CALIFORNIA ENERGY COMMISSION

California Energy Commission

California Schools Healthy Air, Plumbing, and Efficiency Online System

HVAC Assessment Report Companion Document

March 2023

CalSHAPE HVAC Assessment Report
Companion Document

The California Energy Commission administers the California Schools Healthy Air, Plumbing, and Efficiency (CalSHAPE) Program. The CalSHAPE Ventilation Program requires qualified testing personnel or qualified adjusting personnel to prepare an assessment report for review by a licensed professional. The licensed professional shall review the assessment report and determine what, if any, additional adjustments or repairs would be necessary to meet the minimum ventilation and filtration requirements and determine whether any cost-effective energy efficiency upgrades or replacements are warranted or recommended (CalSHAPE Ventilation Program Guidelines, Chapter 2, Section F).

The CalSHAPE HVAC Assessment Report Companion Document provides step-by-step instructions on how to complete the HVAC Assessment Report. The instructions also include general information and tips on navigating the reporting tool.

The CalSHAPE Online System (system) can be accessed at https://calshape.energy.ca.gov/.

A user must have an account in the system to input information on the HVAC Assessment Report. Instructions to register for a user account in the system are provided in the CalSHAPE Online Registration Instructions found at https://www.energy.ca.gov/media/5800.

This companion document is provided for informational purposes only to assist users in the completion of the HVAC Assessment Report. It does not include CalSHAPE Ventilation Program information or requirements. CalSHAPE Ventilation Program information and requirements are provided in the CalSHAPE Ventilation Program Guidelines, found on the CalSHAPE Program webpage at https://www.energy.ca.gov/publications/2022/california-schools-healthy-air-plumbing-and-efficiency-ventilation-program.

Table of Contents

General Information and Navigation

Multiple Users:

- Multiple users can be in one HVAC Assessment Report at the same time. A user can overwrite another user's information based on the most recent saved information in the system.

Assessment Navigation:

- Navigation buttons are found throughout the HVAC Assessment Report pages:
  - Clicking the blue button at the top of the page will take you to the "HVAC Equipment Details for HVAC Unit" page.
  - Saving an HVAC Unit section will return users to the "HVAC Equipment Details for HVAC Unit" page.
  - Internet browser navigation buttons are also an option for use.
  - Please note, some internet browsers have the backspace button as a backward navigation option.

Required Fields:

- All required fields are labeled in a red font. All required fields must be filled out to save the section.

Not Applicable:

- For any items that are found to be not applicable/available, please enter a negative one (-1) value.

Upload Files Button:

- Upload file button is used for any documents, pictures, or any required materials needed for the HVAC Assessment Report.
  - Refer to the File Matrix document for more information.

Notes:

- Utilize "Notes" field for all additional information or explanation.

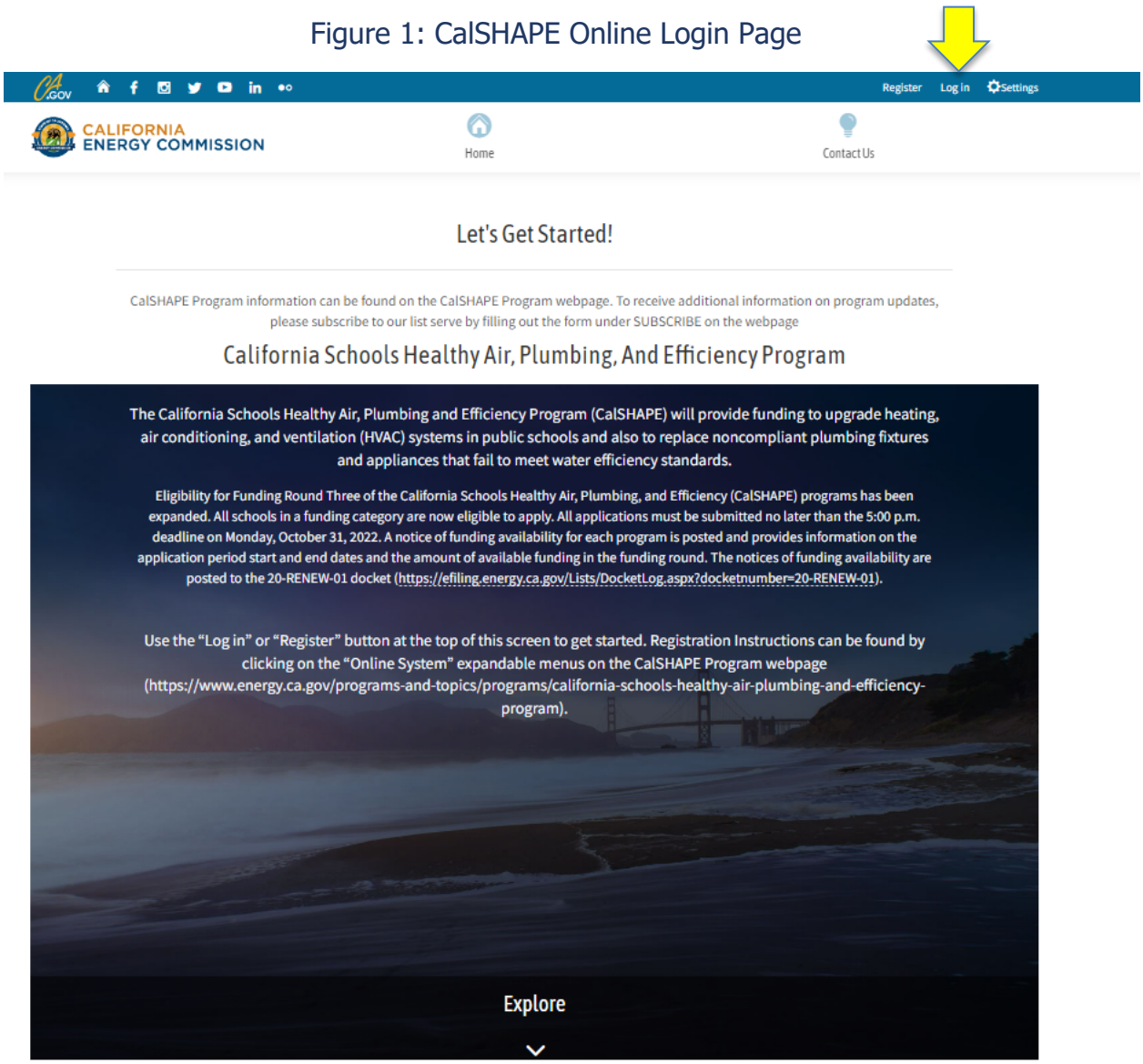
Locating the HVAC Assessment Report Button

Step 1: CalSHAPE Online System Homepage

Instructions:

1. Click on "Log in" located at the top of the screen.

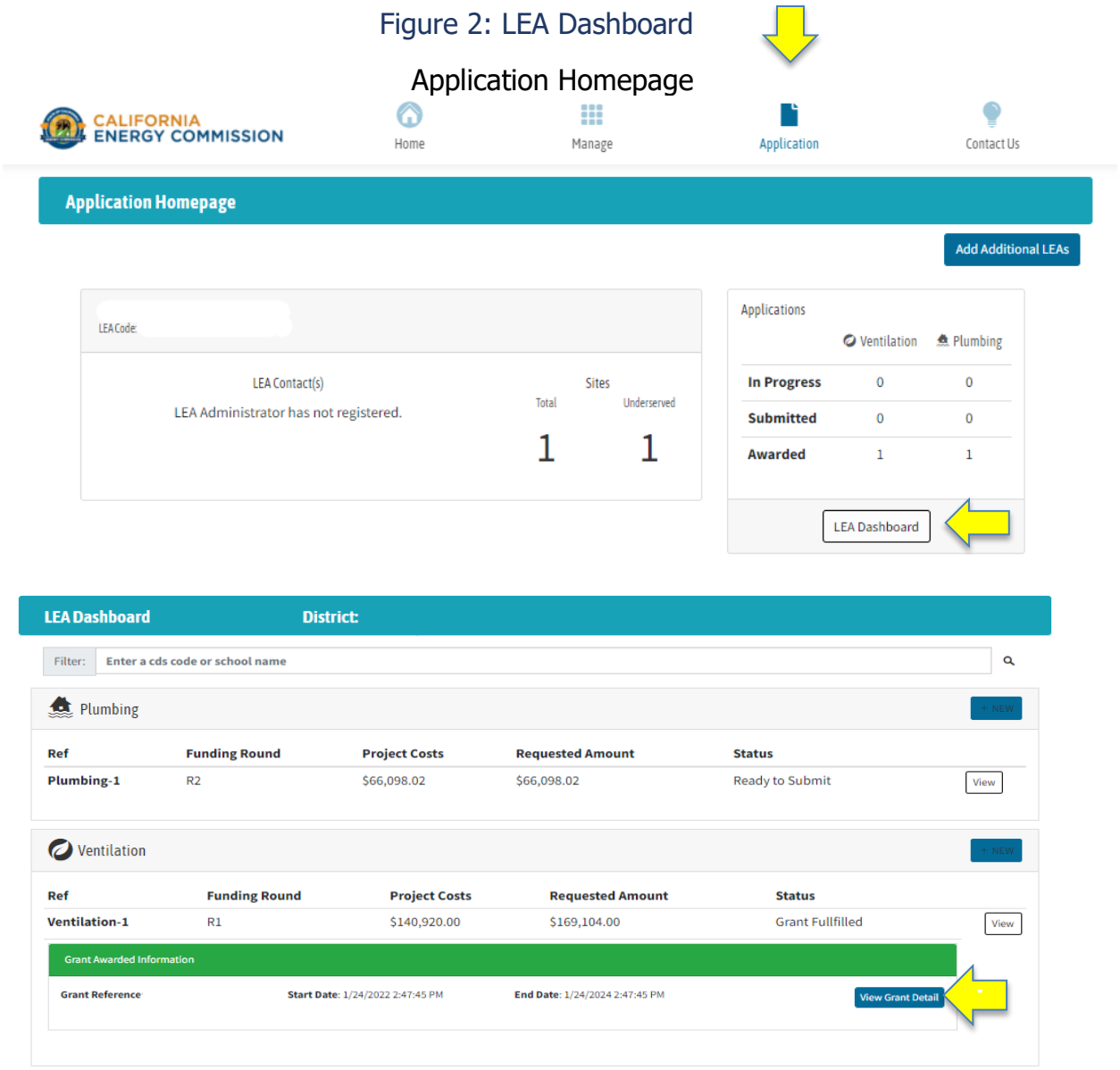
Figure 1: CalSHAPE Online Login Page



Source: California Energy Commission, CalSHAPE Online System

Step 2: Application Homepage

Figure 2: LEA Dashboard

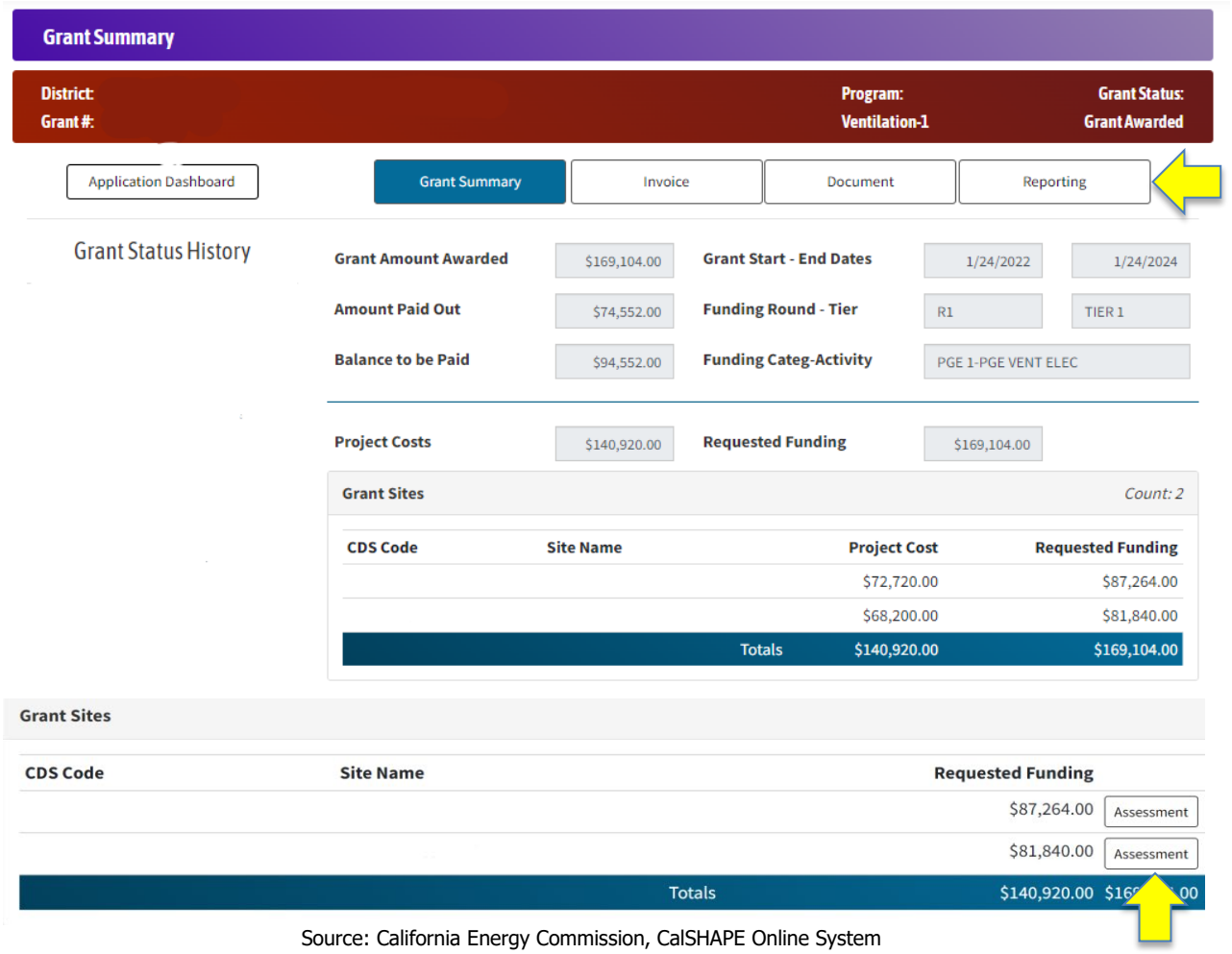


Source: California Energy Commission, CalSHAPE Online System

Instructions:

1. Click on the "Application" icon to navigate the "Application Homepage" shown in Figure 2.
2. Locate the Applications section for the LEA that will start an HVAC Assessment Report and click the "LEA Dashboard" button.
3. Under the Ventilation section on the LEA Dashboard, locate the green "Grant Awarded Information" box and click on the "View Grant Detail" button.

Figure 3: Grant Summary - Reporting Button



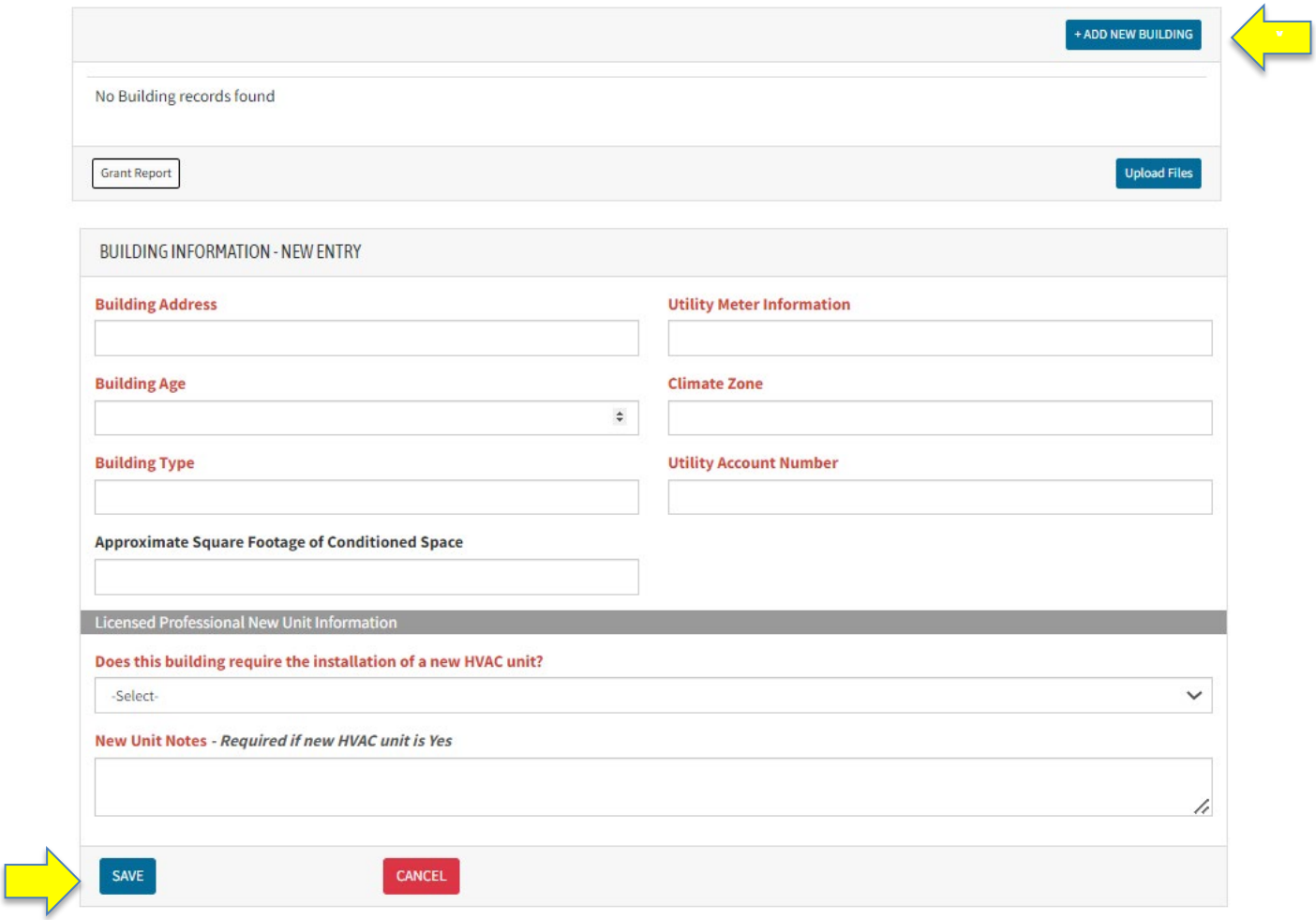
Source: California Energy Commission, CalSHAPE Online System

Instructions:

1. To start the HVAC Assessment Report, click on the "Reporting" button.
2. Locate the site name and click on the "Assessment" button.

HVAC Assessment Report: Getting Started Information

Figure 4: Site Buildings



Source: California Energy Commission, CalSHAPE Online System

Instructions:

1. Click on "+ADD NEW BUILDING" button to create a new building information entry.
2. Enter the following information and click the "Save" button (all Building Information is required to be entered):
    a. Building Address and Building Age – Input the address and age of the building.
    b. Building Type – Building construction type of the building (ex. wood-frame, heavy timber, or ordinary).
    c. Utility Meter Information - Meter is unique to the school (can be found in utility service statement).
    d. Climate Zone - All buildings are assigned a climate zone based on California's climate regions. Climate zone region for a specific zone or ZIP code can be found here: https://www.energy.ca.gov/programs-

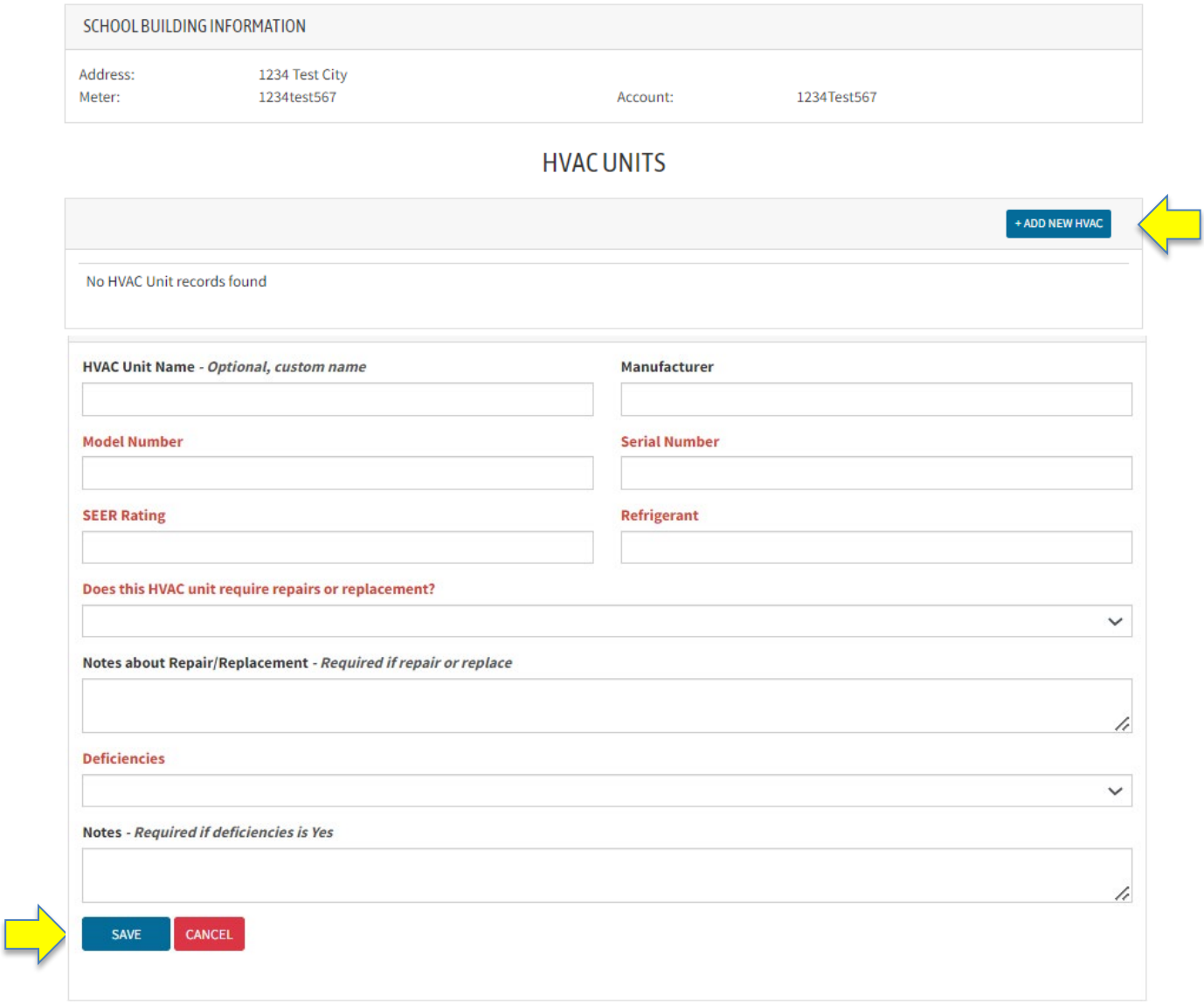
and-topics/programs/building-energy-efficiency-standards/climate-zone-tool-maps-and.

e. Utility Account Number – 11-digit account number corresponding to the LEA's utility service account (PG&E, SCE, SDG&E, and/or SCG)

3. Click on "Select" button to start HVAC equipment entries.

HVAC Equipment Details for HVAC Units

Figure 5: HVAC Units

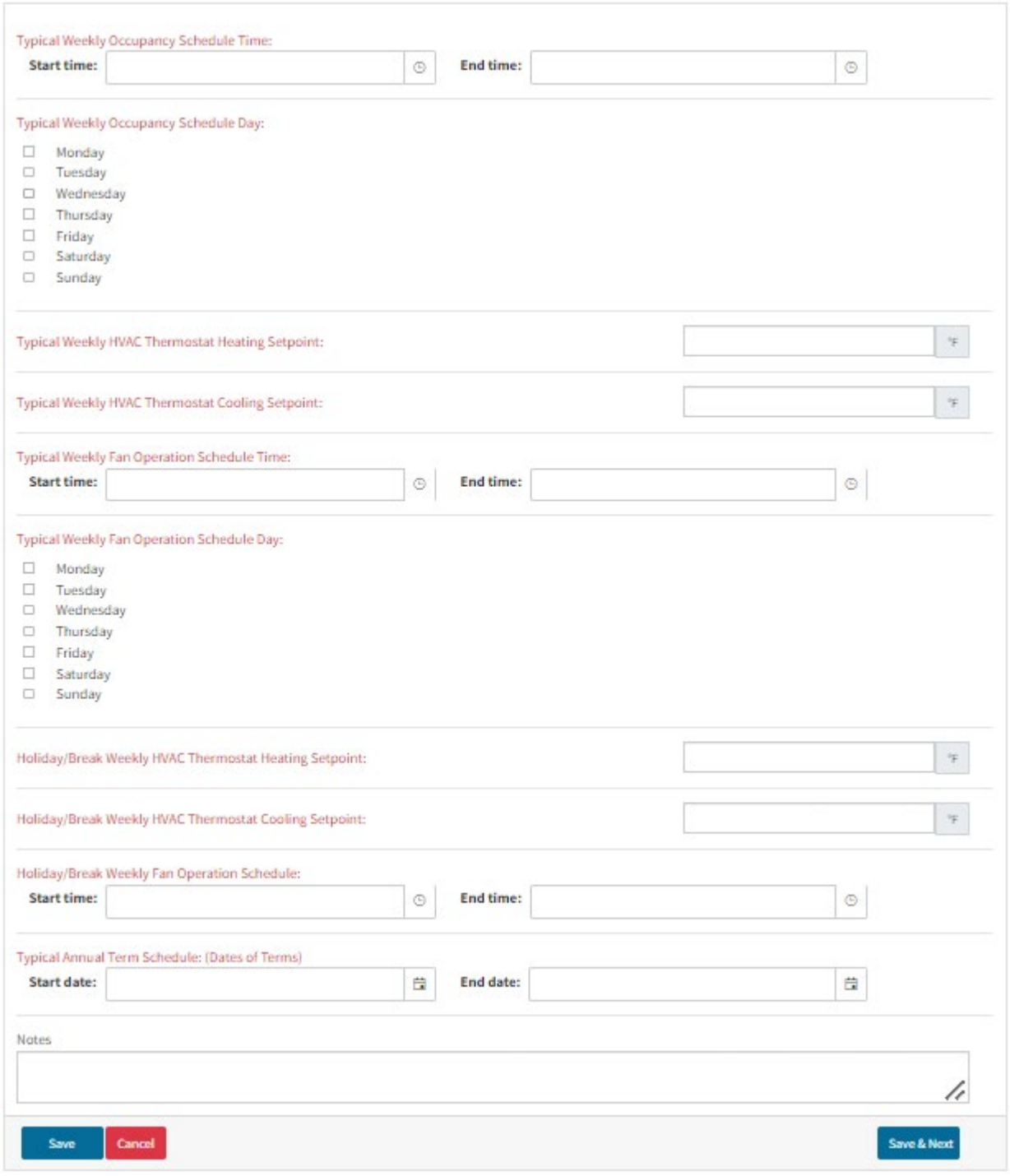


Source: California Energy Commission, CalSHAPE Online System

Instructions:

1. Click "+ Add New HVAC" to add new HVAC unit entry or click "Edit" to make any changes to an existing HVAC unit entry.
2. Input model number, serial number, SEER rating, and refrigerant type.
    a. SEER Rating (Seasonal Energy Efficiency Ratio) – This can be found on a yellow and black rating sticker on the side of the condenser or on an information sheet on the front of the air handler.
    b. Refrigerant (ASHRAE Refrigerant Designations) – Refrigerant will be listed as "R-#" on the data sheet.
3. Utilize the "Notes" box to indicate any deficiencies found during assessment. Select "Yes" or "No" to indicate if there are any deficiencies found.
    a. Utilize the "Notes" box to indicate any deficiencies found during assessment.
4. Click "Save."
    a. From the "HVAC Units" page, click on the "Edit" button to begin inputting all the HVAC equipment details.
5. Utilize the "Collapse header details" checkbox to minimize the HVAC Unit details.

Figure 6: HVAC User Inputs and Setpoints



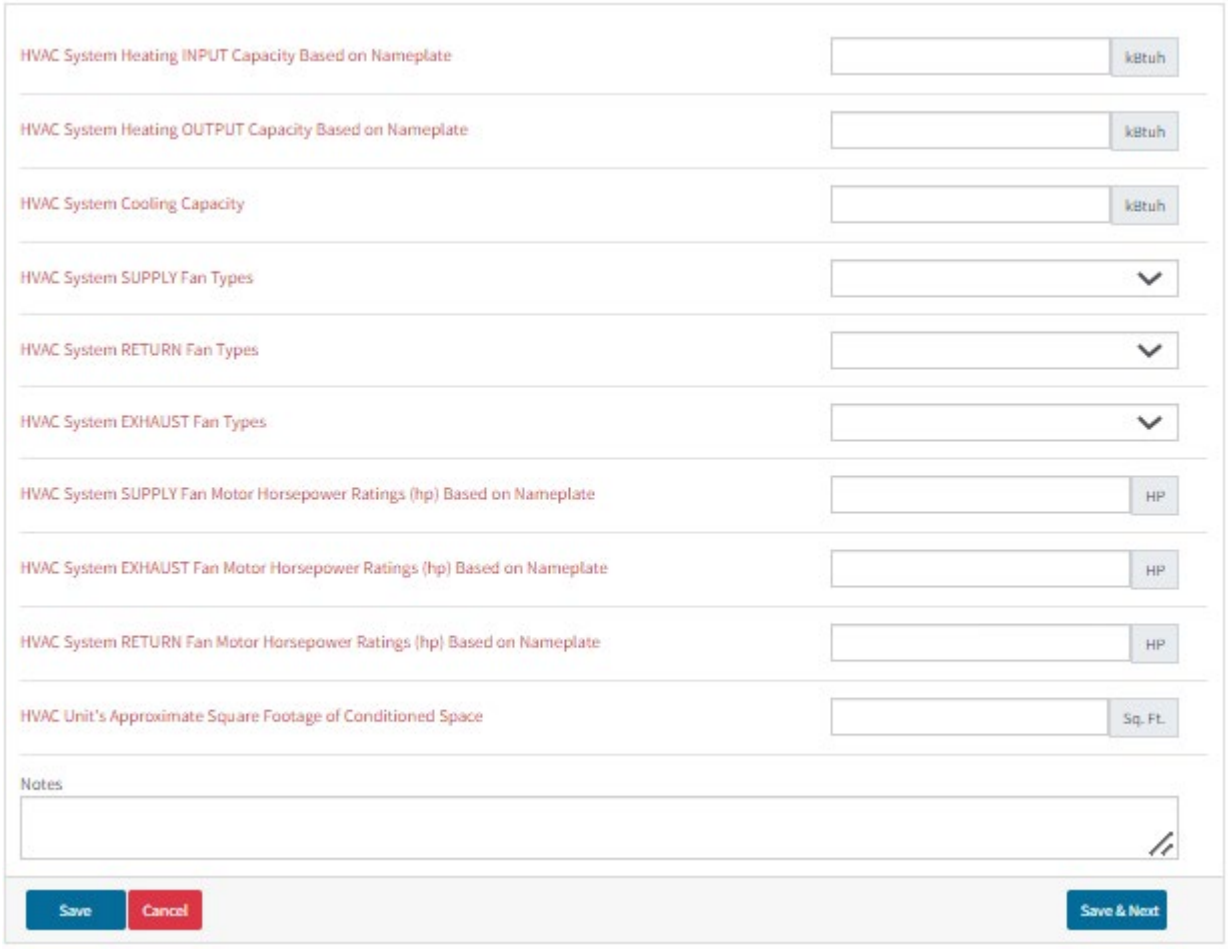
Source: California Energy Commission, CalSHAPE Online System

Instructions:

1. Click on the calendar and clock icon to select proper date and time and proceed with inputting the rest of the information (select the nearest whole hour).

a. Examples:
    i. Typical Weekly Occupancy Schedule: 5:00am - 7:00pm
    ii. Weekly HVAC Thermostat Heating/Cooling Setpoint: (Temperature HVAC System will maintain throughout the day) - 68 (in Fahrenheit)
    iii. Typical Weekly Fan Operation Schedule: 5:00am - 7:00pm (M-F)
        1. For automatic systems, provide an estimate window of operation.
    iv. Holiday/ Break Weekly Fan Operation Schedule: If "Off" during this time, select "12:00 AM-12:00 AM".
    v. Typical Annual Term Schedule: Aug – May
2. Click "Save & Next" to proceed to the next section or Click "Save" to return to the "HVAC Equipment Details for HVAC Unit" page.
    a. A blue check mark should appear on the "HVAC Equipment Details for HVAC Unit" page to indicate completion of the section.

Figure 7: HVAC Equipment Capacities

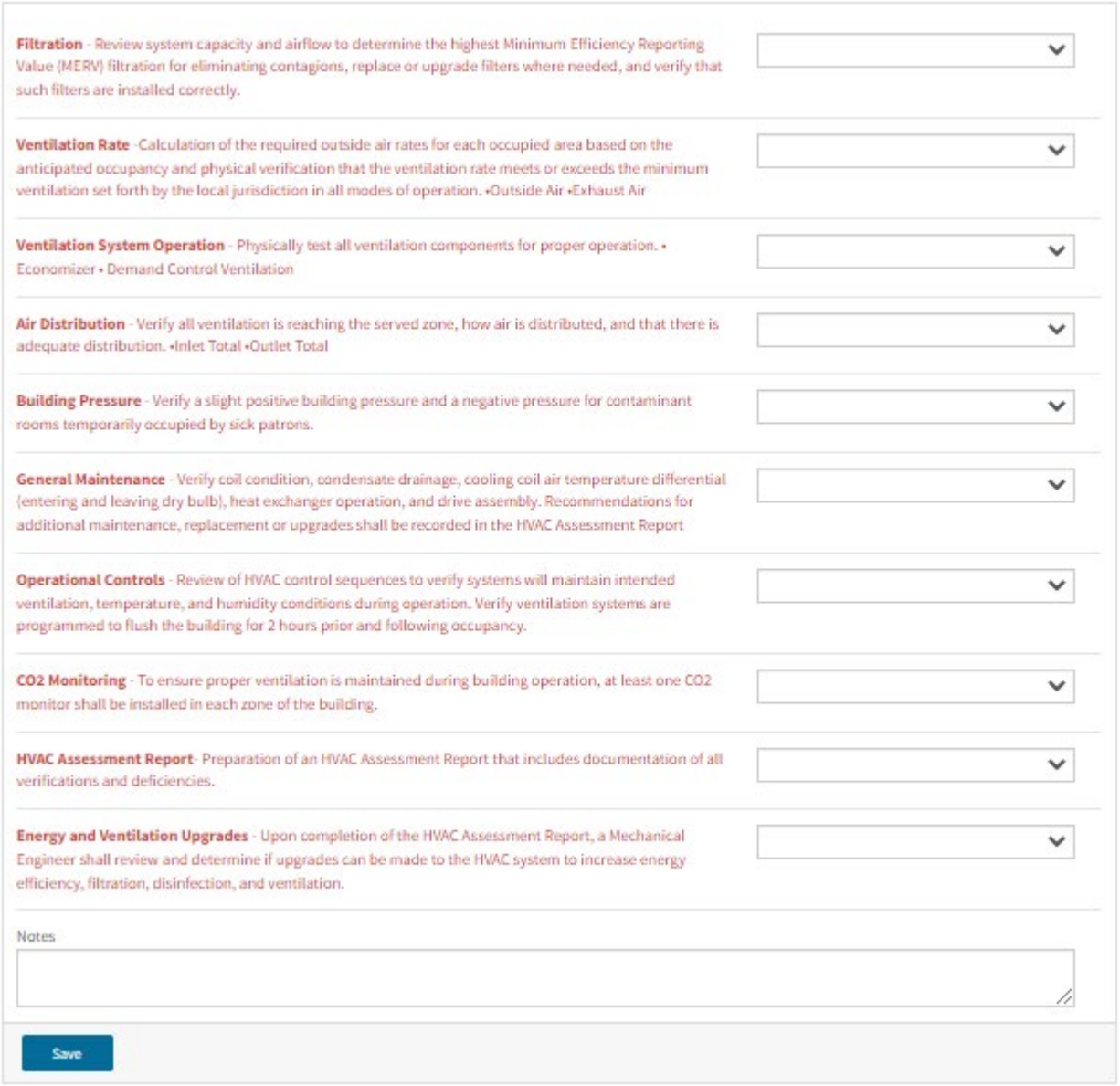


Source: California Energy Commission, CalSHAPE Online System

Instructions:

1. The HVAC Equipment Capacities section contains entries for specifications of HVAC equipment.
    a. Enter HVAC system heating input and output capacity based on nameplate, and HVAC system cooling capacity in kBtuh.
    b. Select "Direct Drive," "Pulleys/Belts," or "Variable Speed" for HVAC system supply, return, and exhaust fan types. Select "Not Applicable" for systems with no return fan or exhaust fan.
    c. Enter HVAC system supply exhaust and return fan motor horsepower ratings (hp) based on nameplate.
    d. Approximate HVAC unit's square footage of conditioned space.
2. Click "Save"

Figure 8: Walkthrough Checklist

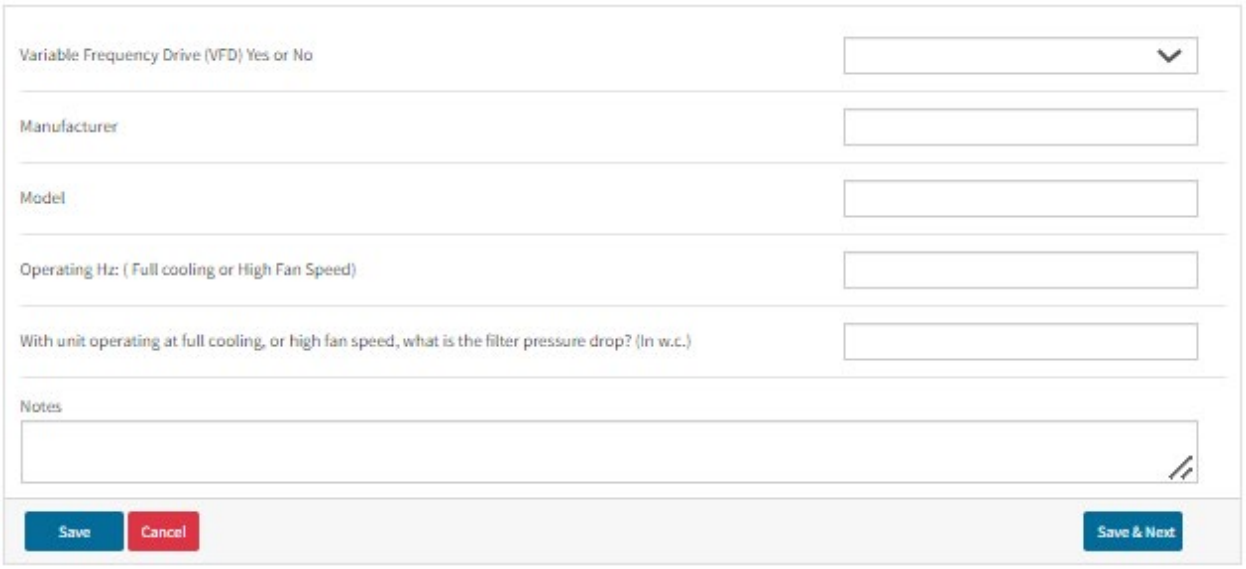


Source: California Energy Commission, CalSHAPE Online System

Instructions:

1. The Walkthrough Checklist section serves to ensure that HVAC Equipment is examined and verified to be in proper working condition.
    a. Use the "Notes" box to provide additional information, findings, recommendation, or deficiencies found during this section.

Figure 9: Variable Frequency Drive

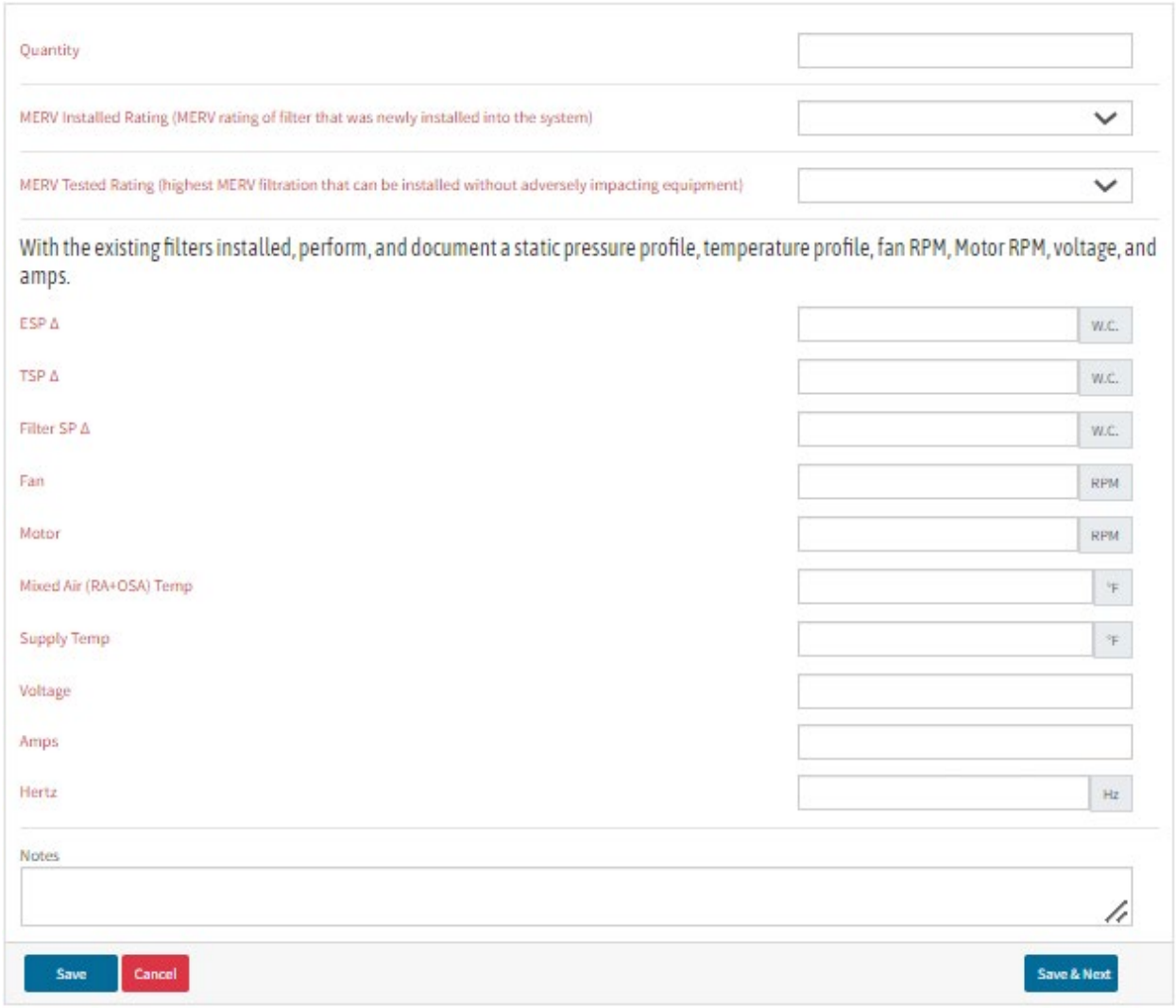


Source: California Energy Commission, CalSHAPE Online System

Instructions:

1. The HVAC System may use a Variable Frequency Drive.
    a. If it does, enter "Yes" and the required fields (Manufacturer, Model, Operating Hz, and Filter Pressure Drop) will be indicated.
    b. If not, then proceed to the next section.

Figure 10: MERV Filter Verification

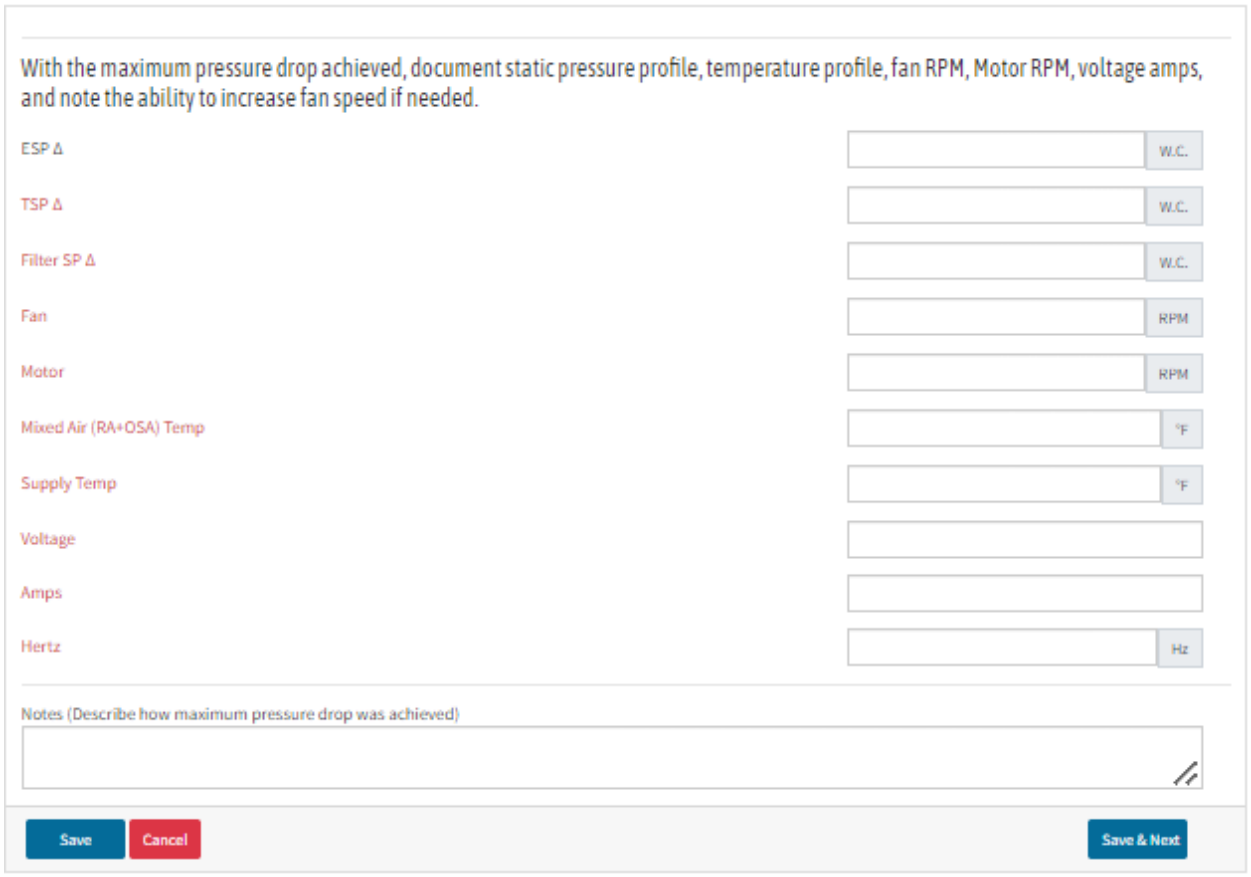


Source: California Energy Commission, CalSHAPE Online System

Instructions:

1. The MERV Filter Verification section serves to analyze existing filters.
    a. Input the quantity and rating of existing filters.
    b. Put "-1" for any unavailable/not applicable fields.
2. Use the "Notes" box to provide explanation for fields with -1.
    a. If a filter does not have a MERV rating, like a washable filter, then put not applicable and provide notes below.

Figure 11: Maximum Pressure Drop

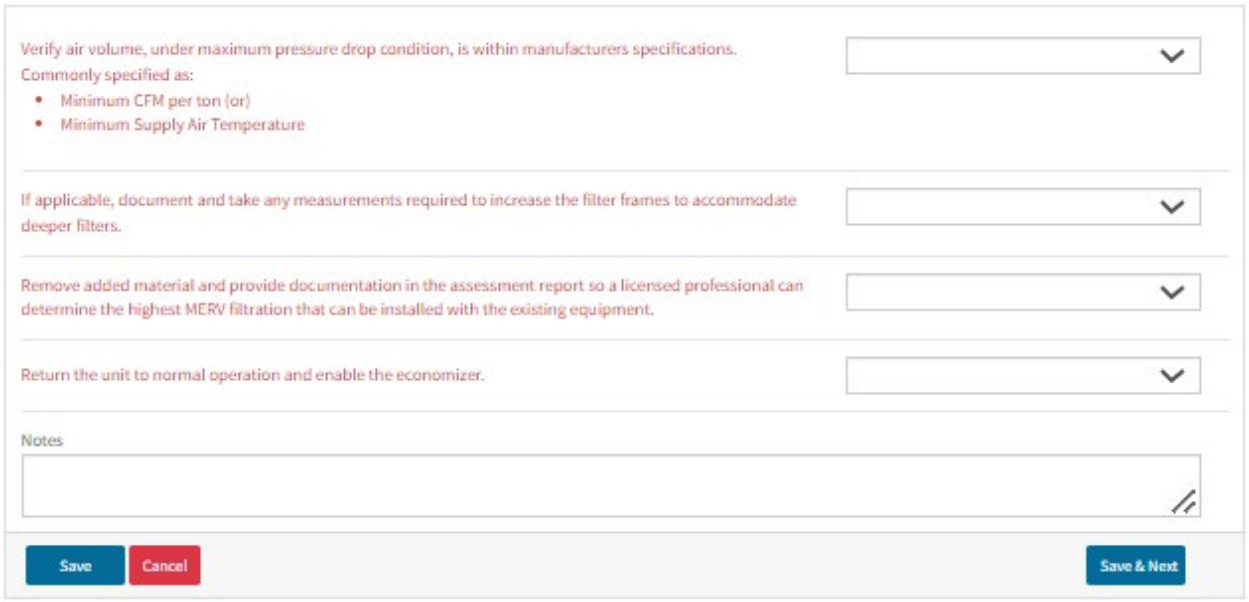


Source: California Energy Commission, CalSHAPE Online System

Instructions:

1. Determine the Maximum Filter Pressure Drop utilizing either of the two methods below.
    a. Primary Method to verify airflow - Directly measure the change in airflow if accessible and efficient.
    b. Secondary Method to verify airflow – Calculate the change in airflow
        i. $CFM_N = CFM_O \times (\sqrt{SP_N}/SP_O)$
2. Using the maximum filter pressure drop, document various recordings for the corresponding HVAC System.
    a. Provide/describe the technique used to determine maximum pressure drop in the "Notes" field.

Figure 12: Walkthrough Checklist (Filter)

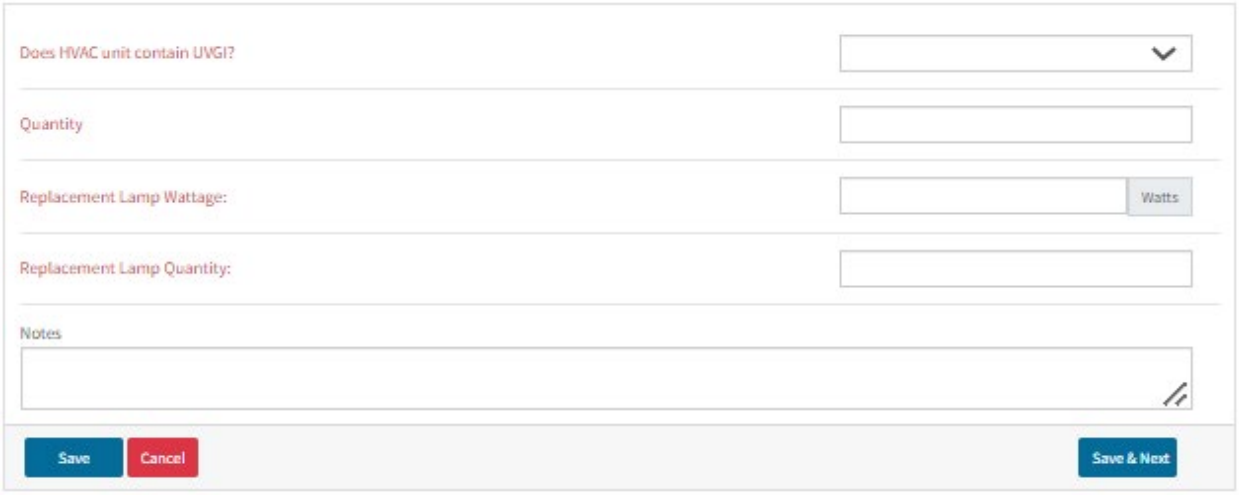


Source: California Energy Commission, CalSHAPE Online System

Instructions:

1. The Walkthrough Checklist (Filter) section serves to ensure that the desired filter will be able to be installed with or without modifications to the filter frame. Final determination for the highest MERV Filtration will be made by a licensed professional.
    a. Provide additional information for fields that cannot modified in the notes box.

Figure 13: Ultraviolet Germicidal Irradiation

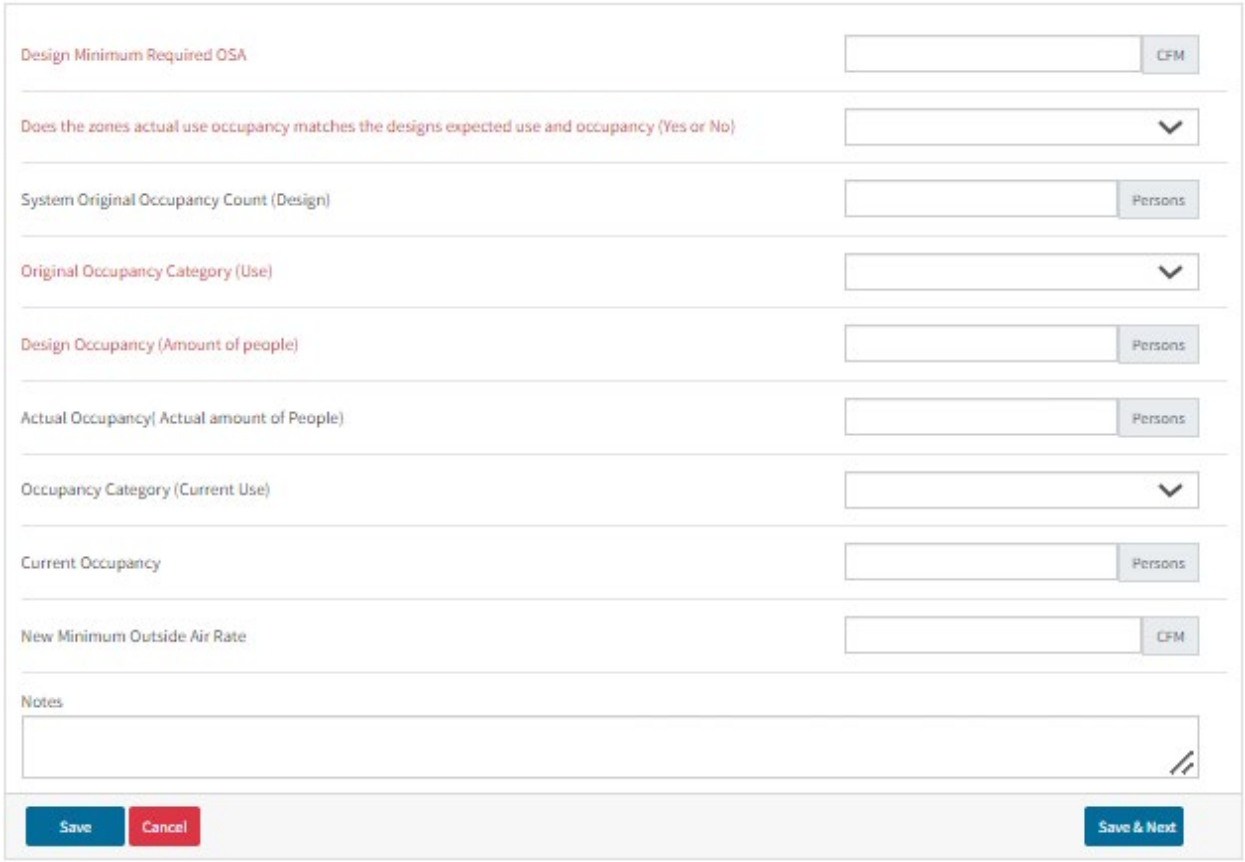


Source: California Energy Commission, CalSHAPE Online System

Instructions:

1. The Ultraviolet Germicidal Irradiation section is for determining how many ultraviolet germicidal irradiation systems are part of the HVAC System.
    a. Replacement lamp wattage and replacement lamp quantity are for the specifications and how many replacement lamps will be replaced in the HVAC System.
    b. If not applicable, enter -1 for all sections.

Figure 14: Determine Minimum Required Outside Air (OSA)

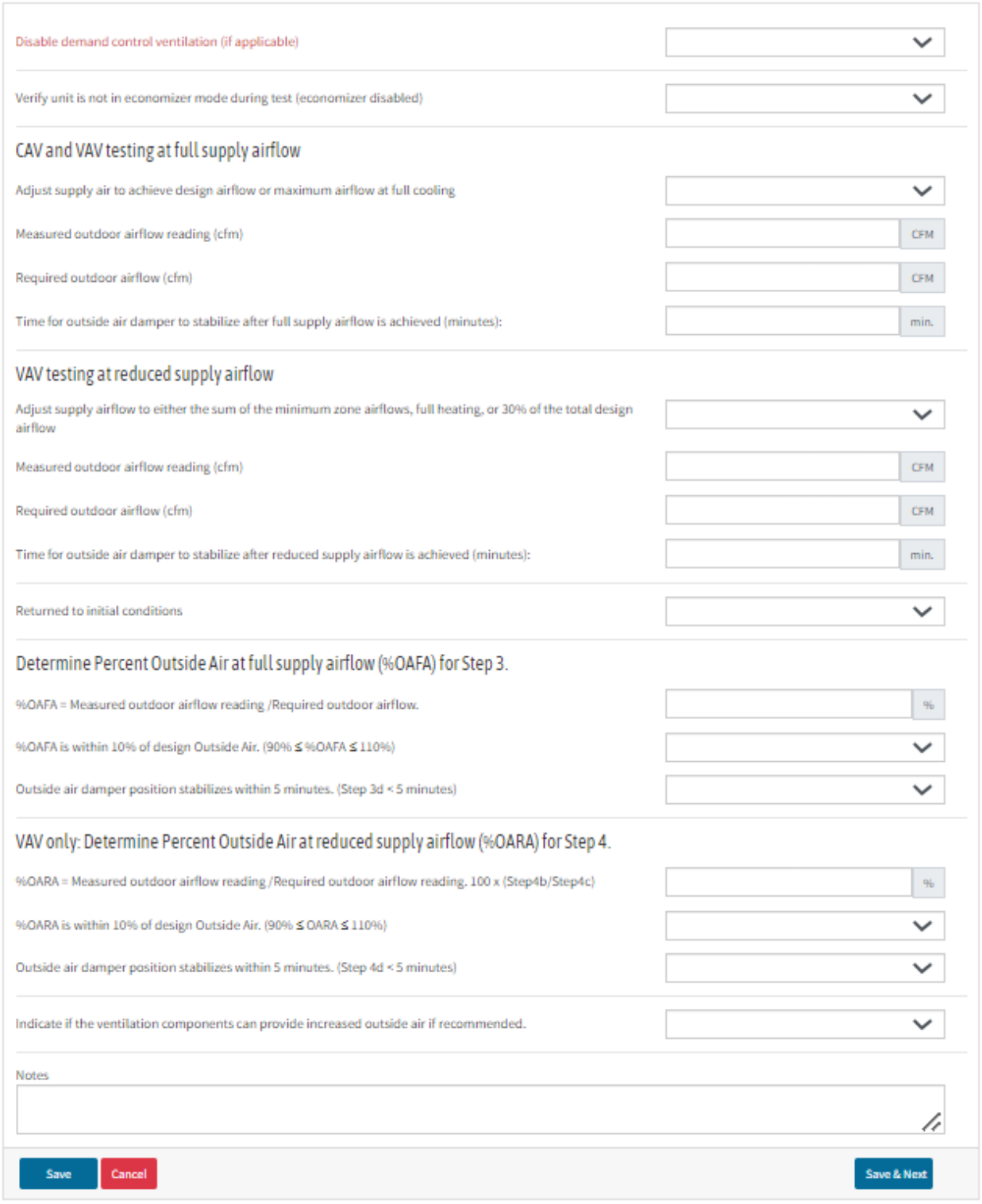


Source: California Energy Commission, CalSHAPE Online System

Instructions:

1. The original design documents, if available, can be used to obtain:
    a. Minimum required OSA
    b. Original Occupancy
    c. Occupancy Category and Occupancy.
2. The following can be determined by a method left up to the qualified testing personnel (CalSHAPE Ventilation Program Guidelines Chapter 2, Section B.2):
    a. The Actual Occupancy
    b. Occupancy Category
    c. Occupancy
3. If the zones actual use and occupancy does not match the designs expected use and occupancy, a new (estimated) minimum outside air rate must be calculated and all fields will be required.

Figure 15: Verify Minimum Required Outside Air (OSA)

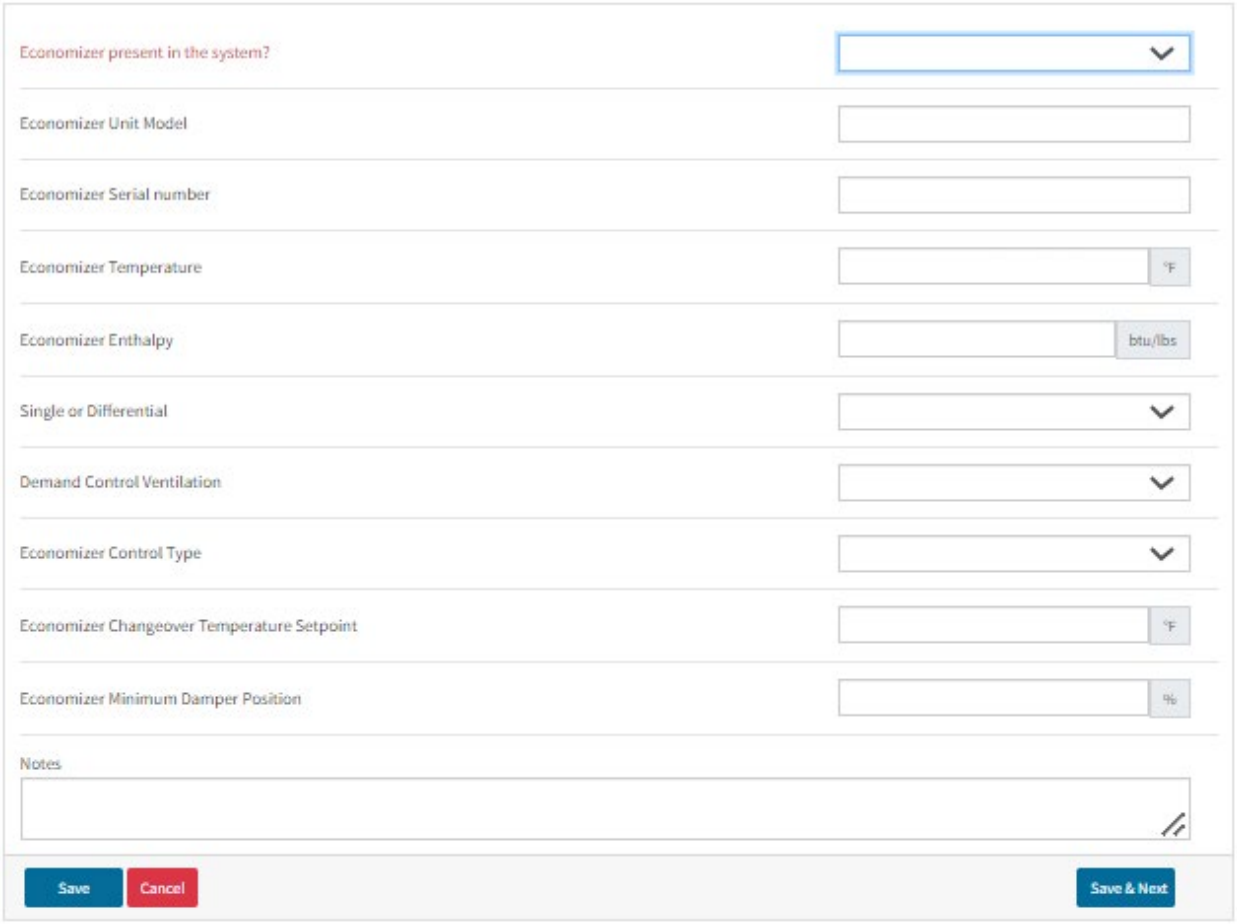


Source: California Energy Commission, CalSHAPE Online System

Instructions:

1. The Verify Minimum Required Outside Air section contains steps and entries to ensure that the minimum required outside air obtained from the design documents or a qualified testing personnel's method is accurate.
2. Different fields will be required depending on the answer to the second question.
    a. Fill in all required fields and put -1 for all "not applicable" fields.

Figure 16: Economizer Information

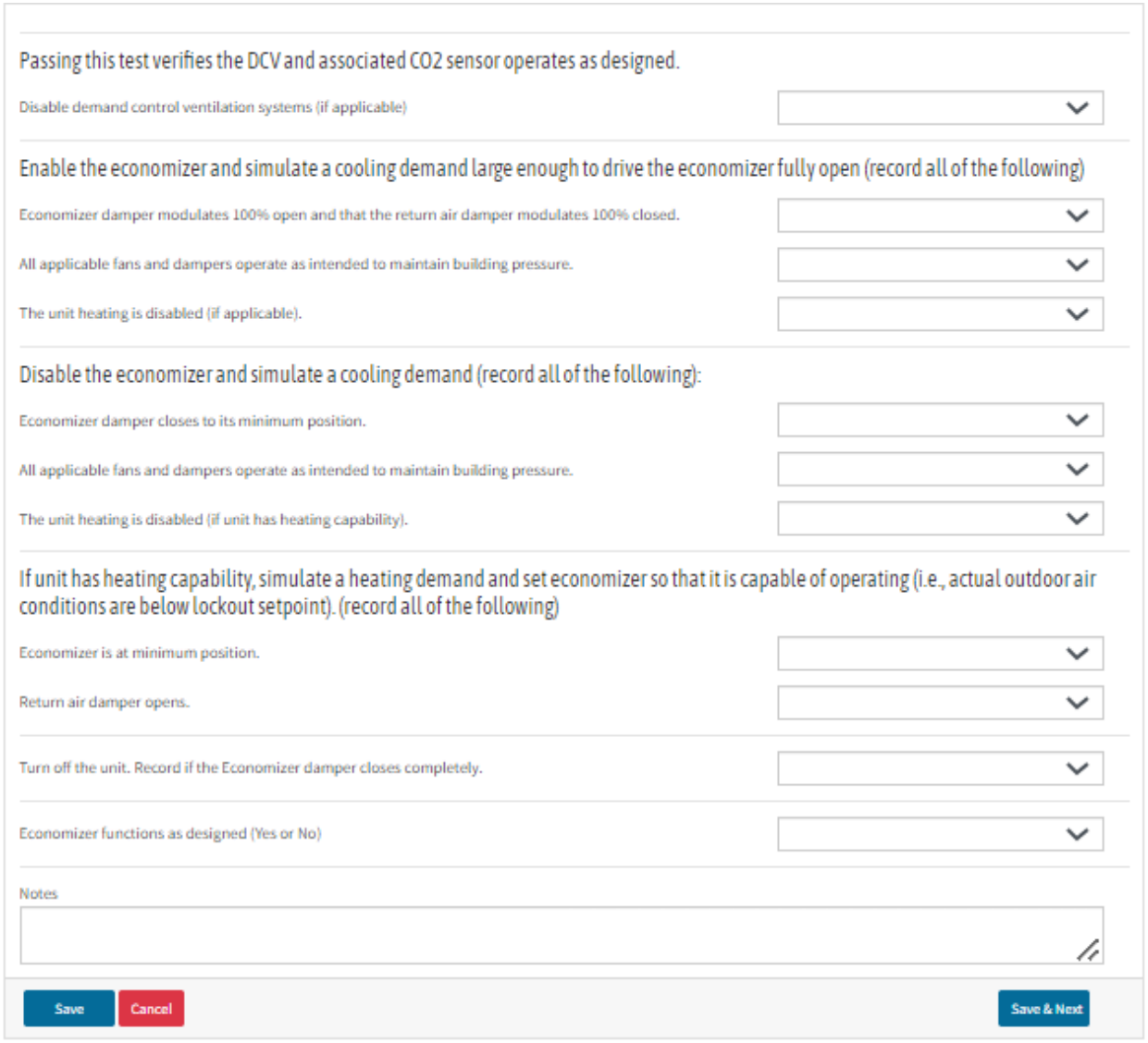


Source: California Energy Commission, CalSHAPE Online System

Instructions:

1. The Economizer Information section contains fields to analyze all required fields if an economizer is present.
2. If there are no economizers present in the system, then move on to the next section.

Figure 17: Verify Economizer Operation

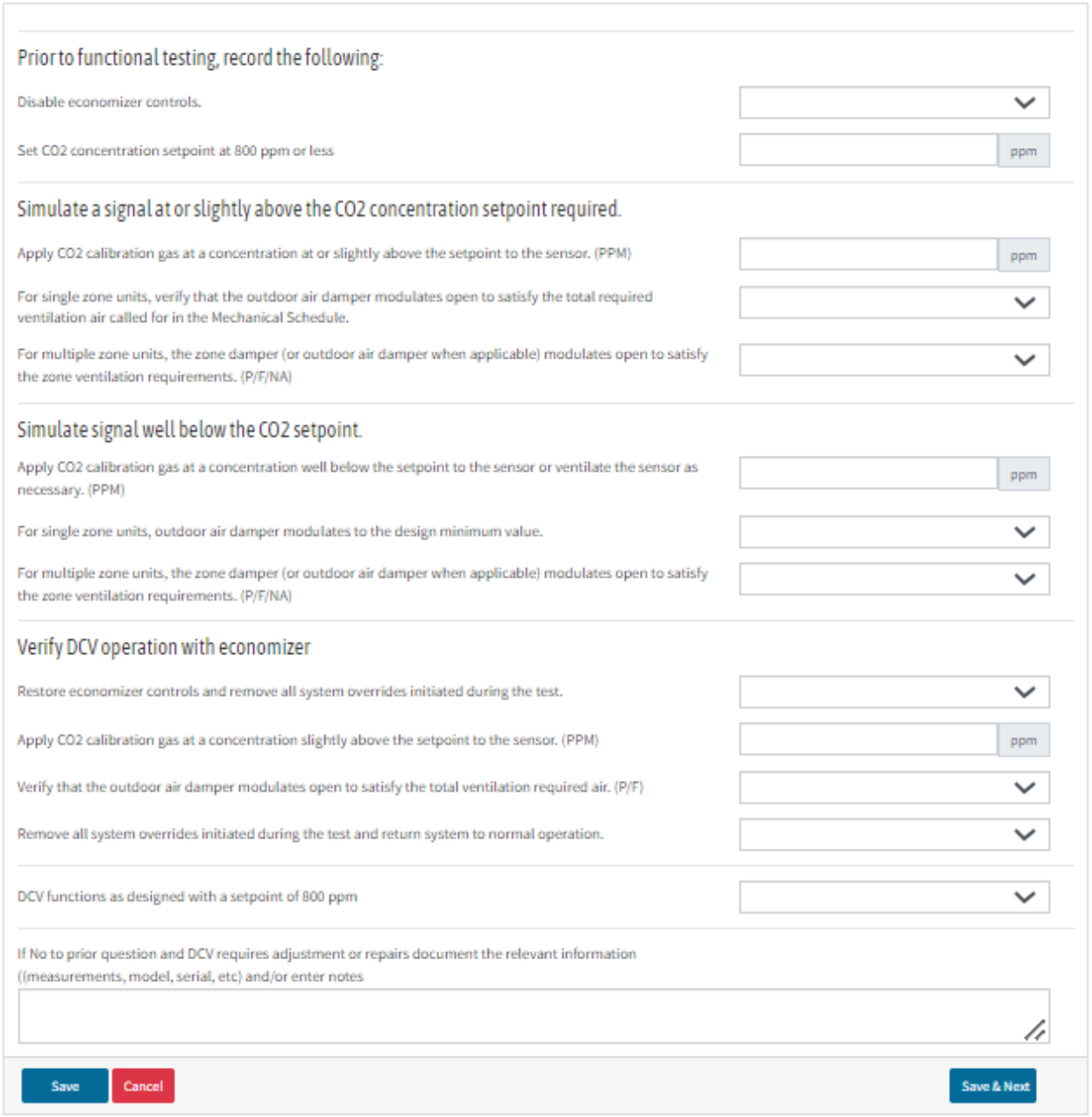


Source: California Energy Commission, CalSHAPE Online System

Instructions:

1. The Verify Economizer Operation section contains steps to verify if the Demand Control Ventilation and associated CO_2 sensor operates as designed.
    a. If the HVAC System does not have an economizer, then you may proceed to the next section.

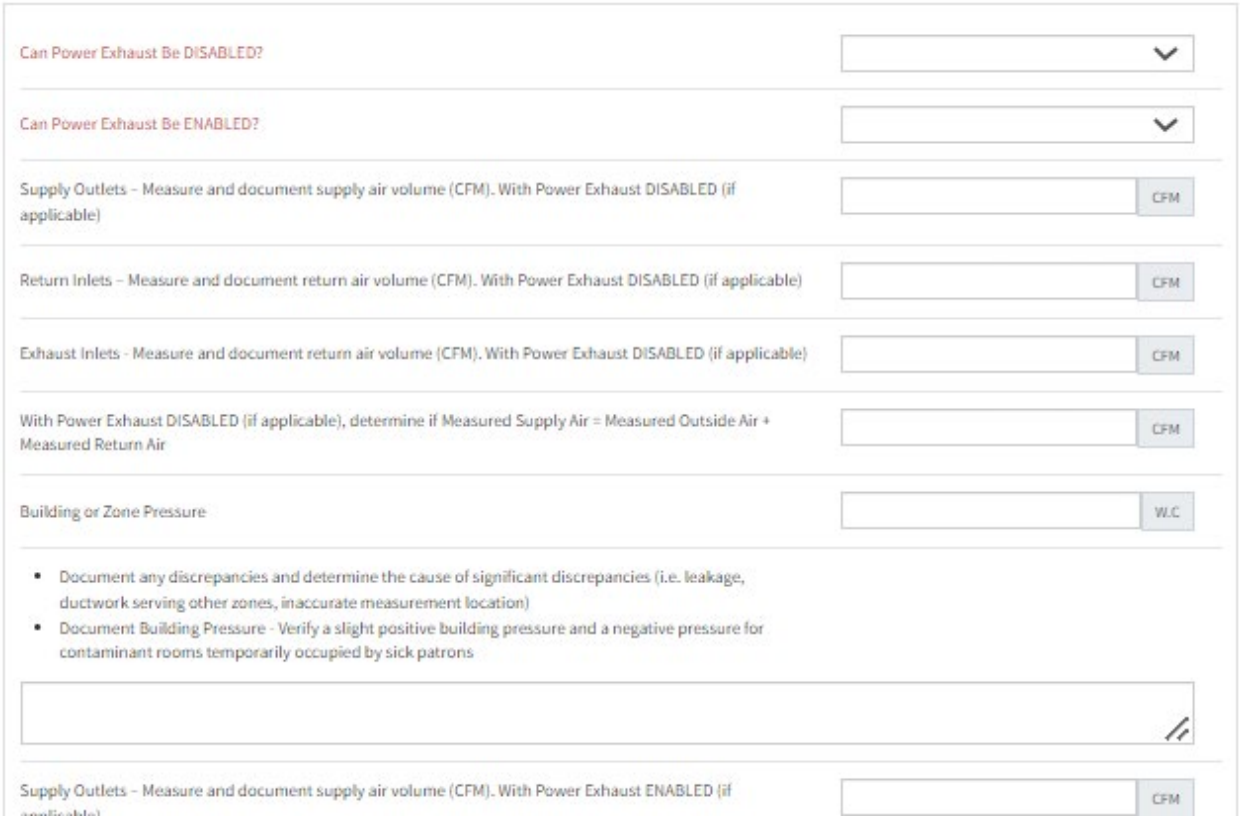
Figure 18: Verify DCV Operation



Instructions:

1. If applicable, complete all four parts of this section.
    a. If not, select NA and click "Save & Next."

Figure 19: Verify Air Distribution and Building Pressurization

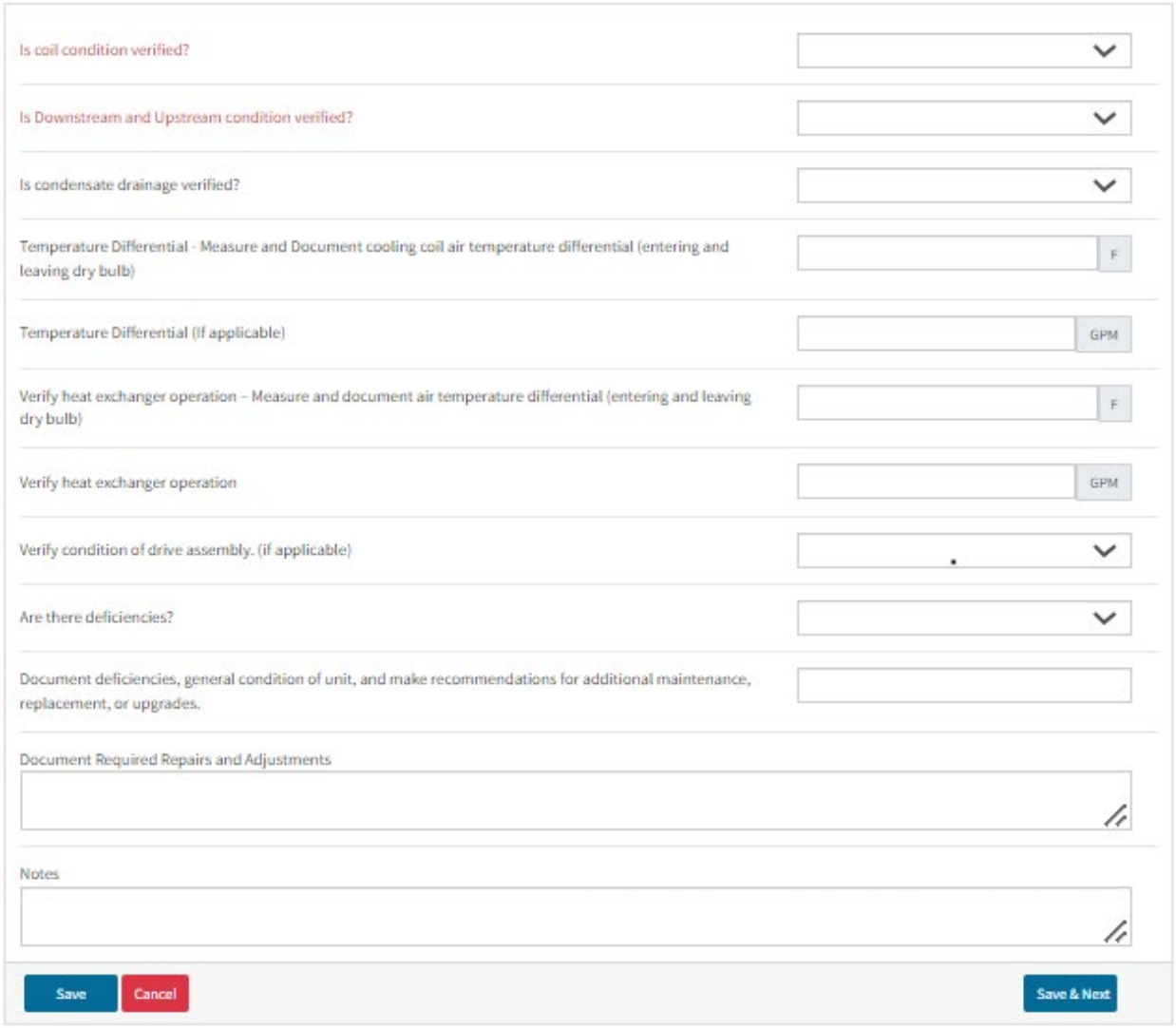


Source: California Energy Commission, CalSHAPE Online System

Instructions:

2. Required fields will change based on the answers for the first two questions.
3. The Verify Air Distribution and Building Pressurization serves to determine if:
    a. Measured Supply Air is slightly greater than Measured Return Air whether Power Exhaust is enabled or disabled.
    b. Supply Outlet, Return Inlet, and Exhaust Inlet air volume must be measured.
4. Record the Building or Zone Pressure.
5. Verify if the Air Distribution for inlets and outlets are balanced within tolerance of the system design as listed within design documents.
    a. If the Air Distribution is not within tolerance, take air distribution notes, document repairs and adjustment, and include relevant photographic documentation using the "Upload Files" located in the "Site Building" page.

Figure 20: Verify General Maintenance

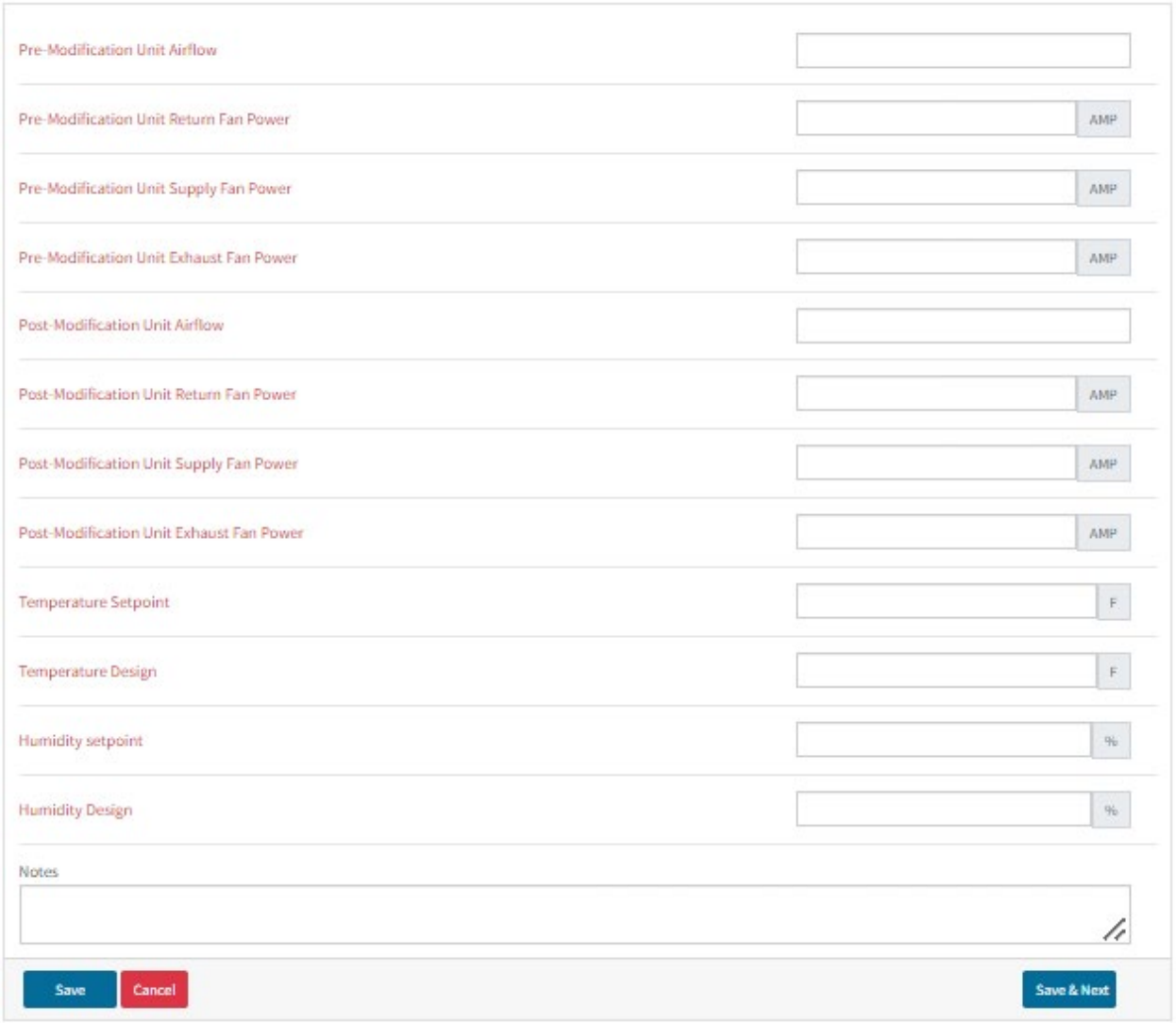


Source: California Energy Commission, CalSHAPE Online System

Instructions:

1. The Verify General Maintenance section is a checklist to ensure that the coil condition is assessed and whether repairs, replacements, or upgrades are necessary per the CalSHAPE Ventilation Program Guidelines Chapter 2, Section B.4.
2. Utilize the note boxes to provide additional information or to indicate any repairs and/or adjustments needed.

Figure 21: Conditioning Unit Details

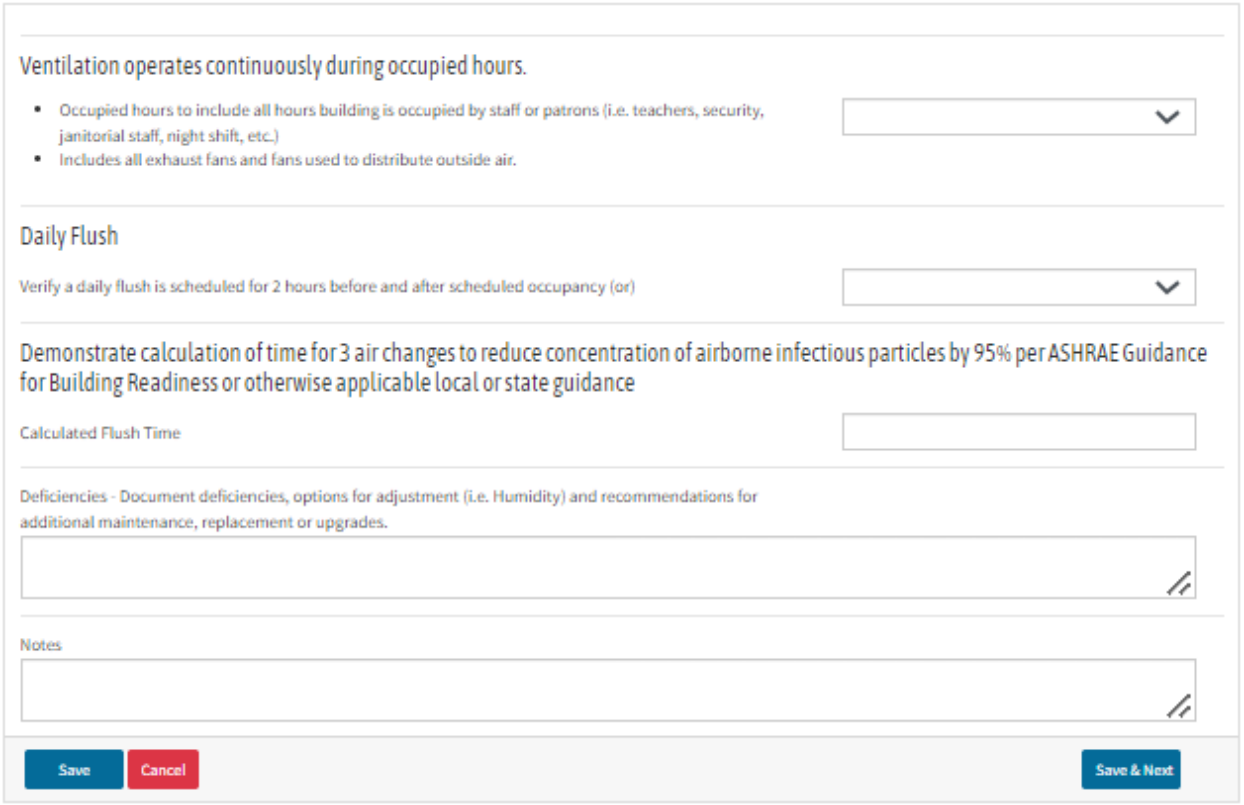


Source: California Energy Commission, CalSHAPE Online System

Instructions:

1. The Condition Unit Detail section asks for the recorded unit airflow and unit supply fan, return, and exhaust powers for both pre- and post- modification.
2. The temperature and humidity's setpoint and design corresponds to the control sequences of the HVAC system. The purpose of this page is to verify if systems will maintain intended conditions during building operation.
3. If no modifications can be made, put -1 to all fields and use the "Notes" box to provide an explanation.

Figure 22: Ventilation Schedule Operation

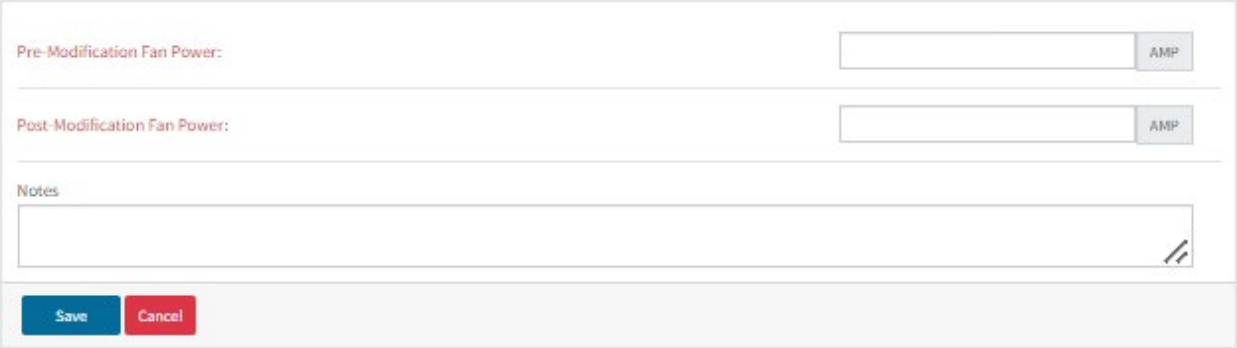


Source: California Energy Commission, CalSHAPE Online System

Instructions:

1. The Ventilation Schedule Operation section verifies that outside air is properly distributed when buildings are occupied and that a daily flush is conducted.
    a. Any deficiencies must also be documented by using the "Deficiencies" field or the "Notes" box.

Figure 23: Fan Output Verification

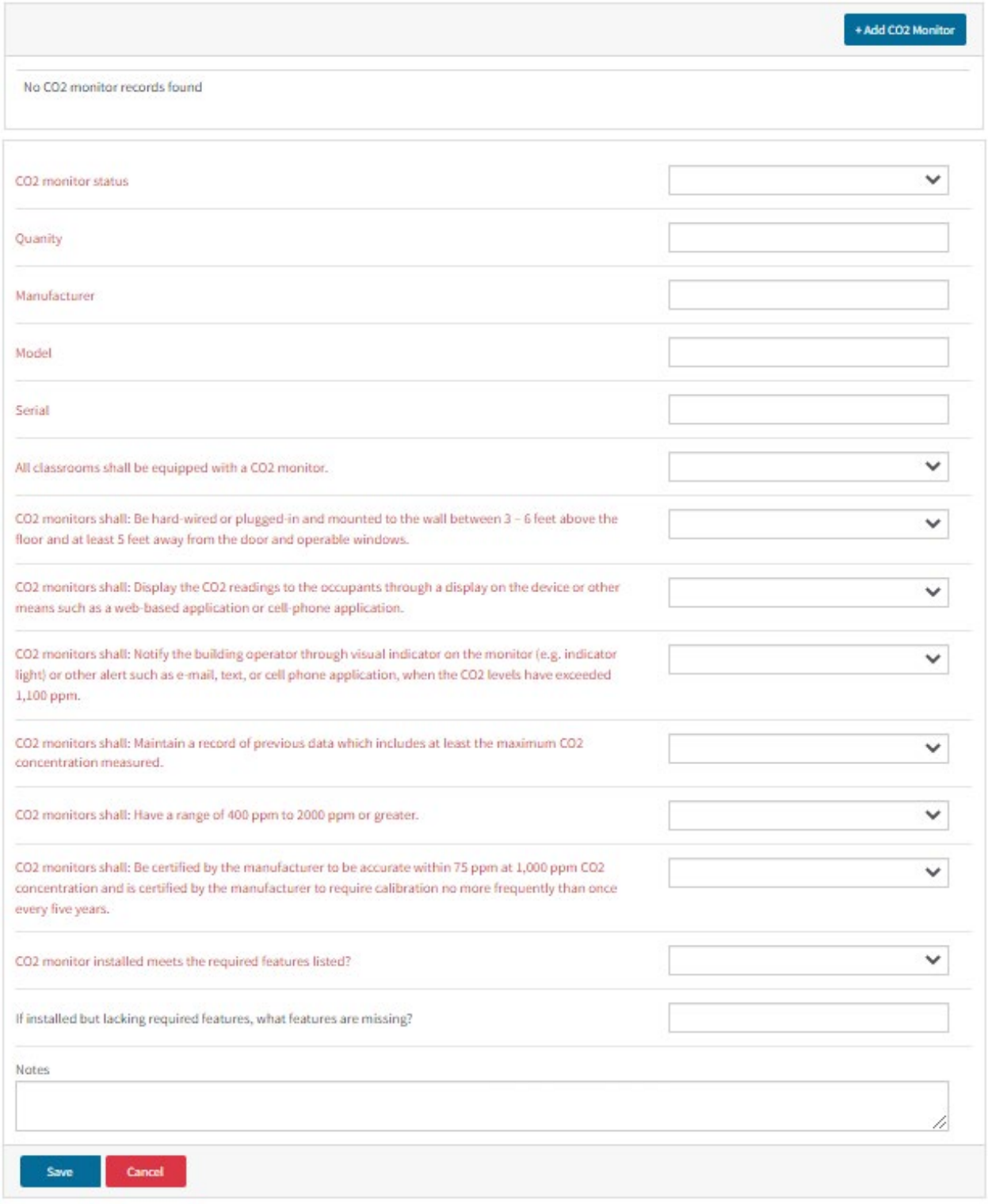


Source: California Energy Commission, CalSHAPE Online System

Instructions:

1. The Fan Output Verification section documents pre-modification and post-modification fan power.
    a. If no modifications can be made, then put -1 and provide additional information.
2. Click on the "Save" button to return to the "HVAC Equipment Details For HVAC Unit"
    a. "HVAC User Inputs and Set Points" to "Fan Output Verification" should all have a blue check mark to indicate the section's completion.

Figure 24: CO2 Monitor

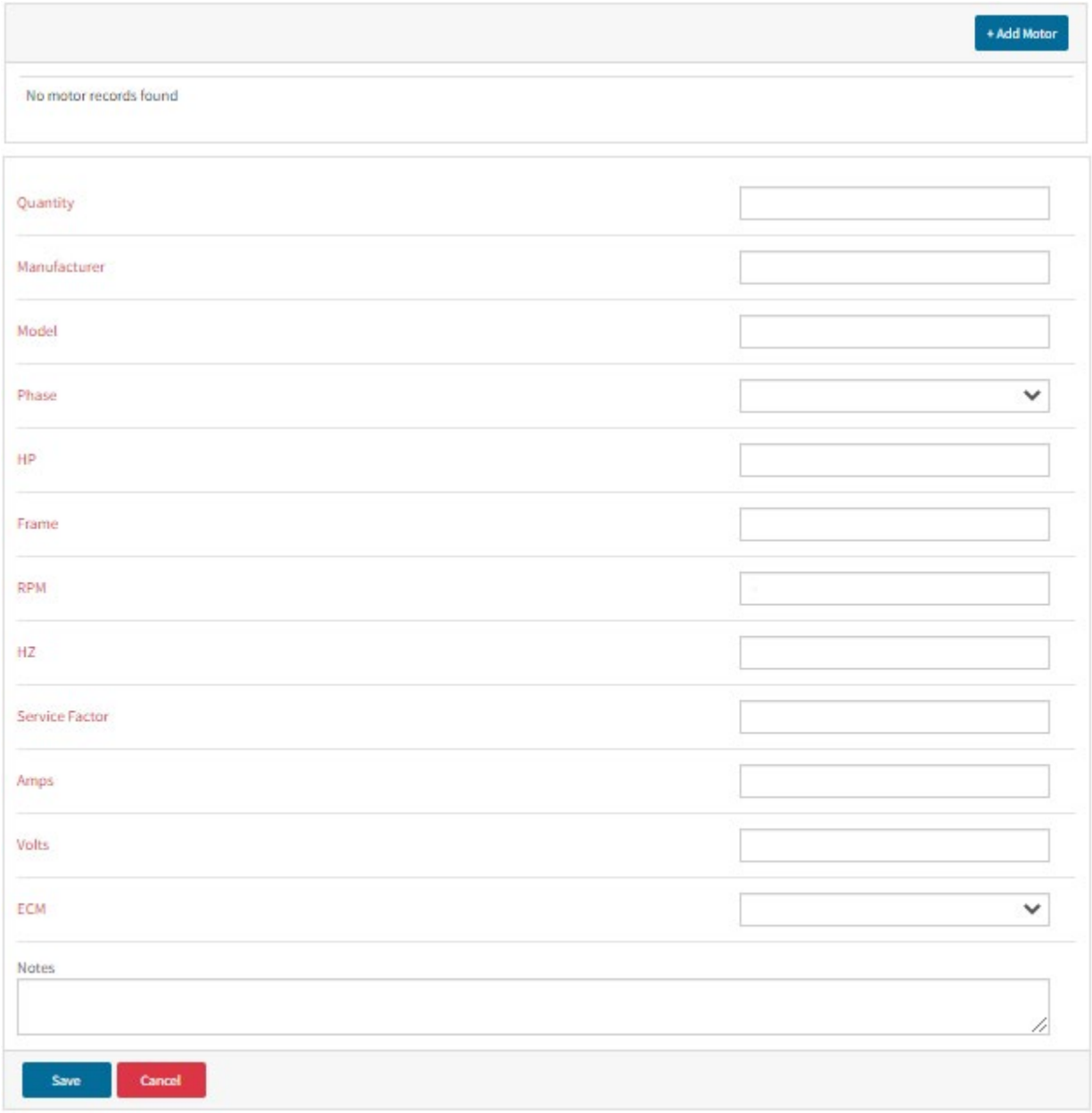


Source: California Energy Commission, CalSHAPE Online System

Instructions:

1. The CO2 Monitor section documents quantity and CO2 monitor information to be installed for the sites' classrooms.
    a. Click the "+ Add CO2 Monitor" to add a new CO2 monitor entry.
    b. If there are fields that cannot be determined, put -1 and provide an explanation as to why the information is unattainable.
    c. Use the "Edit" button to update any existing information.

Figure 25: Motor

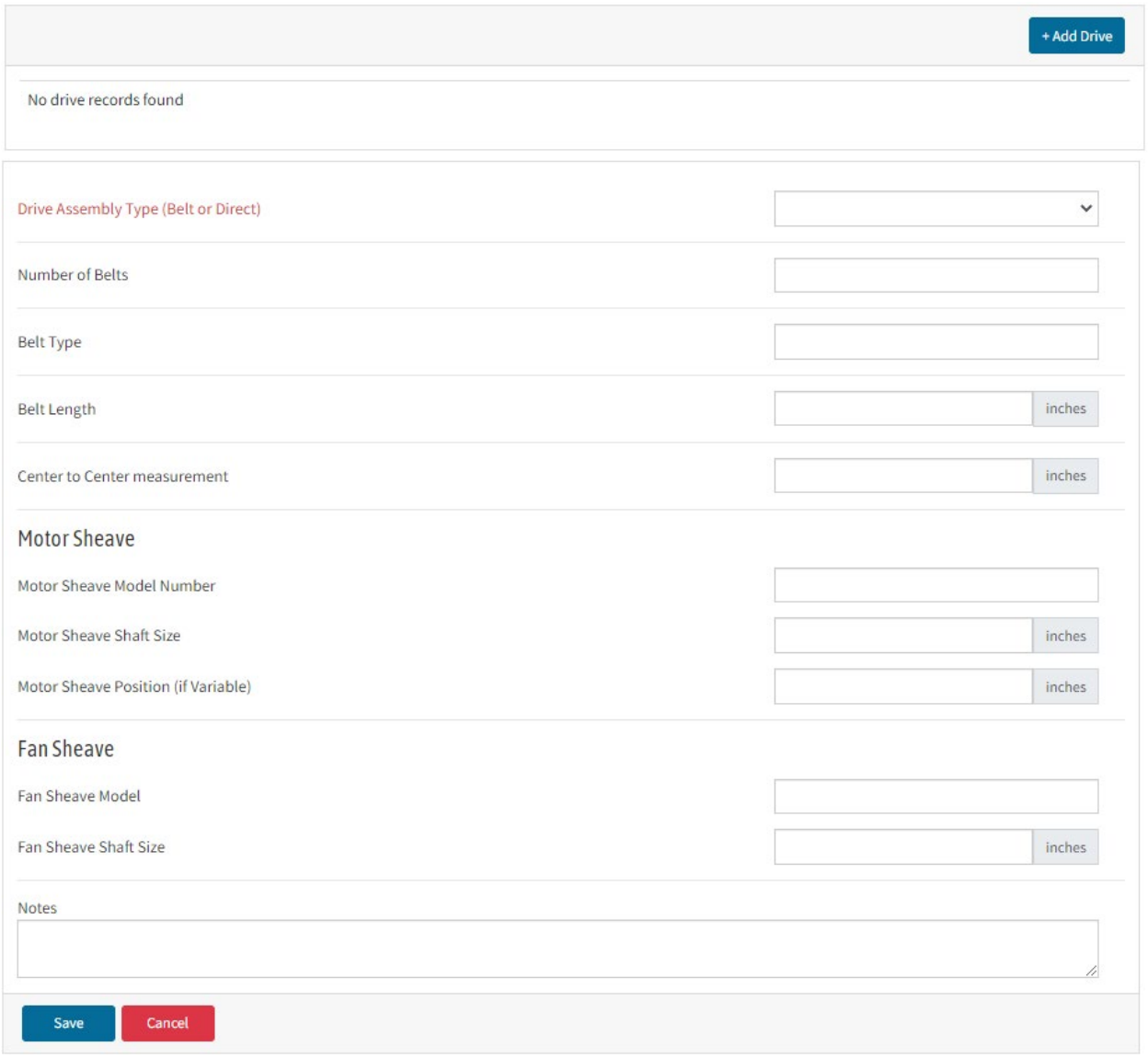


Source: California Energy Commission, CalSHAPE Online System

Instructions:

1. The Motor section is to document various specifications of the motor utilized in the HVAC System. Motor information and specifications may be found on the nameplate attached to the motor.
    a. Click on the "+ Add Motor" button to input data.
    b. Repeat process for additional motors.

Figure 26: Drive Assembly

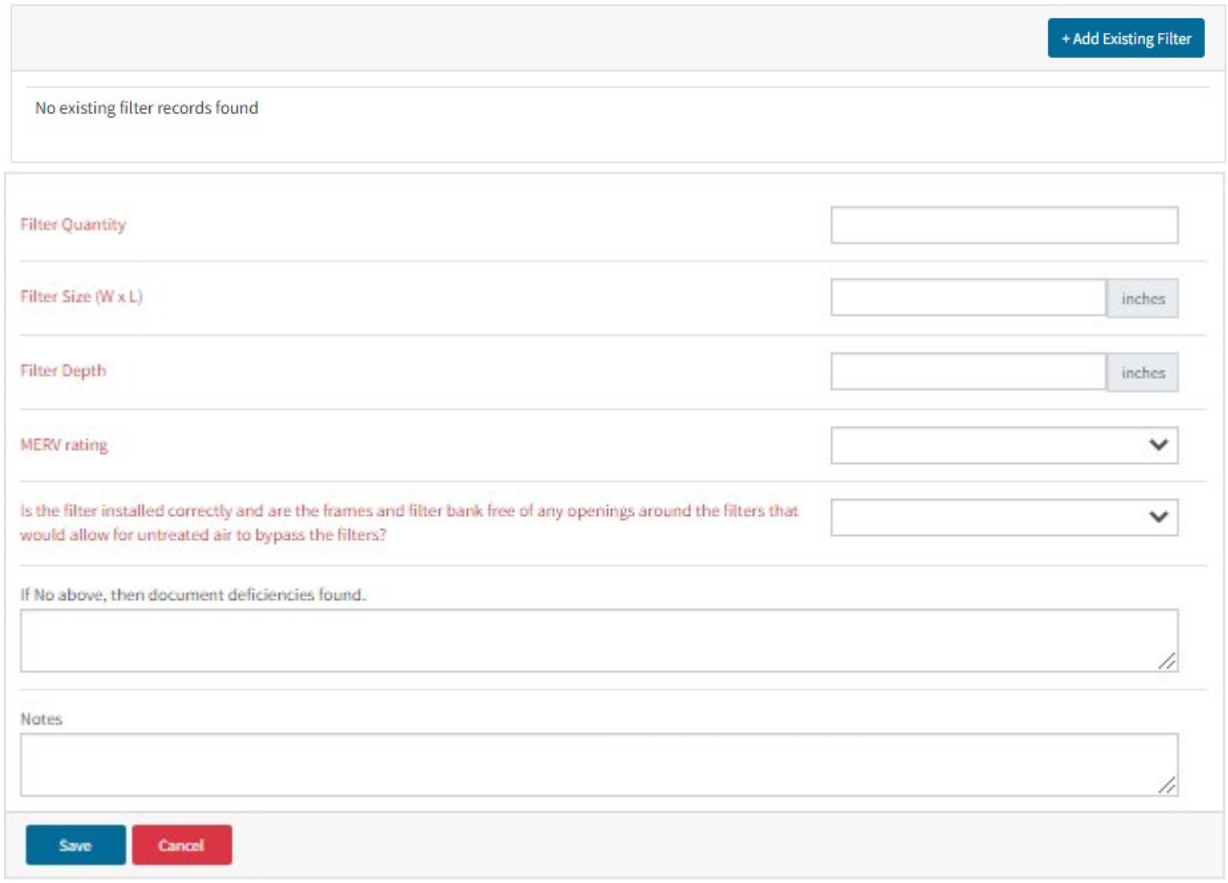


Source: California Energy Commission, CalSHAPE Online System

Instructions:

1. The Drive Assembly section requests additional information relating to the drive assembly belt, motor sheave, and fan sheave.
    a. Click on the "+ Add Drive" button to input data.
    b. Repeat process for additional motors.

Figure 27: Existing Filter Data

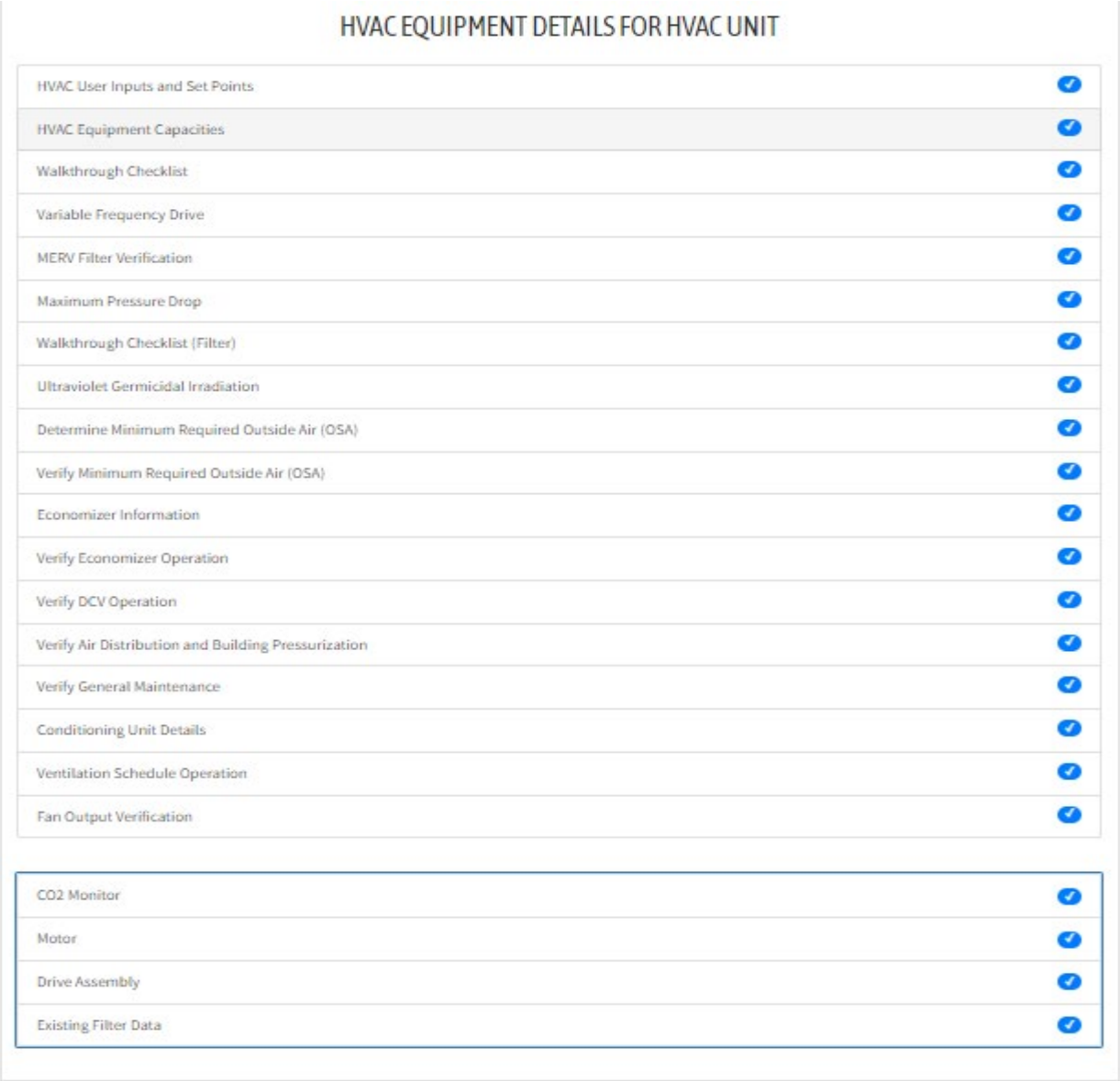


Source: California Energy Commission, CalSHAPE Online System

Instructions:

1. The Existing Filter Data section requires entry of filter information before new replacement filters are installed.
2. Indicate if there are any deficiencies found and using the "Notes" field, input any additional information regarding

Figure 28: HVAC Equipment Details for HVAC Unit Completed



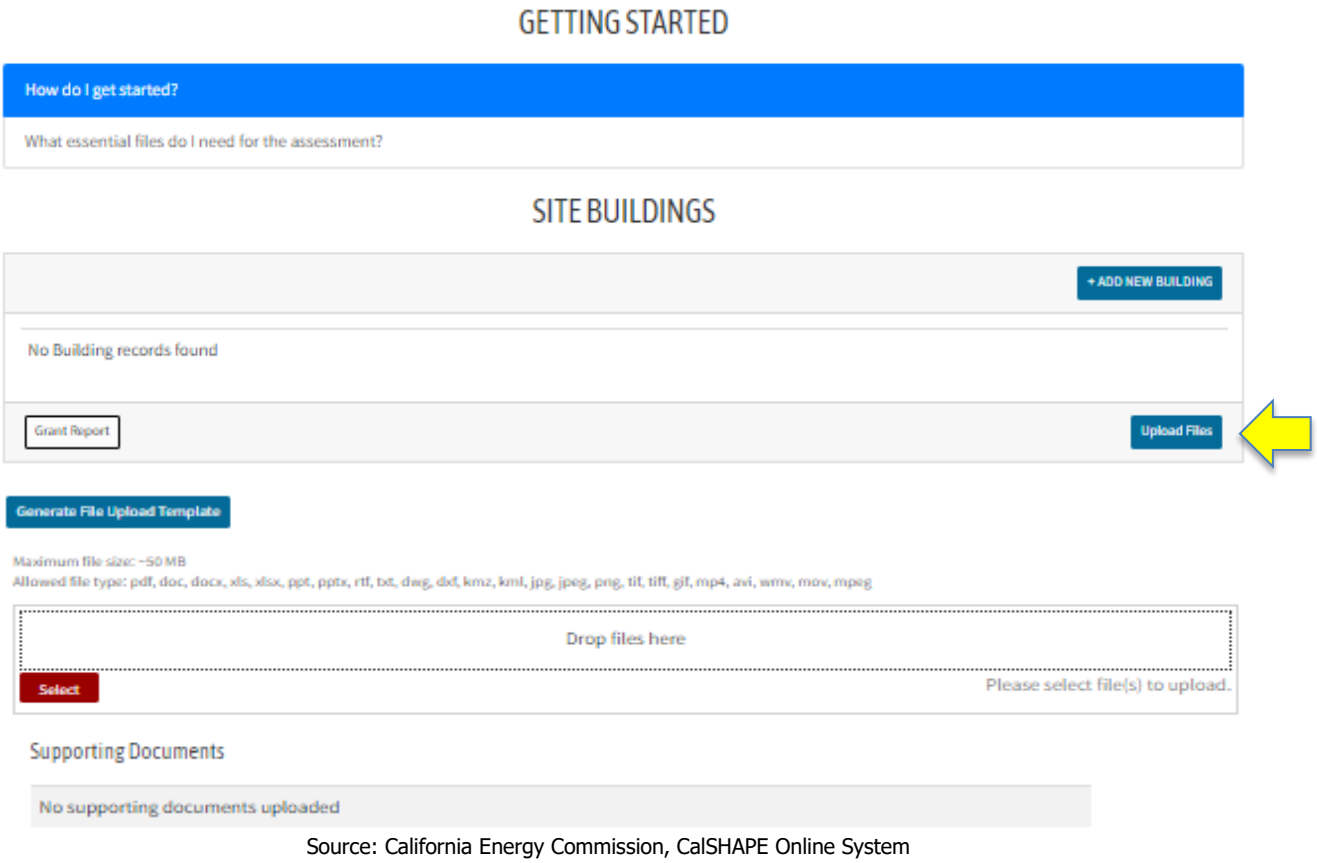
Source: California Energy Commission, CalSHAPE Online System

Instructions:

1. All Sections are marked completed.
2. Return to the "Site Buildings" page upload all files related to this site.

File Matrix Template

Figure 29: Upload Files



Source: California Energy Commission, CalSHAPE Online System

Instructions:

1. After all buildings and HVAC units have been saved in the system, return to the "Site Buildings" page, click on "Upload Files."
2. Click the 'Generate File Upload Template' button to generate an Excel file template for listing assessment file name references by building and HVAC unit.
3. Click "Select" to upload all files and documents you wish to add.
4. The Assessment status should be marked "Completed."
    a. Click on the "Grant Reporting" button to return to the "Grant Reporting" page where you can click the "Submit Assessment(s)" button to submit.

Contact Us

For any questions regarding the HVAC Assessment Report please contact CalSHAPE@energy.ca.gov.