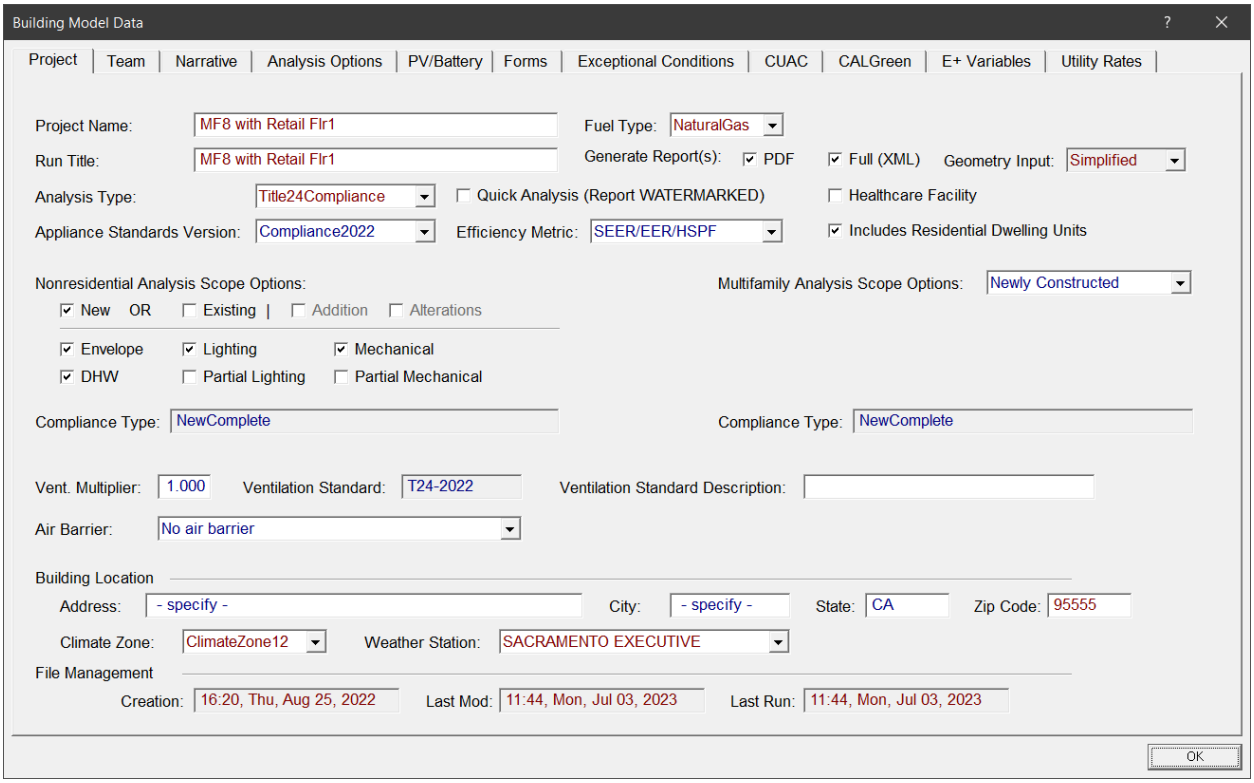
Launch CBECC. Select Either single-family or nonres/multifamily next to the **Create a New Project** option. Click **OK**.

The **Create Project** dialog box appears. Enter the **Project Name** and click **OK.**

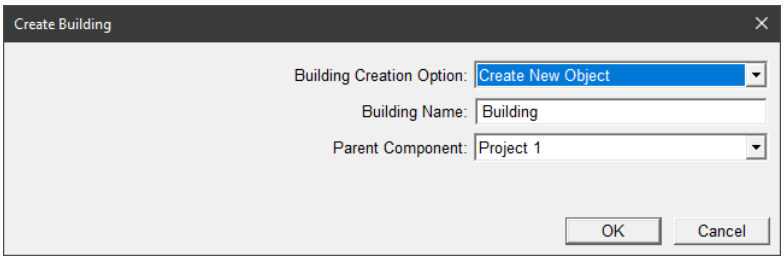




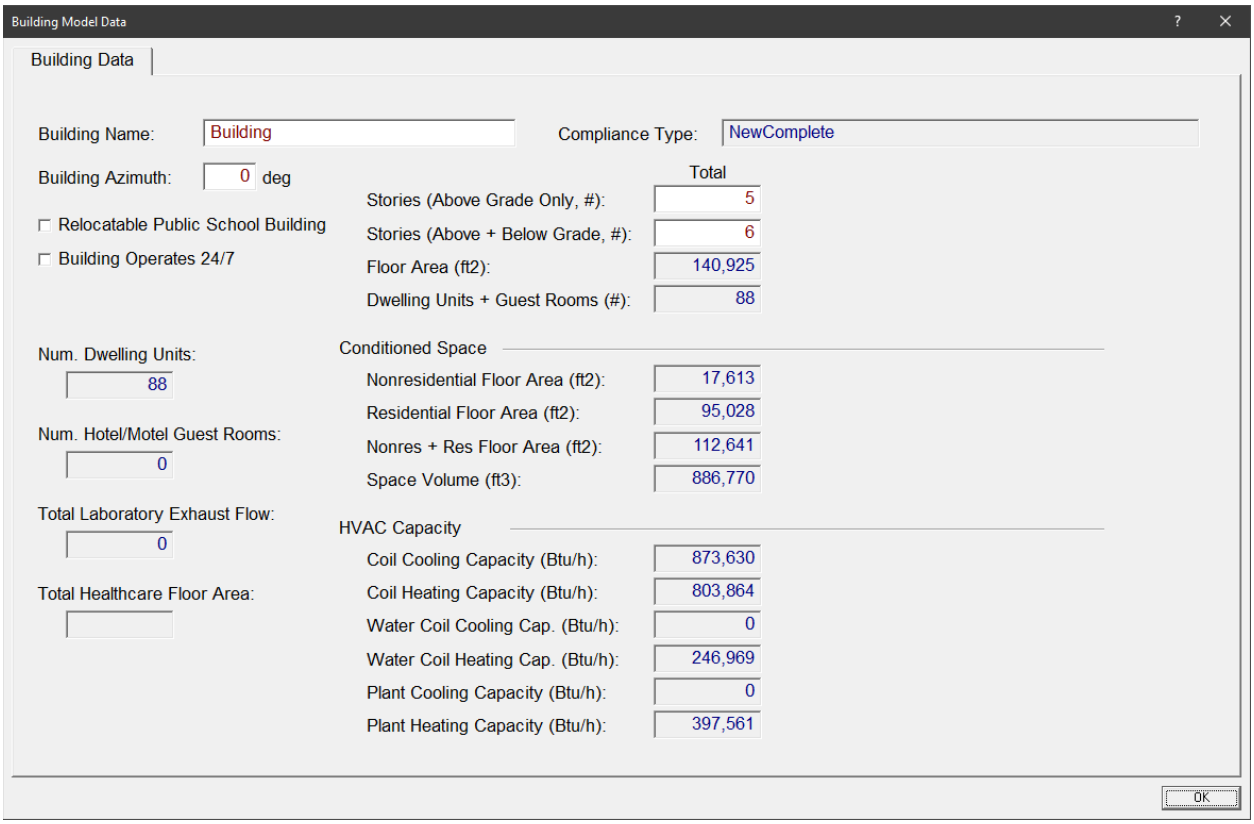
The **Project Data** tab in the **Building Model Data** screen appears. Enter the **Location** of the project, and the other parameters as required. For a multifamily residential project please check the “Includes Residential Dwelling Units” check box.



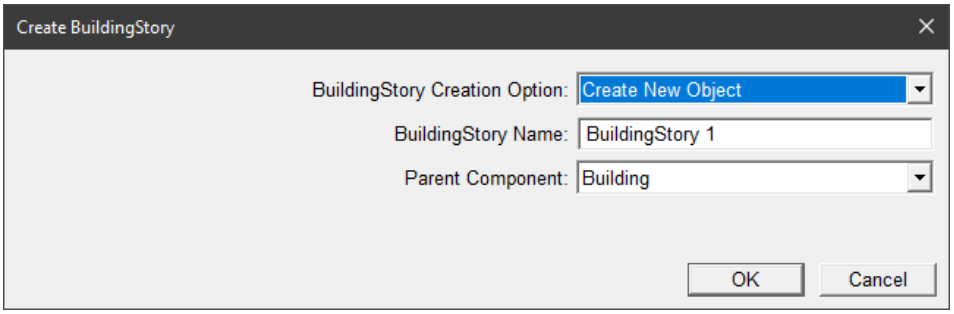
The **Create Building** dialog box appears. Enter the **Building Name** and click **OK**.



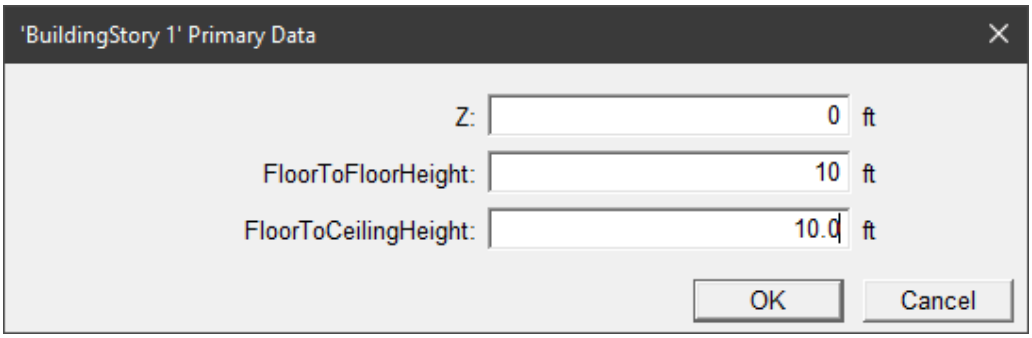
The **Building Data** dialog box appears. Enter the number of stories and click **OK**.



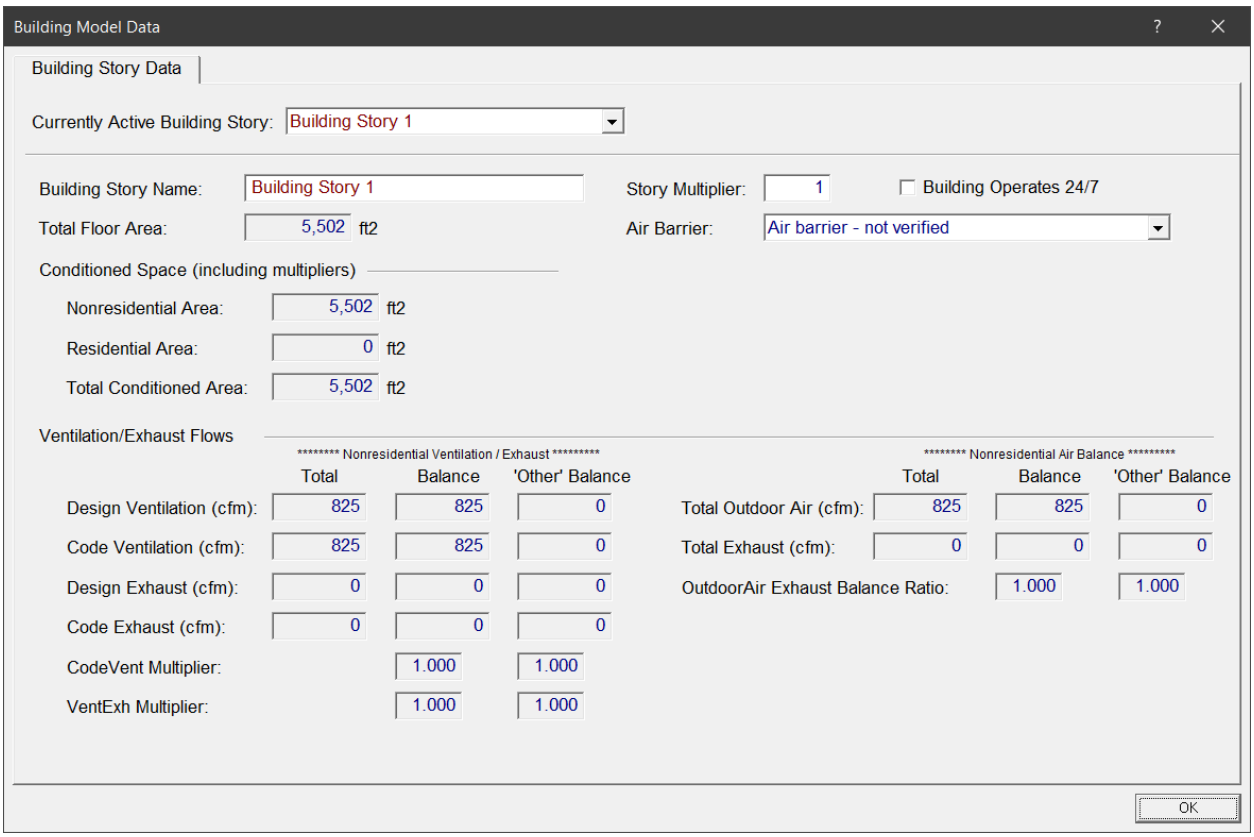
The **Create BuildingStory** dialog box appears. Enter a **BuildingStory Name** and click **OK**.



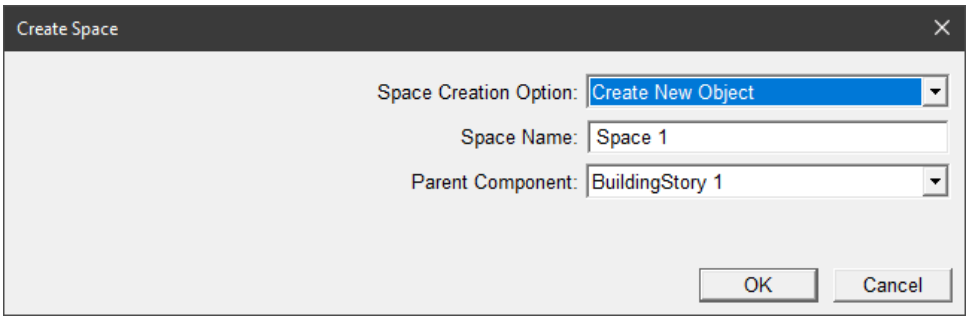
The BuildingStory **Primary Data** dialog box appears. Enter **Z** coordinate for the building story, the **FloorToFloorHeight** and the **FloorToCeilingHeight** in feet. Click **OK**.



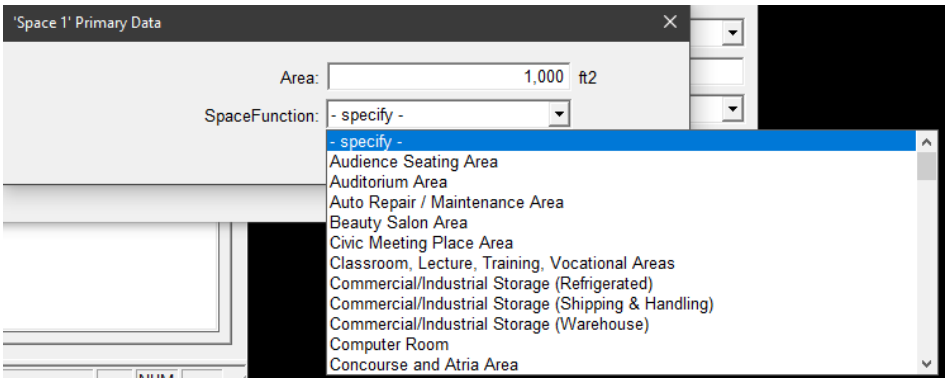
The **Building Story Data** tab appears. Verify input. Click **OK**.



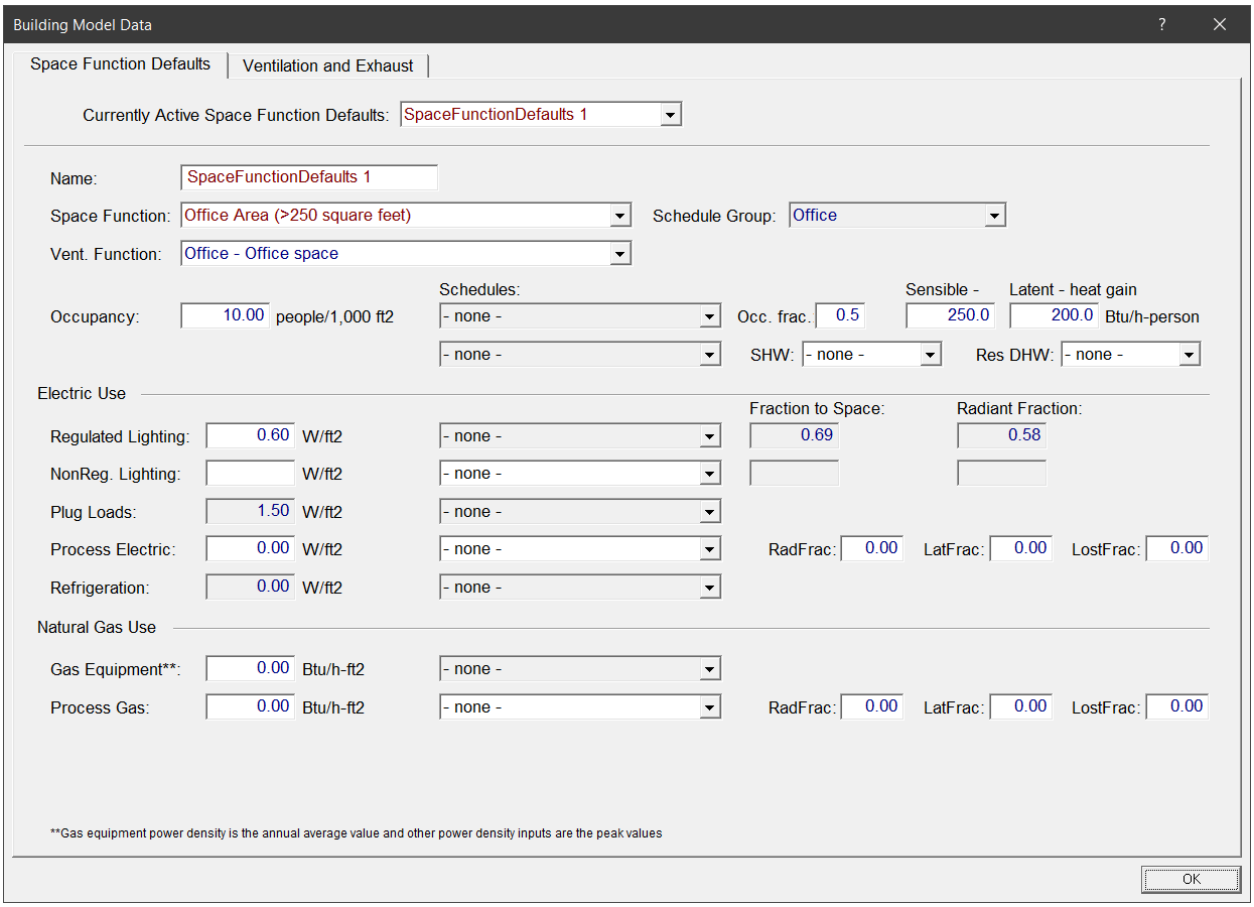
The **Create Space** dialog box appears. Enter the **Space Name** and click **OK**.



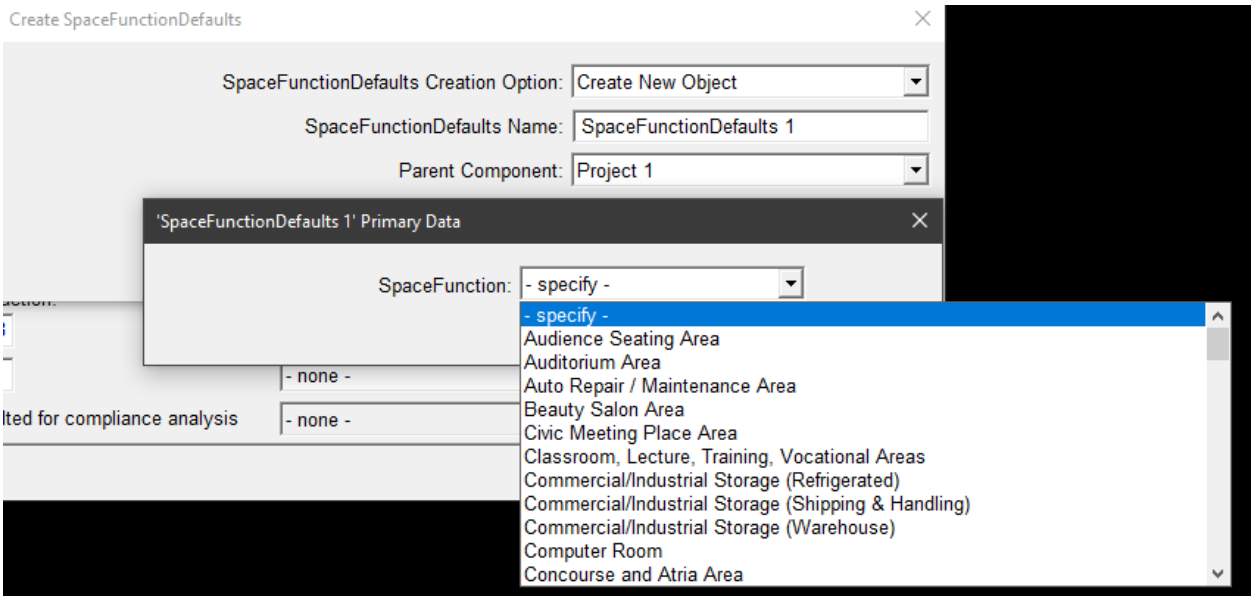
The Create Space **Primary Data** dialog box appears. Enter the **Area** for the space and select the **SpaceFunction** type from the drop-down list.



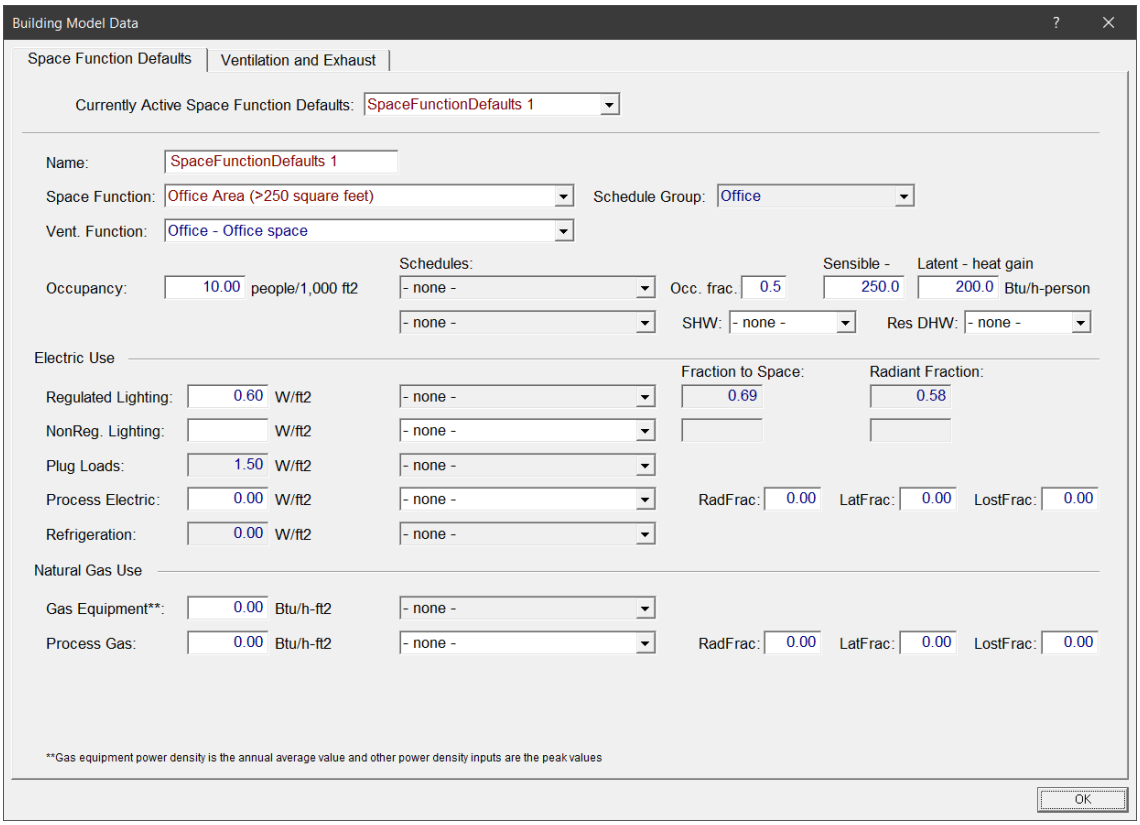
The **Space Data** tab appears. In **Function Defaults**, select **Create SpaceFunctionDefaults**. The **Create SpaceFunctionDefaults** dialog box appears. Select the **Creation Option** and **Parent Component**. Click **OK.**



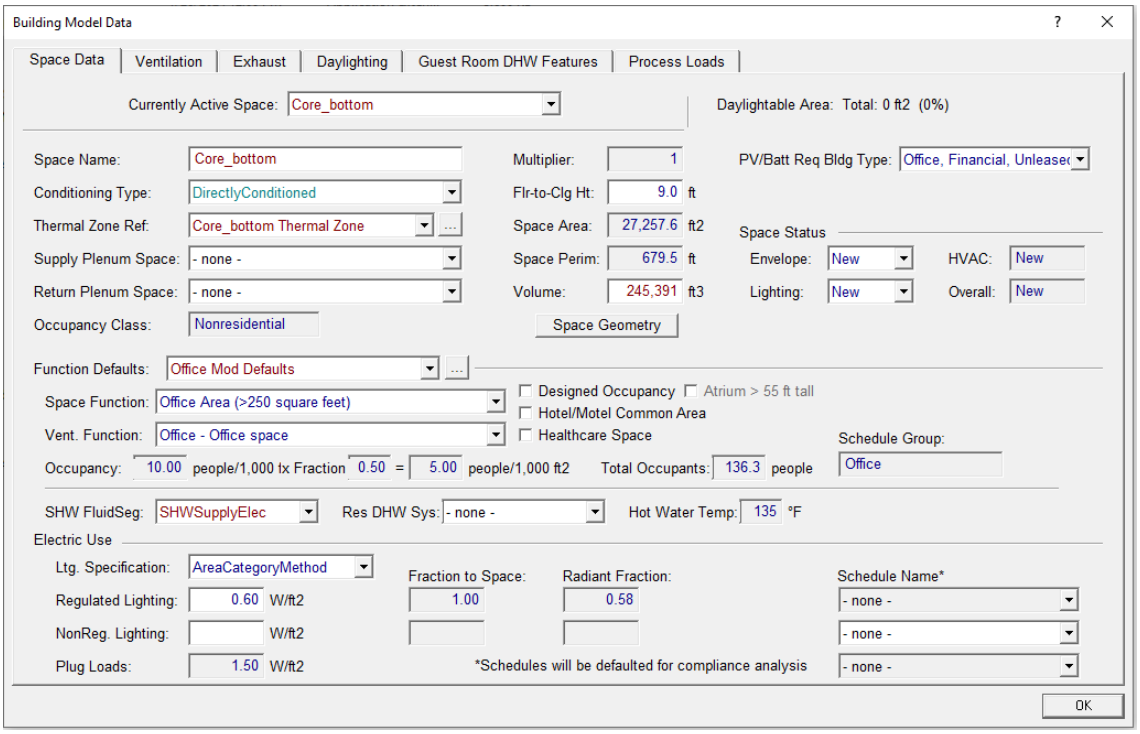
The SpaceFunctionDefaults **Primary Data** dialog box appears. Select the **SpaceFunction** and click **OK**.



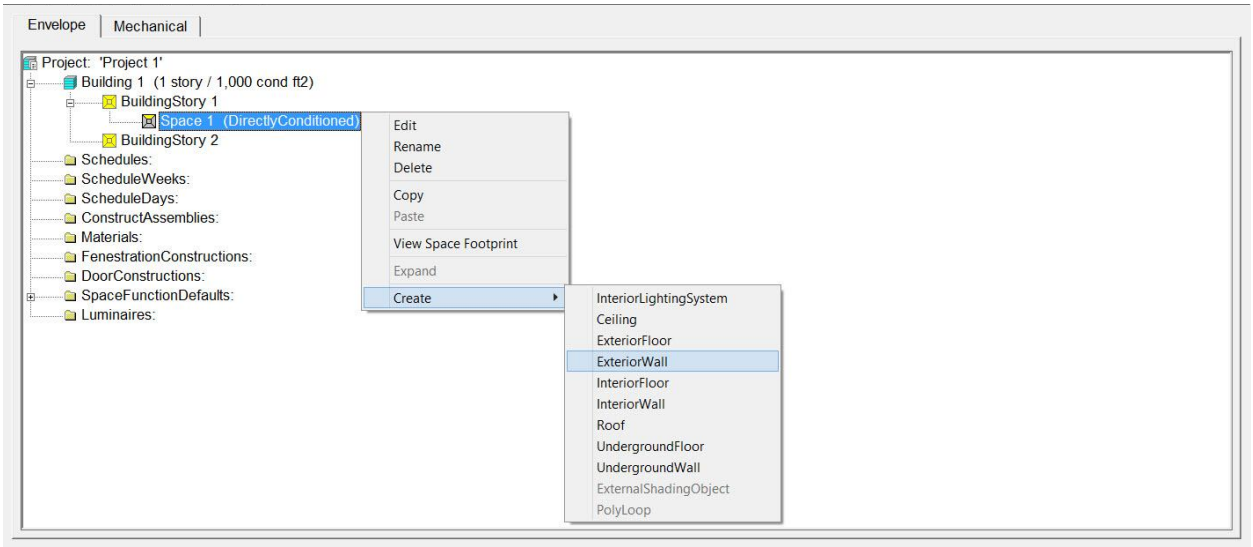
The **Space Function Defaults** tab appears. Assign the data and click **OK.**



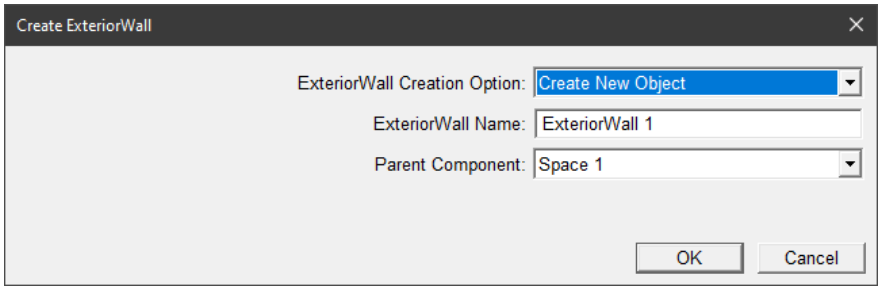
The **Space Data** tab appears. Verify **Function Defaults** and click **OK.**



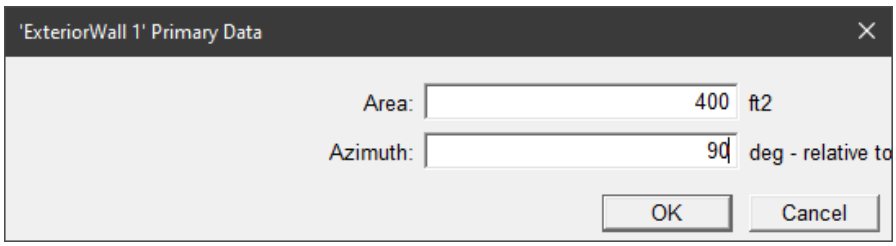
To create geometry surfaces (child objects), right click on the Space name (parent component) in the Project tree. For example, right click on the **BuildingStory** and select **Create** and then click **Exterior Wall.**



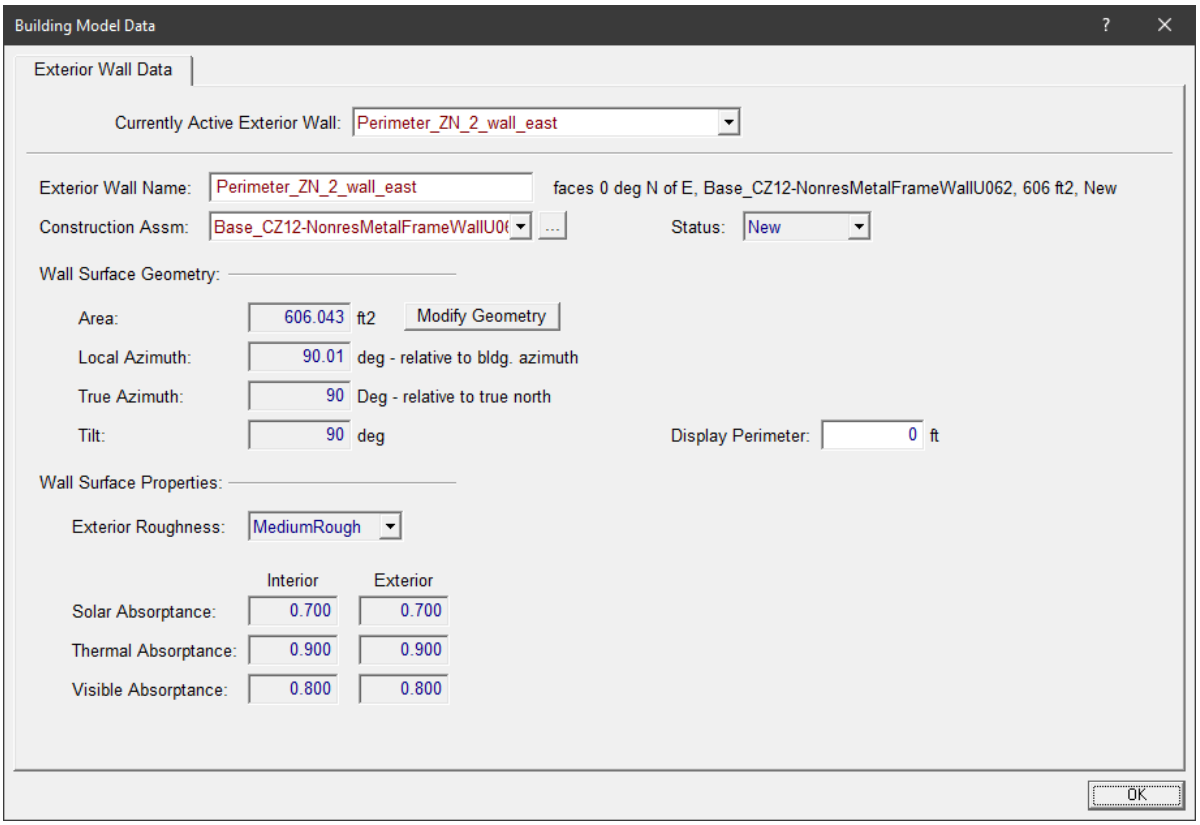
The **Create ExteriorWall** dialog box appears. Select the **Creation Option** and **Parent Component** and click **OK.**



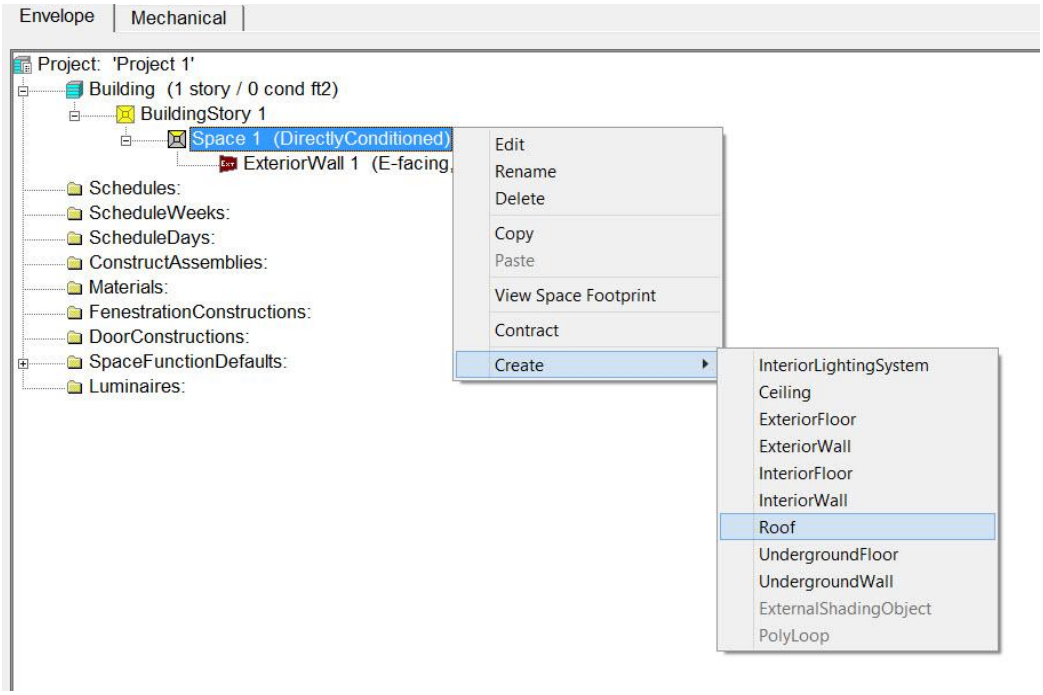
The ExteriorWall **Primary Data** dialog box appears. Enter the **Area** and **Azimuth** for the exterior wall and click **OK**.



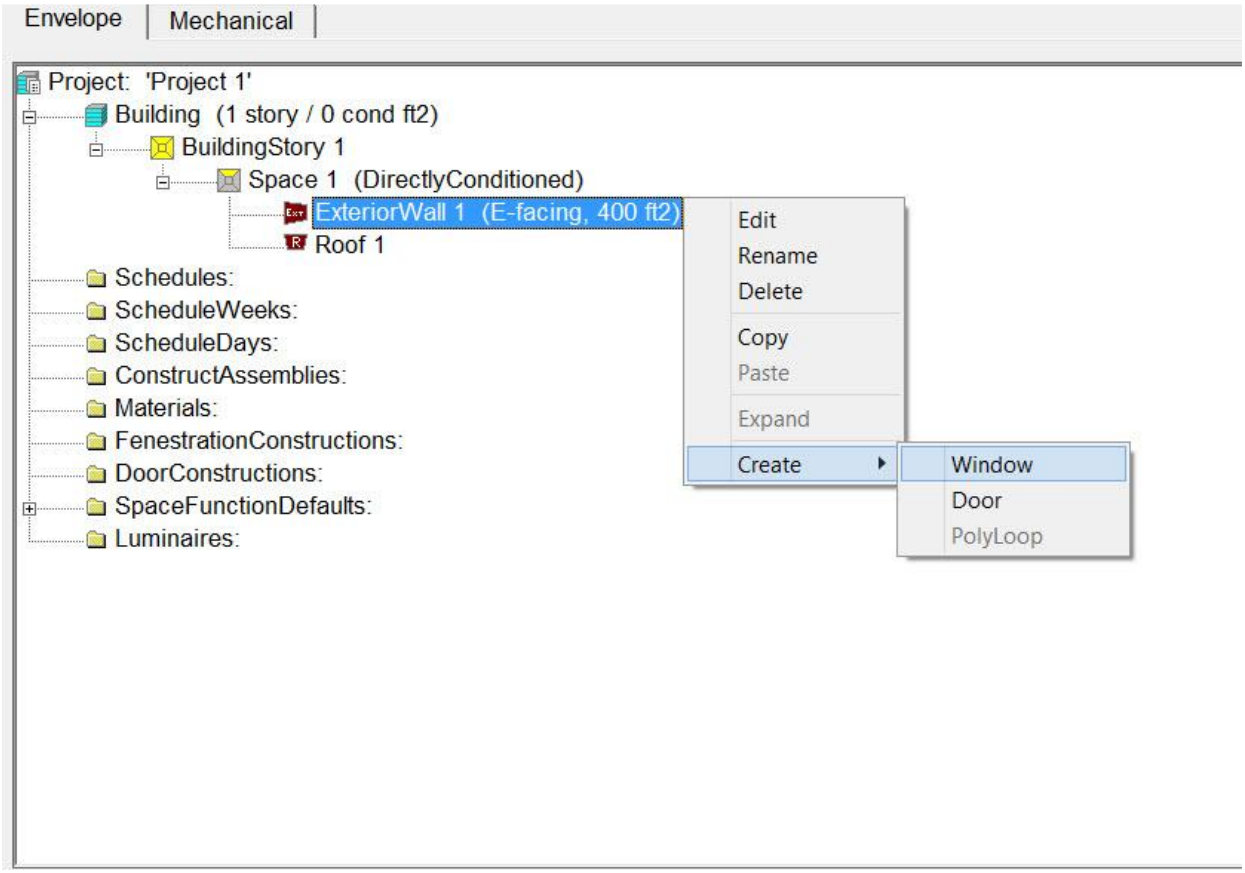
The **Exterior Wall Data** tab appears. In **Construction Assm**, create construction data. Enter values and click **OK.** The Exterior Wall (Exterior Wall icon) appears in the Project tree below Space.



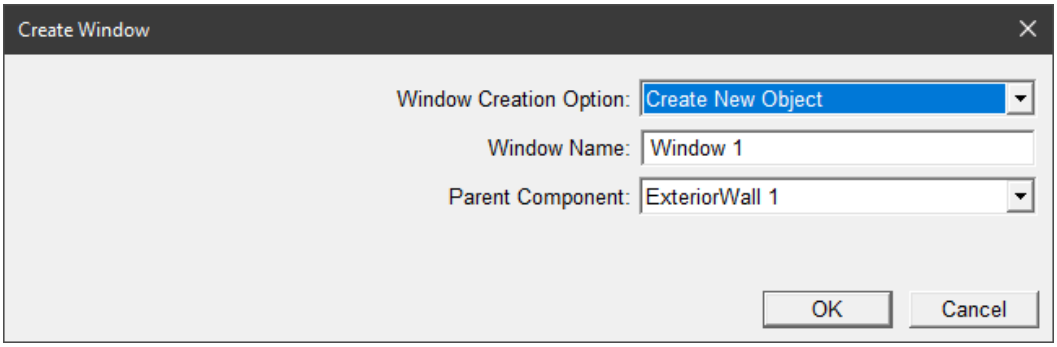
Create **Roof** (and other geometry surfaces such as interior walls and floors) in the Space. The Roof (Roof icon) appears in the Project tree.



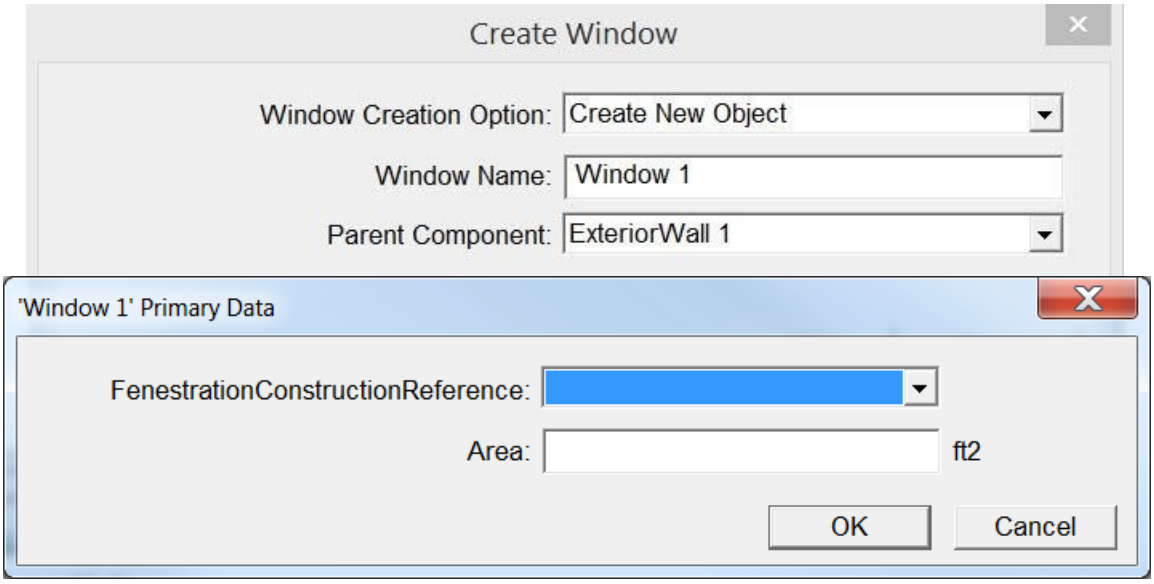
To create **Window**, right click on **Exterior Wall** in the Project tree. Select **Create** and then select **Window**.

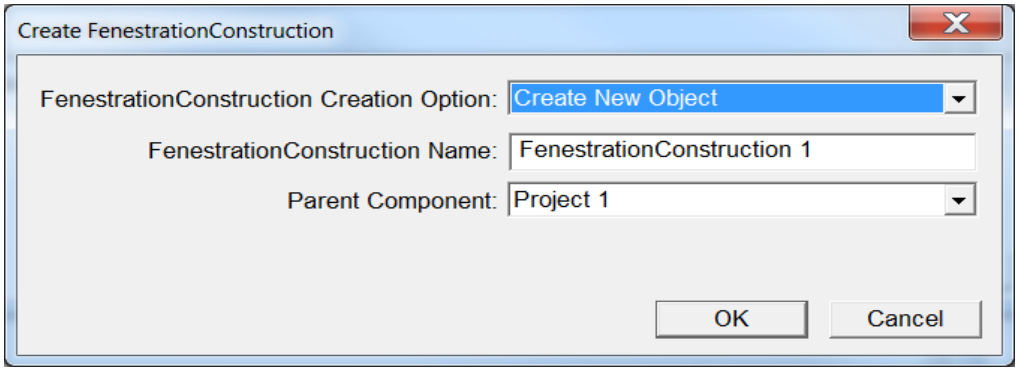


The **Create Window** dialog box appears. Enter **Window** name and click **OK**.

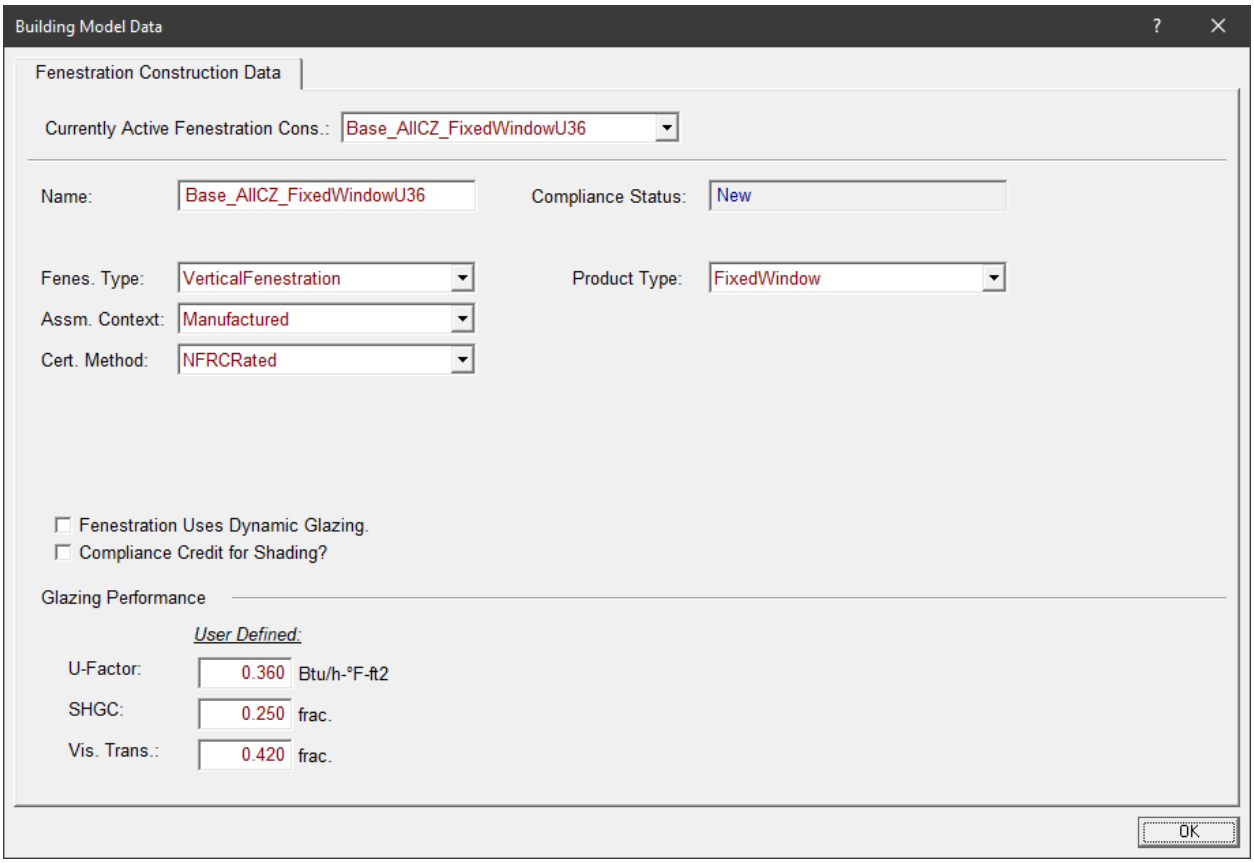


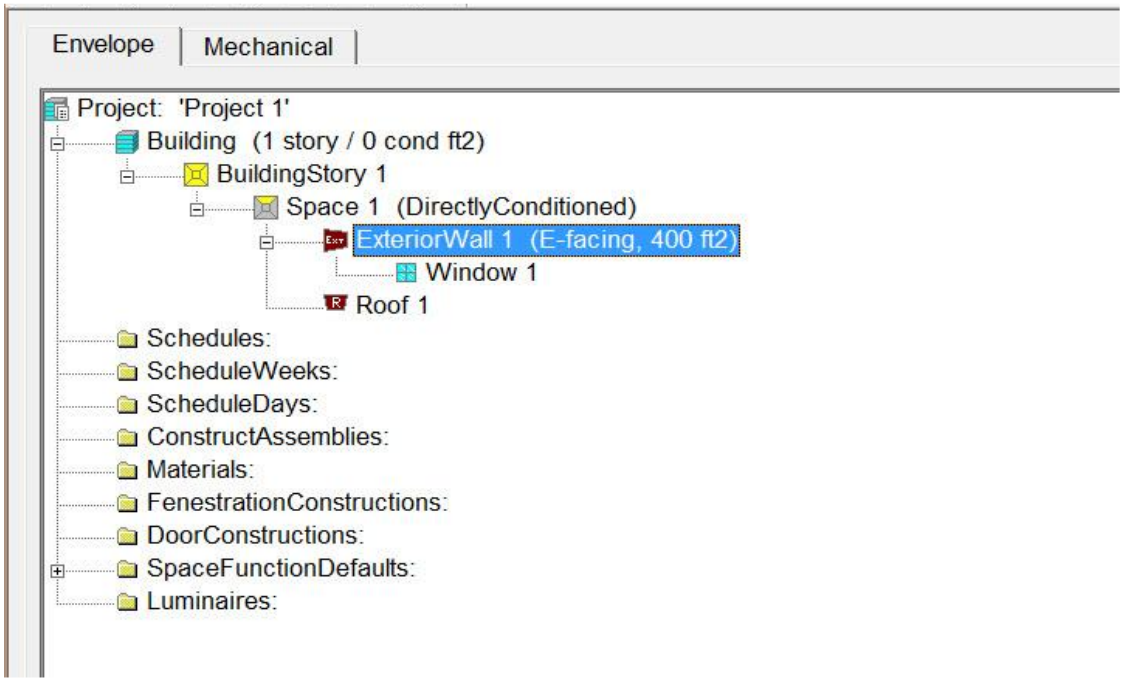
The Window **Primary Data** dialog box appears. Enter the Fenestration Construction Reference, **Window** area and click **OK.** The **Window** (Window icon) appears in the Project tree under **Exterior Wall.**





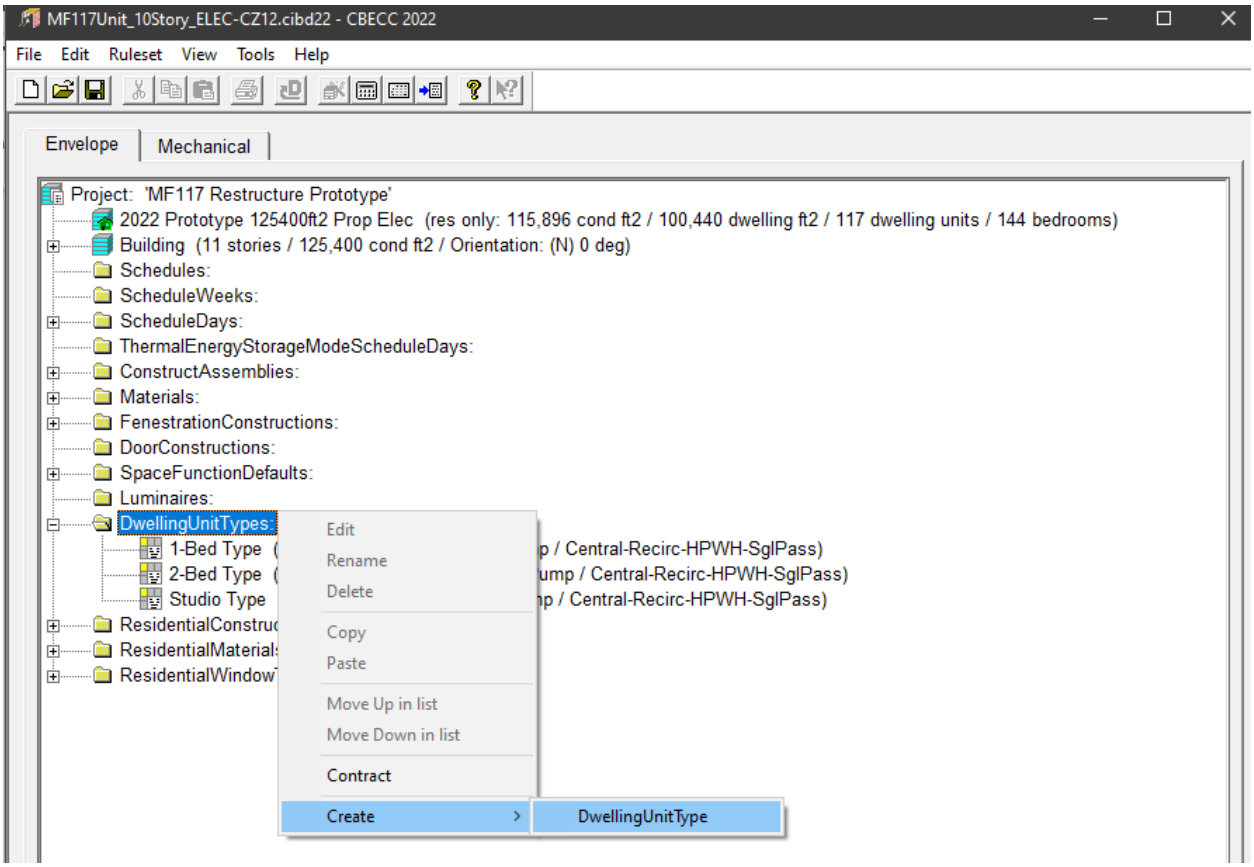
At this point, the Project tree is populated as shown below.



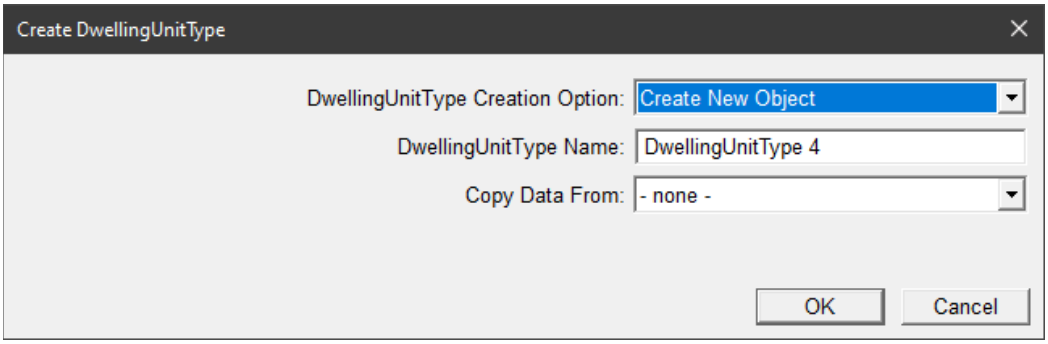


Creating a Dwelling Unit Type (Multifamily/Residential)

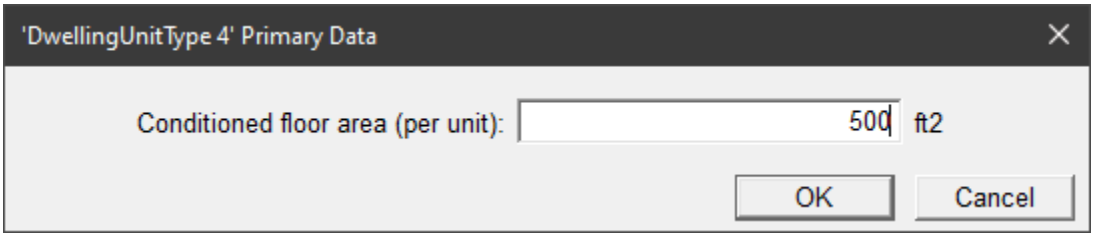
To create Dwelling Unit Types for Multifamily projects, right-click on **DwellingUnitTypes** folder in the Envelope Tab and click **Create > DwellingUnitType**



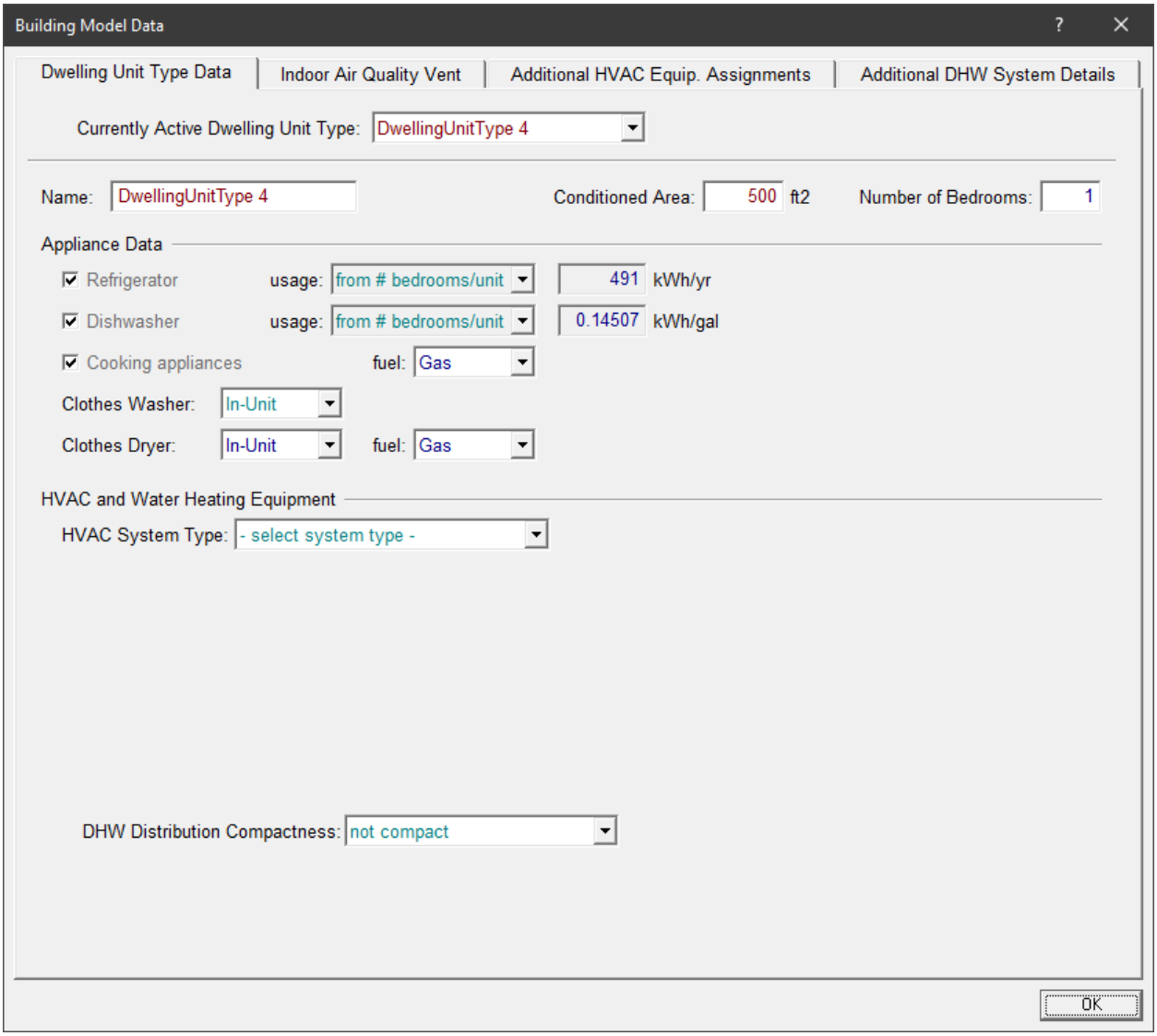
This will bring up a Create **DwellingUnitType** dialog box as shown below. Enter the Name for the Dwelling Unit Type.



Click **OK** to continue and it will bring up another dialog box asking for Conditioned Floor Area



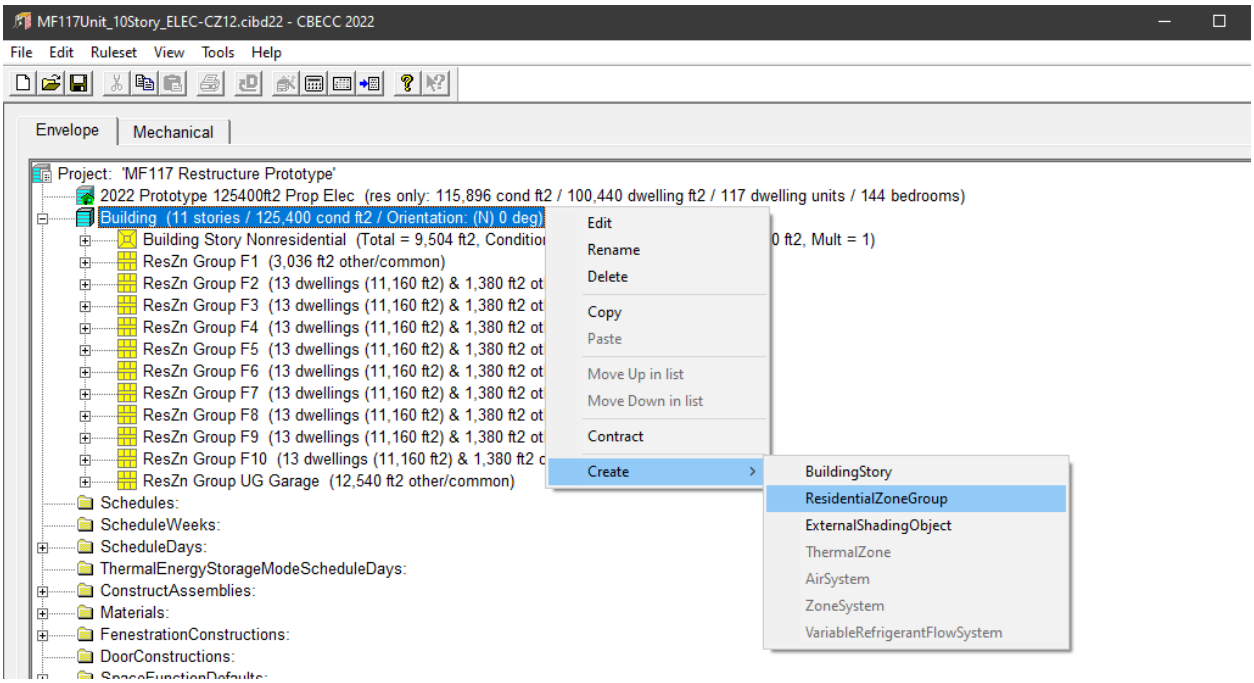
Click **OK** after entering the area and it will bring up the **Dwelling Unit Type Data** Screen.



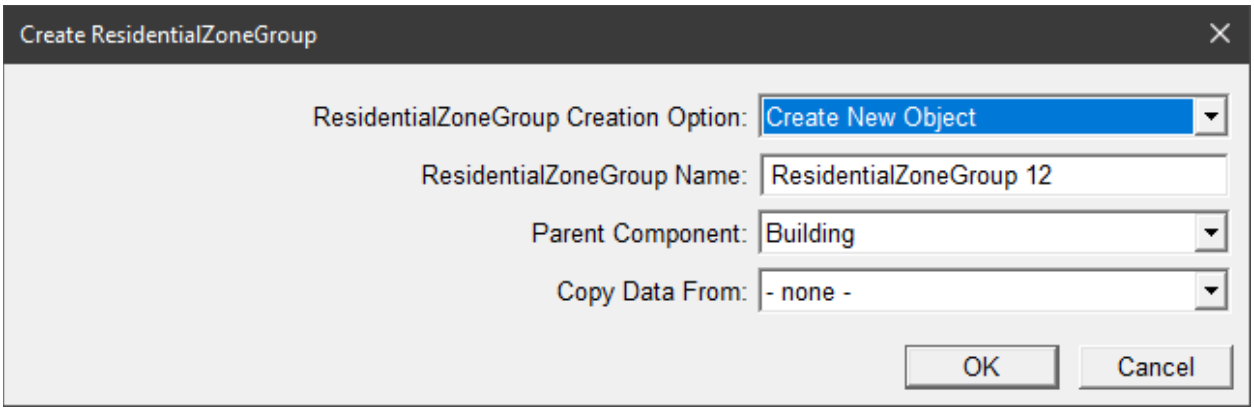
Finish entering all the data and assignments in the various tabs of the Dwelling Unit as required and Click **OK**.

Creating a Residential Zone Group

On the **Envelope** Tab, right-click on the **Building** Object and select **Create** > **ResidentialZoneGroup**

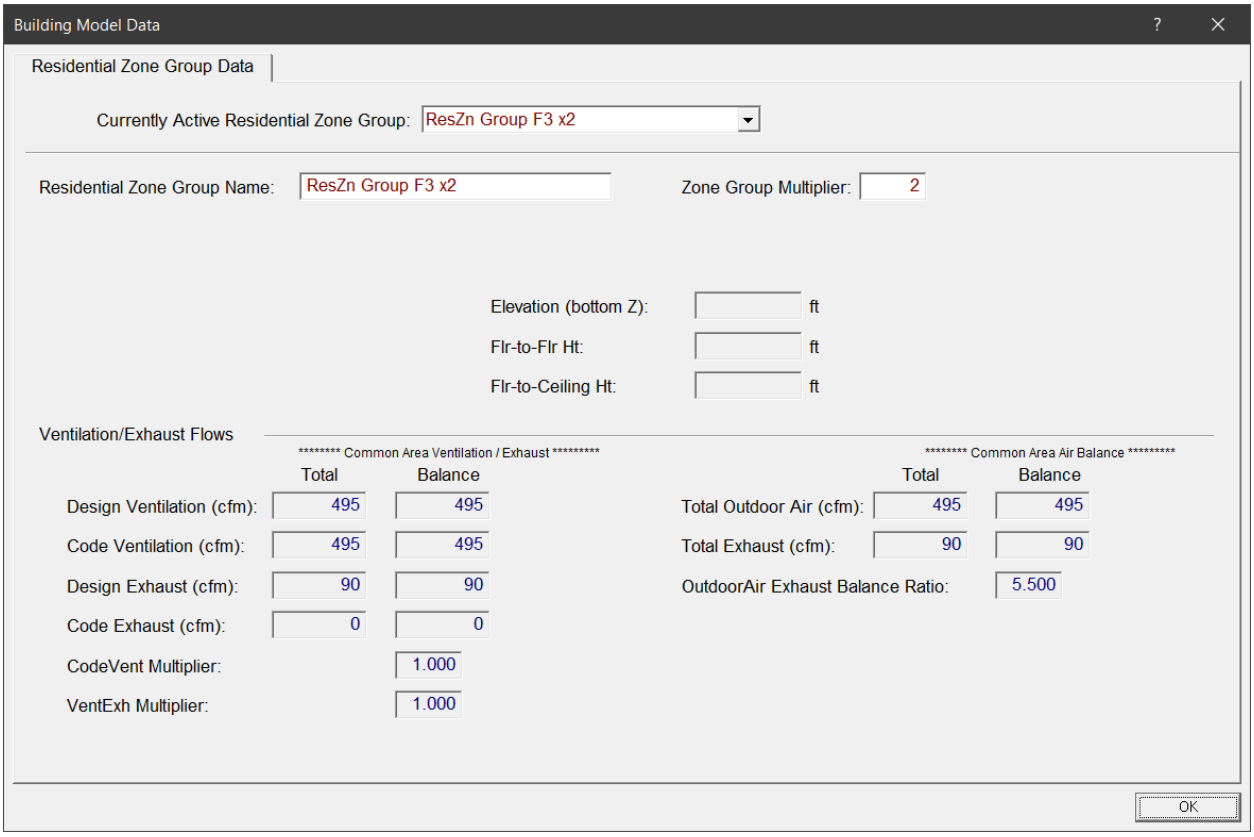


This will bring up a Create **ResidentialZoneGroup** dialog box as shown below.



Enter the **Name** for the **Residential Zone Group**. Click **OK.**

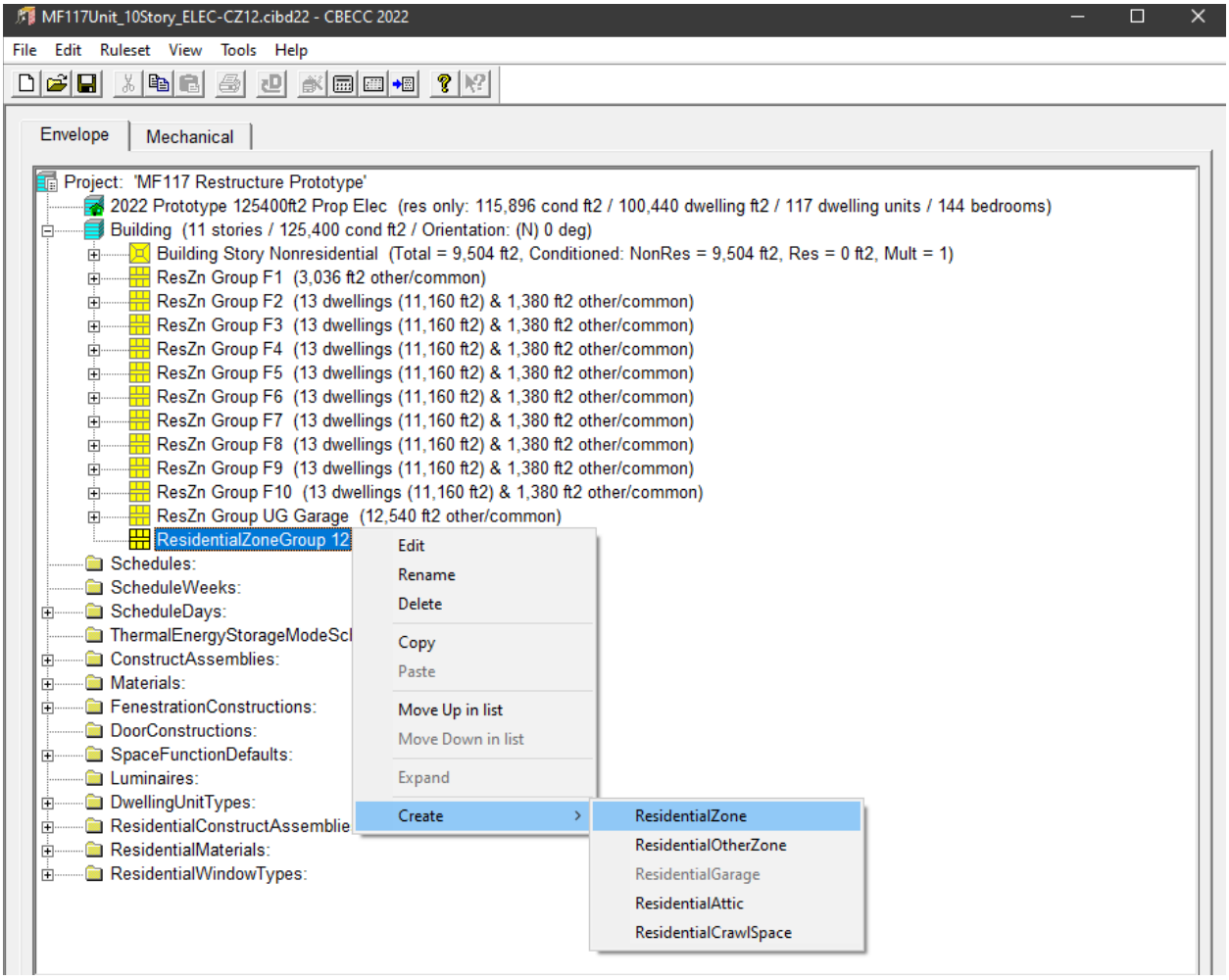
The **Residential Zone Group Data** Screen dialog box will appear Click **OK** continue.



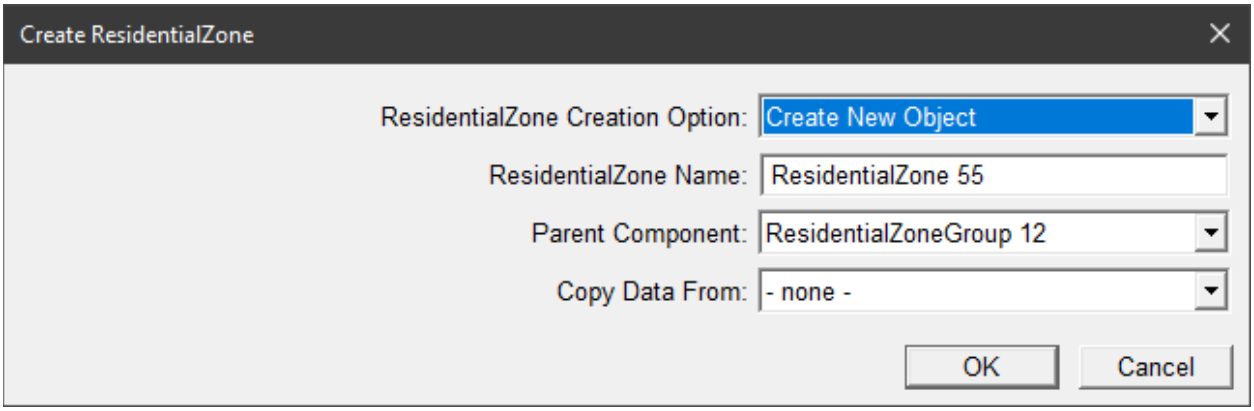
The various fields will be populated once the child objects of the Residential Zone Group are created and assigned.

Creating a Residential Zone

On the **Envelope** Tab, right-click on the **ResidentialZoneGroup** Object that you created and select **Create** > **ResidentialZone**

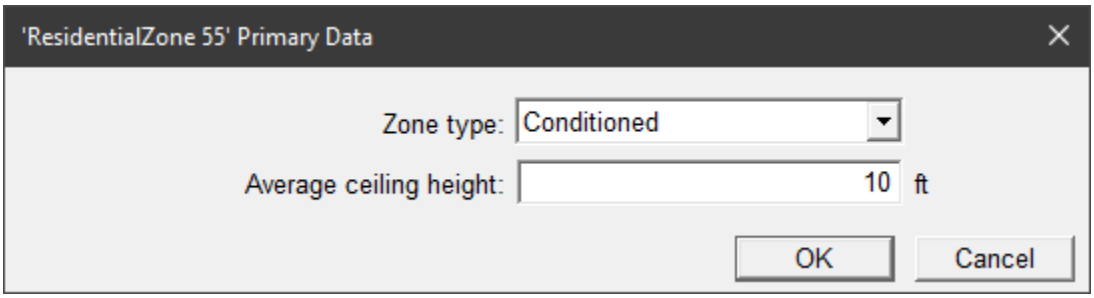


This will bring up a Create **ResidentialZone** dialog box as shown below.

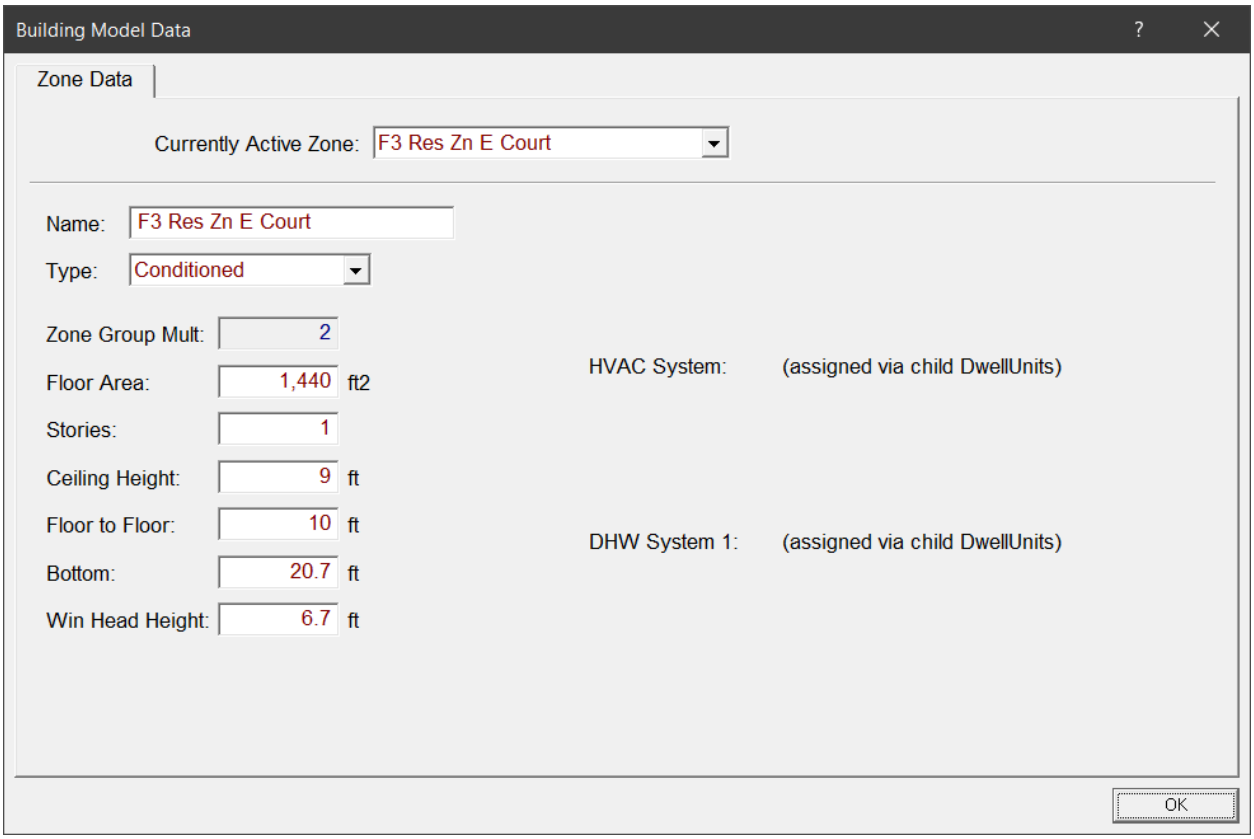


Enter the **Name** for the **Residential Zone.** Click **OK.**

The **Residential Zone Primary Data** Screen dialog box will appear. Enter the **Zone Type** and **Average Ceiling Height**. Click **OK** continue.

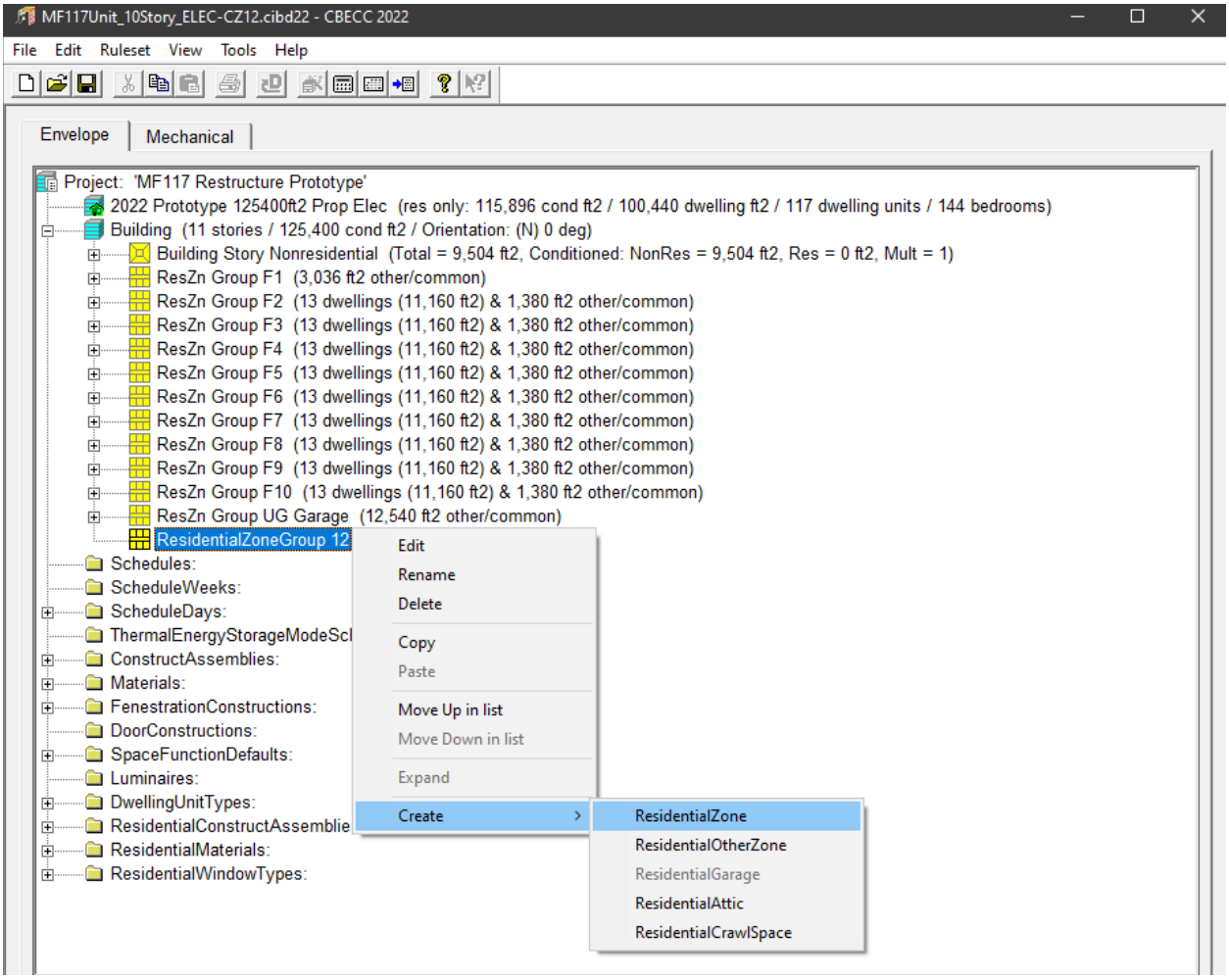


This will bring up the residential **Zone Data** Screen. Fill in all the required inputs and Click **OK**

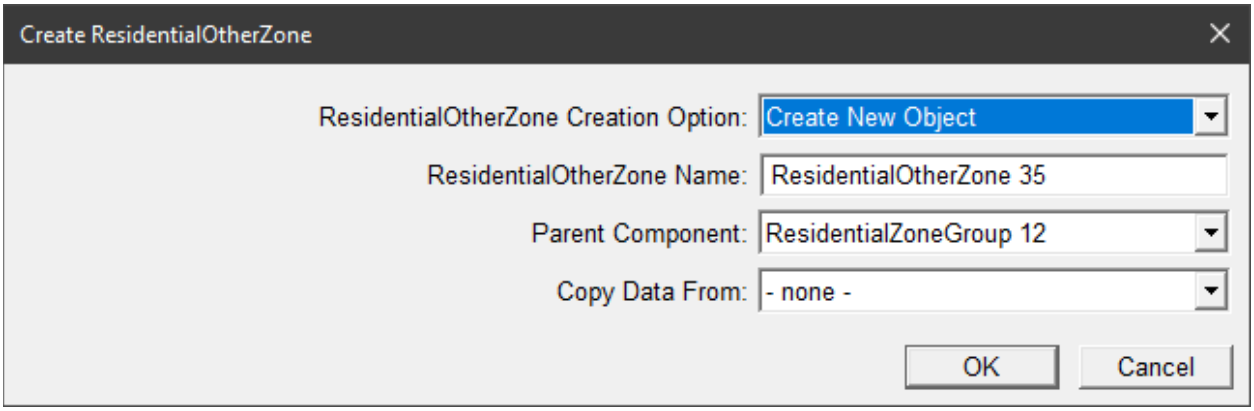


Creating a Residential Other Zone (for Multifamily Common Area Spaces)

On the **Envelope** Tab, right-click on the **ResidentialZoneGroup** Object that you created and select **Create** > **ResidentialOtherZone**

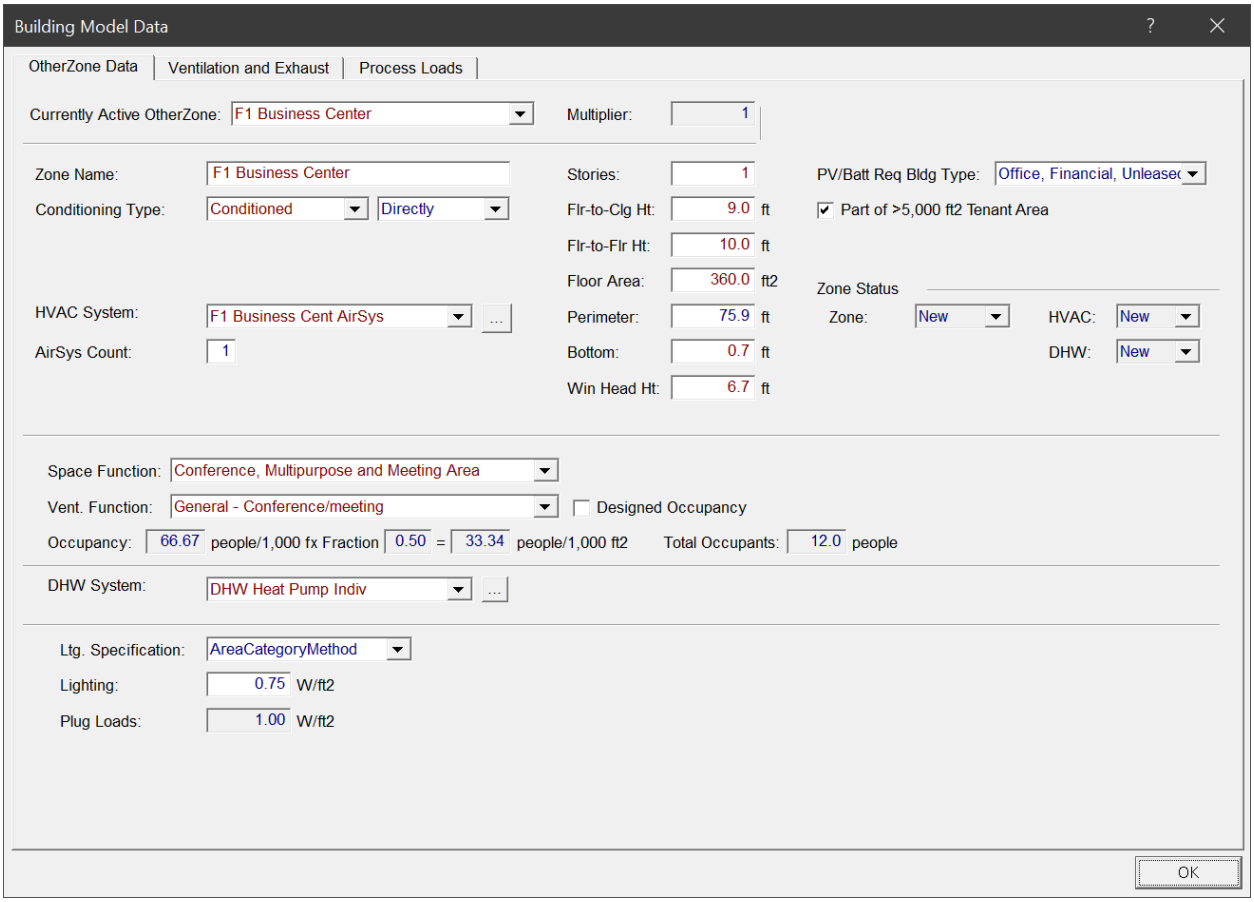


This will bring up a Create **ResidentialOtherZone** dialog box as shown below.



Enter the **Name** for the **Residential Other Zone.** Click **OK.**

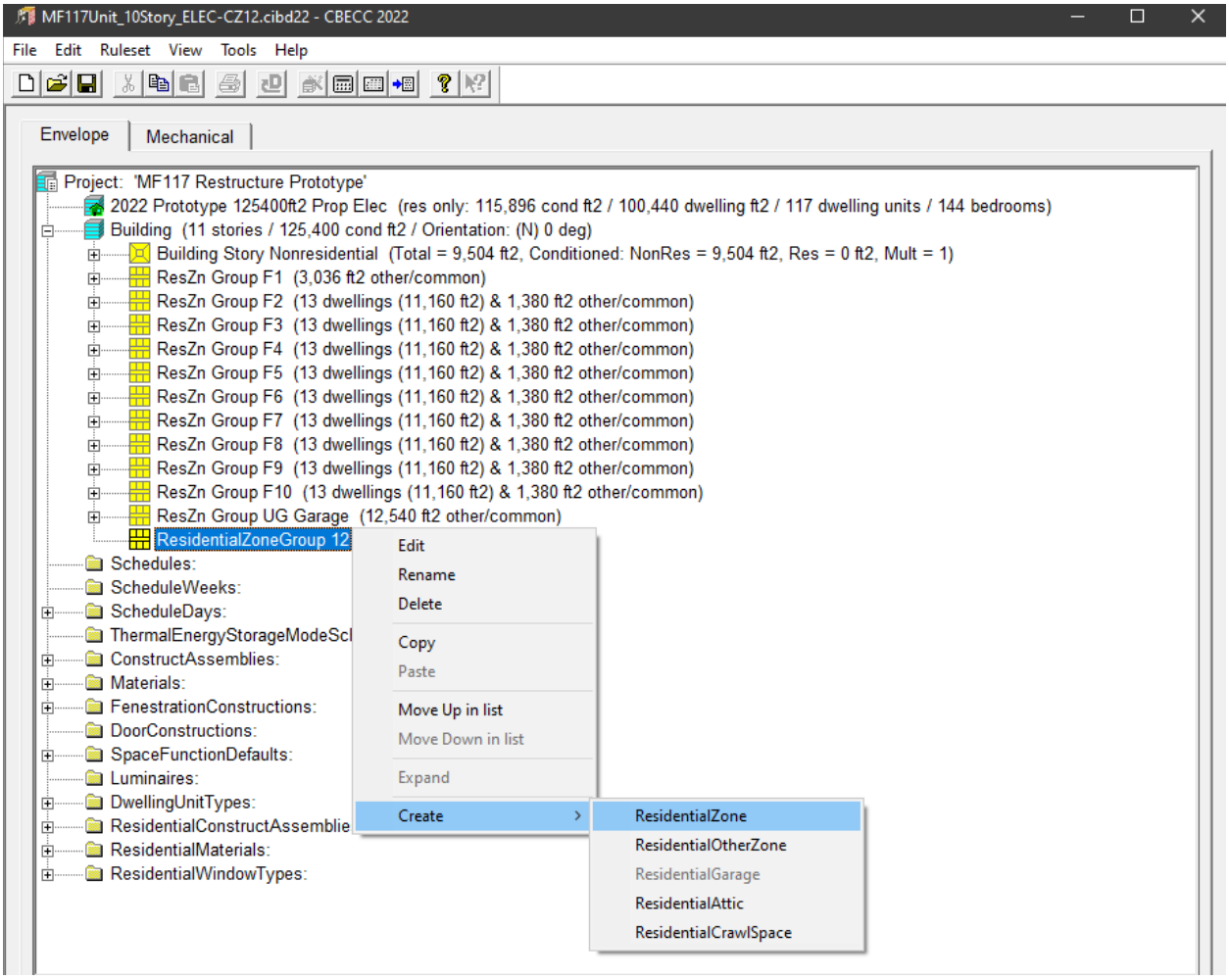
The **Other Zone Data** Screen dialog box will appear.



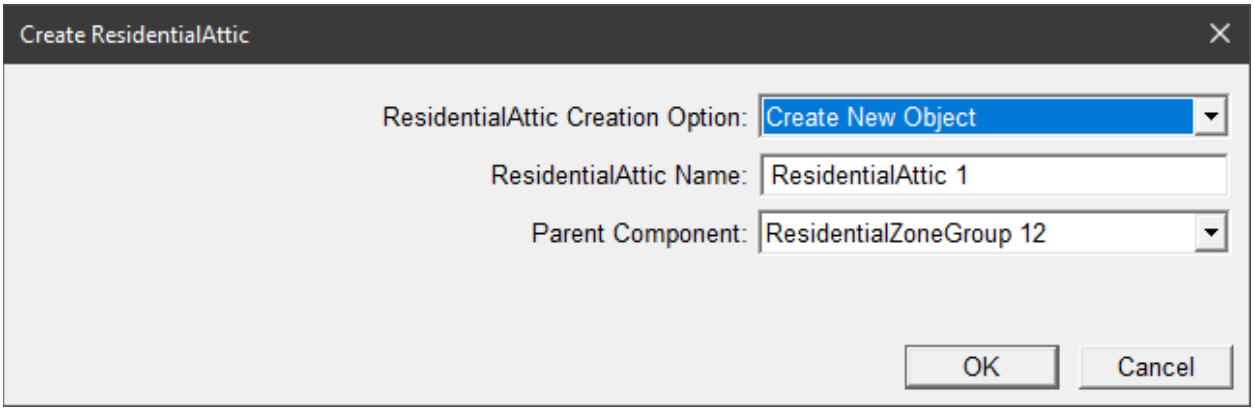
Fill in all the required inputs and Click **OK**

Creating a Residential Attic

On the **Envelope** Tab, right-click on the **ResidentialZoneGroup** Object that you created and select **Create** > **ResidentialAttic**

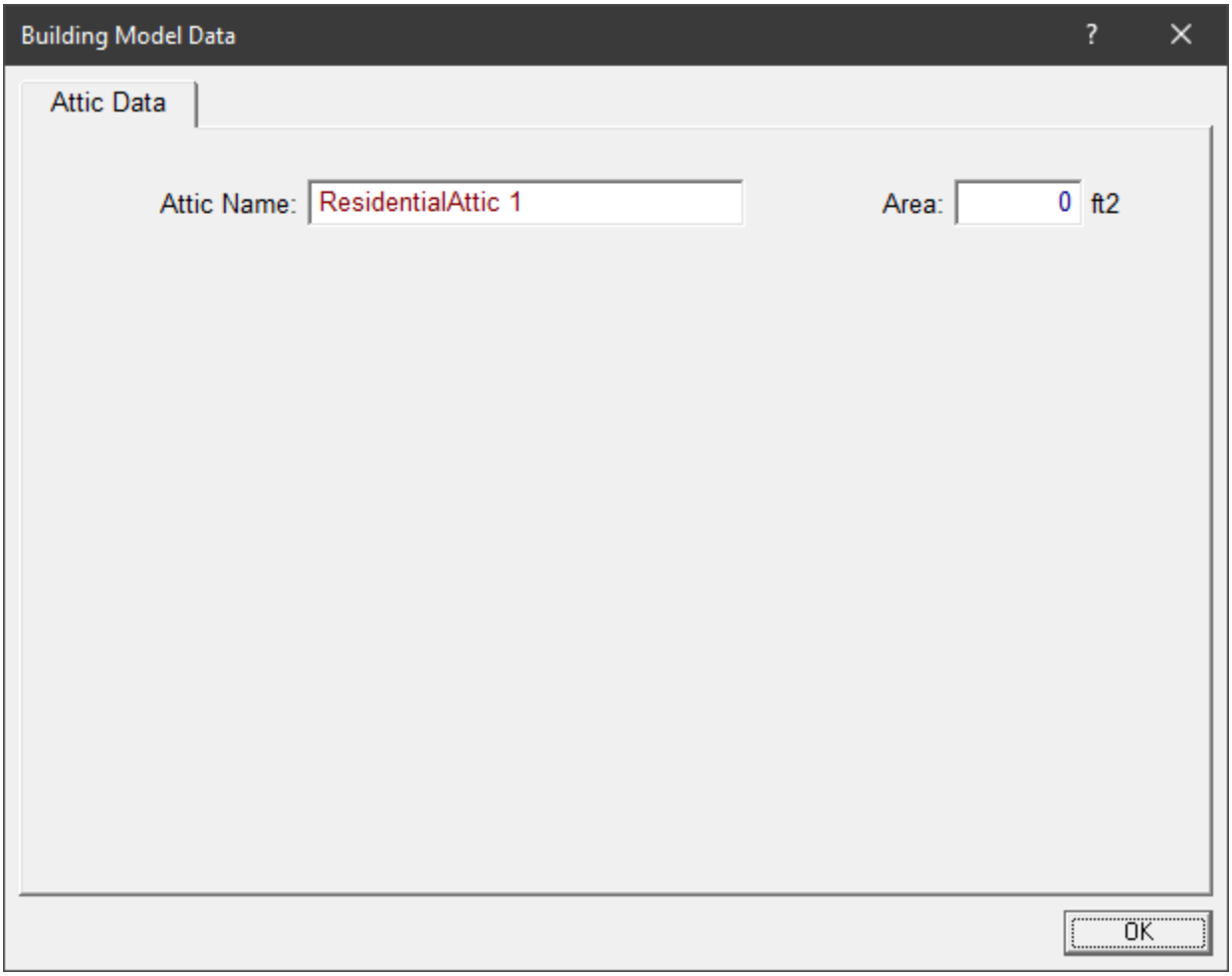


This will bring up a Create **ResidentialAttic** dialog box as shown below.



Enter the **Name** for the **Residential Attic.** Click **OK.**

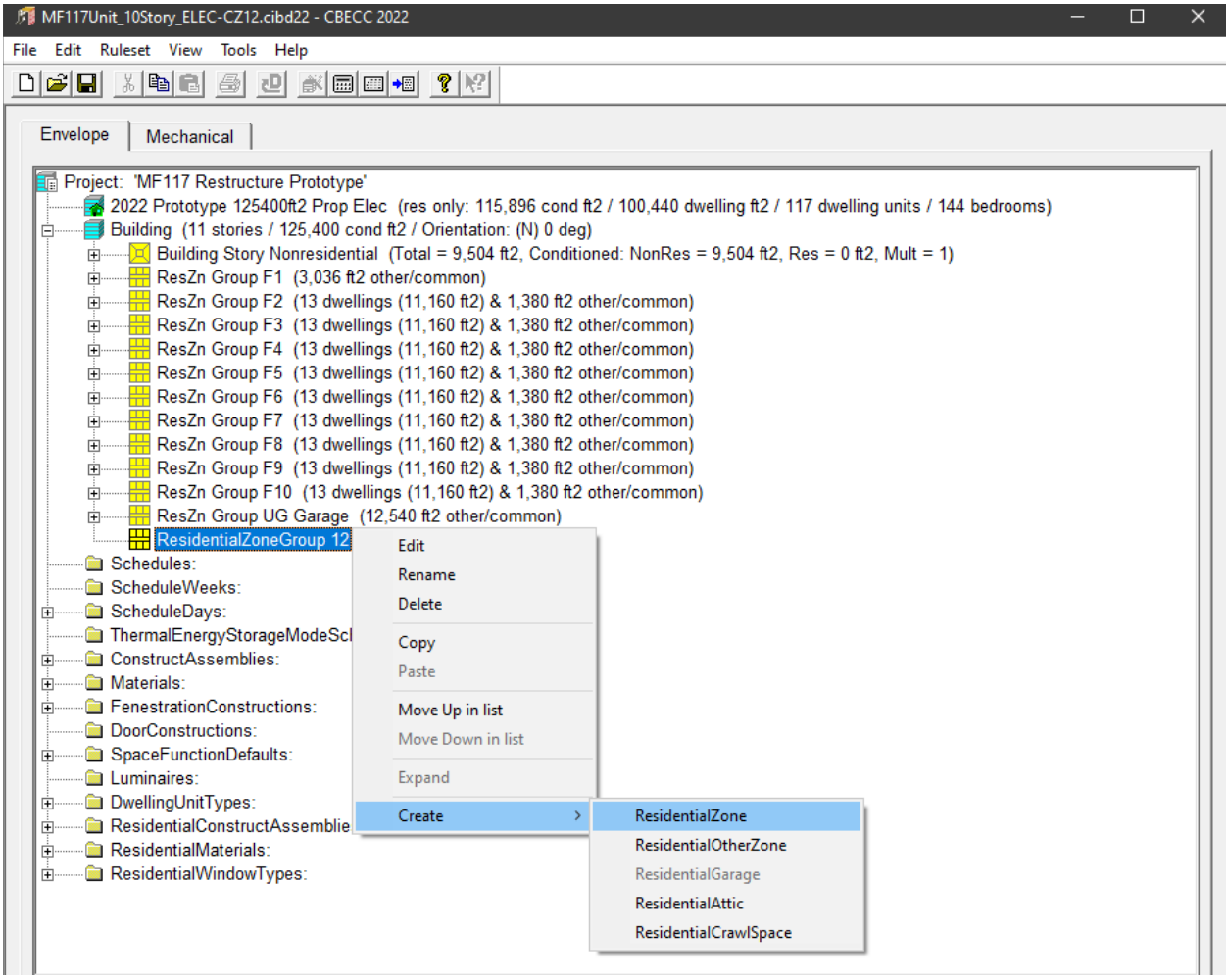
The **Attic Data** Screen dialog box will appear.



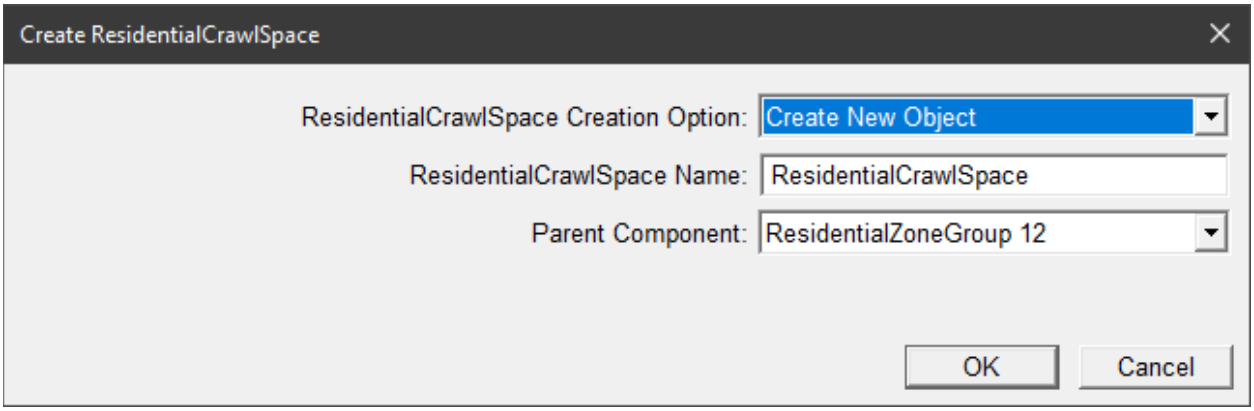
Fill in all the required inputs and Click **OK**

Creating a Residential Crawl Space

On the **Envelope** Tab, right-click on the **ResidentialZoneGroup** Object that you created and select **Create** > **ResidentialCrawlSpace**

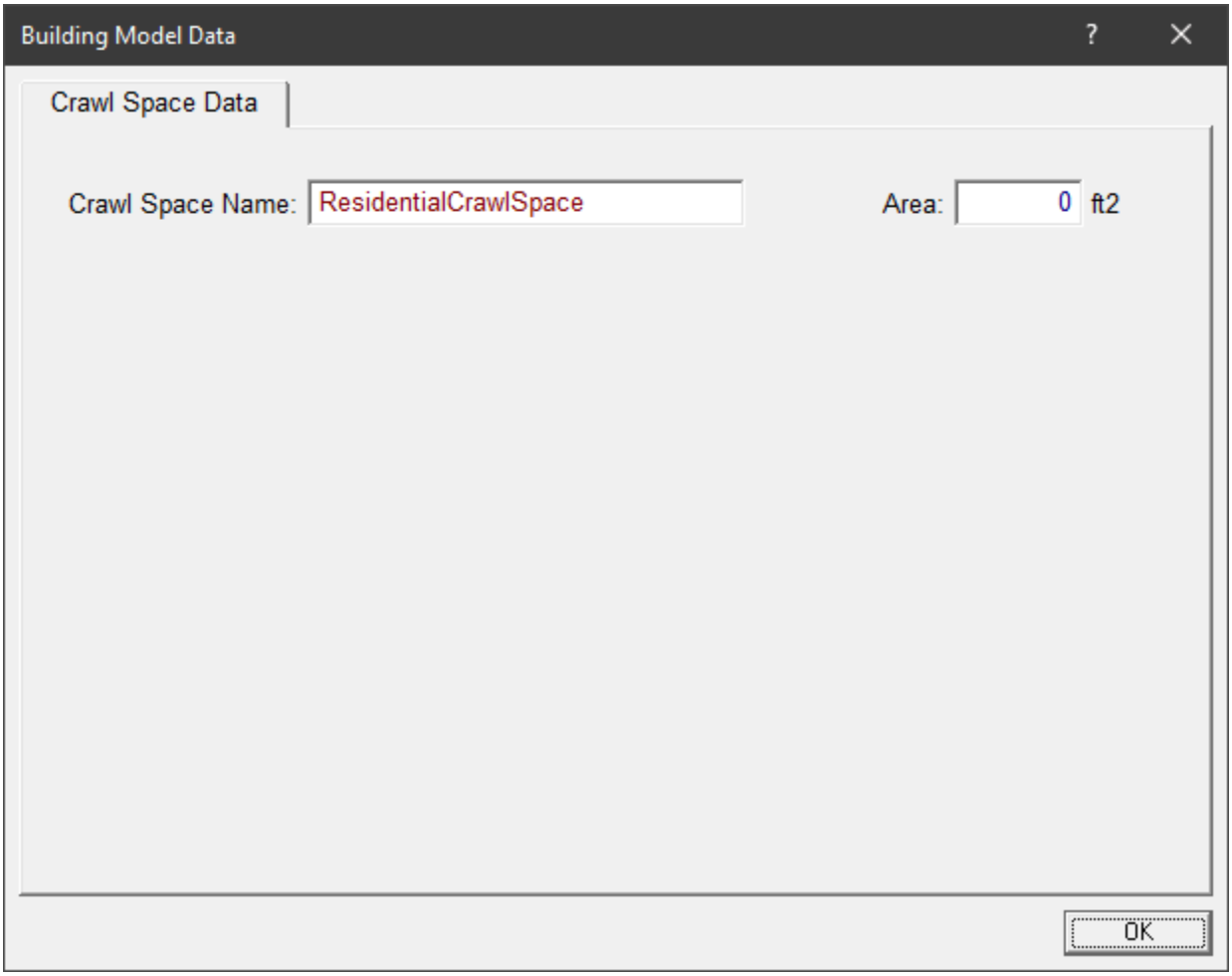


This will bring up a Create **ResidentialCrawlSpace** dialog box as shown below.



Enter the **Name** for the **Residential Crawl Space.** Click **OK.**

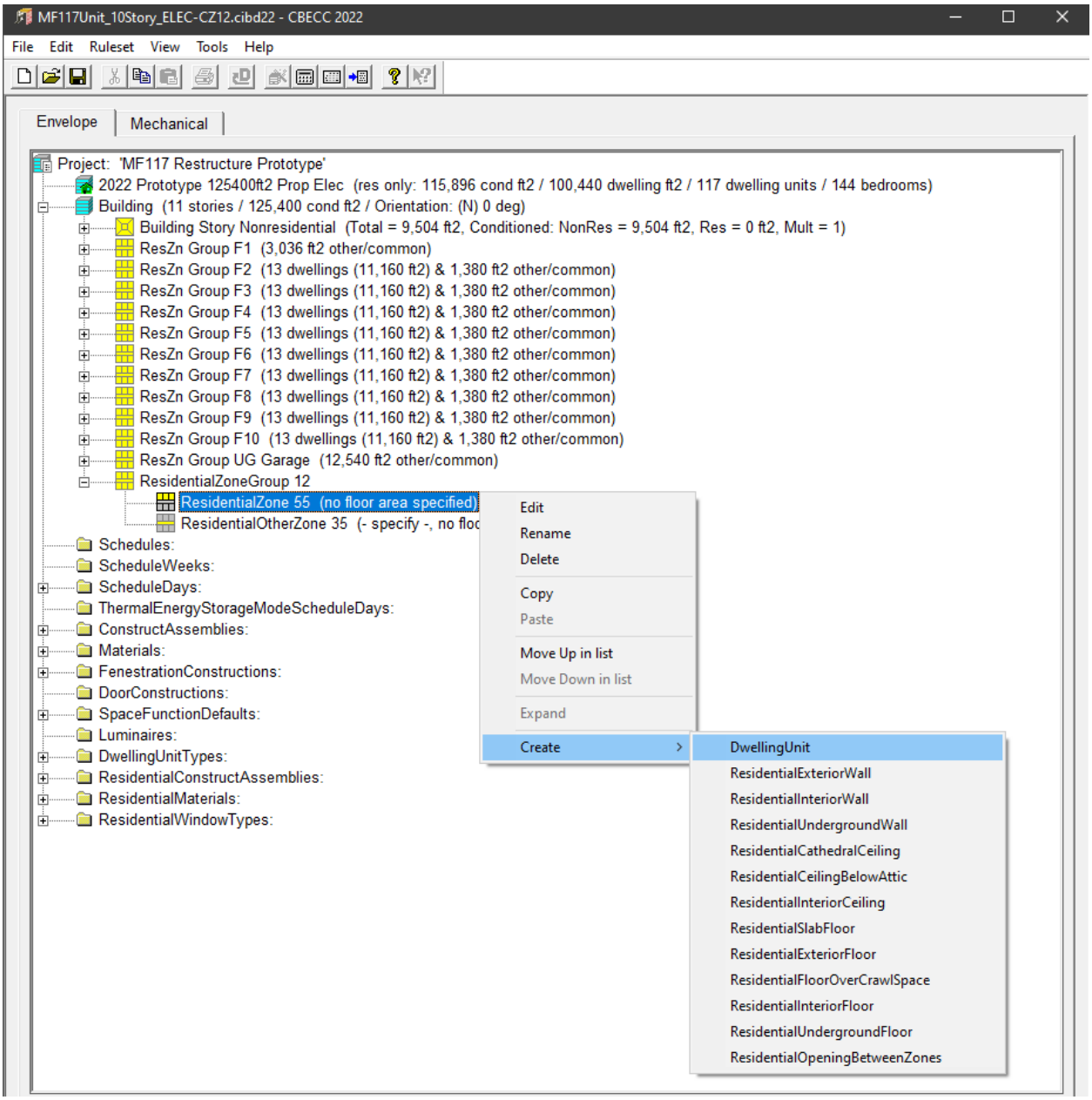
The **Crawl Space Data** Screen dialog box will appear.



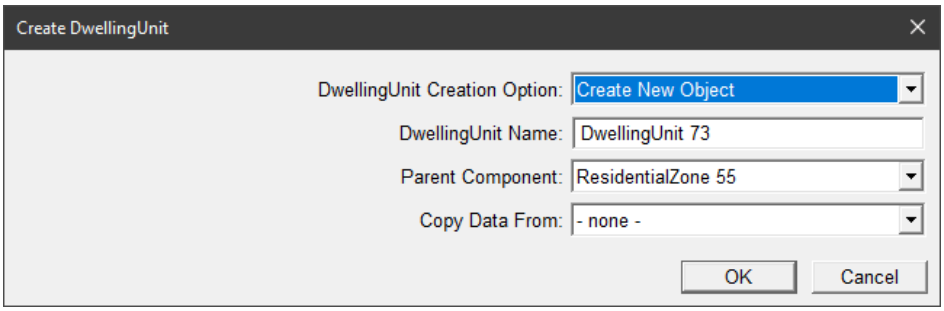
Fill in all the required inputs and Click **OK**

Creating a Dwelling Unit (child object) for Residential Zone.

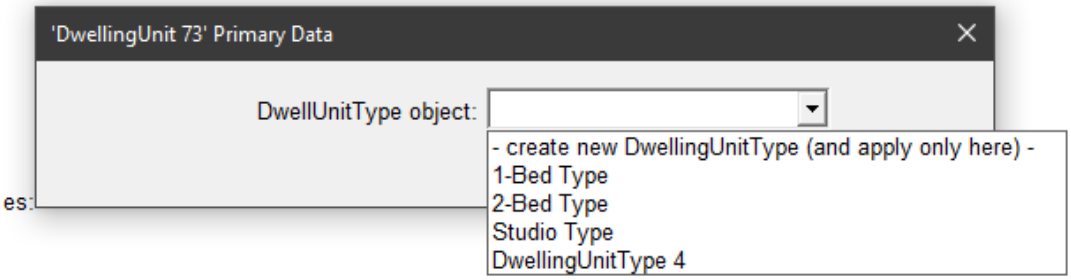
On the **Envelope** Tab, right-click on the **ResidentialZone** Object that you created and select **Create > DwellingUnit**



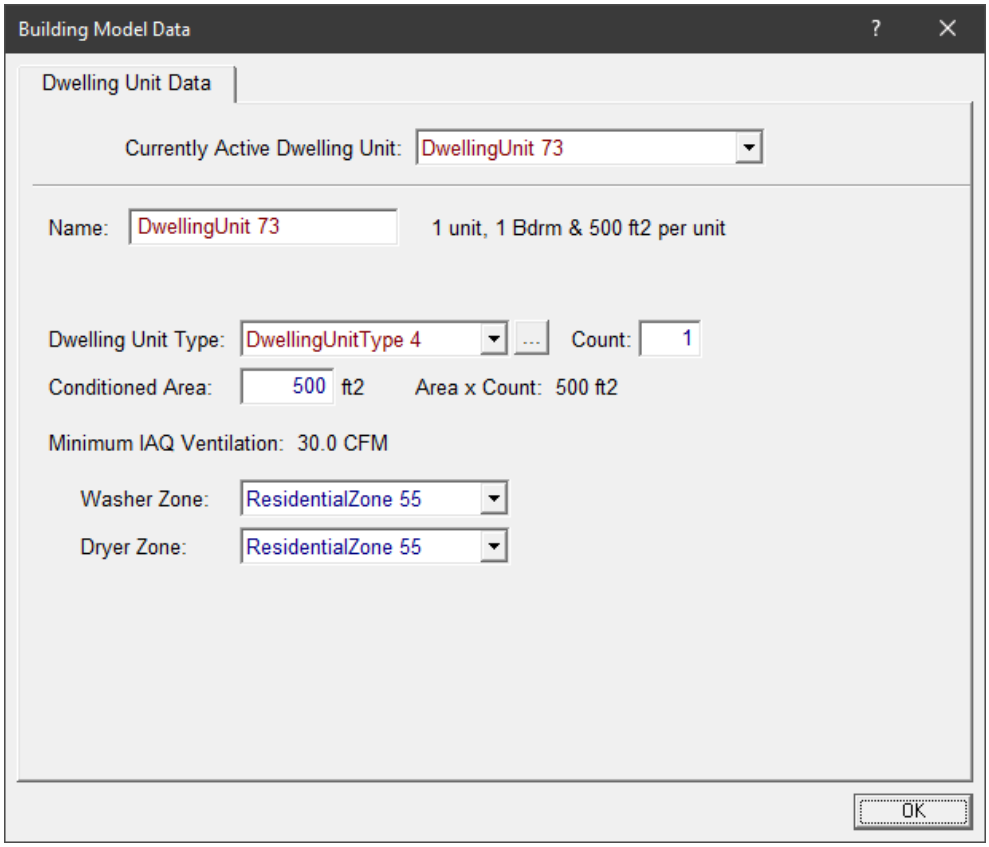
This will bring up a Create **DwellingUnit** dialog box as shown below.



Enter the **Name** for the **Dwelling Unit.** Click **OK.** The **DwellingUnit Primary Data** Screen dialog box will appear.



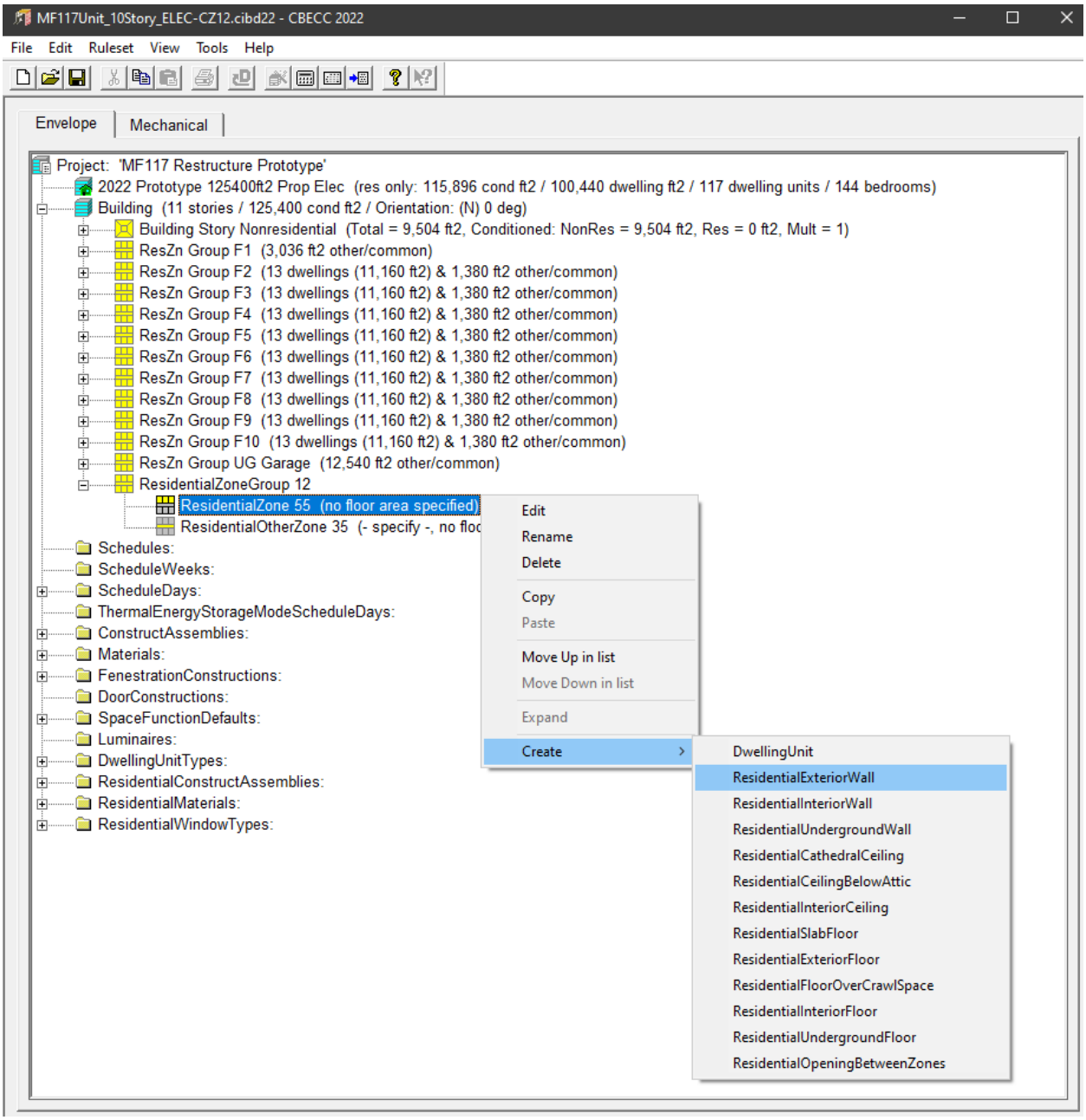
Assign the appropriate Dwelling Unit Type that you created earlier to the Dwelling Unit and Click **OK.**



Fill in all the required inputs and Click **OK.**

Creating a Residential Geometry Surfaces (child objects) for Residential Zone and Residential Other Zone.

On the **Envelope** Tab, right-click on the **ResidentialZone or ResidentialOtherZone** Object that you created and select **Create** and it will display all the child surface objects that you can create and assign to the Residential Zone or Residential Other Zone Object.



Select the required child object and follow the dialog on the screen to complete the inputs and assignments for the various child objects to add them to the Zone objects.

THE CBECC USER INTERFACE

Once the building geometry is input, the model information is presented in the CBECC user interface. The data is organized in a tree structure that is defined by the Standards Data Dictionary (SDD) data model.

The highest level of the tree is the *Project*. The next level (the "child" of the *Project*) is the *Building and/or ResidentialProject*. Beneath the *Building* level are two main categories of data: Envelope and Mechanical.

The Envelope data encompasses the geometry of the building, the properties of the building's construction materials, the spaces in the building, and the thermal gains within each space.

The Mechanical data encompasses all of the air and water systems in the building, which zones they serve and how they operate.

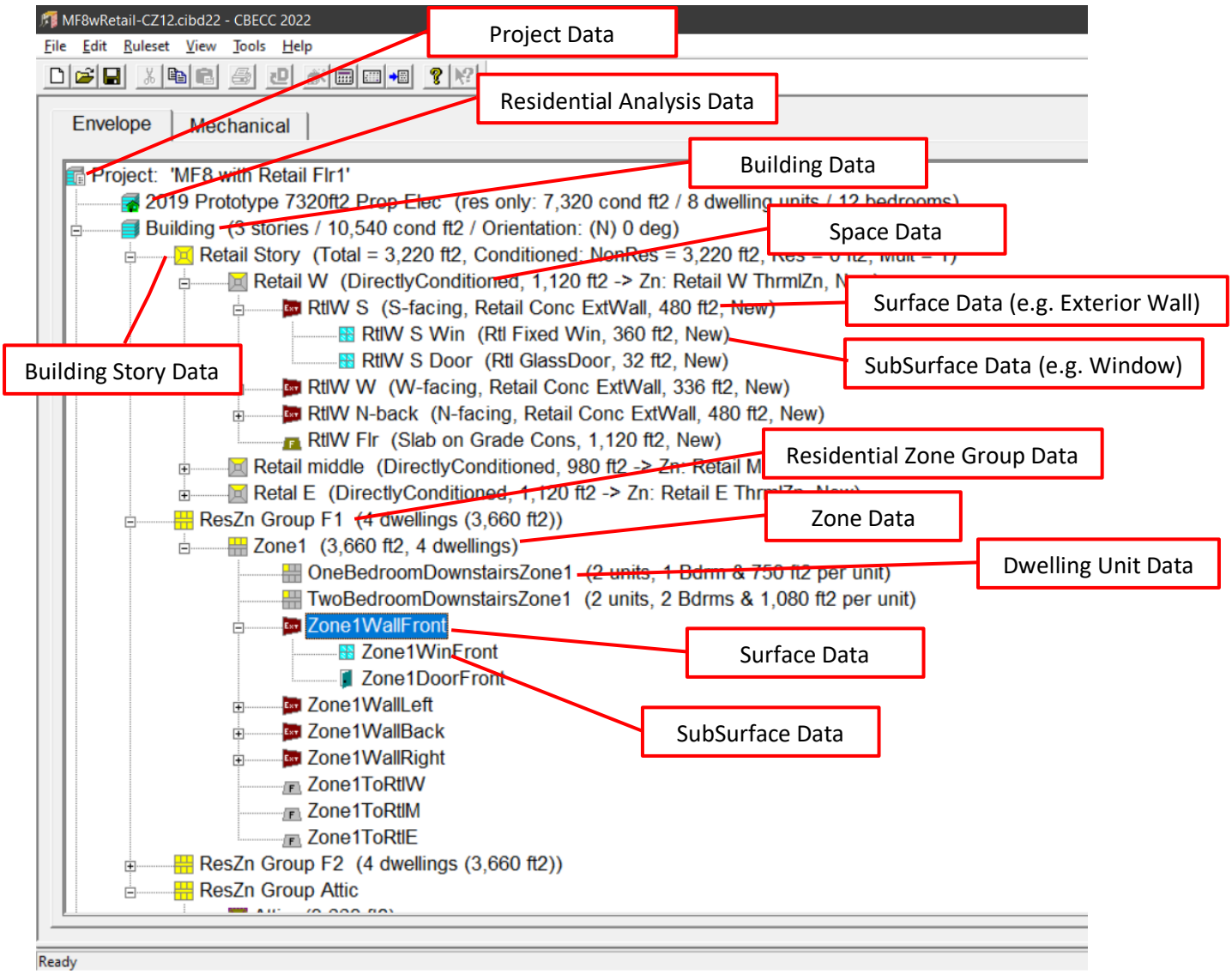
The Envelope and Mechanical data are input on two separate tabs in the user interface. A detailed summary of the model hierarchy on each tab is presented below. Each item on the model tree is an editable object. A user can edit an object's properties (in an input screen) by double clicking it with the mouse, or right-clicking **Edit** on the main menu. Additionally, a user can create child objects by right-clicking the parent and selecting **Create,** and then clicking the desired child object.

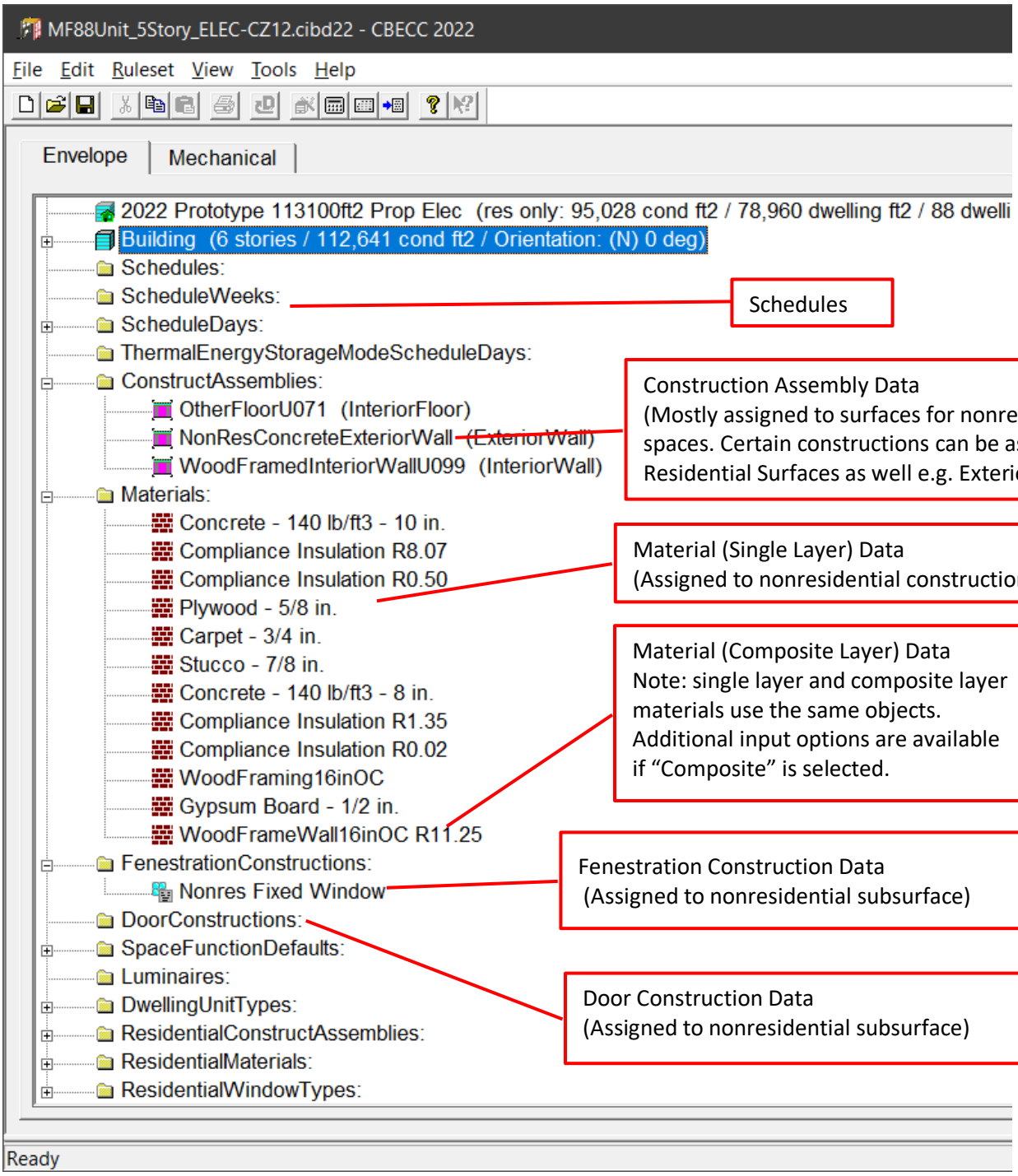
Tip: Input Units

The input screens show the units for numerical inputs. For example, boiler efficiency is input as a decimal like 0.8, not as a percent (%) like 80.

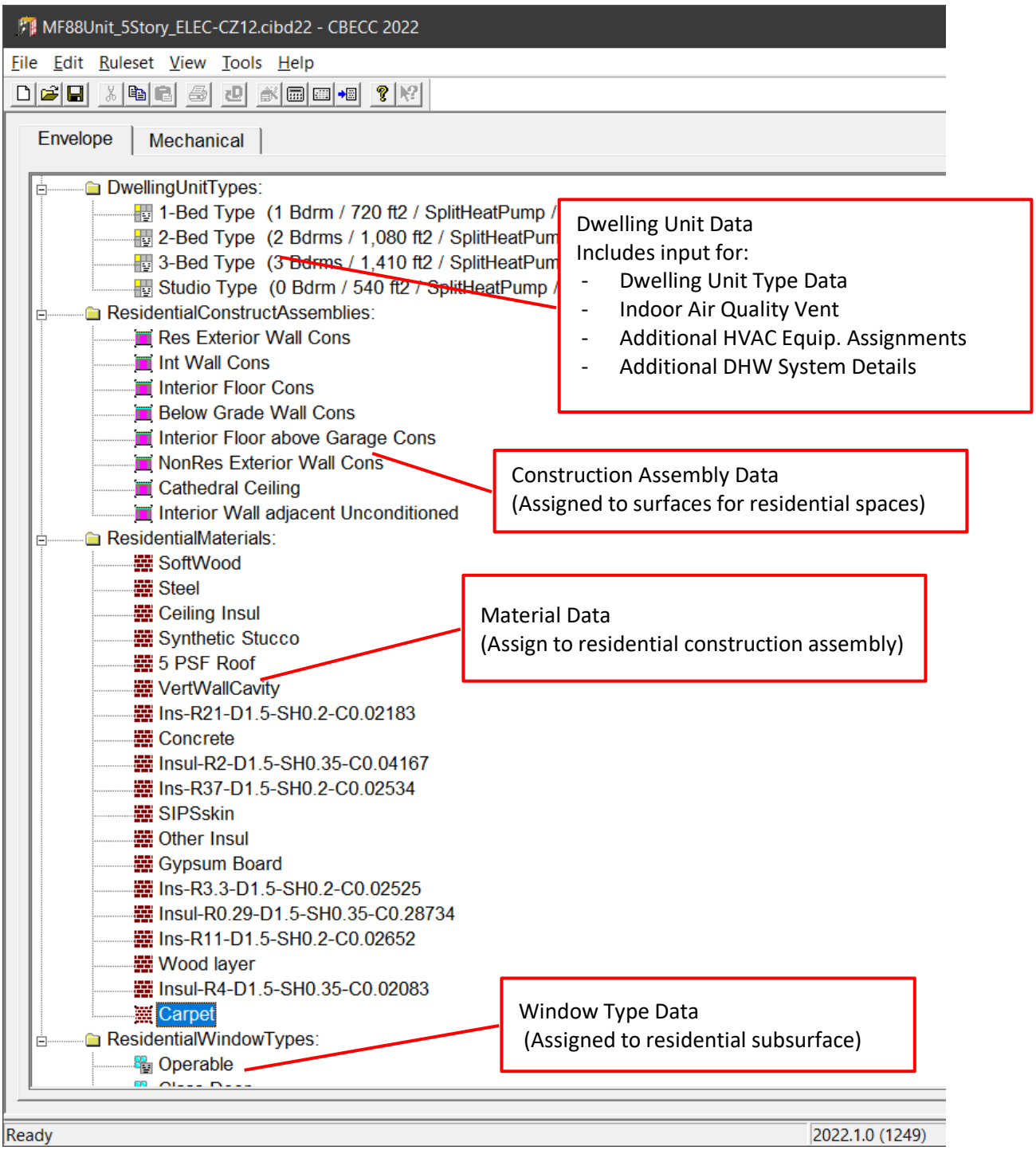
For a detailed description of the software menus and toolbar, please refer to the CBECC Quick Start Guide that can be accessed on the **Help** menu by clicking **Quick Start Guide**.

Organization of the Envelope Tab

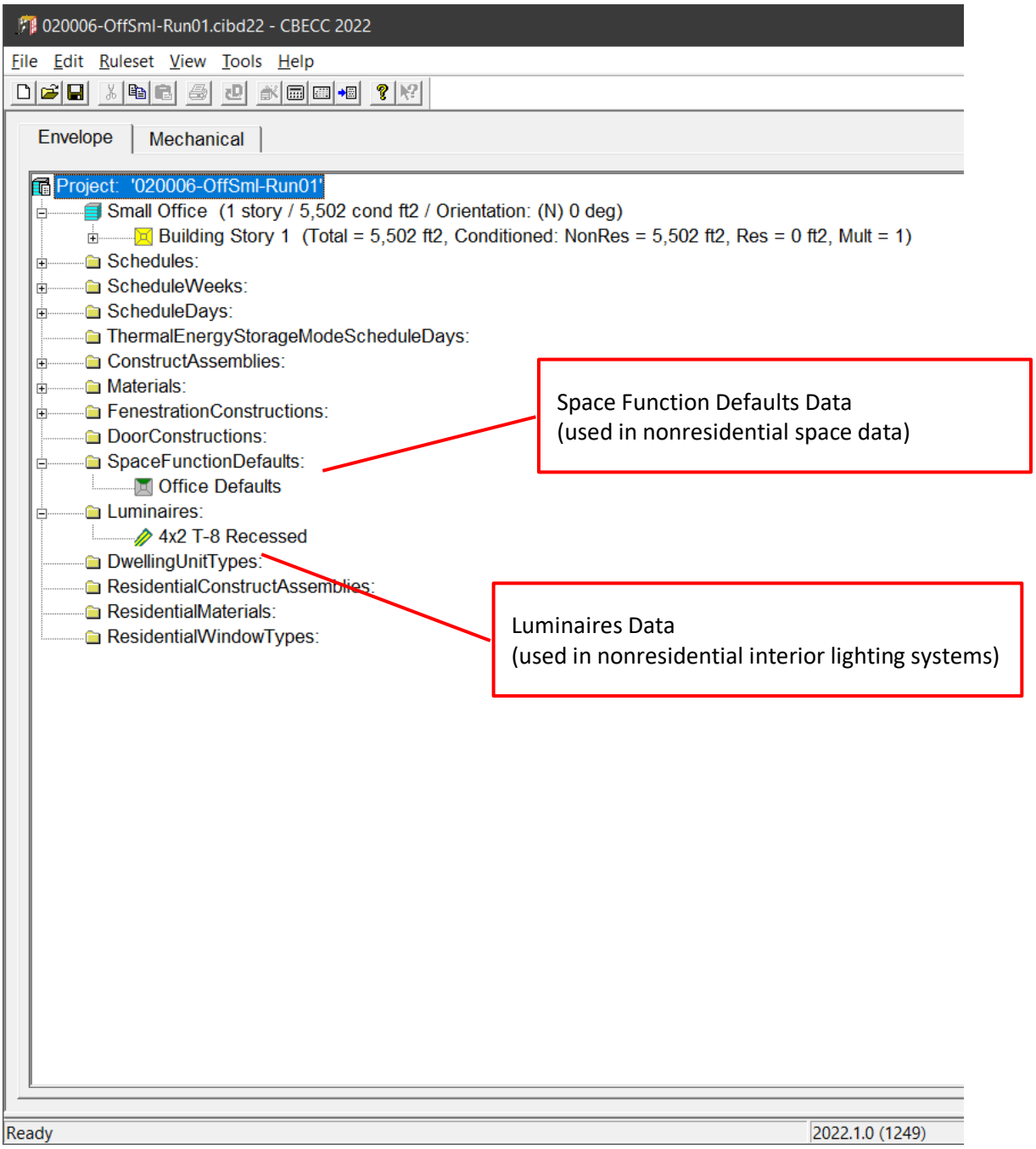



MF88Unit_5Story_ELEC-CZ12.cibd22 - CBECC 2022
File Edit Ruleset View Tools Help
Envelope
Mechanical
2022 Prototype 113100ft2 Prop Elec (res only: 95,028 cond ft2 / 78,960 dwelling ft2 / 88 dwelli
Building (6 stories / 112,641 cond ft2 / Orientation: (N) 0 deg)
Schedules:
ScheduleWeeks:
ScheduleDays:
ThermalEnergyStorageModeScheduleDays:
ConstructAssemblies:
OtherFloorU071 (InteriorFloor)
NonResConcreteExteriorWall (ExteriorWall)
WoodFramedInteriorWallU099 (InteriorWall)
Materials:
Concrete - 140 lb/ft3 - 10 in.
Compliance Insulation R8.07
Compliance Insulation R0.50
Plywood - 5/8 in.
Carpet - 3/4 in.
Stucco - 7/8 in.
Concrete - 140 lb/ft3 - 8 in.
Compliance Insulation R1.35
Compliance Insulation R0.02
WoodFraming16inOC
Gypsum Board - 1/2 in.
WoodFrameWall16inOC R11.25
FenestrationConstructions:
Nonres Fixed Window
DoorConstructions:
SpaceFunctionDefaults:
Luminaires:
DwellingUnitTypes:
ResidentialConstructAssemblies:
ResidentialMaterials:
ResidentialWindowTypes:
Ready
Schedules
Construction Assembly Data
(Mostly assigned to surfaces for nonresidential spaces. Certain constructions can be assigned to Residential Surfaces as well e.g. Exterior wall
Material (Single Layer) Data
(Assigned to nonresidential construction assembly)
Material (Composite Layer) Data
Note: single layer and composite layer materials use the same objects.
Additional input options are available if “Composite” is selected.
Fenestration Construction Data
(Assigned to nonresidential subsurface)
Door Construction Data
(Assigned to nonresidential subsurface)

Organization of the Envelope Tab (continued)



Organization of the Envelope Tab (continued)

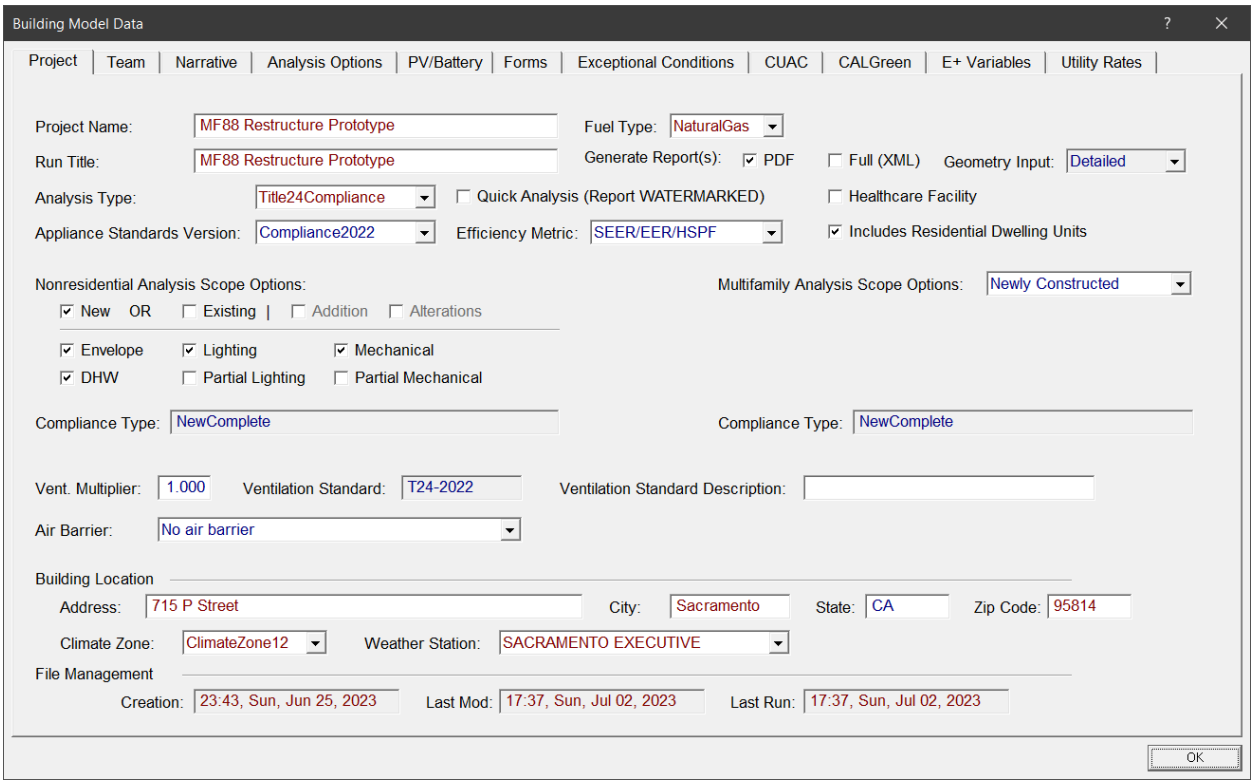


Envelope Input Screen Details

The Envelope Input Screen contains multiple tabs: Project, Team 1, Team 2, Narrative, Analysis Options, PV/Battery, Form 1, Form 2, Form 3, Form 4, HERS, CALGreen, Exceptional Conditions, E+ Variables and Utility Rates. See each screen and its input information below.

Project Data Screen (Project Tab)

To access this screen, in the **Envelope** tab double click the Project name (Project Data icon). The **Project** data tab (the first tab in Project Data) appears.



Input summary for the Project data screen:

- **Project Name**: Name used for the project, if one is applicable.
- **Run Title**: Enter the title that appears on reports to identify this analysis (input is optional).
- **Gas Type**: Selection of fuel used on site. Options include Natural Gas, Propane or None. Select 'None' for all electric buildings (Note: this does not affect the standard design).
- **Generate Report(s)**: Check PDF or Full (XML) (for Title24Compliance only)
- **Appliance Standards Version**: Identifies which appliance efficiency requirements for cooling heating equipment apply to this project.
- **Efficiency Metric**: Default efficiency rating metric input for HVAC systems in the project.
- **Analysis Type:** Type of analysis to be performed. Options are Title24Compliance and Title24ProposedOnly
- **Geometry Input:** Whether building geometry inputs are in 3D (detailed) or are area/azimuths (simplified).
- **Quick Analysis**: Check to enable the Quick Analysis feature. This feature decreases the amount of time required to run a compliance simulation in CBECC by using a method

identified by the Pacific Northwest National Laboratory (PNNL) to simulate 4 weeks of hourly weather data (one week in each season) instead of 52 weeks. (Find the PNNL paper at: https://www.ashrae.org/File%20Library/docLib/Events/ASHRAE-IPBSA-USA/Presentations/05_Athalye.pdf). Quick Analysis uses the 13th, 26th, 39th, and 52nd weeks in a weather file because that set of weeks was found to minimize the differences between annual and Quick Analysis LSC energy results. The results from Quick Analysis may vary from the full annual simulation, so Quick Analysis cannot be used for your final compliance analysis and permitting.

- **Healthcare Facility.** A flag that indicates that the entire project meets the definition of the definition of a 'Healthcare Facility' per Title 24 Part 6, and therefore is eligible for many exceptions in the code.
- **Includes Residential Dwelling Units &/or Common Areas:** Check this box if the project is a multifamily or mixed-use project which has dwelling units defined. Checking this will automatically default the compliance type to NewComplete for the residential portion of the project and create the Residential Project object in the Envelope Tab.
- **Multifamily Analysis Scope Options**: The scope of analysis is specified through use of a dropdown. Options include: Newly Constructed, New – Addition Alone, Addition and/or Alteration
- **Nonresidential Analysis Scope Options**: The scope of analysis is specified through use of a series of checkboxes. Use of these checkboxes results in specification of Compliance Type.

    - **New and Existing.** One (and only one) of these two boxes must always be selected. In the CBECC UI, checking or unchecking either of these options results in the other option automatically being set the opposite way.
    - **New** should be selected when the project involves construction on a site where there is not an existing building or where the subscope (described below) has not been previously constructed. For example, if a new building has been built with tenant spaces that did not have lighting or mechanical systems, a subsequent analysis addressing the lighting or mechanical systems for those tenant spaces is still New, even though the building shell is existing. On the other hand, if that same tenant space is remodeled later, analysis of that project would use Existing.
    - **Existing** should be selected when the project is an addition to an existing building or when an existing building is being altered, or both.
    - **Addition and Alteration**. When Existing has been selected, the Addition and Alteration checkboxes must be used. At least one of these must be selected, and both may be selected. An Addition means that new conditioned floor area is being added to the building, and the construction related to that new floor area is treated in the same way as new construction. Alteration means that portions of the existing building are being changed in ways that affect the energy performance, but without adding new conditioned floor area. When alterations are analyzed, determining the characteristics of the baseline follows different rules than new construction.
    - When an Existing building is described in CBECC, careful attention must be paid to properly specifying the Status of all components to be New, Existing, Altered, or Future, in order to achieve a valid analysis.
    - **Envelope, Lighting, Mechanical, DHW.** These checkboxes allow analysis of partial compliance options. These options are used when only the specified aspects of the building are included in the building permit and energy performance analysis.

- **Partial Lighting, Partial Mechanical.** These checkboxes allow analysis of core and shell projects, where a portion of the lighting or mechanical systems in the building are included in the building permit and energy performance analysis, but other portions have either already been built or will be built in the future.

  Note that if some combinations of Existing, Addition and Alteration are selected, then Envelope, Lighting, Mechanical, Partial Lighting, and Partial Mechanical may be automatically checked or unchecked and the user may not be able to change those selections. In this case, the Status of individual components in the model will determine how the analysis will proceed.

- **Envelope.** For all models, the building envelope, including opaque surfaces and fenestration must be described in the user's input model, which will provide the basis of the proposed model. When Envelope is not checked, it is assumed that the envelope is existing and the envelope in the baseline model will match the proposed model. If the project includes any new or altered envelope components, then Envelope must be checked and the status of envelope components will determine how the baseline model is specified.
- **Lighting and Partial Lighting.** If the project includes any new or altered lighting systems, then Lighting or Partial Lighting must checked. The status of the lighting in each space will be used to determine the characteristics of the lighting in the baseline.
- **For a New project**, if lighting will be designed and permitted are some point in the future, Lighting must be left unchecked. The Status of lighting in all spaces will default to Future. In both the proposed and baseline models, lighting will be specified by the rules and will normally be identical. If the lighting in all spaces has been designed and is being permitted, then Lighting should be checked. If the lighting for some spaces is designed and included in the permit, but the lighting for other portions of the building will be designed and permitted in the future, such as for a core and shell project, then Partial Lighting should be checked.
- **For an Existing project**, if Lighting is unchecked, then the Status of the lighting in each space may be set to either Existing or Future. If the Status of the lighting in a space is set to Existing, that same lighting will be used in the baseline. If the Status is set to Future, then the rules will determine the lighting for both the proposed and baseline (same as for New without lighting).
- If the Status of the lighting in any space will New or Altered, then either **Lighting or Partial Lighting** (but not both) must be checked. In this case, the baseline lighting will be different from the lighting in the proposed model. If a project is New or an Addition where the Status of the lighting in some spaces is Future along with other spaces with the Status of the lighting being New or Altered, then Partial Lighting should be checked. If all spaces have the Status of lighting set to New, Altered or Existing, then Lighting should be checked.
- **Mechanical and Partial Mechanical**. If the project includes any new mechanical system components, then Mechanical or Partial Mechanical must checked. The status of the systems serving each thermal zone will be used to determine the characteristics of the baseline HVAC systems.
- **For a New project**, if the HVAC systems will be designed and permitted are some point in the future, Mechanical and Partial Mechanical must be left unchecked. The HVAC

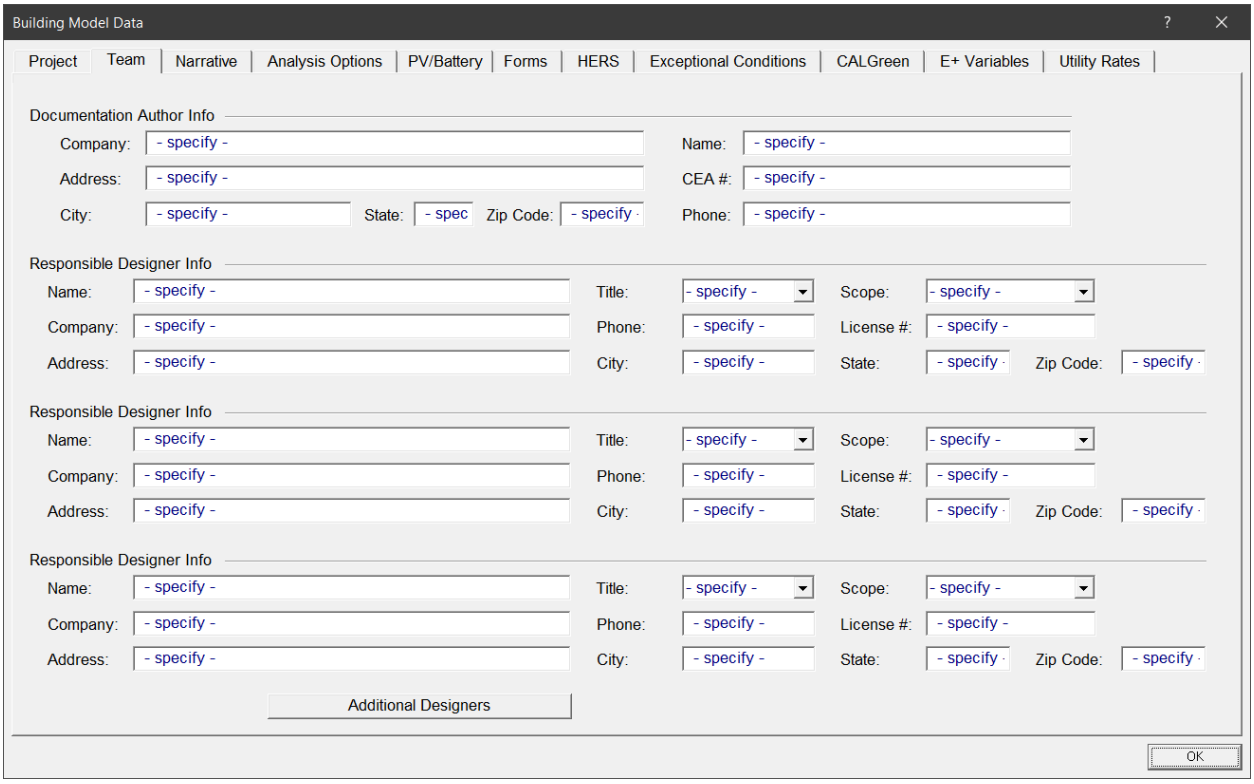
systems in both the proposed and baseline models, will be specified by the rules and will normally be of the same type, with system capacities determined by sizing runs.
    - If the HVAC systems for the entire building have been designed and are being permitted, then Mechanical should be checked. If the systems serving some thermal zones are designed and included in the permit, but for other portions of the building will be designed and permitted in the future, such as for a core and shell project, then Partial Mechanical should be checked.
    - **For an Existing project**, if Mechanical is unchecked, then the Status of the systems may be set to Existing or at the Thermal Zone, "HVAC is unknown" should be checked. This checkbox is used for either existing systems where the details are unknown or for systems that will be designed in the future. In either case, the rules will determine the system configuration for both the proposed and baseline models with sizing determined by sizing runs.
    - **DHW.** DHW may be checked or unchecked regardless of other analysis scope options. If it is included, then DHW systems must be specified, and all spaces assigned to a residential DHW system or a fluid system of type service hot water. If DHW is not checked, the rules will create systems for both the proposed and baseline models.
- **Vent. Multiplier**. A multiplier applied to ventilation inputs to uniformly increase ventilation rates for the project. Used to default the specification for Spaces. Does not apply to zones/spaces specified with VentilationStandard = 'Other'.
- **Ventilation Standard.** This is used to assign the default ventilation specification for all thermal zones in the project. (Non-standard ventilation can be specified for individual zones that have special requirements.)
- **Ventilation Standard Description.** A short description of the 'Other' Ventilation Standard used for the project. This input is used to default all of the Ventilation Standard descriptions defined in the ThermalZones.
- **Air Barrier:** Select the Air Barrier option for the project. This sets the infiltration rate for the nonresidential spaces based on the air barrier option that is used on the project. This selection defaults the values for all Building Storys.

Building Location section
- **St. Address:** Street address where the project is located.
- **City**: City where the project is located.
- **State:** State where the project is located.
- **Zip Code**: ZIP code where the project is located. Location and Weather File date defaulted based on this value.
- **Climate Zone**: California climate zone (CTZ 1–16).
- **Weather Station:** California weather station.

File Management section
- **Creation**: The time and date of creation of the project file.
- **Last Mod**: The time and date of the last revision of the project file.
- **Last Run**: The time and date of the last analysis run of the project file.

Project Data Screen (Team Tab)

To access this screen, in the **Envelope** tab double click on the Project name (Project Data icon) and then click the **Team 1 or Team 2** tab.



Input summary for the **Team** tab:

Documentation Author Info section

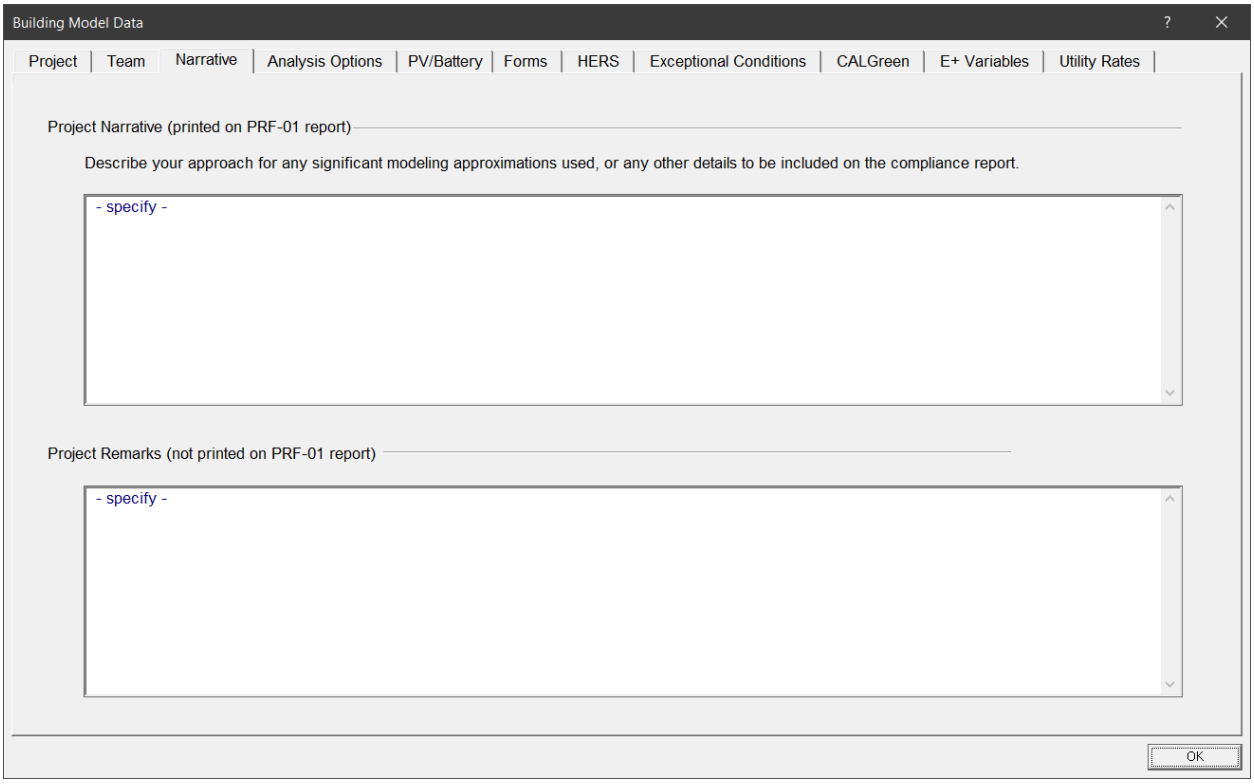
- **Company**: Documentation Author's company.
- **Name**: Documentation Author's primary contact name.
- **Address**: Documentation Author's primary address.
- **City**: Documentation Author's city.
- **State**: Documentation Author's state
- **Zip Code**: Documentation Author's ZIP code.
- **Phone**: Documentation Author's primary contact phone.

Responsible Designer Info section (input is optional)

- **Name**: Responsible designer's primary contact name.
- **Title:** Select the Responsible designer's title.
- **Scope:** Select the scope of work the responsible designer is responsible for.
- **Company**: Responsible designer's company.
- **Phone**: Responsible designer's primary contact phone.
- **License:** Responsible designer's license.
- **Address**: Responsible designer's primary address.
- **City:** Responsible designer's city.
- **State:** Responsible designer's state.
- **Zip Code:** Responsible designer's ZIP code.

Project Data Screen (Narrative Tab)

To access this screen, in the **Envelope** tab double click on the Project name (Project Data icon) and then click the **Narrative** tab.

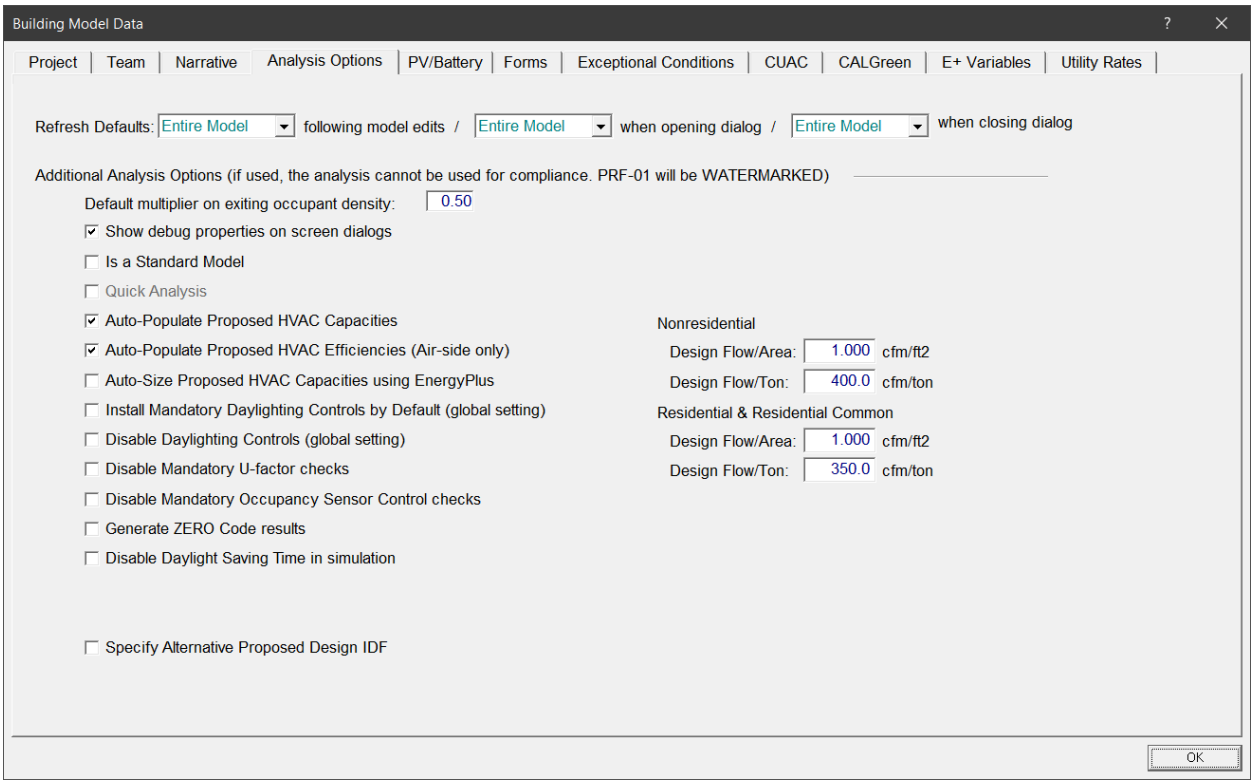


Input summary for the **Narrative** tab:

- **Project Narrative**: A description of any significant modeling approximations, or any other details to be reviewed by the building department.
- **Project Remarks**: Any notes that the documentation author wishes to save with the model for future reference. These will not be printed on the compliance report.

Project Data Screen (Analysis Options Tab)

To access this screen, in the **Envelope** tab double click on the Project name (Project Data icon) and then click the **Analysis Options** tab. This tab provides inputs for use in building analysis other than compliance.



Input summary for the **Analysis Options** tab:

- **Refresh Defaults:** What model defaults to refresh following each modification of model data. This is useful to prevent lag in inputting model data on large projects. A refresh button  is displayed at the bottom of the screen if these inputs are enabled. Users can press this to refresh defaults as required.

Additional Analysis Options section (if anything is checked in this section then the compliance report will be watermarked):

- **Default multiplier on exiting occupant density:** The expected fraction of the exiting density of people in a Space, based on Space Function, which will determine the design occupancy.
- **Show debug properties on screen dialogs:** Check box to enable display of additional debug properties on screen dialogs.
- **Quick Analysis:** Checkbox showing whether or not the model has Quick Analysis enabled
- **Auto-Populate Proposed HVAC Capacities** (check box): For any HVAC component where the user has not specified a capacity value, the rules will calculate capacities based on the design flow/area and design flow/ton values below. Valid compliance analysis cannot be completed with this option checked; it is intended for use with other analysis objectives.

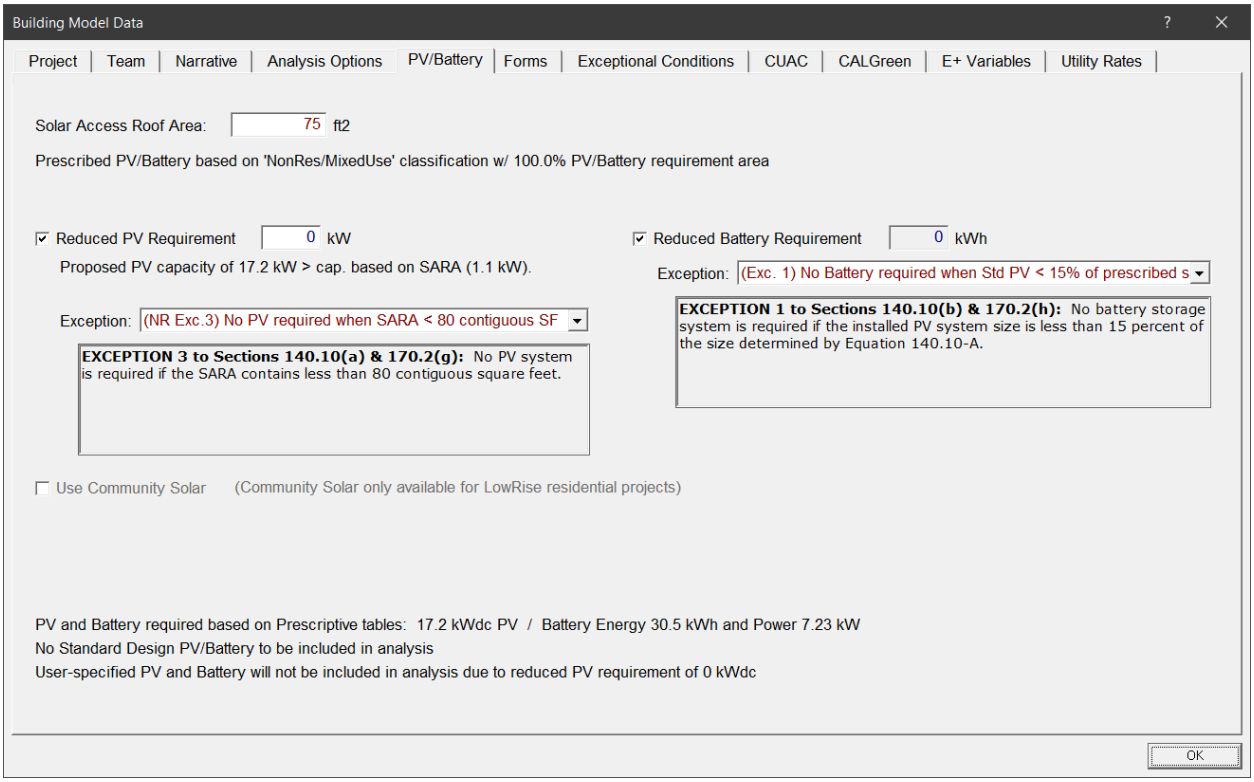
- **Auto-Populate Proposed HVAC Efficiencies (Air-side only)** (check box): For any HVAC component where the user has not specified an efficiency value, the rules will calculate an efficiency. Valid compliance analysis cannot be completed with this option checked; it is intended for use with other analysis objectives.
- **Design Flow/Area (cfm/ft2):** A ratio used to determine airflow capacity of HVAC components when **Auto-Populate Proposed HVAC Capacities** is checked.
- **Design Flow/Ton (cfm/ton):** A ratio used to determine cooling capacity of HVAC components when **Auto-Populate Proposed HVAC Capacities** is checked.

CBECC requires that user model HVAC equipment have all capacity and efficiency inputs entered. For analysis that is not intended for compliance, these inputs may not be known. These inputs allow the user to activate rules of thumb to provide required equipment capacities, and to tailor these inputs if desired. However, if the two boxes are checked, the run results cannot be used to show compliance with the energy code.

- **Install Mandatory Daylighting Controls by Default** (check box)**:** Select to indicate the use of DefaultDayltgCtrls.
- **Disable Daylighting Controls** (check box): Select to disable the daylighting controls.
- **Disable Mandatory U-factor checks** (check box): Select to disable the mandatory envelope U-factor checks.
- **Disable Mandatory Occupancy Sensor Controls checks** (check box): Select to disable the mandatory Occupant Sensor Controls checks.
- **Generate ZERO Code results** (check box): Select to generate ZERO Code results.
- **Specify Exceptional Design Simulation IDF:** When a building cannot be adequately modeled within CBECC, select a modified EnergyPlus IDF with all the capabilities available to EnergyPlus for CBECC to compare with the baseline.
- **Disable Daylight Saving Time in simulation** (check box): Select to disable the daylight savings time in simulation.

Project Data Screen (PV/Battery Options Tab)

To access this screen, in the **Envelope** tab double click on the Project name (Project Data icon) and then click the **PV/Battery** tab. This tab provides project level inputs, display of requirements and exceptions for Photovoltaics (PV) and battery systems if included in the building analysis for compliance.



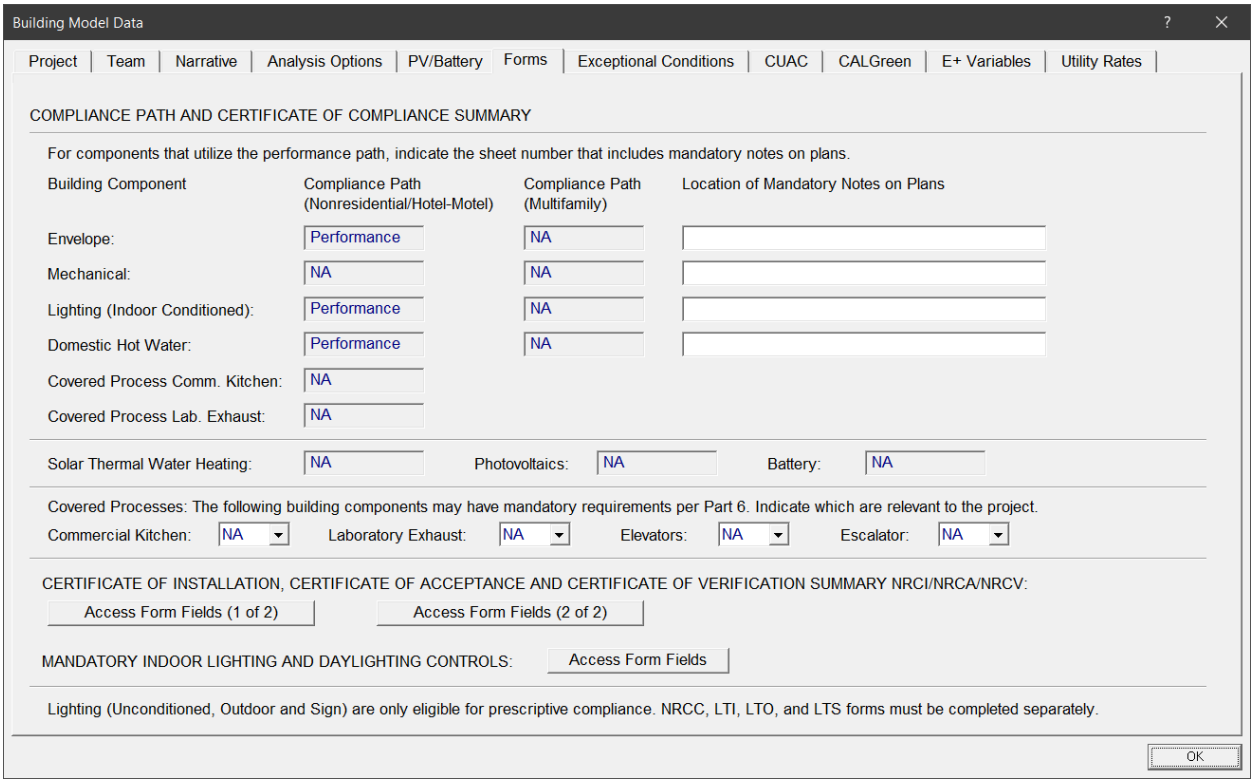
Input summary for the **PV/Battery** tab:

- **Solar Access Roof Area (SARA):** SARA includes the area of the building's roof space capable of structurally supporting a PV system, and the area of all roof space on covered parking areas, carports, and all other newly constructed structures on the site that are compatible with supporting a PV system per Title 24, Part 2, Section 1511.2. Excludes:
  A) Any area that has less than 70 percent annual solar access.
  B) Occupied roofs as specified by CBC Section 503.1.4.
  C) Roof space that is otherwise not available due to compliance with other building code requirements if confirmed by the Executive Director
- **Reduced PV Requirement:** Check this box to indicate whether or not the reduced PV exception list applies to the project.
- **Exception:** Select the appropriate exception to indicate why standard PV requirements to do apply to this project.
- **Reduced Battery Requirement:** Check this box to indicate whether or not the reduced Battery exception list applies to the project.
- **Exception:** Select the appropriate exception to indicate why standard battery requirements to do apply to this project.

- **Community Solar:** Checkbox to indicate whether or not building subscribes to a Community Solar project. This option is only available for low-rise residential projects.
- **This project is located within Community Solar Provider's territory:** Checkbox to indicate that the project is located within the applicable solar provider's territory.
- **SMUD Neighborhood SolarShares have been reserved for this project:** Checkbox to indicate that the SMUD Neighborhood SolarShares have been reserved for the project. Note that as of 11/13/2024 SMUD Neighborhood SolarShares is fully subscribed and not accepting new enrollments.
- **Display text:** Displays a summary of the PV and Battery requirements based on the prescriptive tables. Displays the Standard Design and user specified PV and Battery equipment that will be simulated for compliance analysis.

Project Data Screen (Forms Tab)

To access this screen, in the **Envelope** tab double click on the Project name (Project Data icon) and then click the **Forms** tab.



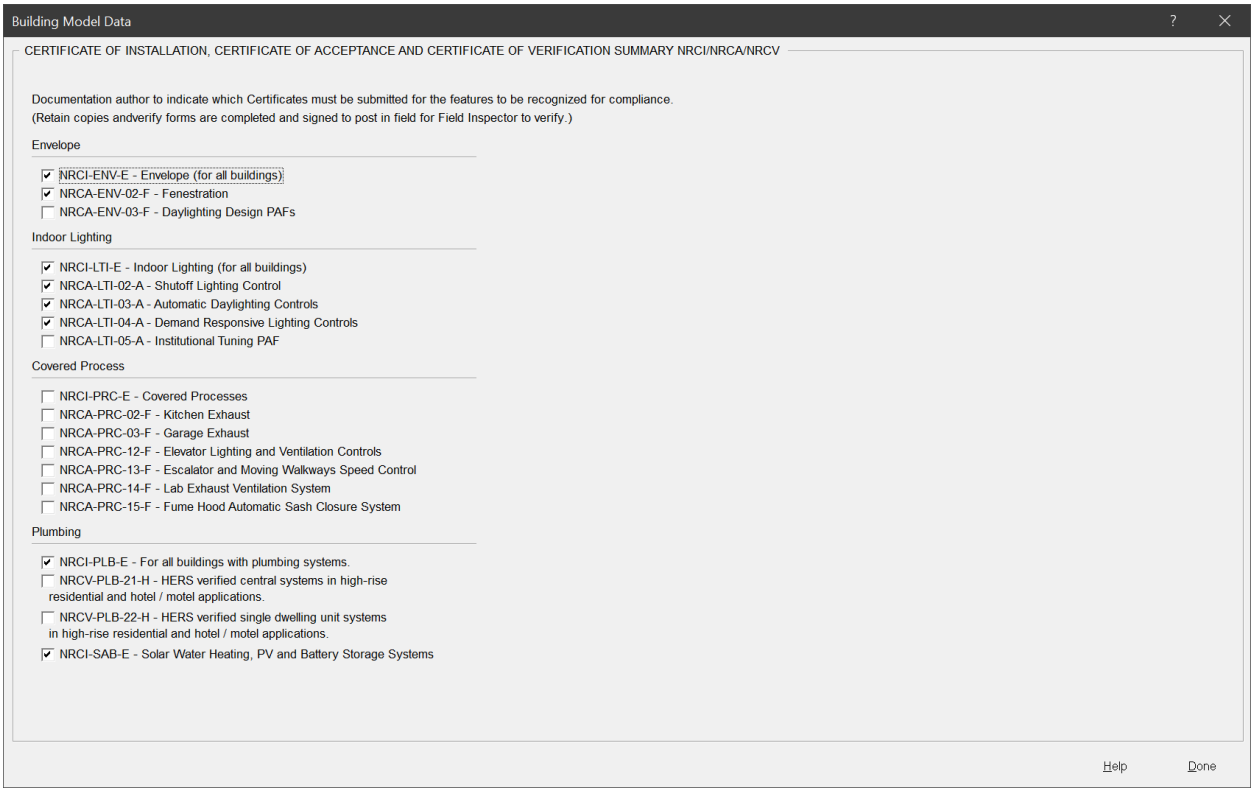
Input summary:

- **Compliance Path:** The choice of Performance or NA is defaulted by the program based on user inputs.
- **Location of Mandatory Notes on Plans:** Enter the location where the notes of the building component compliance path can be found.

The form allows a user to select whether certain building components have mandatory requirements. This is initially defaulted by the program based on the model components input by the user.

Click on individual “Access Form Fields” buttons to open the respective Form screens for reporting.

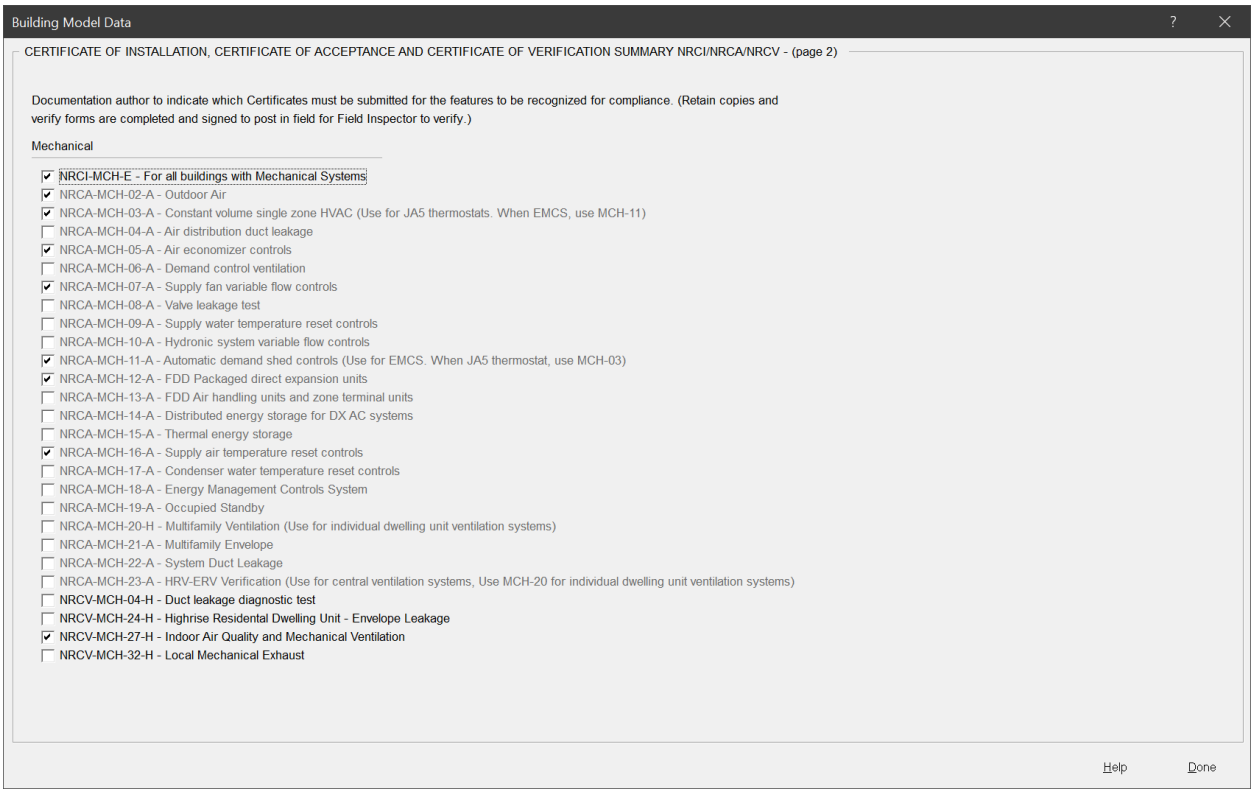
Project Data Screen (Form 1 Button)



Input summary:

- **Certificates of Installation/Acceptance/Verification:** Select the forms (certificate installation, certificate of acceptance and certificate of verification summary forms) that must be submitted for the features to be recognized for compliance. These are initially defaulted by the program based on the model components input by the user.

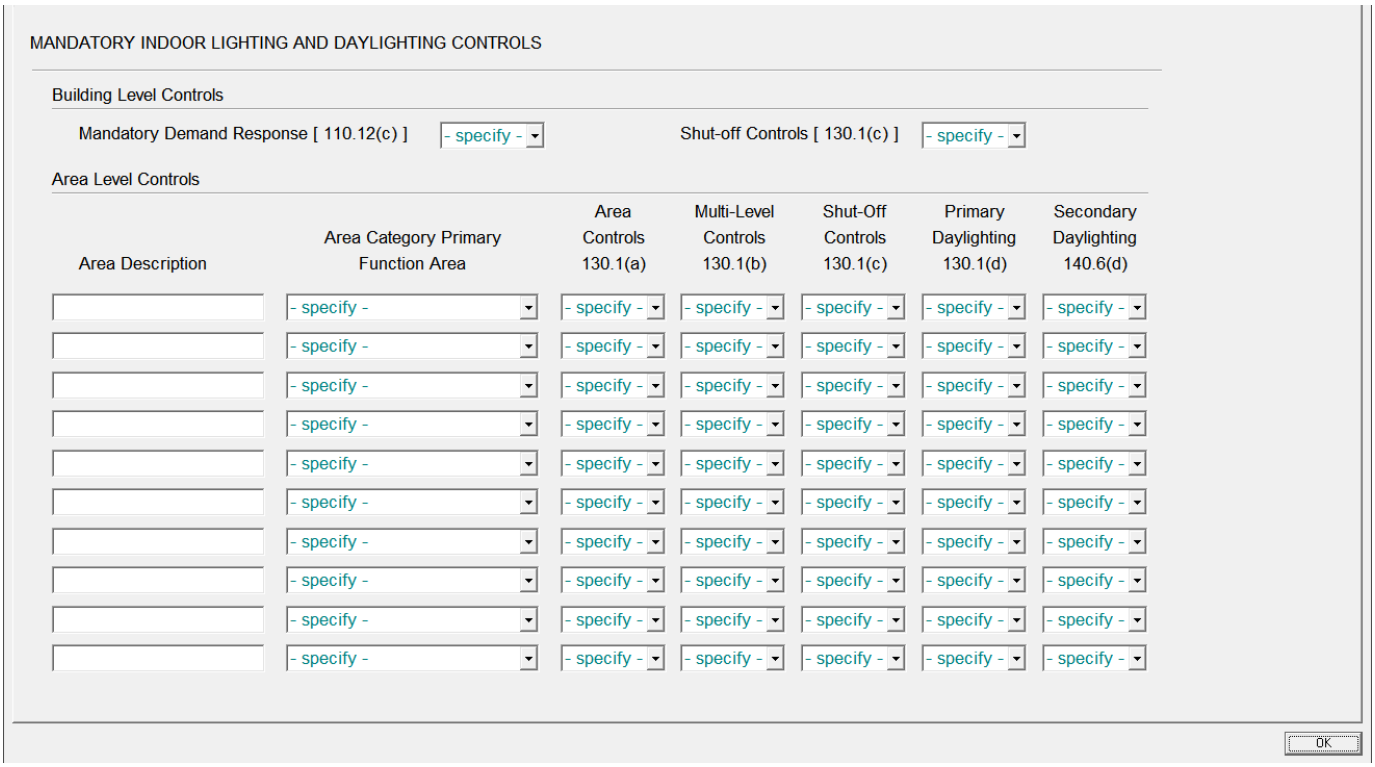
Project Data Screen (Form 2 Button)



Input summary:

- **Certificates of Installation/Acceptance/Verification:** Select the forms (certificate installation, certificate of acceptance and certificate of verification summary forms) that must be submitted for the features to be recognized for compliance. These are initially defaulted by the program based on the model components input by the user.

Project Data Screen (Form 3 Button)

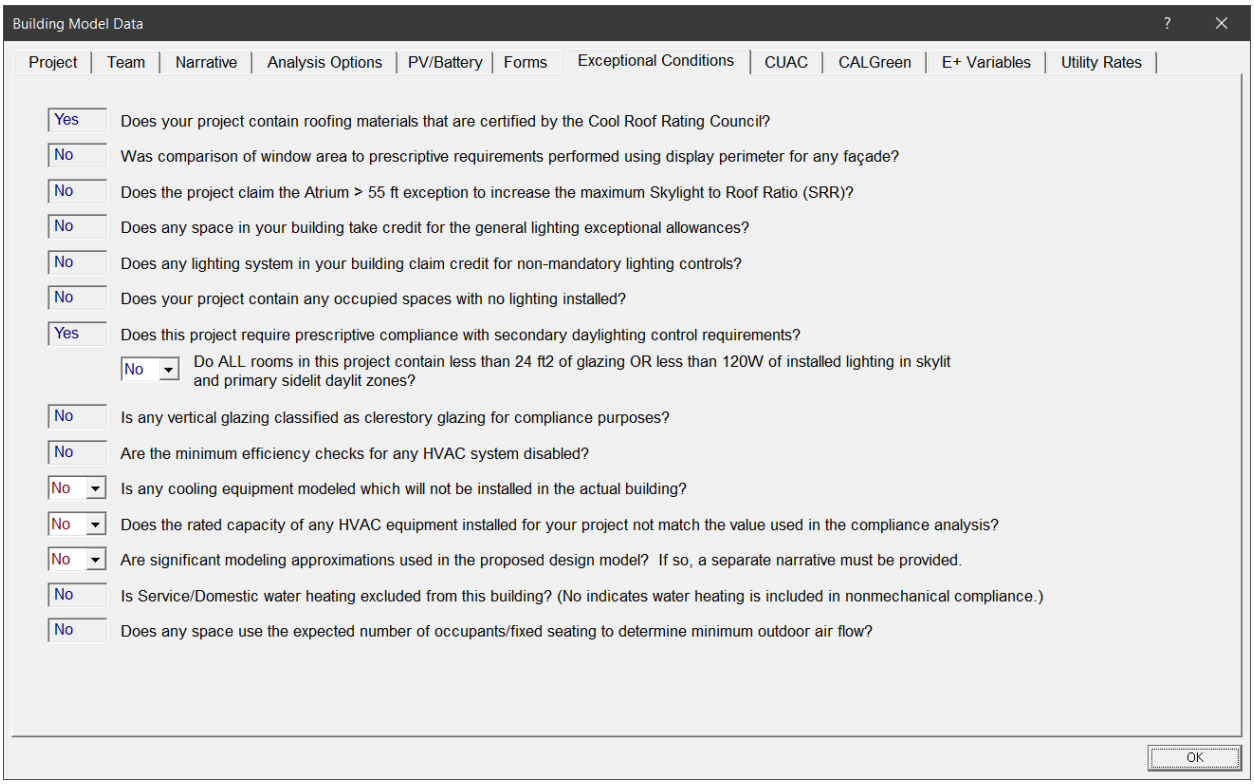


Input summary:

- **Mandatory Indoor Lighting and Daylighting Controls:** This allows the user to enter information specific to indoor and daylighting mandatory controls as included in the project.

Project Data Screen (Exceptional Conditions Tab)

To access this screen, in the **Envelope** tab double click on the Project name (Project Data icon) and then click the **Exceptional Conditions** tab.



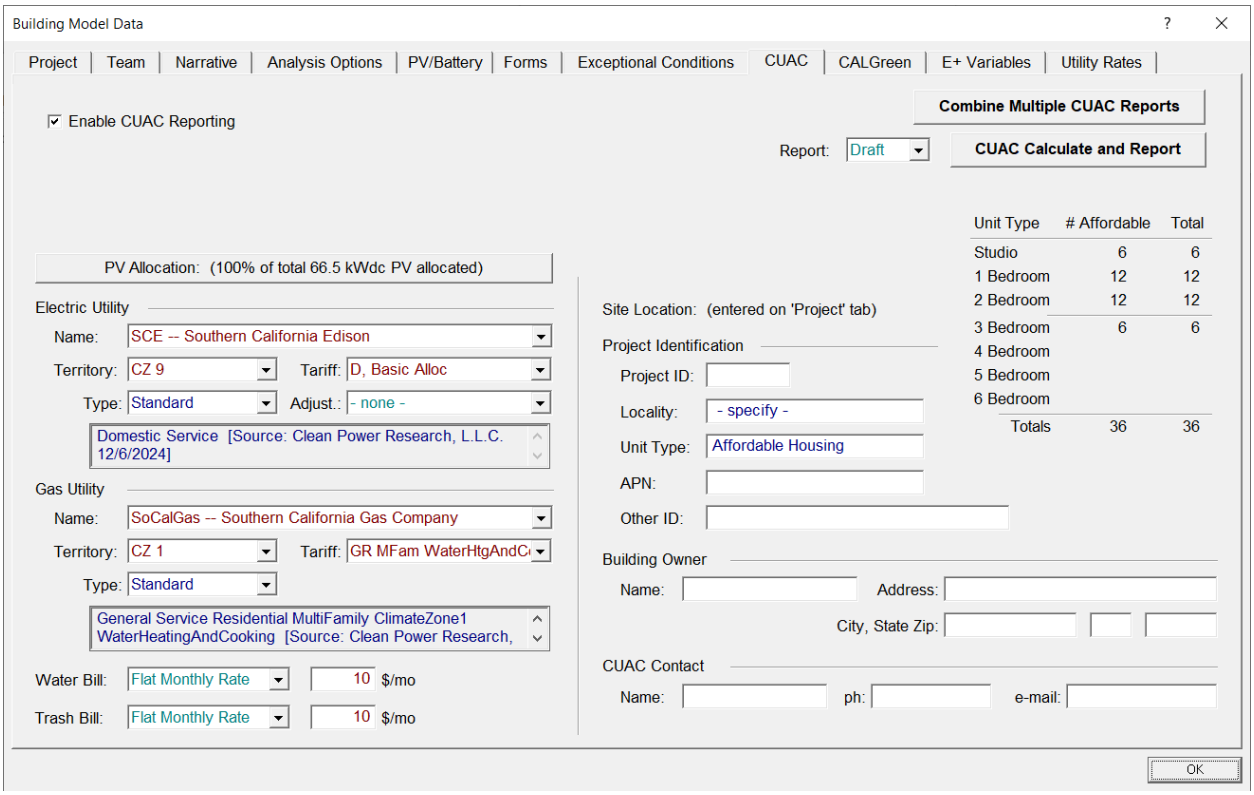
Input summary for the **Exceptional Conditions** tab:

All of the options on this screen must be either **Yes** or **No** as appropriate.

If any of the exceptional conditions apply to your project, select **Yes**. The compliance forms will include guidance for the code reviewer to check the exceptional conditions for compliance.

Project Data Screen (CUAC)

To access this screen, in the **Envelope** tab double click on the Project name (Project Data icon) and then click the **CUAC** tab.

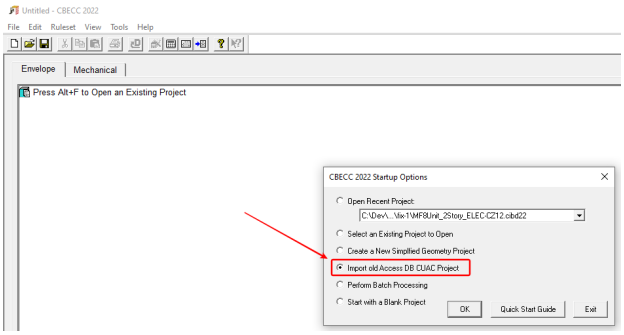


Using CUAC Module in CBECC

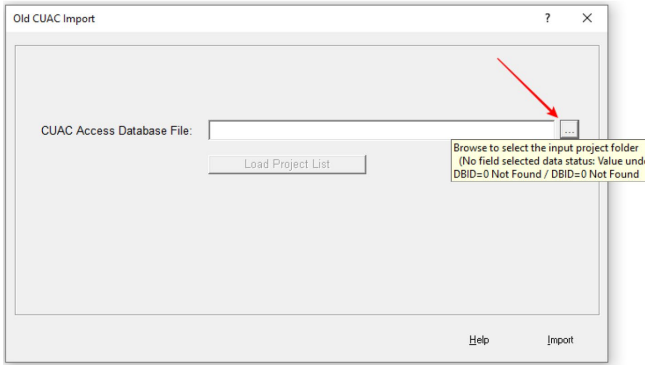
1. Convert MS Access database file

This feature enables users to import project from MS Access database into CBECC and produce new annual reports with the current tariffs in CBECC. Note that users cannot select time-of-use rates since such rates were unavailable in the MS Access tool. This feature is not intended to render a complete file that can be run or updated for compliance but limited to CUAC reporting purposes.

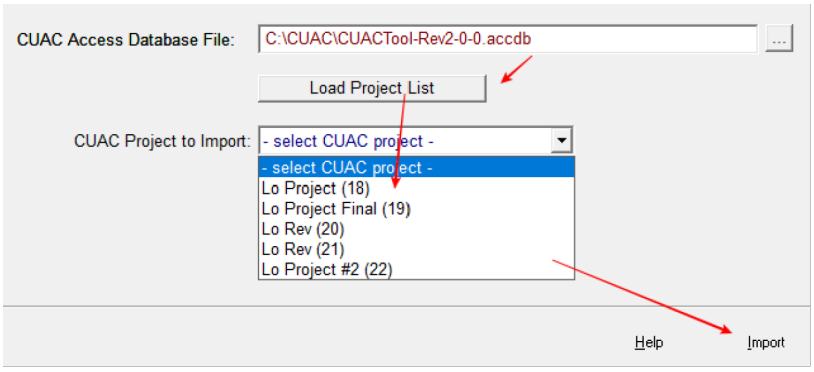
Upon launching CBECC, users are prompted with a startup menu with options. Select “Import old Access DB CUAC project” then “OK.”



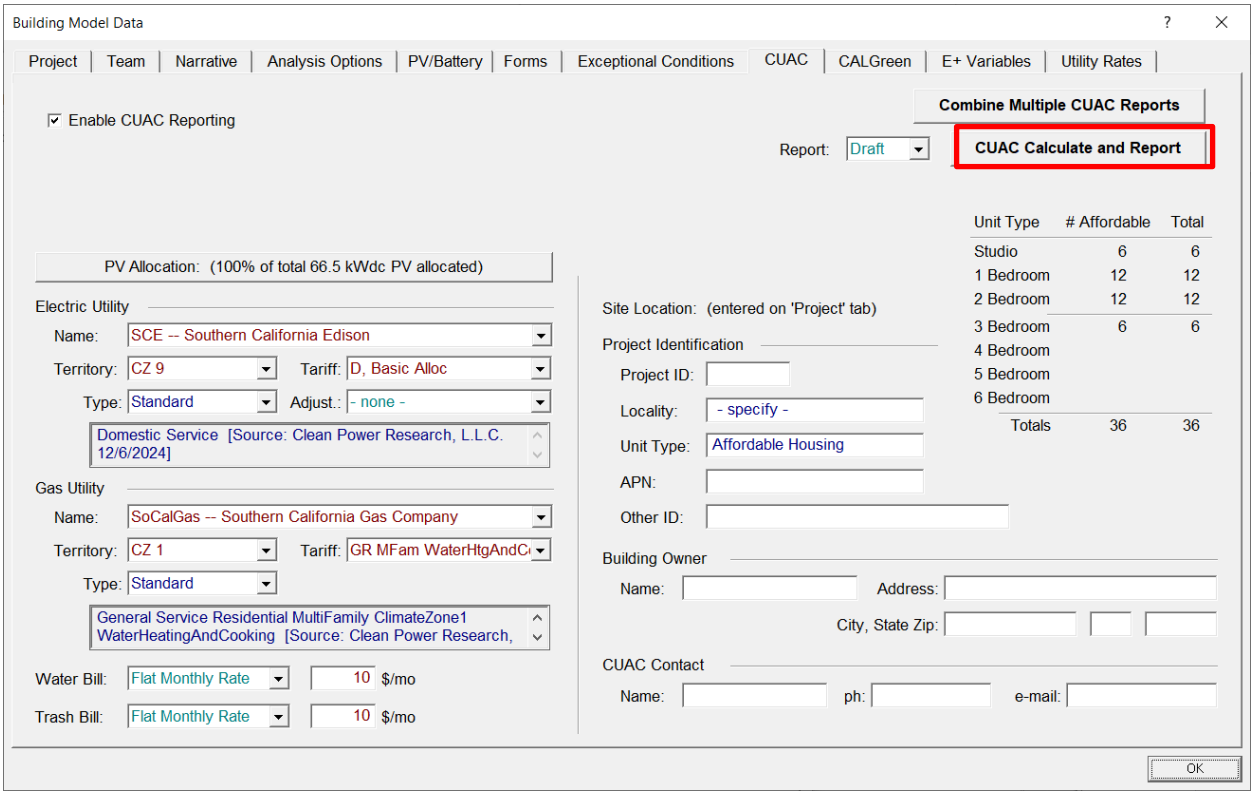
Users then will be prompted to locate the file with either .mdb or .accdb extensions.



Once the file is loaded, users can “Load Project List.” Select “CUAC Project to Import” from the drop-down menu and “Import.”

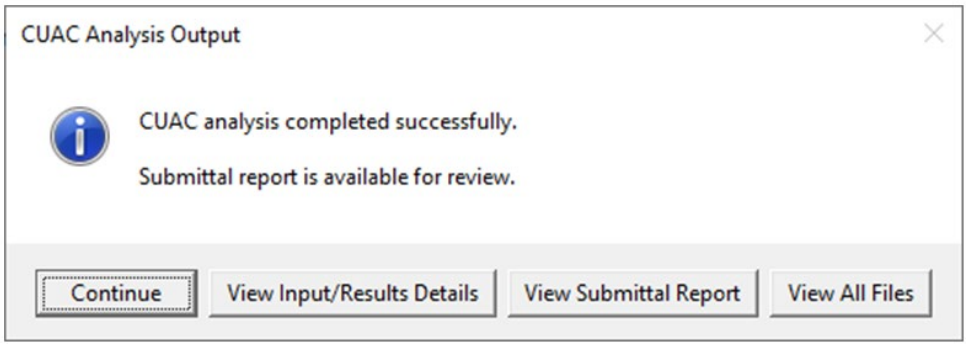


The project is now imported into CBECC and the CUAC window will pop up. Here users can select the appropriate utility rates and click “CUAC Calculate and Report” for the annual updated report.



Users have the option to modify all the inputs on screen to make sure that they match the information in the original Access database file.

Users will be prompted to store the file to a computer. Upon completion of the analysis, users will be prompted with four options. “Continue” or “View Input/Result Details” will provide a CSV file with details for utilities usages calculated hourly. “View Submittal Report” will open up the report type that is pre-chosen before the CUAC run. Finally, “View All Files” will provide all the detailed files of this run.



To rerun the file, users can choose to open the saved project file instead of importing the MS Access file.

Guidance for Combining CUACs for Complex Projects

Some affordable housing developments include both single-family and multifamily units, with multiple unit types and energy models. The CUAC Combination Tool can handle this complexity, using a weighted average calculation method to combine different models effectively.

To combine CUACs from single-family and multifamily models:

1. Prepare the CSV Files: Ensure all CSV files meet the requirements mentioned above: same utility rates, consistent weather file, and generated using the latest CBECC/CBECC-Res version. CSV files created using previous versions of CBECC may generate errors and should not be used.
2. Assign Proper Unit Types: Make sure each unit type (Studio, 1-bedroom, 2-bedroom, etc.) is clearly defined, and that energy models are correctly designated in the CSV files. For mixed-market projects, ensure that the affordable units are properly marked to facilitate the weighted averaging.
3. Run the Combination: Use the CUAC Combination Tool as described in the previous steps. The tool will calculate weighted averages on the backend, ensuring accurate representation of utility allowances and energy use across different unit types.

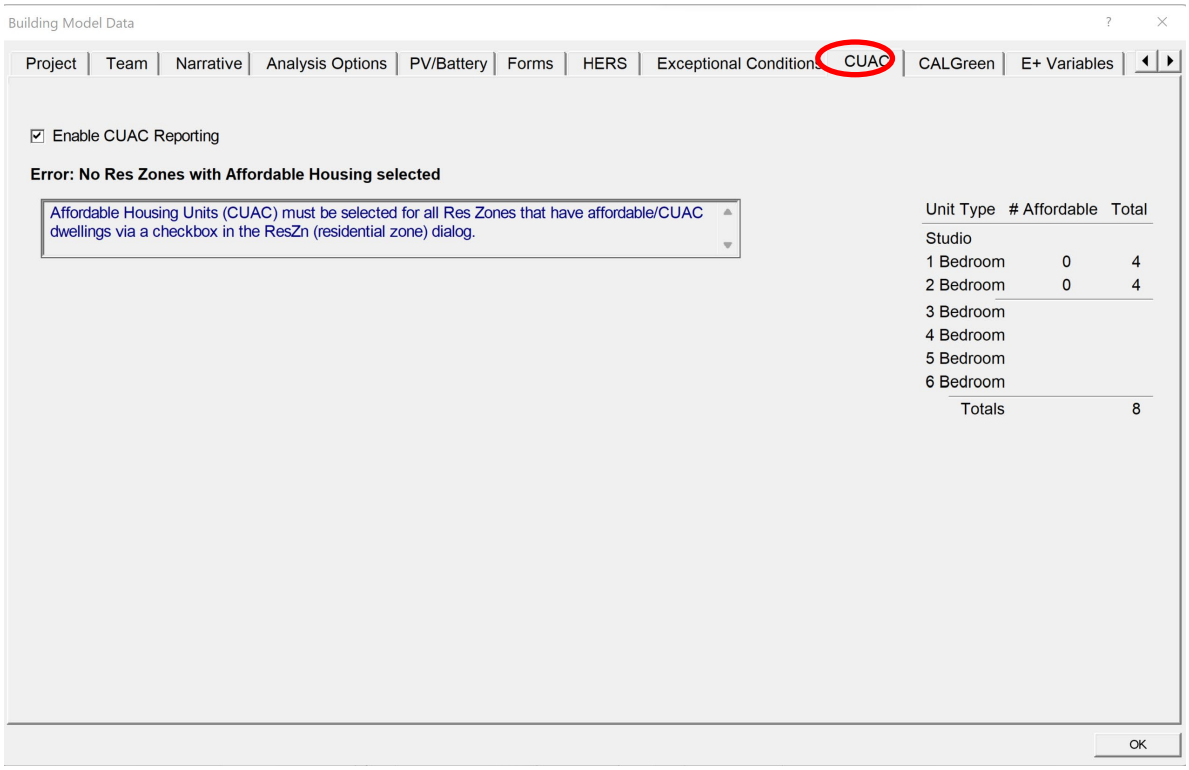
Guidance for Projects with Weather File Mismatch

CBECC-Res utilizes 16 different weather files, one for each climate zone, but CBECC utilizes 96 weather files, with multiple for various climate zones, to improve its precision. CUAC Projects utilizing the CUAC Combiner Tool will need to use the same weather file if possible or use the most accurate weather file available in the software for the relevant models. Projects should not utilize multiple models that are placed in different Climate Zones.

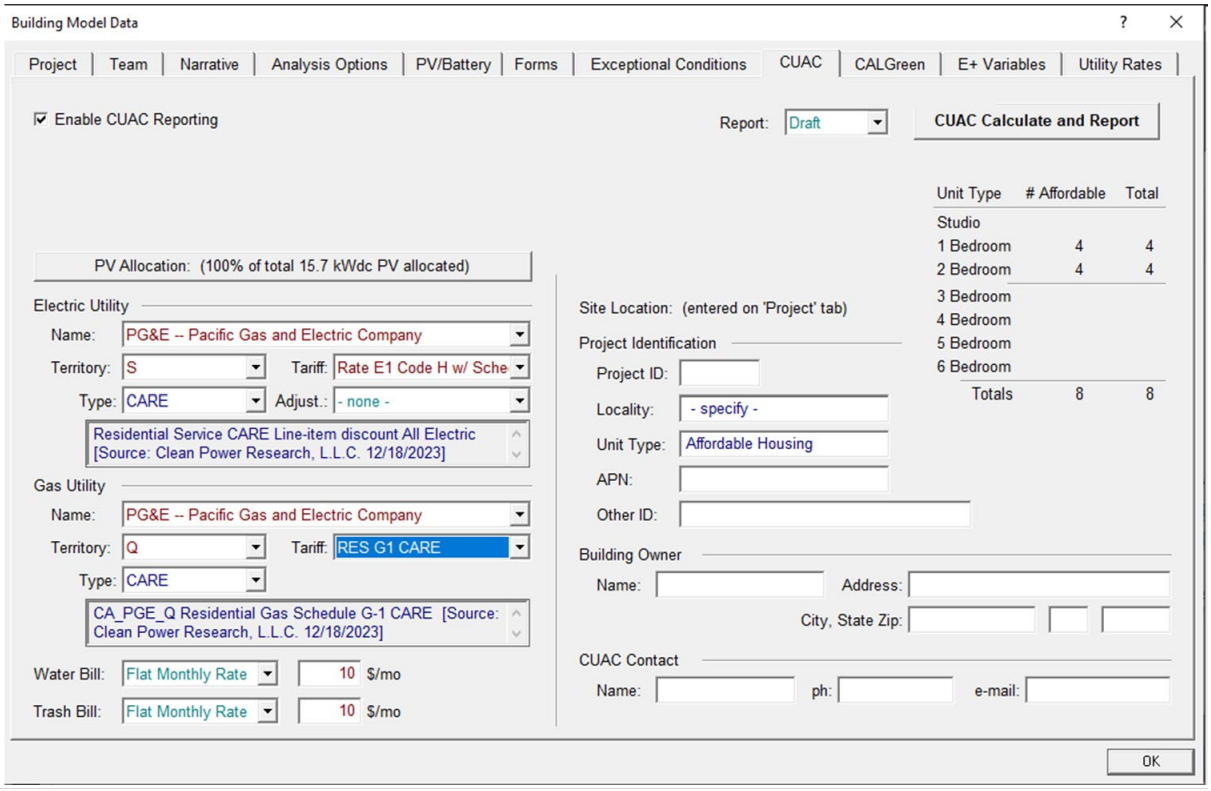
2. Activate CUAC in CBECC for a New Project

The CUAC module is the California Utility Allowance Calculator used to calculate utility bills for tenants. This version of CUAC is incorporated in CBECC and can be activated from CBECC. Note that it is assumed that users have built a compliance file in CBECC **prior** to using CUAC. The file needs do not meet compliance requirements to run the CUAC module, but it needs to be completely built free of running errors.

Open an existing CBECC file. Click on "Project" to open the Project dialog. Click on "CUAC" tab and check box "Enable CUAC Reporting."



If "Error: No Res Zones with Affordable Housing selected" message is presented, users need to go to the "Zones" under "Project" tree and select the affordable housing units for this project. Once affordable housing units are selected, users can proceed with inputs.



3. User Inputs

a. Choose Utility Providers

Select the utility provider (e.g., PG&E - - Pacific Gas and Electricity Company for both Electricity and Gas), territory, tariff rate, and type appropriately for the project for both electricity and gas as shown. Questions related to territories and tariff options need be directed to the applicable utility provider.

For buildings with liquefied petroleum gas or propane, select “Propane” for the gas utility. If fossil gas, renewable gas, synthetic gas nor propane is used in the building, “No Gas” needs to be selected. The propane rate in the CUAC is a statewide average typically adjusted on an annual basis.

Tariff dropdown menu includes “Standard” and “CARE” options. Either “Standard” or “CARE” type is defaulted depending on the selected tariff options. However, users can override the default options if the default option is inappropriate for their projects. Tariff adjuster is either “none” or “VNEM2.” California Alternate Rates for Energy (CARE) programs are intended to identify any low-income utility tariff program although the name of the program may vary. CARE rates only apply if ALL tenant households qualify for the special low-income utility rates.

b. Water Bill Inputs

Choose the applicable Water Bill options from the dropdown menu, which include “Not Paid by Tenant,” “Flat Monthly Rate,” and “Usage Rate.” Enter the monthly cost for “Flat Monthly Rate” option or $/gallon rate with the flat monthly rate if choosing “Usage Rate.”

c. Trash Bill Inputs

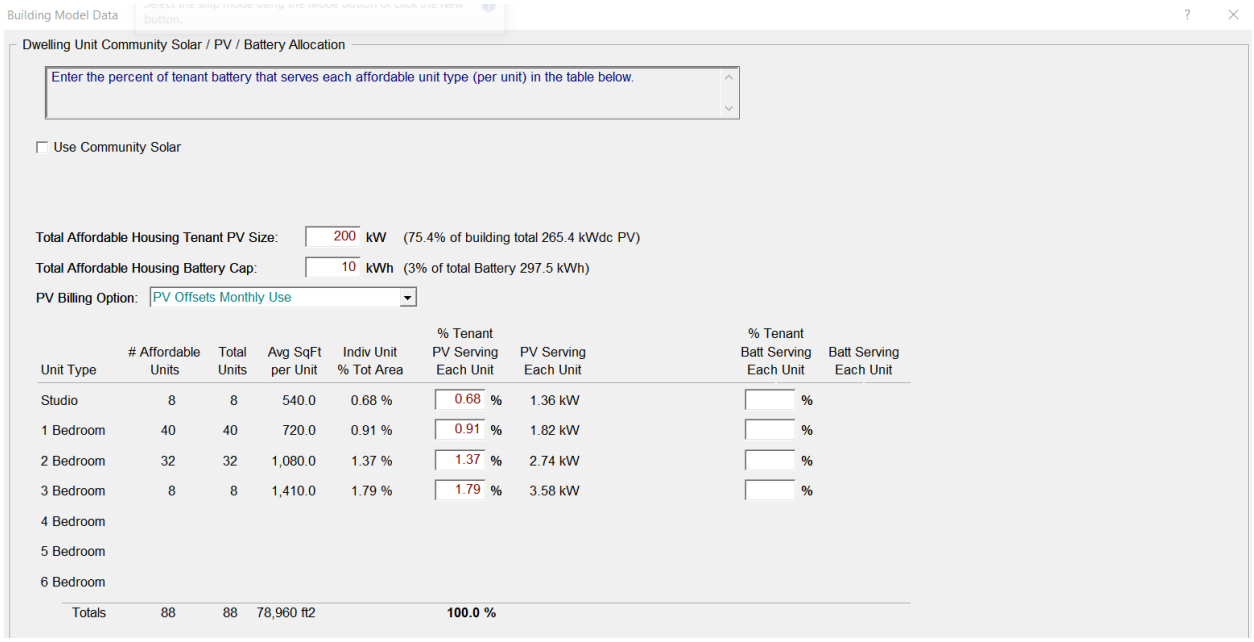
Similarly, the Trash Bill has two options: “Not Paid by Tenant” and “Flat Monthly Rate.” Enter the $/month for the “Flat Monthly Rate” option.

d. Site Location

Enter Project information here.

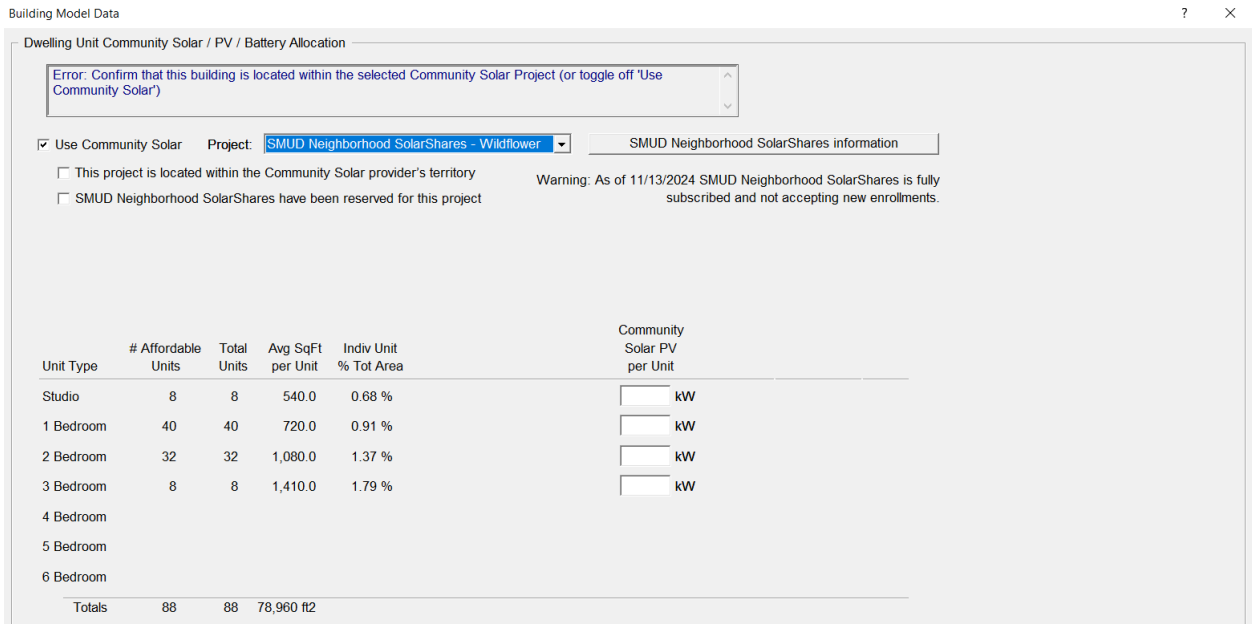
e. PV Allocation

Clicking on “PV Allocation” will pop up the following dialog. The “Use Community Solar” checkbox near the top will override the use of any onsite PV systems in the project data. The PV allocated is separated into each unit type and the total PV needs to add up to 100%. There are two billing options from the drop-down menu: “PV Offsets Monthly Use” or “PV Offsets Monthly Use w/ Carryover.” Similarly, if Battery is included, the Battery allocation for all unit types needs to add up to 100%.



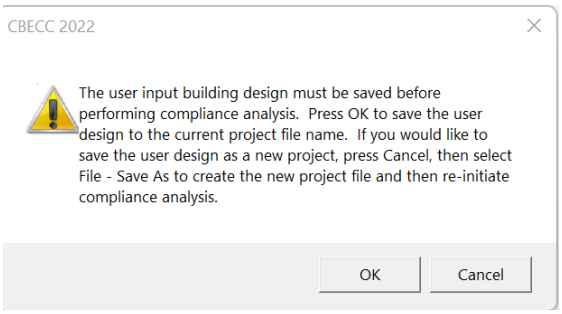
Unit Type	# Affordable Units	Total Units	Avg SqFt per Unit	Indiv Unit % Tot Area	% Tenant PV Serving Each Unit	PV Serving Each Unit	% Tenant Batt Serving Each Unit	Batt Serving Each Unit
Studio	8	8	540.0	0.68 %	0.68 %	1.36 kW	%	
1 Bedroom	40	40	720.0	0.91 %	0.91 %	1.82 kW	%	
2 Bedroom	32	32	1,080.0	1.37 %	1.37 %	2.74 kW	%	
3 Bedroom	8	8	1,410.0	1.79 %	1.79 %	3.58 kW	%	
4 Bedroom								
5 Bedroom								
6 Bedroom								
Totals	88	88	78,960 ft2		100.0 %			

If Community Solar is selected, specify the CS project and confirm that the building is within that community solar project's territory – then enter the amount (kW) of community solar contracted for each affordable unit type.



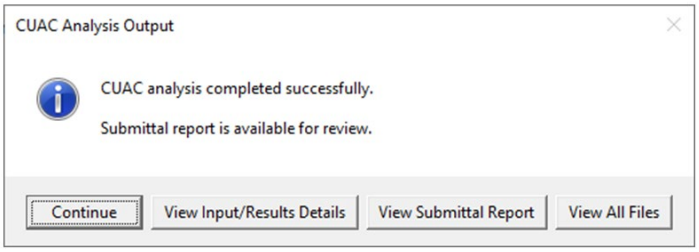
4. Reporting for CUAC

Choose the type of reporting for CUAC to produce after it runs. The dropdown options are "draft," "submittal," or "final." Questions regarding these report types need to be directed to Treasury Office. To initiate the CUAC calculations, click "CUAC Calculate and Report." User will be prompted with a pop-up window as shown below.



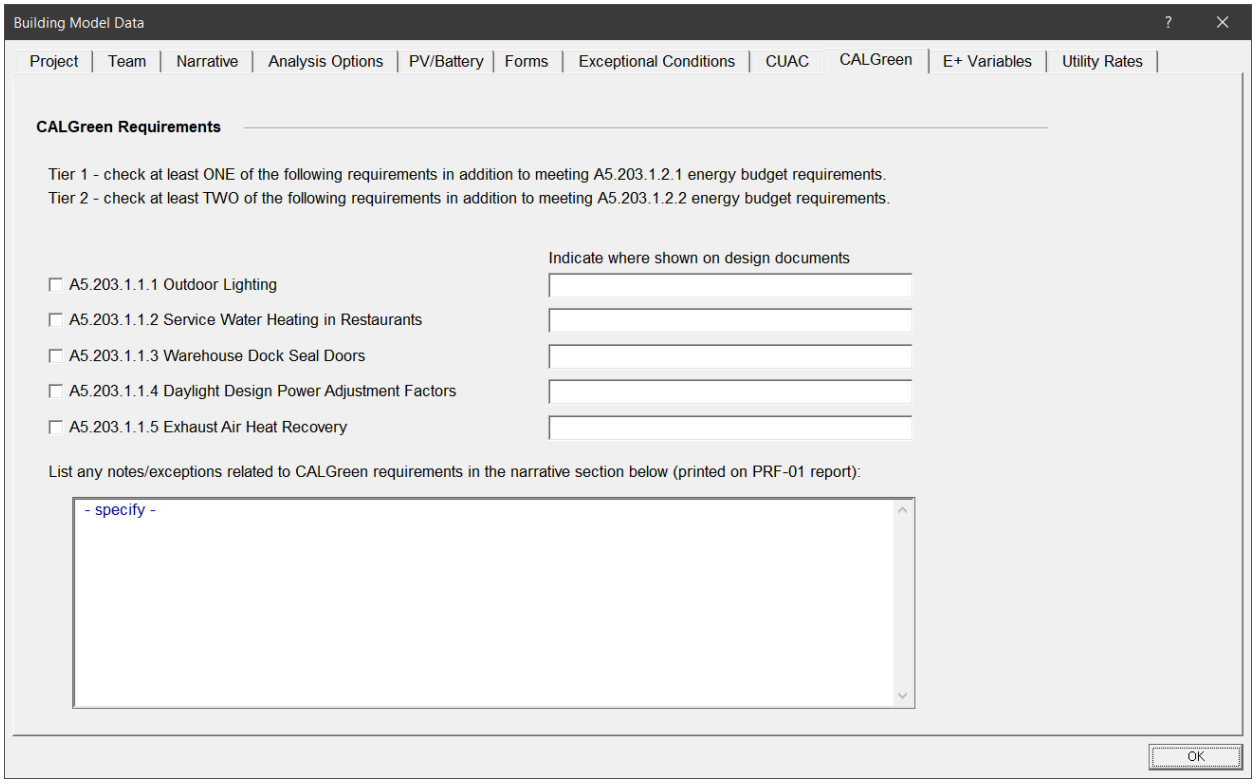
Clicking "OK" to save the project and start the CUAC run or "Cancel" the CUAC run.

If successfully run, user will be prompted with four options. “Continue” or “View Input/Result Details” will provide a CSV file with details for utilities usages calculated hourly. “View Submittal Report” will open the report type that is pre-chosen before the CUAC run. Finally, “View All Files” will provide all the detailed files of this run.



Project Data Screen (CALGreen)

To access this screen, in the **Envelope** tab double click on the Project name (Project Data icon) and then click the **CALGreen** tab.

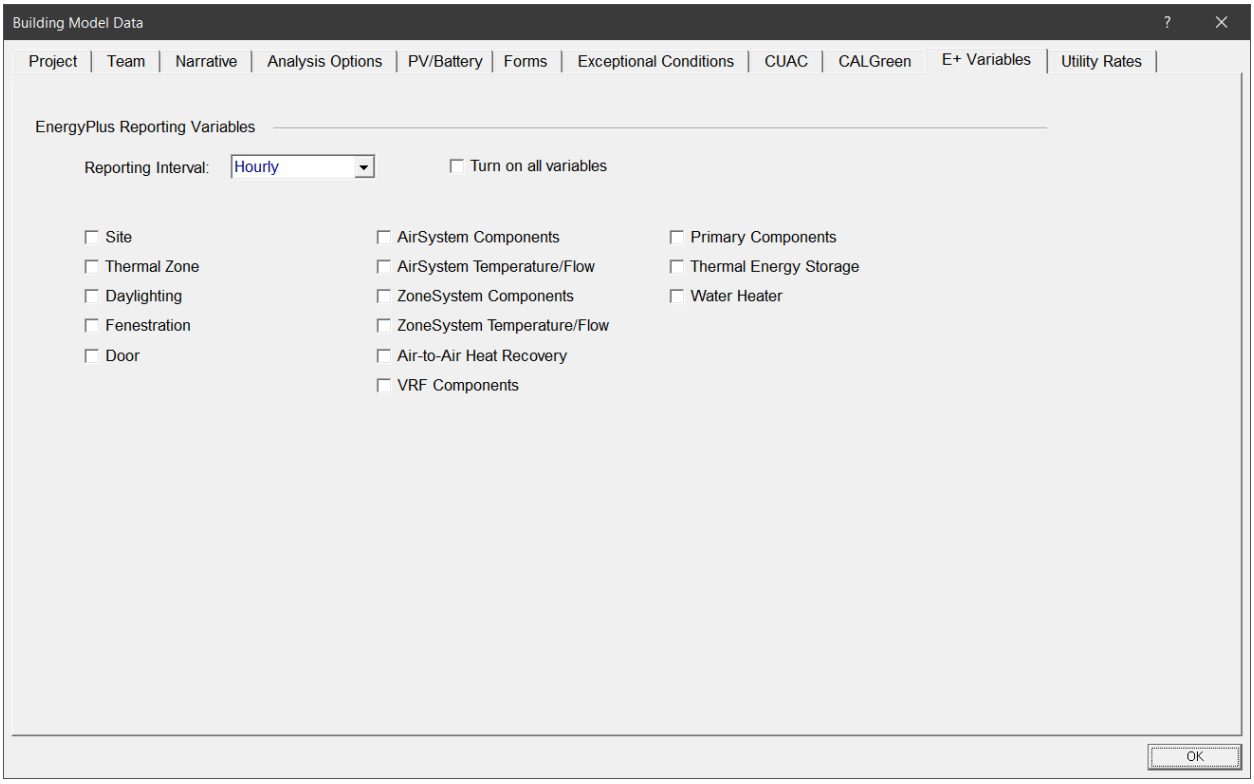


Input summary for the **CALGreen** tab:

- **CALGreen Requirements:** This form allows user to select the appropriate CALGreen requirements based on the Tier they are pursuing.

Project Data Screen (E+ Variables Tab)

To access this screen, in the **Envelope** tab double click on the Project name (Project Data icon) and then click the **E+ Variables** tab.



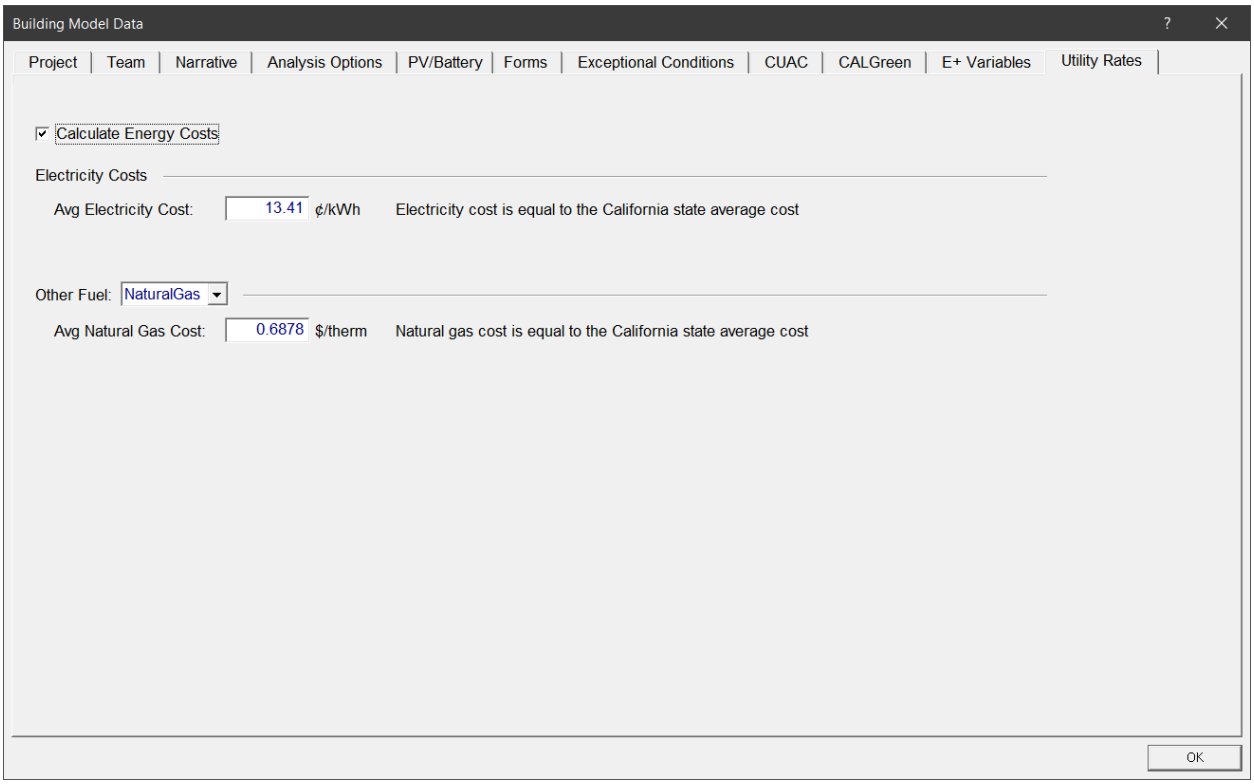
EnergyPlus Reporting Variables section

This section activates options to have EnergyPlus produce time series reports that are useful for model debugging or analysis.

The **EnergyPlus Reporting Variables** check boxes activate writing of designated output variables to special report files. These output files are primarily intended for debugging of the rules and EnergyPlus translations, but may be useful for simulation debugging as well. These check boxes, unlike the previous ones on this tab, do not disqualify the run results from being used to show code compliance.

Project Data Screen (Utility Rates Tab)

To access this screen, in the **Envelope** tab double click on the Project name (Project Data icon) and then click the **Utility Rates** tab.



Input summary for the **Utility Rates** tab:

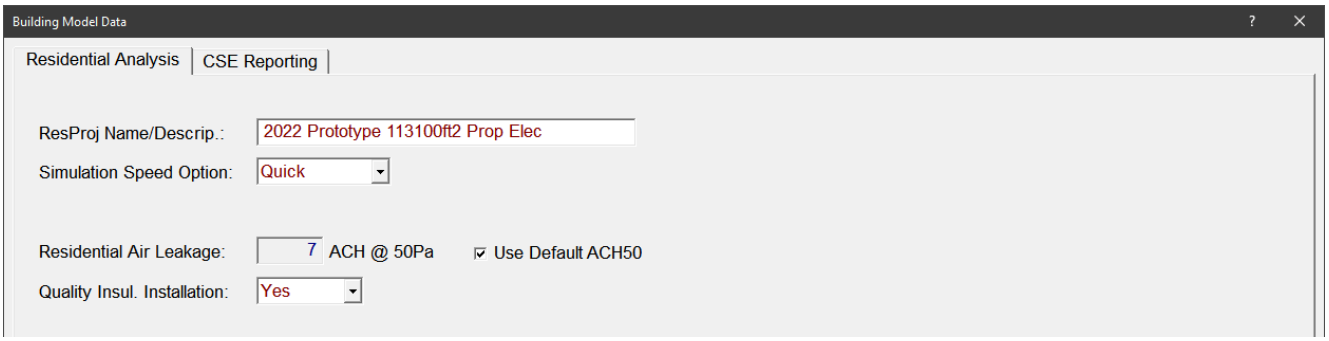
- **Calculate Energy Costs**: Select to indicate whether the energy cost calculations are to be performed (does not impact Title 24 Pass/Fail or compliance margins).

Electricity Costs section

- **Avg Electricity Cost:** The average electricity cost. (Input is optional.)
- **Other Fuel:** Select other fuel used on site if applicable. Options are none, NaturalGas, Propane, and FuelOil#2.

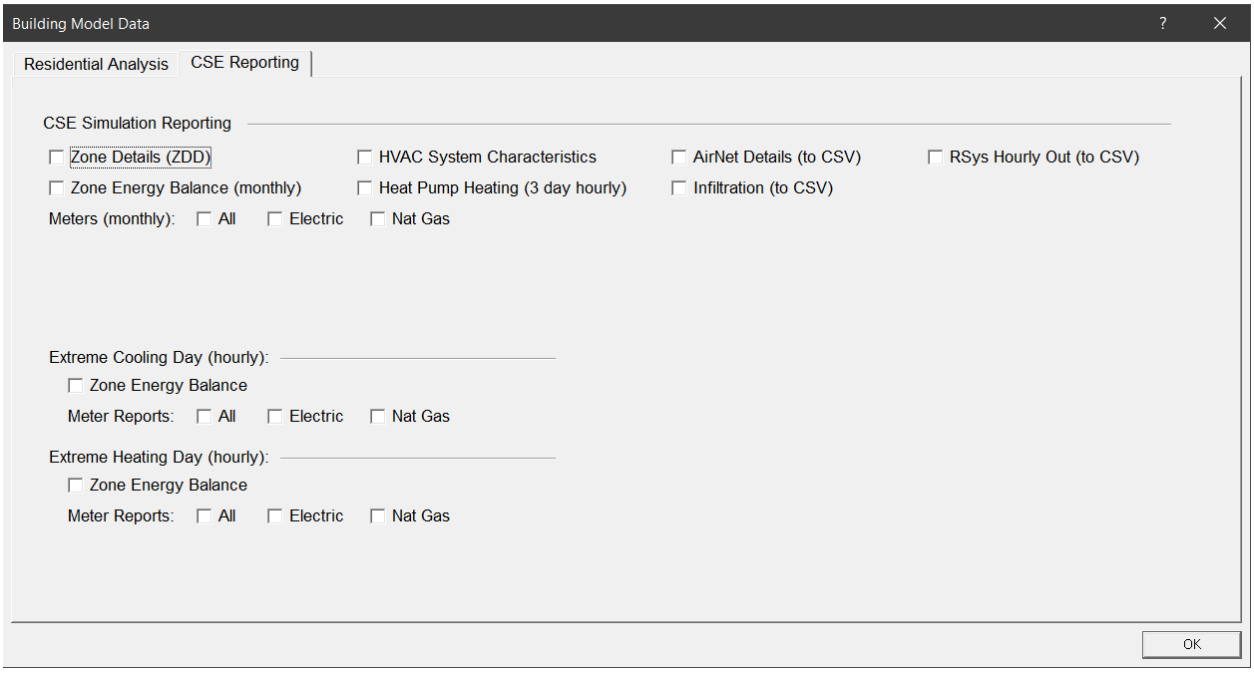
Building Data Screen (Multifamily/Residential Spaces)

To access this screen, under the Project name double click on the **Residential Project Data** icon 



Input summary for the **Building Data** (Residential Analysis) screen:

- **ResProj Name/Descrip**: The name or description used to identify the residential project.
- **Simulation Speed Option:** Settings that control simulation speed ('Compliance' option required for valid compliance results).
- **Residential Air Leakage:** Infiltration - Air Changes per Hour at 50 Pascals pressure difference that leak through the envelope of the conditioned zones.
- **Use Default ACH50:** Checkbox to indicate whether or not to use the default air changes per hour setting in analysis.
- **Quality Insul. Installation:** Select this option to indicate Quality Insulation Installation.

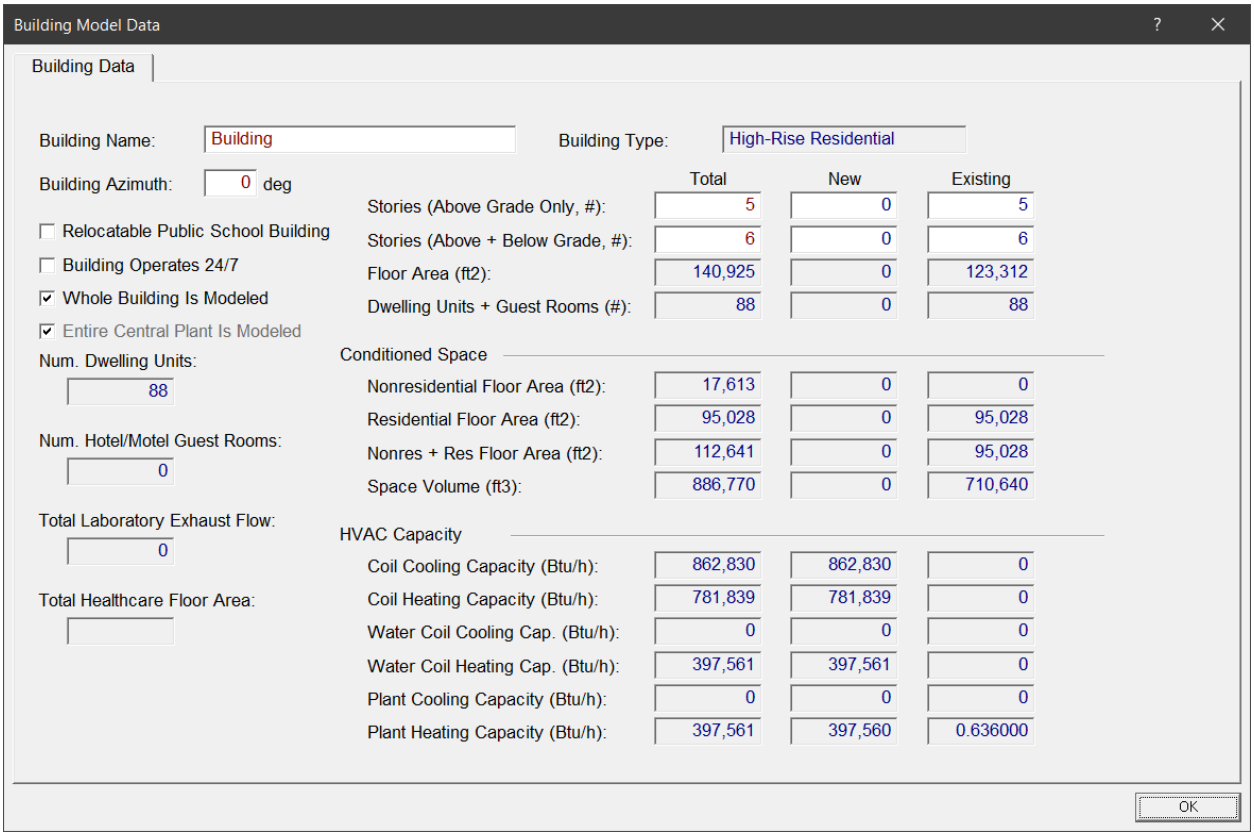


Input summary for the **Building Data** (CSE Reporting) screen:

This section activates options to have CSE produce reports that are useful for model debugging or analysis.

Building Data Screen (Nonresidential Spaces)

To access this screen, under the Project name double click on the **Building Data** (Building Data icon).



Input summary for the **Building Data** screen:

- **Building Name**: The name or description used to identify the building.
- **Building Type**: Indicates the type of building – Nonresidential, High-rise, Low-rise, Mixed Occupancy etc.
- **Building Azimuth:** A measure of the orientation of a planar surface.
- **Relocatable Public School Building?** (check box): If yes, check the box.
- **Building Operates 24/7:** Check this box to indicate if the building operates is designed to be occupied and operated 24 hrs/day 365 days a year.
- **Whole Building is Modeled:** Check this box to indicate that the entire building and the HVAC systems that serve it are explicitly modeled. This checkbox is only available when compliance scope is Existing Addition/Alteration.
- **Entire Central Plant is Modeled:** Check this box to indicate that the central plant is explicitly modeled. This option is available when the 'Whole Building is Modeled' is not checked and the compliance scope is Existing Addition/Alteration
- **Num. Dwelling Units:** The total number of High Rise Residential units in the building.
- **Num. Hotel/Motel Guest Rooms:** The total number of Hotel/Motel units in the building.
- **Stories (Above Only, #):** The number of above-grade building stories. This property is one determining factor for the baseline HVAC system type. A "floor" is considered a "Habitable Story," defined in the Standards as a story that is at least 50 percent above grade.
- **Stories (Above + Below, #):** The number of above- plus below-grade building stories.

- **Floor Area (ft2):** The total floor area (conditioned and unconditioned) of the building.
- **Dwelling Units + Guest Rooms (#):** The total number of residential or hotel/motel living units in the building.

Conditioned Space section

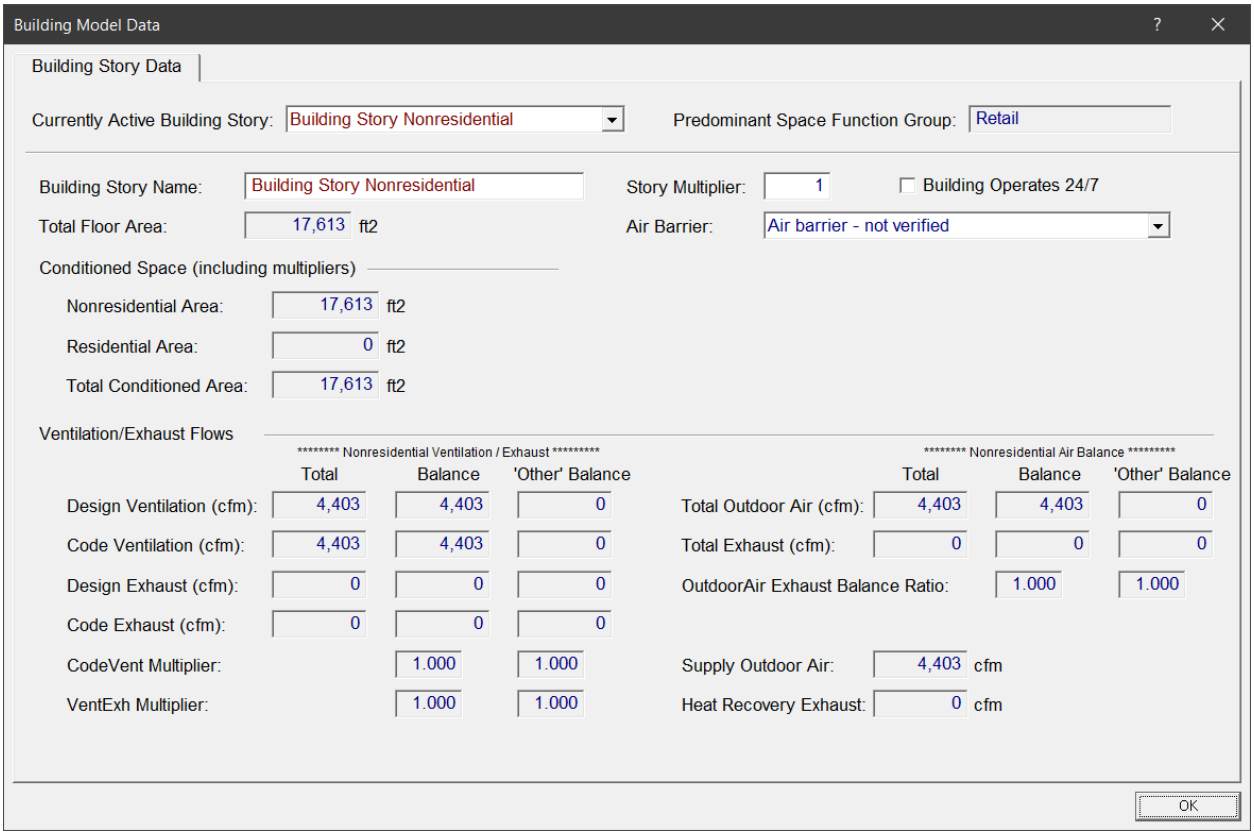
- **Nonresidential Floor Area (ft2)**: The total building nonresidential (conditioned) floor area.
- **Residential Floor Area (ft2):** The total building residential (conditioned) floor area.
- **Nonres + Res Floor Area (ft2):** The total building nonresidential (conditioned) and residential (conditioned) floor area.
- **Space Volume (ft3):** The total building space (conditioned) volume.

HVAC Capacity section

- **Coil Cooling Capacity (Btu/h):** Building coil cooling capacity in Btu/hour.
- **Coil Heating Capacity (Btu/h):** Building coil heating capacity in Btu/hour.
- **Plant Cooling Capacity (Btu/h):** Plant coil cooling capacity in Btu/hour.
- **Plant Heating Capacity (Btu/h):** Plant coil heating capacity in Btu/hour.

Building Story Data Screen (Nonresidential)

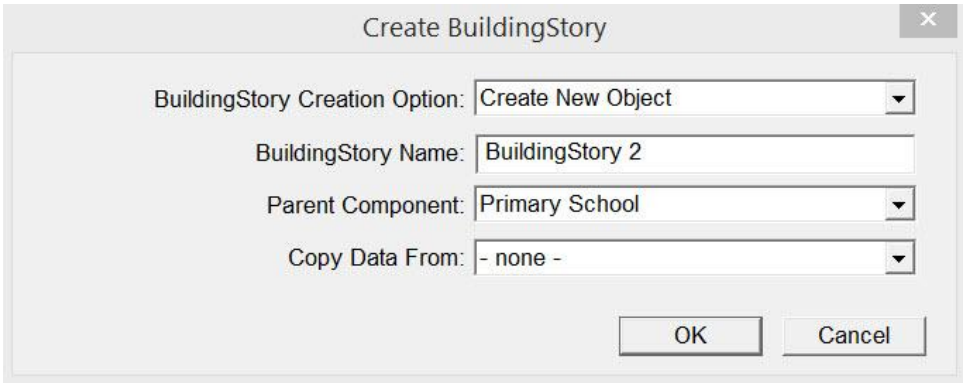
To access this screen, under Building Data double click on the **Building Story Data** (See Building Story icon).



Input summary for the Building Story data screen:

- **Currently Active Building Story:** The name of the currently selected building story.

  Note: If you select **Create New Building Story**, the Create Building Story dialog box appears. Make selections and click **OK.** The new building story is shown in the project tree.



- **Building Story Name**: The name or description used to identify the building story.
- **Story Multiplier**: Story multiplier. This property is user-specified for quickly multiplying the spaces and related thermal zones on each building floor.
- **Building Operates 24/7:** Check this box to indicate if the building operates is designed to be occupied and operated 24 hrs/day 365 days a year.
- **Total Floor Area:** The total floor area (conditioned and unconditioned) of each story including multipliers.
- **Air Barrier:** Select the Air Barrier option for the Building Story. This values is defaulted from the Project level selection but can be changed for each Building Story. This sets the infiltration rate for the nonresidential spaces based on the air barrier option that is used on the project.

Conditioned Space (including multipliers) section

- **Nonresidential Area:** The total Story nonresidential (conditioned) floor area, including multipliers.
- **Residential Area:** The total Story residential (conditioned) floor area, including multipliers. This includes High Rise Residential and Hotel / Motel.
- **Total Conditioned Area:** The total Story (conditioned) floor area, including multipliers.

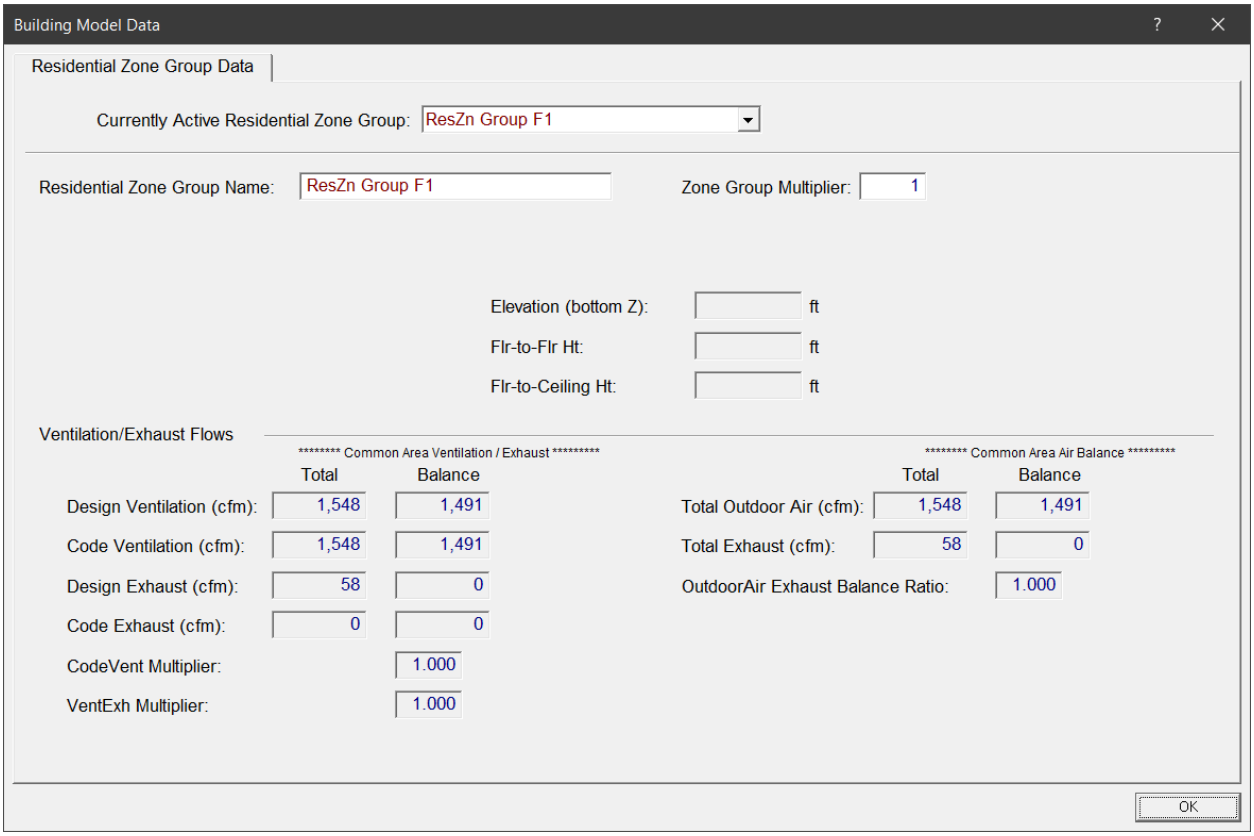
Ventilation/Exhaust Flows section

- **Design Ventilation Flow (Total [cfm]):** The quantity of proposed ventilation air flow (per the proposed design) that is provided to the Building Story at design occupancy.
- **Design Ventilation Flow (For Balance [cfm]):** The quantity of proposed ventilation air flow (per the proposed design) that is provided to the Building Story and included in the ventilation air flow balance.
- **Code Ventilation Flow (Total [cfm]):** The quantity of code ventilation air flow (required per NACM rules) that is provided for the Building Story at design occupancy.
- **Code Ventilation Flow (For Balance [cfm]):** The quantity of ventilation air flow (required per NACM rules) that is provided for the Building Story and included in the ventilation air flow balance.
- **Design Exhaust Flow (Total [cfm]):** The proposed exhaust air flow for the Building Story.
- **Design Exhaust Flow (For Balance [cfm]):** The proposed exhaust air flow for the Building Story included in the ventilation air flow balance.
- **CodeVent Multiplier:** The multiplier used to adjust the proposed design ventilation air flows to be equal to the code minimum required ventilation air flow.
- **VentExhBalance Ratio:** A multiplier used to increase the baseline ventilation air flow rate when the proposed design includes additional ventilation air to make-up for exhaust air flow.
- **VentExh Multiplier:** The ratio of ventilation air to exhaust air provided to the BuildingStory
- **Supply Outdoor Air:** Total amount of outdoor air supplied to zones on a story
- **Heat Recovery Exhaust:** Total amount of exhaust air flow that is run through a heat recovery system.
- **Total Outdoor Air (Total):** Total outdoor air brought directly to the BuildingStory
- **Total Exhaust Air (Total):** Total air removed from the the BuildingStory
- **Total Outdoor Air (Balance):** Total outdoor air brought directly to the BuildingStory included in the air flow balance.
- **Total Exhaust Air (Balance):** Total air removed from the the BuildingStory included in the air flow balance.

- **Total Outdoor Air (Other):** Total outdoor air brought directly to the BuildingStory included in the "Other" air flow balance.
- **Total Exhaust Air (Other):** Total air removed from the the BuildingStory included in the "Other" air flow balance.
- **Outdoor Air Exhaust Balance Ratio:** Ration of Total Outdoor Air to Total Exhaust Air provided to the Building Story.

Residential Zone Group Data Screen (Multifamily/Residential)

To access this screen, under Building Data double click on the **Residential Zone Group Data**



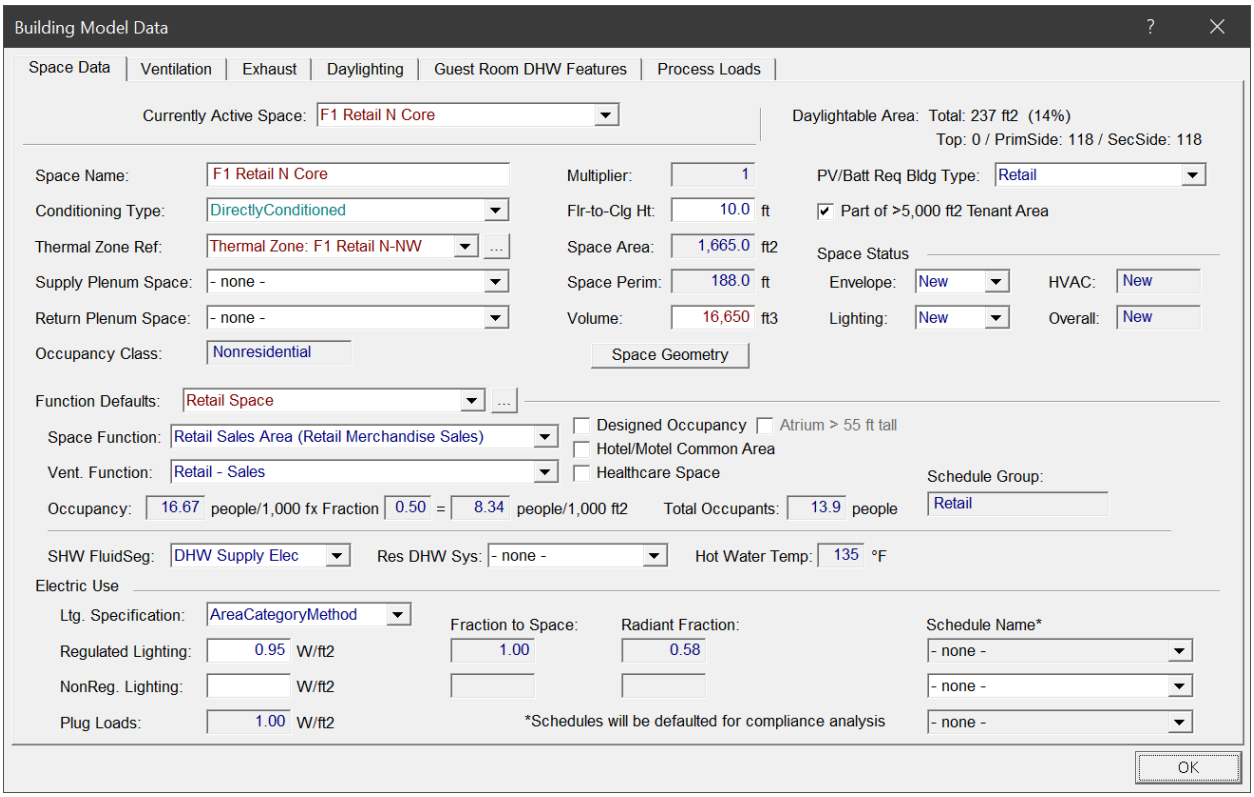
Input summary for the Residential Zone Group data screen:

- **Currently Active Residential Zone Group:** The name of the currently selected residential zone group.
- **Zone Group Multiplier**: Floor Multiplier used for modeling multiple similar Zone Groups.
- **Number of Stories**: Number of stories spanning the zones in this zone group
- **Elevation (Z):** Height of the lowest zone in the group above site ground level
- **Flr-to-Flr Ht:** Difference in elevation between floors in this zone groups.
- **Flr-to-Ceiling Ht:** Height of occupied zones in this zone group.

Ventilation/Exhaust Flows section – Similar to Nonresidential Ventilation/Exhaust Flow section for reporting ventilation, outdoor air and exhaust flows.

Space Data Screen (Space Data Tab)

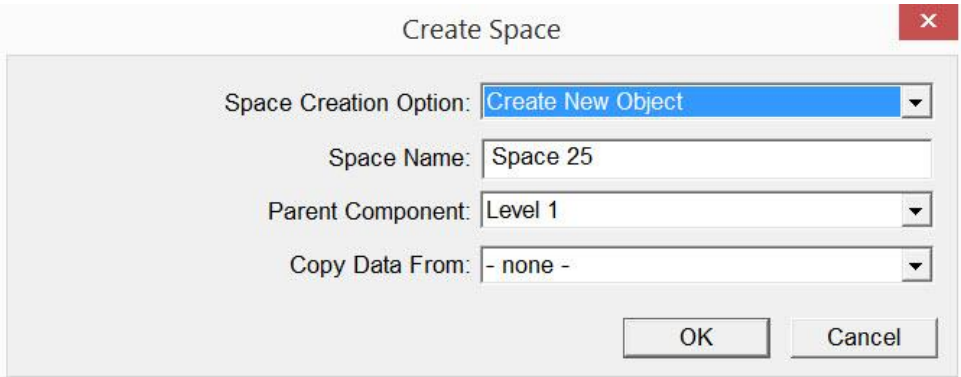
To access this screen, under Building Story Data double click **Space Data** (see Space Data icon).



Input summary for the Space data screen (**Space Data** tab):

- **Currently Active Space**: The name of the currently selected space.

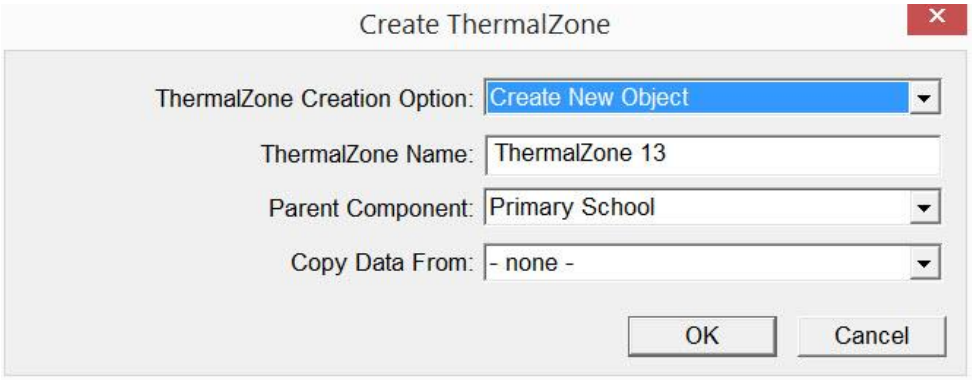
Note: If you select **Create New Space**, the Create Space dialog box appears. Make selections and click **OK.** The Space Primary Data dialog box appears. Select the SpaceFunction and click **OK**. The new space is shown in user interface and the project tree.



- **Space Name**: The name or description used to identify the space.

- **Conditioning Type**: One of a list of categories that characterize the type of conditioning for a space.
- **Thermal Zone Ref:** Select the thermal zone that serves a given space, or create a new ThermalZone (and apply only here).

Note: If you select **Create ThermalZone**, the Create ThermalZone dialog box appears. Make selections and click **OK**. The Thermal Zone screen appears. See Thermal Zone Data screen below.



- **Supply Plenum Space:** The name of the supply air plenum space for the current Space.
- **Return Plenum Space:** The name of the return air plenum space for the current Space.
- **Occupancy Class:** The occupancy classification of the space.
- **Multiplier:** Space multiplier
- **Flr-to-Clg Ht:** The measurement of height from the top surface of the floor to the bottom surface of the ceiling. For spaces with sloped ceilings or floors, this is the nominal height, calculated from the space volume and floor area.
- **Space Area:** The floor area of any geometric space, including plenums, attics and other non-occupiable spaces.
- **Space Perim:** The perimeter of a space.
- **Volume:** Input the space volume (required input).

PV/Battery section

- **PV/Battery Req Bldg Type:** Building type used to determine prescribed PV Battery Sizes. Refer to Section 140.10, Table 140.10-A, Table 140.10-B
- **Part of > 5,000 ft2 Tenant Are** (Checkbox): Whether this space is part of a large (>5,000 ft2) tenant area (pertaining to standard battery design requirement)

Space Status section

- **Envelope:** Specifies the Status of the envelope surfaces in a space for Additions, **Alterations**, and Partial Compliance. Options are New, Altered, and Existing.
- **Lighting:** Specifies the Status of the lighting in a space for Additions, Alterations, and Partial Compliance. Options are New, Altered, Existing, and Future.
- **HVAC:** Specifies the Status of any HVAC systems (not including exhaust) that serve the thermal zone that the Space is assigned to.
- **Overall:** Specifies the Status of the space as determined by the Status of the specific child objects that impact HVAC energy use.

Function Defaults section

- **Function Defaults:** Select a unique SpaceFunctionDefaults object name.
- **Space Function:** The area category occupancy type from Nonresidential Appendix 5.4A.

- **Ventilation Function:** A selection from a set of ventilation functions defined in the Standards (120.2) that define minimum supply and exhaust airflow requirements.
- **Designed Occupancy** (check box)**:** A flag to indicate that the space uses the expected number of occupants for fixed seating criteria for determining space ventilation requirements.
- **Atrium > 55 ft tall** (check box): For Malls and Atria space types this flag indicates whether the atrium is greater than 55 feet tall.
- **Schedule Group:** The schedule group selection from Nonresidential Appendix 5.4A.
- **Hotel/Motel Common Area**: A flag that indicates the space is 'Hotel/Motel Common' area. These areas are spaces that are associated with hotel/motel spaces, such as corridors, stairwells, trash rooms, etc. They are assumed to be lighted, ventilated, and conditioned for all hours.
- **Healthcare Space:** checkbox indicates whether the space is a healthcare space. Spaces designated for healthcare are subject to some requirements (building envelope, interior lighting) but are exempt from others (HVAC, process loads).
- **Occupancy Calcs:** The real density of people associated with a space expressed in people per 1000 square feet.
- **Fraction:** The expected fraction of the exiting density of people in a Space, based on SpaceFunction, which will determine the design occupancy.
- **Total Occupants:** The design number of people in the space.
- **Sensible:** The sensible heat of an occupant expressed in Btu per hour person.
- **Latent:** The latent heat of an occupant expressed in Btu per hour person.
- **Schedule Name** (Occupancy)**:** Reference to a unique occupant Schedule Name. (Schedules will be defaulted for compliance analysis.)
- **SHW FluidSeg Ref:** Select the service hot water loop coming into the space, or create/import PrimarySupply FluidSegment (and apply only here). The Create FluidSegment dialog box appears. Make selections and click **OK**. The Fluid Segment Data tab then appears. Make selections and click **OK**. See the Fluid Segment Data Screen below.
- **Res DHW Sys:** Select the domestic hot water loop coming into the space, or create/import SecondarySupply FluidSegment (and apply only here). The Create ResidentialDHWSystem dialog box appears. Make selections and click **OK**. The Residential Water screen then appears. Make selections and click **OK**. See the Residential Water Heating System Data screen below.
- **Hot Water Temp:** The temperature at which service hot water is supplied to the fixtures in the Space.
- **Guest Rooms/Space:** Number of hotel/motel units in a modeled space.

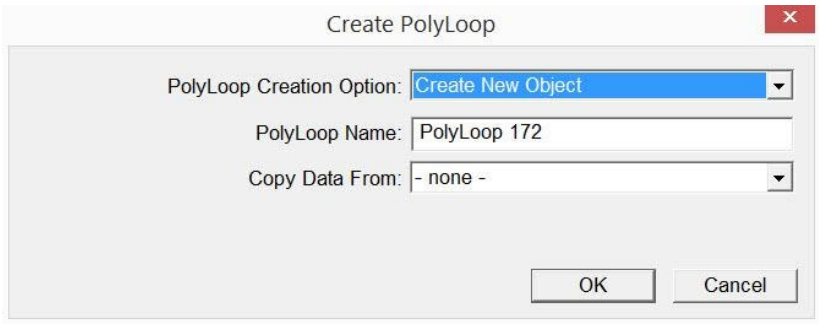
Electric Use section

- **Ltg. Specification**: The method for selecting interior lighting and other loads.
- **Regulated Lighting (W/ft2):** Total regulated connected lighting power density for all interior lighting systems in a Space. This includes the loads for lamps and ballasts.
- **Fraction to Space (Regulated Lighting):** Fraction of regulated interior lighting heat gain going to space air.
- **Radiant Fraction (Regulated Lighting)**: Fraction of regulated interior lighting radiant heat gain going to space surfaces.

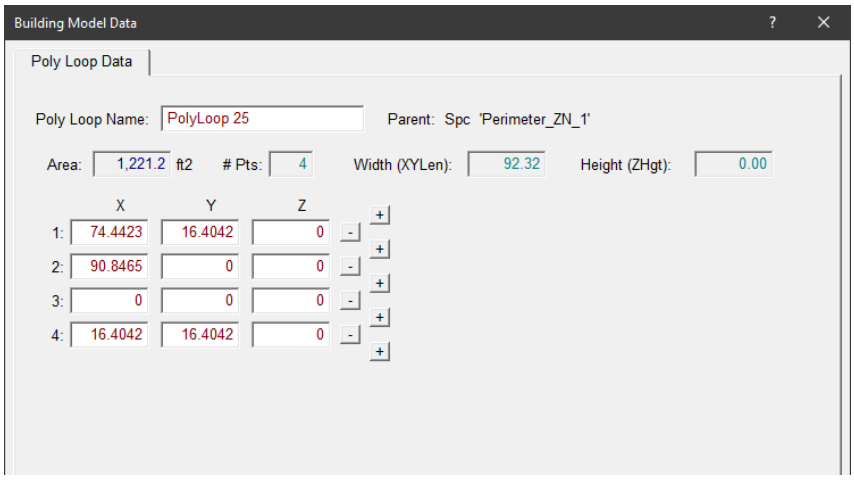
- **NonReg. Lighting (W/ft2)**: Total non-regulated connected lighting power density for all interior lighting systems in a Space. This includes the loads for lamps and ballasts.
- **Fraction to Space (NonReg. Lighting)**: Fraction of non-regulated interior lighting heat gain going to space air.
- **Radiant Fraction (NonReg. Lighting)**: Fraction of non-regulated interior lighting radiant heat gain going to space surfaces.
- **Plug Loads (W/ft2):** The usage of electrical devices plugged into receptacles in a space based on the occupancy type.
- **Schedule Name** (Regulated Lighting):** Reference to a schedule that describes a regulated interior lighting system. (Schedules will be defaulted for compliance analysis.)
- **Schedule Name** (Plug Loads):** Reference to a schedule that describes a nonregulated interior lighting system. (Schedules will be defaulted for compliance analysis.)
- **Schedules (Plug Loads):** Reference to a schedule that describes plug load use.

Space Geometry button

To access the space geometry, click this button (child Poly Loop object). The Create PolyLoop dialog box appears. Make selections and click **OK**.



The Poly Loop Data screen appears. Enter data and click **OK**.



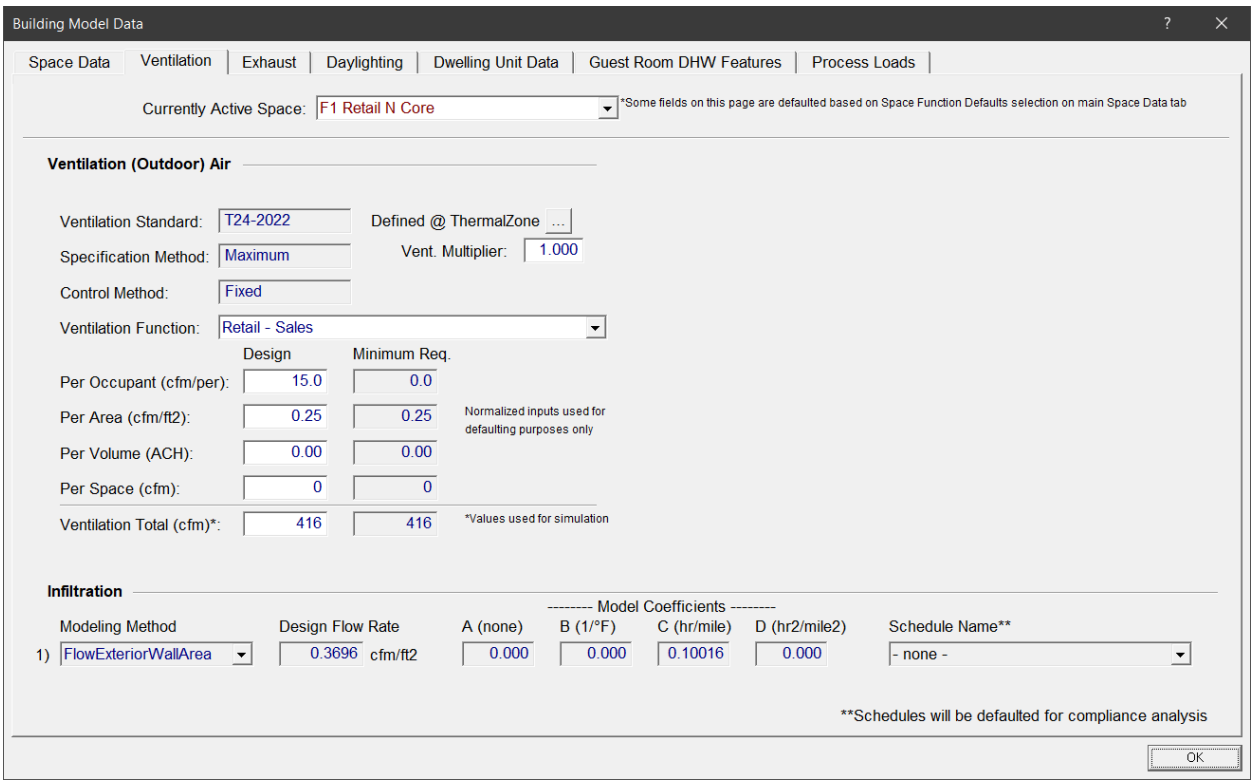
Input summary for the Poly Loop Data screen:

- **Poly Loop Name:** The name or description used to identify the Poly Loop.
- **Area:** Area of the Poly Loop.

- **# Pts:** The number of points.
- **Width (XYLen):** Width of the polygon calculated by the program based on the X/Y vertices..
- **Height (ZHgt):** Range of Z coordinates in the polyloop.
- **X:** The x coordinate of a poly loop vertex.
- **Y:** The y coordinate of a poly loop vertex.
- **Z:** The z coordinate of a poly loop vertex.

Space Data Screen (Ventilation)

To access this screen, double click on Space data (see Space Data icon), and then click on the **Ventilation** tab.



Input summary for the Space Data screen (**Ventilation** tabs):

- **Currently Active Space**: The name of the currently selected space.

Ventilation (Outdoor) Air section

- **Ventilation Standard: Type** ventilation standard for the space's ThermalZone.
- **Specification Method:** The method used to calculate the design ventilation flow for the ThermalZone.
- **Defined @ ThermalZone (button):** Click this button to access thermal zone data assigned to this space. The Thermal Zone Data screen appears. See Thermal Zone Data screen below.
- **Control Method:** The method used to vary the ventilation flow.

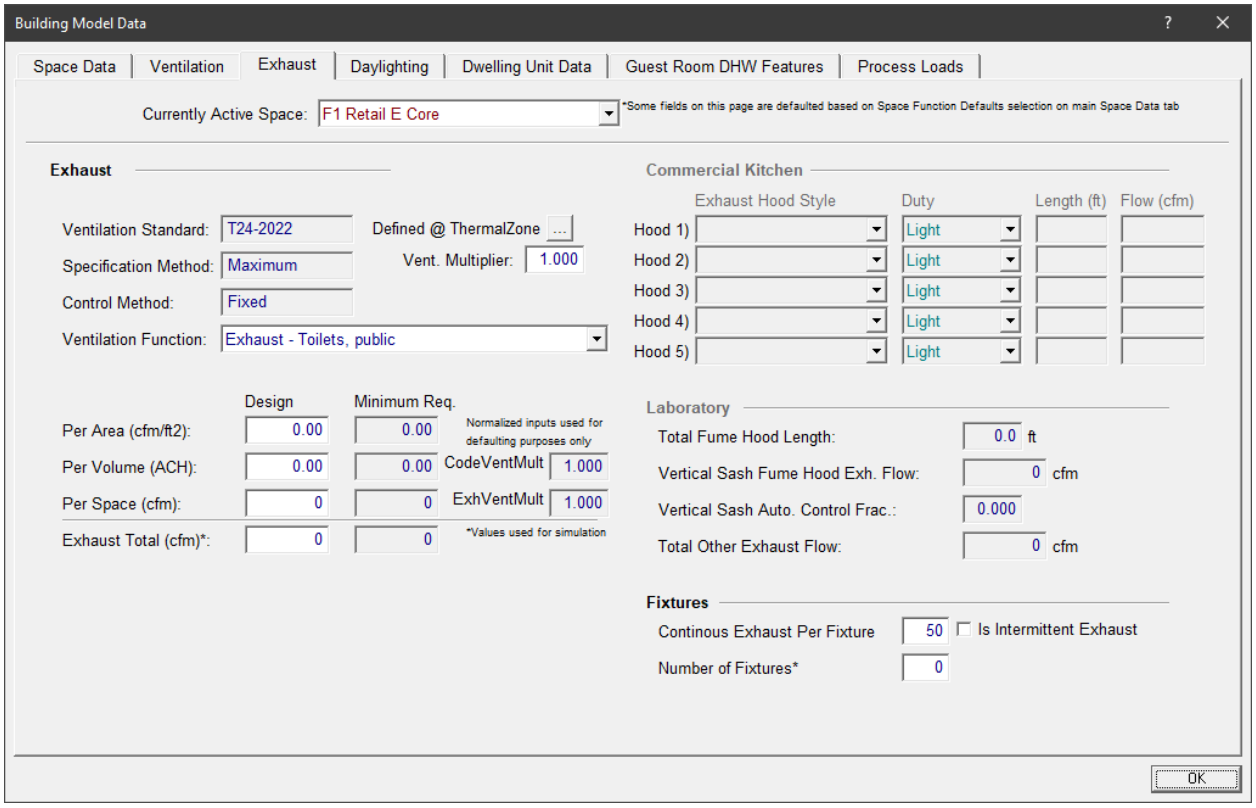
- **Occupant Sensor Vent Control:** Check to confirm that occupancy sensor ventilation devices are installed as per Section 120.1(d)5.
- **Exception:** check this box if ventilation cannot be reduced to zero in this space.
- **Ventilation Function:** the ventilation function type for the space, which defines the supply airflow and exhaust airflow requirements.
- **Per Occupant (cfm/per):** The user input outdoor air flow rate divided by the design or hourly occupancy of the space.
- **Per Area (cfm/ft2):** The user input outdoor air flow rate divided by the floor area of the space.
- **Per Volume (ACH):** The user input outdoor air flow rate in cubic feet per hour divided by the volume of the space.
- **Per Space (cfm):** The user input outdoor air flow rate in cubic feet per minute for the space.
- **Ventilation Total (cfm):** The quantity of ventilation air provided to the Space, based on the specification method defined at the ThermalZone.
- **Minimum Req.:** The code minimum quantity of ventilation air provided to the space.
- **Per Volume (ACH):** The code minimum amount of outside air provided to a space during occupied hours, divided by the volume of the space.
- **Per Area (cfm/ft2):** The code minimum amount of outside air provided to a space during occupied hours, divided by the floor area of that space.
- **Per Occupant (cfm):** The code minimum amount of outside air provided to a space during occupied hours, divided by the design number of people in the space.
- **Vent. Fraction:** The fraction of design occupancy that is assumed for calculating the minimum design ventilation rate for compliance analysis.

Infiltration section

- **Modeling Method:** The method to model infiltration. This field is not user editable.
- **Design Flow Rate:** The quantity of air infiltrating the space in cfm/ft2.
- **Model Coefficients A (none):** The constant infiltration coefficient. The coefficients are not user editable.
- **Model Coefficients B (1/°F):** The infiltration coefficient with units 1/°F.
- **Model Coefficients C (hr/mile):** The infiltration coefficient with units hr/mile.
- **Model Coefficients D (hr2/mile2):** The infiltration coefficient with units hr2/mile2.
- **Schedule Name*:** The user input schedule for infiltration modeling. (Schedules will be defaulted for compliance analysis.)

Space Data Screen (Exhaust, Exhaust - Kitchen, Lab)

To access this screen, double click on Space data (see Space Data icon), and then click on the **Exhaust** tab.



Exhaust Air section

- **Ventilation Standard: Type** ventilation standard for the space's ThermalZone.
- **Specification Method:** The method used to calculate the design ventilation flow for the ThermalZone.
- **Defined @ ThermalZone (button):** Click this button to access thermal zone data assigned to this space. The Thermal Zone Data screen appears. See Thermal Zone Data screen below.
- **Control Method:** The method used to vary the ventilation flow.
- **Ventilation Function:** the ventilation function type for the space, which defines the supply airflow and exhaust airflow requirements.
  The *Design Rates* column shows user inputs for the following:
- **Per Area (cfm/ft2):** The design exhaust air flow rate in CFM/ft2 for the Space.
- **Per Volume (ACH):** The design exhaust air flow rate in air changes per hour (ACH) for the Space.
- **Per Space (cfm):** The design exhaust air flow rate in CFM for the Space.
- **Exhaust Total (cfm):** The design exhaust air flow rate in CFM for the Space. This is calculated from one of the three ways that exhaust airflow can be modeled (per area, per volume, per space), and is not input by the user.
  The *Minimum Req* column displays the minimum code requirements specific to the user-entered ventilation function, for comparison with user-input values.

Exhaust Air section (Commercial Kitchen)

- **Has Process Exhaust:** Kitchen Spaces that have mandatory requirement for Exhaust Fans
- **Exhaust Hood Style:** Select the type of exhaust hood. Input is optional. Options are WallMountedCanopy, SingleIsland, DoubleIsland, Eyebrow, BackshelfOrPassover.
- **Duty:** Select the type of duty. Input is optional. Options are none, light, Medium, or Heavy.
- **Length (ft):** Enter length of hood in feet.
- **Flow (cfm):** The air flow rate in cfm.

Exhaust Air section (Laboratory)

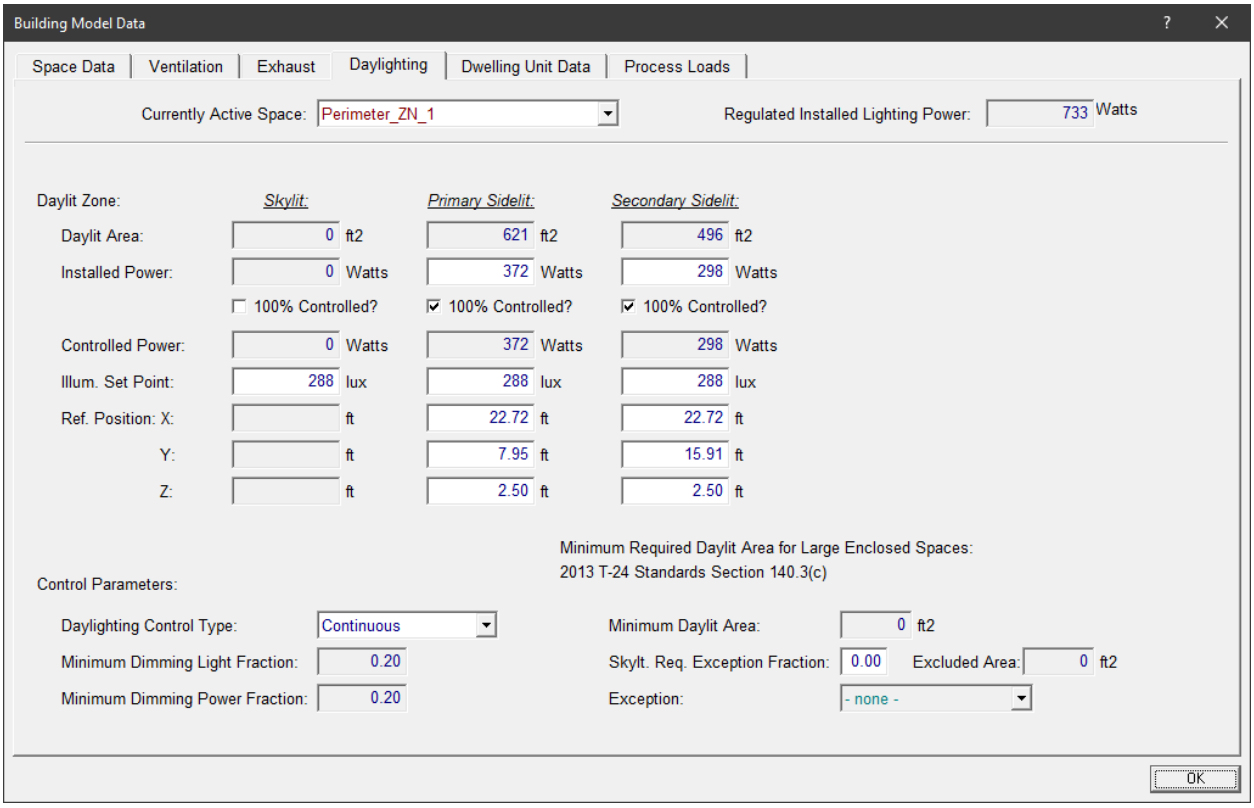
- **Total Fume Hood Length:** The total length of the fume hoods. This and the exhaust airflow is used to determine whether the laboratory is a fume hood intensive laboratory and subject to sash control requirements.
- **Vertical Sash Fume Hood Exh Flow:** The total exhaust flow through fume hoods using vertical sashes (cfm).
- **Vertical Sash Auto. Control Fraction:** the fraction of fume hoods with vertical sashes that have automatic closure control devices.
- **Total Other Exhaust Flow:** Exhaust airflow from other devices.

Exhaust Air section (Fixtures)

- **Continuous Exhaust Per Fixture:** Continuous exhaust air flow rate per fixture (e.g. toilet, showerhead, etc.)
- **Number of Fixtures:** The number of fixtures in the space for fixture-dependent exhaust (toilets, showerheads, etc).
- **Is Intermittent:** Checkbox to indicate that the exhaust system is intermittent

Space Data Screen (Daylighting Tab)

To access this screen, double click on Space data (see Space Data icon), and then click on the **Daylighting** tab.



Input summary for the Space Data screen (**Daylighting** tab):

- **Currently Active Space**: The name of the currently selected space.
- **Regulated Installed Lighting Power (Watts):** This is a reference field which displays the current regulated installed lighting power for the currently active space.

Daylighting Ref. Points: Each daylit area type (Skylit, Primary Sidelit, and Secondary Sidelit) is automatically assigned a daylighting control position, which controls how the space lighting responds to the daylight illuminance measured at the control position. Each daylighting control position uses the following inputs:

- **Daylit Area (Skylit):** The skylit daylit area is the portion of the floor area that gets daylighting from a skylight or window. Skylit daylit area is defined as a band around the skylight well that has a depth equal to 70% of the ceiling height from the edge of the skylight well. The geometry of the skylit daylit area is the same as the geometry of the skylight.
- **Daylit Area (Primary Sidelit):** The primary sidelit daylit area is the portion of the floor area that gets the highest illumination from a window. Primary sidelit daylit area is defined as a band near the window with a depth equal to the distance from the floor to the top of the window and width equal to window width plus 0.5 times window head height wide on each side of the window opening.

- **Daylit Area (Secondary Sidelit):** The secondary sidelit daylit area is the portion of the floor area that gets less high, but still useful daylighting from a window. Secondary sidelit daylit area is defined as a band beyond the primary daylighted area that extends a distance double the distance from the floor to the top of the window and width equal to window width plus 0.5 times window head height wide on each side of the window opening.
- **Installed Power (Skylit):** The total lighting power of all luminaires located within the Skylit Daylit Zone. For spaces that use simplified lighting inputs (no interior lighting system), this value is user editable. For spaces that use interior lighting systems, this value is calculated by CBECC based on the Assigned Daylit Zone input located at the interior lighting system (IntLtgSys:DaylitAreaType).
- **Installed Power (Primary Sidelit):** The total lighting power of all luminaires located within the Primary Sidelit Daylit Zone.
- **Installed Power (Secondary Sidelit):** The total lighting power of all luminaires located within the Secondary Sidelit Daylit Zone.
- **100% Controlled (check box):** If checked, this indicates that 100% of the installed lighting power in Skylit, Primary Sidelit, or Secondary Sidelit Daylit Zone is controlled by the associated daylighting control position.
- **Controlled Power (Skylit):** The total power lighting located within the Skylit Daylit Zone that is controlled by daylight sensors.
- **Controlled Power (Primary Sidelit):** The total power of all luminaires within the Primary Sidelit Daylit Zone that is controlled by the associated daylighting control position. This field is only user editable when the associated daylit area is greater than zero, and 100% controlled is unchecked.
- **Controlled Power (Secondary Sidelit):** The total power of all luminaires within the Secondary Sidelit Daylit Zone that is controlled by the associated daylighting control position. This field is only user editable when the associated daylit area is greater than zero, and 100% controlled is unchecked.
- **Illum. Set Point (Skylit):** The illuminance setpoint for the skylit portion of the space in which the daylight control is located.
- **Illum. Set Point (Primary Sidelit):** The illuminance setpoint for the primary sidelit portion of the space in which the daylight control is located. Lighting controls are simulated so that the illuminance at the reference position is always maintained at, or above the illuminance setpoint.
- **Illum. Set Point (Secondary Sidelit):** The illuminance setpoint for the secondary sidelit portion of the space in which the daylight control is located. Lighting controls are simulated so that the illuminance at the reference position is always maintained at, or above the illuminance setpoint.
- **Ref. Position X (Skylit):** The position of the daylight reference points within the daylit space, identified by the Cartesian **X** position of the reference point (ft), with respect to the overall project coordinate system.
- **Ref. Position X (Primary Sidelit):** The position of the daylight reference points within the daylit space, identified by the Cartesian **X** position of the reference point (ft), with respect to the overall project coordinate system.
- **Ref. Position X (Secondary Sidelit):** The position of the daylight reference points within the daylit space, identified by the Cartesian **X** position of the reference point (ft), with respect to the overall project coordinate system.

- **Ref. Position Y (Skylit):** The position of the daylight reference points within the daylit space, identified by the Cartesian **Y** position of the reference point (ft), with respect to the overall project coordinate system.
- **Ref. Position Y (Primary Sidelit):** The position of the daylight reference points within the daylit space, identified by the Cartesian **Y** position of the reference point (ft), with respect to the overall project coordinate system.
- **Ref. Position Y (Secondary Sidelit):** The position of the daylight reference points within the daylit space, identified by the Cartesian **Y** position of the reference point (ft), with respect to the overall project coordinate system.
- **Ref. Position Z (Skylit):** The position of the daylight reference points within the daylit space, identified by the Cartesian **Z** position of the reference point (ft), with respect to the overall project coordinate system.
- **Ref. Position Z (Primary Sidelit):** The position of the daylight reference points within the daylit space, identified by the Cartesian **Z** position of the reference point (ft), with respect to the overall project coordinate system.
- **Ref. Position Z (Secondary Sidelit):** The position of the daylight reference points within the daylit space, identified by the Cartesian **Z** position of the reference point (ft), with respect to the overall project coordinate system.

Control Parameters Section

- **Daylighting Control Type:** Lighting controls are simulated so that the illuminance at the reference position is always maintained at or above the illuminance setpoint.
    - **None:** Lighting output and power are not modulated in response to predicted daylight illuminance.
    - **Continuous**: Continuous Dimming controls have a fraction to rated power to fraction of rated output that is a linear interpolation of the minimum power fraction at the minimum diming light fraction to rated power (power fraction = 1.0) at full light output.
    - **Continuous Plus Off:** Continuous Dimming + Off controls are the same as continuous dimming controls except that these controls can turn all the way off when none of the controlled light output is needed.
    - **Stepped Switching:** Stepped Switching Controls vary the electric input power and lighting output power in discrete equally spaced steps. See at each step, the fraction of light output is equal to the fraction of rated power.
- **Minimum Dimming Light Fraction:** The minimum light output of controlled lighting when fully dimmed. Minimum light fraction = (Minimum light output) / (Rated light output).
- **Minimum Dimming Power Fraction:** The minimum power fraction when controlled lighting is fully dimmed. Minimum power fraction = (Minimum power) / (Full rated power).
- **Number of Control Steps** (SteppedSwitching): The number of control steps. For step switching, identifies number of steps that require fraction of rated light output and rated power fraction.

Minimum Required Daylit Area for Large Enclosed Spaces: 2019 T-24 Standards Section 140.3(c) Section

- **Minimum Daylit Area:** Area required to be daylit (Skylit plus Primary Sidelit) by Section 140.3c of Title 24 Standards.

- **Skylt. Req. Exception Fraction:** The fraction of floor area that is exempt from the Minimum Daylit Area requirement (2019 T-24 Standards Sec.140.3[c]).
- **Excluded Area:** Total area that is exempt from the skylight Minimum Daylit Area requirement.
- **Exception:** The specific exception to the Minimum Daylit Area requirement. Options are None, Auditorium, Church, MovieTheater, Museum, and RefigeratedWarehouse. Possible exceptions include:
  - The building is not located in climate zone 1 or climate zone 16 (automatically identified by CBECC software).
  - Designed general lighting is less than 0.5 W/ft2 (automatically identified by CBECC software).
  - Existing walls on plans result in enclosed spaces less than 5,000 ft2.
  - Future walls or ceilings on plans result in enclosed spaces less than 5,000 ft2 or ceiling heights less than 15 ft.
  - Plans or documents show that space is an auditorium, religious building of worship, movie theater, museum, or refrigerated warehouse.

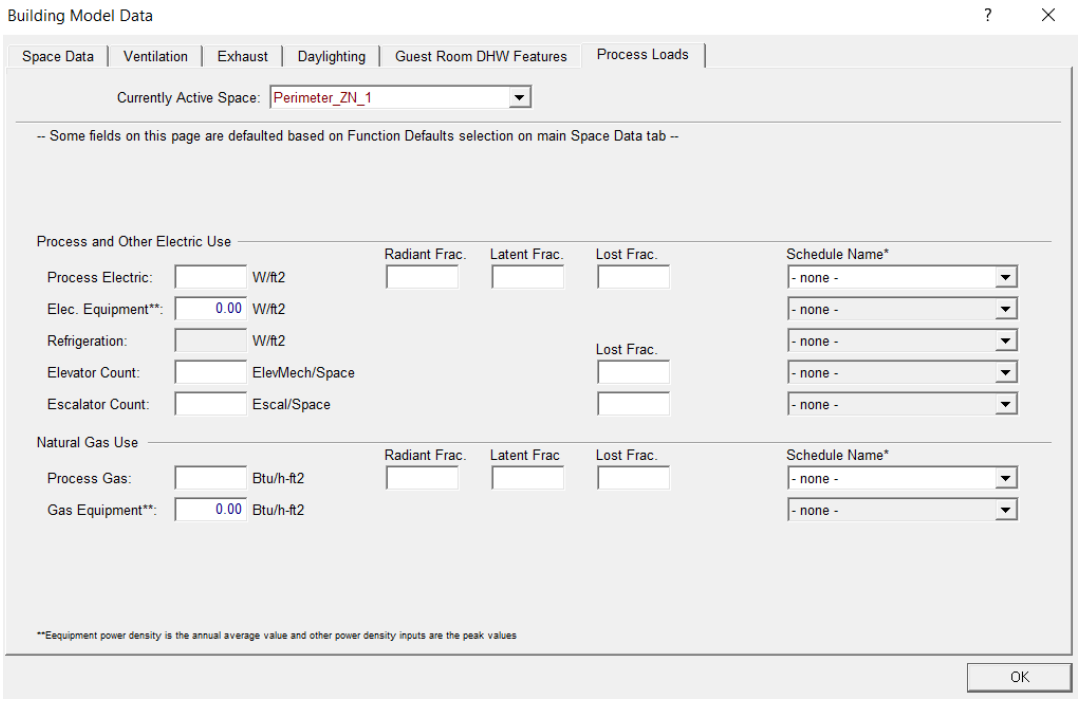
Space Data Screen (Dwelling Unit Data Tab)

Starting with CBECC 2022 this Tab is no longer used to input the Dwelling Unit Data.

Please ruse the DwellingUnitTypes to create and input data for Dwelling Units.

Space Data Screen (Process Loads Tab)

To access this screen, double click on Space data (see Space Data icon), and then click on the **Process and Airflow** tab.



Input summary for the **Process and Air Flow** tab:

- **Currently Active Space**: The name of the currently selected space.

Note: All fields on this page default based on the Space Function selection on main Space Data screen.

Process and Other Electric Use section

- **Process Electric:** Process load is the electric energy consumption in the conditioned space of a building resulting from an activity or treatment not related to the space conditioning, lighting, service water heating, or ventilating of a building as it relates to human occupancy. Process load may include convective (sensible) and/or latent components.
- **Elec. Equipment:** The use of electric devices represented by an electric equipment annual average power density (W/ft2) and associated with the occupancy type selected from the Area Category Method in ACM Appendix 5.4A.
- **Process Electric (Radiant Frac.):** The fraction of radiant heat gain to a space based on appliance energy use. Fraction convective (sensible) is typically equal to 1.0 minus fraction radiant, minus fraction latent, minus fraction lost.
- **Process Electric (Latent Frac.):** The fraction of latent heat gain to a space based on appliance energy use. Fraction convective (sensible) is typically equal to 1.0 minus fraction radiant, minus fraction latent, minus fraction lost.
- **Process Electric (Lost Frac.):** The fraction of heat lost to the exterior is based on appliance energy use.
- **Schedule Name* (Process Electric):** The use of process electric represented by a 24-hour schedule (fraction of density) associated with the occupancy type selected from the Area Category Method in ACM Appendix 5.4B.
- **Refrigeration:** The energy consumption of commercial refrigeration equipment in a space expressed in watts per square foot of space floor area. Commercial refrigeration equipment power density (EPD) is used for walk in freezers, walk in coolers, and refrigerated casework. Other equipment such as Plug in coolers, vending machines and plug in refrigerators should be accounted for in receptacle loads.
- **Refrigeration (Schedule Name*):** Commercial refrigeration equipment schedule reference
- **Elevator Count:** The number of individual elevators within the space.
- **Elevator Count (Lost Frac.):** The fraction of heat lost to the exterior based on appliance energy use.
- **Elevator Count (Schedule Name*):** The use of an elevator represented by a 24-hour schedule (fraction of density) associated with the occupancy type selected from the Area Category Method in ACM Appendix 5.4B.
- **Escalator Count:** The number of individual Escalators within the space
- **Escalator Count (Lost Frac.):** The fraction of heat lost to the exterior based on appliance energy use.
- **Escalator Count (Schedule Name*):** The use of an escalator represented by a 24-hour schedule (fraction of density) associated with the occupancy type selected from the Area Category Method in ACM Appendix 5.4B.
  *Schedules will be defaulted for compliance analysis.

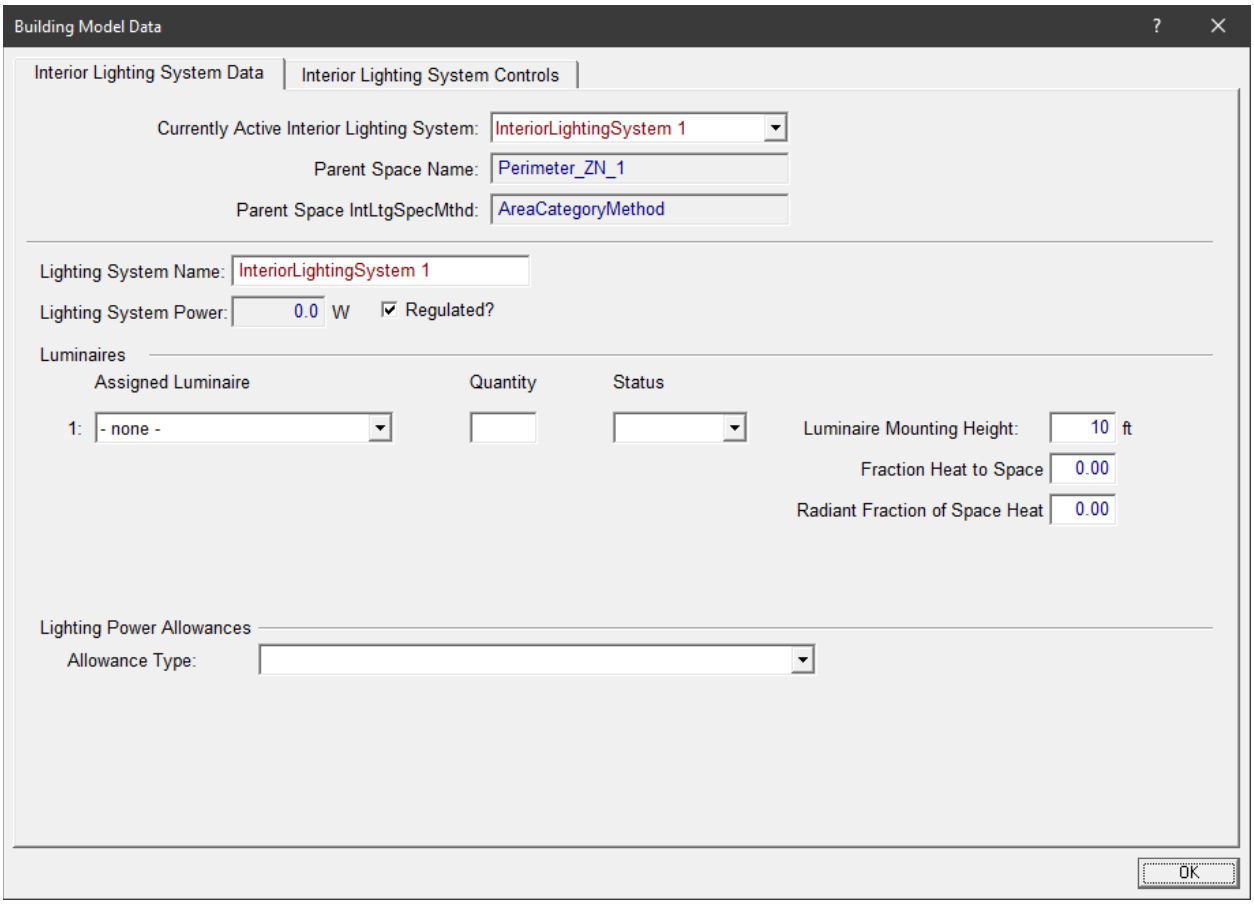
Natural Gas Use section

- **Gas Equipment:** The use of gas devices represented by a gas equipment annual average power density (Btu/h-ft2) and associated with the occupancy type selected from the Area Category Method in ACM Appendix 5.4A.
- **Gas Equipment (Schedule Name*)**: The use of gas equipment represented by a 24-hour schedule (fraction of density) associated with the occupancy type selected from the Area Category Method in ACM Appendix 5.4B.
- **Process Gas:** Process load is the gas energy consumption in the conditioned space of building resulting from an activity or treatment not related to the space conditioning, lighting, service water heating, or ventilating of a building as it relates to human occupancy. Process load may include convective (sensible) and/or latent components.
- **Process Gas (Radiant Frac.):** The fraction of radiant heat gain to a space based on appliance energy use. Fraction convective (sensible) is typically equal to 1.0 minus fraction radiant, minus fraction latent, minus fraction lost.
- **Process Gas (Latent Frac.):** The fraction of latent heat gain to a space based on appliance energy use. Fraction convective (sensible) is typically equal to 1.0 minus fraction radiant, minus fraction latent, minus fraction lost.
- **Process Gas (Lost Frac.):** The fraction of heat lost to the exterior is based on appliance energy use.
- **Process Gas (Schedule Name*):** The use of process gas represented by a 24 hour schedule (fraction of density) associated with the occupancy type selected from the Area Category Method in ACM Appendix 5.4B.

*Schedules will be defaulted for compliance analysis.

Interior Lighting System Data Screen

To access this screen, right click on a space and scroll down to **Create** in the drop-down box. Then click **InteriorLightingSystem.** The **Create InteriorLightingSystem** dialog box appears. Make your selections and click **OK.**



Input summary for Interior Lighting System Data:

- **Currently Active Interior Lighting System**: The name of the currently selected interior lighting system.
- **Parent Space Name**: The name of the parent space for the currently selected interior lighting system.
- **Parent Space IntLtgSpecMthd**: Interior lighting specification method.
- **Lighting System Name**: The name or description used to identify the interior lighting system.
- **Lighting System Power (W)**: Total connected lighting power for all the luminaires in an interior lighting system. This total includes the loads for lamps and ballasts.
- **Regulated?** (check box): Select to indicate whether the lighting system's power is Regulated vs. Non-Regulated. The field defaults to Regulated (checked).
- **Exclusion Type**: If the lighting system is Non-Regulated, select the exclusion type from the options listed.

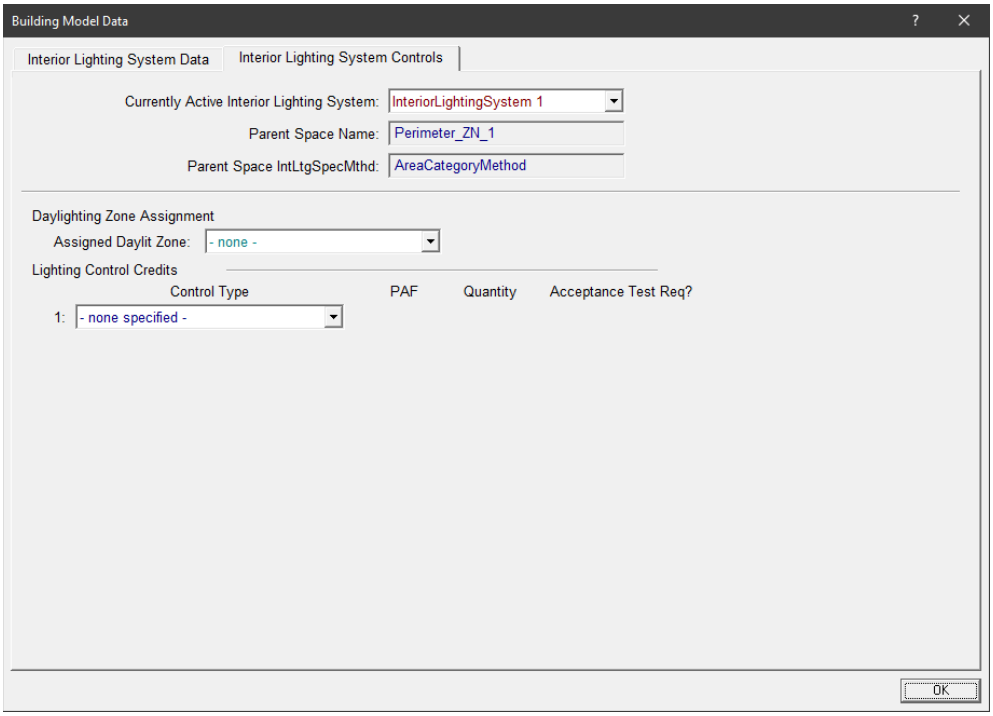
Luminaires section

- **Assigned Luminaire (1–5)**: Used to assign a Luminaire type to an interior lighting system.
- **Quantity (1–5)**: Quantity of each assigned luminaire type associated with the interior lighting.
- **Luminaire Mounting Height**: The Luminaire Height of an IntLtgSys, only necessary for Tailored Method Baseline General and Additional Lighting Power Allowances.
- **Fraction Heat to Space**: Fraction of interior lighting heat gain going to space air.
- **Radiant Fraction of Space Heat**: Fraction of interior lighting radiant heat gain going to space surfaces.

Lighting Power Allowances section

- **Allowance Type:** Custom Lighting Power Allowance Type for Interior Lighting Specified via Area Category Method. (Ornamental)
- **Allowance Area:** The Area (ft2) of which the Area Category or Tailored Allowance (W/ft2) is applied.

Interior Lighting System Controls section

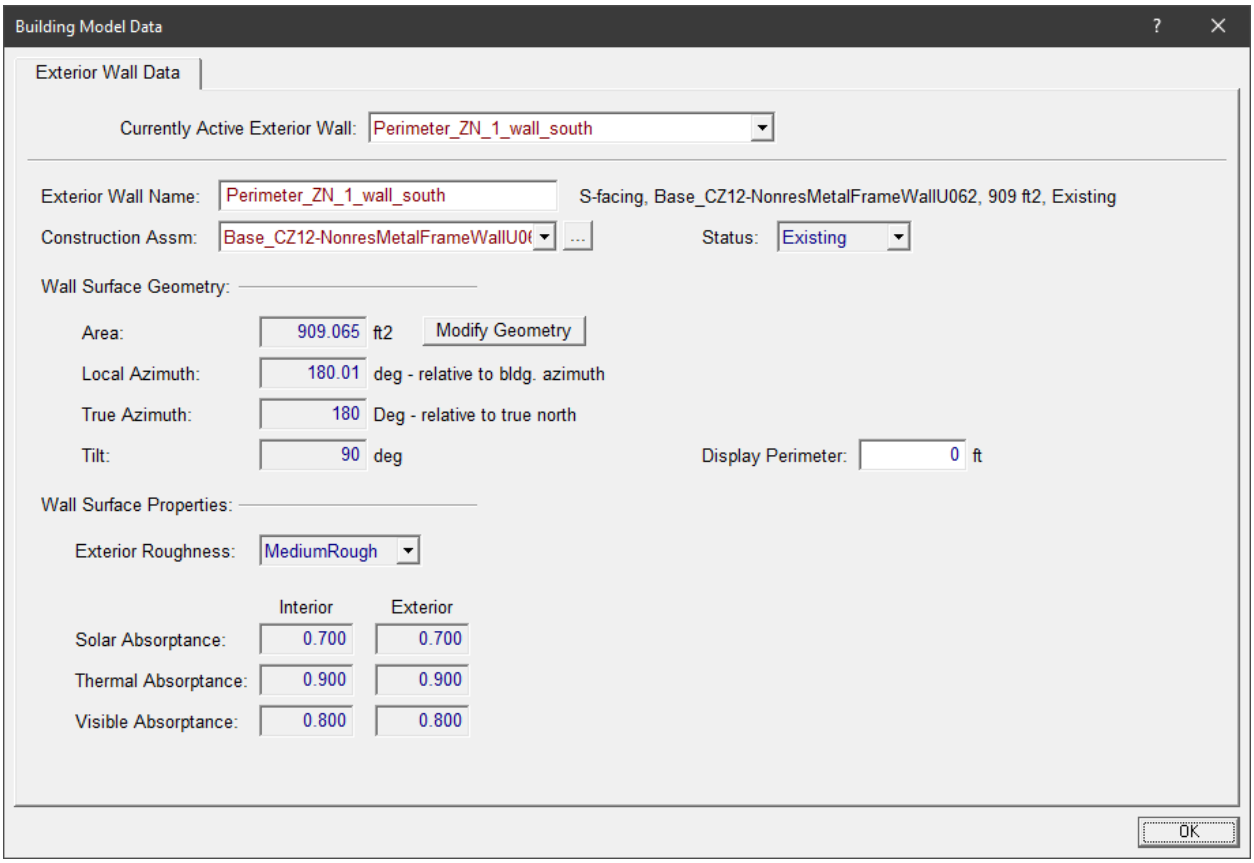


- **Assigned Daylit Zone**: Identifies the type of daylit area (Skylit, Primary Sidelit, Secondary Sidelit) in which 100% of the lights associated with the Interior Lighting System are located. A separate interior lighting system must be defined for luminaires associated with each of the Daylit Zone types (Skylit, Primary Sidelit, Secondary Sidelit, Uncontrolled).
- **Lighting Controls**: Selection of PAF Credit Type allows the software to apply the power adjustment factors (PAF) which represents the percent reduction in lighting power that will approximate the effect of the control. Models account for such controls by multiplying the controlled watts by (1-PAF).

- **Power Adjustment Factor**: Power adjustment factors (PAFs) represent the percent reduction in lighting power that will approximate the effect of the control. Models account for such controls by multiplying the controlled watts by (1-PAF).
- **Quantity**: Primarily for reporting purposes; identifies the number of lighting controls associated with a particular interior lighting system.

Exterior Wall Data Screen

To access this screen, under Space data double click Surface data (Exterior Wall icon).



Input summary for the Exterior Wall Data screen:

- **Currently Active Exterior Wall:** The name of the currently selected exterior wall.
- **Exterior Wall Name (N-Facing, 872 ft2):** The name or description used to identify the exterior wall.
- **Status**: The exterior wall status, which can be New, Existing, or Altered.
- **Construction Assm:** Select the construction assembly reference (construction name) for an exterior wall, or select create/import ExteriorWall ConstructionAssembly (and apply only here). (Input is optional). If you select create/import, the Create ConstructAssembly dialog box appears. Make selections and click **OK**. The Construction Assembly Data screen then appears. Make selections and click **OK**.

Wall Surface Geometry section

- **Area (ft2):** The area of the exterior wall.

- **Display Perimeter:** Display Perimeter of an individual wall.
- **Local Azimuth:** Azimuth of exterior wall w/r to building coordinated.
- **True Azimuth:** Azimuth of exterior wall w/r to true north.
- **Tilt:** The angle between the roof surface and horizontal.

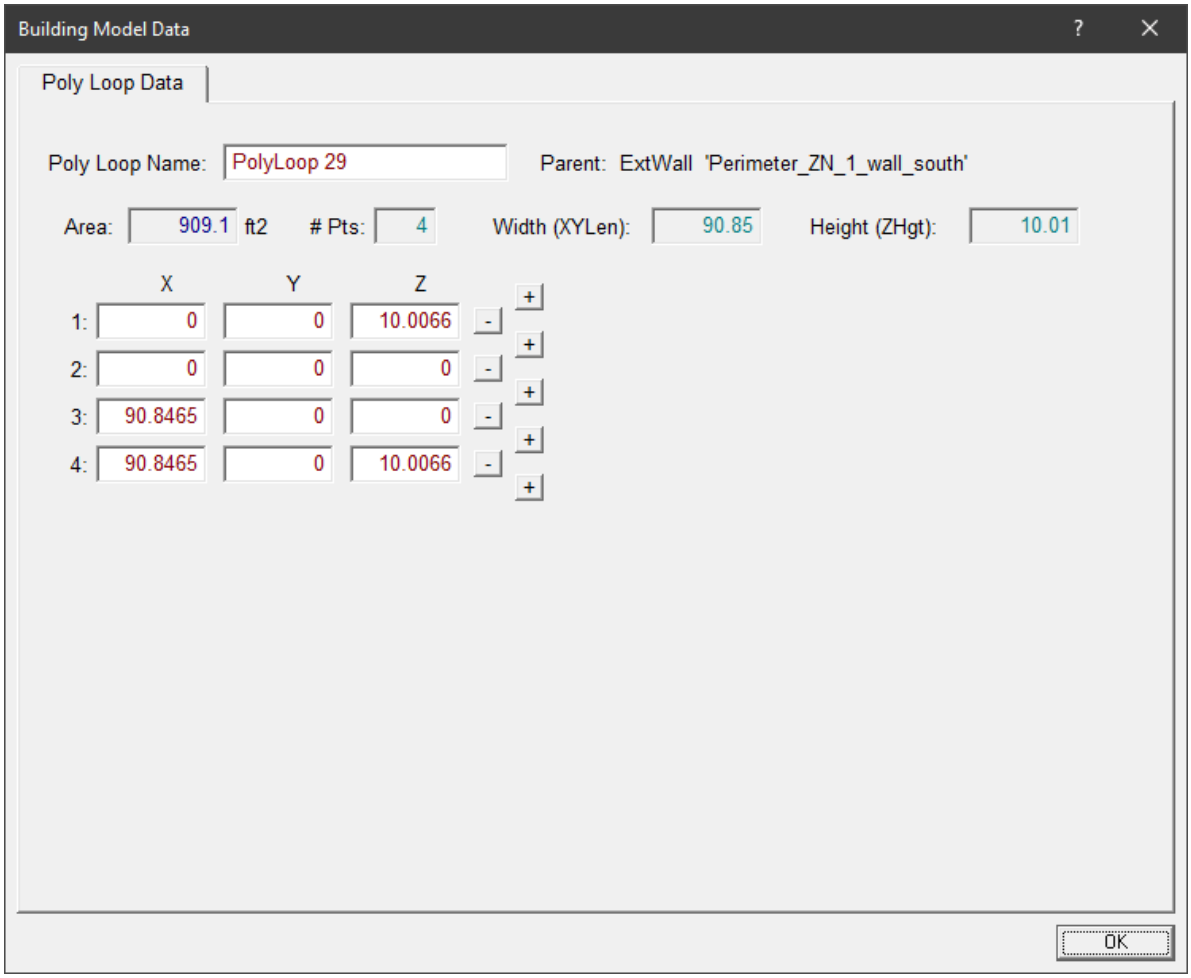
Wall Surface Properties section

- **Exterior Roughness:** Select the surface texture affecting convection.
- **Solar Absorptance:** The fraction of the solar energy absorbed by the wall.
- **Thermal Absorptance:** The fraction of infrared energy absorbed by the wall.
- **Visible Absorptance:** The fraction of visible light absorbed by the wall.

Modify Geometry button
To access surface geometry (child poly loop object), click this button. The **Poly Loop Data** screen appears (see screen below).

Poly Loop Data Screen

The **Poly Loop Data** screen is accessed by clicking the **Surface Geometry** button, which appears on the Surface Data screens. Enter data in the **Poly Loop Data** screen and click **OK**.



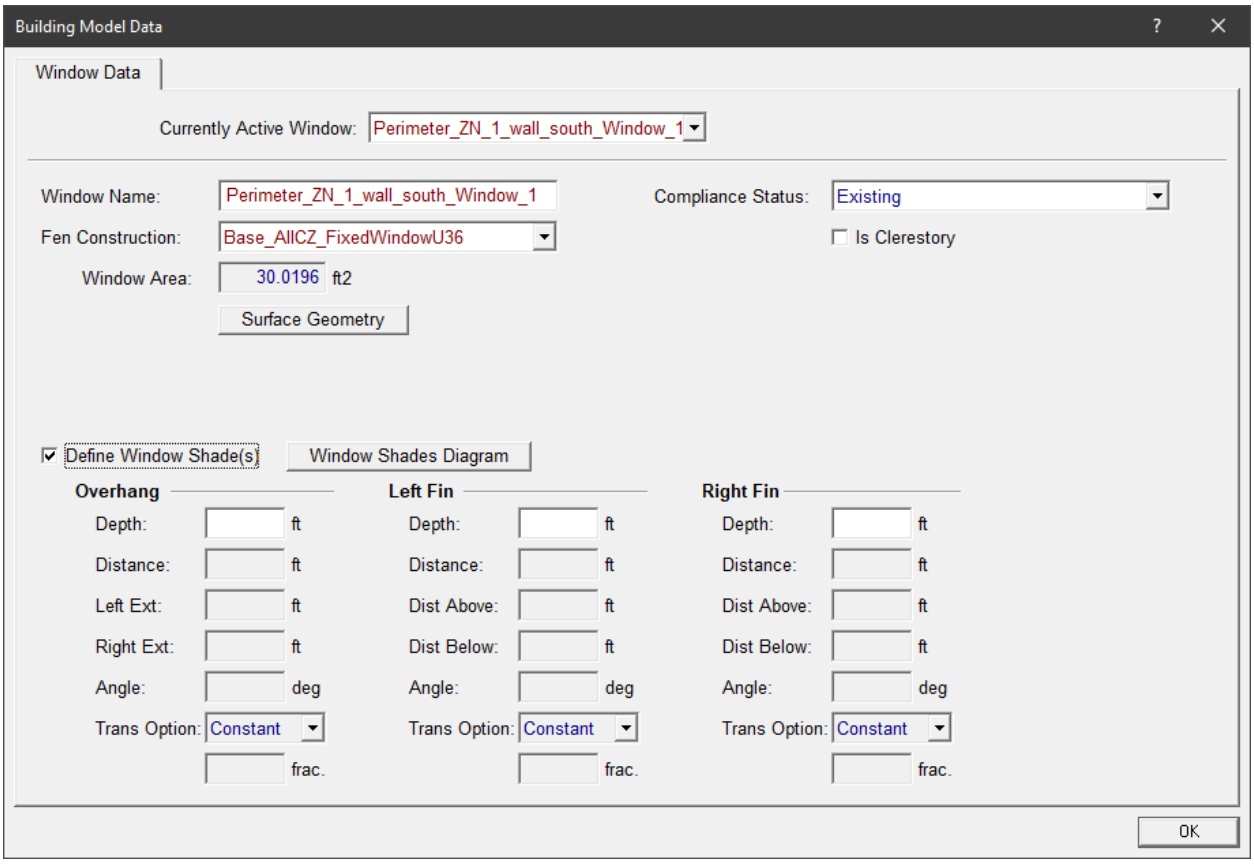
Input summary for the Poly Loop Data screen:

- **Poly Loop Name:** The name or description used to identify the Poly Loop.
- **Area:** Area of the Poly Loop.
- **# Pts**: The number of points.
- **Width (XYLen):** Width of the polygon calculated by the software based on the X/Y vertices..
- **Height (ZHgt)**: Range of Z coordinates in the polyloop..
- **X:** The X coordinate of a poly loop vertex.
- **Y:** The Y coordinate of a poly loop vertex.
- **Z:** The Z coordinate of a poly loop vertex.

Note: Use the plus and minus signs to insert and delete points. Deleting a point can cause the poly loop to no longer be valid.

Subsurface Data (Window) Screen

To access this screen, under **Surface** data, double click **SubSurface** data (Window icon).



Input summary for the SubSurface Window Data:

- **Currently Active Window:** The name of the currently selected window.
- **Compliance Status:** The compliance status of the window. Options are New, Altered, and Existing.
- **Window Name**: The name or description used to identify the window.

- **Fen Construction**: Select the Fenestration Construction reference for a window. Options are none, create new VerticalFenestration FenestrationConstruction (applied only here), or an existing construction. For a new fenestration construction, select the “create new” option, and the **Create FenestrationConstruction** dialog box appears. Input data and click **OK**. The Fenestration Construction Data screen appears.
- **Window Area** (ft2): Calculates area of each window.

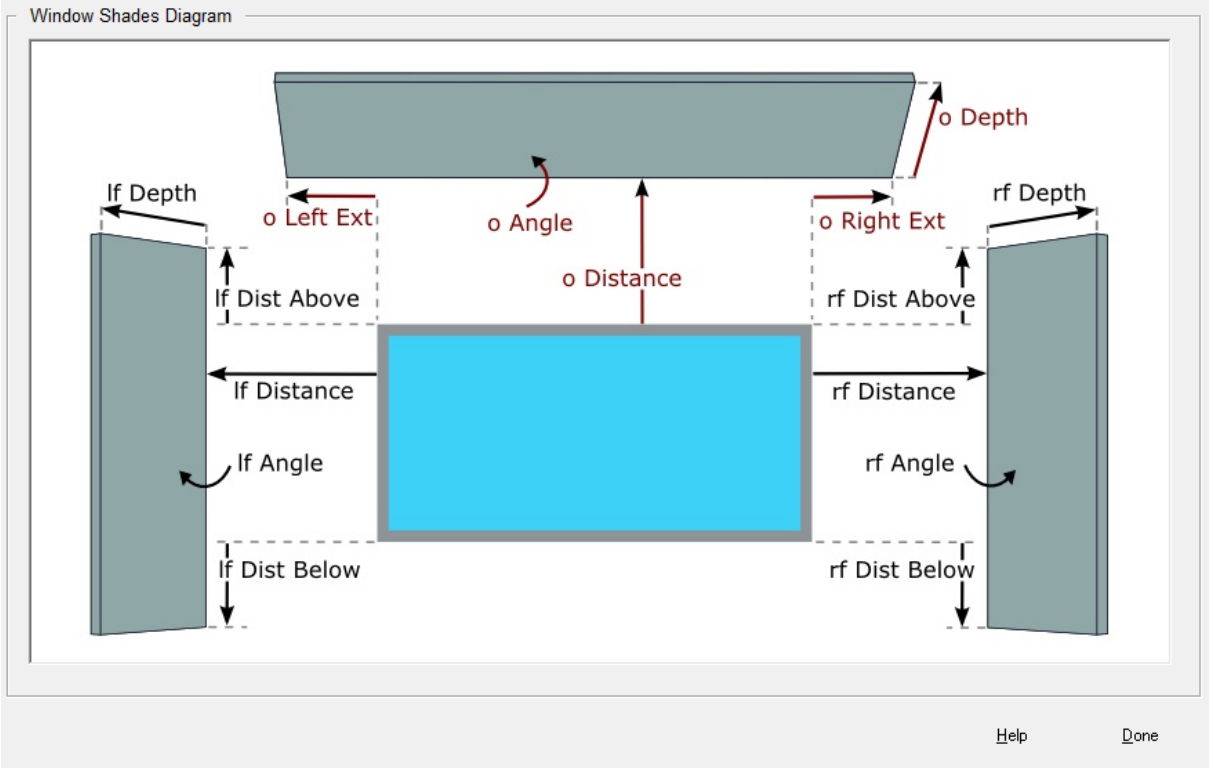
Surface Geometry button

To access surface geometry (child poly loop object), click this button and enter data in the Poly Loop Data screen. (See the Poly Loop Data Screen.)

- **Define Window Shade(s)** (check box): Select to specify data to describe window overhang and/or fins. Specify the dimensions of the shades from the Window Shades Diagram.

Window Shades Diagram button

Click this button to show the diagram for use in specifying the dimensions of the shades.

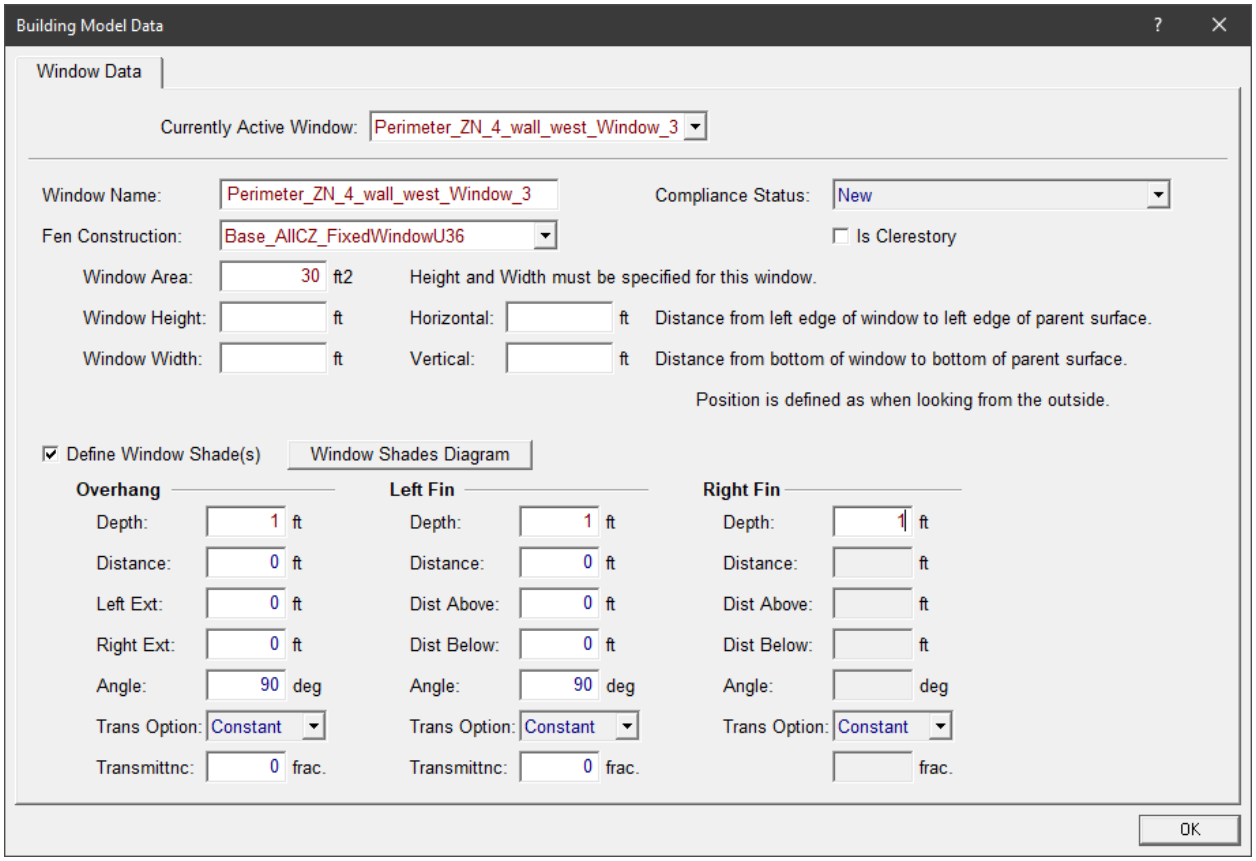


For Overhang, Left Fin, and Right Fin, enter the following data. (Input is optional.)

- **Depth** (Overhang, Left Fin, Right Fin): The depth the shade extends from the wall.
- **Distance** (Overhang, Left Fin, Right Fin)**:** The distance from the edge of the window to the base of the shade.
- **Left Ext** (Overhang): The distance the shade extends past the left edge of the window.
- **Right Ext** (Overhang): The distance the shade extends past the right edge of the window.
- **Dist Above** (Left and Right Fins): The distance the shade extends above the window.
- **Dist Below** (Left and Right Fins): The distance the shade extends below the window.
- **Angle** (Overhang, Left Fin, Right Fin)**:** The angle the shade is mounted relative to the window.
- **Trans Option** (Overhang, Left Fin, Right Fin)**:** Constant.

- **Frac.** (Overhang, Left Fin, Right Fin): The schedule defining the fraction of light that can pass through the shade.

For Simplified Geometry Projects, a few additional inputs are required for specifying window shades:

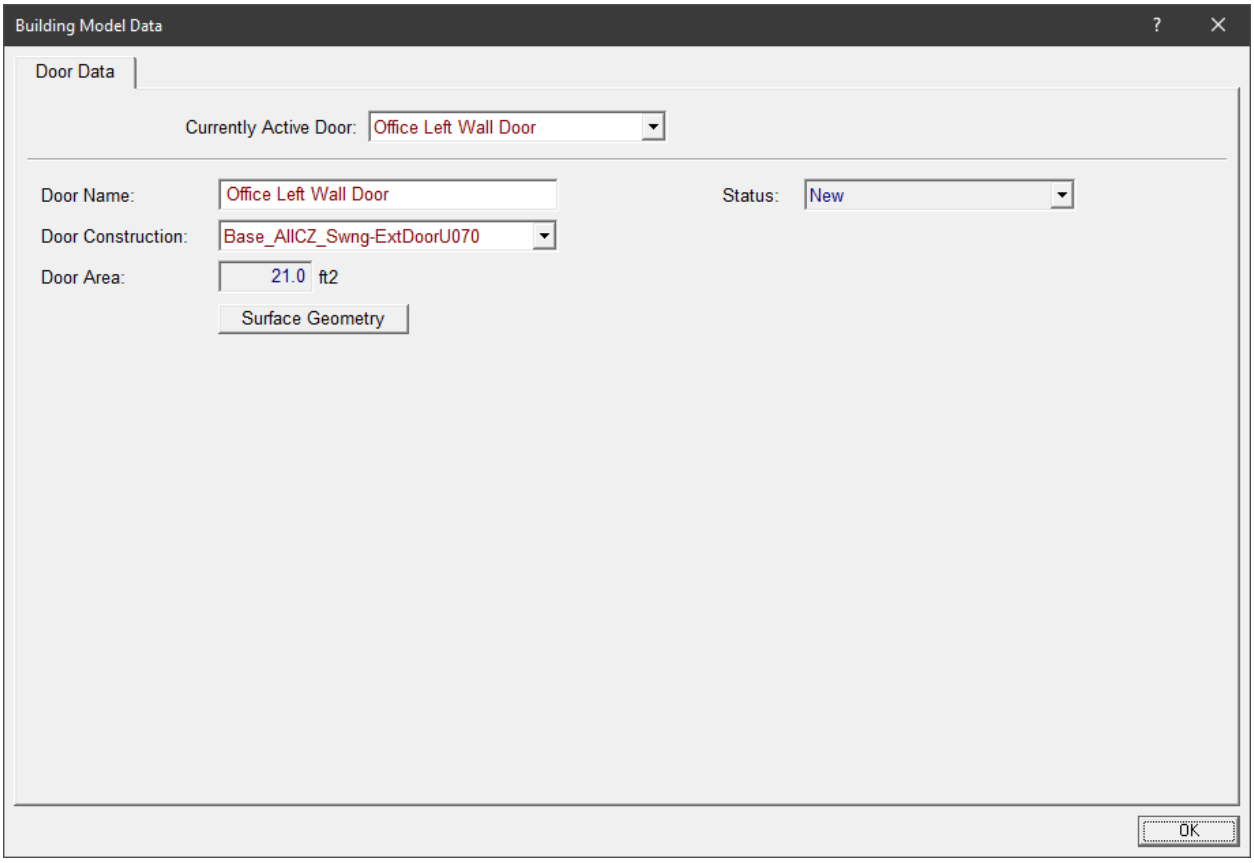


Input summary for the SubSurface Window Data in Simplified Geometry:

- **Currently Active Window:** The name of the currently selected window.
- **Compliance Status:** The compliance status of the window. Options are New, Altered, and Existing.
- **Window Name**: The name or description used to identify the window.
- **Fen Construction**: Select the Fenestration Construction reference for a window. Options are none, create new VerticalFenestration FenestrationConstruction (applied only here), or an existing construction. For a new fenestration construction, select the “create new” option, and the **Create FenestrationConstruction** dialog box appears. Input data and click **OK**. The Fenestration Construction Data screen appears.
- **Window Area** (ft2): Area of window.
- **Window Height** (ft): Height of window
- **Window Width** (ft): Width of window
- **Horizontal:** Distance of the left edge of the window from left edge of parent surface(exterior wall) when looking from outside
- **Vertical:** Distance of the bottom of the window from the bottom of the parent surface (exterior wall) when looking from outside.

SubSurface (Door) Data Screen

To access this screen, right click **Surface** (Exterior Wall icon) and scroll down to **Create** in the drop-down box. Then click **Door.** The **Create Door** dialog box appears. Make your selections and click **OK.**



Input summary for SubSurface data (Door Data):

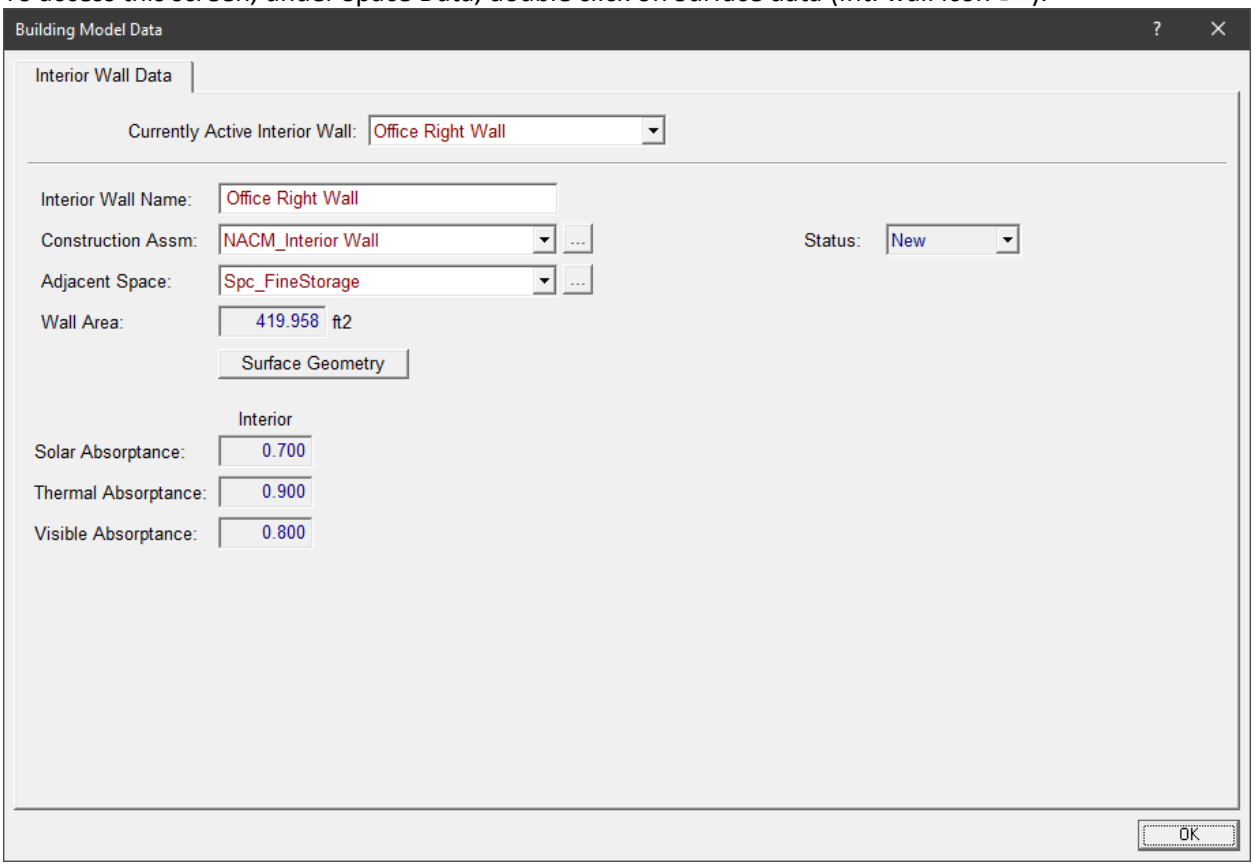
- **Currently Active Door**: Select the name of the currently selected door, or create new Door. The Create Door dialog box appears. Make selections and click **OK**. The new door is shown in the project tree.
- **Door Name**: The name or description used to identify the door.
- **Status:** The compliance status of the door.
- **Door Construction**: Select the door construction (input is optional). Options are none, and create/import DoorConstruction.

Surface Geometry button

To access surface geometry (child poly loop object), click this button and enter data in the Poly Loop Data screen. (See the Poly Loop Data Screen.)

Surface Data (Interior Wall) Screen

To access this screen, under Space Data, double click on Surface data (Int. wall icon).



Input summary for Surface Data (Interior Wall):

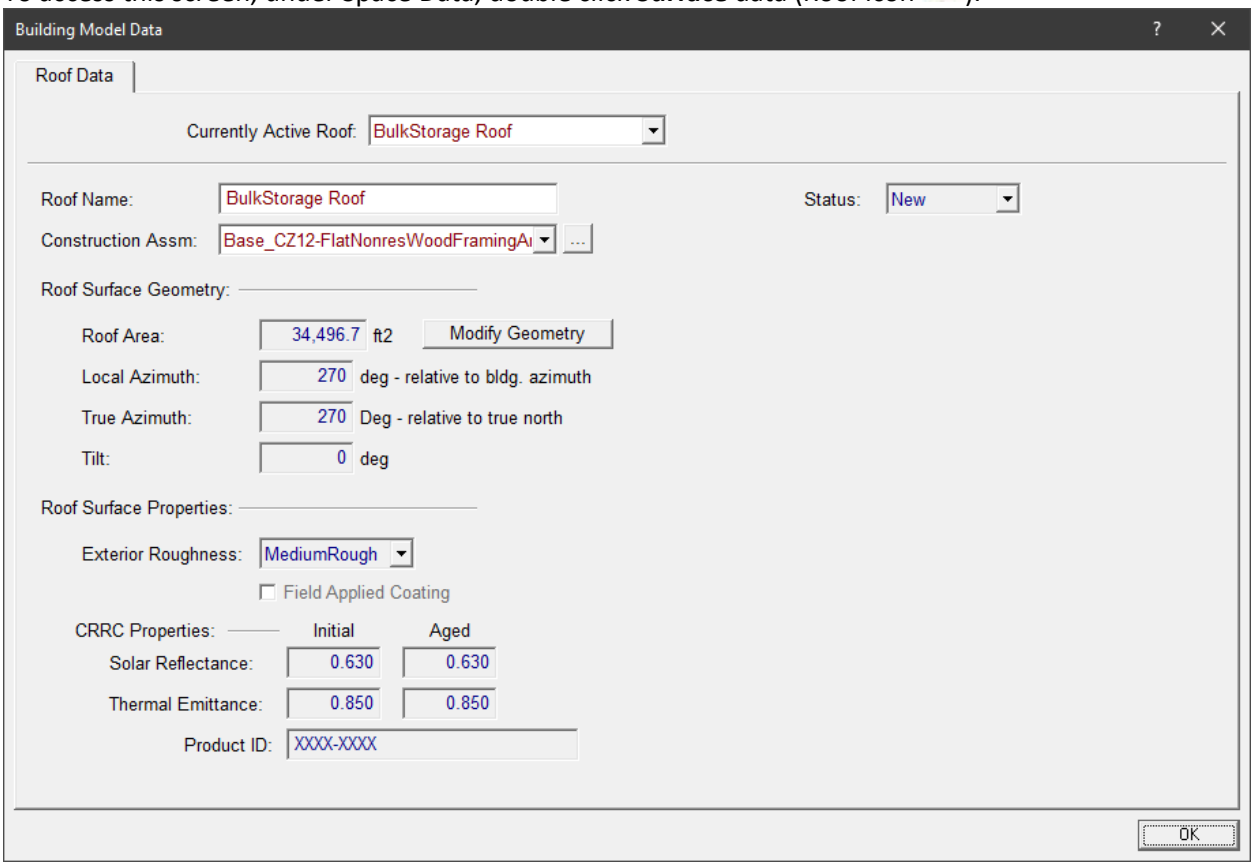
- **Currently Active Interior Wall**: The name of the currently selected interior wall.
- **Interior Wall Name**: The name or description used to identify the interior wall.
- **Construction Assm**: Select the Construction assembly reference (construction name) for a demising wall (input is optional). A reference to a construction assembly. Options are none, an existing option, or create new InteriorWall ConstructAssembly.
- **Status: T**he compliance status of the door.
- **Adjacent Space**: Select the space on the other side of an interior partition.
- **Wall Area (ft2)**: The area of the interior wall.
- **Solar Absorptance:** The fraction of the solar energy absorbed by the wall.
- **Thermal Absorptance:** The fraction of infrared energy absorbed by the wall.
- **Visible Absorptance:** The fraction of visible light absorbed by the wall.

Surface Geometry button

To access surface geometry (child poly loop object), click this button and enter data in the Poly Loop Data screen. (See the Poly Loop Data Screen.)

Roof Data (Surface Data) Screen

To access this screen, under Space Data, double click **Surface** data (Roof icon).



Input summary for Surface Data (Roof):

- **Currently Active Roof**: The name of the currently selected roof.
- **Roof Name**: A unique name that identifies the roof.
  A unique name or code that identifies the roof and ties it to the construction documents submitted for energy code review. It is not mandatory to name roofs.
- **Status**: The roof's compliance status.
- **Construction Assm**: Select the construction assembly reference for a roof (input is optional). Options are none, an existing option, or create/import Roof ConstructAssembly. If you select create/import , the Create ConstructAssembly dialog box appears. Make selections and click **OK**. The Construction Assembly Data screen then appears. Make selections and click **OK.**

Roof Surface Geometry section

- **Roof Area**: Calculate area of each roof (not editable).
- **Local Azimuth:** Angle between roof vector 'P' and True North as defined by NVector
- **True Azimuth:** The Azimuth of a surface with respect to true north
- **Tilt (deg):** The angle between the roof surface and horizontal

Roof Surface Properties section

- **Exterior Roughness**: The surface texture affecting convection. Options are VeryRough, Rough, MediumRough, MediumSmooth, Smooth, and VerySmooth.

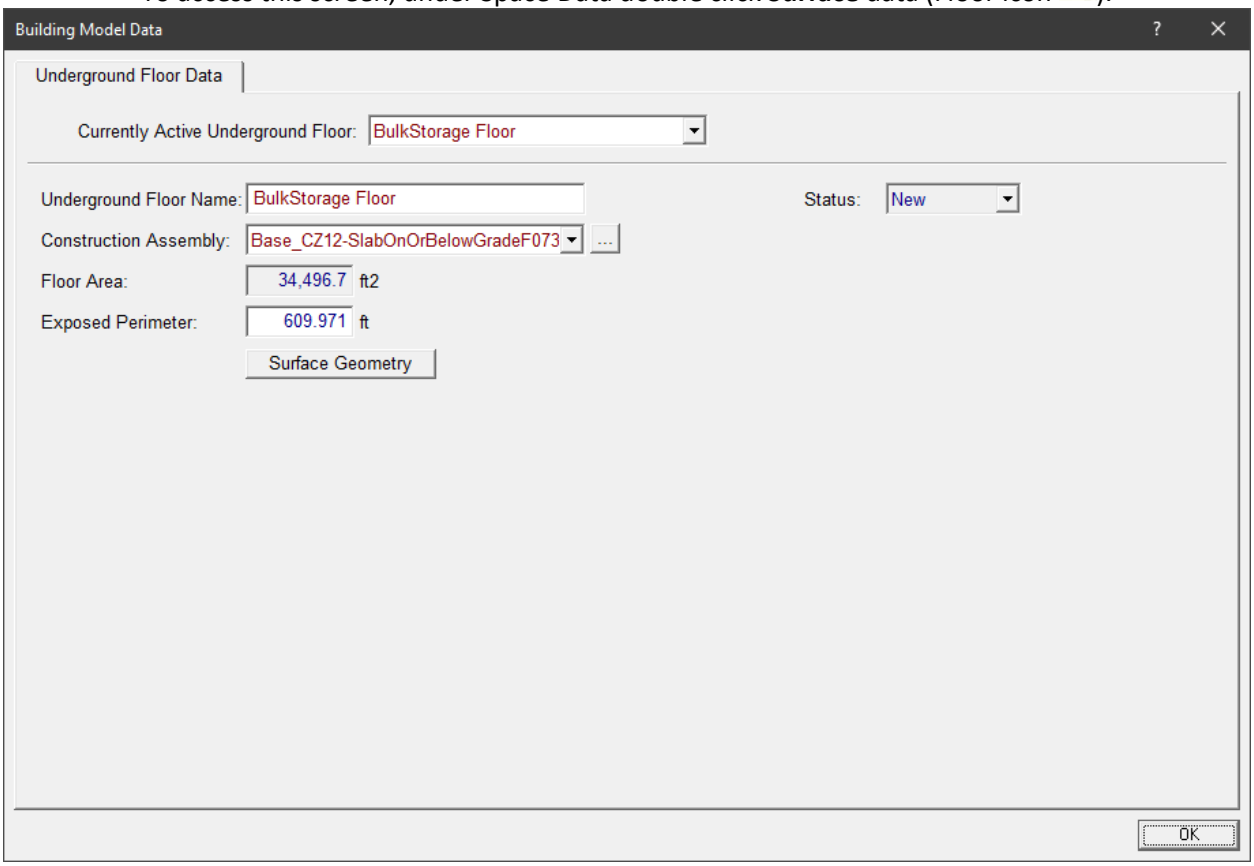
- **Field Applied Coating** (check box): Option checked if a coating was applied in the field.
- **Solar Reflectance (Initial)**: The fraction of solar energy reflected by the initial coating.
- **Solar Reflectance (Aged)**: The fraction of solar energy reflected by the aged coating.
- **Thermal Emittance (Initial):** The fraction infrared energy emitted by the initial coating.
- **Thermal Emittance (Aged):** The fraction infrared energy emitted by the aged coating.
- **Product ID**: The unique identifier of the coating.

Modify Geometry button

To access surface geometry (child poly loop object), click this button. Enter data in the Poly Loop Data screen and click **OK**. (See the Poly Loop Data Screen.)

Underground Floor Data (Surface Data) Screen

To access this screen, under Space Data double click **Surface** data (Floor icon).



Input summary for Underground Floor (Surface data):

- **Currently Active Underground Floor**: The name of the currently selected underground floor.
- **Underground Floor Name**: The name or description used to identify the underground floor.
- **Status**: The underground floor's compliance status.
- **Construction Assembly**: Select the construction assembly reference (construction name) for an Underground Floor (input is optional). A reference to a construction assembly. Options are none, an existing option, and create/import UndergroundFloor ConstructAssembly.
- **Floor Area (ft2)**: The area of the floor.

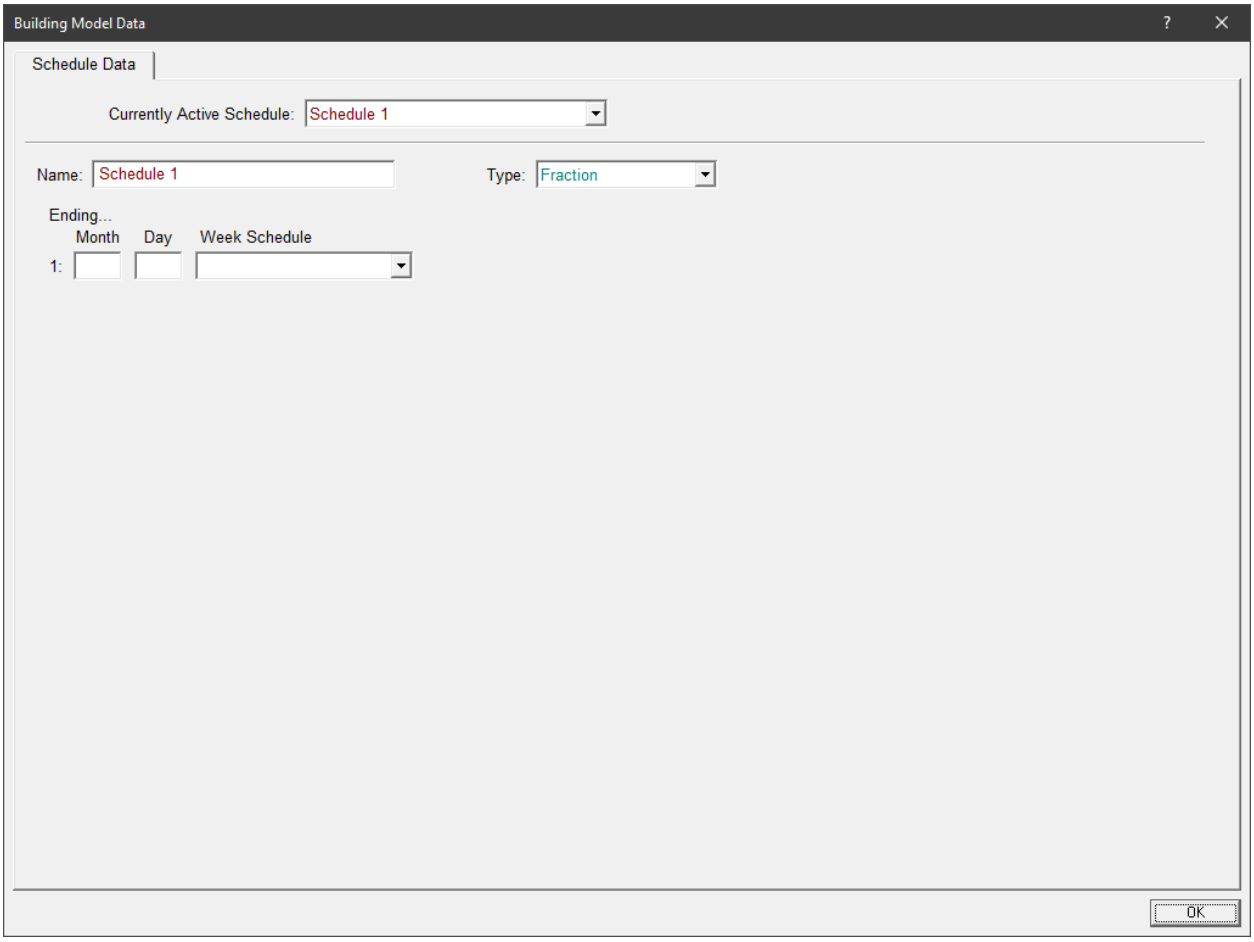
- **Exposed Perimeter (ft)**: The area of the exposed floor.

Surface Geometry button

To access surface geometry (child poly loop object), click this button and enter data in the Poly Loop Data screen. (See the Poly Loop Data Screen.)

Schedules Data Screen

To access this screen, under Project name, expand **Schedules** (by clicking on the plus sign), and double click an option (Schedule icon).



Input summary for **Schedule** Data:

- **Currently Active Schedule**: The name of the currently active schedule.
- **Name**: The name of the schedule.
- **Type**: Select a schedule control mechanism. Options are Fraction, OnOff, and Temperature.

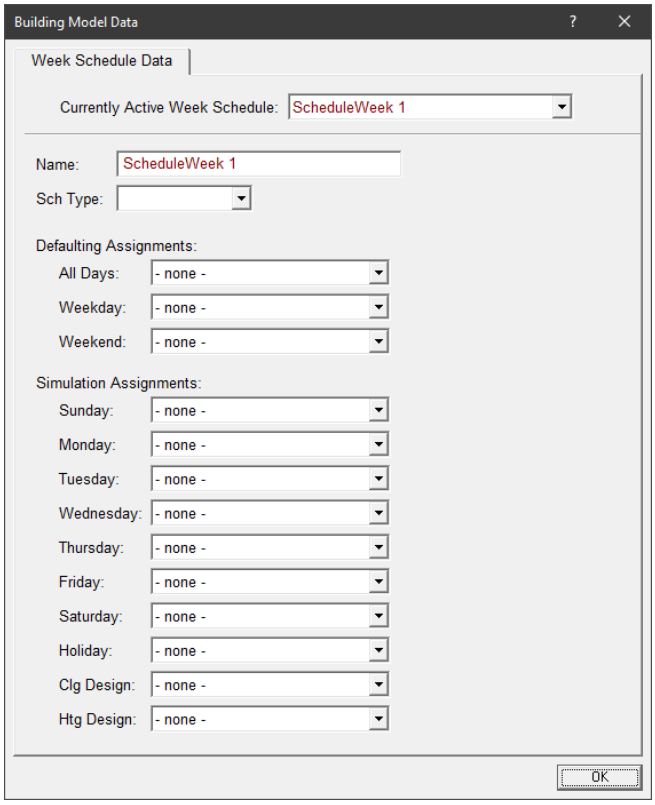
Ending…

- **Month**: Index of ending month (1–12) for the first referenced week schedule.
- **Day**: Index of ending day (1–31) for the first referenced week schedule.

- **Week Schedule:** Select the week schedule used in the time period. Options are create/import Temperature ScheduleWeek, School Occup Week, Cooling Tstat Week, and Heating Tstat Week.

Schedules Weeks Data (Weekly) Screen

To access this screen, under Project name expand **ScheduleWeeks** (by clicking the plus sign), and double click an option (Schedule icon).



Input summary for **ScheduleWeeks** data:

- **Currently Active Week Schedule**: The name of the currently selected week schedule.
- **Name:** The name of the schedule.
- **Sch Type:** Select a schedule control mechanisms. Options are Fraction, OnOff, Temperature, and ThrmlEngyStor Mode.

Defaulting Assignments section

- **All Days:** Select an All Days schedule or create/import Fraction ScheduleDays. (Input is optional.)
- **Weekday:** Select a Weekday schedule or create/import Fraction ScheduleDays. (Input is optional.)
- **Weekend:** Select a Weekend schedule or create/import Fraction ScheduleDays. (Input is optional.)

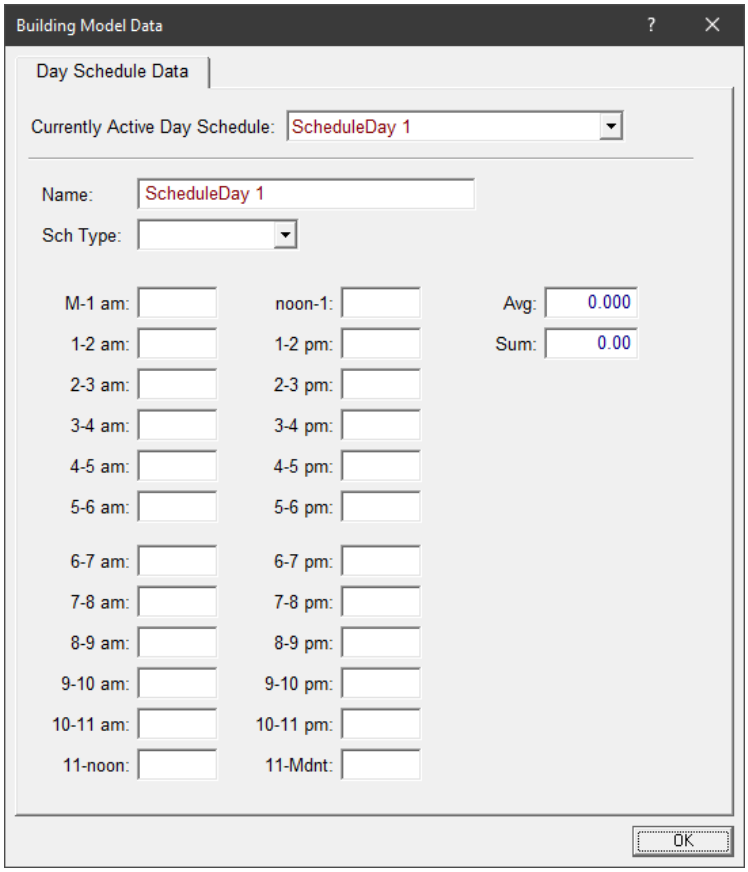
Simulation Assignments section

- **Sunday**: Select the Sunday schedule, or create/import Fraction ScheduleDay. (Input is optional.)

- **Monday**: Select the Monday schedule, or create/import Fraction ScheduleDay. (Input is optional.)
- **Tuesday**: Select the Tuesday schedule, or create/import Fraction ScheduleDay. (Input is optional.)
- **Wednesday**: Select the Wednesday schedule, or create/import Fraction ScheduleDay. (Input is optional.)
- **Thursday**: Select the Thursday schedule, or create/import Fraction ScheduleDay. (Input is optional.)
- **Friday**: Select the Friday schedule, or create/import Fraction ScheduleDay. (Input is optional.)
- **Saturday:** Select the Saturday schedule, or create/import Fraction ScheduleDay. (Input is optional.)
- **Holiday**: Select the Holiday schedule, or create/import Fraction ScheduleDay. (Input is optional.)
- **Clg Design:** Select the Cooling Design (sizing) day schedule, or create/import Fraction ScheduleDay. (Input is optional.)
- **Htg Design**: Select the Heating Design (sizing) day schedule, or create/import Fraction ScheduleDay. (Input is optional.)

Schedules Days Data (Daily) Screen

To access this screen, under Project name expand **ScheduleDays** (by clicking the plus sign), and double click an option (Schedule icon).

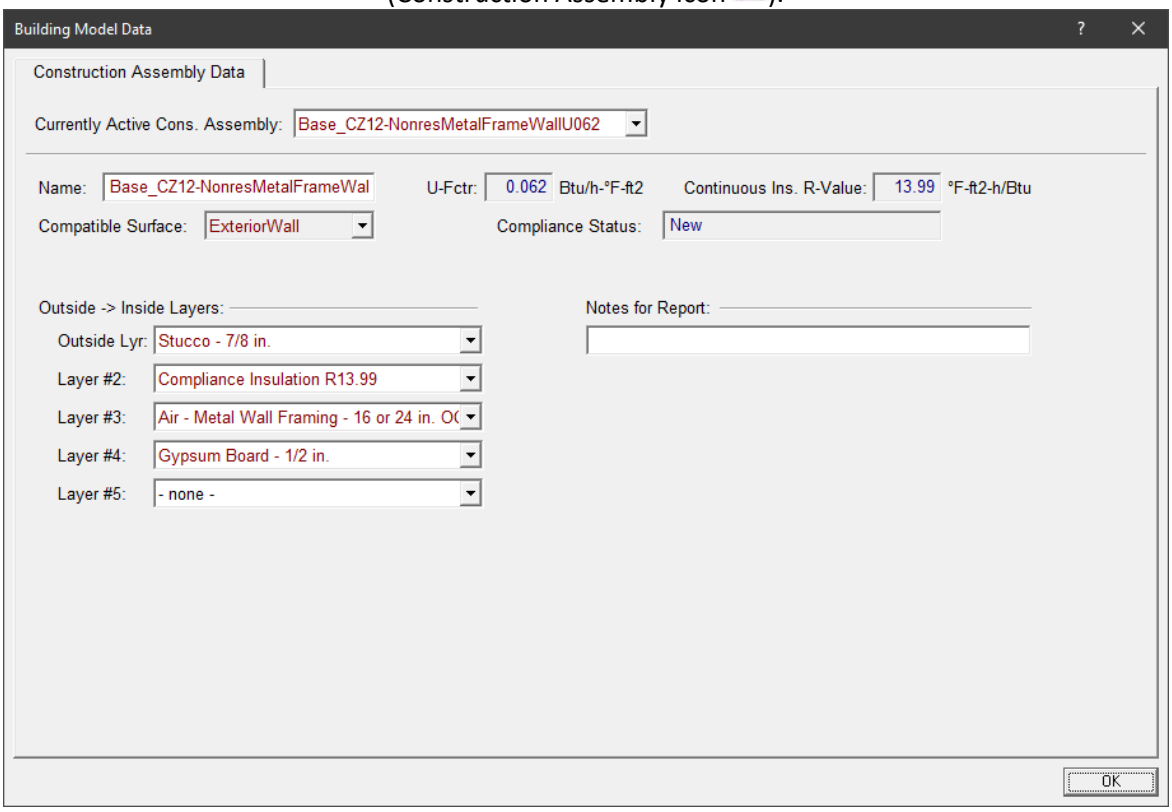


Input Summary screen for **ScheduleDays** data:

- **Currently Active Day Schedule**: The name of the currently selected day schedule.
- **Name:** The name or description used to identify the day schedule.
- **Sch Type**: Select the schedule control mechanisms. Options are Fraction, OnOff, and Temperature.
- **Avg**: The average of hourly schedule values.
- **Sum**: The sum of hourly schedule values.
- **M-1 am**: One hour occurrence between midnight and 1 a.m.
- **1-2 am**: One hour occurrence between 1 a.m. and 2 a.m.
- **2-3 am:** One hour occurrence between 2 a.m. and 3 a.m.
- **3-4 am**: One hour occurrence between 3 a.m. and 4 a.m.
- **4-5 am**: One hour occurrence between 4 a.m. and 5 a.m.
- **5-6 am**: One hour occurrence between 5 a.m. and 6 a.m.
- **6-7 am**: One hour occurrence between 6 a.m. and 7 a.m.
- **7-8 am**: One hour occurrence between 7 a.m. and 8 a.m.
- **8-9 am**: One hour occurrence between 8 a.m. and 9 a.m.
- **9-10 am**: One hour occurrence between 9 a.m. and 10 a.m.
- **10-11 am**: One hour occurrence between 10 a.m. and 11 a.m.
- **11-noon**: One hour occurrence between 11 a.m. and noon.
- **noon-1**: One hour occurrence between noon and 1 p.m.
- **1-2 pm**: One hour occurrence between 1 p.m. and 2 p.m.
- **2-3 pm**: One hour occurrence between 2 p.m. and 3 p.m.
- **3-4 pm**: One hour occurrence between 3 p.m. and 4 p.m.
- **4-5 pm**: One hour occurrence between 4 p.m. and 5 p.m.
- **5-6 pm**: One hour occurrence between 5 p.m. and 6 p.m.
- **6-7 pm**: One hour occurrence between 6 p.m. and 7 p.m.
- **7-8 pm**: One hour occurrence between 7 p.m. and 8 p.m.
- **8-9 pm:** One hour occurrence between 8 p.m. and 9 p.m.
- **9-10 pm**: One hour occurrence between 9 p.m. and 10 p.m.
- **10-11 pm**: One hour occurrence between 10 p.m. and 11 p.m.
- **11-Mdnt**: One hour occurrence between 11 p.m. and midnight.

Construction Assembly Data Screen

To access this screen, under Project name expand **ConstructAssemblies** and double click an option (Construction Assembly icon).



Note: This example above does not represent an actual construction. Please refer to your project construction documents for the appropriate layers

Input summary for **ConstructAssemblies** data:

- **Currently Active Cons. Assembly:** The name of the currently selected construction assembly.
- **Name:** The name or description used to identify the construction assembly.
- **U-Fctr:** The overall U Factor of the selected Construction Assembly.
- **Continuous Ins. RValue:** The sum of the continuous insulation RValues for each construction assemblies.
- **Compatible Surface:** The type of surface object that this construction assembly is assigned to.

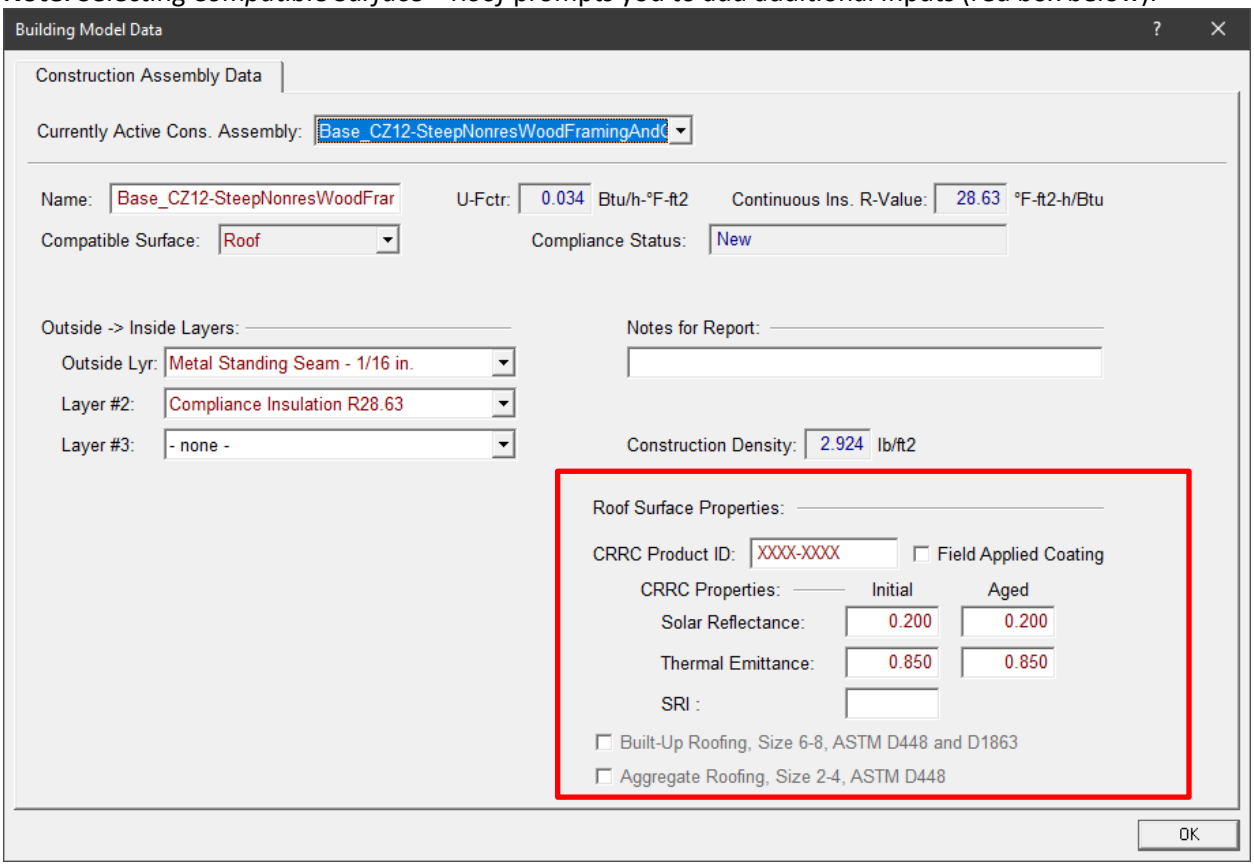
Outside -> Inside Layers section

- **Outside Lyr:** Select the material specified in the outside layer, or select create/import Material.
- **Layer #2:** Select the material specified in the second layer, or select create/import Material.
- **Layer #3:** Select the material specified in the third layer, or select create/import Material.
- **Layer #4:** Select the material specified in the fourth layer, or select create/import Material.
- **Layer #5:** Select the material specified in the fifth layer, or select create/import Material.
- **Notes for Report:** Enter notes about the construction assembly that will be added to the report.

Construction Assembly Data Screen (Compatible Surface = Roof)

To access this screen, under Project name expand **ConstructAssemblies** and double click a Roof option (Construction Assembly icon).

Note: Selecting *Compatible Surface = Roof* prompts you to add additional inputs (red box below).



Note: This example above does not represent an actual construction. Please refer to your project construction documents for the appropriate layers

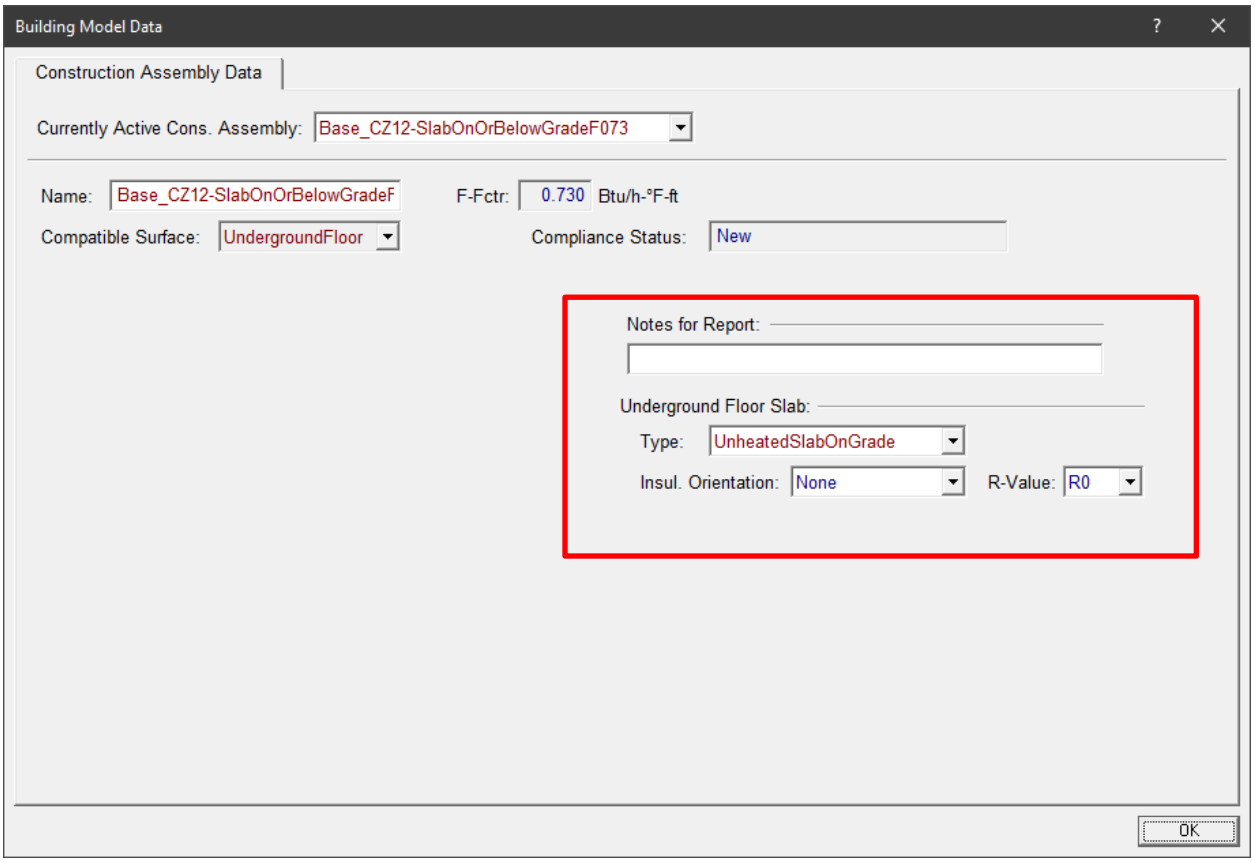
Input summary for the **Roof Surface Properties** section (see red box):

- **Product >= 25 lb ft2:** Check box for Products >= 25 lb/ft2.
- **CRRC Product ID**: A string of letters or numbers serving as a unique identifier of the coating.
- **Field Applied Coating** (check box): A flag to indicate if the roofing surface is from a coating applied on site or not.
- **Solar Reflectance** (Initial): The Initial Reflectance value from Cool Roof Rating Council (CRRC) testing of the roofing.
- **Solar Reflectance** (Aged): The Aged Reflectance value from CRRC testing of the roofing.
- **Thermal Emittance** (Initial): The Initial Emittance value from CRRC testing of the roofing.
- **Thermal Emittance** (Aged): The Aged Emittance value from CRRC testing of the roofing.
- **SRI:** The solar reflectance index.
- **Built-Up Roofing, Size 6-8, ASTM D448 and D1896:** check this box for built up roofing with size 6-8 complying with ASTM D448 and D1896
- **Aggregate Roofing, Size 2-4, ASTM D448**: check this box for aggregate roofing with size 2-4 complying with ASTM D448
- **Construction Density:** The density of the roof construction in lb/ft2.

Construction Assembly Data Screen (Compatible Surface = UndergroundFloor)

To access this screen, under Project name expand **ConstructAssemblies** and double click (Underground Floor) option (Construction Assembly icon).

Note: Selecting *Compatible Surface = UndergroundFloor* prompts you to add additional inputs (see the red box below).



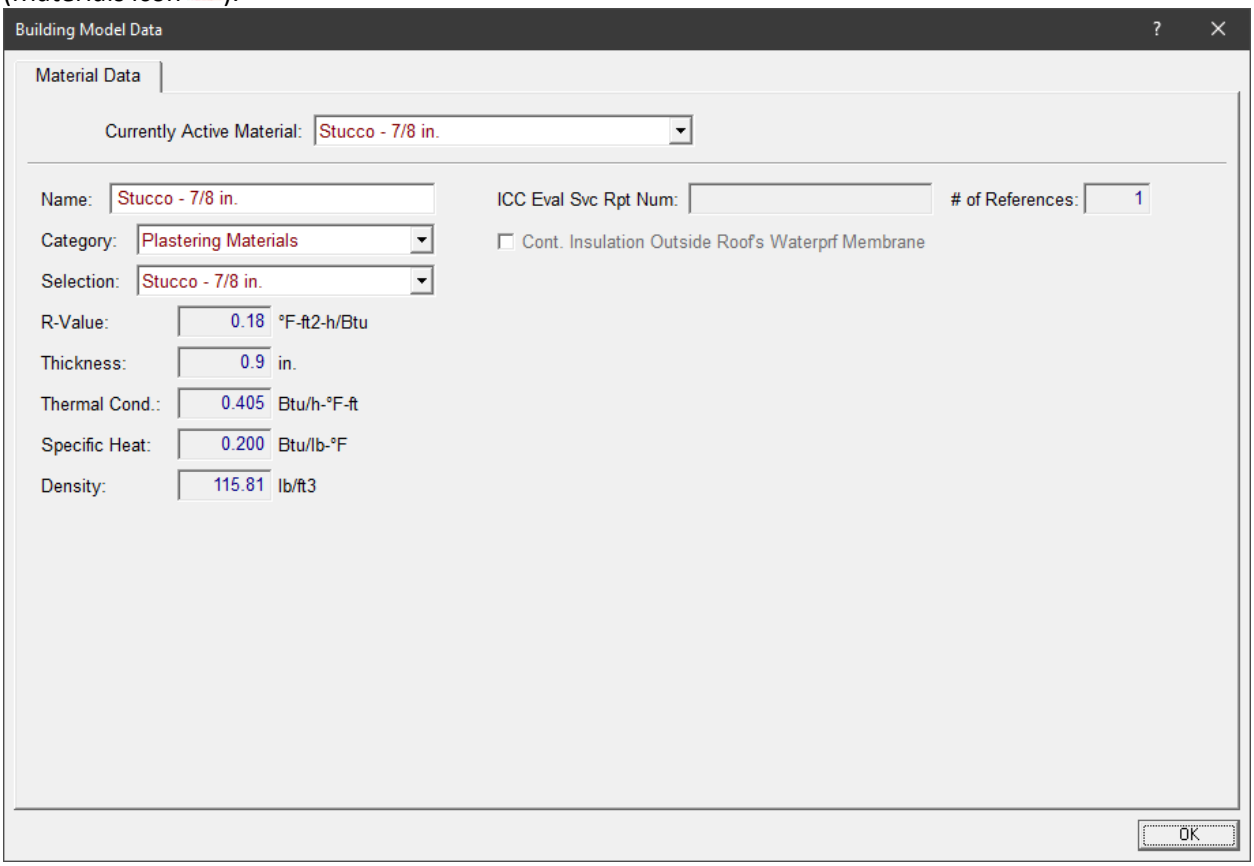
Note: This example above does not represent an actual wall construction. Please refer to your project construction documents for the appropriate layers

Input summary for **Underground Floor Slab** section (red box):

- **Notes for Report**: Enter notes for report. (Input is optional.)
- **Type:** Select the Underground slab type. Available options are HeatedSlabOnGrade, HeatedSlabBelowGrade, UnheatedSlabOnGrade, and UnheatedSlabBelowGrade.
- **Insul. Orientation**: Select the location and extent of slab-on-grade floor insulation.
- **R-Value**: Select the nominal R-value of the underground floor slab.

Material Data (Single Layer) Screen (Category = Stucco)

To access this screen, under Project name expand **Materials** and double click the **Stucco** option (Materials icon).

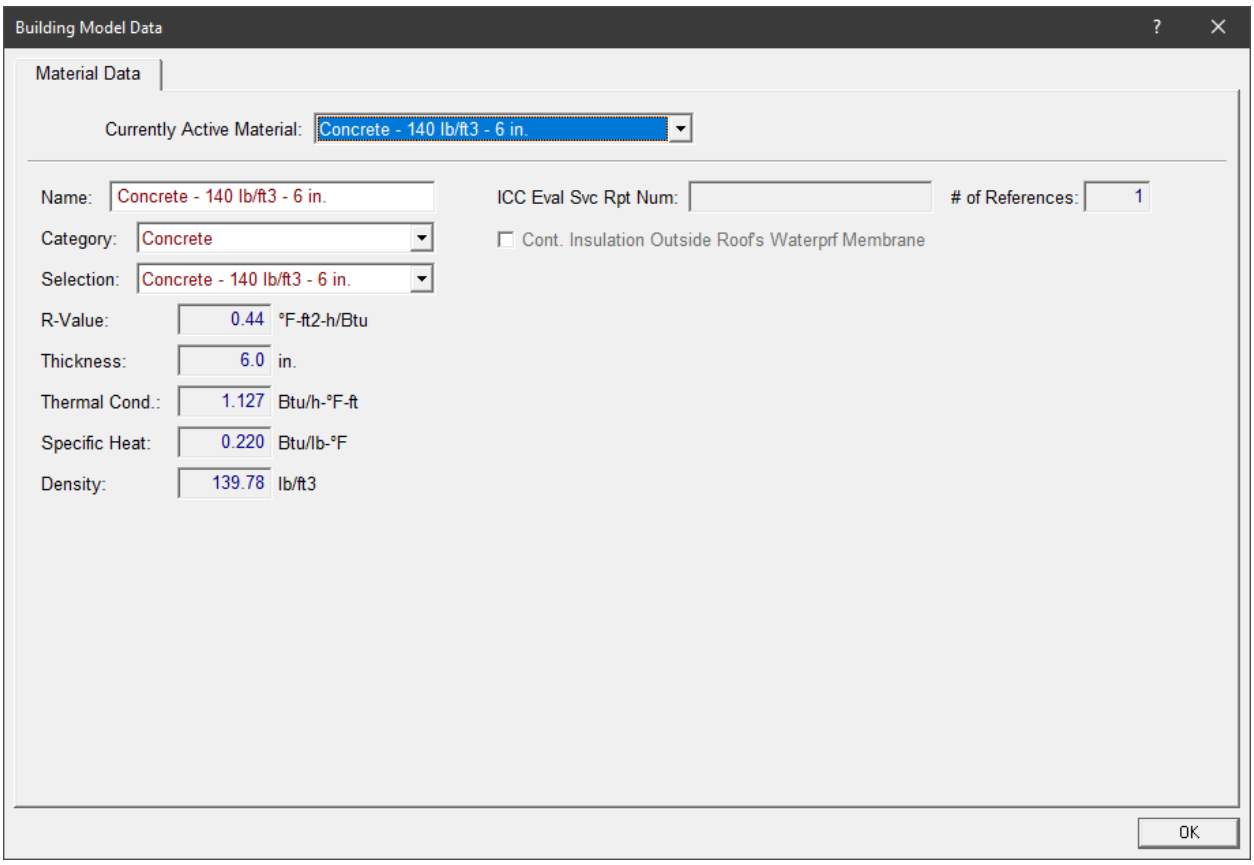


Input summary for **Material Data** screen (single layer):

- **Currently Active Material**: The name of the currently selected active material.
- **Name:** The name or description used to identify the active material.
- **Category:** Select the name or code for a type of material used as a layer in construction assemblies.
- **Selection:** Select the material used from the available options.
- **ICC Eval Svc Rpt Num:** The ICC Evaluation Service Report number for a spray foam or other non-standard insulating product.
- **Cont. Insulation Outside Roof's Waterprf Membrane** (check box): Check if insulation is installed completely on the outside of the roof's waterproof membrane.
- **# of References:** The number of times this material is referenced by ConsAssm objects.
- **FrmDpth:** The depth (in inches) of composite layer cavity.
- **SimpleR:** The R-value of the composite layer.
- **R-Value:** The R-value of the material.
- **Thickness:** The thickness of the material.
- **Thermal Cond.:** The thermal conductivity of the material.
- **Specific Heat:** The specific heat of the material.
- **Density**: The density of the material.

Materials Data (Single Layer) Screen (Category = Concrete)

To access this screen, expand **Materials** and double click the **Concrete** option (Materials icon).



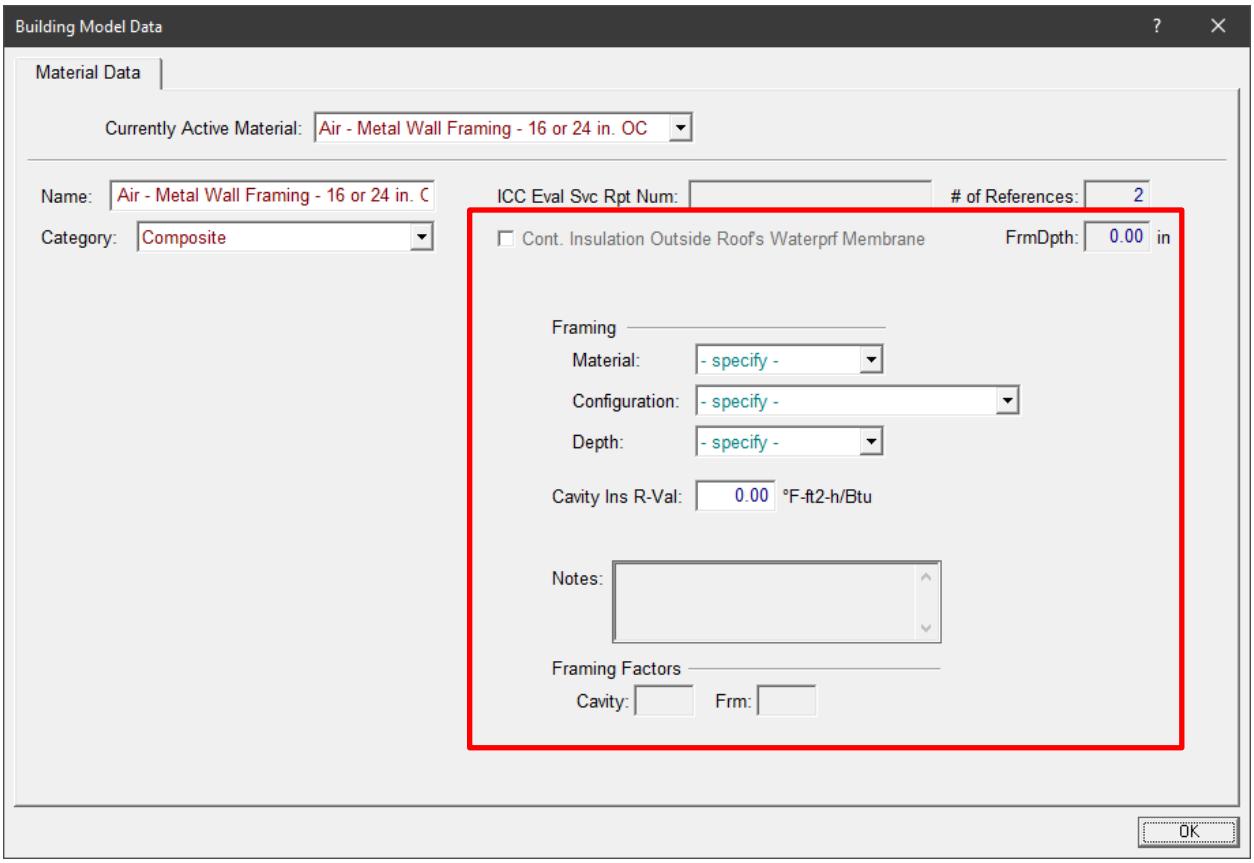
Input summary for **Material Data** screen (Concrete):

- **Currently Active Material**: The name of the currently selected active material.
- **Name:** The name or description used to identify the active material.
- **Category:** Select the name or code for a type of material used as a layer in construction assemblies.
- **ICC Eval Svc Rpt Num:** The ICC Evaluation Service Report number for a spray foam or other non-standard insulating product.
- **Cont. Insulation Outside Roof's Waterprf Membrane** (check box): Check if insulation is installed completely on the outside of the membrane.
- **# of References:** The number of times this material is referenced by ConsAssm objects.
- **FrmDpth:** The depth (in inches) of composite layer cavity.
- **SimpleR:** The R-value of the composite layer.
- **R-Value:** The R-value of the material.
- **Thickness:** The thickness of the material.
- **Thermal Cond.:** The thermal conductivity of the material.
- **Specific Heat:** The specific heat of the material.
- **Density**: The density of the material.

Materials Data Screen (Category = Composite)

To access this screen, expand **Materials** and double click the **Air – Metal Wall Framing** option (Materials icon). Then in **Category,** select **Composite.**

Note: Selecting *Category = Composite* in the Material Data screen prompts you to add additional inputs (red box below) describing the framing configuration and cavity insulation.



Input summary for Materials Data Composite screen (red box):

- **FrmDpth:** The depth (in inches) of composite layer cavity.

Framing section:

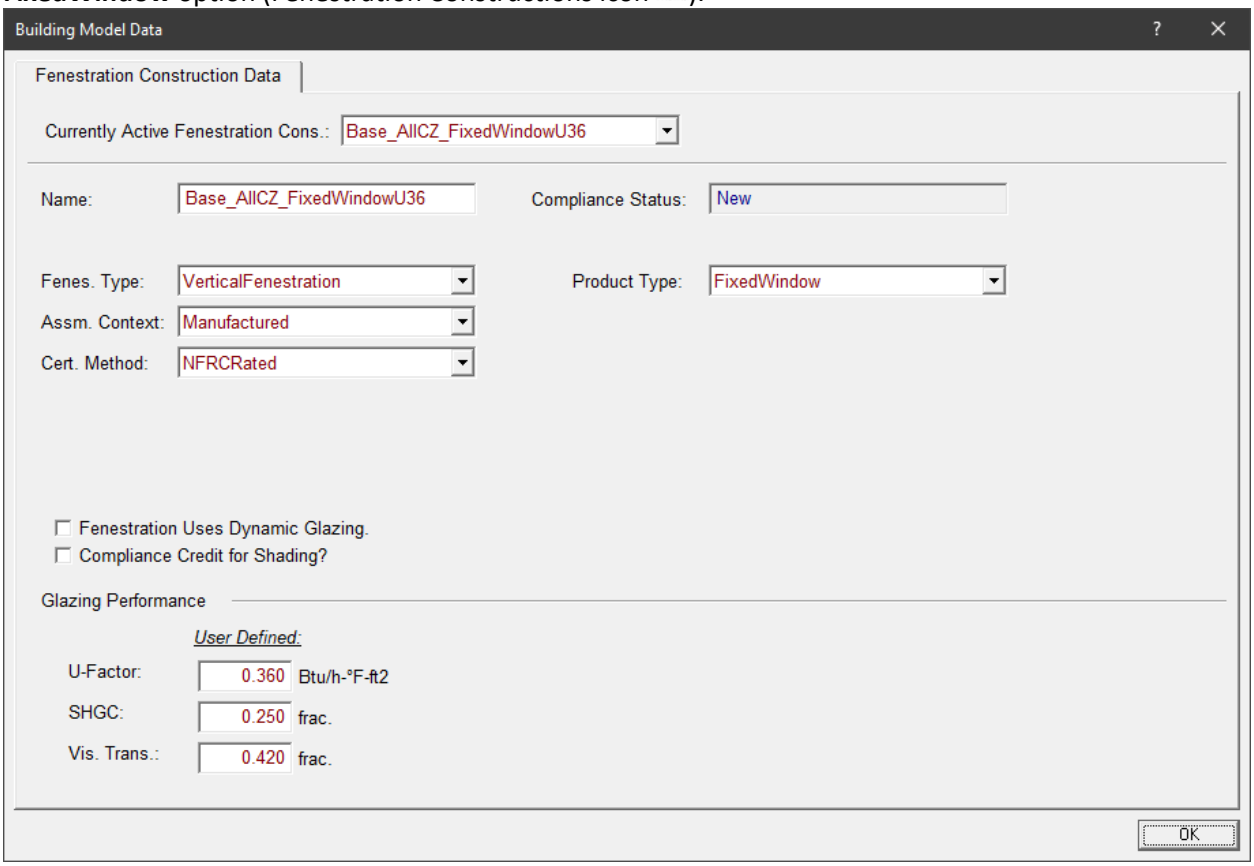
- **Material:** The material used to construct the frame. Options are wood and metal.
- **Configuration:** The configuration used to construct the frame.
- **Depth**: The depth of the framing.
- **Cavity Ins R-Val:** The nominal R-value of composite layer cavity insulation.
- **Notes**: A space to leave detailed information about the framing material and construction.

Framing Factors section

- **Cavity**: Fraction of cavity in the composite layer.
- **Frm**: Framing factor (fraction) of framing members.

Fenestration Construction Data Screen

To access this screen, under Project name expand **FenestrationConstructions** and double click the **FixedWindow** option (Fenestration Constructions icon).



Input summary for **Fenestration Construction Data**:

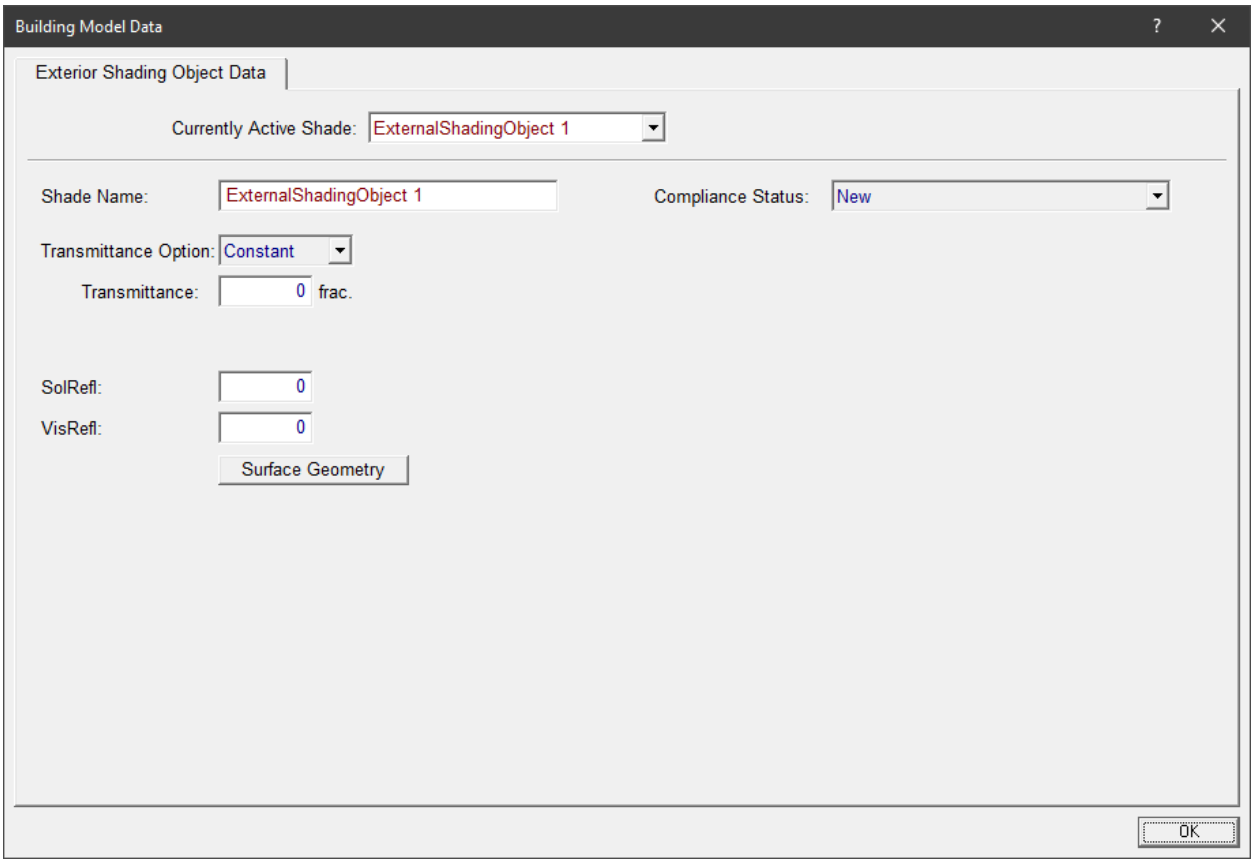
- **Currently Active Fenestration Cons.:** The name of the currently selected fenestration construction.
- **Name**: The name of the Fenestration Construction.
- **Compliance Status:** The compliance status of the window.
- **Fenes. Type**: Select the fenestration type. Options are VerticalFenestration and Skylight.
- **Assm. Context**: Select whether the fenestration product is Manufactured, Site Built or Field Fabricated.
- **Cert. Method**: Select whether the fenestration construction represents an actual National Fenestration Rating Council (NFRC)-rated product (i.e., uses Center of Glass values via the Nonresidential Appendix 6 [NA-6] equation method), or is based on T-24 Default Assumptions.
- **Product Type**: Select whether the fenestration product is for a Fixed Window, operable Window, Curtain Wall or Glazed Door.
- **Fenestration Uses Dynamic Glazing** (checkbox): Indicates whether the fenestration construction is used for dynamic glazing. This is used for reporting purposes only.
- **Compliance Credit for Shading? (check box):** Select to indicate if any fenestration in the building is taking compliance credit for shading (modeled as overhangs/fins). This input is for reporting purposes only and does not result in a credit by checking the box.

Glazing Thermal Performance section *User Defined*

- **U-Factor**: The simulated overall U-factor for the fenestration product, including the glazing and the frame.
- **SHGC:** The simulated overall SHGC for the fenestration product, including the glazing and the frame.
- **Vis. Trans**.: The simulated overall visible transmittance of the fenestration product, including the glazing and the frame.

Exterior Shading Object Data Screen (Detailed Geometry Only)

To access this screen, right click on Building and scroll down to **Create.** Click **ExternalShadingObject.** Make selections in the **Create ExternalShadingObject** dialog box and click **OK.**



Input summary for **Exterior Shading Object Data** screen:

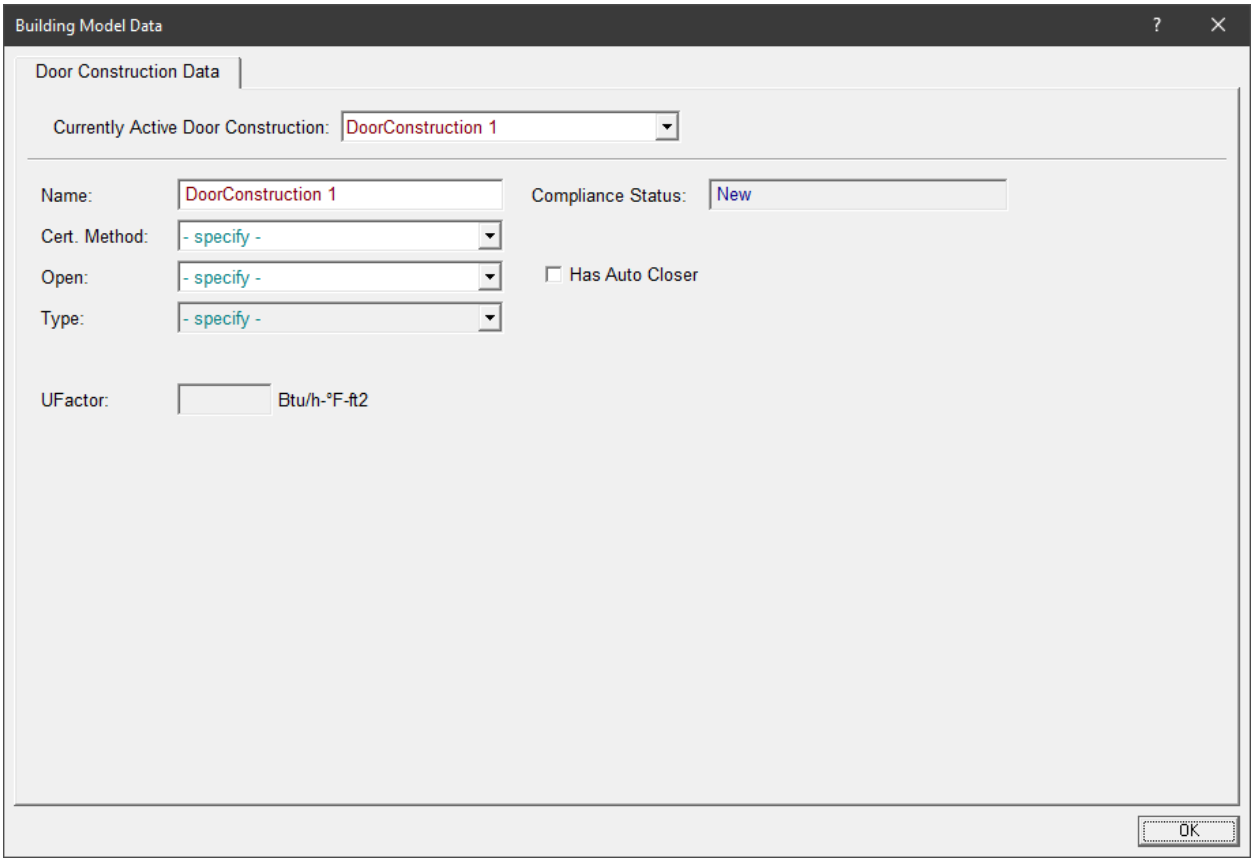
- **Currently Active Shade**: The name of the currently selected shade.
- **Compliance Status**: The compliance status of the exterior shade.
- **Shade Name**: The name or description used to identify the shade.
- **Transmittance Option**: Select the schedule when the shade is in operation.
- **Transmittance (frac.)**: The transmittance of the shade (input is optional).
- **Trans Schedule**: Select schedule, or create/import Fraction Schedule (and apply only here).
- **SolRefl**: The fraction of solar energy reflected by the shade.
- **VisRefl:** The fraction of visible light reflected by the shade.

Surface Geometry button

To access surface geometry (child poly loop object), click this button and enter data in the Poly Loop Data screen. (See the Poly Loop Data Screen.)

Door Construction Data Screen

To access this screen, under Project name right click on **DoorConstructions** and scroll down to **Create**. Then click **DoorConstruction**. Make selections in the **Create DoorConstruction** dialog box, and click **OK.**

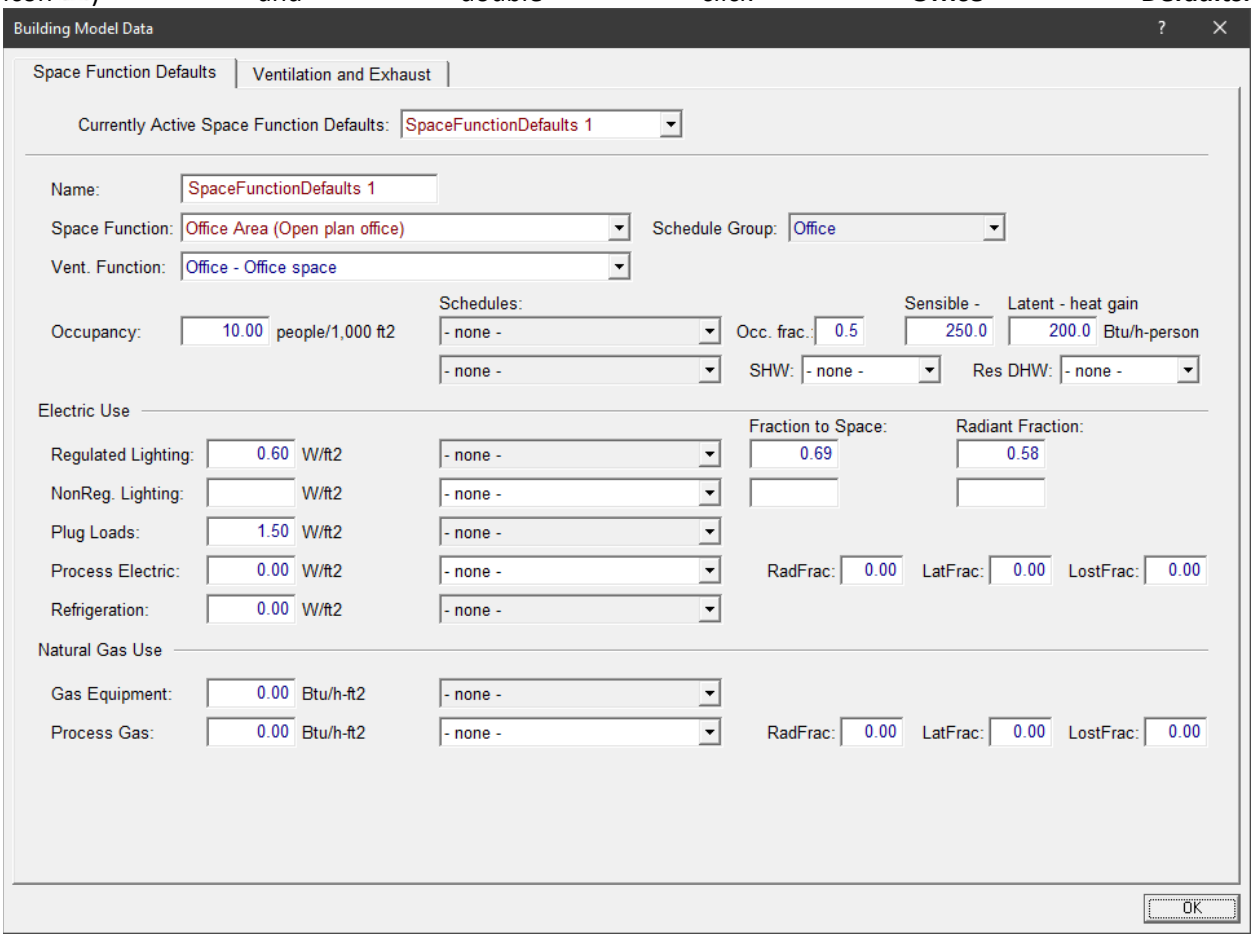


Input summary for **Door Construction Data**:

- **Currently Active Door Construction**: The name of the currently selected door construction.
- **Name:** The name or description used to identify the door construction.
- **Cert. Method:** Select the Certification Method. Options are DefaultPerformance or NRFCRated.
- **Open:** Select the exterior door operation. Options are Swinging and NonSwinging.
- **Type:** The type of door. Types are InsulatedSingleLayerSectionalMetal, InsulatedSwingingMetal, UninsulatedDoubleLayerMetal, UninsulatedSingleLayerMetal, UninsulatedSingleLayerRollupMetal, WoodOther, and WoodThick.
- **UFactor**: The rate of heat transfer of the door. For CEC Default method, this value gets automatically populated depending on user selections for Open and Type fields. (User input required for NFRC-rated method.)
- **Has Auto Closer (check box):** Check if the door has automatic door closer.

Space Function Defaults Data Screen (Space Function Defaults Tab)

To access this screen, under Project name expand **SpaceFunctionDefaults** (Space Function Defaults icon) and double click **Office Defaults.**



Input summary for **Space Function Defaults** tab:

- **Currently Active Space Function Defaults**: Select the name of the active Space Function Defaults, or select create new SpaceFunctionDefaults.
- **Name:** The name of the Space Function Defaults.
- **Function:** Select the area category occupancy type from Nonresidential Appendix 5.4A.
- **Schedule Group:** Select a type of occupancy category used to determine schedules.
- **Occupancy:** The people per area in the space.
- **Schedules** (Occupancy): Select a schedule that describes the fraction of occupancy on an hourly basis.
- **Occ. frac :** The fraction of occupant density in a space.
- **Sensible Rate** (Btu/h-person): The rate of sensible heat released per person, which is a function of activity.
- **Latent Rate** (Btu/h-person)**:** The rate of latent heat released per person, which is a function of activity.
- **SHW**: Select the service hot water loop coming into the space, or create/import the FluidSegment.

- **Res DHW**: Select the residential water loop coming into the space or create/import the FluidSegment.

Electric Use section

- **Regulated Lighting**: Total regulated connected lighting power density for all interior lighting systems in a Space. This includes the loads for lamps and ballasts.
- **Schedules** (IntPDReg): Select a schedule that describes the fraction of lighting use on an hourly basis.
- **Fraction to Space** (IntPDReg)**:** Fraction of regulated interior lighting heat gain going to space air.
- **Radiant Fraction** (IntPDReg)**:** Fraction of regulated interior lighting radiant heat gain going to space surfaces.
- **NonReg. Lighting:** Total non-regulated connected lighting power density for all interior lighting systems in a Space. This includes the loads for lamps and ballasts.
- **Schedules** (IntPDNonReg): Select a schedule that describes the fraction of lighting use on an hourly basis.
- **Fraction to Space** (IntPDNonReg): Fraction of non-regulated interior lighting heat gain going to space air.
- **Radiant Fraction** (IntPDNonReg): Fraction of non-regulated interior lighting radiant heat gain going to space surfaces.
- **RecptPwrDens:** The usage of electrical devices plugged into receptacles in a space based on the occupancy type.
- **Schedules** (RecptPwrDens): Select a schedule that describes the fraction of receptacle use on an hourly basis.
- **ProcElecPwrDens**: Process electrical power density resulting from an activity or treatment not related to the space conditioning, lighting, service water heating, or ventilating of a building as it relates to human occupancy. Process load may include sensible and/or latent components. For data centers this includes transformers, UPS, PDU, server fans, power supplies, etc.
- **Schedules** (ProcElecPwrDens): Select a schedule that describes the fraction of receptacle use on an hourly basis.
- **RadFrac** (ProcElecPwrDens): The fraction of radiant heat gain to a space based on appliance energy use.
- **LatFrac** (ProcElecPwrDens)**:** The fraction of latent heat gain to a space based on appliance energy use.
- **LostFrac** (ProcElecPwrDens): The fraction of heat lost to the exterior is based on appliance energy use.
- **RefrigPwrDens:** The amount of power supplied to a unit area for refrigeration.
- **Schedules** (RefrigPwrDens): Select a schedule that describes the fraction of refrigeration use on an hourly basis.

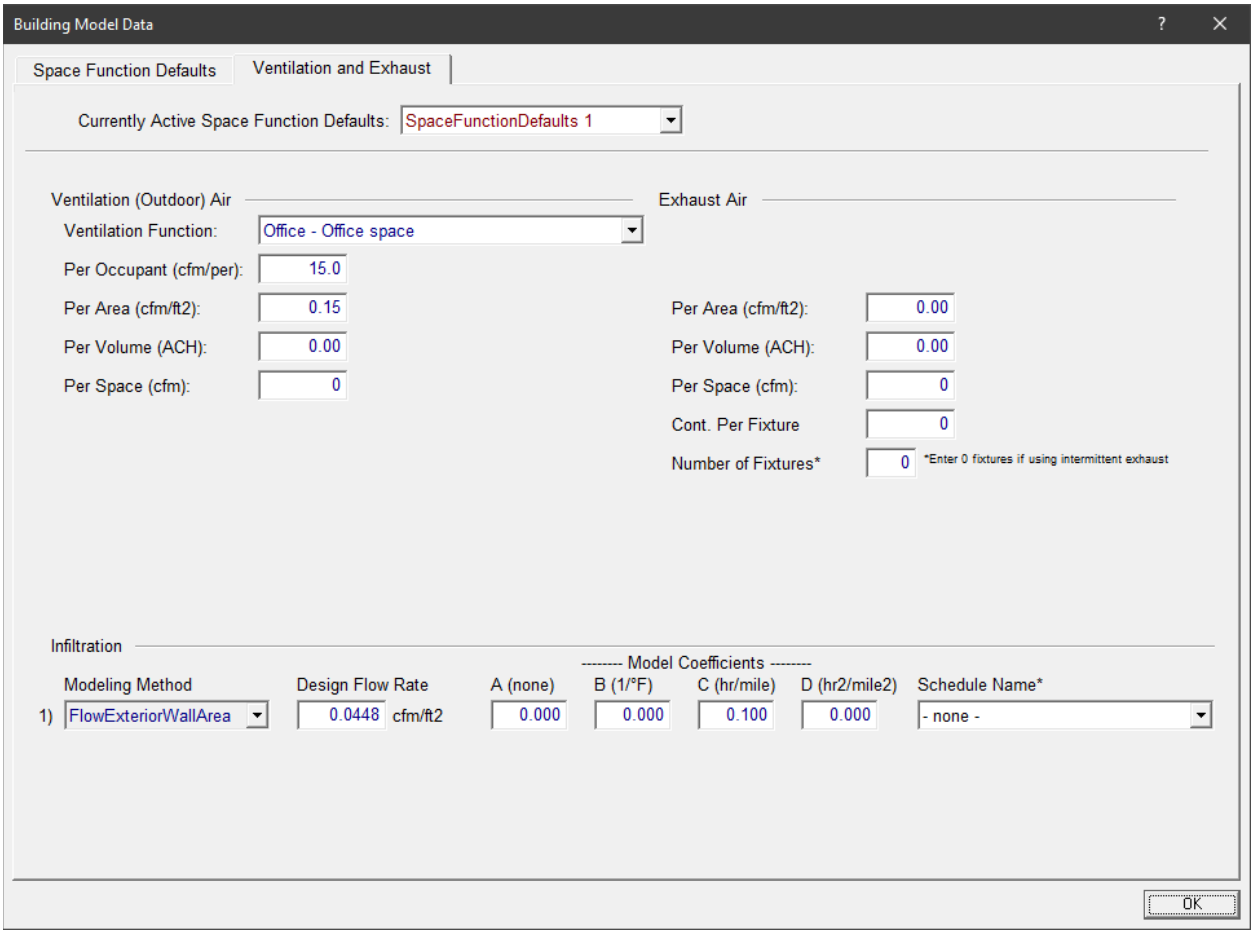
Natural Gas Use section

- **GasEqpPwrDens**: Commercial gas power density is the average power density for all commercial gas equipment, assuming constant year-round operation.
- **Schedules** (GasEqpPwrDens): Select a schedule that describes the fraction of gas equipment use on an hourly basis.

- **ProcGasPwrDens:** Process load is the gas energy consumption in the conditioned space of a building resulting from an activity or treatment not related to the space conditioning, lighting, service water heating, or ventilating of a building as it relates to human occupancy. Process load may include convective (sensible) and/or latent components.
- **Schedules** (ProcGasPwrDens): Select a schedule that describes the fraction of process gas equipment use on an hourly basis.
- **RadFrac** (ProcGasPwrDens): The fraction of radiant heat gain to a space based on appliance energy use.
- **LatFrac** (ProcGasPwrDens)**:** The fraction of latent heat gain to a space based on appliance energy use.
- **LostFrac** (ProcGasPwrDens): The fraction of heat lost to the exterior is based on appliance energy use.

Space Function Defaults Data Screen (Ventilation and Exhaust Tab)

To access this screen, under Project name expand **SpaceFunctionDefaults** (Space Function Defaults icon), double click **Office Defaults**, and then click on the **Ventilation and Exhaust** tab**.**



Input summary for **Ventilation and Exhaust** tab:

Ventilation (Outdoor) Air section

- **Per Occupancy (cfm/per)**: The design outside air flow rate divided by the design occupancy of the space.
- **Per Area (cfm/ft2)**: The design outside air flow rate divided by the floor area of the space.
- **Per Volume (ACH):** The design outside air changes per hour.
- **Per Space (cfm):** The design outside air per space in cfm

Exhaust Air section

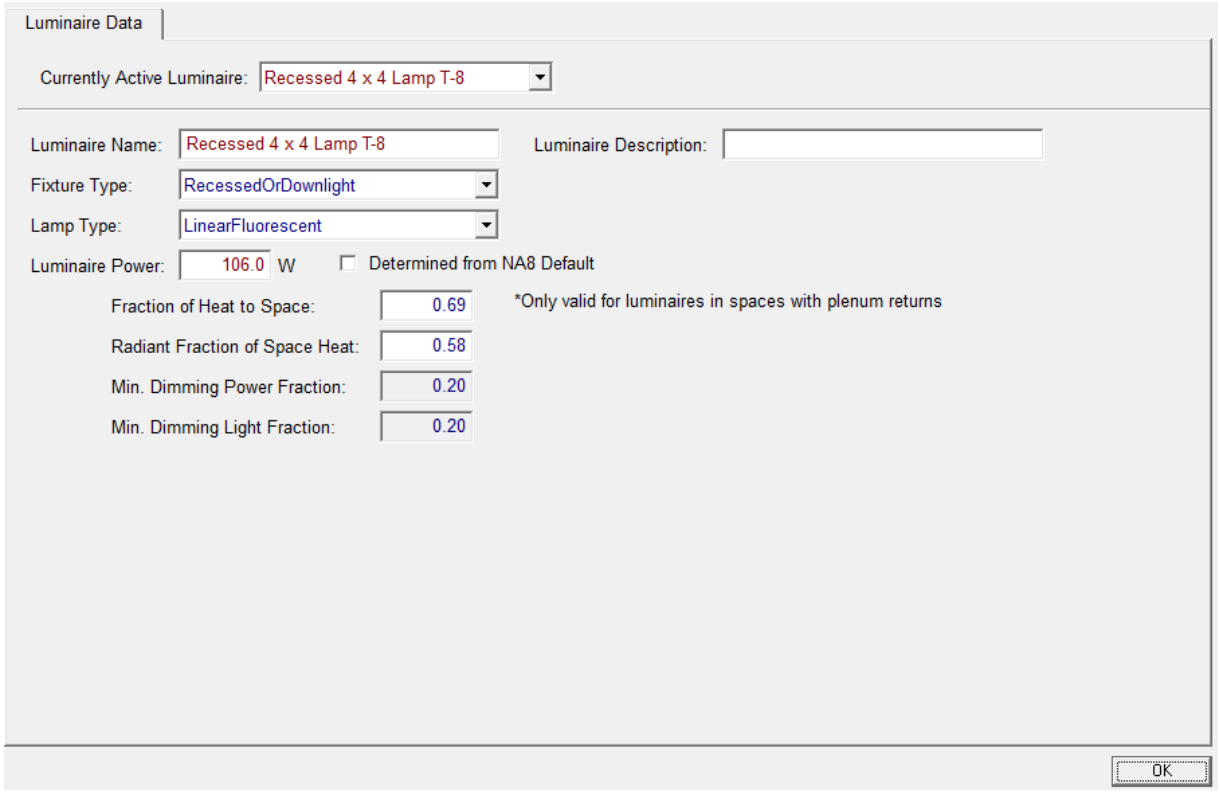
- **Per Area (cfm/ft2)**: The design exhaust air flow rate divided by the floor area of the space.
- **Per Volume (ACH):** The design exhaust air changes per hour.
- **Per Space (cfm):** The design exhaust air per space in cfm

Infiltration section

- **Modeling Method**: Method used for modeling uncontrolled air leakage or infiltration. Options include FlowZone, FlowArea, FlowExteriorArea, FlowExteriorWallArea, and AirChangesPerHour.
- **Design Flow Rate**: The infiltration rate specified as cfm/ft² of exterior wall area at a wind speed of 10 mph and an infiltration schedule value of 1. The default value of 0.0448 cfm/ft² must be used unless specific air sealing methods beyond requirements of the standard are applied and documented.
- **Model Coefficients A:** Infiltration overall coefficient.
- **Model Coefficients B:** Infiltration temperature coefficient.
- **Model Coefficients C**: Infiltration windspeed coefficient.
- **Model Coefficients D**: Infiltration windspeed squared coefficient.
- **Schedule Name:** Select an infiltration schedule. (Input is optional.)

Luminaires Data Screen

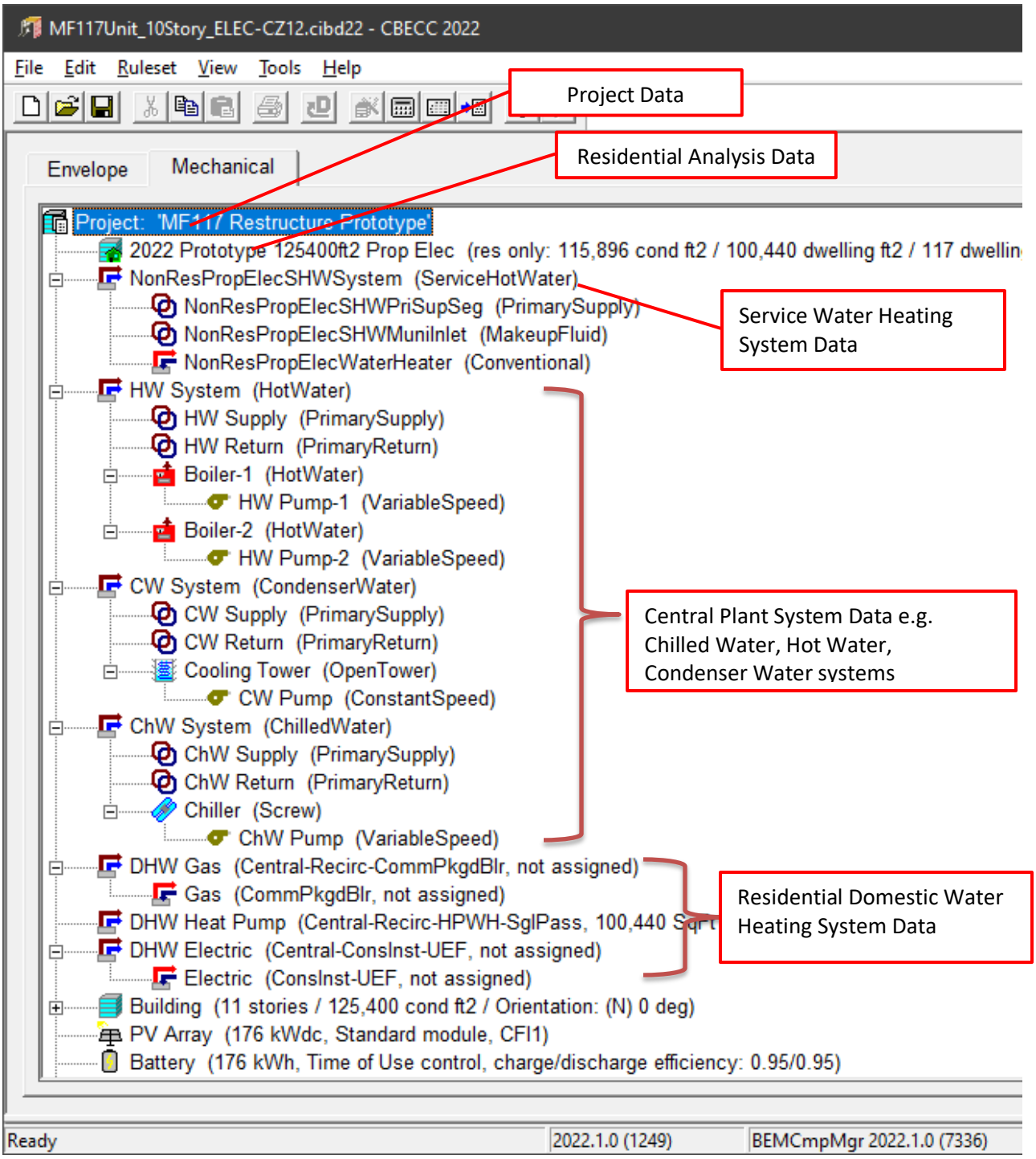
To access this screen, under the Project name expand **Luminaires** (Luminaires icon) and double click the **Recessed** option.



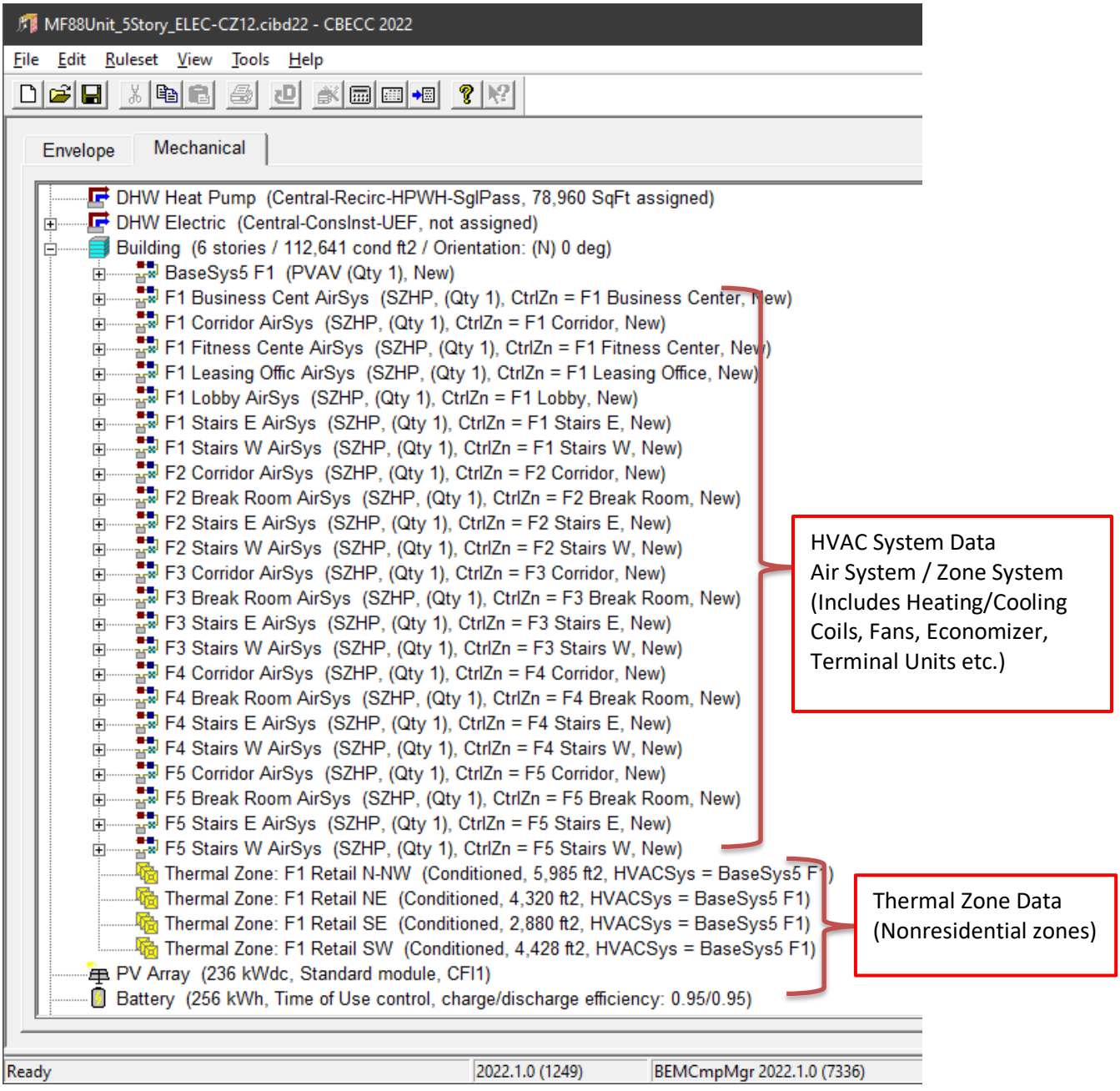
Input summary for **Luminaire Data** tab:

- **Currently Active Luminaire**: The name of the currently selected luminaire. Options are Recessed 4’ by 4 Lamp T-8, Chalkboard Track Luminaire, and Stage Lighting.
- **Luminaire Name**: The name of the luminaire.
- **Fixture Type:** Select the Luminaire’s fixture type. Options are RecessedWithLens, RecessedOrDownlight, NotInCeiling.
- **Lamp Type:** Select the lamp type used in the luminaire. Options are LinearFluorescent, CFL, Incandescent, LED, MetalHalide, MercuryVapor, HighPressureSodium.
- **Luminaire Power**: Luminaire power, the connected power for a luminaire including lamp and ballast.
- **Determined from NA8 Default (check box)**: Select for lamp power determined from NA8 defaults.
- **Fraction of Heat to Space**: Fraction of luminaire heat gain going to space air.
- **Radiant Fraction of Space Heat**: Fraction of luminaire radiant heat gain going to space surfaces.
- **Min**. **Dimming Power Fraction:** The minimum power fraction when controlled lighting is fully dimmed.
- **Min**. **Dimming Light Fraction:** The minimum light output of controlled lighting when fully dimmed.

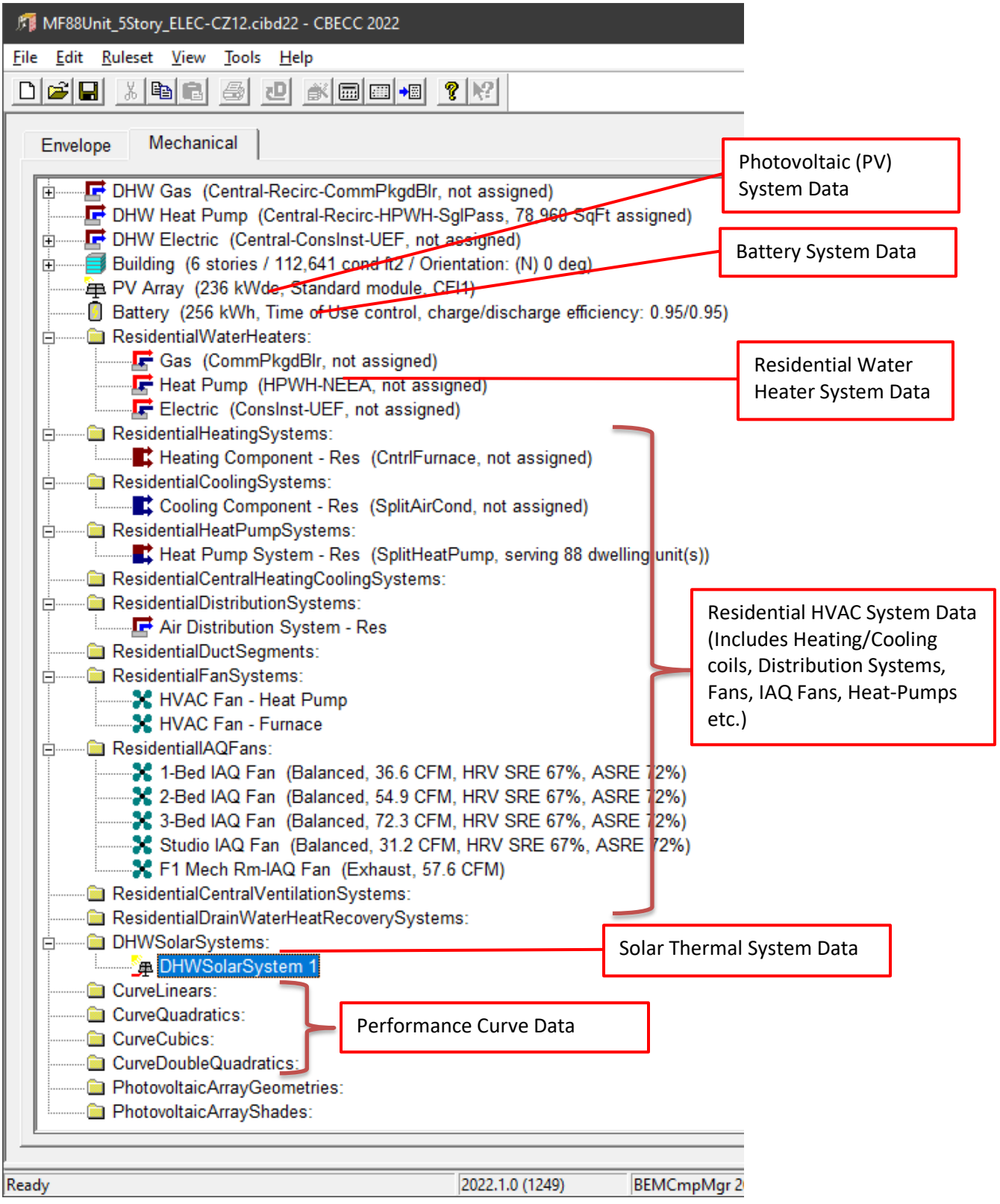
Organization of the Mechanical Tab



Organization of the Mechanical Tab (continued)



Organization of the Mechanical Tab (continued)



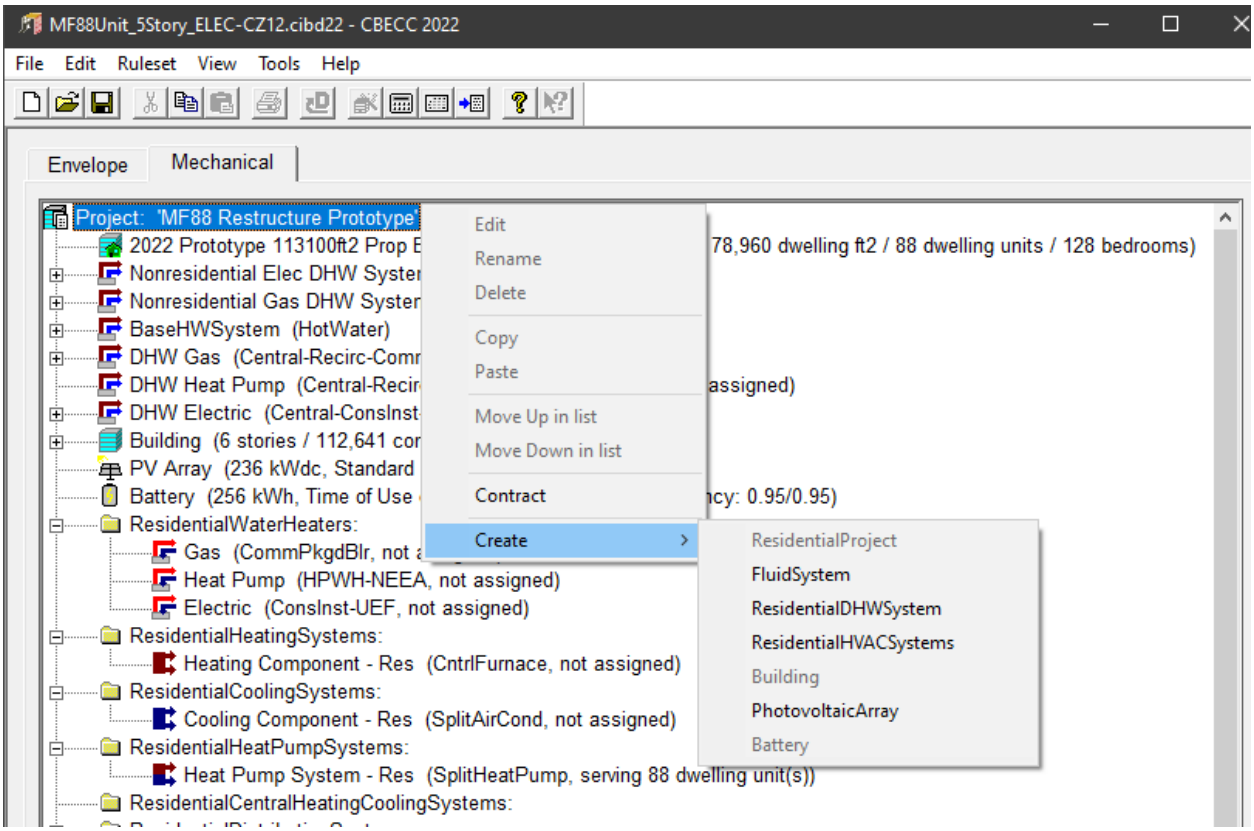
Mechanical Input Screen Details

Project Data Screen

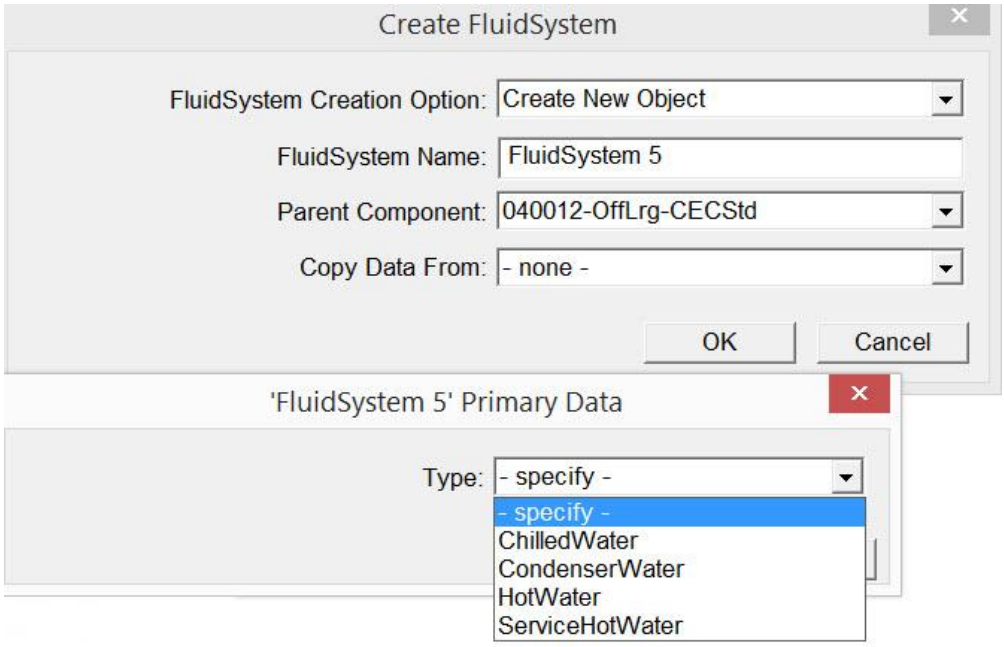
Note that the Project Data input screen is identical to that described above in the Envelope Input Screen Details. Users may edit Project Data on either the Envelope or Mechanical tab of the user interface and that data will persist on both tabs.

Fluid System Data Screen (New)

The following types of Fluid Systems can be created: Chilled Water, Condenser Water, Hot Water, and Service Hot Water. To create a new Fluid System, in the Mechanical tab right click on Project, scroll down to **Create**, and select **FluidSystem.**

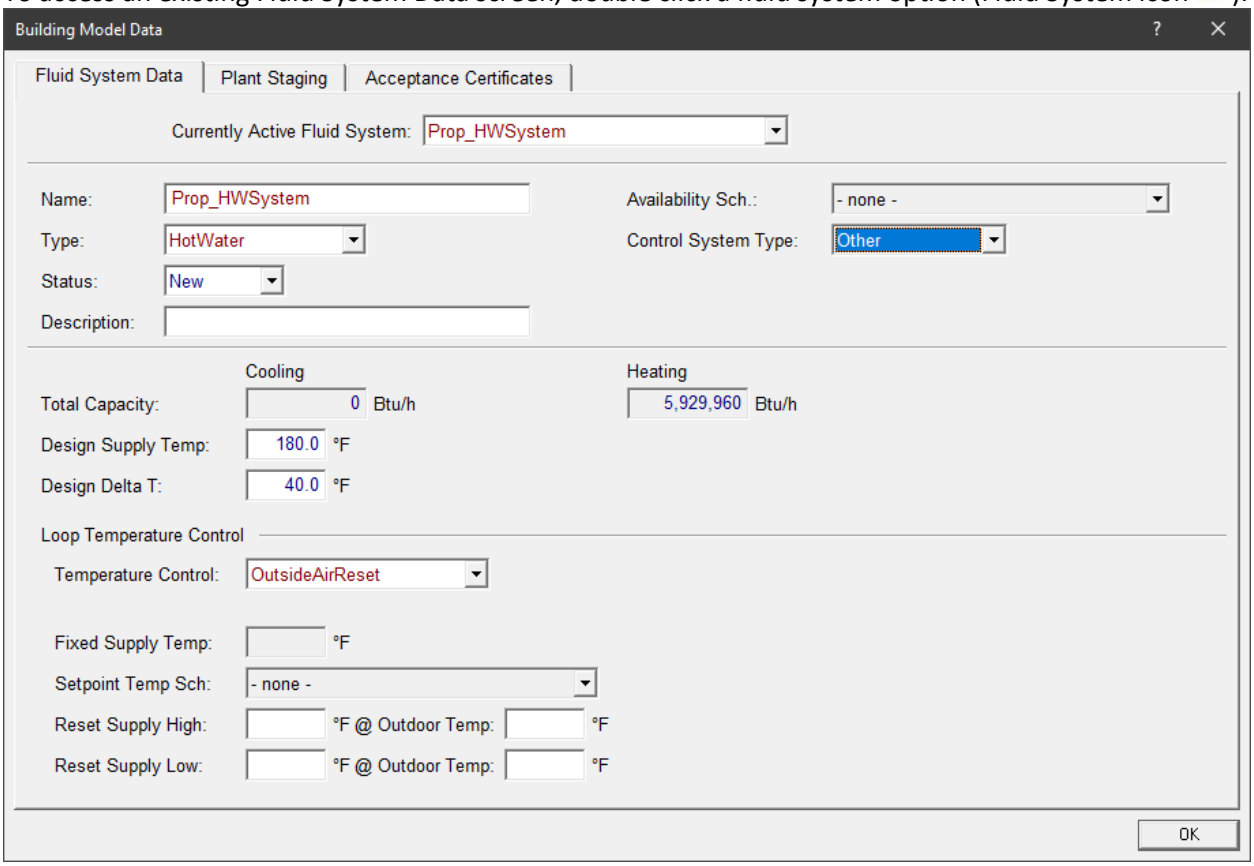


The Create FluidSystem dialog box appears. Make selections and click **OK**. The FluidSystem Primary Data dialog box appears. Make a selection and click **OK**.



Fluid System Data Screen (Existing)

To access an existing Fluid System Data screen, double click a fluid system option (Fluid System icon).



Input Summary:

- **Currently Active Fluid System:** Name of the currently selected fluid system.
- **Name**: The name of the fluid system.
- **Type**: Select the type of fluid system. Options are ChilledWater, CondensedWater, HotWater, and ServiceHotWater. Type is used to validate the connections between various FluidSys objects.
- **Status**: Defines system as New, Existing, or Altered.
- **Description**: A brief description of the fluid system that summarizes its essential characteristics.
- **Availability Schedule**: The name of the schedule that determines when the hot water system is available to provide heating. The system is not necessarily providing heating at all times it is available, but if it is not available, no heating will be provided.
- **Control System Type**: Select the type of control system used for the fluid system. This is used to specify part load curves for variable speed pumps. Options are DDC or other.
- **Annual Solar Fraction**: The fraction provided by a certified solar calculator from Go Solar California, applicable for ServiceHotWater fluid system type.
- **Total Capacity (Cooling):** Reference to the sum of primary equipment cooling capacities.
- **Total Capacity (Heating):** Reference to the sum of primary equipment heating capacities.
- **Design Supply Temp**: The design supply water temperature of the loop.

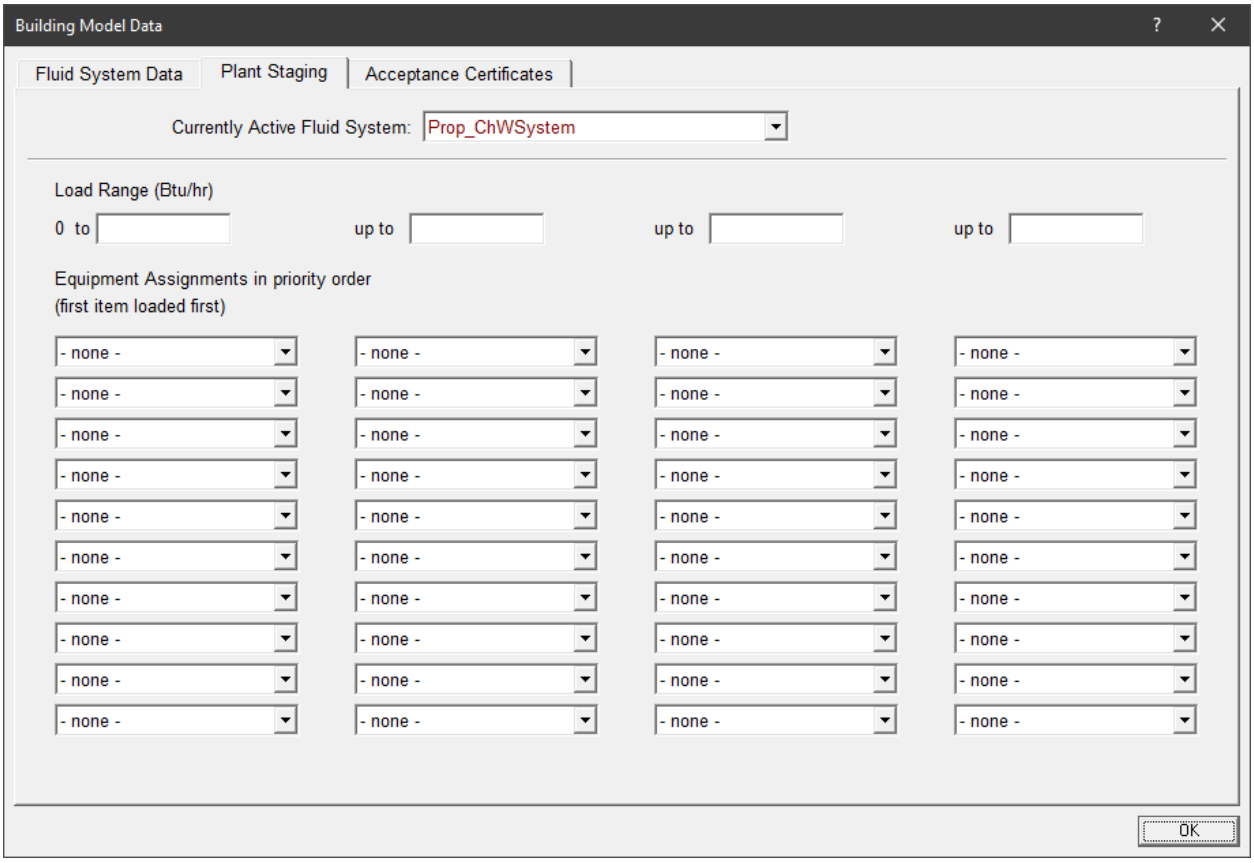
- **Design Delta T**: The design supply water temperature delta T.

Loop Temperature Control section

- **Temperature Control**: The method used to control the chilled water supply temperature. The options are Fixed, Scheduled, OutsideAirReset, WetBulbReset, FixedDualSetpoint.
    - Fixed means that a constant temperature setpoint is used.
    - Scheduled means that the temperature is adjusted based on a user specified schedule.
    - OutsideAirReset means that the supply water temperature is adjusted based on the outdoor air temperature.
    - WetBulbReset is only applicable to condenser water loops, and means that the supply condenser water temperature is adjusted based on the outdoor wet bulb temperature.
    - FixedDualSetpoint is applicable only to condenser water loops which have both heating and cooling primary equipment, such as a boiler and cooling tower used for water source heat pumps. The high setpoint is used for cooling and the low setpoint for heating. Fixed means that a constant temperature setpoint is used.
- **Fixed Supply Temp (Cooling)**: The supply water temperature setpoint for 'Fixed' or 'FixedDualSetpoint' temperature control.
- **Fixed Supply Temp (Heating)**: The supply water temperature setpoint for ' FixedDualSetpoint ' temperature control.
- **Setpoint Temp Sch (Cooling)**: The scheduled supply water temperature setpoint of fluid system.
- **Setpoint Temp Sch (Heating)**: The scheduled supply water temperature setpoint of fluid system.
- **Reset Supply High**: The maximum (high) reset supply water temperature for Temperature Ctrl = OutsideAirReset or LoadReset.
- **Reset Supply High (deg. F @ Outdoor Temp)**: The outdoor air temperature that corresponds to the maximum (high) reset supply water temperature.
- **Reset Supply Low**: The low supply water temperature used for a reset control. This is the temperature at the high outside air temperature or high cooling load.
- **Reset Supply Low (deg. F @ Outdoor Temp)**: The outdoor air temperature that corresponds to the low supply water temperature used for a reset control.

Fluid System Data Screen (Plant Staging Tab)

To access this screen, double click the **Fluid System** option (Fluid System icon), and then click on the **Plant Staging** tab.

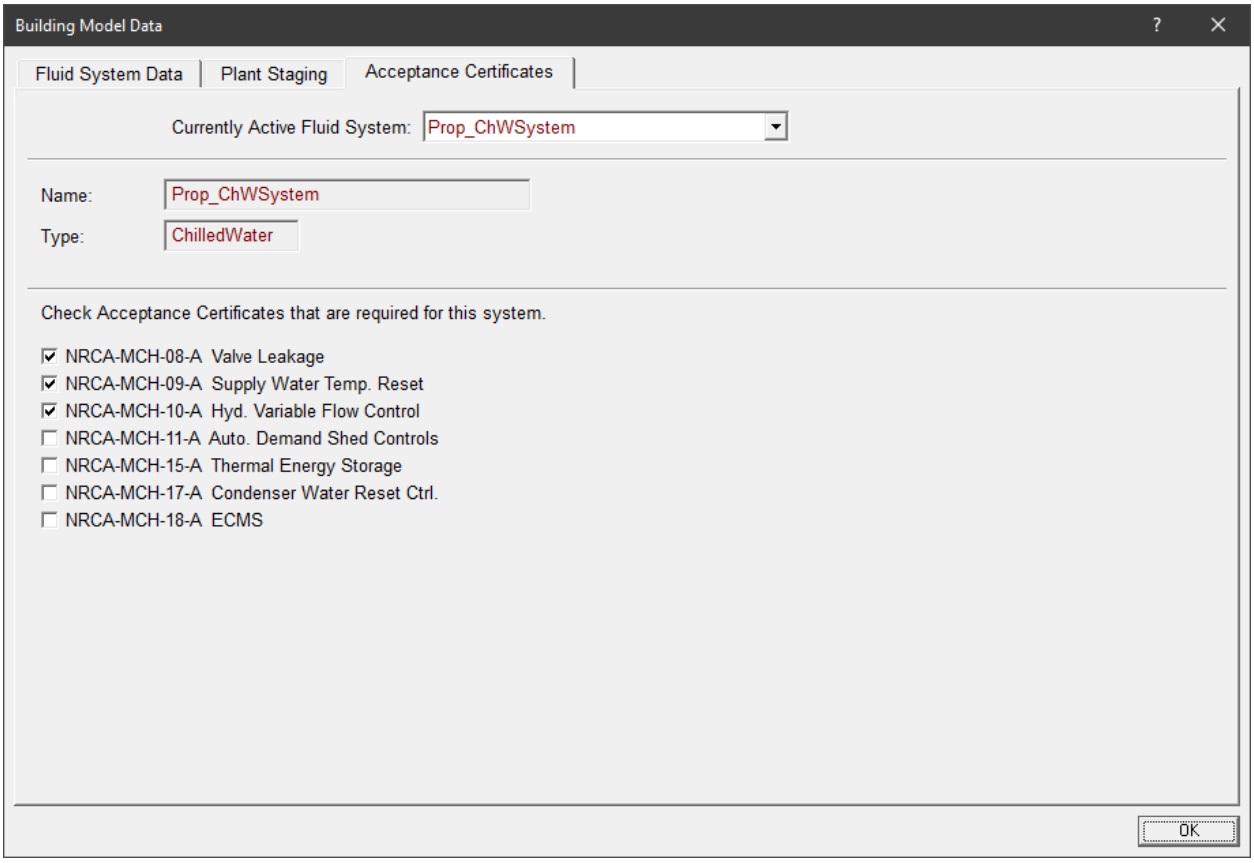


Input Summary:

- **Currently Active Fluid System Name:** Name of the fluid system.
- **Load Range:** Load Range for Chilled water or Hot Water plant systems
- **Equipment Assignments in priority order (first item loaded first)**

Fluid System Data Screen (Acceptance Certificates Tab)

To access this screen, under building data double click an air system option (Fluid System icon), and then click on the **Acceptance Certificates** tab.

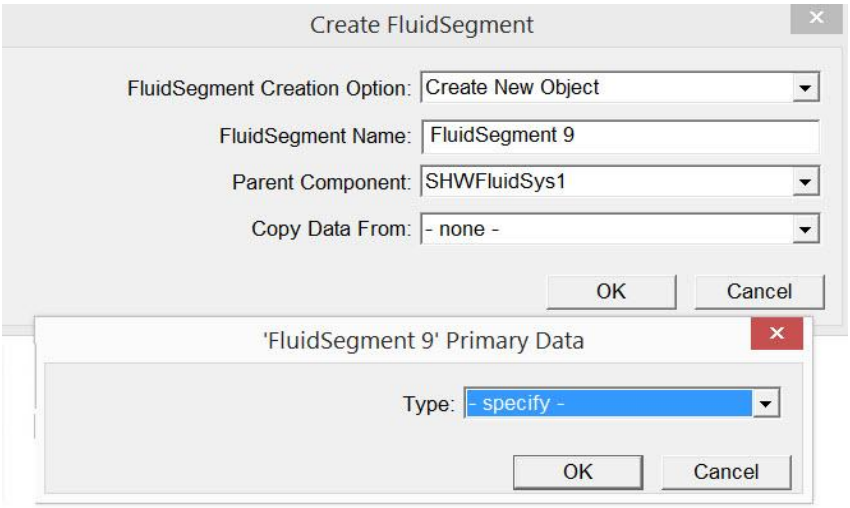


Input Summary:

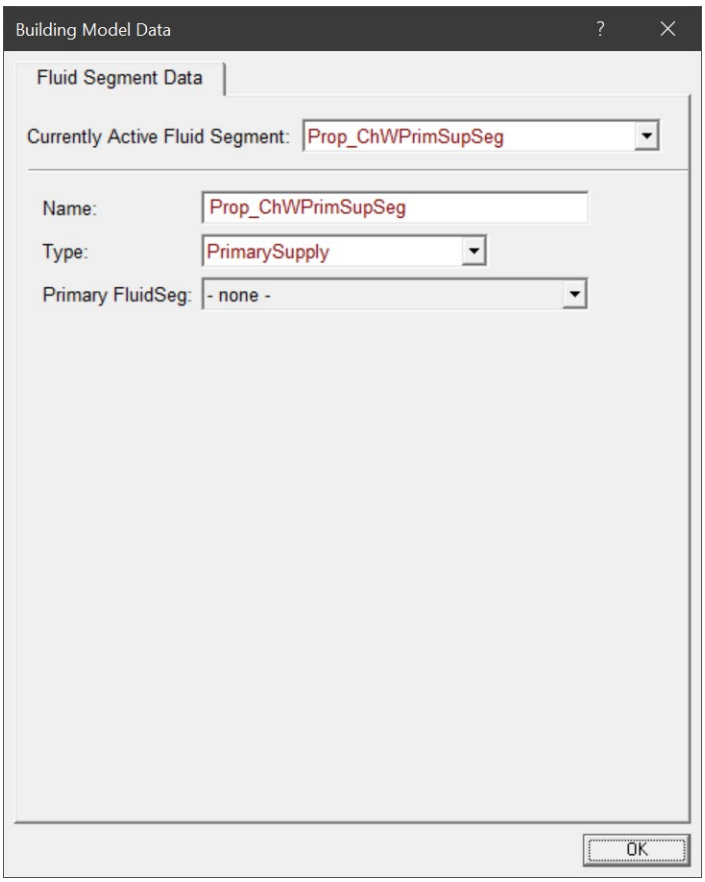
- **Currently Active Fluid System:** The name of the currently selected Fluid System.
- **Name:** The name of the Fluid System.
- **Type**: The type of the Fluid system, a unique descriptor that identifies high level attributes of a fluid system. Options are ChilledWater, CondenserWater, HotWater, and ServiceHotWater.
- **Acceptance Certificates:** Check Acceptance Certificates indicating whether an acceptance certificate of the number matching the term name is required (used for reporting).

Fluid Segment Data Screen

To create a new Fluid Segment, in the Mechanical tab right click on Fluid System, scroll down to **Create**, and select **FluidSegment.** The Create FluidSegment dialog box appears. Make selections and click **OK**. The FluidSegment Primary Data dialog box then appears. Make selections and click **OK**. The Fluid Segment Data tab appears (see below).



To access this screen, double click a Fluid Segment (Fluid Segment icon).

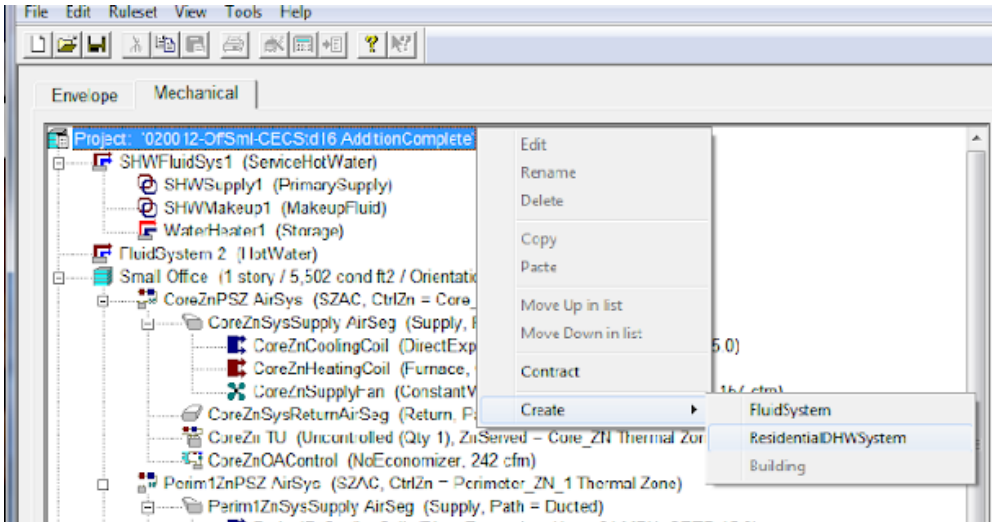


Input Summary:

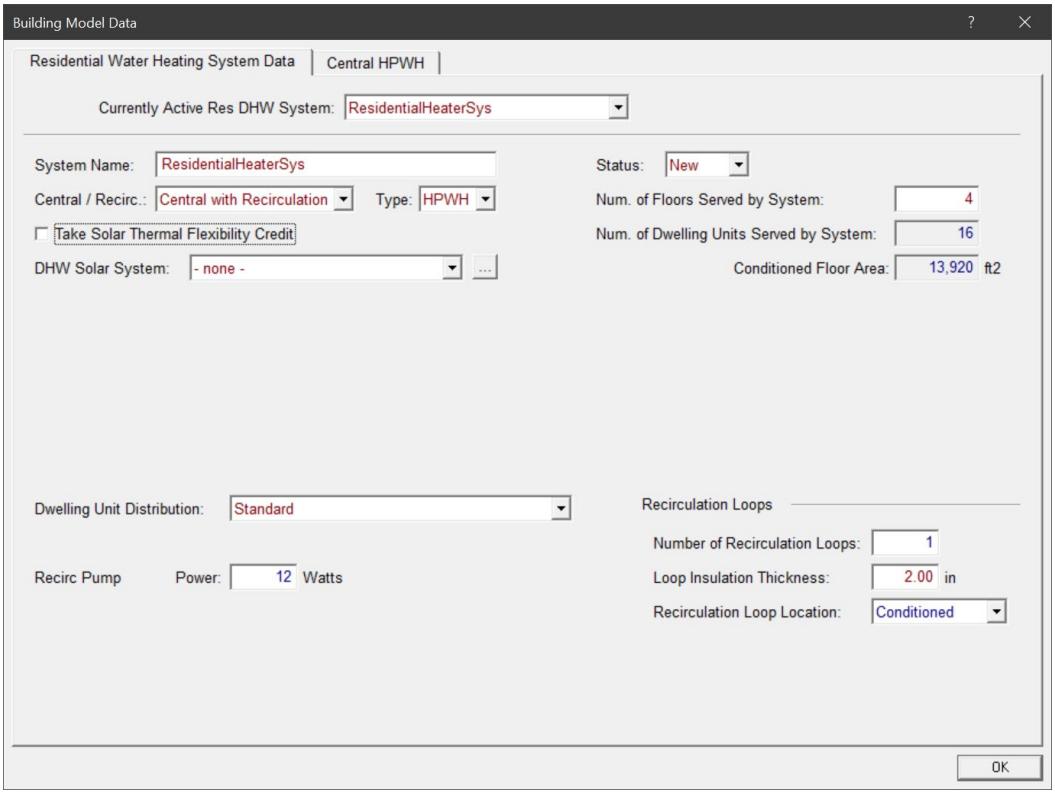
- **Currently Active Fluid Segment:** The name of the currently selected fluid segment.
- **Name**: The name of the fluid segment.
- **Type**: Select the type of fluid segment. This field is used to validate the connections between various FluidSys objects. Options include PrimarySupply, PrimaryReturn, SecondarySupply, SecondaryReturn, MakeupFluid and Connector.
- **Primary FluidSeg**: Refers to the segment that supplies fluid to a secondary segment. Applicable to fluid loops subordinate to the primary loop (secondary, tertiary, etc.), this property is used to define the inlet and outlet of secondary segment.

Residential Water Heating System Data Screen (Residential Water Heating System Tab)

To create a new Residential Water Heating System, in the Mechanical tab right click on Project, scroll down to **Create**, and select **ResidentialDHWSystem.** The Create ResidentialDHWSystem dialog box appears. Make selections and click **OK**. The Residential Water Heating System Data screen appears (see below).



To access the Residential Water Heating System Data screen, double click the **Residential Water Heating** option (Fluid System icon).

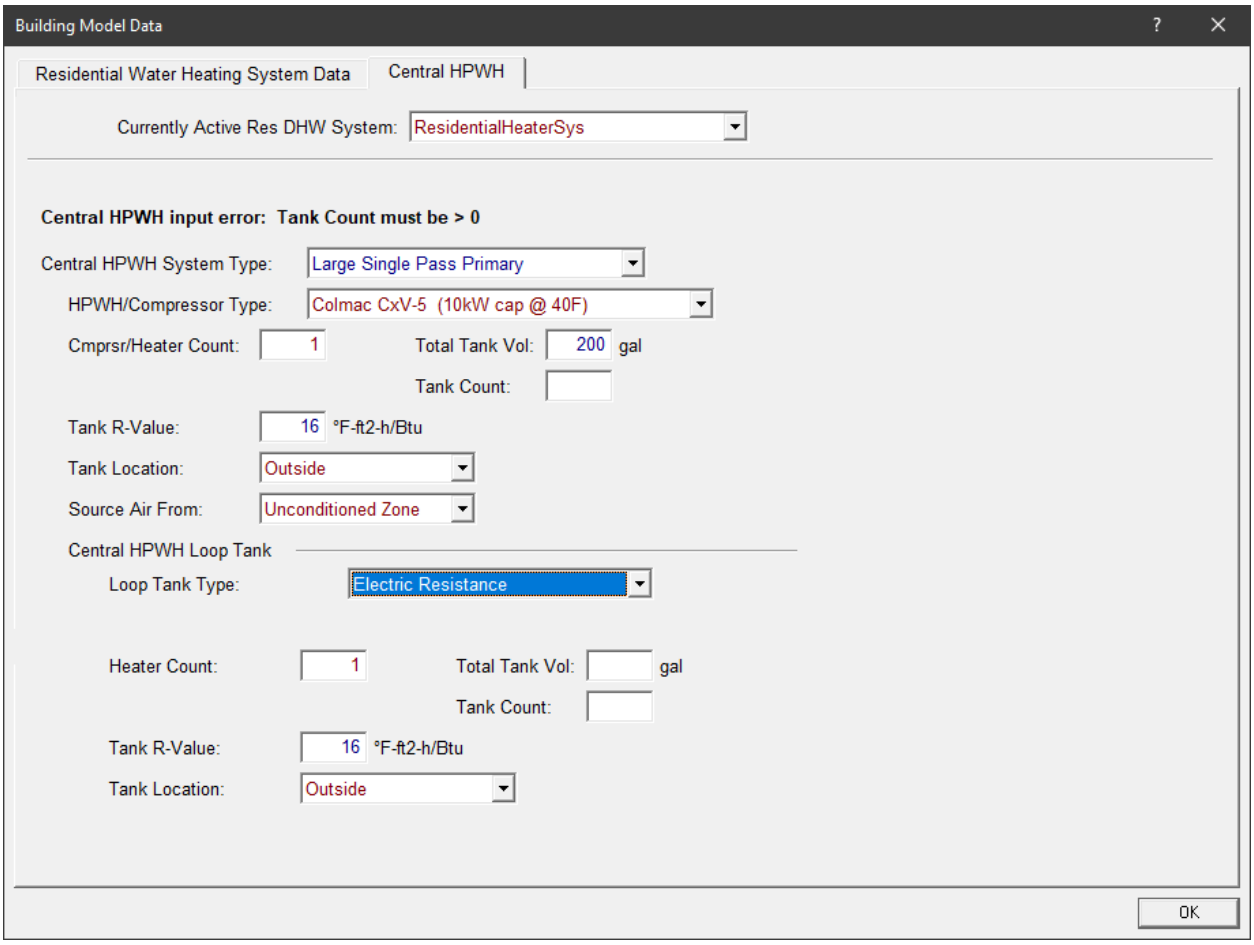


Input Summary:

- **Currently Active Res DHW System:** Name of the currently selected Residential Water heating system.
- **System Name:** The name of the Residential Water heating system.
- **Central / Recirc:** Indicates whether the active Residential Water Heating system is central system or not. Options include Non-central /Central, No Recirculation / Central with Recirculation.
- **Type:** Type of central system serving more than one dwelling unit. Options – Other / HPWH
- **Take Solar Thermal Flexibility Credit:** Checkbox to apply flexibility credit for all-electric central DHW models with PV to offset standard design solar thermal DHW.
- **DHW Solar System:** Enter the domestic hot water solar system assigned to this residential DHW System.
- **Distribution Compactness:** Compact distribution credit option (available when central system is unchecked). Options – not compact, Basic Credit, Expanded Credit (HER's required)
- **Conditioned Floor Area:** Conditioned floor area served by the system.
- **Status:** The status of the system or component used for additions and alterations. Options are New, Existing, and Altered.
- **Num. of Floors Served by System:** Indicates number of floors served by the residential water heating system.
- **Num. of Dwelling Units Served by System:** Indicates number of dwelling units served by the residential water heating system.
- **Dwelling Unit Distribution:** The type of Residential Water heating system. Options are Standard, Parallel Piping, Point of Use, Recirculation options and water heating system with various HERS requirements.
- **Recirc Pump Power:** Recirculation pump power in watts.
- **Number of Recirculation Loops:** The number of identical recirculation loops.
- **Loop Insulation Thickness:** The Thickness of the loop insulation.
- **Recirculation Loop Location:** The Location of the recirculation loop. Options are Conditioned, Semi-Conditioned, Unconditioned or Underground.

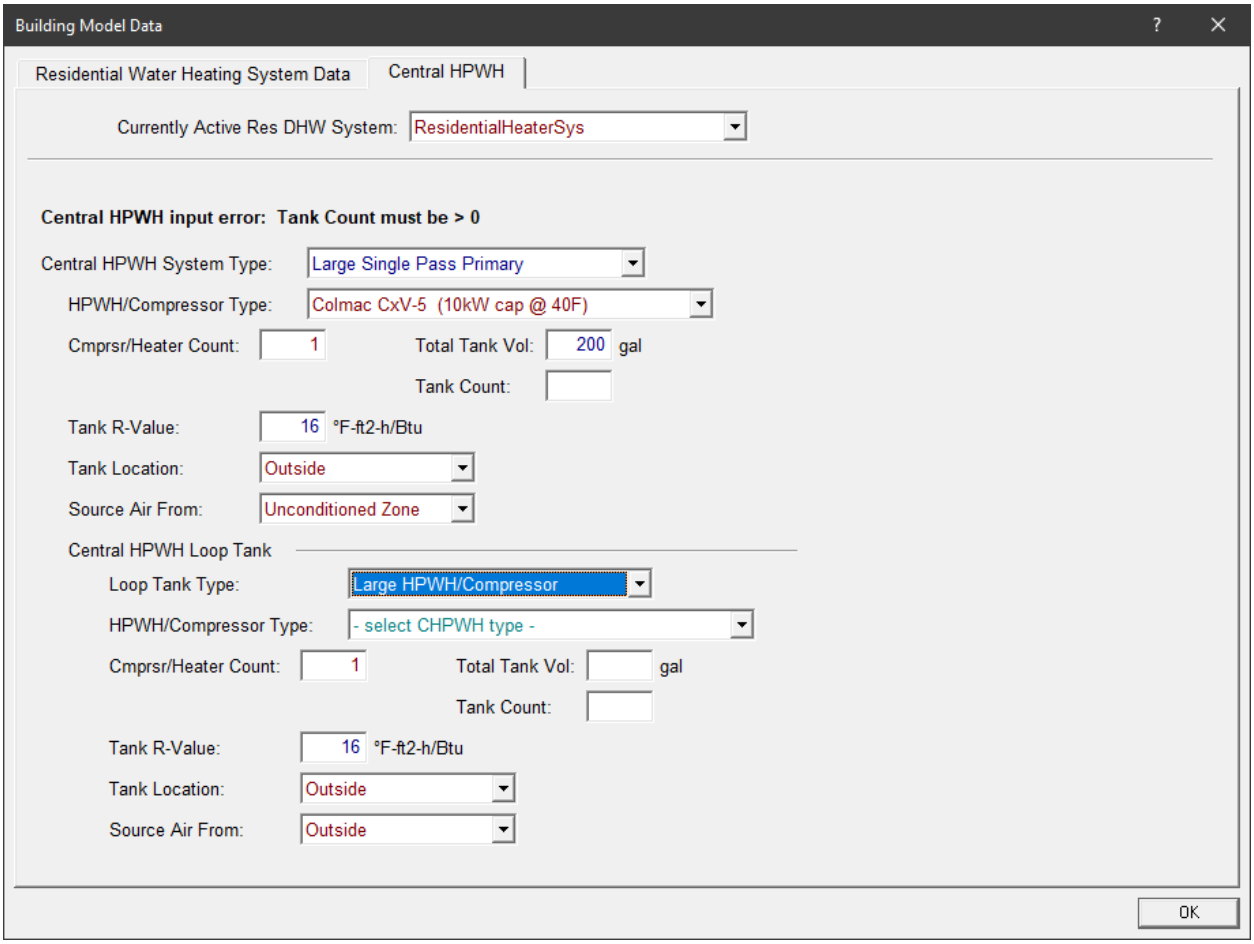
Residential Water Heating System Data Screen (Central HPWH)

The inputs on this data screen are available when Central water heating checkbox is selected on the **Residential Water Heating System Data** screen and **Type** selected is HPWH.



Input Summary (Central Heat-Pump Water Heater Inputs):

- **Central HPWH System Type:** Type of central HPWH heater system.
- **HPWH/Compressor Type:** Select the central HPWH compressor type
- **Cmprsr/Heater Count:** Number of central HPWH compressors
- **Total Tank Vol (gal):** Total primary tank volume (across all tanks)
- **Tank Count:** Number of central HPWH storage tanks
- **Tank R-Value (°F-ft2-h/Btu):** Central HPWH storage tank insulation R-value
- **Tank Location:** Location of primary storage tanks(s)
- **Source Air From:** Location from primary tank ASHP source air comes from

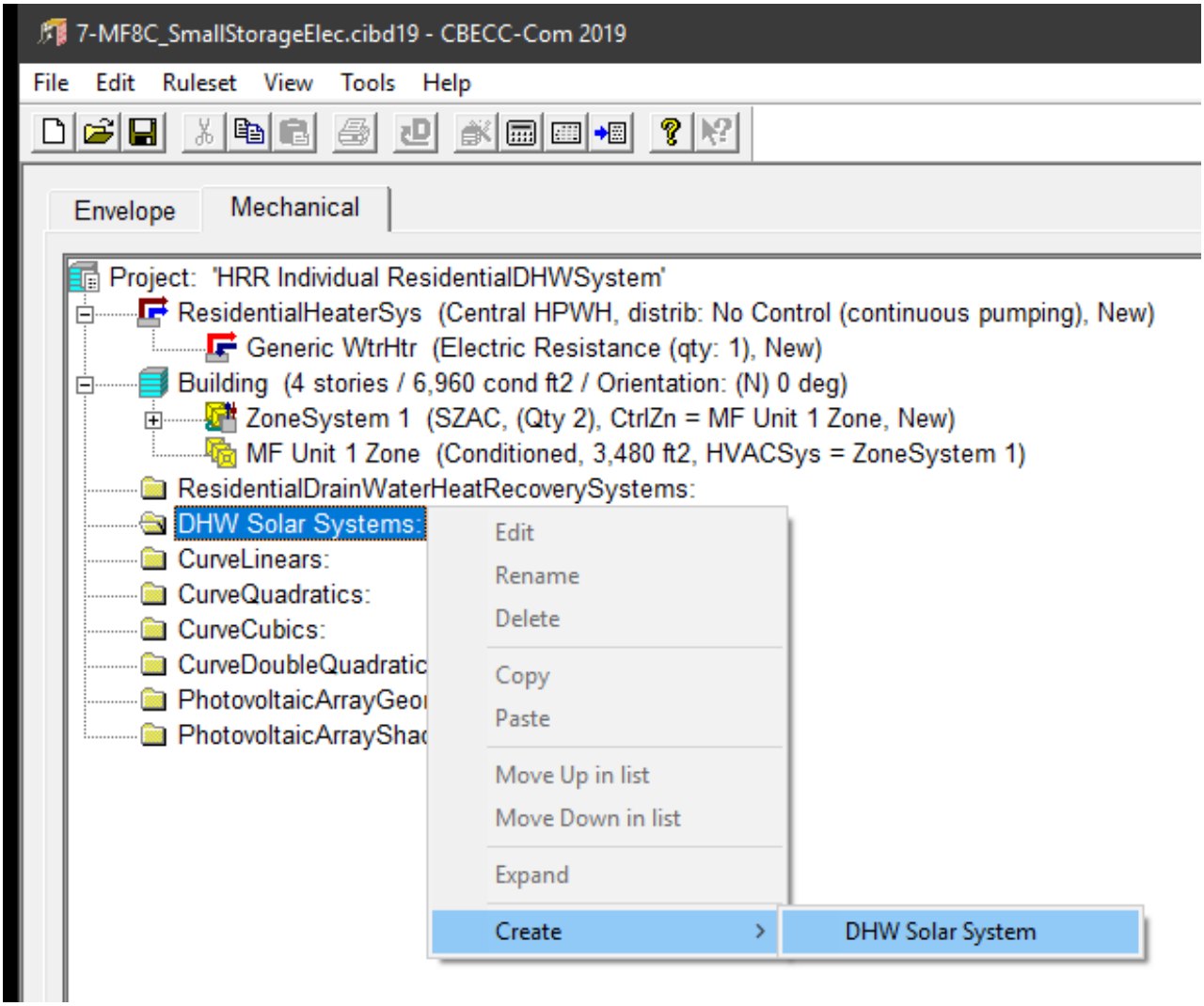


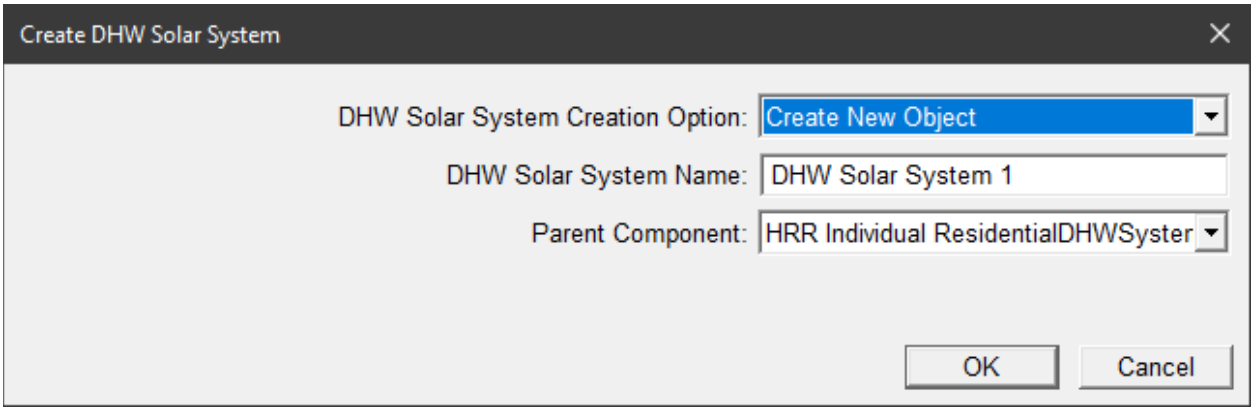
Input Summary (Central HPWH Loop Tank Inputs):

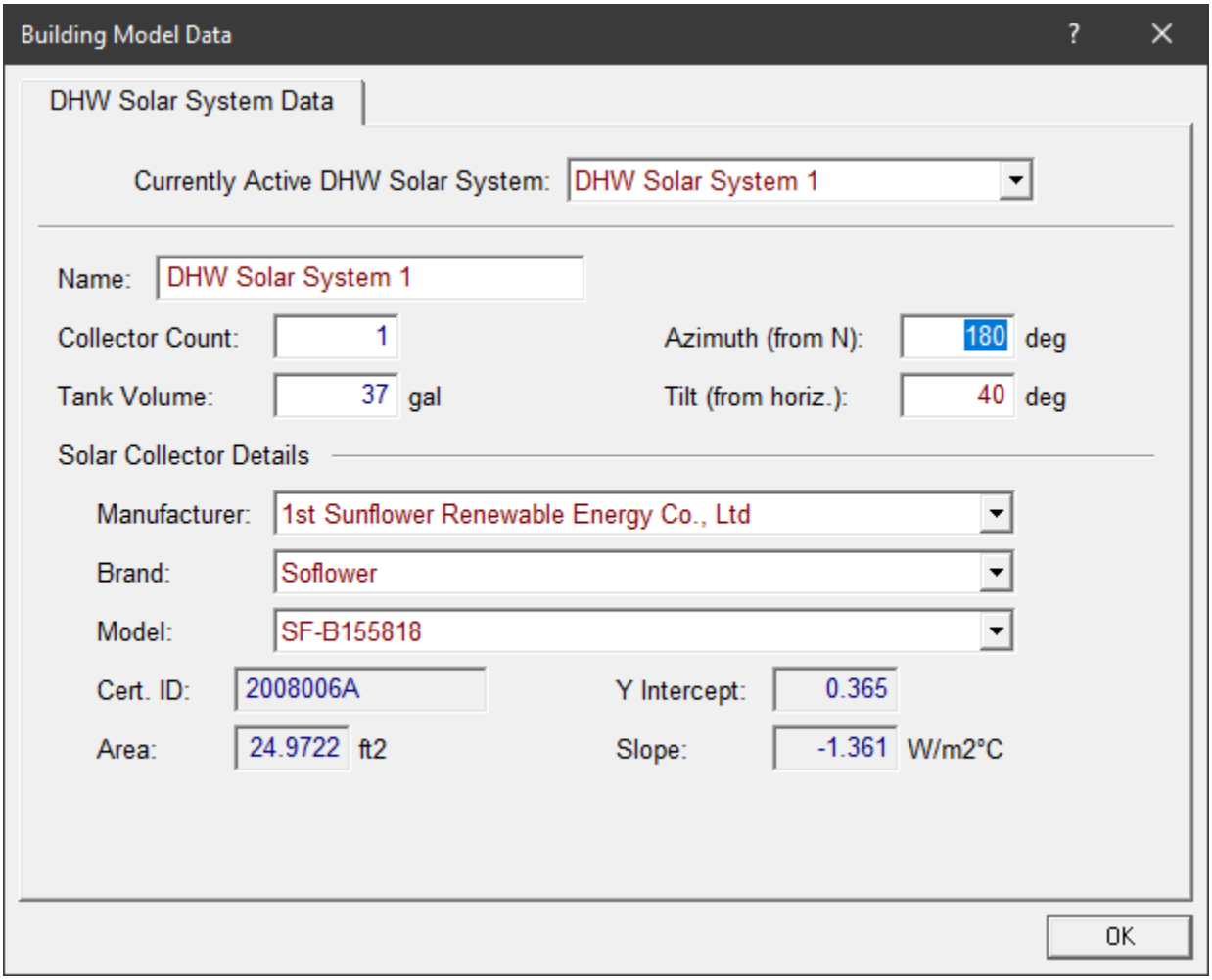
- **Loop Tank Type:** Type of central HPWH loop tank presence/type
- **HPWH/Compressor Type:** Central HPWH loop tank HPWH/compressor type
- **Comprsr/Heater Count:** Number of central HPWH heater/compressors
- **Heater Count:** Number of central HPWH loop heaters/compressors
- **Total Tank Vol (gal):** Total loop tank volume
- **Tank Count:** Number of central HPWH loop storage tanks
- **Tank R-Value (°F-ft2-h/Btu):** Central HPWH loop storage tank insulation R-value
- **Tank Location:** Location of central HPWH loop storage tanks(s)
- **Source Air From:** Location from where loop tank ASHP source air comes from

DHW Solar System Data Screen

To create a new DHW Solar Thermal System, right click on DHW Solar Systems in the Mechanical tab and scroll to select Create, and then select **DHW Solar System.**







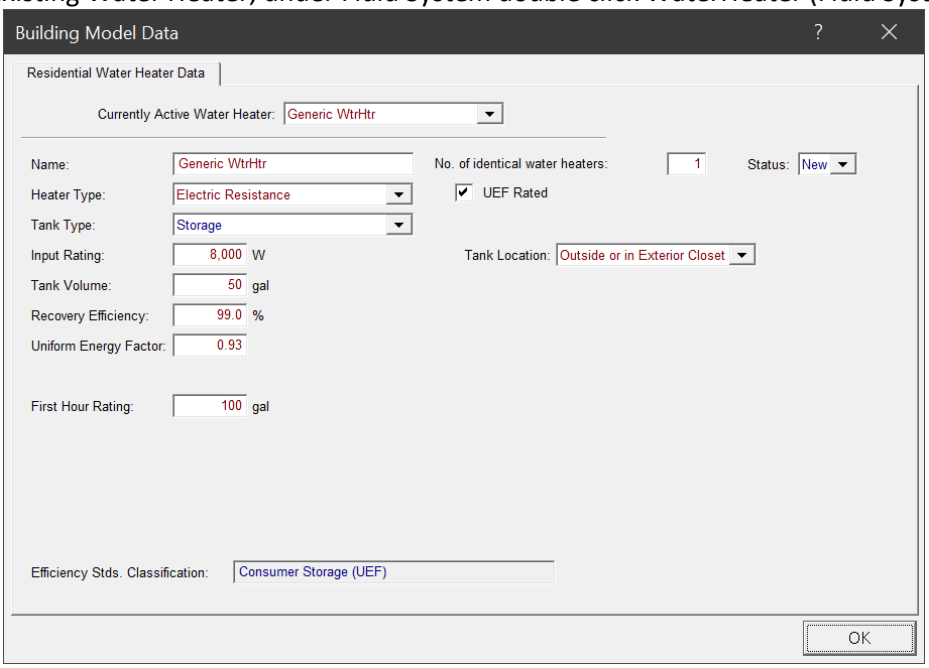
Input Summary:

- **Name:** Name of the solar thermal system.
- **Tank Volume:** Solar thermal system tank volume
- **Azimuth:** Azimuth of collectors in degrees
- **Tilt:** Tilt of collectors in degrees
- **Manufacturer:** Prepopulated list of various solar collector manufactures
- **Brand:** Prepopulated list of solar collector brand per manufacturer
- **Model:** Prepopulated list of solar collector models available per brand

Residential Water Heater Data Screen

To create a new Water Heater, right click on FluidSystem (Residential Water Heating System), scroll down to Create, and then select **Residential WaterHeater.**

To access an existing Water Heater, under Fluid System double click WaterHeater (Fluid System icon).



Input Summary:

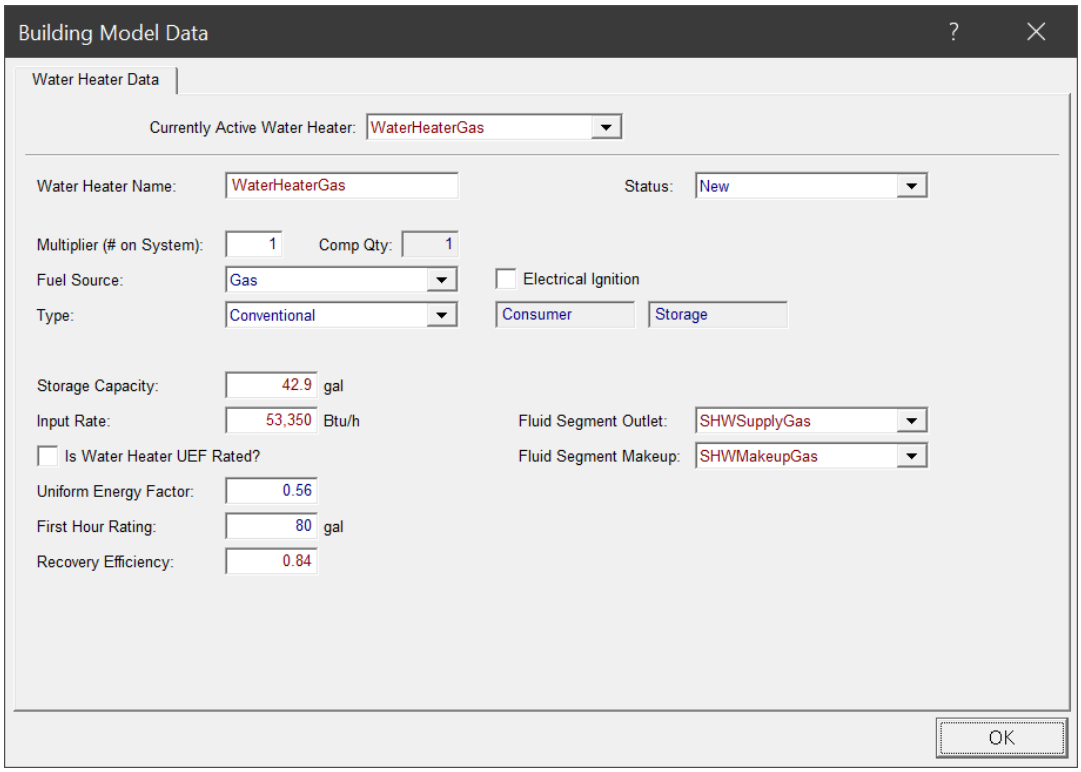
- **Currently Active Water Heater:** Name of the currently selected water heater.
- **Water Heater Name:** The name of the water heater.
- **No. of identical water heaters:** Indicates number of duplicate water heaters.
- **Status:** The status of the system or component used for additions and alterations. Options are New and Existing.
- **Heater Type:** Select the type of water heater. Options are Electric Resistance, Gas and Heat Pump.
- **Tank Type:** Select the water heater type. Options are Boiler, Indirect, Instantaneous and Storage., Commercial Instantaneous and Commercial Storage
- **Input Rating:** Indicates the heating capacity of the water heater at rated conditions.
- **Energy Factor:** The energy factor of the residential water heater.
- **Tank Volume:** The tank volume of the residential water heater.
- **UEF Rated** (check box): Check if the water heater has Uniform Energy Factor rating (UEF).
- **Uniform Energy Factor**: This is the newest measure of the water heater's overall efficiency.
- **First Hour Rating**: For storage water heaters rated with UEF this is the water heater's first hour rating in gallons.
- **Recovery Efficiency**: This is the water heater's recovery efficiency.
- **Flow Rate:** For instantaneous water heaters this is the flow rate of the water heater in gallons per minute.
- **Tank Location:** Indicates location of the water heater tank. Options are Conditioned, Unconditioned, Outside or in Exterior closet.
- **Thermal Efficiency:** The thermal efficiency of the residential water heater.

- **Standby Loss Frac:** The standby loss fraction of the residential water heater.
- **Pilot Energy (Btu/h):** The pilot energy of the residential water heater.
- **Includes Electric Mini Tank (checkbox):** Indicates whether the water heater includes an electric mini tank.
- **Ambient Condition:** The surrounding conditions of the residential water heater. Options are Conditioned, Unconditioned.
- **Tank Insulation R-values** section**:**
  - **Exterior:** Indicates exterior insulation of the water heater.
  - **Interior:** Indicates interior insulation of the water heater.
- **NEEA Rated (checkbox):** Indicates whether the Heat Pump water heater is NEEA rated.
- **Heat Pump Brand:** NEEA rated heat pump water heater brand name.
- **Heat Pump Model:** NEEA rated heat pump water heater model name for selected brand.

Water Heater Data Screen

To create a new Water Heater, right click on FluidSystem (Service Hot Water), scroll down to Create, and then select **WaterHeater.**

To access an existing Water Heater, under Fluid System double click WaterHeater (Fluid System icon).



Input Summary:

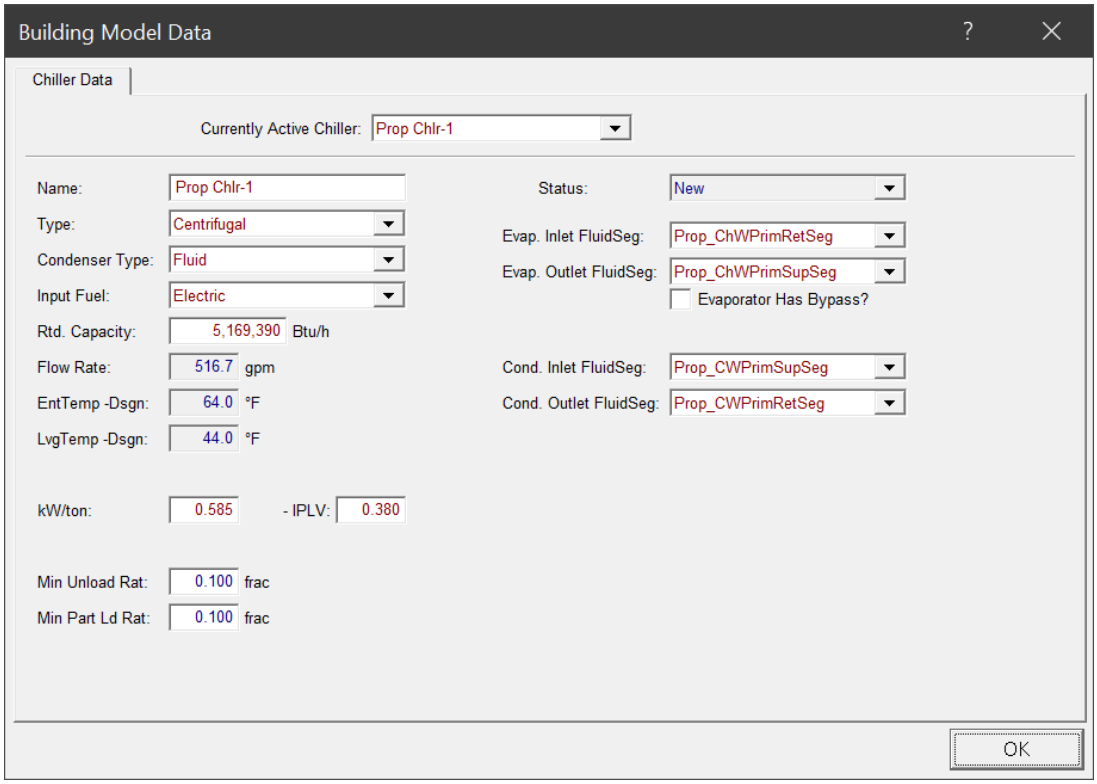
- **Currently Active Water Heater:** Name of the currently selected water heater.
- **Water Heater Name:** The name of the water heater.
- **Status:** The status of the system or component used for additions and alterations. Options are New and Existing.
- **Multiplier (# on System):** The number of duplicate water heaters. This duplication number is only applicable for multiple water heaters that are identical in every way and in the same space or zone location.
- **Comp Qty:** Total number of water heaters including fluid system multipliers.
- **Fuel Source:** The water heater fuel source. Options are Gas and Electricity.
- **Type:** Select the water heater type. For electric water heaters, options are Conventional, HeatPumpPackaged, and HeatPumpSplit. For gas water heater, Conventional is the only option.
- **Electrical Ignition (check box):** Check this box if the water heater has an electrical ignition.
- **Storage Capacity:** This is the water heater's storage capacity.
- **Input Rate:** This is the water heater's rated capacity.
- **Energy Factor:** The energy factor (EF) is the ratio of the energy delivered by the water heater divided by the energy used in the same units. The EF is calculated according to 10 CFR Part 430 Test Procedure, which specifies a 24-hour pattern of draws, a storage temperature, inlet water temperature and other test conditions.

- **Is Water Heater UEF Rated** (check box): Check if the water heater has Uniform Energy Factor rating (UEF).
- **Uniform Energy Factor**: This is the newest measure of the water heater's overall efficiency.
- **First Hour Rating**: For storage water heaters rated with UEF this is the water heater's first hour rating in gallons.
- **Flow Rate:** For instantaneous water heaters this is the flow rate of the water heater in gallons per minute.
- **Thermal Efficiency:** The full load efficiency of a water heater at rated conditions expressed as a dimensionless ratio of output over input. This is also referred to as recovery efficiency.
- **Standby Loss Fraction:** The tank standby loss coefficient for the water heater.
- **Recovery Efficiency:** The water heater recovery efficiency.
- **Fluid Segment Outlet:** Select the fluid segment outlet. (Input is optional.)
- **Fluid Segment Makeup:** Select the fluid segment makeup. (Input is optional.)
- **Draft Fan Power:** The power of the draft fan. (Input is optional.)

Chiller Data Screen

To create a new Chiller, right click on FluidSystem (Chilled Water), scroll down to Create, and then select **Chiller.**

To access an existing Chiller, double click a Chiller option (Chiller icon).



Input Summary:

- **Currently Active Chiller**: The name of the currently selected chiller.
- **Name**: The name of the chiller.
- **Status:** Defines equipment as new or existing.

- **Type**: Select the type of chiller being used based on the compressor type or absorption process. Options are Centrifugal, Reciprocating, Scroll, Screw, Absorption Single Effect. Note that the heat rejection process is not included in the Type descriptor; see Condenser Type.
- **Condenser Type:** Select the method used to reject heat from the chiller. Options are Air and Fluid.

Air-cooled chillers use air to cool the condenser coils. Water-cooled chillers use cold water to cool the condenser and additionally need either a cooling tower or a local source of cold water. Evaporatively cooled chillers are similar to air-cooled chillers, except they use a water mist to cool the condenser coil, which makes them more efficient.

- **Input Fuel:** Select the form of the primary energy input to the chiller. All chillers have a primary energy input along with electricity use for auxiliaries. This input describes the form of the primary energy. Options are Electricity, Steam, Hot Water, Natural Gas, or Oil.
- **Rtd. Capacity:** The cooling capacity of the chiller at rating conditions. The full load output of the chiller operating at rating temperatures and flows.
- **EntTemp -Dsgn:** The chilled water return temperature at design conditions.

This temperature is used to size the chilled water components of the system.

- **LvgTemp -Dsgn:** The chilled water supply temperature at design conditions.

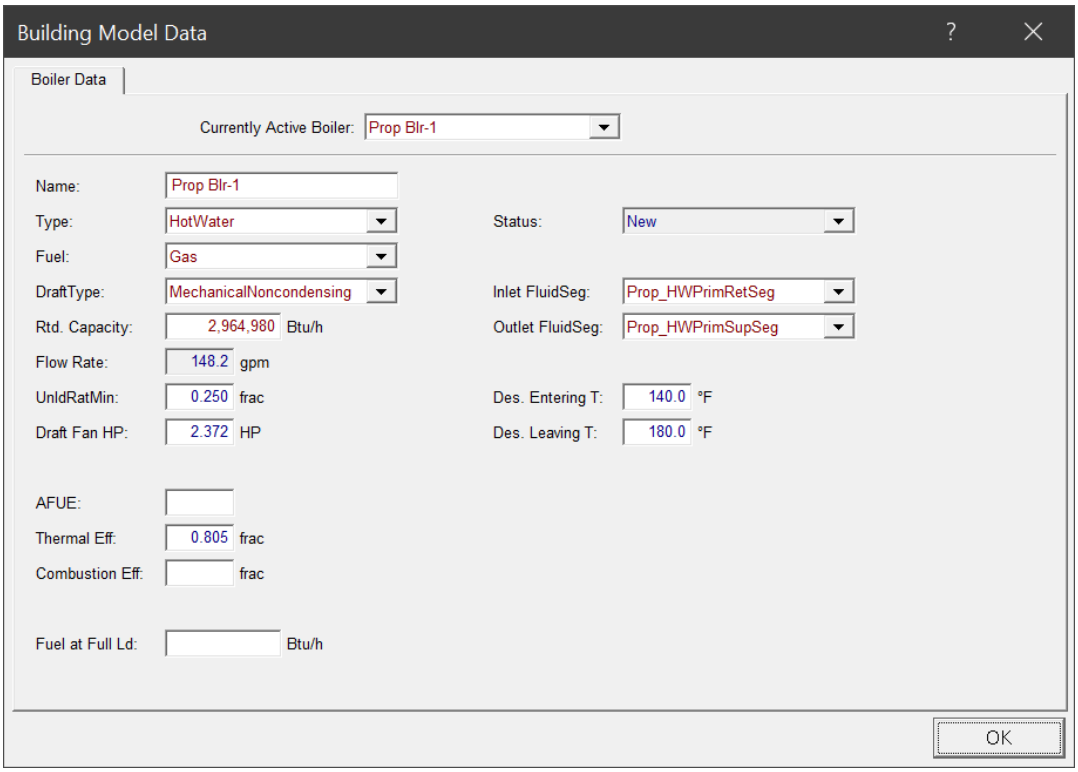
This temperature is used to size the chilled water components of the system.

- **kW/ton:** The efficiency of water cooled electric chillers in kW/ton.
- **- IPLV:** The integrated part load value (IPLV) value for water cooled electric chillers in kW/ton.
- **- IPLV:** The IPLV value for fuel or heat driven chillers in COP units, Btu/Btu.
- **Min Unload Rat:** Minimum unloading ratio.
- **Min Part Ld Rat:** Minimum part load ratio.
- **Evap. Inlet FluidSeg**: Name of the fluid segment connected to the evaporator inlet. This is the chiller evaporator inlet connection, to chilled water return.
- **Evap. Outlet FluidSeg:** Name of the fluid segment connected to the evaporator outlet. The chiller condenser outlet connection, to condenser water return.
- **Evaporator Has Bypass? (check box):** Whether or not the chiller has Bypass.
- **Cond. Inlet FluidSeg:** Name of the fluid segment connected to the condenser inlet. This is the chiller condenser inlet connection, to condenser water supply.
- **Cond. Outlet FluidSeg:** Name of the fluid segment connected to the condenser outlet. This is the chiller condenser outlet connection, to condenser water return.

Boiler Data Screen

To create a new Boiler right click on FluidSystem (Hot Water), scroll down to Create, and then select **Boiler.**

To access an existing Boiler, double click Boiler data (Boiler icon).



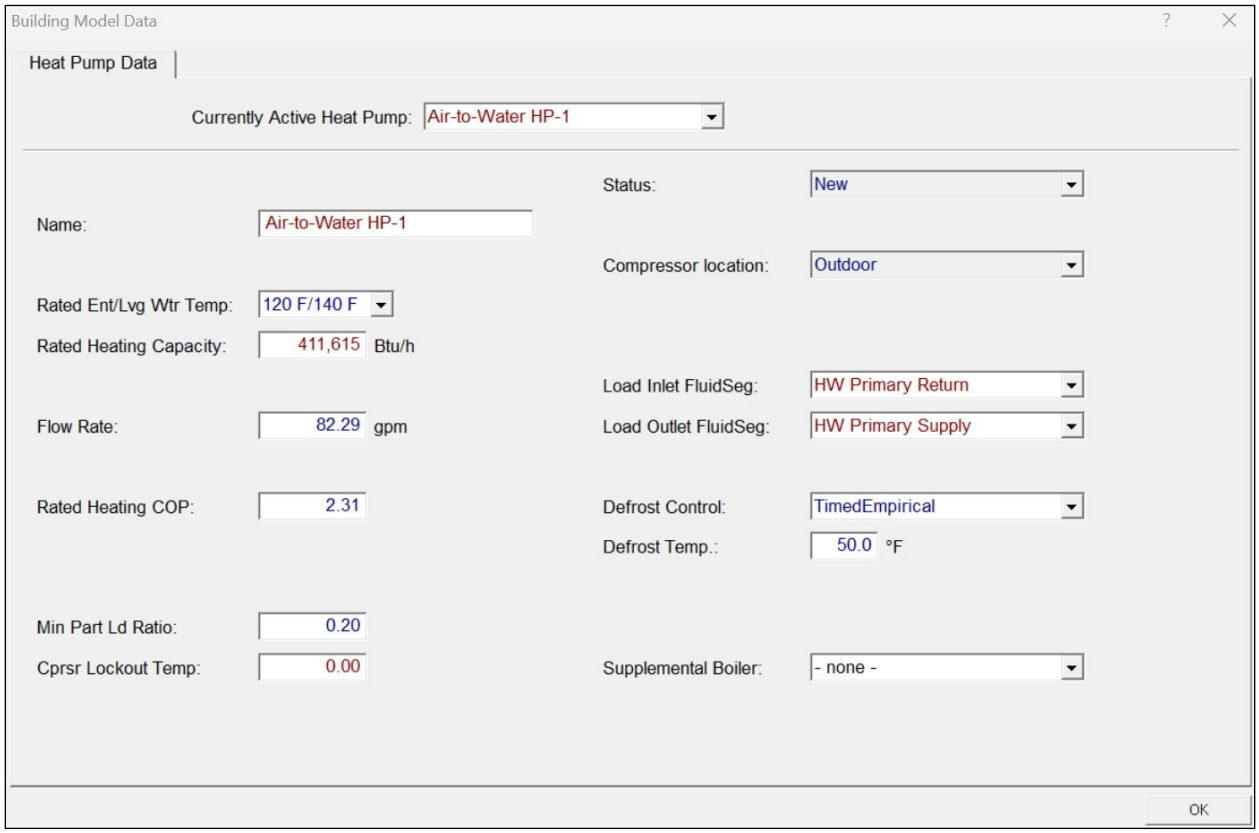
Input Summary:

- **Currently Active Boiler:** The name of the currently selected boiler.
- **Name:** The name of the boiler.
- **Type**: Select the type of boiler in terms of steam or hot water. Boiler type in terms of fuel used or draft type are defined in other descriptors and rules.
- **Fuel**: Select the primary fuel used by the boiler to generate heat. Options are gas, oil or electric.
- **DraftType**: Select the type of boiler output. Options are MechanicalNoncondensing, Condensing, and Natural.
- **Rtd. Capacity** (Btu/h): Heat output of the boiler at full load and rated conditions.
- **UnldRatMin** (frac): The minimum load on the boiler at which the boiler can operate without cycling, expressed as a fraction of the full load capacity. At loads less than this, the boiler cycles at the minimum capacity as needed to meet the load.
- **Draft Fan HP**: The nameplate horsepower of the draft fan motor for boilers with mechanical draft.
- **AFUE**: The Annual Fuel Utilization Efficiency (AFUE) of the boiler. Applies only to smaller gas, propane, or oil fired boilers with output heating capacities of less than 300,000 Btu/hr. For larger fuel-fired boilers, use thermal efficiency, and for electric boilers use EIR.

- **Thermal Eff** (frac)**:** The Thermal Efficiency of the boiler. Applies only to larger gas, propane or oil fired boilers with output heating capacities of 300,000 Btu/hr or more. For smaller fuel-fired boilers use AFUE. For electric boilers use EIR.
- **Combustion Eff** (frac)**:** The thermal efficiency of the boiler. Applies only to fuel-fired boilers with capacities of more than 2,500,000 Btu/hr.
- **Fuel at Full Ld** (Btu/h): The fuel consumption at design conditions.
- **Status**: Defines if equipment is new, existing or modified.
- **Inlet FluidSeg:** The boiler inlet connection to hot water return, or HWR.
- **Outlet FluidSeg**: The boiler outlet connection to hot water supply, or HWS.
- **Des. Entering T**: The temperature of the hot water returned to the boiler at design conditions. This may not be the return water temperature during normal operation.
- **Des. Leaving T**: The temperature of the hot water supplied by the boiler at design conditions. This may not be the supply water temperature during normal operation.
- **HasBypass?** (check box): Whether or not the Boiler has Bypass.

Air-to-Water Heat Pump Data Screen

To create a new Air-to-Water Heat Pump right click on FluidSystem (Hot Water), scroll down to Create, and then select **Heat Pump.**



Input Summary:

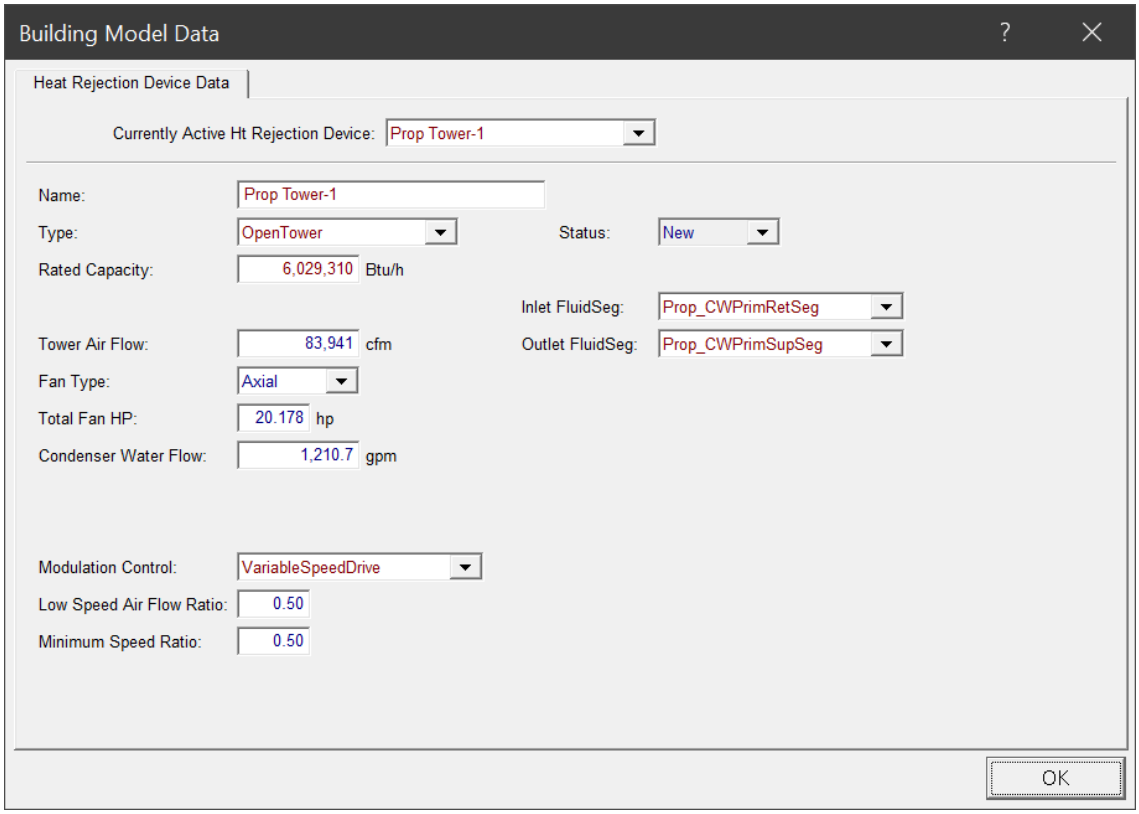
- **Currently Active Air-to-Water Heat-Pump:** The name of the currently selected air-to-water heat-pump.
- **Name:** The name of the air-to-water heat-pump.
- **Status**: Defines if equipment is new or existing.
- **Rated Ent/Lvg Wtr Temp:** Selection for the entering and leaving water temperature at which the rated performance was determined.
- **Rated Heating Capacity (Btu/h)**: Heat output of the heat-pump at full load and AHRI 550/590 rating conditions.
- **Flow Rate (gpm)**: Heat load side flow rate.
- **Rated Heating COP:** COP of the heat-pump at rated conditions.
- **Min Part Ld Ratio:** The minimum operating part load ratio. Below this value the compressor will cycle proportionate to the load.
- **Cprsr Lockout Temp:** Compressor lockout temperature. The outside dry-bulb temperature below which the compressor is shut off.
- **Fluid Segment Inlet:** The inlet connection to hot water return, or HWR.
- **Fluid Segment Outlet**: The outlet connection to hot water supply, or HWS.

- **Defrost Control:** The defrost control mechanism. Options are none, timed, on demand, and timed empirical.
- **Defrost Temp:** The maximum temperature where defrost will occur. Defrost operation will not be active above this temperature.
- **Supplemental Boiler:** The name of the boiler which provides supplemental heating for the heat pump.

Heat Rejection Device Data Screen

To create a new Heat Rejection Device, right click on FluidSystem (Condenser Water), scroll down to Create, and then select **HeatRejection.**

To access existing Heat Rejection Device data, under Project expand **CondenserWater** and double click a heat rejection device option (Heat Rejection Device icon).



Input Summary:

- **Currently Active Ht Rejection Device**: The name of the currently selected heat rejection device.
- **Name:** The name of the heat rejection device.
- **Type:** Select the type of heat rejection device. Heat rejection devices include cooling towers. The available options are OpenTower and ClosedTower,
- **Rated Capacity** (Btu/h): The rated cooling capacity at CTI test conditions.

The cooling capacity at rated conditions of 95°F condenser water return, 85°F condenser water supply, and 78°F wet-bulb with a 3 gpm/nominal ton water flow, where a nominal ton is 15,000 Btu/hr.

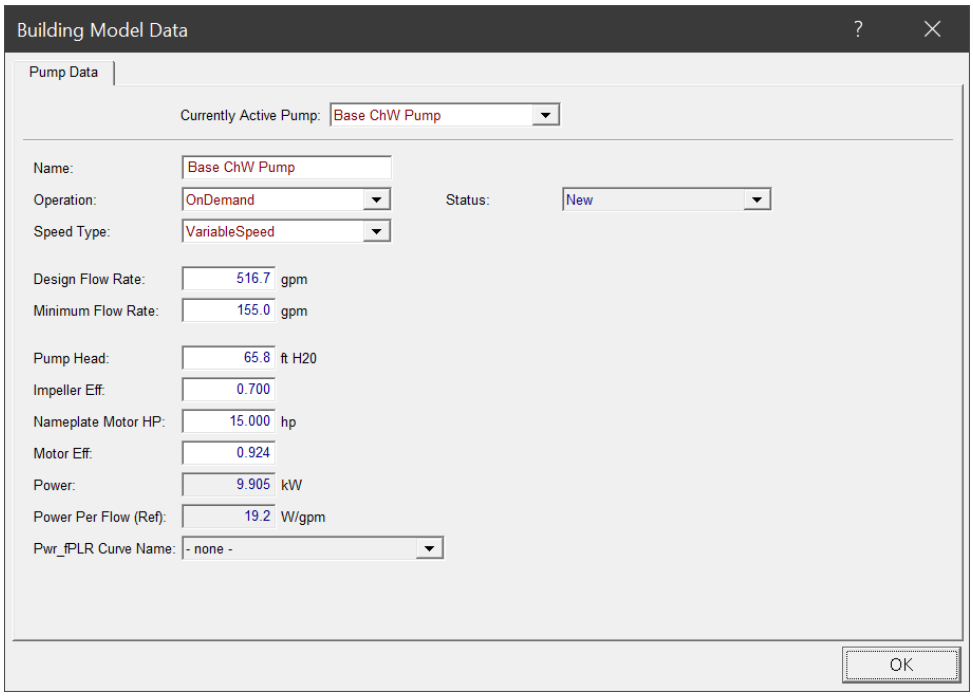
- **Number of Cells**: The number of cells in the cooling tower. Each cell has its own fan and water flow allowing for responding to lower load conditions.

Each cell will be modeled as equal size. Cells are subdivisions of cooling towers into individual cells, each with their own fan and water flow, allowing the cooling system to respond more efficiently to lower load conditions.

- **Tower Air Flow** (cfm): The rate of air moving through the tower.
- **Fan Type:** The type of fan used in a cooling tower. Fan type options are axial or centrifugal.
- **Total fan HP**: The sum of the nameplate rated horsepower (hp) of all fan motors on the cooling tower.
- **Condenser water flow rate** (gpm)**:** The rate of water flowing through the condenser.
- **Modulation Control:** The method used by the heat rejection device to modulate capacity. Options are Bypass, Cycling, TwoSpeed, and VariableSpeedDrive.
- **Low Speed Air Flow Ratio:** Ratio of the low-speed airflow to full speed airflow. The percentage full load airflow that the tower has at low speed or with the pony motor operating. This is equivalent to the percentage full load capacity when operating at low speed.
- **Minimum Speed Ratio**: Minimum fan speed for a variable speed tower. The minimum fan speed setting of a VSD controlling a cooling tower fan expressed as a ratio of full load speed.
- **Status:** Defines if equipment is new, existing or modified.
- **Inlet FluidSeg Name:** Select the heat rejection inlet connection to condenser water return (CWR), or create/import a FluidSegment.
- **Outlet FluidSeg Name**: Select the heat rejection outlet connection to condenser water supply (CWS), or create/import a FluidSegment.

Pump Data Screen

To create a new Pump, right click on FluidSegment, Boiler, Chiller, Cooling Tower or Water Heater, scroll down to Create, and then select **Pump.** To access existing Pump data, double click a pump (Pump icon).



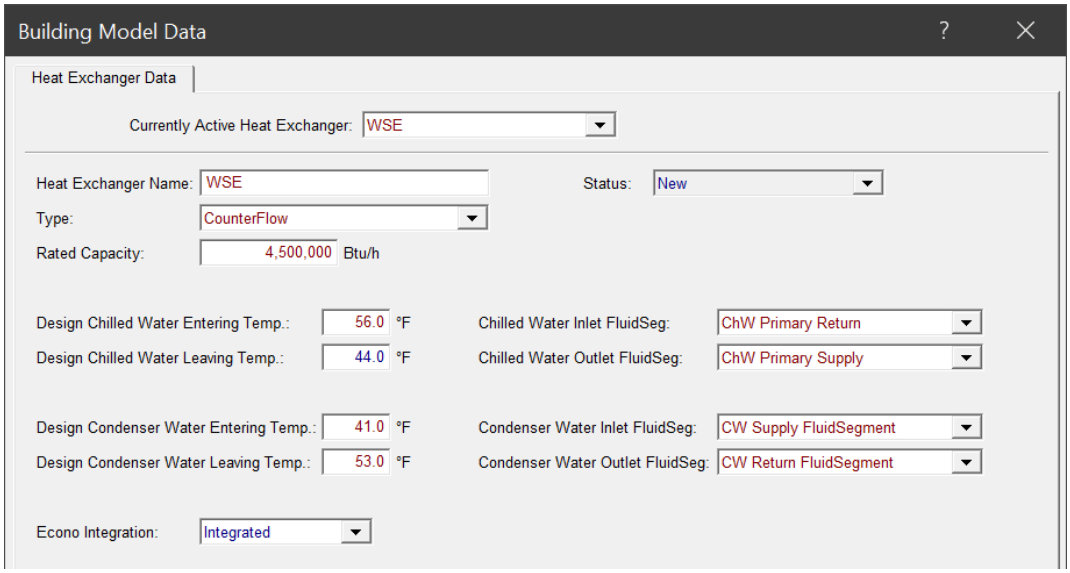
Input Summary:

- **Currently Active Pump**: The name of the currently selected pump.
- **Name**: The name of the pump.
- **Operation:** Select how the pump operation is controlled. Options are OnDemand, StandBy, and Scheduled.
- **Status**: Defines the pump status as New or Existing.
- **Speed Type**: Select the type of speed control for the pump. Options are ConstantSpeed and VariableSpeed.
- **Design Flow Rate** (gpm): The capacity of the pump.
- **Minimum Flow Rate** (gpm): The lowest flow rate available for the pump.
- **Pump Head** (ft H2o)**:** The pressure head of the pump at design flow conditions.
- **Impeller Eff:** Full load efficiency of the pump impeller.
- **Nameplate Motor HP:** The nameplate horsepower of the pump motor.
- **Motor Eff:** Indicates how well the motor converts electrical power into mechanical power and is defined as output power divided by input power expressed as a ratio.
- **Power** (kW)**:** The design power of the pump. This input gets calculated by the software based on user inputs for other pump parameters.
- **Power Per Flow (Ref)** (W/gpm)**:** The power of the pump per unit flow at design flow capacity.
- **Pwr_fPLR Curve Name:** The name of the power as a function of PLR curve. This is normally a biquadratic curve.

Heat Exchanger (Waterside Economizer) Data Screen

To create a new Waterside Economizer Heat Exchanger (HX), right click on FluidSystem scroll down to Create, and then select **HeatExchanger.**

To access existing Heat Exchanger data, double click a heat exchanger (HX icon).



Input Summary:

- **Currently Active Heat Exchanger**: The name of the currently selected HX.
- **Name**: The name of the heat exchanger.
- **Type:** The heat exchanger configuration
- **Rated Capacity (Btu/h):** Design cooling capacity of the waterside economizer heat exchanger
- **Status**: Defines the HX status as New or Existing.
- **Design Chilled Water Entering Temp**: Temperature of water entering the HX on the chilled water side of the system at design conditions
- **Design Chilled Water Leaving Temp**: Temperature of water leaving the HX on the chilled water side of the system at design conditions
- **Design Condenser Water Entering Temp**: Temperature of water entering the HX on the condenser water side of the system at design conditions
- **Design Condenser Water Leaving Temp**: Temperature of water leaving the HX on the condenser water side of the system at design consitions
- **Chilled Water Inlet FluidSeg:** Name of the fluid segment connected to the chiller outlet
- **Chilled Water Outlet FluidSeg:** Name of the fluid segment connected to the chiller outlet
- **Condenser Water Inlet FluidSeg:** Name of the fluid segment connected to the condenser outlet
- **Condenser Water Outlet FluidSeg:** Name of the fluid segment connected to the condenser outlet
- **Econo Integration:** Integrated or NonIntegrated economizer

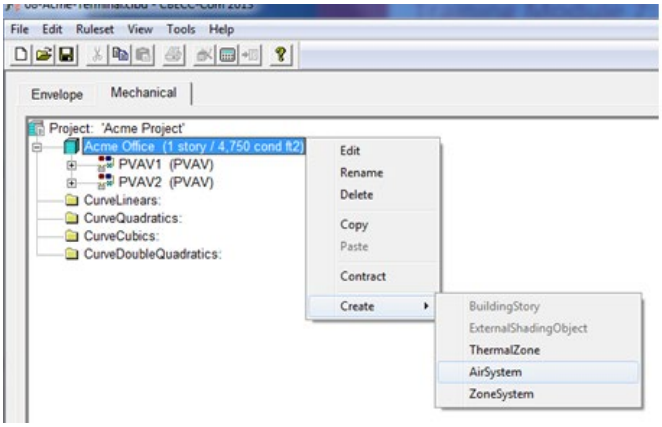
Building Data Screen

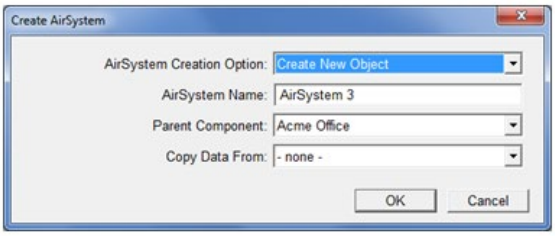
Note that the Building Data input screen is identical to the Building Data screen described above in Envelope Input Screen Details. Users may edit Building Data on either the Envelope or Mechanical tab of the user interface and that data will persist on both tabs.

See the Building Data Screen above in the Envelope tab for details.

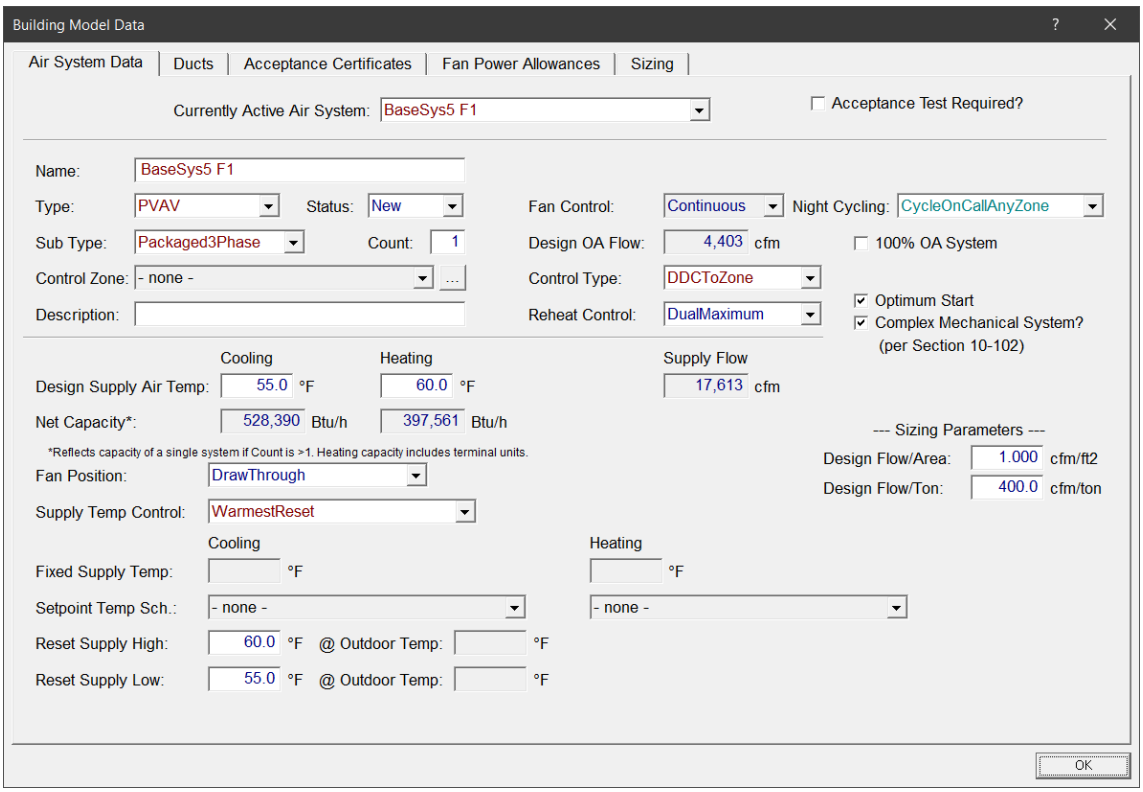
Air System Data Screen (Air System Data Tab)

The following types of Air Systems can be created: PVAV, VAV, SZAC, SZHP, SZVAVAC, SZVAVHP, HV, SPVAC, SPVHP, DOASCV, DOASVAV and Exhaust. To create a new Air System, in the Mechanical tab right click on Building, scroll down to **Create**, and select **AirSystem.**





To access this screen, under building data double click an air system option (Air System icon).



Input Summary:

- **Currently Active Air System:** The name of the currently selected Air System.
- **Acceptance Test Required:** whether or not acceptance test is required on this air system.
- **Name:** The name of the Air System.
- **Type**: Select the type of air system, a unique descriptor that identifies high level attributes of a HVAC system. Options are PVAV, VAV, SZAC, SZHP, SZVAVAC, SZVAVHP, HV, SPVAC, SPVHP, DOASCV, DOASVAV and Exhaust.
- **Status:** Defines system status as New, Existing, or Altered.
- **Sub Type:** Property used to define rating conditions and efficiency requirements of system components. Options available are Packaged 3Phase, Split3Phase, Packaged1Phase, Split1Phase,CRAC and CRAH.
- **Count**: The number of duplicate systems represented by the current system.

The number of duplicate systems can only be >1 when all attributes of the system are the same. If Count is specified to be >1, all parameters (capacities, power, etc.) should be specified for the single piece of equipment. The ruleset applies multipliers for the final simulation.

- **Control Zone**: A reference to the thermal zone name where controls for the Air System are located.
- **Description:** A brief description of the Air System that summarizes its essential characteristics.
- **Availability Schedule**: Select the name of the Availability schedule for the Air System.
- **Night Cycle Control**: The HVAC system control method when heating, cooling and fan systems are scheduled to be Off. For this control, the space is controlled to the setback or setup temperature only; this control is not equivalent to night purge control. Options include StaysOff, CycleOnCallAnyZone, and CycleZoneFansOnly.
- **Ventilation Control:** Defaults as per rules to be same as PriAirCondgSysRef
- **Design OA Flow:** The design outside air flow of the Air System in cfm.
- **Control Type:** Select the type of control system used for an HVAC system. Applicable to multizone HVAC systems and their related equipment only. This input affects the proposed design system specification for zone level controls, supply air temperature reset controls, ventilation controls and fan and pump static pressure part-load curves. . Options are DDCToZone and Other.
- **Reheat Control:** Select the air/temperature control strategy for VAV reheat box in heating mode.
    - Single Maximum: The airflow is set to a minimum constant value in both the deadband and heating mode. The minimum airflow setpoint is typically 30 to 50 percent of maximum. This control mode typically has a higher minimum airflow than the minimum used in the dual maximum below, resulting in more frequent reheat.
    - Dual Maximum: raises the SAT as the first stage of heating, and increases the airflow to the zone as the second stage of heating, as follows:
      1. The first stage of heating consists of modulating the zone supply air temperature setpoint up to a maximum setpoint no larger than 95°F while the airflow is maintained at the deadband flow rate.
      2. The second stage of heating consists of modulating the airflow rate from the deadband flow rate up to the heating maximum flow rate (50 percent of design flow rate).

- **Optimum Start** (check box): Select to indicate Optimum start.
- **Complex Mechanical System? (per Section 10-102)** (check box): Check to indicate whether an HVAC system is Simple or Complex, used for reporting. Complex systems serve multiple zones or use hydronic heating or cooling. Simple systems are all other systems. Single zone air systems are simple, except for any with hot water heating of chilled water cooling. All multizone air systems are complex.
- **Design Supply Air Temp** (Cooling): Enter the design cooling supply air temperature of single duct system or the cold duct of a dual duct system. This is also the control setpoint for Fixed air temperature control. (Input is optional.)
- **Design Supply Air Temp** (Heating): Enter the design heating supply air temperature of single duct system or the hot duct of a dual duct system. This is also the control setpoint for Fixed air temperature control. (Input is optional.)
- **Net Capacity*** (Cooling): Net Capacity of the Cooling System. Reflects capacity of a single system if count is > 1.
- **Net Capacity*** (Heating): Net capacity of the Heating System. Reflects capacity of a single system if count is > 1.
- **Net Capacity*** (Supply Flow): The capacity of the supply fan in cfm. Reflects capacity of a single system if count is > 1.
- **Fan Position:** The position of the supply fan relative to the cooling coil. Options available are DrawThrough and BlowThrough.
- **Supply Temp Control**: The method of controlling the supply air temperature of a single duct system, or the cold duct of dual duct system. Options available are Fixed, WarmestResetFlowFirst, OutdoorAirReset and Scheduled.
- **Fixed Supply Temp**: The temperature of the air being supplied to the space.
- **Setpoint Temp. Sch**: The scheduled supply air temperature setpoint of a single duct air system, or the scheduled setpoint temperature of the cold duct in a dual duct system.
- **Reset Supply High:** The maximum (high) reset supply air temperature for a single duct system, or for the cold duct of a dual duct system.

If supply air temperature is reset based on outside air temperature, specifies the supply air high setpoint to at the outside drybulb low. If supply air temperature is reset based on 'Warmest' zone, specifies the maximum supply air temperature for reset.

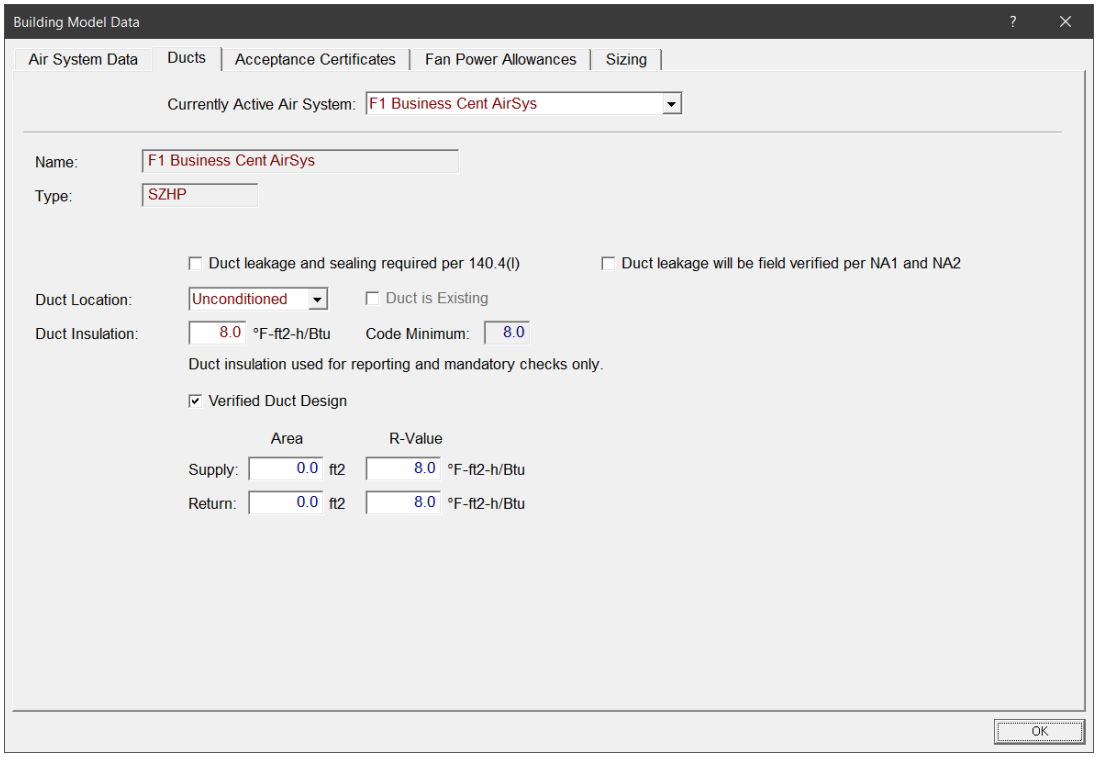
- **@ Outdoor Temp** (High): The minimum (low) outdoor air temperature at the high reset supply air temperature during cooling. Applicable when cooling supply air temperature is reset based on outside air temperature, specifies the outside drybulb low.
- **Reset Supply Low:** The minimum (low) reset supply air temperature during cooling. If cooling supply air temperature is reset based on outside air temperature, specifies the supply air low setpoint to at the outside drybulb high. If cooling supply air temperature is reset based on warmest zone, specifies the minimum supply air temperature for reset.
- **@ Outdoor Temp** (Low): The maximum (high) outdoor air temperature at the low reset supply air temperature during cooling. If cooling supply air temperature is reset based on outside air temperature, specifies the supply air low setpoint to at the outside drybulb high.

Auto-Hardsize Parameters section

- **Design Flow/Area (cfm/ft2):** Air flow per sq ft of area for auto hardsizing the system
- **Design Flow/Ton (cfm/ton):** Air flow per net cooling ton for auto hardsizing the system

Air System Data Screen (Ducts Tab)

To access this screen, under building data double click an air system option (Air System icon), and then click on the **Ducts** tab.



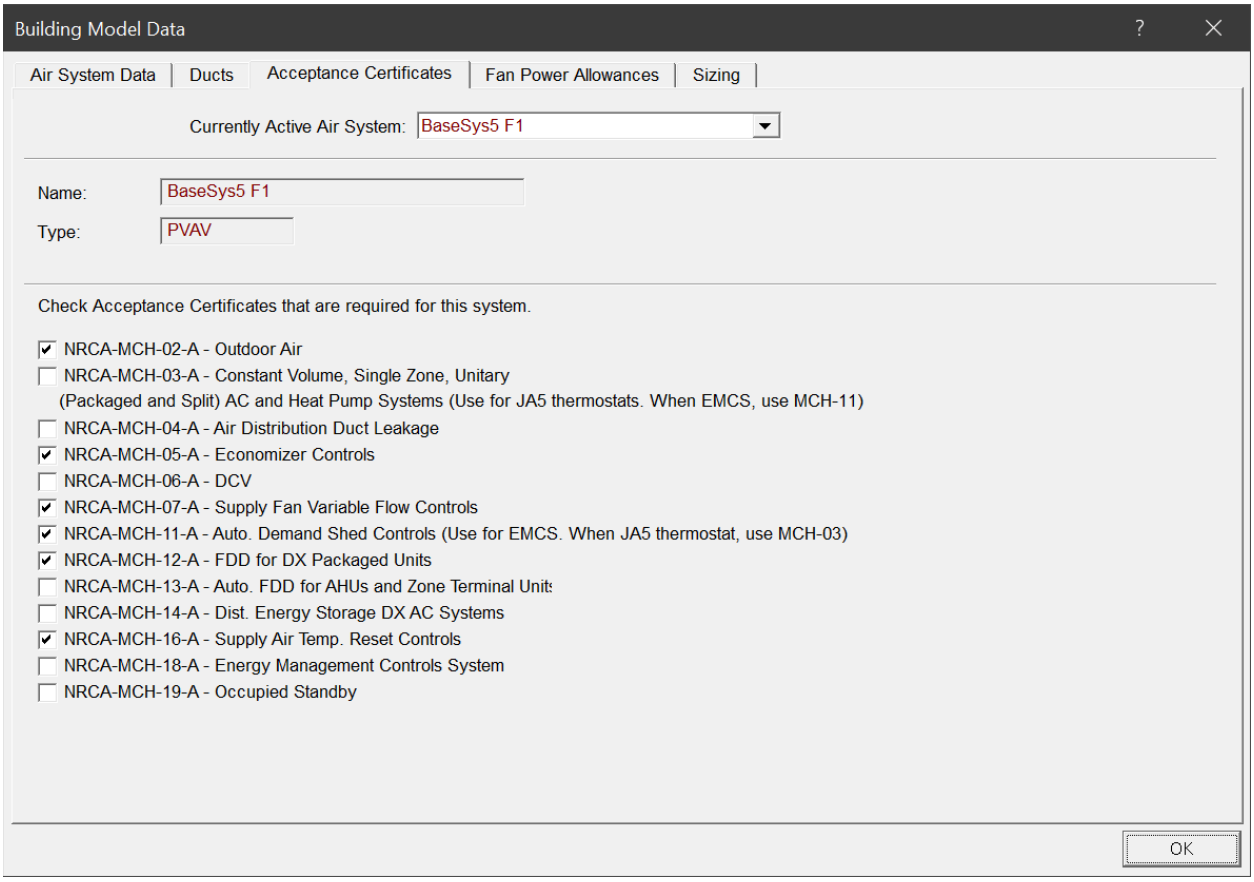
Note: These inputs are for reporting only and will not impact simulation results.

Input Summary:

- **Currently Active Air System:** The name of the currently selected Air System.
- **Name:** The name of the Air System.
- **Type**: Select the type of air system, a unique descriptor that identifies high level attributes of a HVAC system.
- **Duct leakage and sealing required per 140.4(l)**: Check box to indicate whether HERS duct leakage testing is required, used for reporting. HERS duct leakage testing is required if duct systems: 1. Supply conditioned air to occupiable space from a single zone constant speed system, 2. Serve less the 5,000 ft2 of conditioned floor area, and 3. More than 25% of the total duct system surface area is located in unconditioned space.
- **Duct leakage will be field verified per NA1 and NA2:** Check box to indicate whether HERS duct leakage testing will be performed per appendix NA2. If duct leakage will not be field verified the project will incur a penalty as per the Standards /ACM.
- **Duct Insulation:** The duct insulation R-value for reporting and mandatory checks only.
- **Duct Location:** The duct location (Conditioned, Unconditioned, Other, None) for reporting and mandatory checks only
- **Duct is Existing:** Checkbox to indicate if the duct is existing. This option is available for Existing, Addition and Alteration projects
- **Verified Duct Design:** This option is only available when AirSys serves the multi-family common areas.

Air System Data Screen (Acceptance Certificates Tab)

To access this screen, under building data double click an air system option (Air System icon), and then click on the **Acceptance Certificates** tab.

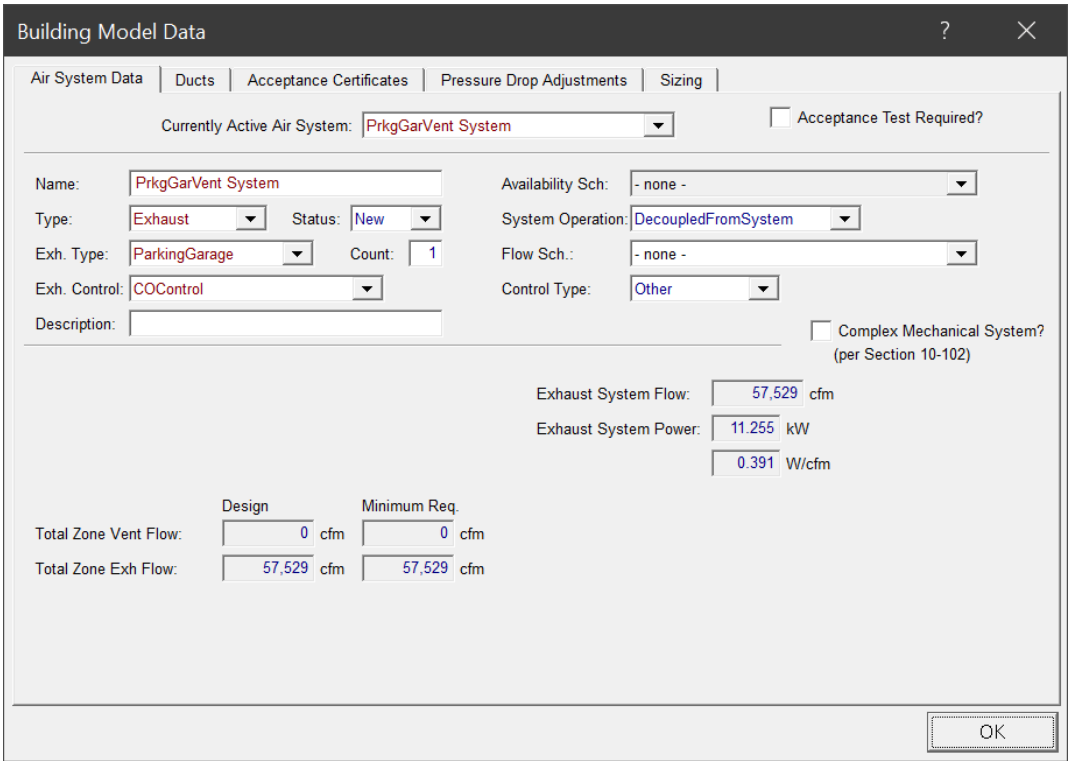


Input Summary:

- **Currently Active Air System:** The name of the currently selected Air System.
- **Name:** The name of the Air System.
- **Type**: Select the type of air system, a unique descriptor that identifies high level attributes of a HVAC system. Options are PVAV, VAV, SZAC, SZHP, SZVAVAC, SZVAVHP, HV and Exhaust.
- **Acceptance Certificates:** Check boxes to indicate whether an acceptance certificate of the number matching the term name is required, used for reporting.

Air System Data Screen (Exhaust)

To access this screen, under Building data double click an air system option (Air System icon). In the **Type** field, select Exhaust.



Input Summary:

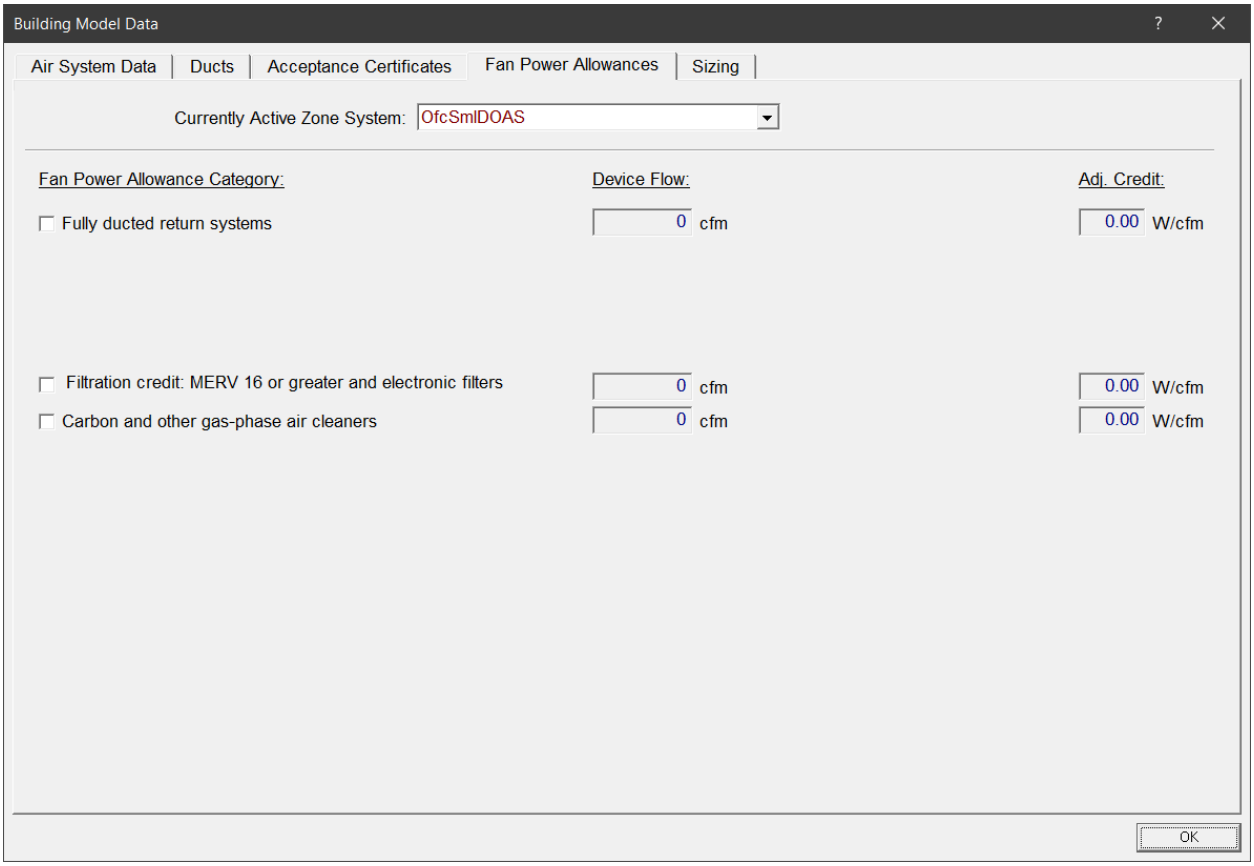
- **Currently Active Air System:** The name of the currently selected Air System.
- **Name:** The name of the Exhaust Air System.
- **Type**: Select the type of air system, a unique descriptor that identifies high level attributes of a HVAC system.
- **Status:** Defines system status as New, Existing, or Altered.
- **Exh. Type:** The type of exhaust system. This input is used to default assumptions for system controls and power. Options available are Laboratory, Commercial Kitchen and Parking Garage exhaust systems and can only be assigned to thermal zones comprised of the applicable SpaceFunction categories.
- **Count**: The number of duplicate systems represented by the current system. The number of duplicate systems can only be >1 when all attributes of the system are the same. If Count is specified to be >1, all parameters (capacities, power, etc.) should be specified for the single piece of equipment. The ruleset applies multipliers for the final simulation.
- **Exh. Control**: Control Type for the Exhaust System. Options available are COContol, NoCOControl.
- **Description:** A brief description of the Air System that summarizes its essential characteristics.
- **Availability Schedule**: Select the name of the Availability schedule for the Air System.
- **System Operation**: Describes whether exhaust system availability control is interlocked with the HVAC system availability. For compliance analysis, exhaust fans are assumed to have the

same availability schedule as the ThermalZone's ventilation system, but does not night cycle. Options available are DecoupledFromSystem and CoupledFromSystem.

- **Flow Schedule:** The schedule that defines the flow schedule for the system. This schedule is prescribed for Type = Commercial Kitchen and Laboratory exhaust systems. For General exhaust, the schedule is user defined, but will default to match the HVAC system availability schedule for the ThermalZones that the exhaust system serves. For Parking Garage systems, the schedule is prescribed to be constant, and the fan power is adjusted to account for variable speed fan control.

Air System Data Screen (Fan Power Allowances)

To access this screen, under building data double click an air system option (Air System icon), and then click on the **Fan Power Allowances** tab.



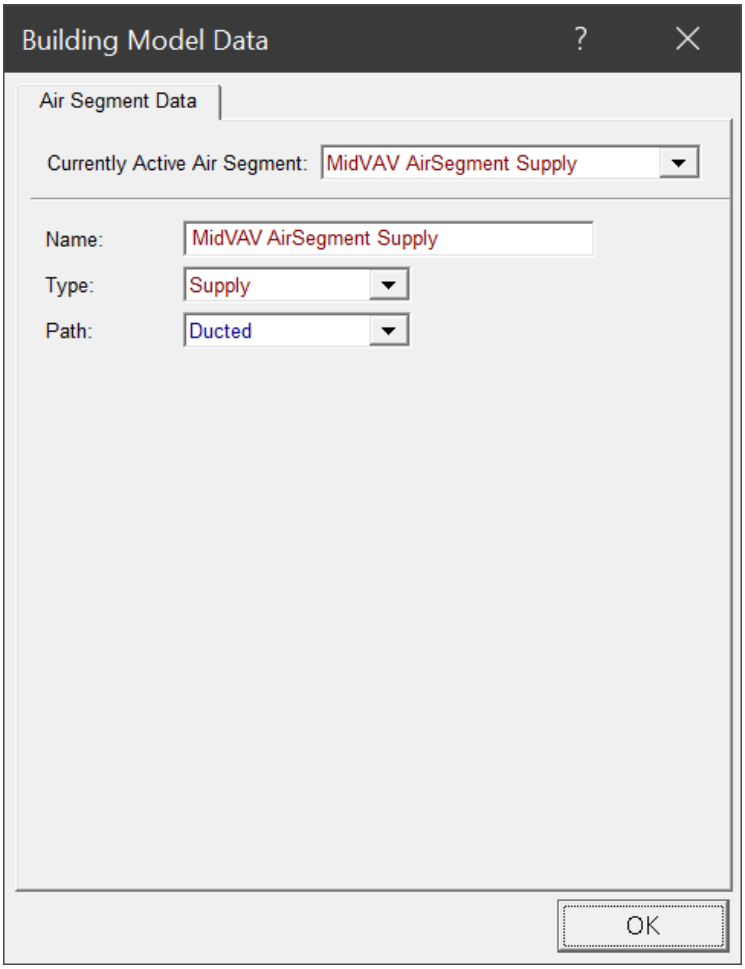
Input Summary:

- Use thus section to model any fan power allowances as they apply to the system.

Air Segment Data Screen

To create a new Air Segment, in the Mechanical tab right click on Air System, scroll down to **Create**, and select **AirSegment**

To access this screen, double click an air segment option (Air Segment icon).

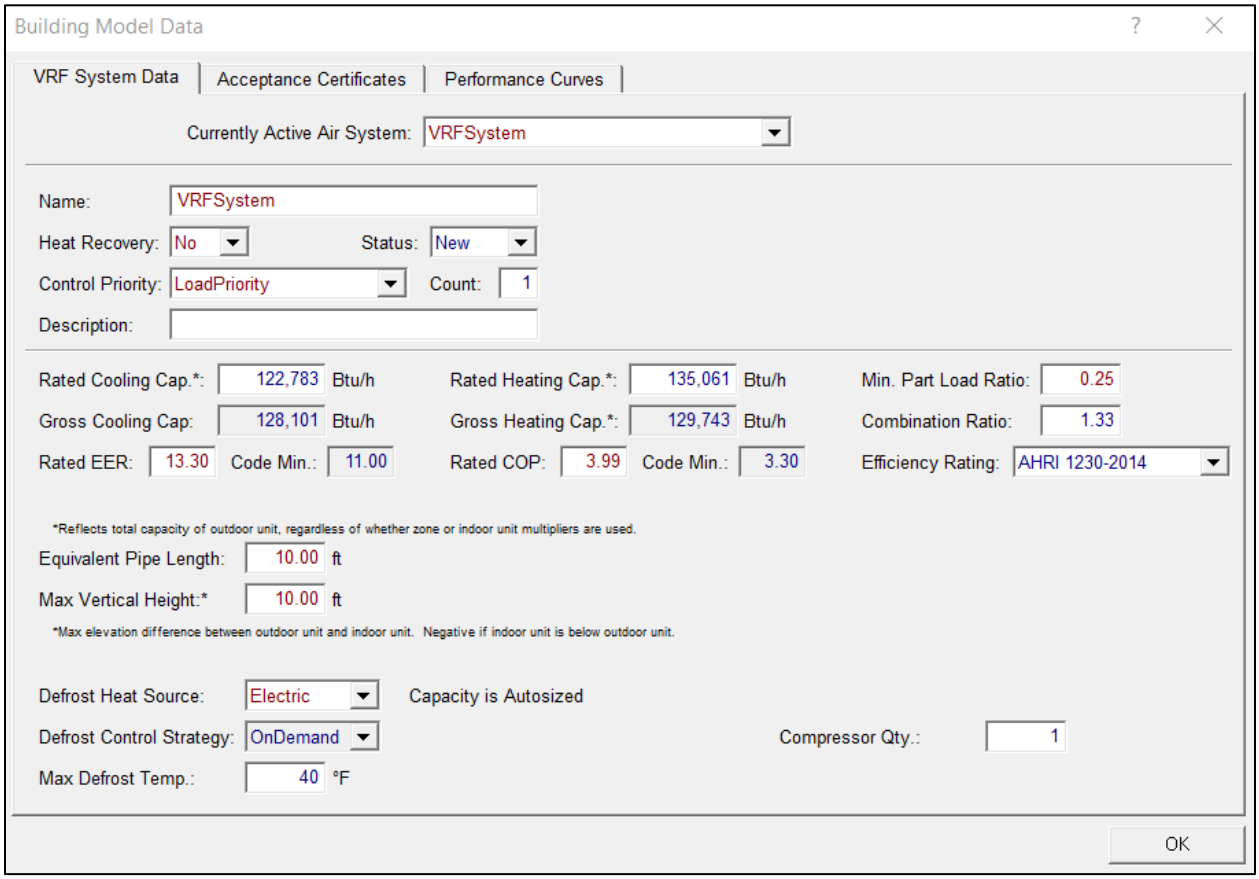


Input Summary:

- **Currently Active Air Segment:** The name of the currently selected Air Segment.
- **Name**: The name of the air segment.
- **Type**: Select the type of Air Segment. Options are Supply, Return, Relief, and Exhaust.
- **Path**: Select the path of air flow to/from the zone. Options are NotApplicable, Direct, Ducted, and PlenumZones.

VRF System Data Screen

VRF System is the outdoor unit for a VRF Zone system or systems.



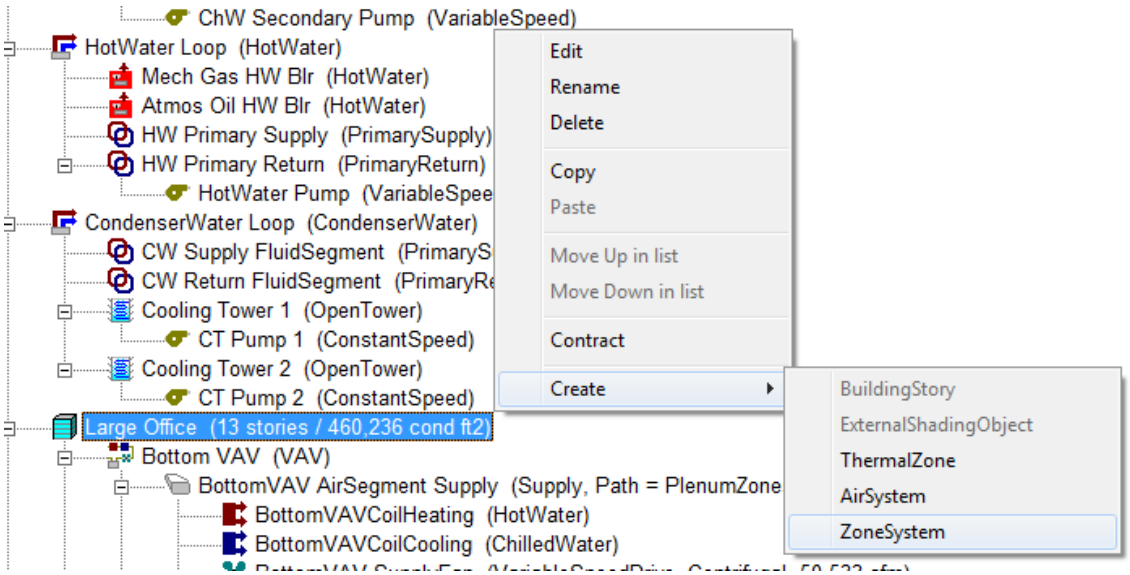
Input Summary:

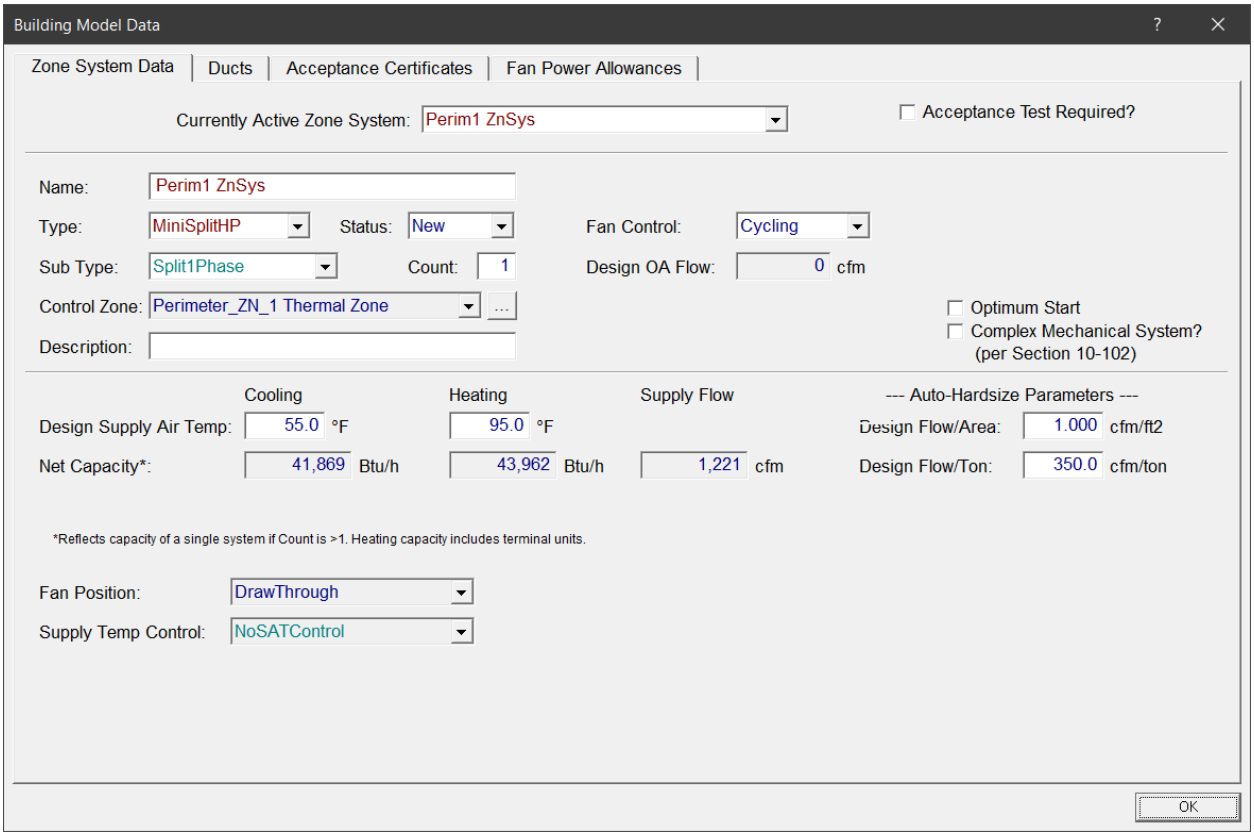
- **Name**: The name of the VRF system.
- **Heat Recovery**: Indicate if the VRF system is capable of heat recovery.
- **Status**: Defines system status as New, Existing, or Altered.
- **Control Priority**: The method used to determine if the outdoor unit is in heating or cooling; options are MasterThermostatPriority or LoadPriority.
- **Description:** A brief description of the Air System that summarizes its essential characteristics.
- **Rated Cooling Cap.**: The net total cooling capacity of the VRF system at AHRI rating conditions.
- **Rated Heating Cap.**: The net total heating capacity of the VRF system at AHRI rating conditions.
- **Min. Part Load Ratio:** The minimum operating part-load ratio (PLR) of the heat pump. When the heat pump operates at PLR below this value, the heat pump's compressor will cycle to meet the cooling or heating demand. Above this value, the heat pump's compressor operates the entire time step to meet the cooling or heating demand.
- **Combination Ratio:** The ratio of indoor unit total rated capacity to outdoor unit capacity.
- **Rated EER:** The cooling EER @ 95F of the VRF system at AHRI conditions. This value includes the condenser fan energy.

- **Rated SEER:** The cooling SEER of the VRF system at AHRI conditions.
- **Rated IEER:** The cooling IEER of the VRF system at AHRI conditions.
- **Rated COP:** The heating COP @ 47F of the VRF system at AHRI conditions. This value includes the condenser fan energy.
- **Efficiency Rating:** AHRI test standard the system is rated under. Options are AHRI 1230-2014 and AHRI 1230-2021/2023.
- **Equivalent Pipe Length:** The equivalent pipe length in feet between the farthest terminal unit and the heat pump compressor.
- **Max Vertical Height:** The vertical pipe height in feet between the highest or lowest terminal unit and the outdoor unit.
- **Defrost Heat Source:** Type of defrost heat; Electric or HotGas
- **Max Defrost Temp.:** Maximum outdoor dry-bulb temperature for defrost operation.
- **Compressor Qty.:** Number of compressors in the VRF system.

Zone System Data Screen

The following types of Zone Systems can be created: SZAC, SZHP, SPVAC, SPVHP, PTAC, PTHP, FPFC, Baseboard, WSHP, Furnace, PassiveBeam, MiniSplitAC, MiniSplitHP, Exhaust, and VRF. To create a new zone system, right click the Building data, scroll down to **Create**, and select **ZoneSystem.** The **Create ZoneSystem** dialog box appears. Enter data and click **OK**.





Input Summary:

- **Currently Active Zone System:** The name of the currently selected Zone System.
- **Acceptance Test Required:** whether or not acceptance test is required on this zone system.
- **Name**: The name of the zone system.
- **Availability Schedule:** The schedule that defines when the zone system can operate.
- **Type**: Select the type of zone system. Options are SZAC, SZHP, SPVAC, SPVHP, PTAC, PTHP, FPFC, VRF, Baseboard, WSHP, Furnace, Radiant, PassiveBeam, MiniSplitAC, MiniSplitHP, Exhaust and VentilationOnly.
- **Status**: Defines system status as New, Existing, or Altered.
- **Fan Control:** The zone HVAC system fan control method system is scheduled to be On.
- **Sub Type:** Property used to define rating conditions and efficiency requirements of system components. Options available are Packaged 3Phase, Split3Phase, Packaged1Phase, and Split1Phase.
- **Count**: The number of duplicate systems represented by the current system.

The number of duplicate systems can only be >1 when all attributes of the system are the same. If Count is specified to be >1, all parameters (capacities, power, etc.) should be specified for the single piece of equipment. The ruleset applies multipliers for the final simulation.

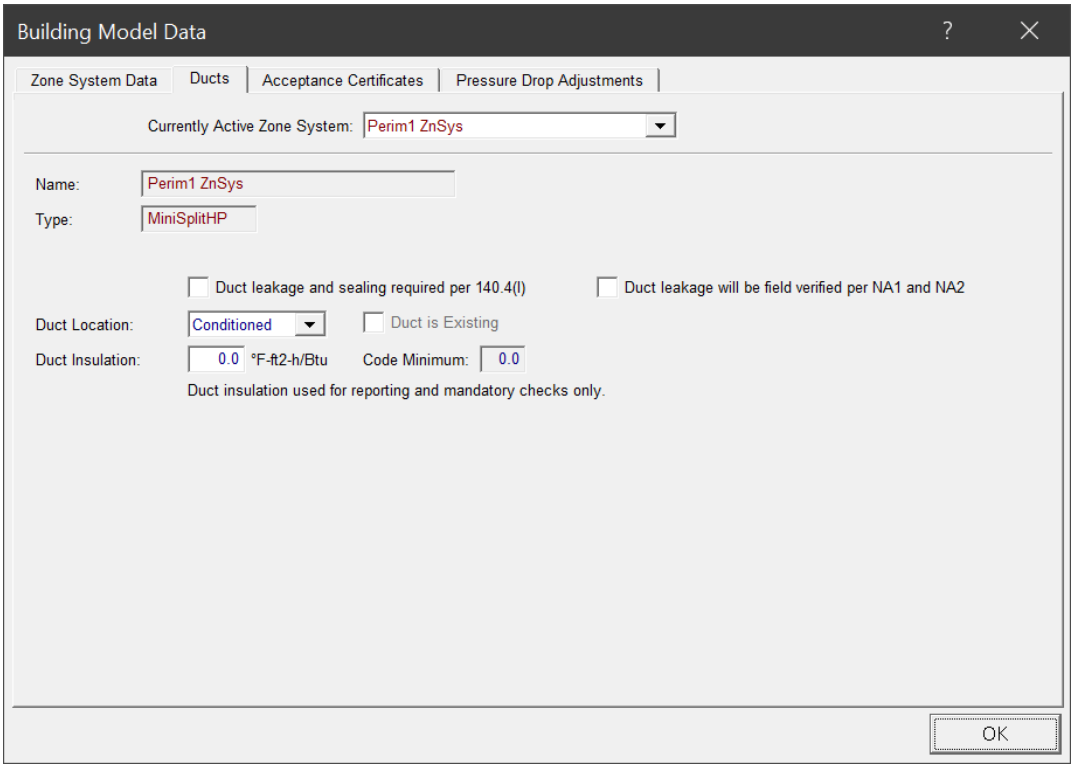
- **Control Zone:** The thermal zone controlling the zone system.
- **Description:** A brief description of the zone system that ties the zone system to the building plans.
- **Complex Mechanical System? (per Section 10-102):** Check to indicate whether an HVAC system is Simple or Complex, used for reporting. Complex systems serve multiple zones or

use hydronic heating or cooling. Simple systems are all other systems. PTAC, PTHP and exhaust zone systems are simple – FPFC, WSHP and Baseboard zone systems are complex.

- **Design Supply Air Temp (Cooling):** The design cooling supply air temperature for sizing zone/system airflows.
- **Design Supply Air Temp (Heating):** The design heating supply air temperature for sizing zone/system airflows.
- **Net Capacity* (Cooling)** (Btu/h)**:** The net cooling capacity of the ZoneSystem. Reflects capacity of a single system if Count is > 1.
- **Net Capacity* (Heating)** (Btu/h)**:** The net heating capacity of the ZoneSystem. Reflects capacity of a single system if Count is > 1.
- **Net Capacity* (Supply Flow)** (cfm)**:** The total supply fan capacity of the ZoneSystem. Reflects capacity of a single system if Count is > 1.
- **Design Flow/Area** (cfm/ft2)**:** Used for AutoHardSizing only, a system level specification of air side supply air flow capacity based on system conditioned floor area. This value is referenced for AutoHardSizing of system capacities.
- **Design Flow/Ton** (cfm/ton)**:** Used for AutoHardSizing only, a system level specification of air side cooling capacity based on supply air flow. This value is referenced for AutoHardSizing of system capacities.
- **Fan Position**: The position of the supply fan relative to the cooling coil (DrawThrough or BlowThrough).
- **Supply Temp Control:** The method of controlling the supply air temperature of a single duct system, or the cold duct of dual duct system.
- **Design OA Flow:** The rate of outside air that needs to be delivered by the system at design conditions.

Zone System Data Screen (Ducts Tab)

To access this screen, under building data double click an Zone system option and then click on the **Ducts** tab.



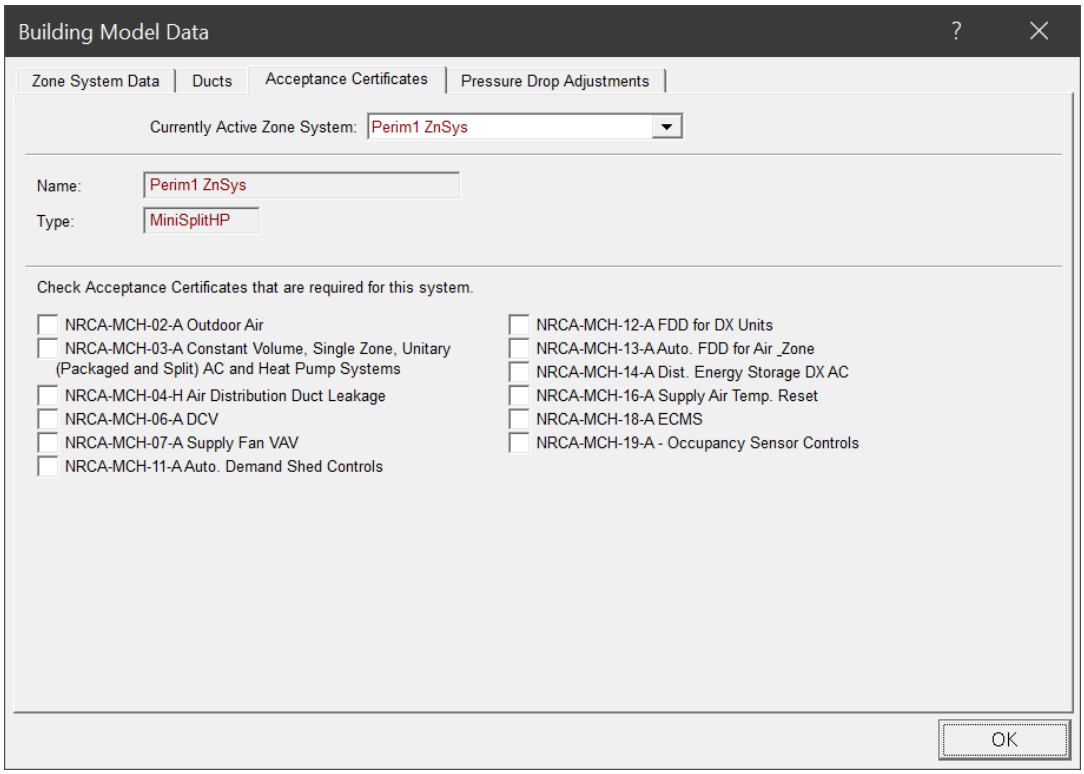
Note: These inputs are for reporting only and will not impact simulation results.

Input Summary:

- **Currently Active Zone System:** The name of the currently selected Air System.
- **Name:** The name of the ZoneSystem.
- **Type**: Type of zone system
- **Duct leakage and sealing required per 140.4(l)**: Check box to indicate whether HERS duct leakage testing is required, used for reporting. HERS duct leakage testing is required if duct systems: 1. Supply conditioned air to occupiable space from a single zone constant speed system, 2. Serve less the 5,000 ft2 of conditioned floor area, and 3. More than 25% of the total duct system surface area is located in unconditioned space.
- **Duct leakage will be field verified per NA1 and NA2:** Check box to indicate whether HERS duct leakage testing will be performed per appendix NA2. If duct leakage will not be field verified the project will incur a penalty as per the Standards /ACM.
- **Duct Insulation:** The duct insulation R-value for reporting and mandatory checks only.
- **Duct Location:** The duct location (Conditioned, Unconditioned, Other, None) for reporting and mandatory checks only
- **Duct is Existing:** Checkbox to indicate if the duct is existing. This option is available for Existing, Addition and Alteration projects

Zone System Data Screen (Acceptance Certificates Tab)

To access this screen, under building data double click a zone system option and then click on the **Acceptance Certificates** tab.

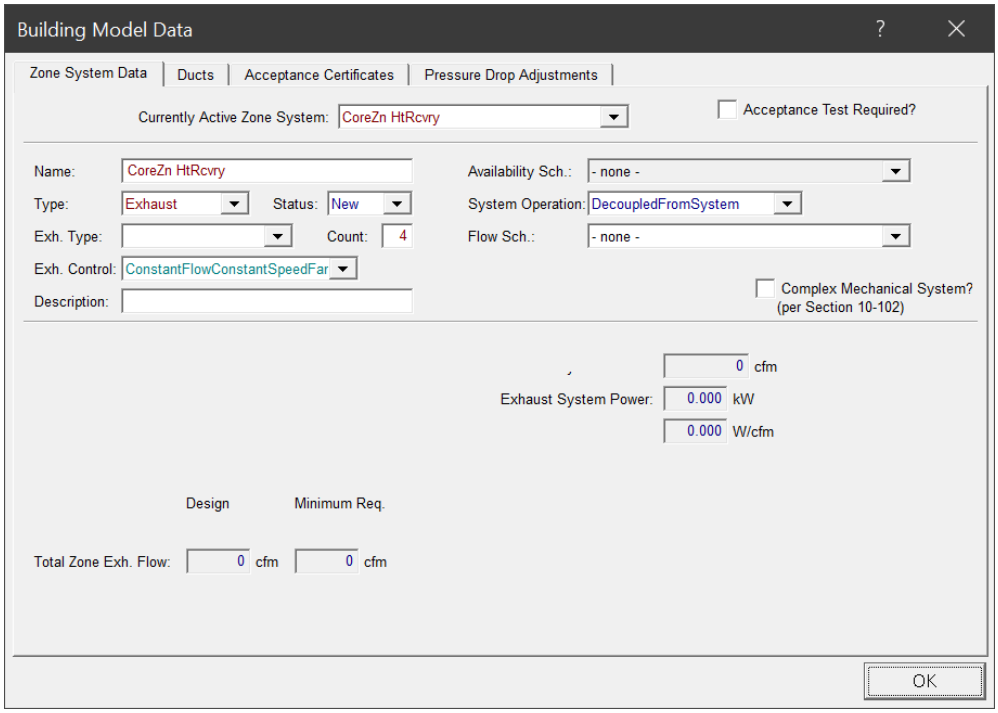


Input Summary:

- **Currently Active Zone System:** The name of the currently selected Zone System.
- **Name:** The name of the ZoneSystem.
- **Type**: Type of zone system,.
- **Acceptance Certificates:** Check boxes to indicate whether an acceptance certificate of the number matching the term name is required, used for reporting.

Zone System Data Screen (Exhaust)

To access this screen, right click the Building data, scroll down to **Create**, and select **ZoneSystem.** The **Create ZoneSystem** dialog box appears. Enter data and click **OK** and select Type **Exhaust**.



Input Summary:

- **Currently Active Zone System:** The name of the currently selected Zone System.
- **Acceptance Test Required?:** Check to indicate whether a test is required for an HVAC system (for reporting purposes).
- **Name:** The name of the Exhaust System.
- **Type**: Select the type of air system, a unique descriptor that identifies high level attributes of a HVAC system.
- **Status:** Defines system status as New, Existing, or Altered.
- **System Type:** The type of exhaust system. This input is used to default assumptions for system controls and power. Options available are Laboratory, Commercial Kitchen and Parking Garage exhaust systems and can only be assigned to thermal zones comprised of the applicable SpaceFunction categories.
- **Count**: The number of duplicate systems represented by the current system.

The number of duplicate systems can only be >1 when all attributes of the system are the same. If Count is specified to be >1, all parameters (capacities, power, etc.) should be specified for the single piece of equipment. The ruleset applies multipliers for the final simulation.

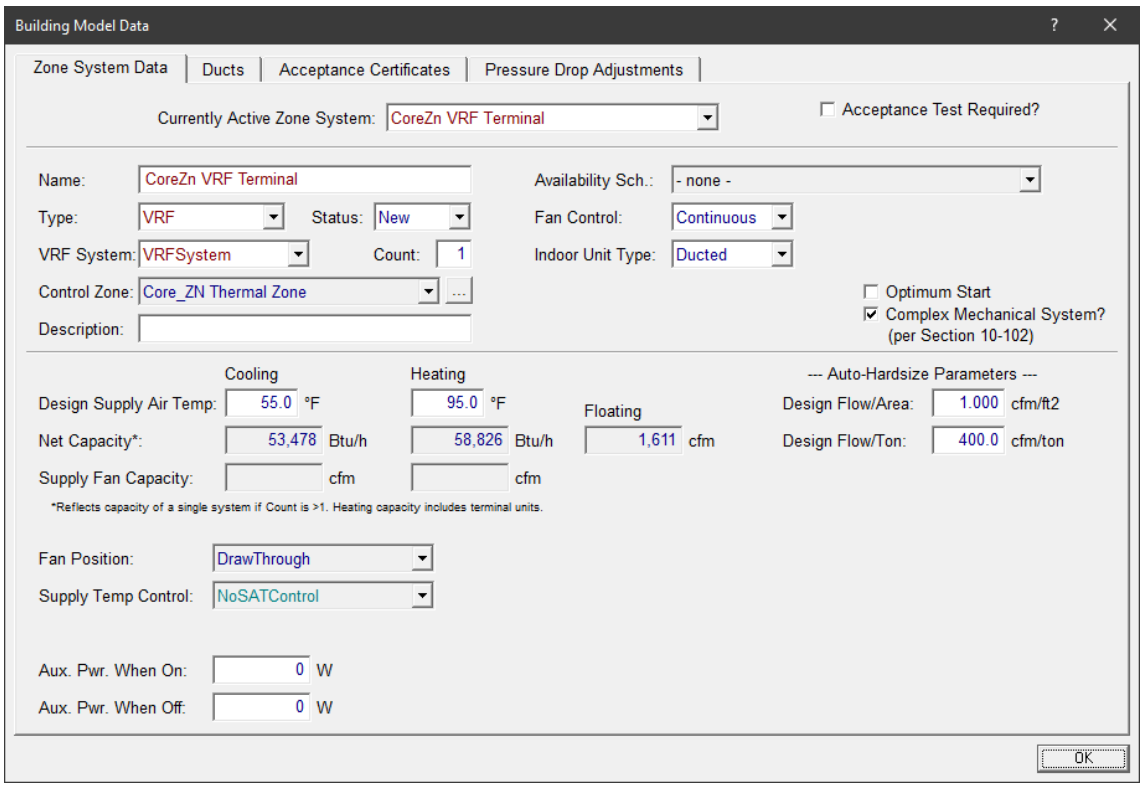
- **Control**: Control Type for the Exhaust System. Options available are COContol, NoCOControl.
- **Description:** A brief description of the Air System that summarizes its essential characteristics.
- **Availability Schedule**: Select the name of the Availability schedule for the Air System.
- **System Operation**: Describes whether exhaust system availability control is interlocked with the HVAC system availability. For compliance analysis, exhaust fans are assumed to have the

same availability schedule as the ThermalZone's ventilation system, but does not night cycle. Options available are DecoupledFromSystem and CoupledFromSystem.

- **Flow Schedule:** The schedule that defines the flow schedule for the system. This schedule is prescribed for Type = Commercial Kitchen and Laboratory exhaust systems. For General exhaust, the schedule is user defined, but will default to match the HVAC system availability schedule for the ThermalZones that the exhaust system serves. For Parking Garage systems, the schedule is prescribed to be constant, and the fan power is adjusted to account for variable speed fan control.
- **Complex Mechanical System? (Per Section 10-102):** Check to indicate whether HVAC system is simple or complex (for reporting purposes).

Zone System Data Screen (Variable Refrigerant Flow System)

To create a new indoor unit of a variable refrigerant flow system, right click the Building data, scroll down to **Create**, and select **ZoneSystem**. The **Create ZoneSystem** dialog box appears. Note that a VRFRefriferationSystem (outdoor unit) must also be defined to use a VRF zone system. Enter data and click **OK**. The ZoneSystem Primary Data dialog box then appears. Select VRF and click **OK**. In the **VRF System** input field, assign an appropriate outdoor unit of the variable refrigerant flow system.



Input Summary:

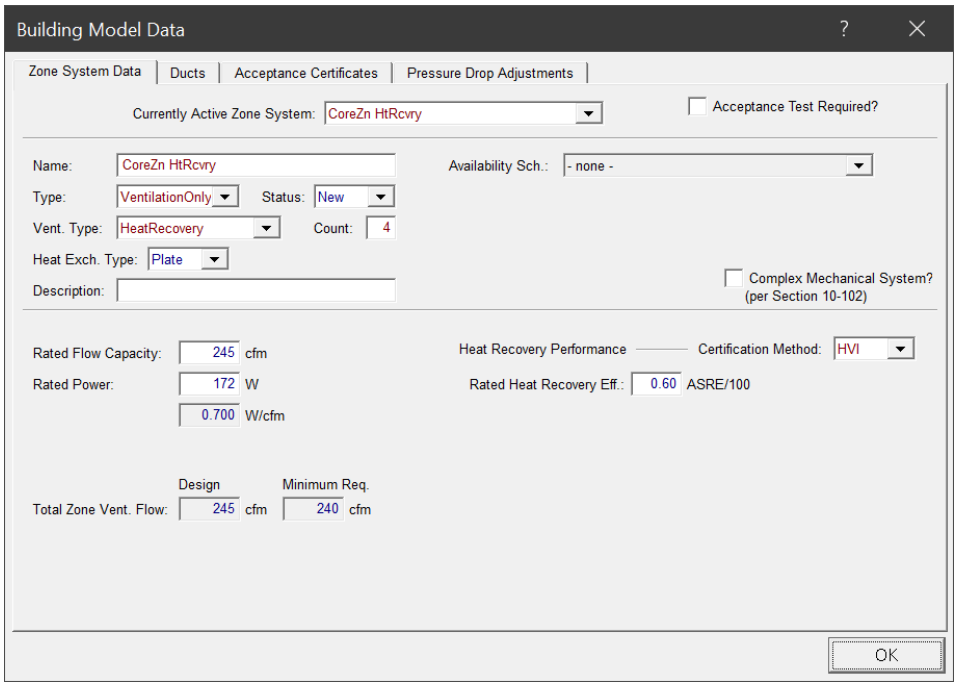
- **Currently Active Zone System:** The name of the currently selected Zone System.
- **Acceptance Test Required:** A checkbox that indicates on the compliance forms whether or not an acceptance test is required on this zone system.

- **Name:** The name of the zone system.
- **Availability Schedule:** The schedule that defines when the zone system can operate.
- **Type:** Select VRF type of zone system. Typically VRF zone systems are specified with a VRF outdoor unit (condensing unit).
- **Status:** Defines system status as New, Existing, or Altered.
- **Fan Control:** The fan control method used to determine how the fan will operate.
- **VRF System:** The name of the variable refrigerant flow system outdoor unit to which the indoor VRF zone system is connected.
- **Count:** The number of duplicate systems represented by the current system. The number of duplicate systems can only be >1 when all attributes of the systems are the same. If Count is specified to be >1, all parameters (capacity, power, etc.) are specified for the single piece of equipment. The ruleset applies multipliers for the final simulation.
- **Indoor Unit Type:** Specification of whether the variable refrigerant flow system indoor unit is 'Ducted' or 'Non-Ducted.'
- **Control Zone:** The name of the thermal zone served by the zone system.
- **Description:** A brief description of the zone system that ties the zone system to the building plans.
- **Complex Mechanical System? (per Section 10-102):** Checkbox to indicate whether the HVAC system is Simple or Complex, used for reporting. Complex systems serve multiple zones or use hydronic heating or cooling. Simple systems are all other systems. PTAC, PTHP and exhaust zone systems are simple – VRF, FPFC, WSHP and Baseboard zone systems are complex.
- **Design Supply Air Temp (Cooling):** The design cooling supply air temperature for sizing zone/system airflows in cooling mode.
- **Design Supply Air Temp (Heating):** The design heating supply air temperature for sizing zone/system airflows in heating mode.
- **Net Capacity (Cooling)** (Btu/h)**:** The net cooling capacity of the zone system. Reflects capacity of a single system if Count is > 1.
- **Net Capacity (Heating)** (Btu/h)**:** The net heating capacity of the zone system. Reflects capacity of a single system if Count is > 1.
- **Supply Fan Capacity (Cooling)** (cfm): The supply fan air flow rate when the indoor unit is in cooling mode.
- **Supply Fan Capacity (Heating)** (cfm): The supply fan air flow rate when the indoor unit is in heating mode.
- **Supply Fan Capacity (Floating)** (cfm)**:** The supply fan air flow rate when the indoor unit is not in cooling or heating mode.
- **Design Flow/Area** (cfm/ft²)**:** Used for AutoHardSizing only, a system level specification of supply air flow capacity based on system conditioned floor area. This value is referenced for AutoHardSizing of system capacities.
- **Design Flow/Ton** (cfm/ton)**:** Used for AutoHardSizing only, a system level specification of air side cooling capacity based on supply air flow. This value is referenced for AutoHardSizing of system capacities.
- **Fan Position**: The position of the supply fan relative to the cooling coil (DrawThrough or BlowThrough).
- **Supply Temp Control:** The method of controlling the supply air temperature of the zone system.
- **Design OA Flow:** The rate of outside air that needs to be delivered by the system at design conditions.

- **Aux. Pwr. When On**: The parasitic electrical energy use of the zone terminal unit when either terminal unit coil is operating.
- **Aux. Pwr. When Off**: The parasitic electrical energy use of the zone terminal unit when the terminal unit coils are not operating.

Zone System Data Screen (VentilationOnly)

To access this screen, right click the Building data, scroll down to **Create**, and select **ZoneSystem.** The **Create ZoneSystem** dialog box appears. Enter data and click **OK** and select Type **VentilationOnly**.



Input Summary:

- **Currently Active Zone System:** The name of the currently selected Zone System.
- **Acceptance Test Required:** A checkbox that indicates on the compliance forms whether or not an acceptance test is required on this zone system.
- **Name:** The name of the zone system.
- **Availability Schedule:** The schedule that defines when the zone system can operate.
- **Type:** Select VentilationType type of zone system.
- **VentType:** Select the type of Ventilation system this zonal system represents – Balanced, Supply Only, Exhaust and Heat Recovery.
  Note: In all these four cases a child Fan object is not required to be modeled.
- **Status:** Defines system status as New, Existing, or Altered.
- **Description:** A brief description of the zone system that ties the zone system to the building plans.
- **Complex Mechanical System? (per Section 10-102):** Checkbox to indicate whether the HVAC system is Simple or Complex, used for reporting. Complex systems serve multiple zones or use hydronic heating or cooling. Simple systems are all other systems. PTAC, PTHP

and exhaust zone systems are simple – VRF, FPFC, WSHP and Baseboard zone systems are complex.

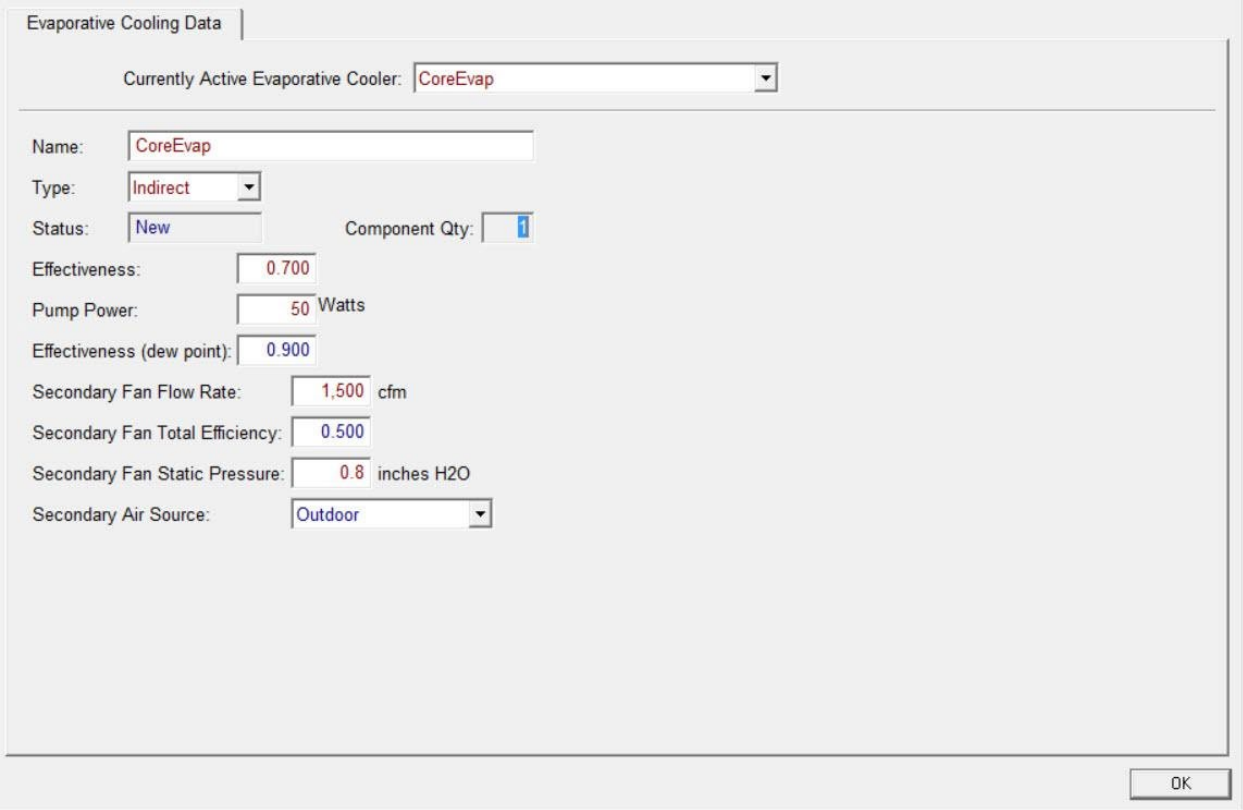
- **Rated Flow Capacity (cfm):** The rated ventilation flow of the exhaust, supply, or HRV/ERV fan system. For all cases, the input value should be the flow rate for the rated condition. For HVI certified fans, this is the rated flow at the highest static pressure condition. For HVI certified HRV/ERV products, input the net airflow @ max rated SRE. For balanced systems that utilize two or more fans, input the rated flow of the supply fan of the system.
- **Rated Power (W):** The rated input power of the exhaust, supply, or HRV/ERV fan system. For all cases, the input value should be the fan input power for the rated condition. For HVI certified fans, this is the input power for the rated flow at the highest static pressure condition. For HVI certified HRV/ERV products, input the power consumed @ max rated SRE. For balanced systems that utilize two or more fans, input the total rated input power all fans in the system.
- **Heat Recovery Performance Certification Method:** Certification program for heat recovery equipment – HVI/AHRI
- **Rated Heat Recovery Eff.:** The rated heat recovery effectiveness of HVI certified heat recovery equipment. For HVI certified HRV/ERV products, this is the Adjusted Rated Sensible Recovery Efficiency (ASRE) @ 0°C, divided by 100.

  Note: For AHRI rated HRV please refer to Heat Recovery Data Screen section

Evaporative Cooling Data Tab (Indirect)

To create a new Evaporative Cooler, in the Mechanical tab right click on Air Segment (icon), scroll down to **Create**, and select **Evaporative Cooler.**

To access an existing Evaporative Cooler, double click an indirect evaporative cooling option (Evaporative Cooling icon).



Input Summary:

- **Currently Active Evaporative Cooler:** Select the name of the evaporative cooler.
- **Name:** The name of the evaporative cooler.
- **Type:** The type of evaporative cooler. For Indirect or Direct evaporative coolers, specify the indirect and direct portions as two separate devices.
- **Status**: The status of the system or component used for additions or alterations.
- **Component Qty**: The number of duplicate systems can only be > 1 when all attributes of the system are the same. If Count is specified to be > 1, all parameters (capacities, power, etc.) should be specified for the single piece of equipment. The ruleset will apply multipliers for the final simulation.
- **Effectiveness**: The effectiveness of the evaporative cooler. The leaving air temperature will be the entering temperature minus the difference between the entering dry-bulb and wet-bulb temperatures multiplied by the effectiveness, Tout = Tdb - (Tdb - Twb) x Eff.
- **Pump Power (Watts)**: Power consumption by the evaporative cooler water pumping.
- **(Indirect) Effectiveness (dewpoint)**: The effectiveness of the evaporative cooler based on dewpoint depression. This field is an optional input that determines the maximum leaving air temperature based on dewpoint depression rather than wet-bulb depression. The leaving air

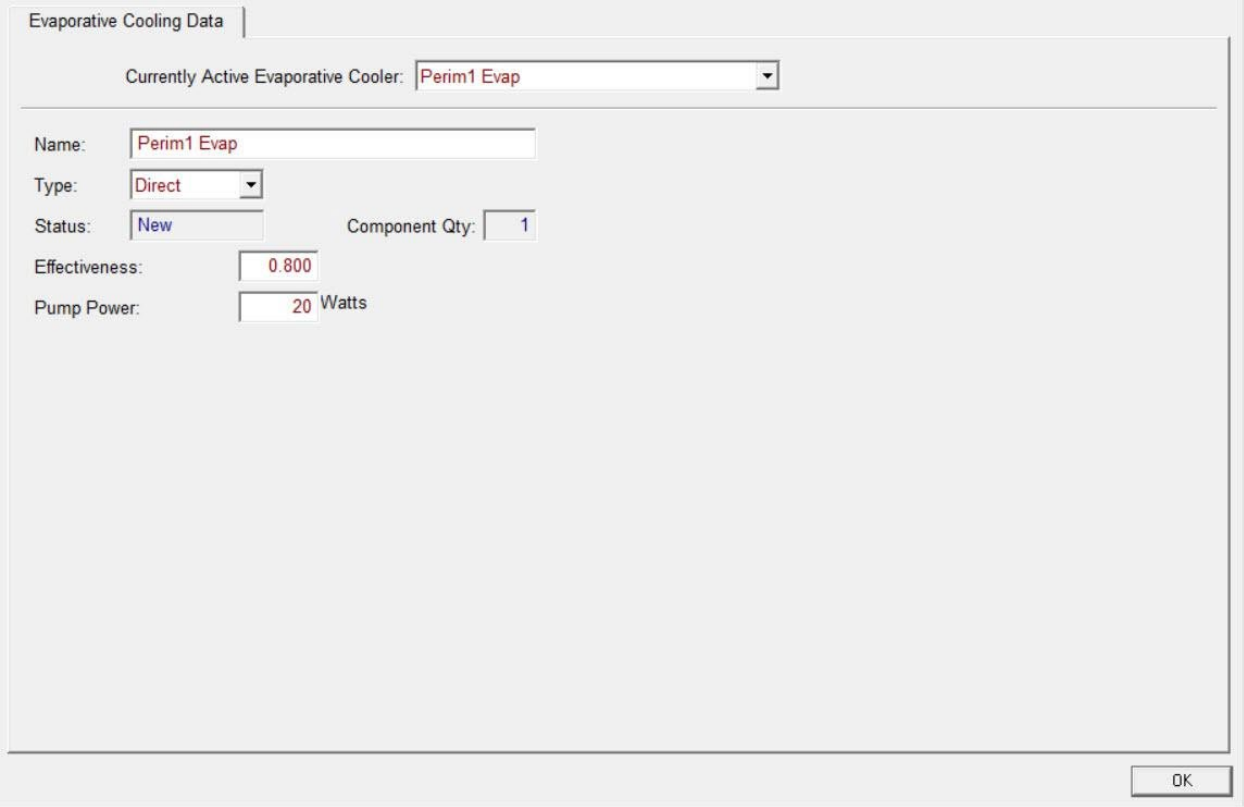
temperature calculated with the DewPtEff will be the entering temperature minus the difference between the entering dry-bulb and dewpoint temperatures multiplied by the effectiveness, Tout = Tdb - (Tdb - Tdp) x Eff. The actual leaving temperature will be the warmer of the two temperatures calculated from the wet-bulb and dewpoint effectiveness values.

- **Secondary Fan Flow Rate (cfm)**: The flow rate of any integrated fan providing air to the secondary (wet) side of the indirect evaporative cooler.
- **Secondary Fan Total Efficiency**: The overall efficiency of any integrated fan providing air to the secondary (wet) side of the indirect evaporative cooler. This efficiency includes that of the fan, motor and drive.
- **Secondary Fan Static Pressure (inches H2o)**: The total static pressure of any integrated fan providing air to the secondary (wet) side of the indirect evaporative cooler.
- **Secondary Air Source**: The primary source of air supplied to the secondary (wet) side of the indirect evaporative cooler. If RETURN is selected and there the air system return air cannot meet the airflow desired by the evaporative cooler, the difference will be made up using outdoor air.

Evaporative Cooling Data Tab (Direct)

To create a new Evaporative Cooler, in the Mechanical tab right click on Air Segment (icon), scroll down to **Create**, and select **Evaporative Cooler.**

To access an existing Evaporative Cooler, double click a direct evaporative cooling option (Evaporative Cooling icon).



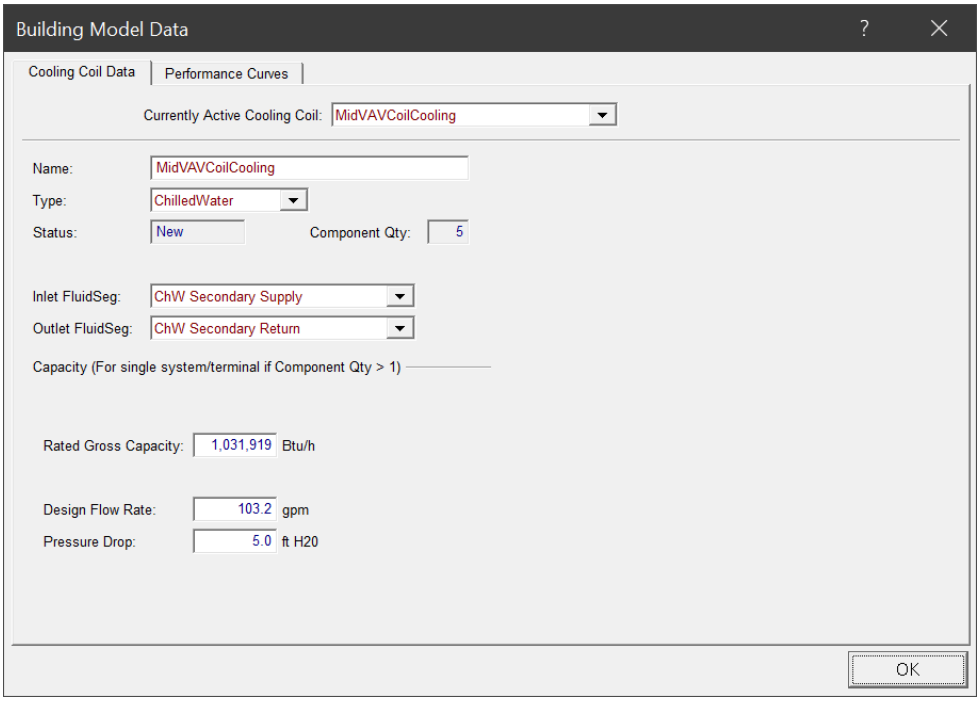
Input Summary:

- **Currently Active Evaporative Cooler:** Select the name of the evaporative cooler.
- **Name:** The name of the evaporative cooler.
- **Type:** The type of evaporative cooler. For Indirect or Direct evaporative coolers, specify the indirect and direct portions as two separate devices.
- **Status**: The status of the system or component used for additions or alterations.
- **Component Qty**: The number of duplicate systems can only be > 1 when all attributes of the system are the same. If Count is specified to be > 1, all parameters (capacities, power, etc.) should be specified for the single piece of equipment. The ruleset will apply multipliers for the final simulation.
- **Effectiveness**: The effectiveness of the evaporative cooler. The leaving air temperature will be the entering temperature minus the difference between the entering dry-bulb and wet-bulb temperatures multiplied by the effectiveness, Tout = Tdb - (Tdb - Twb) x Eff.
- **Pump Power (Watts)**: Power consumption by the evaporative cooler water pumping.

Cooling Coil Data Screen (Chilled Water)

To create a new Cooling Coil, in the Mechanical tab right click on Air Segment (icon), scroll down to **Create**, and select **CoilCooling.**

To access this screen, double click a cooling coil option (Cooling Coil icon). In the **Type** field, select **ChilledWater.**



Input Summary:

- **Currently Active Cooling Coil:** The name of the currently selected cooling coil.
- **Name**: Name of the cooling coil.
- **Type:** Select the type of cooling coil. Options are Chilled Water or Direct Expansion.
- **Status:** Defines cooling coil as New or Existing.
- **Inlet FluidSeg**: Defines the inlet/supply-side fluid segment of hydronic coils. Options are create/import PrimarySupply FluidSegment (and apply only here), create/import SecondarySupply FluidSegment (and apply only here), BaseHWPrimSupSeg, BaseCWPrimSupSeg, BaseChWPrimSupSeg, and SHWSupply1.
- **Outlet FluidSeg:** Defines the outlet/return-side fluid segment of hydronic coils. Options are create/import PrimaryReturn FluidSegment (and apply only here), create/import SecondaryReturn FluidSegement (and apply only here), BaseHWPrimRetSeg, BaseCWPrimRetSeg, and BaseChWPrimRetSeg.

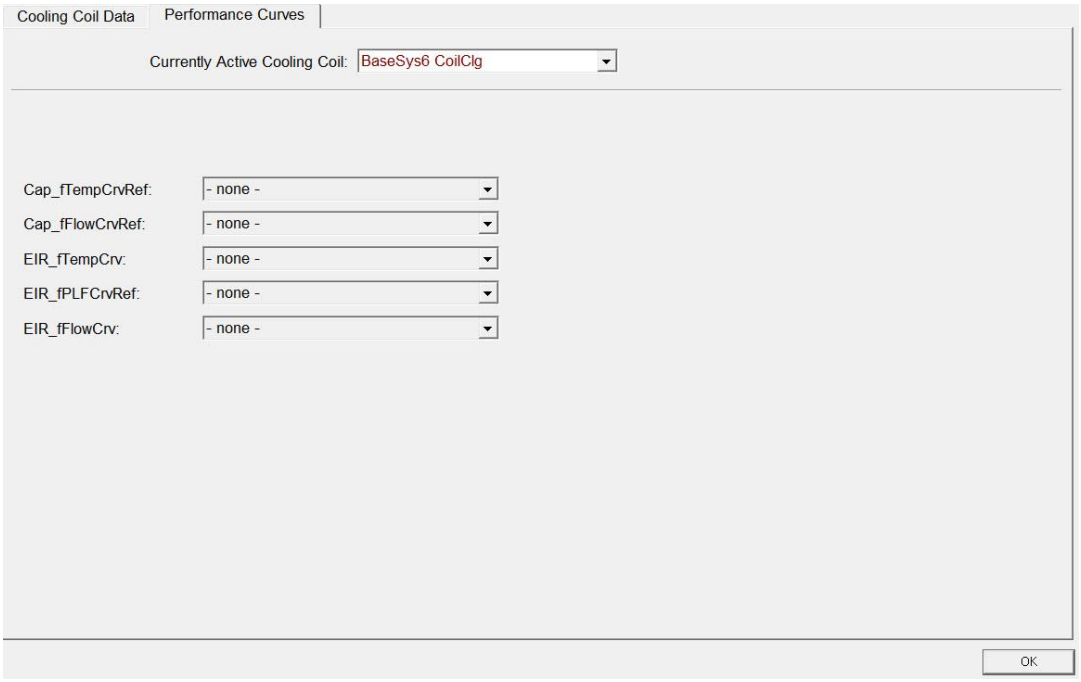
Capacity (For single system/terminal if Component Qty > 1) section

- **Rated Gross Capacity** (Btu/h): The gross total (both sensible and latent) cooling capacity of a cooling coil or packaged DX system at Air Conditioning, Heating, & Refrigeration Institute (AHRI) rating conditions.

The gross capacity is the total cooling capacity without adjustments for fan heat.

- **Design Flow Rate** (gpm): The rate of water moving through the coil.

Cooling Coil Data Screen (Chilled Water), Performance Curves Tab



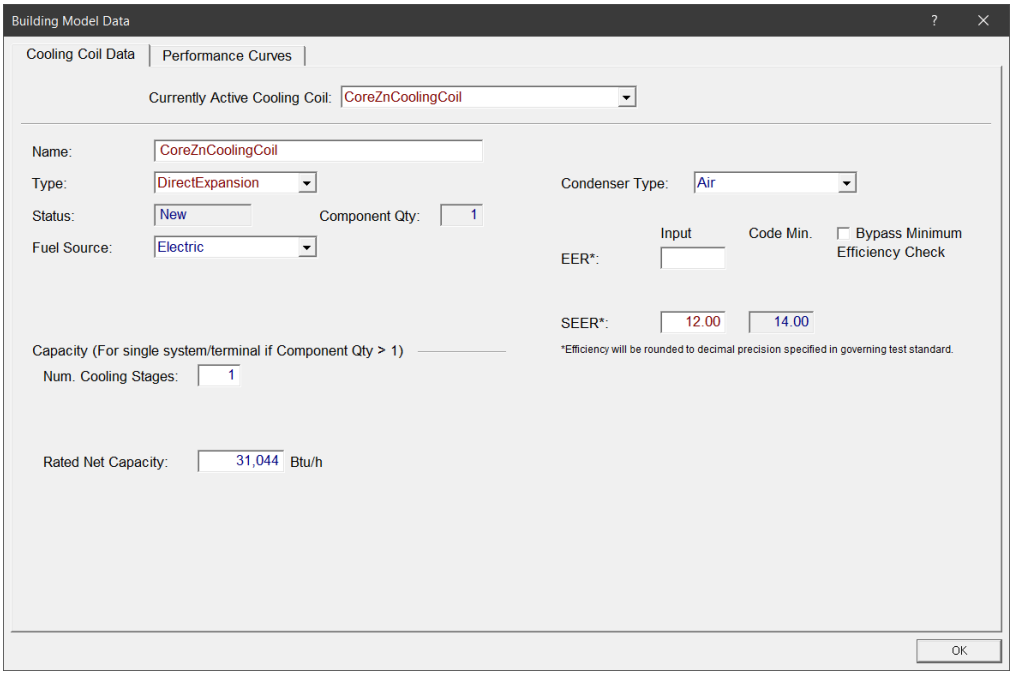
Performance Curves tab

- **Currently Active Cooling Coil:** The name of the currently selected cooling coil.
- **Cap_fTempCrvRef**: A curve hat describes the adjustment of cooling coil capacity as a function of temperature.
- **Cap_fFlowCrvRef**: Normalized curve that varies cooling capacity as a function of airflow, which affects system latent capacity. Used for EnergyPlus DX coil model only.
- **EIR_fTempCrv**: Normalized curve that varies full-load efficiency (EIR) as a function of indoor coil and condenser conditions.
- **EIR_fPLFCrvRef**: Normalized curve that varies full-load efficiency (EIR) as a function of part-load factor. This curve type is specific to EnergyPlus.
- **EIR_fFlowCrv**: Normalized curve that varies full-load efficiency (EIR) as a function of indoor coil flow. This curve type is specific to EnergyPlus.

Cooling Coil Data Screen (Direct Expansion)

To create a new Cooling Coil, in the Mechanical tab right click on Air Segment (icon), scroll down to **Create**, and select **CoilCooling.** Make selections and click **OK**. The CoolingCoil Primary Data dialog box then appears. Select DirectExpansion and click **OK**.

To access an existing Cooling Coil, double click a cooling coil (Cooling Coil icon). In the **Type** field, select **DirectExpansion**.



Input Summary:

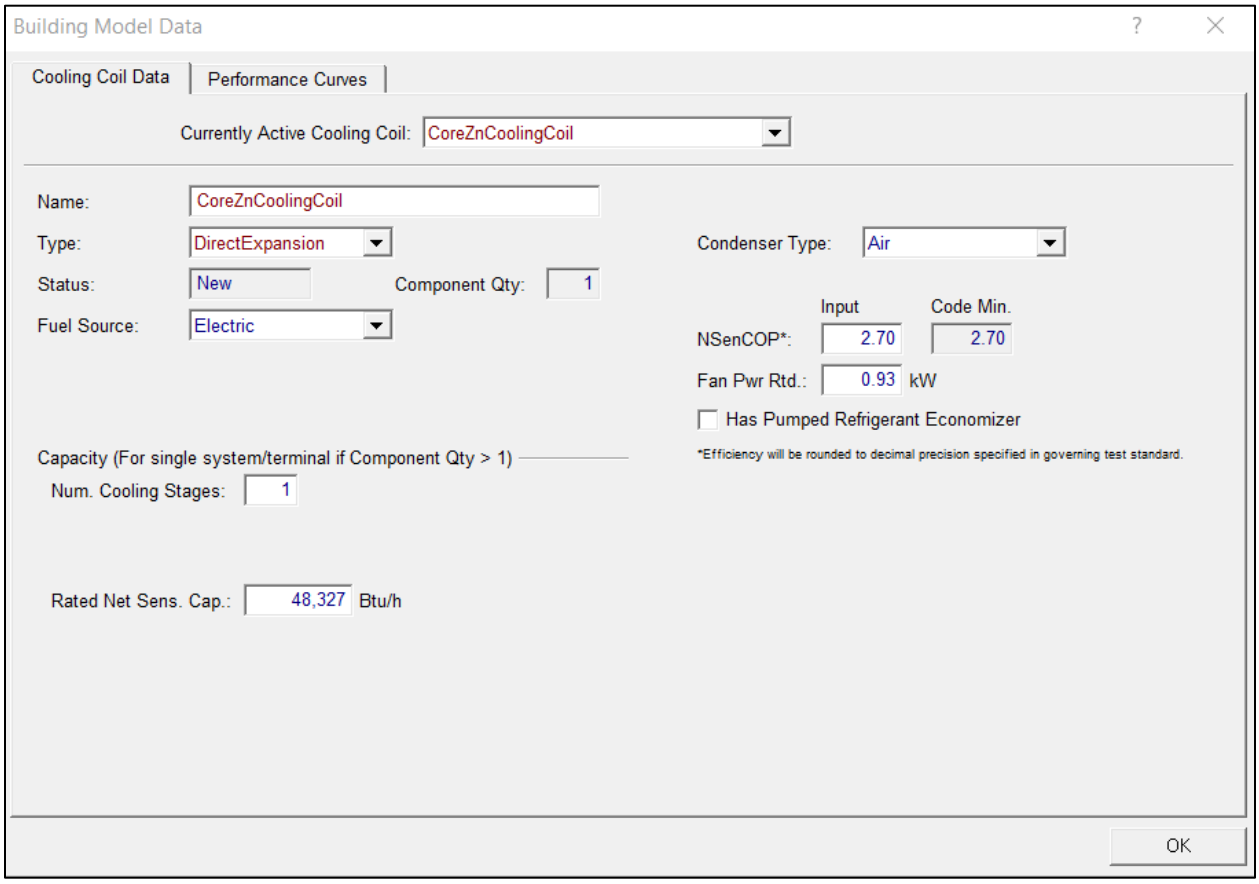
- **Condenser Type:** The type of condenser for a Direct Expansion (DX) cooling system. In DX, the default option is Air.

Capacity section

- **Num. Cooling Stages:** The number of mechanical cooling stages for a DX cooling coil. This applies to DX systems with more than one stage of DX cooling. This system is typically a packaged unit with multiple compressors and a two-speed or variable-speed fan.
- **Rated Net Capacity** (Btu/h): The net total (both sensible and latent) cooling capacity (both sensible and latent) of a cooling coil in unitary system at AHRI conditions.
  The net capacity is the total cooling capacity of the coil after adjusting for fan heat at rated conditions. The gross capacity is the total cooling capacity without adjustments for fan heat.
- **EER** (Input): The cooling efficiency of a DX cooling system at AHRI rated conditions.
- **EER** (Code Minimum): Code Minimum Energy Efficiency Ratio (EER) value.
- **IEER (Input):** The integrated part-load efficiency of a DX cooling system at AHRI rated conditions
- **IEER (Code Minimum):** Code minimum integrated part-load efficiency of a DX cooling system.
- **SEER** (Input): The Seasonal Energy Efficiency Ratio (SEER) is a term used to describe the seasonal performance of a DX cooling system. It is determined in accordance with AHRI standards.

- **SEER** (Code Minimum): Code Minimum SEER value.
- **Bypass Min Efficiency Check:** Selecting this option triggers an Exceptional condition to be shown on the compliance report and requires code reviewers to manually check that the equipment meets the minimum efficiency requirements of the applicable equipment category in the Standards. This option should only be selected if :
  1) the equipment category of the system in the proposed design is not supported in CBECC by the combination of Type/SubType or
  2) The equipment was manufactured prior to a change in equipment efficiency Standards and does not meet current efficiency requirements, but it is still legal to install

Cooling Coil Data Input Screen for Computer Rooms:



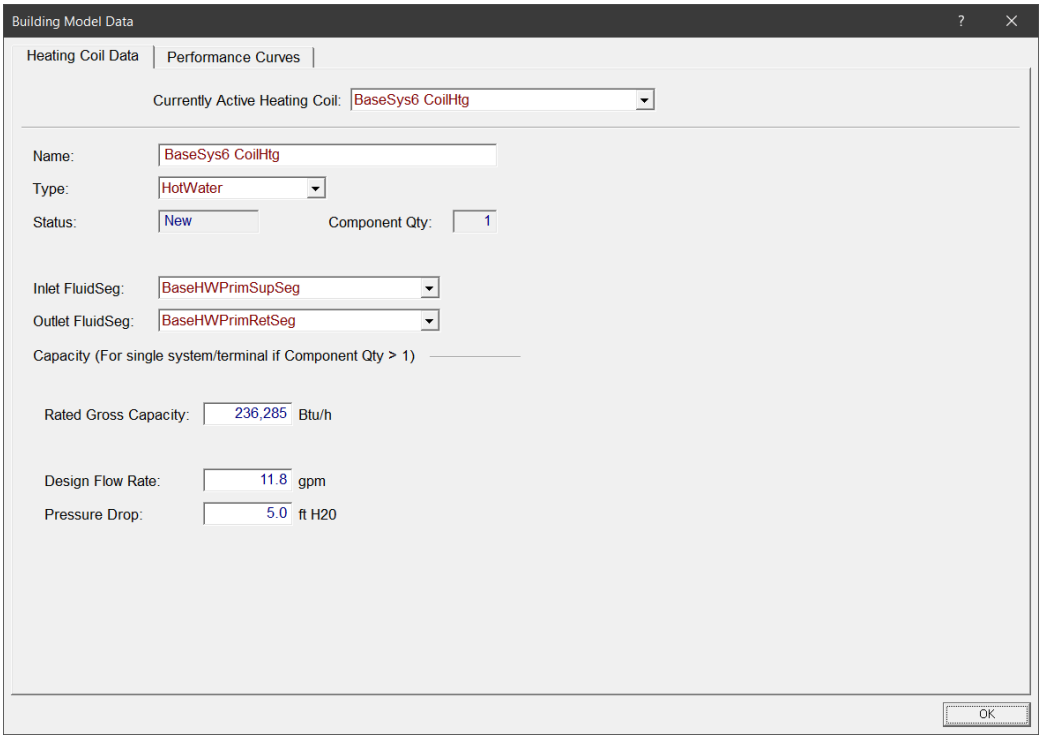
Additional Inputs for Computer Room Systems:

- **NSenCOP:** Net Sensible Coefficient of Performance (COP) at AHRI Standard 1360 rating conditions.
- **Has Pumped Refrigerant Economizer:** Checkbox to indicate if the computer room system has a pumped refrigerant economizer.

Heating Coil Data Screen (Hot Water)

To create a new Heating Coil, in the Mechanical tab right click on Air Segment or Terminal Unit, scroll down to **Create**, and select **CoilHeating.** In the CoilHeating Primary Data dialog box, select **HotWater** in the **Type** field, and click **OK**.

To access existing Heating Coil Data, double click a heating coil option (Heating Coil icon).



Input Summary:

- **Currently Active Heating Coil**: The name of the currently selected heating coil.
- **Name:** The name of the heating coil.
- **Type:** Select the type of heating coil. Options are Resistance, Furnace, HeatPump, and HotWater.
- **Status:** Defines heating coil as New or Existing.
- **Component Qty**: The number of components.
- **Inlet FluidSeg**: Defines the inlet/supply-side fluid segment of hydronic/steam coils.

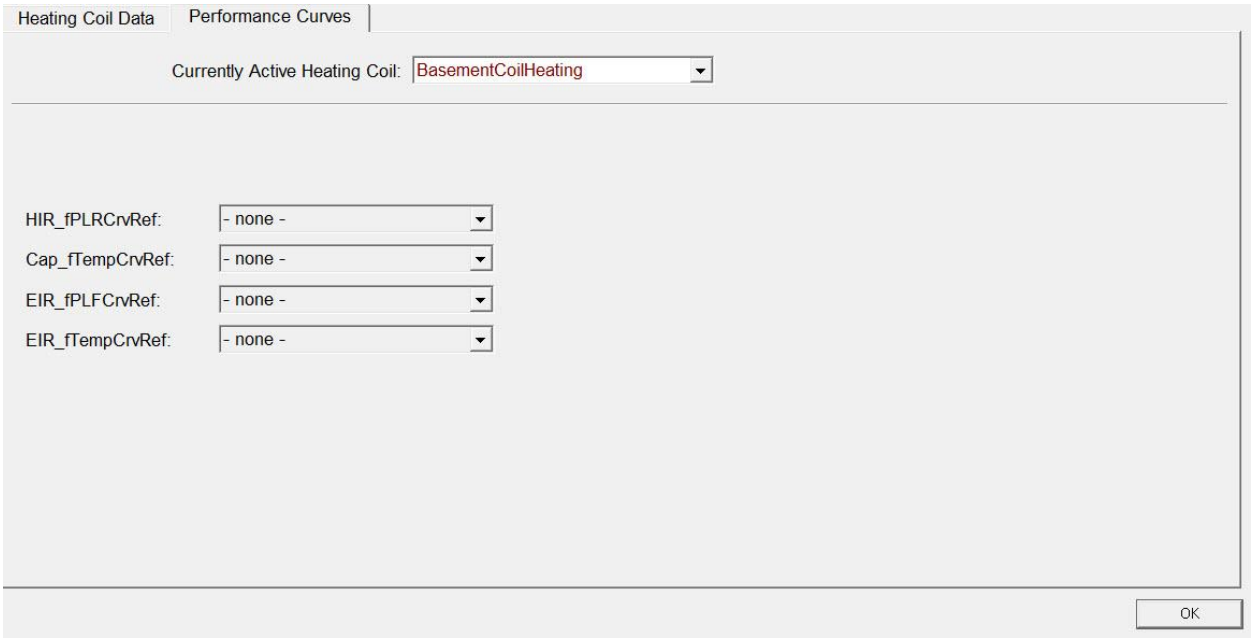
Options are create/import PrimarySupply FluidSegment (and apply only here), create/import SecondarySupply FluidSegment (and apply only here), BaseHWPrimSupSeg, BaseCWPrimSupSeg, BaseChWPrimSupSeg, and SHWSupply1.

- **Outlet FluidSeg:** Defines the outlet/return-side fluid segment of hydronic/steam coils. Options are create/import PrimaryReturn FluidSegment (and apply only here), create/import SecondaryReturn FluidSegement (and apply only here), BaseHWPrimRetSeg, BaseCWPrimRetSeg, and BaseChWPrimRetSeg.

Capacity (For single system/terminal if Component Qty > 1) section

- **Gross Capacity** (Btu/h)**:** The gross heating capacity of the coil at AHRI conditions without adjustments for fan heat.
- **Design Flow Rate** (gpm)**:** The design water volume flow rate (gpm) through the coil.

Heating Coil Data Screen (Hot Water) Performance Curves Tab



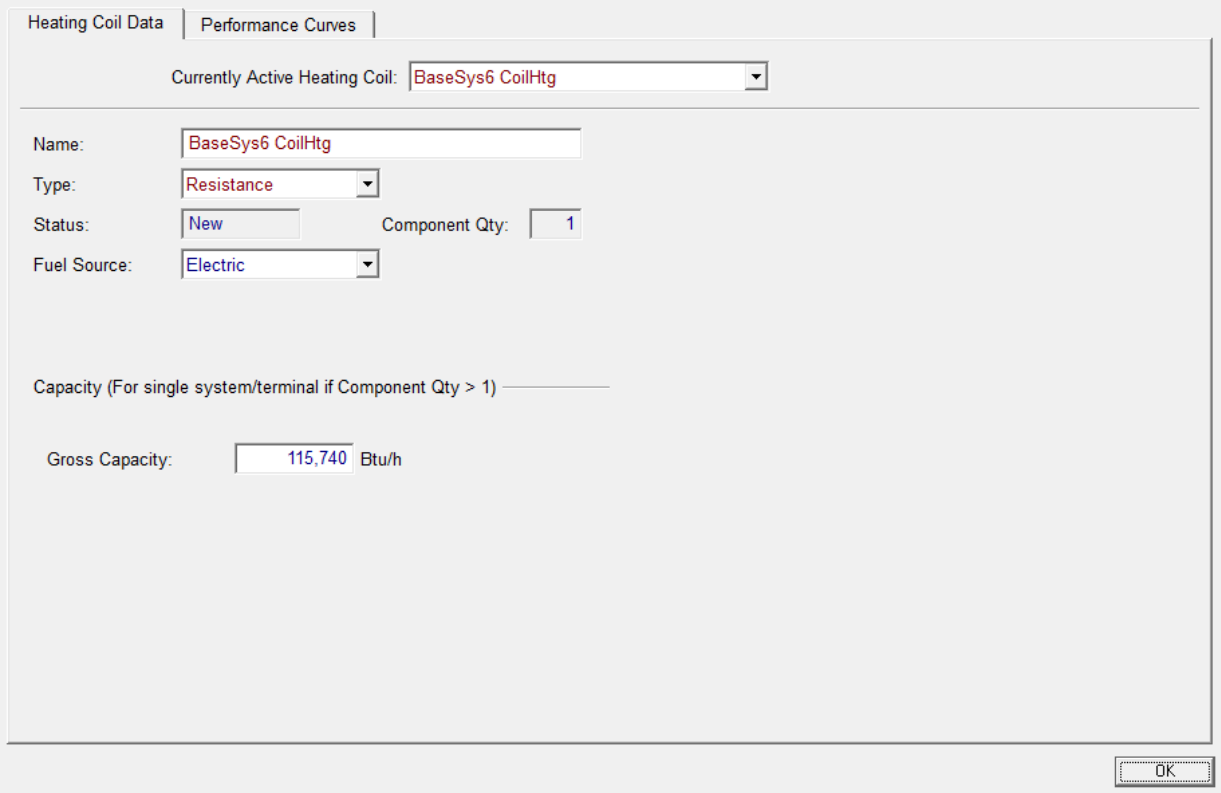
Performance Curves Tab

- **HIR_fPLRCrvRef**: Normalized curve that varies full-load efficiency as a function of part-load ratio.
- **Cap_fTempCrvRef**: A curve that describes the adjustment of a heat pump heating coil capacity as a function of temperature.
- **EIR_fPLFCrvRef**: Normalized curve that varies full-load efficiency (EIR) as a function of part-load factor. This curve type is specific to EnergyPlus.
- **EIR_fTempCrvRef**: Normalized curve that varies full-load efficiency (EIR) as a function of indoor coil and condenser conditions.

Heating Coil Data Screen (Resistance)

To create a new Heating Coil, in the Mechanical tab right click on Air Segment or Terminal Unit, scroll down to **Create**, and select **CoilHeating.** In the CoilHeating Primary Data dialog box, select **Resistance** in the **Type** field, and click **OK**.

To access existing Heating Coil Data (Resistance), double click a heating coil option (Heating Coil icon).



Input Summary:

- **Currently Active Heating Coil**: The name of the currently selected heating coil.
- **Name:** The name of the heating coil.
- **Type:** Select the type of heating coil. Options are Resistance, Furnace, HeatPump, and HotWater.
- **Status:** Defines heating coil as New or Existing.
- **Component Qty**: The number of components.
- **Fuel Source:** The fuel driving the heating coil.

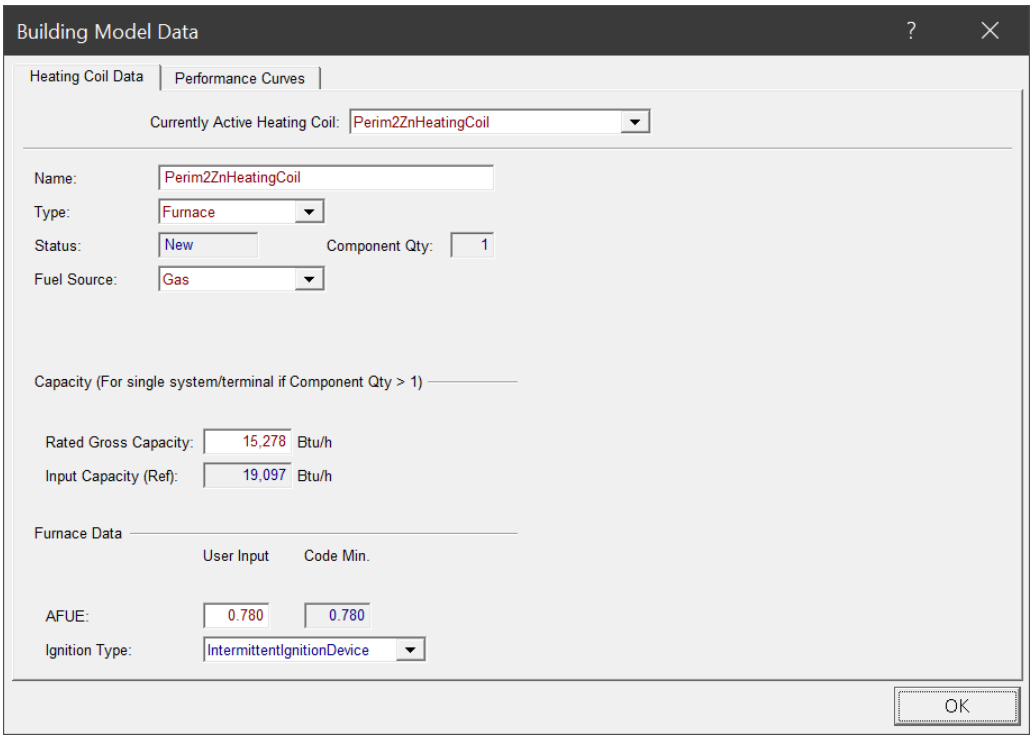
Capacity (For single system/terminal if Component Qty > 1) section

- **Gross Capacity** (Btu/h)**:** The gross heating capacity of the coil at AHRI conditions without adjustments for fan heat.

Heating Coil Data Screen (Furnace)

To create a new Heating Coil, in the Mechanical tab right click on Air Segment or Terminal Unit, scroll down to **Create**, and select **CoilHeating.** In the CoilHeating Primary Data dialog box, select **Furnace** in the **Type** field, and click **OK**.

To access this screen, double click a heating coil option (Heating Coil icon).



Input Summary:

- **Currently Active Heating Coil**: The name of the currently selected heating coil.
- **Name:** The name of the heating coil.
- **Type:** Select the type of heating coil. Options are Resistance, Furnace, HeatPump, and HotWater.
- **Status:** Defines heating coil as New or Existing.
- **Component Qty**: The number of components.
- **Fuel Source:** The fuel driving the heating coil.

Capacity (For single system/terminal if Component Qty > 1) section

- **Rated Gross Capacity** (Btu/h)**:** The gross heating capacity of the coil at AHRI conditions without adjustments for fan heat.

Furnace Data section

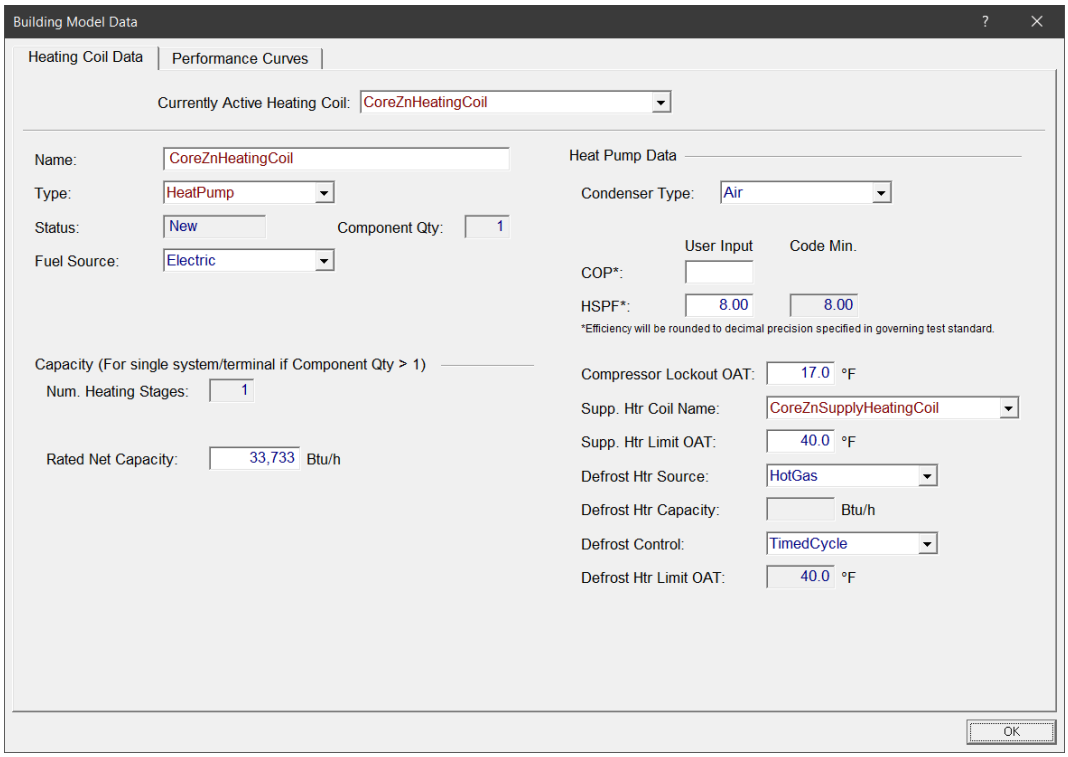
- **Thermal Efficiency (User Input):** The heating efficiency of a furnace at AHRI rated conditions.
- **Thermal Efficiency (Code Minimum):** The heating efficiency of a furnace at AHRI rated conditions at the minimum AFUE value allowed by code
- **AFUE (User Input):** The Annual Fuel Utilization Efficiency (AFUE) is an indicator of expected, seasonal furnace efficiency. It is determined in accordance with DOE Test Standards.

- **Ignition Type:** The method used to start combustion in fuel-fired furnaces. (Options are IntermittentIgnitionDevice, and PilotLight.)
- **Bypass Min Efficiency Check:** Selecting this option triggers an Exceptional condition to be shown on the compliance report and requires code reviewers to manually check that the equipment meets the minimum efficiency requirements of the applicable equipment category in the Standards. This option should only be selected if
  1) The equipment category of the system in the proposed design is not supported in CBECC by the combination of Type/SubType or
  2) The equipment was manufactured prior to a change in equipment efficiency Standards and does not meet current efficiency requirements, but it is still legal to install
-

Heating Coil Data Screen (Heat Pump)

To create a new Heating Coil, in the Mechanical tab right click on Air Segment or Terminal Unit, scroll down to **Create**, and select **CoilHeating.** In the CoilHeating Primary Data dialog box, select **HeatPump** in the **Type** field, and click **OK**.

To access an existing Heat Pump, double click a heating coil option (Heating Coil icon).



Input Summary:

- **Currently Active Heating Coil**: The name of the currently selected heating coil.
- **Name:** The name of the heating coil.
- **Type:** Select the type of heating coil. Options are Resistance, Furnace, HeatPump, and HotWater.
- **Status:** Defines heating coil as New or Existing.
- **Component Qty**: The number of components.
- **Fuel Source:** The fuel driving the heating coil.

Capacity (For single system/terminal if Component Qty > 1) section

- **Num. Heating Stages:** The number of heating stages for a furnace or heat pump heating coil. This applies to heating coils with more than one stage of heating. This system is typically a packaged unit with multiple heat pump compressors or a furnace with multiple firing rates.
- **Rated Net Capacity** (Btu/h)**:** The net heating capacity of the coil at AHRI conditions without adjustments for fan heat. Not a user input.

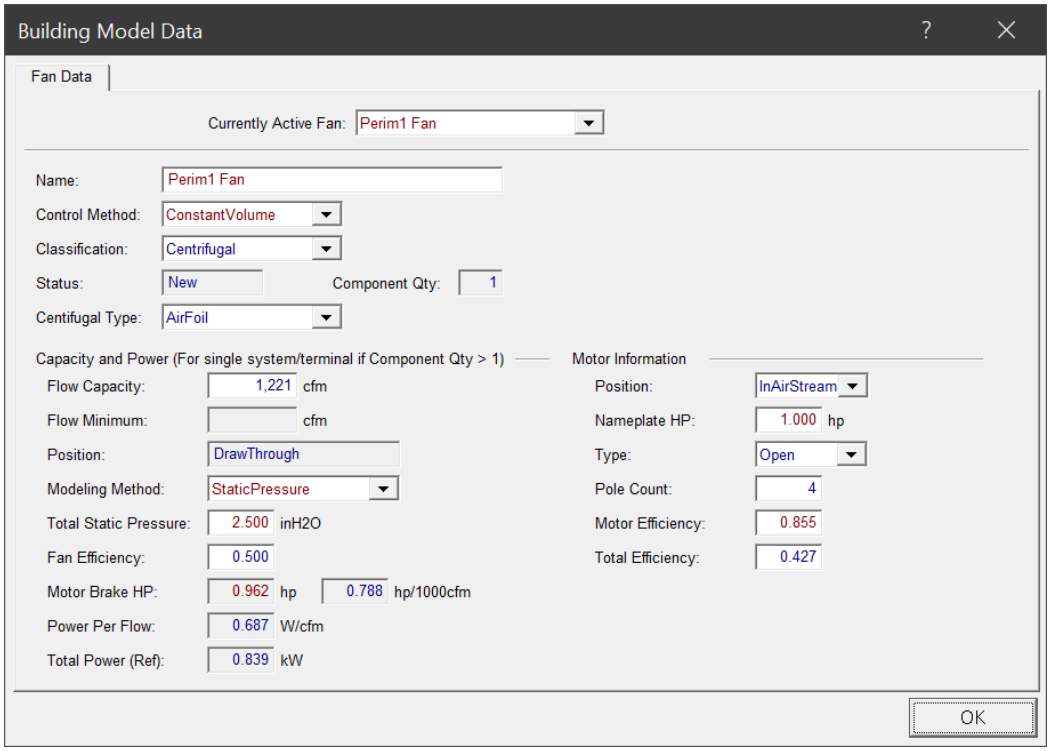
Heat Pump Data section

- **Condenser Type**: The type of condenser for heat pump heating systems. Options include Air, WaterSource, Groundwater Source and GroundSource.
- **COP** (User Input): The heating efficiency of a heat pump at AHRI-rated conditions.
- **COP** (Code Minimum): The Code minimum COP.
- **HSPF** (User Input): An indicator of expected, average seasonal heat pump efficiency. It is determined in accordance with AHRI Standards.
- **HSPF** (Code Minimum): The Code minimum HSPF.
- **Compressor Lockout OAT** (deg F): The outside dry-bulb temperature below which the heat pump supplemental heating is allowed to operate.
- **Supp Htr Coil Name**: Select the Heating Coil.
- **Supp Htr Limit OAT**(deg F): The outside dry-bulb temperature below which the heating coil is allowed to operate.
- **Defrost Htr Source**: The fuel used for defrosting the evaporator. (Electric, HotGas)
- **Defrost Control**: Select if defrost operates at a specific time or when required. (OnDemand, TimedCycle)
- **Defrost Htr Limit OAT** (deg F): The outside dry-bulb temperature below which the defrost is allowed to operate.
- **Bypass Min Efficiency Check:** Selecting this option triggers an Exceptional condition to be shown on the compliance report and requires code reviewers to manually check that the equipment meets the minimum efficiency requirements of the applicable equipment category in the Standards. This option should only be selected if
  1) The equipment category of the system in the proposed design is not supported in CBECC by the combination of Type/SubType or
  2) The equipment was manufactured prior to a change in equipment efficiency Standards and does not meet current efficiency requirements, but it is still legal to install

Fan Data Screen

To create a new Fan, in the Mechanical tab right click on Air Segment or Terminal Unit, scroll down to **Create**, and select **Fan.**

To access existing Fan data, under air system double click a fan option (Fan icon).



Input Summary:

- **Currently Active Fan**: The name of the currently selected fan.
- **Name**: The name of the fan.
- **Control Method**: Select the method used to control fan flow. Options are ConstantVolume, VariableSpeedDrive, Dampers, InletVanes and TwoSpeed.
- **Status:** The status of the system or component used for additions and alterations. Options are new and existing.
- **Component Qty:** The number of duplicate systems represented by the current system. The number of duplicate systems can only be >1 when all attributes of the system are the same. If Count is specified to be >1, all parameters (capacities, power, etc.) should be specified for the single piece of equipment. The ruleset applies multipliers for the final simulation.
- **Classification:** Fan classification based on centrifugal or axial types.
- **Centrifugal Type**: The type of blade type used in a centrifugal fan. Options are AirFoil, BackwardInclined, ForwardCurved.

Capacity and Power (For single system/terminal if Component Qty > 1) section

- **Flow Capacity** (cfm): The design air flow rate of the fan at design conditions. This building descriptor sets the 100 percent point for the fan part-load curve. This input should be at least as great as the sum of the design air flow specified for each of the thermal

zones that are served by the fan system. For multiple deck systems, a separate entry should be made for each deck.

- **Flow Minimum** (cfm): The lowest flow rate rated for a fan.
- **Position**: The position of the supply fan relative to the cooling coil.
- **Modeling Method:** The method used to describe the design power consumption of a fan. Software commonly models fans in three ways. The simple method is for the user to enter the electric power per unit of flow (W/cfm). This method is commonly used for unitary equipment and other small fan systems. A more detailed method is to model the fan as a system whereby the static pressure, fan efficiency, part-load curve, and motor efficiency are specified at design conditions. A third method is to specify brake horsepower at design conditions instead of fan efficiency and static pressure. This is a variation of the second method whereby brake horsepower is specified in lieu of static pressure and fan efficiency. The latter two methods are commonly used for VAV and other larger fan systems.
- **Total Static Pressure:** The total static pressure drop across the fan at design conditions. The total static pressure (TSP) drop includes the pressure drop across components both internal and external to an air handler. It is important for both fan electric energy usage and fan heat gain calculations.
- **Fan Efficiency**: The efficiency of the fan at design conditions.
  Overall fan efficiency includes belt/drive and fan efficiency, but does not include the efficiency of the fan motor.
- **Motor Brake HP**: The design motor shaft brake horsepower of the fan.
  The motor brake horse power is the power at the motor shaft, including fan and drive efficiencies.
- **Power Per Flow (Ref)** (W/cfm)**:** The supply fan power, in watts, per unit of flow, in CFM

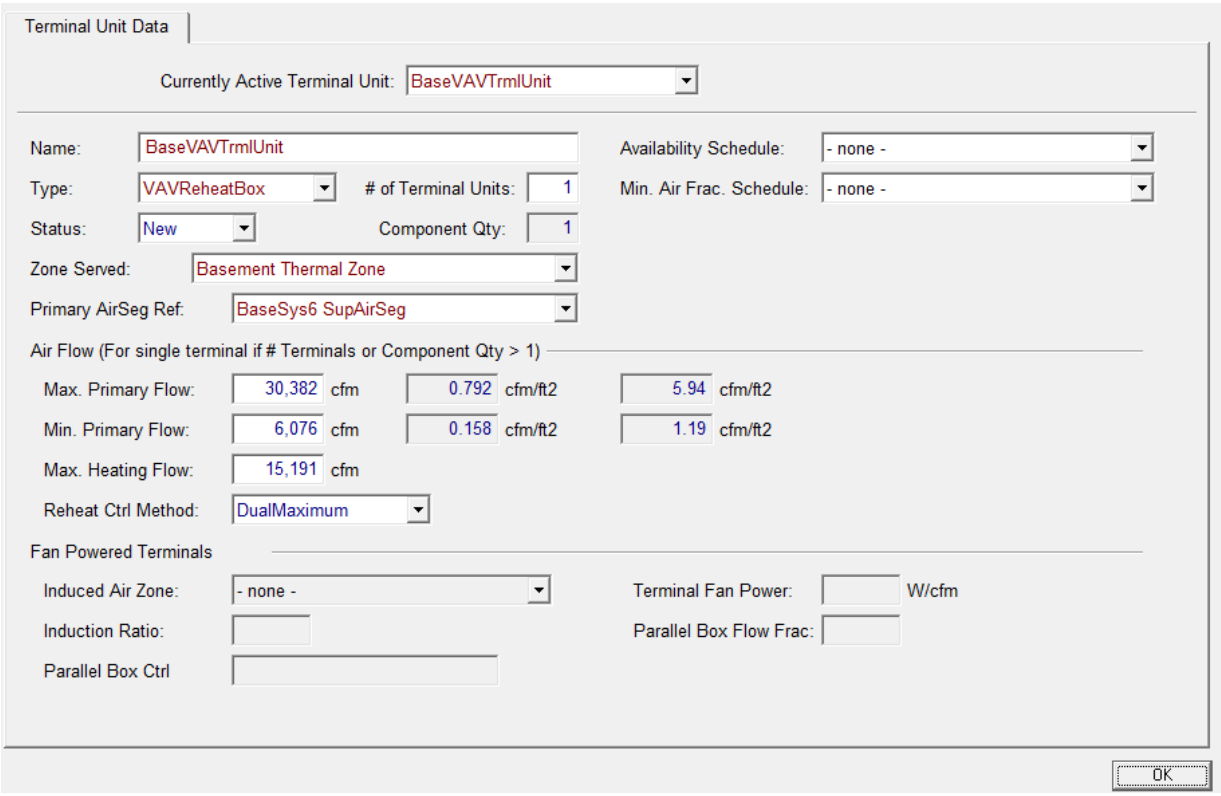
Motor Information section

- **Position**: The position of the supply fan motor relative to the cooling air stream. Options are InAirStream and NotInAirStream.
- **Nameplate HP**: The nameplate HP of the fan motor.
- **Type:** Defines if the motor is open or closed.
- **Pole Count**: The number of pole electromagnetic windings in the motor's stator and used to assign MotorEfficiency. Poles are always paired, so PoleCount is always a multiple of 2.
  Motor Efficiency: The efficiency of the motor serving a fan.

Terminal Unit Data Screen

To create a new Terminal Unit, in the Mechanical tab right click on Air System, scroll down to **Create**, and select **Terminal Unit.**

To access this screen, double click a terminal unit option (Terminal Unit icon).



Input Summary:

- **Currently Active Terminal Unit:** The name of the currently selected terminal unit.
- **Name:** The name of the terminal unit.
- **Type**: Select the type of terminal used to deliver, and if applicable, regulate air delivery to a thermal zone. Options include Uncontrolled, VAVReheatBox, ParallelFanBox, SeriesFanBox, VAVNoReHeatBox and ActiveBam.
- **# of Terminal Units:** The number of duplicate terminal units represented by the current terminal unit
- **Status:** Options are New and Existing.
- **Component Qty:** The number of duplicate systems represented by the current system.

The number of duplicate systems can only be >1 when all attributes of the system are the same. If Count is specified to be >1, all parameters (capacities, power, etc.) should be specified for the single piece of equipment. The ruleset applies multipliers for the final simulation.

- **Zone Served**: Select the name of the thermal zone that the terminal unit provides air to.
- **Primary AirSeg Ref**: Select the supply air segment that provides primary air to the terminal unit.
- **Availability Schedule**: The schedule that defines when the terminal unit can operate.
- **Min**. **Air Frac. Schedule:** The schedule that defines the minimum air flow as a fraction of the total.

Air Flow (For single system/terminal if Component Qty > 1) section

- **Max. Primary Flow** (cfm/ft2): The zone air delivery rate at design conditions. For uncontrolled terminal units, describes the design air flow rate provided to zones when the system is on. For VAV systems, specifies the maximum air flow delivered to the zone by the terminal unit.
- **Min. Primary Flow** (cfm/ft2): The minimum air flow rate of variable volume terminal units
- **Max. Heating Flow** (cfm): The maximum primary air flow to the terminal in heating mode
- **Reheat Ctrl Method**: The air/temperature control strategy for VAV reheat box in heating mode. Options available are Single Maximum and Dual Maximum.
  - Single Maximum: The airflow is set to a minimum constant value in both the deadband and heating mode. The minimum airflow setpoint is typically 30 to 50 percent of maximum. This control mode typically has a higher minimum airflow than the minimum used in the dual maximum below, resulting in more frequent reheat.
  - Dual Maximum: Raises the SAT as the first stage of heating, and increases the airflow to the zone as the second stage of heating, as follows:
    - The first stage of heating consists of modulating the zone supply air temperature setpoint up to a maximum setpoint no larger than 95°F while the airflow is maintained at the deadband flow rate.
    - The second stage of heating consists of modulating the airflow rate from the deadband flow rate up to the heating maximum flow rate (50 percent of design flow rate).

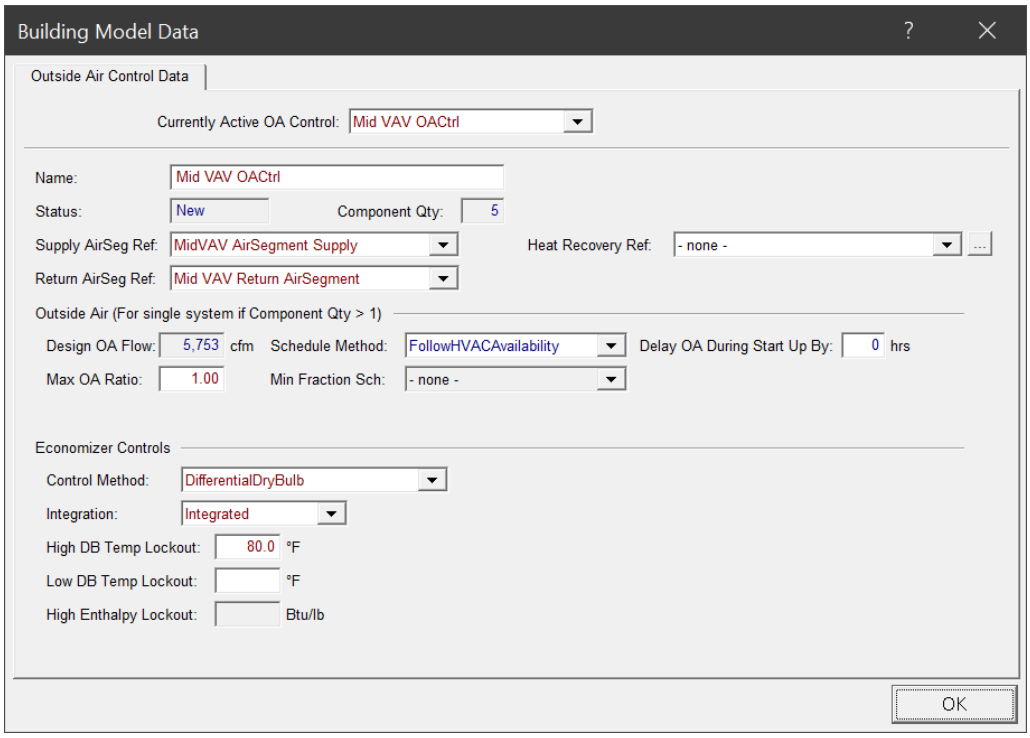
Fan Powered Terminals section (Available when selecting Type=ParallelFanBox)

- **Induced Air Zone:** Specifies the zone from which secondary air is drawn by a fan-powered box.
- **Induction Ratio:** The ration of induced secondary airflow to the total design airflow of a fan-powered box.
- **Parallel Box Ctrl:** Control method for parallel powered fan boxes.
- **Terminal Fan Power** (W/cfm)**:** The terminal unit fan power per flow.
- **Parallel Box Flow Frac:** The fraction of the primary air flow at which fan turns on. In the parallel PIU the fan operation is intermittent. If the primary air flow is above this fraction of the maximum, the fan is off.

Outside Air Control Data Screen

To create a new Outside Air Controller, in the Mechanical tab right click on Air System, scroll down to **Create**, and select **OutsideAirControl.**

To access this screen, double click an outside air control option (Outside Air Control icon)



Input Summary:

- **Currently Active OA Control**: The name of the currently selected outdoor air control.
- **Name:** The name of the outside air control.
- **Status:** Options are new and existing.
- **Component Qty:** The number of duplicate systems represented by the current system. The number of duplicate systems can only be >1 when all attributes of the system are the same. If Count is specified to be >1, all parameters (capacities, power, etc.) should be specified for the single piece of equipment. The ruleset applies multipliers for the final simulation.
- **Supply AirSeg**: Select the supply air segment of the Air System.
- **Return AirSeg**: Select the return/relief air segment of the Air System.
- **Heat Recovery Ref**: Refrence to a heat recovery system if one is part of the system.

Outside Air (For single system/terminal if Component Qty > 1) section

- **Design OA Flow** (cfm): The rate of outside air that needs to be delivered by the system at design conditions. Minimum ventilation requirements specified by Standard 120(b)2 as the greater of 15 cfm/person and the minimum ventilation rates specified in Appendix 5.4. For systems serving laboratory spaces, the system shall be 100 percent outside air, with ventilation rates determined by the Authority Having Jurisdiction.
- **Schedule Method:** The method used to describe the minimum amount of ventilation (outdoor) air that is provided by the system.

- **Delay OA During Startup By**: If the OAScheduleMethod is FollowHVACAvailability, this positive integer value indicates the number of hours that the system outside air flow is zero during system start up.
- **Max OA Ratio** (For individual systems, not total if # of systems>1) Max Ratio: The maximum ratio of outside air that a system can provided, defined as a percentage of the design supply air. Applies to systems with modulating outside air dampers. Economizers for smaller systems (<54,000 Btu/h) are assumed to have a restricted intake capacity.
- **Min Fraction Sch**: A schedule that defines the minimum outdoor air flow rate as a fraction of total system air flow.

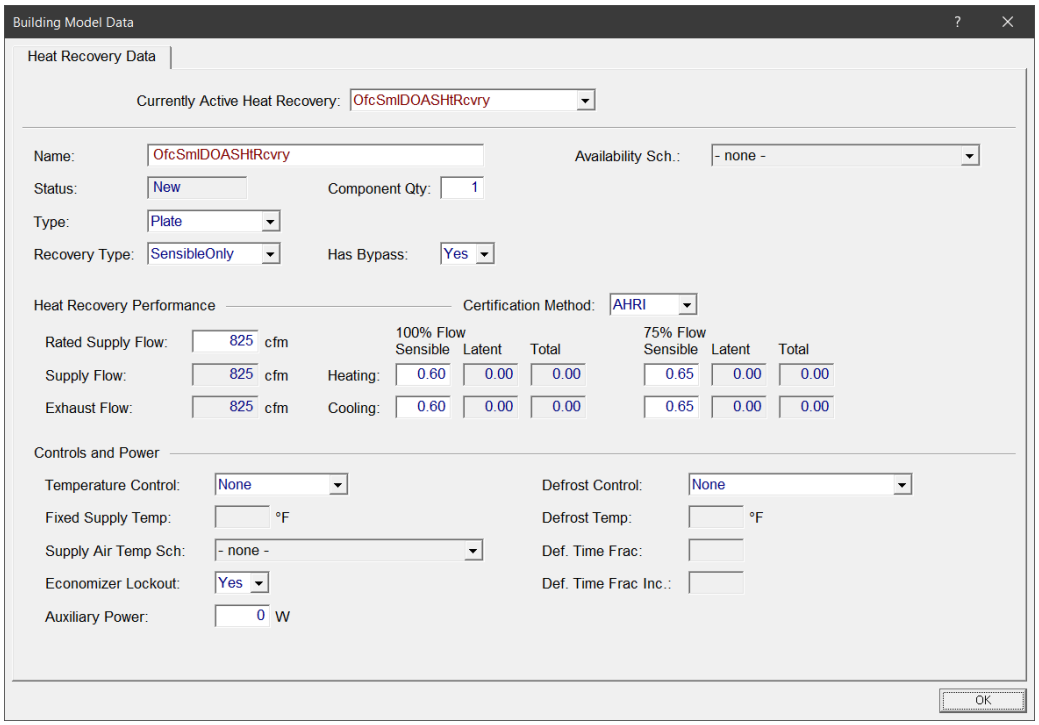
Economizer Controls section

- **Control Method**: Select the method used to control the air-side economizer.
  An air-side economizer increases outside air ventilation during periods when mechanical cooling loads can be reduced by increasing outside air flow. The control types include:
  - No economizer: Fixed outside is fraction at the system's design outside air flow when the system fan runs.
  - Fixed dry-bulb: The system shifts to 100 percent outside air and shuts off the cooling when the temperature of the outside air is equal to or lower than the supply air temperature.
  - Differential dry-bulb: The system shifts to 100 percent outside air when the temperature of the outside air is lower than the return air temperature but continues to operate the cooling system until outside air temperature reaches the supply air temperature.
  - Differential enthalpy: The system shifts to 100 percent outside air when the enthalpy of the outside air is lower than the return air enthalpy but continues to operate the cooling system until the outside air enthalpy reaches the supply air enthalpy.
  - Differential enthalpy and dry-bulb: Utilizes combination of both the DifferentialDryBulb and DifferentialEnthalpy economizer control strategies.
- **Integration**: Specify whether or not the economizer is integrated with mechanical cooling. Options include:
  - NonIntegrated: The system runs the economizer as the first stage of cooling. When the economizer is unable to meet the load, the economizer returns the outside air damper to the minimum position and the compressor turns on as the second stage of cooling.
  - Integrated: The system can operate with the economizer fully open to outside air and mechanical cooling active (compressor running) simultaneously, even on the lowest cooling stage.
- **High DB Temp Lockout** (deg F): The outside air drybulb temperature above which the economizer will return to its minimum position.
- **Low DB Temp Lockout** (deg F): The outside air drybulb temperature below which the economizer will return to its minimum position.
- **High Enthalpy Lockout** (Btu/lb): The outside air drybulb temperature above which the economizer will return to its minimum position.

Heat Recovery Data Screen

To create a new Heat Recovery object, in the Mechanical tab right click on Air System, scroll down to **Create**, and select **HeatRecovery.**

To access this screen, double click an Heat Recovery option (Heat Recovery icon)



Input Summary:

- **Currently Active Heat Recovery:** The name of the currently selected heat recovery.
- **Name:** The name of the heat recovery object.
- **Status:** Status of the heat recovery object from the AirSystem data screen.
- **Component Qty:** Component quantity from Air Sytem data screen.
- **Type:** Type of Heat Recovery object. Options are plate and wheel.
- **Recovery Type:** Select from options Total, Sensible Only and Latent Only**.**
- **Has Bypass:** Indicates whether or not heat recovery has bypass.
- **Availability Sch**: The name of the schedule based on which the heat recovery operates.
- **Certification Method:** Certification program for heat recovery equipment – HVI/AHRI

Heat Recovery Performance section

- **Rated Supply Flow:** The 100% supply air flow rate at which the heat recovery object is rated.
- **100% Flow- Heating (Sensible):**The sensible heat exchange effectiveness at heating condition with both supply and exhaust air volume flow rates equal to 100%
- **100% Flow- Heating (Latent):** The latent heat exchange effectiveness at heating condition with both supply and exhaust air volume flow rates equal to 100%
- **100% Flow- Heating (Total):** The total heat exchange effectiveness at heating condition with both supply and exhaust air volume flow rates equal to 100%

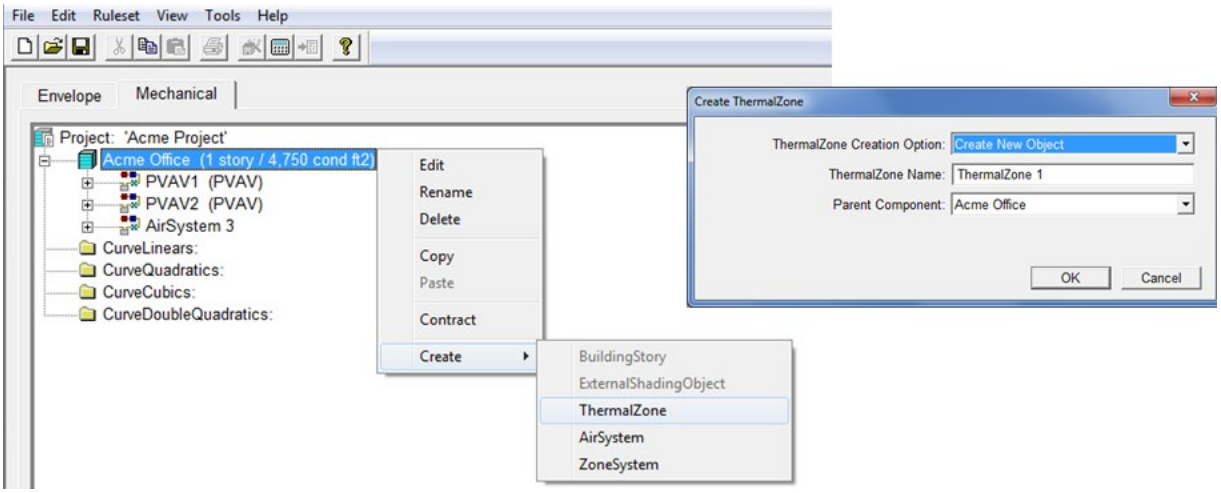
- **100% Flow- Cooling (Sensible):** The sensible heat exchange effectiveness at cooling condition with both supply and exhaust air volume flow rates equal to 100%
- **100% Flow- Cooling (Latent):** The latent heat exchange effectiveness at cooling condition with both supply and exhaust air volume flow rates equal to 100%
  - **100% Flow- Cooling (Total):** The total heat exchange effectiveness at cooling condition with both supply and exhaust air volume flow rates equal to 100%
- **75% Flow- Heating (Sensible):** The sensible heat exchange effectiveness at heating condition with both supply and exhaust air volume flow rates equal to 75%
- **75% Flow- Heating (Latent):** The latent heat exchange effectiveness at heating condition with both supply and exhaust air volume flow rates equal to 75%
- **75% Flow- Heating (Total):** The total heat exchange effectiveness at heating condition with both supply and exhaust air volume flow rates equal to 75%
- **75% Flow- Cooling (Sensible):** The sensible heat exchange effectiveness at cooling condition with both supply and exhaust air volume flow rates equal to 75%
- **75% Flow- Cooling (Latent):** The latent heat exchange effectiveness at cooling condition with both supply and exhaust air volume flow rates equal to 75%
- **75% Flow- Cooling (Total):** The total heat exchange effectiveness at cooling condition with both supply and exhaust air volume flow rates equal to 75%
- **Rated Heat Recovery Eff.:** The rated heat recovery effectiveness of HVI certified heat recovery equipment. For HVI certified HRV/ERV products, this is the Adjusted Rated Sensible Recovery Efficiency (ASRE) @ 0°C, divided by 100.

Controls and Power section

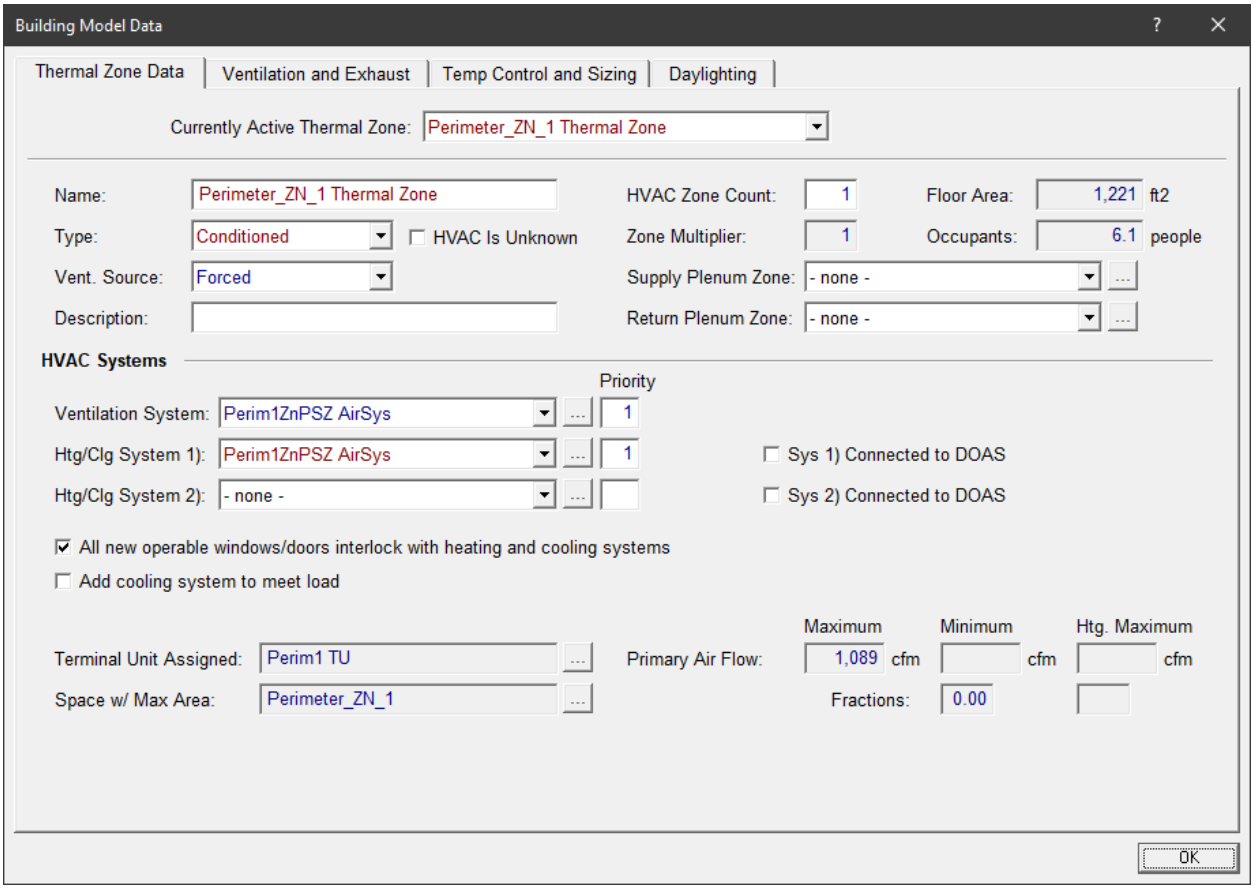
- **Temperature Control:** Indicates if the heat recovery objects supply air outlet is controlled by a temperature setpoint.
- **Fixed Supply Temp.:** Fixed supply temperature at the heat exchangers supply outlet.
- **Supply Air Temp Sch:** The supply air temperature schedule of the temperature setpoint at supply outlet.
- **Economizer Lockout:** This field indicates whether the heat exchanger is locked out when the economizer is operating.
- **Auxiliary Power:** The electric consumption rate of the heat recovery object.
- **Defrost Control:** The defrost control method of the heat exchanger.
- **Defrost Temp.:** The defrost temperature of the heat exchanger object.
- **Defrost Time Frac.:** Fraction of simulation timestep when frost control will be invoked when the threshold temperature is reached.
- **Defrost Time Frac. Inc.:** Rate of increase in the defrost time fraction as the supply air inlet temperature falls below the threshold temperature.

Thermal Zone Data Screen

To create a new Thermal Zone, in the Mechanical tab right click on Building, scroll down to **Create**, and select **ThermalZone.**



To access this screen, under Building data double click a thermal zone (Zone icon).



Input Summary:

- **Currently Active Thermal Zone**: The name of the selected thermal zone.
- **Name:** The name of the thermal zone made up of 50 or fewer alphanumeric characters.
- **Type**: Select the type of thermal zone as directly conditioned space, indirectly conditioned space (i.e., conditioned only by passive heating or cooling from an adjacent thermal zone), or plenum (i.e., unoccupied but partially conditioned as a consequence of its role as a path for returning air). Options are Conditioned, Plenum, and Unconditioned.
- **HVAC is Unknown** (check box): Check if the HVAC system is unknown for purposes of compliance analysis. Applicable to core shell analysis where the HVAC system will be permitted in the future, or when an HVAC is existing and not modeled for compliance.
- **Ventilation**: Select the source of ventilation for a thermal zone. Options are, Forced, and None.
- **Description**: A brief description of the thermal zone that ties the thermal zone to the building plans. The description may identify the spaces that make up the thermal zone or can be other descriptive information.
- **HVAC Zone Count**: The number of building HVAC zones represented by the modeled thermal zone. This property is used to simulate multiples of a single thermal zone. All spaces that reference the thermal zone must have the same multiplier, and spaces with multipliers greater than one cannot be children of different Story objects. The following SDD modeling rules for Multipliers must be followed:
    1. All spaces that are combined into a thermal zone must have the same Multiplier.
    2. Spaces that are combined into a thermal zone cannot span multiple stories.
- **Zone Multiplier**: This property is used to simulate multiples of a single thermal zone. All spaces that reference the thermal zone must have the same multiplier, and thermal zones with multipliers greater than one cannot be children of different Story objects.
  The following SDD modeling rules for Multipliers must be followed:
    - All spaces that are combined into a thermal zone must have the same Multiplier.
    - Spaces that are combined into a thermal zone cannot span multiple stories.
    - All ThermalZones that are served by the same HVAC system must have the same Multiplier.
- **Floor Area** (ft2): The gross floor area of a thermal zone (before multiplier is applied); including walls and minor spaces for mechanical or electrical services such as chases that are not assigned to other thermal zones. Larger mechanical spaces and electrical rooms should not be combined.
- **Occupants:** Number of occupants.
- **Supply Plenum Zone:** The name of supply air plenum zone for the current ThermalZone.
- **Return Plenum Zone:** The name of return air plenum zone for the current ThermalZone.

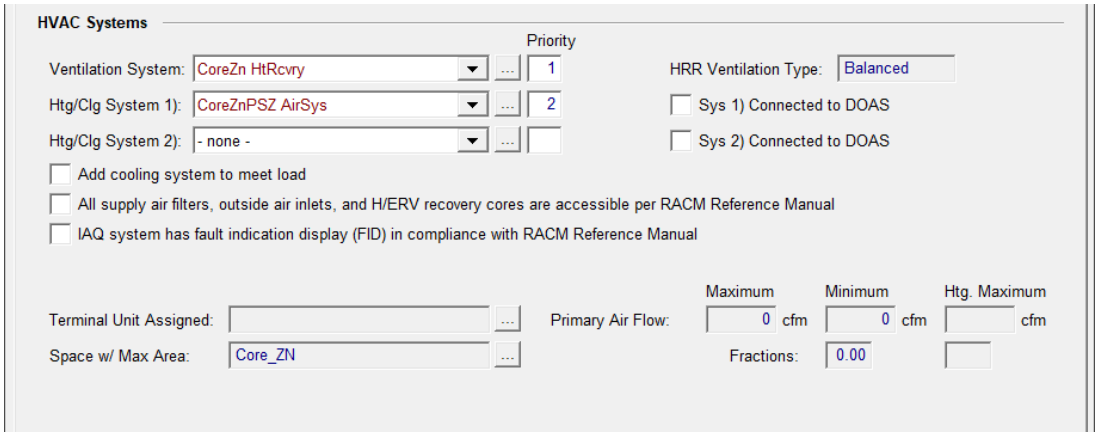
HVAC Systems section

- **Ventilation System**: The name of the air or zone system that provides ventilation air to the thermal zone. This is by default the same system as the primary air conditioning system.
- **Htg/Clg System 1/2**: The name of the air or zone system that is the principal source of heating and/or cooling for the thermal zone. Only one unique Air System can be assigned to this field.
- **Sys 1) 2) Connected to DOAS** (check box): A flag that indicates that if the #1/#2 heating /cooling Zone System is connected to a dedicated ventilation system (DOAS) AirSystem. A

ZoneSystem that serves as a primary air conditioning can be connected to the zone ventilation system (i.e. DOAS) if it meets the following criteria:

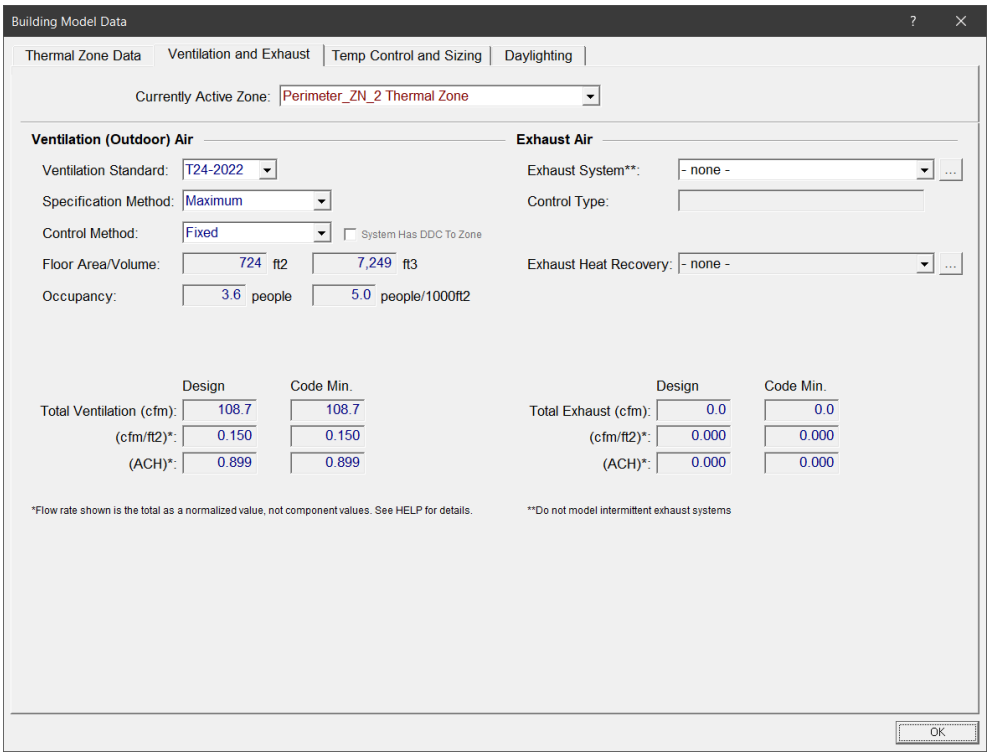
1) It is Type 'SZAC', 'SZHP', 'SPVAC', 'SPVHP', 'FPFC, 'WSHP', 'PTAC','PTHP', or 'VRF', and
2) The ZoneSystem fan control is 'Continuous'.
3) The ventilation system is a different system and is not connected to any other ZoneSystems serving the zone.

- **Add Cooling System to Meet Load** (check box): Check to indicate that a zonal cooling system should be added to meet or supplement meeting the cooling loads of the thermal zone. This box should be checked if the zone was not specifically designed to have cooling, or may have insufficient cooling to meet loads. If checked, an air-source, zonal system will be added to the proposed model, and the zone will be cooled to the prescribed cooling setpoint schedule.
- **Terminal Unit:** The name of the TerminalUnit that servers the zone.
- **Primary Air Flow (Maximum)** (cfm)**:** The maximum air flow rate of provided by the TerminalUnit that serves the zone.
- **Primary Air Flow (Minimum)** (cfm)**:** The minimum air flow rate of provided by the Terminal Unit that serves the zone. Only applicable to VAV terminal units.
- **Primary Air Flow (Htg. Maximum)** (cfm)**:** The heating maximum air flow rate of provided by the Terminal Unit that serves the zone. Only applicable to VAV terminal units.
- **Fractions (Minimum):** The fraction calculated by dividing the zone minimum primary air flow by the design (maximum) primary airflow for the zone.
- **Fractions (Htg. Maximum):** The fraction calculated by dividing the maximum primary air flow in in heating mode by the design (maximum) primary airflow for the zone.
- **Window/Door Interlock** (checkbox): To confirm that switches are provided on operable windows and the switches interlock with the heating and cooling equipment.



- **System Accessible** (checkbox): A flag that indicates whether single-zone IAQ system supply air filters, outside air inlets, and H/ERV recovery cores (if applicable) are accessible according to the criteria set in the RACM. If not checked, the Standard Design ventilation system is modeled the same as the Proposed with limitations on system fan power.
- **IAQ system** (checkbox): A flag that indicates whether single-zone IAQ system have fault indication display (FID) according to the criteria set in the RACM. If not checked, penalty adjustments to fan power and heat recovery effectiveness will be applied to the Proposed system.

Thermal Zone Data (Ventilation and Exhaust Tab)



Ventilation (Outdoor) Air section

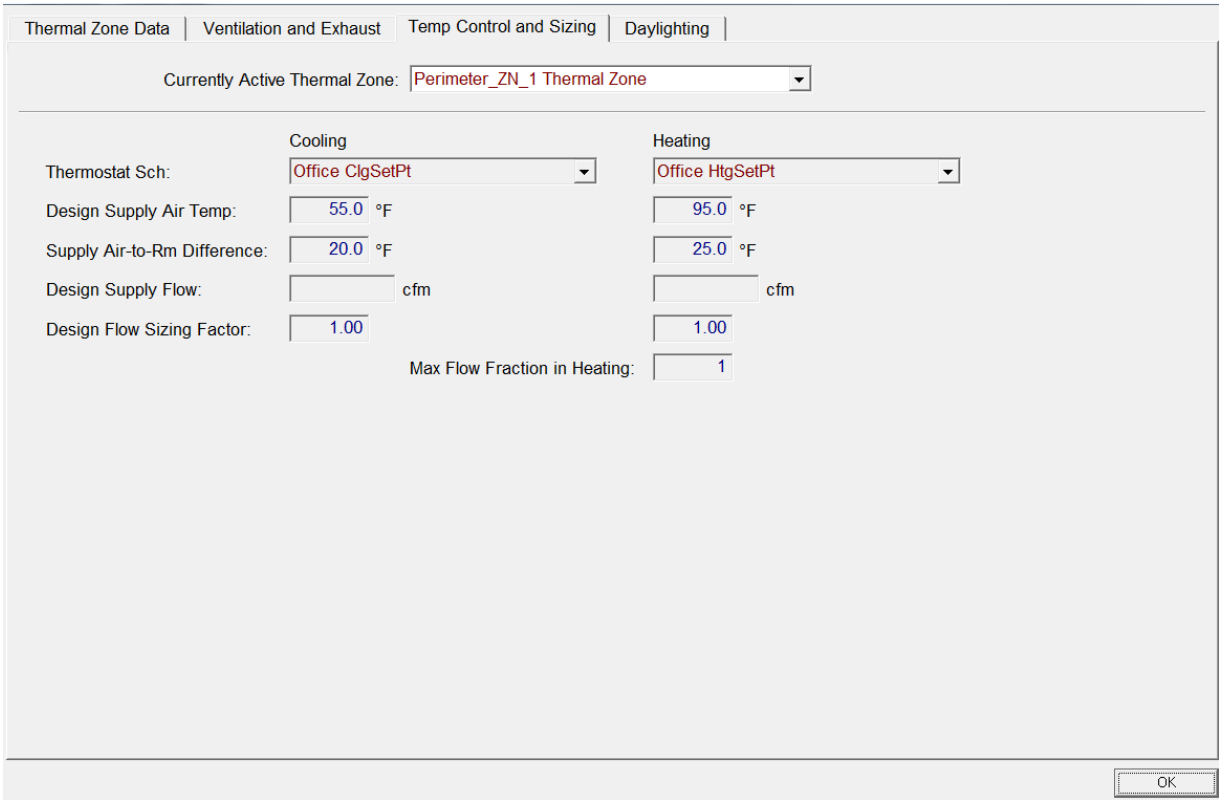
- **Ventilation Standard**: The ventilation standard used for the thermal zone. By default, the ventilation standard is defaulted to the one specified for the ruleset. If the zone has been designed to some other standard, select 'Other'. If 'Other', the ventilation rate for the zone is the same for both the proposed and baseline.
- **Description**: A short description of the 'Other' ventilation standard used for the zone should be entered here if the
- **Specification Method**: Options are: NoVentilation, Maximum, Sum, FlowPerPerson, FlowPerArea, AirChangesPerHour, and FlowPerZone.
- **Control Method**: The method used to vary the minimum ventilation flow. Ventilation airflow may be fixed at a specified rate or it may be reduced by the use of CO2 sensors or shut off based on an occupancy sensor.
- **System Has DDC To Zone (check box):** Check box to indicate when the system has DDC to Zone.
- **Floor Area** (ft2): The gross floor area of a ThermalZone (before multiplier is applied); including walls and minor spaces for mechanical or electrical services such as chases that are not assigned to other ThermalZones. Larger mechanical spaces and electrical rooms should not be combined.
- **Occupancy**: The number of people in the ThermalZone at design occupancy.
- **Occupancy Density**: The density of people in the ThermalZone at design occupancy.
- **Total Ventilation (cfm) (Design)**: The quantity of ventilation air, per the proposed design, that is provided to the Story at design occupancy. The default value shall be the larger of 15 cfm times the design occupancy from Appendix 5.4A or the conditioned floor area times the applicable ventilation rate from Appendix 5.4A or Table 120.1-A of the Standards.

- **Total Ventilation (cfm) (Minimum)**: The minimum quantity of ventilation air, per the NACM, that must be provided to the ThermalZone at design occupancy. The default value shall be the larger of 15 cfm times the design occupancy from Appendix 5.4A or the conditioned floor area times the applicable ventilation rate from Appendix 5.4A or Table 120.1-A of the Standards.
- **Total Ventilation (cfm/ft2) (Design):** The design ventilation air flow rate, in cfm/ft2, for the ThermalZone.
- **Total Ventilation (cfm/ft2) (Minimum):** The minimum ventilation air flow rate, in cfm/ft2, for the ThermalZone.
- **Total Ventilation (cfm/person) (Design):** The minimum ventilation air flow rate, in cfm/person, for the ThermalZone.
- **Total Ventilation (cfm/person) (Minimum):** The minimum ventilation air flow rate, in cfm/person, for the ThermalZone.
- **Total Ventilation (ACH) (Design):** The design air flow rate, in ACH, for the ThermalZone.
- **Total Ventilation (ACH) (Minimum):** The minimum air flow rate, in ACH, for the ThermalZone.

Exhaust Air section

- **Exhaust System:** The name of the air or zone system that exhausts air from the thermal zone. (Input is optional.)
- **Control Type:** Echo of the control method defined at exhaust system referenced by the thermal zone.
- **Exhaust Source:** The source of exhaust make-up air. The ExhaustSource defines where make-up air for the exhaust systems comes from. Currently, 'VentilationSystem', 'TransferFromAdjacentZones', and 'BothVentilationAndTransfer' result in the same behavior; exhaust make-up air is assumed to be provided in the user's design to the local zone by the ventilation system, or from adjacent zones by transfer openings. These options do not change the user's model or impact the simulation. 'DirectOutsideAir' indicates a louver or other means of allowing untempered, outside air to enter from the exterior to make-up for the exhaust. This results in the equivalent amount of exahust air to be infiltrated into the zone in the simulation. 'DirectOutsideAir' is the default for zones that require outside air ventilation and use an exhaust fan as the VentilationSystem, or if the zone is not directly or indirectly conditioned."
- **Heat Recovery:** Reference to the heat recovery system to which the exhaust system is connected.
- **Total Exhaust (cfm):** The design exhaust air flow rate in cfm for the thermal zone.
- **Total Exhaust (ACH):** The design exhaust air flow rate in ACH for the thermal zone.
- **Total Exhaust (cfm/ft2):** The design exhaust air flow rate in cfm/ft2 for the thermal zone.

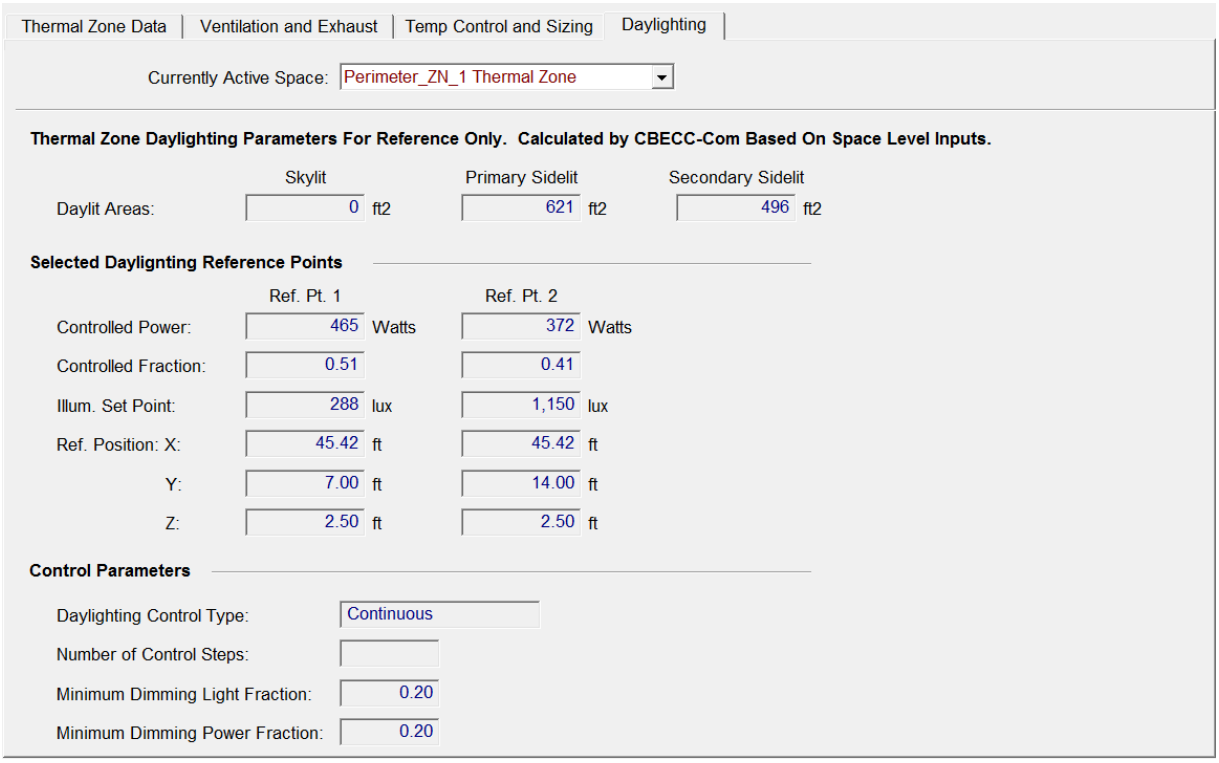
Thermal Zone Data (Temp Control and Sizing Tab)



Input Summary:

- **Thermostat Sch (Cooling):** HVAC zone cooling temperature schedule. The schedules specified in Appendix 5.4A and detailed in Appendix 5.4B is used as default.
- **Thermostat Sch (Heating):** HVAC zone heating temperature schedule. The schedules specified in Appendix 5.4A and detailed in Appendix 5.4B is used as default.
- **Design Supply Air Temp** (deg F): The design (cooling or heating) supply air temperature for sizing zone/system airflows.
- **Supply Air-to-Rm Difference** (deg F): The temperature difference between the (cooling or heating) supply air temperature and room air temperature used for sizing system supply fans.
- **Design Supply Flow** (cfm): The air flow provided to the thermal zone at the design (cooling or heating) condition. Applicable to sizing runs only.
- **Design Flow Sizing Factor:** A factor applied to the autosized zone cooling air flow (cooling or heating).
- **Max Flow Fraction in Heating:** The maximum supply air flow fractions during heating for sizing zone reheat coils capacity.

Thermal Zone Data (DaylightingTab)



Input Summary:

- **Currently Active Zone**: The name of the currently selected thermal zone.
- **Skylit Daylit Area** (ft2)**:** The total skylit daylit area in the thermal zone.
- **Primary Sidelit Area** (ft2)**:** The total primary sidelit daylit area in the thermal zone.
- **SecondarySidelit Area** (ft2)**:** The total secondary sidelit daylit area in the thermal zone.

Selected Daylighting Reference Points section

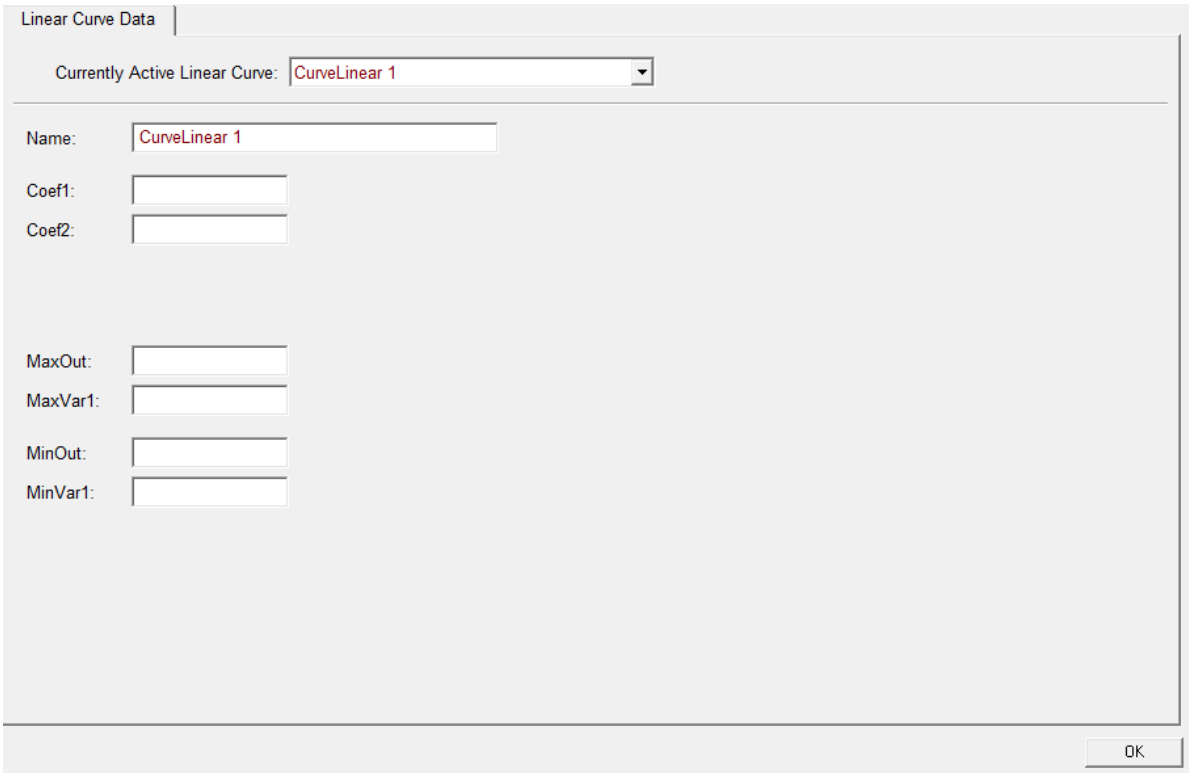
- **Controlled Power (Watts):** The total power of all controlled lighting controlled.
- **Controlled Fraction:** The fraction of total power of all controlled power controlled.
- **Illum. Set Point (lux):** The illuminance setpoint at the reference position.
- **X (ft):** The X position of the thermal daylighting reference point.
- **Y (ft):** The Y position of the thermal daylighting reference point.
- **Z (ft):** The Z position of the thermal daylighting reference point.

Controlled Parameters section

- **Daylighting Control Type:** The type of daylighting control.
- **Number of Control Steps:** The number of control steps.
- **Minimum Dimming Lighting Fraction:** The power fraction at minimum dimming.
- **Minimum Dimming Power Fraction:** The lighting fraction at minimum dimming.

Linear Curve Data Screen

To access this screen, right click **CurveLinears**. Select **Create** and then **CurveLinear**. The **Create CurveLinear** dialog box appears. Enter the **CurveLinear Name** and click **OK**.



The linear curve consists of two coefficients and an independent variable. The minimum and maximum values for the independent variable can be specified as well as the minimum and maximum output of the performance curve.

Out = Coef1 + Coef2 * Var1

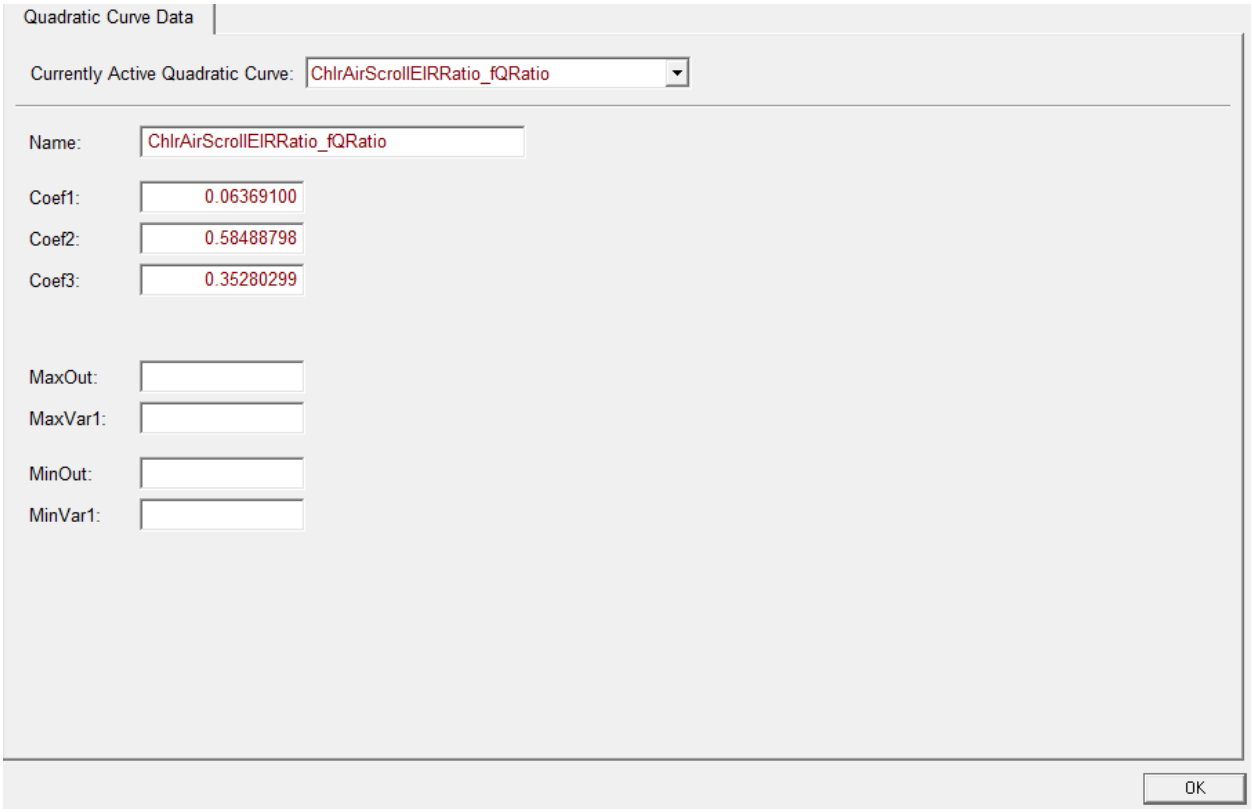
Input Summary:

- **Currently Active Linear Curve**: The name of the selected linear curve.
- **Name**: The name of the linear curve.
- **Coef1**: The constant coefficient in the equation.
- **Coef2**: The linear coefficient in the equation.

- **MaxOut:** The maximum allowable output value. (optional)
- **MaxVar1:** The maximum allowable value for the independent variable.
- **MinOut**: The minimum allowable output value. (optional)
- **MinVar1**: The minimum allowable value for the independent variable.

Quadratic Curve Data Screen

To access this screen, right click **CurveQuadratic**. Select **Create** and then **CurveQuadratic**. The **Create CurveQuadratic** dialog box appears. Enter the **CurveQuadratic Name** and click **OK**.



The quadratic curve consists of three coefficients and an independent variable. The minimum and maximum values for the independent variable can be specified as well as the minimum and maximum output of the performance curve.

Out = Coef1 + Coef2 * Var1 + Coef3 * Var1 ^ 2

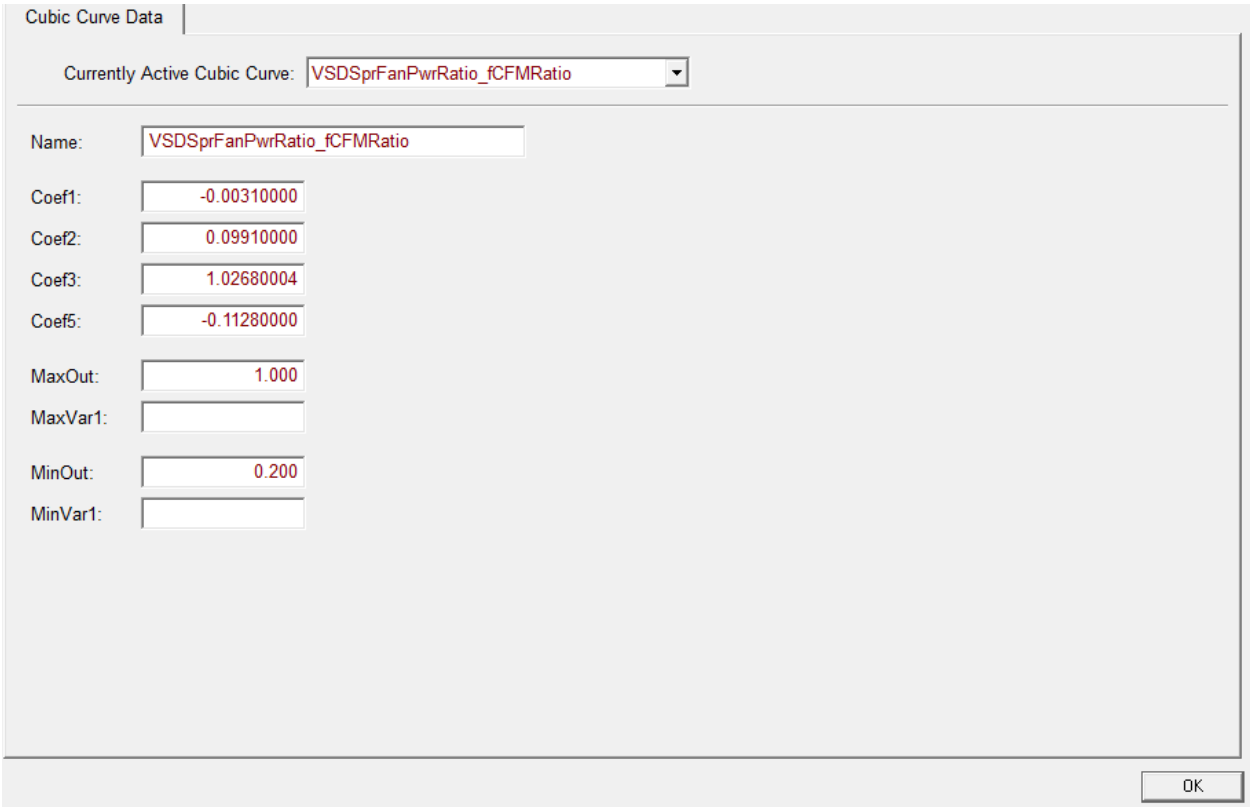
Input Summary:

- **Currently Active Quadratic Curve:** The name of the active quadratic curve.
- **Name:** The name of the quadratic curve.
- **Coef1**: The constant coefficient in the equation.
- **Coef2**: The linear coefficient in the equation.
- **Coef3**: The quadratic coefficient in the equation.

- **MaxOut:** The maximum allowable output value. (optional)
- **MaxVar1**: The maximum allowable value for the independent variable.
- **MinOut**: The minimum allowable output value. (optional)
- **MinVar1**: The minimum allowable value for the independent variable.

Cubic Curve Data Screen

To access this screen, right click **CurveCubic**. Select **Create** and then **CurveCubic**. The **Create CurveCubic** dialog box appears. Enter the **CurveCubic Name** and click **OK**.



The cubic curve consists of four coefficients and an independent variable. The minimum and maximum values for the independent variable can be specified as well as the minimum and maximum output of the performance curve.

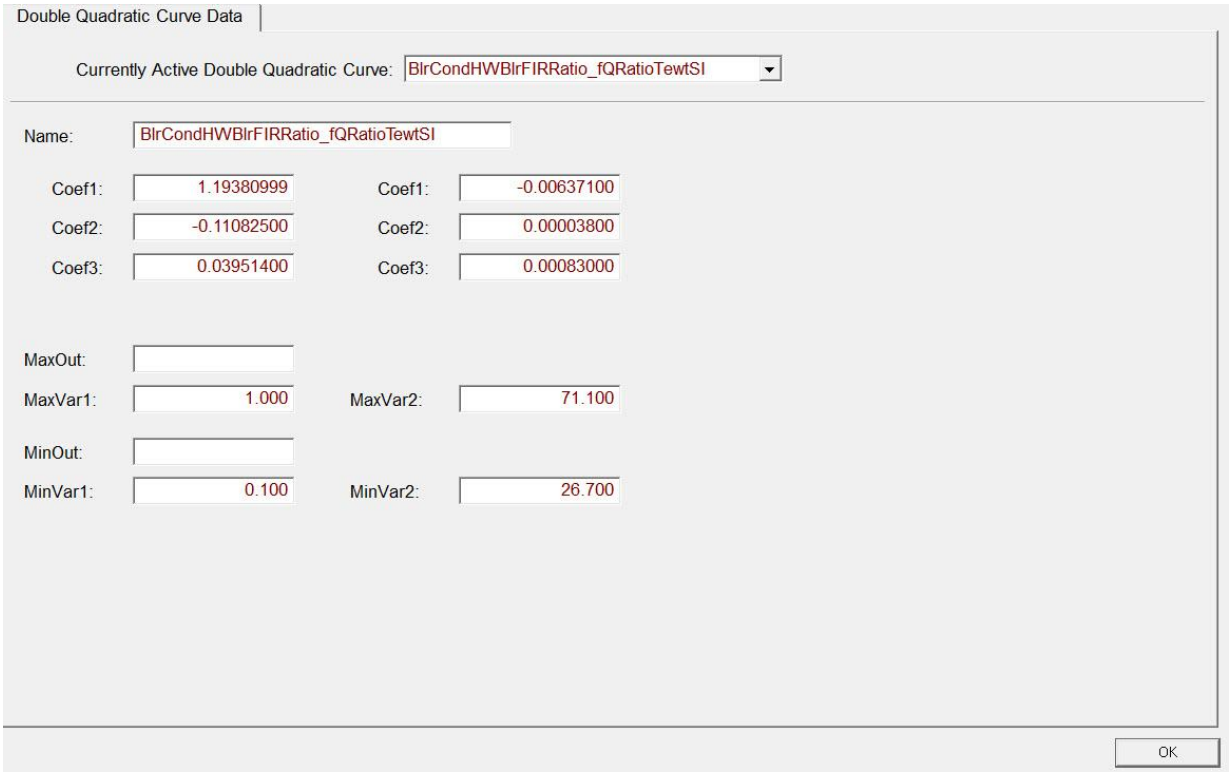
Out = Coef1 + Coef2 * Var1 + Coef3 * Var1 ^ 2 + Coef5 * Var1 ^ 2

Input Summary:

- **Currently Active Cubic Curve:** The name of the active cubic curve.
- **Name**: The name of the cubic curve.
- **Coef1**: The constant coefficient in the equation.
- **Coef2**: The linear coefficient in the equation.
- **Coef3**: The quadratic coefficient in the equation.
- **Coef5**: The cubic coefficient in the equation.
- **MaxOut**: The maximum allowable output value. (optional)
- **MaxVar1**: The maximum allowable value for the independent variable.
- **MinOut**: The minimum allowable output value. (optional)
- **MinVar1:** The minimum allowable value for the independent variable.

Double Quadratic Curve Data Screen

To access this screen, right click **CurveDoubleQuadratic**. Select **Create** and then **CurveDoubleQuadratic**. The **Create CurveDoubleQuadratic** dialog box appears. Enter the **CurveDoubleQuadratic Name** and click **OK**.



The double quadratic curve consists of two independent variables and three coefficients for each variable. The minimum and maximum values for the independent variable can be specified as well as the minimum and maximum output of the performance curve.

Out = Coef1 + Coef1 + Coef2 * Var1 + Coef2 * Var2 + Coef3 * Var1 ^ 2 + Coef3 * Var2 ^ 2

Input Summary:

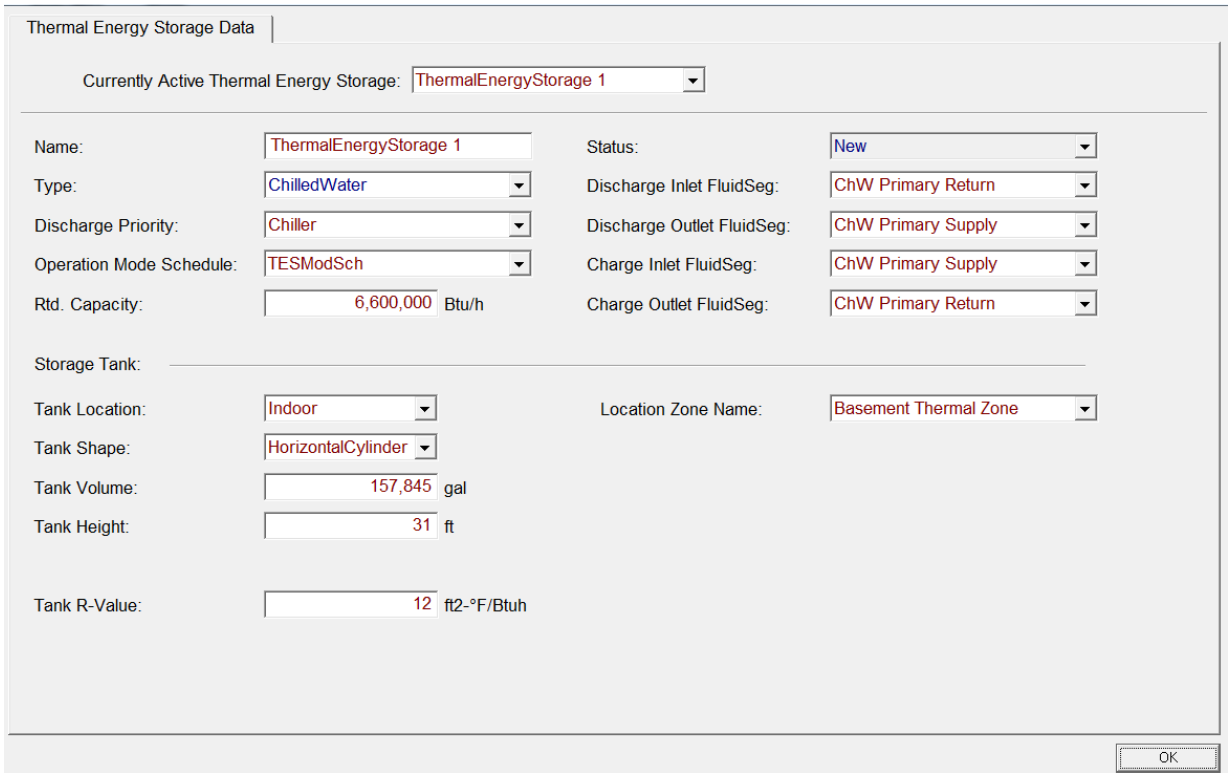
- **Currently Active Double Quadratic Curve**: The name of the active double quadratic curve.
- **Name:** The name of the double quadratic curve.
- **Coef1:** The constant coefficient in the equation.
- **Coef2:** The linear coefficient in the equation.
- **Coef3:** The quadratic coefficient in the equation.

- **MaxOut**: The maximum allowable output value. (optional)
- **MaxVar1**: The maximum allowable value for the first independent variable.
- **MaxVar2**: The maximum allowable value for the second independent variable.
- **MinOut**: The minimum allowable output value. (optional)
- **MinVar1**: The minimum allowable value for the first independent variable.
- **MinVar2**: The minimum allowable value for the second independent variable.

Thermal Energy Storage Data Screen

To create a new Thermal Energy Storage System, right click on FluidSystem (Chilled Water), left click on Create, and then select **ThermalEnergyStorage.**

To access an existing ThermalEnergyStorage, system double click it (ThermalEnergyStorage icon).



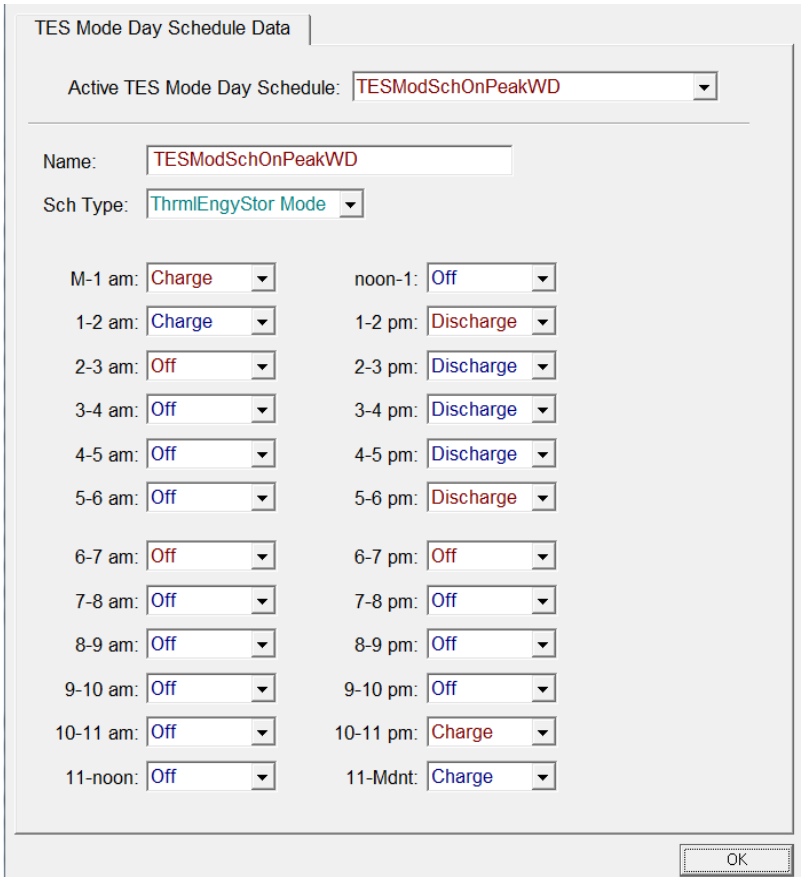
Input Summary:

- **Currently Active Thermal Energy Storage**: The name of the currently selected thermal energy storage.
- **Name**: The user specified name of the thermal energy storage.
- **Status**: Display the equipment status as new or existing.
- **Type**: Select the type of thermal energy storage being used. ChilledWater is currently the only supported option.
- **Discharge Priority**: Select the method to determine whether the storage system or a chiller operates first to meet cooling loads during the discharge period. Storage priority will normally provide larger demand charge savings but requires a larger storage system. Chiller priority allows use of a significantly smaller storage system but demand reduction will be smaller.
- **Operation Mode Schedule**: Assign the schedule which controls the operating mode of the thermal energy storage system. The schedules defines when the system can be discharging (supplying chilled water to meet cooling loads), charging (receiving chilled water to be stored for later use) or off. This schedule will typically be aligned with the demand periods used in the electricity tariff.
- **Rtd. Capacity**: The cooling capacity of the thermal energy storage at rating conditions. The full load output of the thermal energy storage operating at rating temperatures and flows.

- **Discharge Inlet FluidSeg**: Name of the inlet fluid segment when the storage system is discharging. This must be a chilled water return.
- **Discharge Outlet FluidSeg**: Name of the outlet fluid segment when the storage system is discharging. This must be a chilled water supply.
- **Charge Inlet FluidSeg**: Name of the inlet fluid segment when the storage system is charging. This must be a chilled water supply.
- **Charge Outlet FluidSeg**: Name of the outlet fluid segment when the storage system is charging. This must be a chilled water return.
- **Tank Location**: Select the location of the storage tank for determining losses and heat energy interaction with the surroundings. Options are Indoor, Outdoor, and Underground.
- **Location Zone Name**: Name of the zone where the storage tank is located. This field will be active when Indoor is selected for Tank Location.
- **Tank Shape**: Select the shape of the storage tank. Options are VerticalCylinder, HorizontalCylinder, and Rectangular.
- **Tank Volume**: The volume of water held in the thermal energy storage tank in gallons.
- **Tank Height**: For a vertical cylinder or rectangular tank, the height of the tank will be the maximum internal height of water held in the storage tank. For a horizontal cylinder tank, the height of the storage tank will be the inner diameter of the storage tank.
- **Tank Length to Width Ratio**: The length to width ratio of a rectangular storage tank in plan view. Required only if tank shape is Rectangular.
- **Tank R-Value**: The insulation applied to the tank in hr-ft²-°F/Btu.

Thermal Energy Storage Mode Schedule Days Data Screen

To create a new operation mode schedule for the Thermal Energy Storage System, right click on ThermalEnergyStorageModeScheduleDays, scroll down to Create, and then select **ThermalEnergyStorageModeScheduleDays.**
To access an existing thermal energy storage system operation mode schedule, under Project name, expand **ThermalEnergyStorageModeScheduleDays** (by clicking on the plus sign), and double click an option (Schedule icon).



Input Summary screen for **ThermalEnergyStorageModeScheduleDays** data:

- **Active TES Mode Day Schedule**: The name of the currently selected thermal energy storage mode day schedule.
- **Name:** The user specified name used to identify the day schedule.
- **Sch Type**: Select the type of hourly values in the schedule. The only option available is ThrmlEngyStorMode.
- **M-1 am**: The operating mode available between midnight and 1 a.m.
- **1-2 am**: The operating mode available between 1 a.m. and 2 a.m.
- **2-3 am:** The operating mode available between 2 a.m. and 3 a.m.
- **3-4 am**: The operating mode available between 3 a.m. and 4 a.m.
- **4-5 am**: The operating mode available between 4 a.m. and 5 a.m.
- **5-6 am**: The operating mode available between 5 a.m. and 6 a.m.
- **6-7 am**: The operating mode available between 6 a.m. and 7 a.m.
- **7-8 am**: The operating mode available between 7 a.m. and 8 a.m.

- **8-9 am**: The operating mode available between 8 a.m. and 9 a.m.
- **9-10 am**: The operating mode available between 9 a.m. and 10 a.m.
- **10-11 am**: The operating mode available between 10 a.m. and 11 a.m.
- **11-noon**: The operating mode available between 11 a.m. and noon.
- **noon-1**: The operating mode available between noon and 1 p.m.
- **1-2 pm**: The operating mode available between 1 p.m. and 2 p.m.
- **2-3 pm**: The operating mode available between 2 p.m. and 3 p.m.
- **3-4 pm**: The operating mode available between 3 p.m. and 4 p.m.
- **4-5 pm**: The operating mode available between 4 p.m. and 5 p.m.
- **5-6 pm**: The operating mode available between 5 p.m. and 6 p.m.
- **6-7 pm**: The operating mode available between 6 p.m. and 7 p.m.
- **7-8 pm**: The operating mode available between 7 p.m. and 8 p.m.
- **8-9 pm:** The operating mode available between 8 p.m. and 9 p.m.
- **9-10 pm**: The operating mode available between 9 p.m. and 10 p.m.
- **10-11 pm**: The operating mode available between 10 p.m. and 11 p.m.
- **11-Mdnt**: The operating mode available between 11 p.m. and midnight.

SPECIAL FEATURES AND MODELING ASSUMPTIONS

The *ACM Reference Manual* contains requirements for Special Documentation and Reporting, many of which are implemented in CBECC

The following modeling assumptions are made by CBECC.

Modeling Assumptions

- CBECC uses the concept of three parallel sets of input for a single building modeled for compliance.
    1. The user model is the set of inputs entered by the user that reflect the actual specification of the as-designed building.
    2. The proposed model is generated by the software and applies modeling constraints to user inputs, when needed, for use in compliance. Values of prescribed inputs such as schedules or equipment power density are overridden with inputs to follow the rules in the *ACM Reference Manual.*
    3. The standard design model is the baseline for comparison.
- The CBECC software applies modeling concepts to identify building model inputs that can be modified by the user from those that cannot.
    - A prescribed input is a modeling input that is fixed for both the proposed design and the standard design (baseline). Examples of prescribed inputs are occupancy schedules and equipment power density (EPD) for a given space type.
    - A neutral input is a modeling input that is entered by the user, but the value for the standard design (baseline) is set by the software to match the user input. Examples of this type of input include climate zone, and the building geometry (excluding fenestration).
    - A user-defined input is a modeling input that is entered by the user, whose value is allowed to vary above or below the stringency level in the standard design. Examples of this type of input include lighting power and HVAC equipment efficiency.

- The modeling rules and input restrictions are defined in detail in the *ACM Reference Manual*, available on the California Energy Commission website.
- While most algorithms are handled automatically by the software, the CBECC software employs a calculation algorithm for recirculating water heating systems in multi-family water heating. Refer to Residential ACM Appendix RE for calculation details.
- While refrigeration systems are not modeled explicitly in the CBECC software, refrigeration can be entered as a process load in the space. For modeling purposes this is considered a "neutral" load—the same value is used in the proposed design and standard design model.

CHECKLIST FOR COMPLIANCE SUBMITTAL

CBECC will produce the Certificate of Compliance for the Nonresidential Performance Compliance Method, NRCC-PRF-01-E.

Note: Please check the Compliance Statement section to make sure that the version you are using has been certified by the California Energy Commission to show compliance with California's 2025 Building Energy Efficiency Standards.

COMPLIANCE STATEMENT

CBECC 2025.2.0 can be used to show performance compliance with California's 2025 Building Energy Efficiency Standards.

SAMPLE COMPLIANCE DOCUMENTATION - EXAMPLE BUILDING A

CERTIFICATE OF COMPLIANCE - NONRESIDENTIAL PERFORMANCE COMPLIANCE METHOD	NRCC-PRF-E
Nonresidential Performance Compliance Method	(Page 1 of 20)

Project Name:	020012-OffSml-CECStd25	Date Prepared:	2025-11-07

A. General Information

1	Project Name	020012-OffSml-CECStd25			
2	Run Title				
3	Project Location	- specify -			
4	City	- specify -	**5**	Standards Version	Compliance 2025
6	Zip code	95814	**7**	Compliance Software (version)	CBECC 2025.2.0 (1394)
8	Climate Zone	12	**9**	Building Orientation (deg)	0
10	Building Type(s)	• Nonresidential	**11**	Weather File	CA_Title24_2025_CZ12_SACRAMENTO-EXECUTIVE.epw
12	Project Scope	• New complete scope	**13**	Number of Dwelling Units	0
14	Total Conditioned Floor Area in Scope (ft^2)	5502.05	**15**	Total # of hotel/motel rooms	0
16	Total Unconditioned Floor Area (ft^2)	0	**17**	Fuel Type	Natural gas
18	Is Natural Gas Available per Section 100.1?	Yes	**19**	Nonresidential Conditioned Floor Area	5502.05
20	Total # of Stories (Habitable Above Grade)	1	**21**	Residential Conditioned Floor Area	0

B. PROJECT SUMMARY

Table B shows which building components are included in the performance calculation. If indicated as not included, the project must show compliance prescriptively if within the permit application.

Building Components Complying via Performance						**Building Components Complying Prescriptively**	
Envelope (See Table G)	Nonres	Performance	Solar Thermal Water Heating (See Table I3)	☐	Performance	The following building components are ONLY eligible for prescriptive compliance and should be documented on the NRCC form listed if within the scope of the permit application (i.e. compliance will not be shown on the NRCC-PRF-E).	
	MultiFam	Not Included		☒	Not Included		
Mechanical (See Table H)	Nonres	Performance	Covered Process: Commercial Kitchens (see Table J)	☐	Performance	Indoor Lighting (Unconditioned) 140.6 & 170.2(e)	NRCC-LTI-E is required
	MultiFam	Not Included		☒	Not Included	Outdoor Lighting 140.7 & 170.2(e)	NRCC-LTO-E is required
Domestic Hot Water (See Table I)	Nonres	Performance	Covered Process: Laboratory Exhaust (see Table J)	☐	Performance	Sign Lighting 140.8 & 170.2(e)	NRCC-LTS-E is required
	MultiFam	Not Included		☒	Not Included	**Building Components Complying with Mandatory Measures**	
Lighting (Indoor Conditioned, see Table K)	Nonres	Performance	Photovoltaics (see Table F)	☒	Performance	Electrical power systems, commissioning, solar ready, elevator and escalator requirements are mandatory and should be documented on the NRCC form listed if applicable (i.e. compliance will not be shown on the NRCC-PRF-E.)	
	MultiFam	Not Included		☐	Not Included	Electrical Power Distribution 110.11	NRCC-ELC-E is required
			Battery (see Table F)	☒	Performance	Commissioning 120.8	NRCC-CXR-E is required
				☐	Not Included	Solar and Battery 110.10	NRCC-SAB-E is required

C1. COMPLIANCE SUMMARY

COMPLIES*

	Long-term System Cost (LSC)[1]		Source Energy Use
	Efficiency[2] ($/ft²-yr)	**Total[3] ($/ft²-yr)**	**Total[3] (kBtu/ft²-yr)**
Standard Design	32.93	14.68	5.86
Proposed Design	31.68	13.46	5.55
Compliance Margins	**1.25**	**1.22**	**0.31**
	Pass	**Pass**	**Pass**

[1] Long-term System Cost (LSC) is a 30-year present value cost to California's energy system. LSC is not a predicted utility bill.

[2] Efficiency measures include energy efficiency improvements such as better building envelope and more efficient mechanical equipment

[3] Compliance Totals include efficiency, photovoltaics and batteries

** New Construction: Building complies when Proposed Design is equal to or less than Standard Design in all compliance categories and unmet load hour limits are not exceeded. Complete Addition Scope and Existing, Addition and Alteration Scope: Building complies when efficiency compliance margin is greater than or equal to zero and unmet load hour limits are not exceeded.*

C2. LSC ENERGY COMPLIANCE RESULTS FOR PERFORMANCE COMPONENTS (Annual LSC Energy Use, $/ft^2-yr)

COMPLIES

Energy Component	Standard Design (LSC)	Proposed Design (LSC)	Compliance Margin (LSC)[1]
Space Heating	3.08	3.2	-0.12
Space Cooling	6.33	6.17	0.16
Indoor Fans	17.07	15.85	1.22
Heat Rejection	0	0	0
Pumps & Misc.	0	0	0
Domestic Hot Water	1.5	1.51	-0.01
Indoor Lighting	4.95	4.95	0
Flexibility	---	---	---
EFFICIENCY COMPLIANCE TOTAL	**32.93**	**31.68**	**1.25 (3.8%)**
Photovoltaics	-17.71	-17.67	-0.04
Batteries	-0.54	-0.55	0.01
TOTAL COMPLIANCE	**14.68**	**13.46**	**1.22 (8.3%)**

[1] *Notes: This number in parenthesis following the Compliance Margin in column 4, represents the Percent Better than Standard.*

C3. LSC ENERGY RESULTS FOR NON-REGULATED COMPONENTS[1]

Non-Regulated Energy Component	Standard Design (LSC)	Proposed Design (LSC)	Compliance Margin (LSC)[2]
Receptacle	19.93	19.93	---
Process	---	---	---
Other Ltg	---	---	---
Process Motors	---	---	---
TOTAL (TOTAL COMPLIANCE + NON-REGULATED COMPONENTS)	**34.61**	**33.39**	**1.22 (3.5%)**

[1] Notes: This table is not used for Energy Code Compliance.

[2] Notes: This number in parenthesis following the Compliance Margin in column 4, represents the Percent Better than Standard.

C4. SOURCE ENERGY COMPLIANCE RESULTS FOR PERFORMANCE COMPONENTS (Annual SOURCE Energy Use, kBtu/ft^2 /yr)

COMPLIES

Energy Component	Standard Design (SOURCE)	Proposed Design (SOURCE)	Compliance Margin (SOURCE)[1]
Space Heating	1.49	1.54	-0.05
Space Cooling	0.79	0.76	0.03
Indoor Fans	4.58	4.25	0.33
Heat Rejection	0	0	0
Pumps & Misc.	0	0	0
Domestic Hot Water	0.37	0.37	0
Indoor Lighting	1.24	1.24	0
Flexibility	---	---	---
EFFICIENCY COMPLIANCE TOTAL	**8.47**	**8.16**	**0.31 (3.7%)**
Photovoltaics	-2.12	-2.12	---
Batteries	-0.49	-0.49	---
TOTAL COMPLIANCE	**5.86**	**5.55**	**0.31 (5.3%)**

[1] *Notes: This number in parenthesis following the Compliance Margin in column 4, represents the Percent Better than Standard.*

C5. SOURCE ENERGY RESULTS FOR NON-REGULATED COMPONENTS[1]

Non-Regulated Energy Component	Standard Design (SOURCE)	Proposed Design (SOURCE)	Compliance Margin (SOURCE)[2]
Receptacle	4.21	4.21	---
Process	---	---	---
Other Ltg	---	---	---
Process Motors	---	---	---
TOTAL (TOTAL COMPLIANCE + NON-REGULATED COMPONENTS)	**10.07**	**9.76**	**0.31 (3.1%)**

[1] Notes: This table is not used for Energy Code Compliance.

[2] Notes: This number in parenthesis following the Compliance Margin in column 4, represents the Percent Better than Standard.

C6. 'ABOVE CODE' QUALIFICATIONS

☐ This project is pursuing CalGreen Tier 1 ☐ This project is pursuing CalGreen Tier 2

C7. ENERGY USE SUMMARY

Energy Component	Standard Design Site (MWh)	Proposed Design Site (MWh)	Margin (MWh)	Standard Design Site (MBtu)	Proposed Design Site (MBtu)	Margin (MBtu)
Space Heating	2.4	2.5	-0.1	---	---	---
Space Cooling	7.8	7.6	0.2	---	---	---
Indoor Fans	17.9	16.6	1.3	---	---	---
Heat Rejection	---	---	---	---	---	---
Pumps & Misc.	---	---	---	---	---	---
Domestic Hot Water	1.7	1.7	0	---	---	---
Indoor Lighting	5.4	5.4	0	---	---	---
Flexibility	---	---	---	---	---	---
EFFICIENCY TOTAL	**35.2**	**33.8**	**1.4**	**0**	**0**	**0**
Photovoltaics	-27.1	-27.1	0	---	---	---
Batteries	0.2	0.2	0	---	---	---
ENERGY USE SUBTOTAL	**8.3**	**6.9**	**1.4**	**0**	**0**	**0**
Receptacle	23.6	23.6	0	---	---	---
Process	---	---	---	---	---	---
Other Ltg	---	---	---	---	---	---
Process Motors	---	---	---	---	---	---
ENERGY USE TOTAL	**31.9**	**30.5**	**1.4**	**0**	**0**	**0**

C8. ENERGY USE INTENSITY (EUI)

	Standard Design (kBtu/ft^2 / yr)	Proposed Design (kBtu/ft^2 / yr)	Margin (kBtu/ft^2 / yr)	Margin Percentage
GROSS EUI[1]	36.59	35.72	0.87	2.38
NET EUI[1]	19.78	18.91	0.87	4.4

[1] Notes: Gross EUI is Energy Use Total (not including PV)/Total Building Area. Net EUI is Energy Use Total (including PV)/Total Building Area.

D1. EXCEPTIONAL CONDITIONS

- The aged solar reflectance and aged thermal emittance must be listed in the Cool Roof Rating Council database of certified products. For projects where initial reflectance is used, the initial reflectance must be listed, and the aged reflectance is calculated by the software program and used in the compliance model.
- Verify project meets the requirements for Vestibules as per Section 120.7(e).
- Project will follow Division of State Architect's or California State University's procedures for school campus PV systems to comply

F1. REQUIRED PV SYSTEMS

01	02	03	04	05	06	07	08	09	10	11	12
DC System Size (kWdc)	Exception[1]	Module Type	Array Type	Power Electronics	CFI	Azimuth (deg)	Tilt Input	Array Angle (deg)	Tilt: (x in 12)	Inverter Eff. (%)	Annual Solar Access (%)
17.22		Standard (14-17%)	Fixed	none	true	150-270	n/a	n/a	<=7:12	96	98

[1]See Table D1 for any PV exceptions used.

F1B. PV BATTERY BUILDING TYPE(S)

01	02	03
Building Occupancy Type* (From Table 140.10-A/B and 170.2-U/V)	**Conditioned Floor Area (ft^2)**	**Unconditioned Floor Area (ft^2)**
Events and Exhibits	0	0
Library	0	0
Hotel/Motel	0	0
Office, Financial Institutions, Unleased Tenant Space, Medical Office Building/Clinic	5502.05	0
Restaurants	0	0
Retail, Grocery	0	0
School	0	0
Warehouse	0	0
Religious Worship	0	0
Sports and Recreation	0	0
Multifamily greater than 3 stories	0	0
None	0	0

**Building Occupancy Types are defined in Section 100.1 of the Energy Code*

F2. BATTERY SYSTEMS[1]

01	02	03	04	05	06	07
Control	**Capacity (kWh)**	**Charging Efficiency**	**Charging Rate (kW)**	**Discharging Efficiency**	**Discharging Rate (kW)**	**Round Trip Efficiency**
TOU	30.46	N/A	7.62	N/A	7.62	0.9

[1]See Table D1 for any Battery exceptions used.

G1. ENVELOPE GENERAL INFORMATION (conditioned spaces only)

01	02	03	04
Opaque Surfaces & Orientation	**Total Gross Surface Area (ft^2)**	**Total Fenestration Area (ft^2)**	**Window to Wall Ratio (%)**
North-Facing[1]	909.06	180.12	19.81
East-Facing[2]	606.04	120.08	19.81
South-Facing[3]	909.06	222.15	24.44
West-Facing[4]	606.04	120.08	19.81
Total	**3030.21**	**642.43**	**21.2**
Roof	6445.01	0	0

Notes

[1]North-Facing is oriented to within 45 degrees of true north, including 4500'00" east of north (NE), but excluding 4500'00" west of north (NW),

[2]East-Facing is oriented to within 45 degrees of true east, including 4500'00" south of east (SE), but excluding 4500'00" north of east (NE),

[3]South-Facing is oriented to within 45 degrees of true south, including 4500'00" west of south (SW), but excluding 4500'00" east of south (SE),

[4]West-Facing is oriented to within 45 degrees of true west, including 4500'00" north of west (NW), but excluding 4500'00" south of west (SW),

G2A. ROOFING PRODUCT SUMMARY (NONRESIDENTIAL)

01	02	03	04	05	06
Assembly Name	**Roof Pitch**	**Roof Rise (x in 12)**	**Aged Solar Reflectance**	**Thermal Emittance**	**SRI**
Base_CZ12-SteepNonresWoodFramingAndOtherRoofU028	SteepSlope	N/A	0.25	0.8	N/A

G4. NONRESIDENTIAL AIR BARRIER

01	02
Building Story Name	**Air Barrier**
Building Story 1	Air barrier - not verified

G5. OPAQUE SURFACE ASSEMBLY SUMMARY

01	02	03	04	05	06		07	08	09	10
Surface Name	Construction Type	Area (ft²)	Framing Type	Cavity R-Value	Continuous R-Value		Units	Value	Description of Assembly Layers	Status[1]
					Interior	Exterior				
Base_CZ12-SlabOnOrBelowGradeF073	Underground Floor	5,502.05	N/A	0	N/A	N/A	F-factor	0.73	Slab Type =Unheated slab on grade Insulation Orientation =None Insulation R-Value =none	N
Base_CZ12-NonresMetalFrameWallU055	Exterior Wall	3,030.21	Metal	0	N/A	16.05	U-factor	0.055	Stucco - 7/8 in. Compliance Insulation R14.60 Compliance Insulation R1.41 Compliance Insulation R0.02 Compliance Insulation R0.02 Air - Metal Wall Framing - 16 or 24 in. OC Gypsum Board - 1/2 in.	N
NACM_Interior Wall	Interior Wall	2,645.59	Metal	0	N/A	N/A	U-factor	0.3195	Gypsum Board - 5/8 in. Air - Metal Wall Framing - 16 or 24 in. OC Gypsum Board - 5/8 in.	N
Base_CZ12-SteepNonresWoodFramingAndOtherRoofU028	Roof	6,445.01	N/A	0	N/A	34.93	U-factor	0.028	Metal Standing Seam - 1/16 in. Compliance Insulation R34.93	N
Base_CZ12-NonresOtherFloorU071	Exterior Floor	611.6	N/A	0	N/A	9.83	U-factor	0.071	Compliance Insulation R9.83 Plywood - 5/8 in. Carpet - 3/4 in.	N
NACM_Drop Ceiling	Interior Floor	5,502.05	N/A	0	N/A	N/A	U-factor	0.2924	Acoustic Tile - 3/4 in.	N

[1] Status: N - New, A - Altered, E - Existing

G7A. FENESTRATION ASSEMBLY SUMMARY (NONRESIDENTIAL)

01	02	03	04	05	06	07	08	09
Fenestration Assembly Name	Fenestration Type/ Product Type / Frame Type	Certification Method[1]	Assembly Method	Area (ft^2)	Overall U-factor	Overall SHGC	Overall VT	Status[2]
Base_AllCZ_FixedWindowU34	Vertical fenestration Fixed window N/A	NFRC	Manufactured	600.39	0.34	0.22	0.42	N
Glazed Door	Vertical fenestration Glazed door N/A	NFRC	Manufactured	42.04	0.45	0.23	0.17	N

[1] Notes: Newly installed fenestration shall have a certified NFRC Label Certificate or use the CEC default tables found in Table 110.6-A and Table 110.6-B. Center of Glass (COG) values are for the glass-only, determined by the manufacturer, and are shown for ease of verification. Site-built fenestration values are calculated per Nonresidential Appendix NA6 and are used in the analysis.

[2] Status: N - New, A - Altered, E - Existing

H1. DRY SYSTEM EQUIPMENT (FURNACES, AIR HANDLING UNITS, HEAT PUMPS, VRF, ECONOMIZERS ETC.)

01	02	03	04	05	06	07	08	09	10	11	12
			Heating				Cooling				
Equipment Name	Equipment Type	Qty	Total Heating Output (kBtu/h)	Supp Heat Output (kBtu/h)	Efficiency Unit	Efficiency	Total Cooling Output (kBtu/h)	Efficiency Unit	Efficiency	Economizer Type (if present)	Status[1]
CoreZnPSZ AirSys	Single Zone Heat Pump (SZHP) Air System	1	33.58	28.84	HSPF2	6.7	30.9	SEER2	13.4	No Economizer	N
Perim1ZnPSZ AirSys	Single Zone Heat Pump (SZHP) Air System	1	33.56	25.61	HSPF2	6.7	30.88	SEER2	13.4	No Economizer	N

[1] Status: N - New, A - Altered, E - Existing

H1. DRY SYSTEM EQUIPMENT (FURNACES, AIR HANDLING UNITS, HEAT PUMPS, VRF, ECONOMIZERS ETC.)

01	02	03	04	05	06	07	08	09	10	11	12
			Heating				Cooling				
Equipment Name	Equipment Type	Qty	Total Heating Output (kBtu/h)	Supp Heat Output (kBtu/h)	Efficiency Unit	Efficiency	Total Cooling Output (kBtu/h)	Efficiency Unit	Efficiency	Economizer Type (if present)	Status[1]
Perim2ZnPSZ AirSys	Single Zone Heat Pump (SZHP) Air System	1	19.32	14.84	HSPF2	6.7	17.78	SEER2	13.4	No Economizer	N
Perim3ZnPSZ AirSys	Single Zone Heat Pump (SZHP) Air System	1	27.25	22.8	HSPF2	6.7	25.08	SEER2	13.4	No Economizer	N
Perim4ZnPSZ AirSys	Single Zone Heat Pump (SZHP) Air System	1	23.8	16.12	HSPF2	6.7	21.9	SEER2	13.4	No Economizer	N

[1] *Status: N - New, A - Altered, E - Existing*

H3. NONRESIDENTIAL / COMMON USE AREA FAN SYSTEMS SUMMARY

01	02	03	04	05	06	07	08	09	10	11	12	13
Name or Item Tag	Qty	Design OA CFM	Supply Fan				Return / Relief Fan					Status[1]
			CFM	Power	Power Units	Control	Fan Type	CFM	Power	Power Units	Control	
CoreZnPSZ AirSys	1	241.63	1,090.18	2.5	InH2O	Constant Vol	N/A	N/A	N/A	N/A	N/A	N
Perim1ZnPSZ AirSys	1	183.17	1,069.22	0.74	W/cfm	Constant Vol	N/A	N/A	N/A	N/A	N/A	N
Perim2ZnPSZ AirSys	1	108.66	610.99	0.74	W/cfm	Constant Vol	N/A	N/A	N/A	N/A	N/A	N
Perim3ZnPSZ AirSys	1	183.17	884.71	0.74	W/cfm	Constant Vol	N/A	N/A	N/A	N/A	N/A	N
Perim4ZnPSZ AirSys	1	108.66	695.28	0.74	W/cfm	Constant Vol	N/A	N/A	N/A	N/A	N/A	N

01	14	15	16	17	18	19
Name or Item Tag	Supply Fan			Return / Relief Fan		
	Modeling Method	Fan Efficiency	Motor Efficiency	Modeling Method	Fan Efficiency	Motor Efficiency
CoreZnPSZ AirSys	Static Pressure	0.65	0.86	N/A	N/A	N/A
Perim1ZnPSZ AirSys	Power Per Unit Flow	0.65	0.86	N/A	N/A	N/A
Perim2ZnPSZ AirSys	Power Per Unit Flow	0.65	0.86	N/A	N/A	N/A
Perim3ZnPSZ AirSys	Power Per Unit Flow	0.65	0.86	N/A	N/A	N/A
Perim4ZnPSZ AirSys	Power Per Unit Flow	0.65	0.86	N/A	N/A	N/A

[1] *Status: N - New, A - Altered, E - Existing*

H8. SYSTEM SPECIAL FEATURES

01	02	03	04
System Name	**Equipment Type**	**Interlocks per 140.4(n)[1]**	**Other Special Features and Controls**
Perim1ZnPSZ AirSys	Single Zone Heat Pump (SZHP) Air System	Yes	N/A
SHWFluidSysElec	Service Hot Water	N/A	Fixed Temperature Control

Notes: This table includes controls related to the performance path only. For projects using the prescriptive path, mandatory and prescriptive controls requirements are documented on the NRCC-MCH-E.

[1] Yes = interlocks are provided, No = interlocks are not provided, NA means no operable openings.

H9. NONRESIDENTIAL / COMMON USE AREA & HOTEL/MOTEL VENTILATION

01	02	03	04	05	06	07
Zone Name	**Mechanical Ventilation**				**Conditioned Area (sf)**	**DCV or Occupant Sensor Controls, or Both**
	Ventilation Function	**# of People**	**Supply OA CFM**	**Exhaust CFM**		
Core_ZN Thermal Zone	Office - Office space	8.05	241.63	0	1610.9	N/A
Perimeter_ZN_1 Thermal Zone	Office - Office space	6.11	183.17	0	1221.17	N/A
Perimeter_ZN_2 Thermal Zone	Office - Office space	3.62	108.66	0	724.41	N/A
Perimeter_ZN_3 Thermal Zone	Office - Office space	6.11	183.17	0	1221.17	N/A
Perimeter_ZN_4 Thermal Zone	Office - Office space	3.62	108.66	0	724.41	N/A

H11. ZONAL SYSTEM AND TERMINAL UNIT SUMMARY

01	02	03	04	05	06	07	08	09	10	11	12
System ID	**System Type**	**Qty**	**Rated Capacity (kBtuh)**		**Airflow (cfm)**			**Fan**			**VSD**
			Heating	**Cooling**	**Design**	**MIn.**	**Min. Ratio**	**Power**	**Power Units**	**Cycles**	
CoreZn TU	Uncontrolled	1	N/A	N/A	1,090.18	N/A	0	N/A	N/A	N/A	☐

H11. ZONAL SYSTEM AND TERMINAL UNIT SUMMARY

01	02	03	04	05	06	07	08	09	10	11	12
System ID	System Type	Qty	Rated Capacity (kBtuh)		Airflow (cfm)			Fan			VSD
			Heating	Cooling	Design	MIn.	Min. Ratio	Power	Power Units	Cycles	
Perim1 TU	Uncontrolled	1	N/A	N/A	1,069.22	N/A	0	N/A	N/A	N/A	☐
Perim2 TU	Uncontrolled	1	N/A	N/A	610.99	N/A	0	N/A	N/A	N/A	☐
Perim3 TU	Uncontrolled	1	N/A	N/A	884.71	N/A	0	N/A	N/A	N/A	☐
Perim4 TU	Uncontrolled	1	N/A	N/A	695.28	N/A	0	N/A	N/A	N/A	☐

I1. WATER HEATER EQUIPMENT SUMMARY

01	02	03	04	05	06	07	08	09	10	11	12	13	14
Name	Heater Element Type	Tank Type	Qty	Tank Vol (gal)	Rated Input	Rated Input Unit	Efficiency	Efficiency Unit	Tank Insulation R-value Int/Ext	Standby Loss Fraction	1st Hr. Rating or Flow Rate (gal)	Heat Pump Type	Tank Location or Ambient Condition
WaterHeaterElec	Electricity	Storage	1	29.99	8.74	kW	0.92	UEF	N/A	N/A	60	N/A	N/A

K1. INDOOR CONDITIONED LIGHTING GENERAL INFO

01	02	03	04	05	06
Occupancy Type[1]	Conditioned Floor Area[2] (ft^2)	Installed Lighting Power (Watts)	Lighting Control Credits (Watts)	Additional (Custom) Allowance	
				Area Category Footnotes (Watts)	Area Category Footnotes (Watts)
Office (250 square feet)	5502.05	3301.23	0	0	0
Building Totals:	**5502.05**	**3301.23**	**0**	**0**	**0**

[1]See Table 140.6-C

[2]See NRCC-LTI--E for unconditioned spaces

[3]Lighting information for existing spaces modeled is not included in this table

K4. INDOOR CONDITIONED LIGHTING MANDATORY LIGHTING CONTROL

See NRCC-LTI-E for mandatory controls

N. DECLARATION OF REQUIRED CERTIFICATES OF INSTALLATION

Selections made by Documentation Author indicate which Certificates of Installation must be submitted for the features to be recognized for compliance. These documents must be retained and provided to the building inspector during construction and can be found online

Building Component	Form/Title
Envelope	NRCI-ENV-E - Envelope (for all buildings)
Mechanical	NRCI-MCH-E - For all buildings with Mechanical Systems
Plumbing	NRCI-PLB-E - For all buildings with Plumbing Systems
Solar and Battery	NRCI-SAB-E - Solar Water Heating, PV and Battery Storage Systems
Indoor Lighting	NRCI-LTI-E - Indoor Lighting (for all buildings)

O. DECLARATION OF REQUIRED CERTIFICATES OF ACCEPTANCE

Selections made by Documentation Author indicate which Certificates of Acceptance must be submitted for the features to be recognized for compliance. These documents must be provided to the building inspector during construction. Lighting controls and mechanical NRCAs must be completed through an Acceptance Test Technician Certification Provider (ATTCP).

Building Component [1]	Form/Title & System Name(s)
Envelope	NRCA-ENV-02-F - NRFC label verification for fenestration
Indoor Lighting	NRCA-LTI-02-A - Occupancy Sensors and Automatic Time Switch Controls.
Indoor Lighting	NRCA-LTI-03-A - Automatic Daylight Controls.
Mechanical	NRCA-MCH-02-A - Outdoor Air must be submitted for all newly installed HVAC units. Note: MCH-02-A can be performed in conjunction with MCH-07-A Supply Fan VFD Acceptance (if applicable) since testing activities overlap
	CoreZnPSZ AirSys, Perim1ZnPSZ AirSys, Perim2ZnPSZ AirSys, Perim3ZnPSZ AirSys and Perim4ZnPSZ AirSys.
Mechanical	NRCA-MCH-03-A - Constant Volume Single Zone HVAC
	CoreZnPSZ AirSys, Perim1ZnPSZ AirSys, Perim2ZnPSZ AirSys, Perim3ZnPSZ AirSys and Perim4ZnPSZ AirSys.
Mechanical	NRCA-MCH-04(b)-A - Air Distribution Duct Leakage - ATT only
	CoreZnPSZ AirSys

O. DECLARATION OF REQUIRED CERTIFICATES OF ACCEPTANCE

Selections made by Documentation Author indicate which Certificates of Acceptance must be submitted for the features to be recognized for compliance. These documents must be provided to the building inspector during construction. Lighting controls and mechanical NRCAs must be completed through an Acceptance Test Technician Certification Provider (ATTCP).

Building Component [1]	Form/Title & System Name(s)
Mechanical	NRCA-MCH-24-A Must be submitted for Cooling Tower Conductivity Controls
	SHWFluidSysElec

[1]Refer to other prescriptive NRCC forms applicable to the project for additional NRCA tests required that are not included in the NRCC-PRF-E form

P. DECLARATION OF REQUIRED CERTIFICATES OF VERIFICATION

Selections made by Documentation Author indicate which Certificates of Verification must be submitted for the features to be recognized for compliance. These documents must be retained and provided to the building inspector during construction and can be found online

Building Component	Form/Title
Mechanical	NRCV-MCH-27 Indoor Air Quality & Mechanical Ventilation

Documentation Author's Declaration Statement

1. I certify that this Certificate of Compliance documentation is accurate and complete.	
Documentation Author Name:	Documentation Author Signature:
Company:	Signature Date:
Address:	CEA/AEA/ECC Certification Identification (if applicable):
City/State/Zip: ,	Phone:

Responsible Person's Declaration statement

I certify the following under penalty of perjury, under the laws of the State of California:

1. The information provided on this Certificate of Compliance is true and correct.
2. I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer).
3. The energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.
4. The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.
5. I understand that a completed signed copy of this Certificate of Compliance shall be made available with the building permit(s) issued for the building and shall be made available to the enforcement agency for all applicable inspections. I will take the necessary steps to fulfill this requirement.
6. I understand that a completed signed copy of this Certificate of Compliance is required to be included with the documentation the builder provides to the building owner at occupancy. I will take the necessary steps to fulfill this requirement.

Responsible Designer Name:	Responsible Designer Signature:	
Company:		
Address:	Date Signed:	
City/State/Zip: ,	License #:	
Phone:	Title:	Scope:

SAMPLE COMPLIANCE DOCUMENTATION - EXAMPLE BUILDING B

CERTIFICATE OF COMPLIANCE - LOWRISE MULTIFAMILY PERFORMANCE COMPLIANCE METHOD		LMCC-PRF-01-E
Lowrise Multifamily Mixed Use Performance Compliance Method		(Page 1 of 26)
Project Name:	MF8wRetail-ResDHW-CentHPRecirc-SinglePassPrimary-NonCentHP_NEEA	**Date Prepared:** 2025-11-07

A. General Information

1	Project Name	MF8wRetail-ResDHW-CentHPRecirc-SinglePassPrimary-NonCentHP_NEEA			
2	Run Title	MF8wRetail-ResDHW-CentHPRecirc-SinglePassPrimary-NonCentHP_NEEA			
3	Project Location	- specify -			
4	City	- specify -	**5**	Standards Version	Compliance 2025
6	Zip code	95555	**7**	Compliance Software (version)	CBECC 2025.2.0 (1394)
8	Climate Zone	12	**9**	Building Orientation (deg)	0
10	Building Type(s)	• Mixed Occupancy	**11**	Weather File	CA_Title24_2025_CZ12_SACRAMENTO-EXECUTIVE.epw
12	Project Scope	• New complete scope	**13**	Number of Dwelling Units	8
14	Total Conditioned Floor Area in Scope (ft^2)	10540	**15**	Total # of hotel/motel rooms	0
16	Total Unconditioned Floor Area (ft^2)	0	**17**	Fuel Type	Natural gas
18	Is Natural Gas Available per Section 100.1?	Yes	**19**	Nonresidential Conditioned Floor Area	3220
20	Total # of Stories (Habitable Above Grade)	3	**21**	Residential Conditioned Floor Area	7320

B. PROJECT SUMMARY

Table B shows which building components are included in the performance calculation. If indicated as not included, the project must show compliance prescriptively if within the permit application.

Building Components Complying via Performance						Building Components Complying Prescriptively	
Envelope (See Table G)	Nonres	Performance	Solar Thermal Water Heating (See Table I3)	☐	Performance	The following building components are ONLY eligible for prescriptive compliance and should be documented on the LMCC form listed if within the scope of the permit application (i.e. compliance will not be shown on the LMCC-PRF-E).	
	MultiFam	Performance		☒	Not Included		
Mechanical (See Table H)	Nonres	Performance	Covered Process: Commercial Kitchens (see Table J)	☐	Performance	Indoor Lighting (Unconditioned) 140.6 & 170.2(e)	LMCC-LTI-01E is required
	MultiFam	Performance		☒	Not Included	Outdoor Lighting 140.7 & 170.2(e)	LMCC-LTO-01E is required
Domestic Hot Water (See Table I)	Nonres	Performance	Covered Process: Laboratory Exhaust (see Table J)	☐	Performance	Sign Lighting 140.8 & 170.2(e)	LMCC-LTS-01E is required
	MultiFam	Performance		☒	Not Included	**Building Components Complying with Mandatory Measures**	
Lighting (Indoor Conditioned, see Table K)	Nonres	Performance	Photovoltaics (see Table F)	☐	Performance	Electrical power systems, commissioning, solar ready, elevator and escalator requirements are mandatory and should be documented on the LMCC form listed if applicable (i.e. compliance will not be shown on the LMCC-PRF-E.)	
	MultiFam	Performance		☒	Not Included	Electrical Power Distribution 110.11	LMCC-ELC-01E is required
			Battery (see Table F)	☐	Performance	Commissioning 120.8	LMCC-CXR-01E is required
				☒	Not Included	Solar and Battery 110.10	LMCC-SAB-01E is required

C1. COMPLIANCE SUMMARY

COMPLIES*

	Long-term System Cost (LSC)[1]		Source Energy Use
	Efficiency[2] ($/ft²-yr)	**Total[3] ($/ft²-yr)**	**Total[3] (kBtu/ft²-yr)**
Standard Design	29.88	29.88	9.88
Proposed Design	22.42	22.42	7.67
Compliance Margins	**7.46**	**7.46**	**2.21**
	Pass	**Pass**	**Pass**

[1] Long-term System Cost (LSC) is a 30-year present value cost to California's energy system. LSC is not a predicted utility bill.

[2] Efficiency measures include energy efficiency improvements such as better building envelope and more efficient mechanical equipment

[3] Compliance Totals include efficiency and no photovoltaics and batteries

** New Construction: Building complies when Proposed Design is equal to or less than Standard Design in all compliance categories and unmet load hour limits are not exceeded. Complete Addition Scope and Existing, Addition and Alteration Scope: Building complies when efficiency compliance margin is greater than or equal to zero and unmet load hour limits are not exceeded.*

C2. LSC ENERGY COMPLIANCE RESULTS FOR PERFORMANCE COMPONENTS (Annual LSC Energy Use, $/ft^2-yr)

COMPLIES

Energy Component	Standard Design (LSC)	Proposed Design (LSC)	Compliance Margin (LSC)[1]
Space Heating	1.43	3.79	-2.36
Space Cooling	4.93	4.07	0.86
Indoor Fans	9.2	2.55	6.65
Heat Rejection	0	0	0
Pumps & Misc.	0.11	0.36	-0.25
Domestic Hot Water	9.38	6.82	2.56
Indoor Lighting	4.83	4.83	0
Flexibility	---	---	---
EFFICIENCY COMPLIANCE TOTAL	**29.88**	**22.42**	**7.46 (25%)**
Photovoltaics	---	---	---
Batteries	---	---	---
TOTAL COMPLIANCE	**29.88**	**22.42**	**7.46 (25%)**

[1] *Notes: This number in parenthesis following the Compliance Margin in column 4, represents the Percent Better than Standard.*

C3. LSC ENERGY RESULTS FOR NON-REGULATED COMPONENTS[1]

Non-Regulated Energy Component	Standard Design (LSC)	Proposed Design (LSC)	Compliance Margin (LSC)[2]
Receptacle	13.22	13.22	---
Process	8.12	8.05	0.07
Other Ltg	1.45	1.45	---
Process Motors	---	---	---
TOTAL (TOTAL COMPLIANCE + NON-REGULATED COMPONENTS)	**52.67**	**45.14**	**7.53 (14.3%)**

[1] Notes: This table is not used for Energy Code Compliance.

[2] Notes: This number in parenthesis following the Compliance Margin in column 4, represents the Percent Better than Standard.

C4. SOURCE ENERGY COMPLIANCE RESULTS FOR PERFORMANCE COMPONENTS (Annual SOURCE Energy Use, kBtu/ft^2 /yr)

COMPLIES

Energy Component	Standard Design (SOURCE)	Proposed Design (SOURCE)	Compliance Margin (SOURCE)[1]
Space Heating	0.65	3.42	-2.77
Space Cooling	0.63	0.54	0.09
Indoor Fans	2.3	0.6	1.7
Heat Rejection	0	0	0
Pumps & Misc.	0.04	0.14	-0.1
Domestic Hot Water	5.14	1.85	3.29
Indoor Lighting	1.12	1.12	0
Flexibility	---	---	---
EFFICIENCY COMPLIANCE TOTAL	**9.88**	**7.67**	**2.21 (22.4%)**
Photovoltaics	---	---	---
Batteries	---	---	---
TOTAL COMPLIANCE	**9.88**	**7.67**	**2.21 (22.4%)**

[1] *Notes: This number in parenthesis following the Compliance Margin in column 4, represents the Percent Better than Standard.*

C5. SOURCE ENERGY RESULTS FOR NON-REGULATED COMPONENTS[1]

Non-Regulated Energy Component	Standard Design (SOURCE)	Proposed Design (SOURCE)	Compliance Margin (SOURCE)[2]
Receptacle	3.32	3.32	---
Process	1.9	1.88	0.02
Other Ltg	0.41	0.41	---
Process Motors	---	---	---
TOTAL (TOTAL COMPLIANCE + NON-REGULATED COMPONENTS)	**15.51**	**13.28**	**2.23 (14.4%)**

[1] Notes: This table is not used for Energy Code Compliance.

[2] Notes: This number in parenthesis following the Compliance Margin in column 4, represents the Percent Better than Standard.

C6. 'ABOVE CODE' QUALIFICATIONS

☐ This project is pursuing CalGreen Tier 1

☐ This project is pursuing CalGreen Tier 2

C7. ENERGY USE SUMMARY

Energy Component	Standard Design Site (MWh)	Proposed Design Site (MWh)	Margin (MWh)	Standard Design Site (MBtu)	Proposed Design Site (MBtu)	Margin (MBtu)
Space Heating	2.1	2.6	-0.5	---	29.8	---
Space Cooling	9.9	8.1	1.8	---	---	---
Indoor Fans	18.4	4.8	13.6	---	---	---
Heat Rejection	---	---	---	---	---	---
Pumps & Misc.	0.2	0.5	-0.3	---	---	---
Domestic Hot Water	15.8	11.6	4.2	---	---	---
Indoor Lighting	10.6	10.6	0	---	---	---
Flexibility	---	---	---	---	---	---
EFFICIENCY TOTAL	**57**	**38.2**	**18.8**	**0**	**29.8**	**-29.8**
Photovoltaics	---	---	---	---	---	---
Batteries	---	---	---	---	---	---
ENERGY USE SUBTOTAL	**57**	**38.2**	**18.8**	**0**	**29.8**	**-29.8**
Receptacle	23.8	23.8	0	---	---	---
Process	13.2	13.1	0.1	---	---	---
Other Ltg	2.1	2.1	0	---	---	---
Process Motors	---	---	---	---	---	---
ENERGY USE TOTAL	**96.1**	**77.2**	**18.9**	**0**	**29.8**	**-29.8**

C8. ENERGY USE INTENSITY (EUI)

	Standard Design (kBtu/ft^2 / yr)	Proposed Design (kBtu/ft^2 / yr)	Margin (kBtu/ft^2 / yr)	Margin Percentage
GROSS EUI[1]	31.11	27.82	3.29	10.58
NET EUI[1]	31.11	27.82	3.29	10.58

[1] *Notes: Gross EUI is Energy Use Total (not including PV)/Total Building Area. Net EUI is Energy Use Total (including PV)/Total Building Area.*

D1. EXCEPTIONAL CONDITIONS

- Verify project meets the requirements for Vestibules as per Section 120.7(e).

D2. MULTIFAMILY REQUIRED SPECIAL FEATURES

- Solar Electric Generation Systems / Solar PV System requirements for newly constructed residential buildings are suspended per Executive Order N-29-25
- Indoor air quality, balanced fan
- IAQ Ventilation System: supply outside air inlet, filter, and H/ERV cores accessible per RACM Reference Manual
- IAQ Ventilation System: fault indicator display
- Cool roof
- Insulation below roof deck
- Non-standard duct location (any location other than attic)
- Central Heat Pump Water Heater
- Multifamily: Recirculating with no control (continuous pumping)
- Northwest Energy Efficiency Alliance (NEEA) rated heat pump water heater; specific brand/model, or equivalent, must be installed

E1. ECC FEATURE SUMMARY

The following is a summary of the features that must be field-verified by a certified ECC Rater as a condition for meeting the modeled energy performance for this computer analysis. Additional detail is provided in the building tables below. Registered LMCIs and LMCVs are required to be completed in the ECC Registry.

Building-level Verifications:
- Quality insulation installation (QII)
- Indoor air quality ventilation
- Kitchen range hood

Cooling System Verifications:
- Minimum Airflow
- Verified EER
- Verified SEER
- Fan Efficacy Watts/CFM

Heating System Verifications:
- Verified heat pump rated heating capacity

HVAC Distribution System Verifications:
- Duct leakage testing
- Ducts located entirely in conditioned space confirmed by duct leakage testing

Domestic Hot Water System Verifications:
- -- None --

G1. ENVELOPE GENERAL INFORMATION (conditioned spaces only)

01	02	03	04
Opaque Surfaces & Orientation	**Total Gross Surface Area (ft^2)**	**Total Fenestration Area (ft^2)**	**Window to Wall Ratio (%)**
North-Facing[1]	3454	329.4	9.54
East-Facing[2]	846	246	29.08
South-Facing[3]	3454	1455.4	42.14
West-Facing[4]	846	246	29.08

Notes

[1]North-Facing is oriented to within 45 degrees of true north, including 4500'00" east of north (NE), but excluding 4500'00" west of north (NW),

[2]East-Facing is oriented to within 45 degrees of true east, including 4500'00" south of east (SE), but excluding 4500'00" north of east (NE),

[3]South-Facing is oriented to within 45 degrees of true south, including 4500'00" west of south (SW), but excluding 4500'00" east of south (SE),

[4]West-Facing is oriented to within 45 degrees of true west, including 4500'00" north of west (NW), but excluding 4500'00" south of west (SW),

G1. ENVELOPE GENERAL INFORMATION (conditioned spaces only)

01	02	03	04
Opaque Surfaces & Orientation	**Total Gross Surface Area (ft^2)**	**Total Fenestration Area (ft^2)**	**Window to Wall Ratio (%)**
Total	**8600**	**2276.8**	**26.47**
Roof	0	0	0

Notes

[1]North-Facing is oriented to within 45 degrees of true north, including 4500'00" east of north (NE), but excluding 4500'00" west of north (NW),

[2]East-Facing is oriented to within 45 degrees of true east, including 4500'00" south of east (SE), but excluding 4500'00" north of east (NE),

[3]South-Facing is oriented to within 45 degrees of true south, including 4500'00" west of south (SW), but excluding 4500'00" east of south (SE),

[4]West-Facing is oriented to within 45 degrees of true west, including 4500'00" north of west (NW), but excluding 4500'00" south of west (SW),

G2B. ROOFING PRODUCT SUMMARY (MULTIFAMILY AND COMMON AREAS)

01	02	03	04	05	06
Name	**Roof Pitch**	**Roof Rise (x in 12)**	**Aged Solar Reflectance**	**Thermal Emittance**	**SRI**
Attic	Steep slope	5	0.2	0.85	N/A

G3. ATTIC

01	02	03	04
Name	**Construction**	**Type**	**Radiant Barrier**
Attic	Attic Roof Cons	Ventilated	No

G4. NONRESIDENTIAL AIR BARRIER

01	02
Building Story Name	**Air Barrier**
Retail Story	Air barrier - not verified

G5. OPAQUE SURFACE ASSEMBLY SUMMARY

01	02	03	04	05	06		07	08	09	10
Surface Name	Construction Type	Area (ft²)	Framing Type	Cavity R-Value	Continuous R-Value		Units	Value	Description of Assembly Layers	Status[1]
					Interior	Exterior				
Retail Conc ExtWall	Exterior Wall	3,432	Wood	0	N/A	34.93	U-factor	0.0264	Stucco - 7/8 in. Concrete - 140 lb/ft3 - 8 in. Compliance Insulation R34.93 Wood Frm Gypsum Board - 1/2 in.	N
Slab on Grade Cons	Underground Floor	3,220	N/A	0	N/A	N/A	F-factor	0.73	Slab Type =Unheated slab on grade Insulation Orientation =None Insulation R-Value =none	N
Retail IntWall Cons	Interior Wall	672	Wood	19	N/A	N/A	U-factor	0.0789	Gypsum Board - 1/2 in. Retail IntWall WdFrame Gypsum Board - 1/2 in.	N
Exterior Wall Cons	Exterior Walls	5,168	Wood Framed Wall	60	0	4	U-factor	0.034	Inside Finish: Gypsum Board Cavity / Frame: R-60 / 2x6 Sheathing / Insulation: R-4 Sheathing Exterior Finish: Synthetic Stucco	N
Ceiling Below Attic Cons	Ceilings (below attic)	3,660	Wood Framed Ceiling	38	0	0	U-factor	0.0253	Over Ceiling Joists: R-28.9 insul. Cavity / Frame: R-9.1 / 2x4 Btm Chrd Inside Finish: Gypsum Board	N
Attic Roof Cons	Attic Roofs	3,660	Wood Framed Ceiling	19	0	0	U-factor	0.0552	Roofing: 10 PSF (RoofTileAirGap) Tile Gap: present Roof Deck: Wood Siding/sheathing/decking Cavity / Frame: R-13.0 / 2x4 Around Roof Joists: R-6.0 insul.	N

[1] *Status: N - New, A - Altered, E - Existing*

G5. OPAQUE SURFACE ASSEMBLY SUMMARY

01	02	03	04	05	06		07	08	09	10
Surface Name	Construction Type	Area (ft^2)	Framing Type	Cavity R-Value	Continuous R-Value		Units	Value	Description of Assembly Layers	Status[1]
					Interior	Exterior				
Interior Floor	Interior Floors	6,880	Wood Framed Floor	0	0	0	U-factor	0.1957	Floor Surface: Carpeted Floor Deck: Wood Siding/sheathing/decking Cavity / Frame: no insul. / 2x12 Ceiling Below Finish: Gypsum Board	N

[1] *Status: N - New, A - Altered, E - Existing*

G6A. OPAQUE DOOR SUMMARY (NONRESIDENTIAL)

01	02	03	04
Assembly Name	Area (ft^2)	Overall U-factor	Status[1]
Rtl Door Cons	67.5	0.5	N

[1] *Status: N - New, A - Altered, E - Existing*

G6B. OPAQUE DOOR SUMMARY (MULTIFAMILY AND COMMON AREAS)

01	02	03	04
Name	Area (ft^2)	Overall U-factor	Status[1]
Zone1DoorFront	80	0.2	N
Zone2DoorFront	80	0.2	N

[1] *Status: N - New, A - Altered, E - Existing*

G7A. FENESTRATION ASSEMBLY SUMMARY (NONRESIDENTIAL)

01	02	03	04	05	06	07	08	09
Fenestration Assembly Name	**Fenestration Type/ Product Type / Frame Type**	**Certification Method[1]**	**Assembly Method**	**Area (ft^2)**	**Overall U-factor**	**Overall SHGC**	**Overall VT**	**Status[2]**
Rtl Fixed Win	Vertical fenestration Fixed window N/A	NFRC	Manufactured	1,360	0.36	0.25	0.42	N
Rtl GlassDoor	Vertical fenestration Glazed door N/A	NFRC	Manufactured	96	0.36	0.25	0.42	N

[1] Notes: Newly installed fenestration shall have a certified NFRC Label Certificate or use the CEC default tables found in Table 110.6-A and Table 110.6-B. Center of Glass (COG) values are for the glass-only, determined by the manufacturer, and are shown for ease of verification. Site-built fenestration values are calculated per Nonresidential Appendix NA6 and are used in the analysis.

[2] Status: N - New, A - Altered, E - Existing

G7B. FENESTRATION SUMMARY (MULTIFAMILY AND COMMON AREAS)

01	02	03	04	05	06	07	08	09	10	11	12	13
Fenestration Name	Fenestration Type/ Product Type / Frame Type	Parent Surface	Azimuth	Multiplier	Area (ft^2)	Overall U-factor	U-factor Source	Overall SHGC	SHGC Source	Overall VT	Exterior Shading	Status[1]
Zone1WinFront	Vertical fenestration Architectural Window - Operable (Multifamily only) N/A	Zone1WallFront	0	10.98	164.7	0.3	NFRC	0.23	NFRC	N/A	Standard bug screens	N
Zone1WinLeft	Vertical fenestration Architectural Window - Operable (Multifamily only) N/A	Zone1WallLeft	90	2.7	40.5	0.3	NFRC	0.23	NFRC	N/A	Standard bug screens	N
Zone1WinBack	Vertical fenestration Architectural Window - Operable (Multifamily only) N/A	Zone1WallBack	180	10.98	164.7	0.3	NFRC	0.23	NFRC	N/A	Standard bug screens	N
Zone1WinRight	Vertical fenestration Architectural Window - Operable (Multifamily only) N/A	Zone1WallRight	270	2.7	40.5	0.3	NFRC	0.23	NFRC	N/A	Standard bug screens	N
Zone2WinFront	Vertical fenestration Architectural Window - Operable (Multifamily only) N/A	Zone2WallFront	0	10.98	164.7	0.3	NFRC	0.23	NFRC	N/A	Standard bug screens	N
Zone2WinLeft	Vertical fenestration Architectural Window - Operable (Multifamily only) N/A	Zone2WallLeft	90	2.7	40.5	0.3	NFRC	0.23	NFRC	N/A	Standard bug screens	N
Zone2WinBack	Vertical fenestration Architectural Window - Operable (Multifamily only) N/A	Zone2WallBack	180	10.98	164.7	0.3	NFRC	0.23	NFRC	N/A	Standard bug screens	N

[1] *Status: N - New, A - Altered, E - Existing*

G7B. FENESTRATION SUMMARY (MULTIFAMILY AND COMMON AREAS)

01	02	03	04	05	06	07	08	09	10	11	12	13
Fenestration Name	**Fenestration Type/ Product Type / Frame Type**	**Parent Surface**	**Azimuth**	**Multiplier**	**Area (ft^2)**	**Overall U-factor**	**U-factor Source**	**Overall SHGC**	**SHGC Source**	**Overall VT**	**Exterior Shading**	**Status[1]**
Zone2WinRight	Vertical fenestration Architectural Window - Operable (Multifamily only) N/A	Zone2WallRight	270	2.7	40.5	0.3	NFRC	0.23	NFRC	N/A	Standard bug screens	N

[1] *Status: N - New, A - Altered, E - Existing*

G8. OVERHANG DETAILS

01	02	03	04	05	06	07
Fenestration Tag/ ID	**Azimuth**	**Depth (ft)**	**Height from Top of Sill to Overhang (ft)**	**Right Extent (ft)**	**Left Extent (ft)**	**Flap Height**
RtlW S Win	180	6	12	2	2	N/A
RtlM S Win	180	6	12	2	2	N/A
RtlE S Win	180	6	12	2	2	N/A

H1. DRY SYSTEM EQUIPMENT (FURNACES, AIR HANDLING UNITS, HEAT PUMPS, VRF, ECONOMIZERS ETC.)

01	02	03	04	05	06	07	08	09	10	11	12
			Heating				**Cooling**				
Equipment Name	**Equipment Type**	**Qty**	**Total Heating Output (kBtu/h)**	**Supp Heat Output (kBtu/h)**	**Efficiency Unit**	**Efficiency**	**Total Cooling Output (kBtu/h)**	**Efficiency Unit**	**Efficiency**	**Economizer Type (if present)**	**Status[1]**
BaseSys5 Rtl	Package VAV Air System	1	72.68	0	N/A	NA - See Boiler	96.6	EER	11	Differential DB	N

[1] *Status: N - New, A - Altered, E - Existing*

H2. DWELLING UNIT HVAC HEATING AND COOLING SYSTEMS

01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
Dwelling Unit Type	Equipment Name	Equipment Type	Quantity	Air Distribution System Name	Fan System name	Heating					Cooling			
						Heat Output at 47	Heat Output at 17	Efficiency Unit	Efficiency	Backup	Total Cooling Output	Efficiency Unit	Efficiency	Variable Speed
OneBedroom	HeatpumpSystem	Central split HP N/A	4	AirDistributionSystem	HVACFan-HeatPump	36,000	24,804	HSPF2	7.5	Electric	34,631	EER2 SEER2	8.7 15	☒
TwoBedroom	HeatpumpSystem	Central split HP N/A	4	AirDistributionSystem	HVACFan-HeatPump	36,000	24,804	HSPF2	7.5	Electric	34,631	EER2 SEER2	8.7 15	☒

H3. NONRESIDENTIAL / COMMON USE AREA FAN SYSTEMS SUMMARY

01	02	03	04	05	06	07	08	09	10	11	12	13
Name or Item Tag	Qty	Design OA CFM	Supply Fan				Return / Relief Fan					Status[1]
			CFM	Power	Power Units	Control	Fan Type	CFM	Power	Power Units	Control	
BaseSys5 Rtl	1	821.1	3,220	0.98	W/cfm	VSD	N/A	N/A	N/A	N/A	N/A	N

01	14	15	16	17	18	19
Name or Item Tag	Supply Fan			Return / Relief Fan		
	Modeling Method	Fan Efficiency	Motor Efficiency	Modeling Method	Fan Efficiency	Motor Efficiency
BaseSys5 Rtl	Power Per Unit Flow	0.65	0.9	N/A	N/A	N/A

[1] *Status: N - New, A - Altered, E - Existing*

H3a. MULTIFAMILY / COMMON USE AREA FAN SYSTEMS SUMMARY

01	02	03	04	05
Name	Type	Power	Power Units	Status
HVACFan-HeatPump	Fixed speed	0.58	W/cfm	N/A

H4. MULTIFAMILY HVAC DISTRIBUTION

01	02	03	04	05	06	07	08
Name	Type	Duct Ins. R-value Supply	Duct Ins. R-value Return	Duct Location Supply	Duct Location Return	Verified Duct Design Surface Area	
						Supply	Return
AirDistributionSystem	Conditioned space-entirely (Non-Verified)	R-4.2	R-4.2	Conditioned Zone	Conditioned Zone	N/A	N/A

H4b. MULTIFAMILY HVAC DISTRIBUTION – ECC VERIFICATION

01	02	03	04	05	06	07	08	09
Name	Duct Leakage Verification	Duct Leakage Target (%)	Verified Duct Location	Verified Duct Design	Buried Ducts	Deeply Buried Ducts	Low-leakage Air Handler	Low Leakage Ducts Entirely in Conditioned Space
AirDistributionSystem	Yes	total leakage <= 12.0 or leakage to outdoors <= 6.0	Required	Not Required	Not Required	Credit not taken	Not Required	No

H6. WET SYSTEM EQUIPMENT (boilers, chillers, cooling towers, etc.)

01	02	03	04	05	06	07	08	09	10
Name or Item Tag	Equipment Type	Parent Fluid System Name	Qty	Vol (gal)	Rated Capacity	Capacity Unit	Rating	Rating Unit	Status[1]
Rtl Boiler	Hot Water	Rtl HW Sys	1	N/A	72.68	kBtu/Hr	0.82	AFUE	N

[1] *Status: N - New, A - Altered, E - Existing*

H7. PUMPS

01	02	03	04	05	06	07	08
Name or Item Tag	Parent Equipment	Qty	Power	Power Units	GPM	VSD (Yes/No)	Status[1]
Rtl Blr Pump	Rtl Boiler	1	0.08	BHP	3.63	☒	N

[1] *Status: N - New, A - Altered, E - Existing*

H8. SYSTEM SPECIAL FEATURES

01	02	03	04
System Name	**Equipment Type**	**Interlocks per 140.4(n)[1]**	**Other Special Features and Controls**
BaseSys5 Rtl	Package VAV Air System	N/A	Dual Maximum Reheat Controls Warmest Zone Supply Air Temp. Reset DDC Controls (ASHRAE Guideline 36) Differential DB
Rtl HW Sys	Hot Water System	N/A	Fixed Temperature Control
Retail SHW	Service Hot Water	N/A	Fixed Temperature Control

Notes: This table includes controls related to the performance path only. For projects using the prescriptive path, mandatory and prescriptive controls requirements are documented on the LMCC-MCH-E.

[1] Yes = interlocks are provided, No = interlocks are not provided, NA means no operable openings.

H9. NONRESIDENTIAL / COMMON USE AREA & HOTEL/MOTEL VENTILATION

01	02	03	04	05	06	07
Zone Name	**Mechanical Ventilation**				**Conditioned Area (sf)**	**DCV or Occupant Sensor Controls, or Both**
	Ventilation Function	**# of People**	**Supply OA CFM**	**Exhaust CFM**		
Retail W ThrmlZn	Retail - Sales	19.04	285.6	0	1120	N/A
Retail M ThrmlZn	Retail - Sales	16.66	249.9	0	980	N/A
Retail E ThrmlZn	Retail - Sales	19.04	285.6	0	1120	N/A

H10. MULTIFAMILY DWELLING UNIT TYPE CENTRAL / INDIVIDUAL VENTILATION

01	02	03	04	05	06	07	08	09	10	11	12	13
Dwelling Unit Type	IAQ Option	Central Fan (If applicable)					Individual Fan (if applicable)					
		IAQ Fan Type Type	Supply Airflow CFM	Supply Fan Efficacy W/CFM	Exhaust CFM	Exhaust Fan Efficacy W/CFM	IAQ Fan Type	Count	Airflow CFM	Fan Efficacy W/CFM	Recovery Efficiency SRE	Recovery Efficiency ASRE
OneBedroom	Default Minimum Balanced IAQ Fan	N/A	N/A	N/A	N/A	N/A	Balanced	N/A	37.5	N/A	N/A	N/A
TwoBedroom	Default Minimum Balanced IAQ Fan	N/A	N/A	N/A	N/A	N/A	Balanced	N/A	54.9	N/A	N/A	N/A

H11. ZONAL SYSTEM AND TERMINAL UNIT SUMMARY

01	02	03	04	05	06	07	08	09	10	11	12
System ID	System Type	Qty	Rated Capacity (kBtuh)		Airflow (cfm)			Fan			VSD
			Heating	Cooling	Design	MIn.	Min. Ratio	Power	Power Units	Cycles	
RtlW TU	Variable Air Volume Reheat Box	1	19.15	N/A	1,120	285.6	0.25	N/A	N/A	N/A	☐
RtlM TU	Variable Air Volume Reheat Box	1	16.76	N/A	980	249.9	0.26	N/A	N/A	N/A	☐
RtlE TU	Variable Air Volume Reheat Box	1	19.15	N/A	1,120	285.6	0.25	N/A	N/A	N/A	☐

I1. WATER HEATER EQUIPMENT SUMMARY

01	02	03	04	05	06	07	08	09	10	11	12	13	14
Name	Heater Element Type	Tank Type	Qty	Tank Vol (gal)	Rated Input	Rated Input Unit	Efficiency	Efficiency Unit	Tank Insulation R-value Int/Ext	Standby Loss Fraction	1st Hr. Rating or Flow Rate (gal)	Heat Pump Type	Tank Location or Ambient Condition
HeatPumpWater Heater-NEEA	Heat Pump	Storage	2	40	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Residential (NEEA RATED) PRODUCT	Outside
Retail SHW WtrHtr	Electricity	Storage	1	30	4.44	kW	2	UEF	N/A	N/A	66	Packaged Heat Pump Water Heater	N/A

I1A. WATER HEATERS - HEAT PUMP

01	02	03	04	05	06	07	08	09	10
Name	# of Units	Tank Vol. (gal)	Heat Pump Brand	Heat Pump Model	Tank Location	Duct Inlet Air Source	Duct Outlet Air Source	UEF	JA13 Compliant
HeatPumpWater Heater-NEEA	8	40	Generic	NEEA Tier 4 Generic 40	Outside	Outside	Outside	3.1	☐

I2. MULTI-FAMILY WATER HEATING SYSTEM DETAIL

01	02	03	04	05	06	07	08
System Name	Configuration	Type	Qty in System	Dwelling Unit Distribution Type	Water Heater Name	Solar Heating System	Is Compact Distribution
DHWHeatpump	Domestic Hot Water (DHW)	Central	1	Standard Distribution System	DHWHeatpump - heater	N/A	N/A
DHWHeatpump-NonCentral	Domestic Hot Water (DHW)	Unitary	2	Standard Distribution System	HeatPumpWaterHeater-NEEA	N/A	No

I3. MULTIFAMILY & HOTEL/MOTEL WATER HEATER EQUIPMENT SUMMARY - CHPWH

01	02	03	04	05	06	07	08
Name	**Brand/Model**	**Number of Compressors**	**Primary Tank Volume (gal)**	**Tank Count**	**Tank R-value**	**Tank Location**	**Air Source**
DHWHeatpump	GS3-45HPA-US	2	160	1	16	Outside	Outside

I5. RECIRCULATION LOOPS

01	02	03	04	05	06
Water Heating System Name	**Number of Recirculation Loops**	**Loop Insulation Thickness (in)**	**Recirculation Loop Location**	**Recirculation Pump Power**	**Recirculation Pump Power Units**
DHWHeatpump	1	2	Semi-conditioned	10	Watts

K1. INDOOR CONDITIONED LIGHTING GENERAL INFO

01	02	03	04	05	06
Occupancy Type[1,3]	**Conditioned Floor Area[2] (ft2)**	**Installed Lighting Power (Watts)**	**Lighting Control Credits (Watts)**	**Additional (Custom) Allowance**	
				Area Category Footnotes (Watts)	**Area Category Footnotes (Watts)**
Retail Merchandise Sales	3220	3059	0	0	0
Building Totals:	**3220**	**3059**	**0**	**0**	**0**

[1]See Table 140.6-C

[2]See LMCC-LTI01--E for unconditioned spaces

[3]Lighting information for existing spaces modeled is not included in this table

K4. INDOOR CONDITIONED LIGHTING MANDATORY LIGHTING CONTROL

See LMCC-LTI01-E for mandatory controls

L. DWELLING UNIT INFORMATION

01	02	03	04
Dwelling Unit Name	**Dwelling Unit Type**	**Zone**	**Zone Group Multiplier**
OneBedroomDownstairsZone1-(1/2)	OneBedroom	Zone1	1
OneBedroomDownstairsZone1-(2/2)	OneBedroom	Zone1	1
TwoBedroomDownstairsZone1-(1/2)	TwoBedroom	Zone1	1
TwoBedroomDownstairsZone1-(2/2)	TwoBedroom	Zone1	1
OneBedroomUpstairsZone1-(1/2)	OneBedroom	Zone2	1
OneBedroomUpstairsZone1-(2/2)	OneBedroom	Zone2	1
TwoBedroomUpstairsZone1-(1/2)	TwoBedroom	Zone2	1
TwoBedroomUpstairsZone1-(2/2)	TwoBedroom	Zone2	1

M. DWELLING UNIT TYPES

01	02	03	04	05	06	07
Name	**CFA (ft^2)**	**Number of Bedrooms**	**Number in Building**	**Space Conditioning Systems Assigned**	**DHW System Name**	**IAQ Vent Fan Name**
OneBedroom	750	1	4	OneBedroom | :HeatpumpSystem:AirDistributionSystem:HVACFan-HeatPump:2:3	DHWHeatpump	Default Minimum Balanced IAQ Fan
TwoBedroom	1080	2	4	TwoBedroom | :HeatpumpSystem:AirDistributionSystem:HVACFan-HeatPump:2:3	DHWHeatpump-NonCentral	Default Minimum Balanced IAQ Fan

N. DECLARATION OF REQUIRED CERTIFICATES OF INSTALLATION

Selections made by Documentation Author indicate which Certificates of Installation must be submitted for the features to be recognized for compliance. These documents must be retained and provided to the building inspector during construction and can be found online

Building Component	Form/Title
Envelope	NRCI-ENV-E - Envelope (for all buildings)

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Building Component	Form/Title
Mechanical	NRCI-MCH-E - For all buildings with Mechanical Systems
Plumbing	NRCI-PLB-E - For all buildings with Plumbing Systems
Indoor Lighting	NRCI-LTI-E - Indoor Lighting (for all buildings)
Envelope	LMCI-ENV-E - Envelope (for all buildings)
Mechanical	LMCI-MCH-E - For all buildings with Mechanical Systems
Plumbing	LMCI-PLB-E - For all buildings with Plumbing Systems
Solar and Battery	LMCI-SAB-E - Solar Water Heating, PV and Battery Storage Systems
Indoor Lighting	LMCI-LTI-E - Indoor Lighting (for all buildings)
Covered Process	LMCI-PRC-E - Covered Processes

O. DECLARATION OF REQUIRED CERTIFICATES OF ACCEPTANCE

Selections made by Documentation Author indicate which Certificates of Acceptance must be submitted for the features to be recognized for compliance. These documents must be provided to the building inspector during construction. Lighting controls and mechanical NRCAs must be completed through an Acceptance Test Technician Certification Provider (ATTCP).

Building Component [1]	Form/Title System Name(s)
Envelope	NRCA-ENV-02-F - NRFC label verification for fenestration
Indoor Lighting	NRCA-LTI-02-A - Occupancy Sensors and Automatic Time Switch Controls.
Indoor Lighting	NRCA-LTI-03-A - Automatic Daylight Controls.
Mechanical	NRCA-MCH-02-A - Outdoor Air must be submitted for all newly installed HVAC units. Note: MCH-02-A can be performed in conjunction with MCH-07-A Supply Fan VFD Acceptance (if applicable) since testing activities overlap
	BaseSys5 Rtl
Mechanical	NRCA-MCH-05-A - Air Economizer Controls
	BaseSys5 Rtl
Mechanical	NRCA-MCH-07-A Supply Fan Variable Flow Controls
	BaseSys5 Rtl

O. DECLARATION OF REQUIRED CERTIFICATES OF ACCEPTANCE

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Building Component [1]	Form/Title System Name(s)
Mechanical	NRCA-MCH-08-A Valve Leakage Test
	Rtl HW Sys
Mechanical	NRCA-MCH-10-A Hydronic System Variable Flow Controls
	Rtl HW Sys
Mechanical	NRCA-MCH-11-A Automatic Demand Shed Controls
	BaseSys5 Rtl
Mechanical	NRCA-MCH-12-A FDD for Packaged Direct Expansion Units
	BaseSys5 Rtl
Mechanical	NRCA-MCH-16-A Supply Air Temperature Reset Controls
	BaseSys5 Rtl
Mechanical	NRCA-MCH-24-A Must be submitted for Cooling Tower Conductivity Controls
	NRCAMch24ASystemsToFieldVerify

[1]Refer to other prescriptive NRCC forms applicable to the project for additional NRCA tests required that are not included in the NRCC-PRF-E form

P. DECLARATION OF REQUIRED CERTIFICATES OF VERIFICATION

Selections made by Documentation Author indicate which Certificates of Verification must be submitted for the features to be recognized for compliance. These documents must be retained and provided to the building inspector during construction and can be found online Selections made by Documentation Author indicate which Certificates of Verification must be submitted for the features to be recognized for compliance. These documents must be retained and provided to the building inspector during construction and can be found online

Building Component	Form/Title
Mechanical	NRCV-MCH-27 Indoor Air Quality & Mechanical Ventilation

Documentation Author's Declaration Statement

1. I certify that this Certificate of Compliance documentation is accurate and complete.	
Documentation Author Name:	Documentation Author Signature:
Company:	Signature Date:
Address:	CEA/AEA/ECC Certification Identification (if applicable):
City/State/Zip: ,	Phone:

Responsible Person's Declaration statement

I certify the following under penalty of perjury, under the laws of the State of California:

1. The information provided on this Certificate of Compliance is true and correct.
2. I am eligible under Division 3 of the Business and Professions Code to accept responsibility for the building design or system design identified on this Certificate of Compliance (responsible designer).
3. The energy features and performance specifications, materials, components, and manufactured devices for the building design or system design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 1 and Part 6 of the California Code of Regulations.
4. The building design features or system design features identified on this Certificate of Compliance are consistent with the information provided on other applicable compliance documents, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with this building permit application.
5. I understand that a registered copy of this Certificate of Compliance shall be made available with the building permit(s) issued for the building and shall be made available to the enforcement agency for all applicable inspections. I will take the necessary steps to fulfill this requirement.
6. I understand that a registered copy of this Certificate of Compliance is required to be included with the documentation the builder provides to the building owner at occupancy. I will take the necessary steps to fulfill this requirement.

Responsible Designer Name:	Responsible Designer Signature:
Company:	Date Signed:
Address:	License #:
City/State/Zip:	Title:
Phone:	Scope: