



# **California Schools Healthy Air, Plumbing, and Efficiency Ventilation Program**

## **Scheduled for Replacement Pathway HVAC Assessment Report Worksheets October 2021**

1. Filtration System
2. CO2 Monitoring

These worksheets are made available to help Program participants gather information for an HVAC Assessment Report as part of the California Schools Healthy Air, Plumbing, and Efficiency (CalSHAPE) Ventilation Program Assessment and Maintenance Grant. These worksheets are intended to be used for optional information gathering purposes only since completion of these worksheets does not constitute an HVAC Assessment Report. To comply with grant requirements and be eligible for funding, participants must submit an HVAC Assessment Report electronically by entering the required information through the CalSHAPE Online System as set forth in the most recent CalSHAPE Ventilation Program Guidelines.

These worksheets were designed and offered with a technician in mind that may not always have an electronic device to use when recording data. These worksheets can be printed out and then written on in the field. The information can later be typed into the required HVAC Assessment Report submitted electronically to the CalSHAPE Online System.

The CalSHAPE Ventilation Program Guidelines, these worksheets, and other program requirements such as a data reporting and processes are subject to change by the California Energy Commission, including but not limited to any changes to data reporting requirements from the California Public Utilities Commission. It is the participant's responsibility to use the most recent version of these worksheets and otherwise comply with the current requirements of the CalSHAPE Ventilation Program.



# HVAC ASSESSMENT REPORT WORKSHEET 1

## FILTRATION

October 2021

CALIFORNIA ENERGY COMMISSION



|   |        |                                      |                                       |
|---|--------|--------------------------------------|---------------------------------------|
| <b>Existing Filter Data</b>   |        |                                      |                                       |
| Document rating of existing filters.  |        |                                      |                                       |
| Document filters size/depth/quantity.   |        |                                      |                                       |
| Size:   | Depth: | Quantity:                            | MERV:                                 |
| Size:   | Depth: | Quantity:                            | MERV:                                 |
| <ul style="list-style-type: none"> <li>Is the filter installed correctly? (Yes or No) <i>If not document the deficiency and take any measurements required to make the repair.</i></li> </ul>   |        |                                      |                                       |
| <ul style="list-style-type: none"> <li>Are the frames and filter bank free of any openings around the filters that would allow for untreated air to bypass the filters? (Yes or No) <i>If not document the deficiency and take any measurements required to make the repair.</i></li> </ul> |        |                                      |                                       |
| <ul style="list-style-type: none"> <li>Determine type of motor and control (ECM, VFD, Belt, Direct).             <ul style="list-style-type: none"> <li>Document nameplate and installed components as applicable.</li> </ul> </li> </ul>   |        |                                      |                                       |
| <b>Motor</b>  |        |                                      |                                       |
| Manufacturer =  |        | Model =                              | Phase =                               |
| HP =  |        | Frame =                              | RPM =                                 |
| HZ =  |        | Service Factor =                     | Amps =                                |
| Volts =   |        | ECM = (Y/N)                          |                                       |
| <b>Drive Assembly</b>   |        | Belt Driven <input type="checkbox"/> | Direct Drive <input type="checkbox"/> |
| Belt(s) Number=   |        | Belt Type=                           | Belt Length:                          |
| Center to Center =  |        |                                      |                                       |
| Motor Sheave  | Model: | Shaft Size:                          | Position (if Variable):               |
| Fan Sheave  | Model: | Shaft Size:                          |                                       |

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|  |  |   |
|--|--|---|
| <b>Variable Frequency Drive (VFD)</b> (Yes or No) <input type="checkbox"/> |  |   |
| Manufacturer =   | Model =  | Operating Hz:<br>• Full cooling or High Fan Speed |
|  | • With unit operating at full cooling, or high fan speed, what is the filter pressure drop?  | In. w.c.  |
| <input type="checkbox"/>   | <b>MERV 13 Verification</b>  |   |
|  | • MERV 13 or better filtration is installed. (Yes or No)   |   |
|  | • If MERV 13 or better filtration is not installed, perform the following steps to determine the highest Minimum Efficiency Reporting Value (MERV) filtration that can be installed without adversely impacting equipment.   |   |
|  | • Obtain the existing filters new and final pressure drop from the manufacturer.   |   |
|  | • Posture the unit to provide full cooling, or high fan speed, and disable the economizer.   |   |
|  | • With the existing filters installed, perform, and document a static pressure profile, temperature profile, fan RPM, Motor RPM, voltage, and amps.  |   |
| ESP Δ =  | TSP Δ =  | Filter SP Δ =                                     |
| Fan RPM =  | Motor RPM =  | Mixed Air (RA+OSA) Temp =                         |
| Supply Temp =  | Voltage =  | Amps =  |
| Hertz (Hz) =   |  |   |
|  | <ul style="list-style-type: none"> <li>Using the previously recorded data as a baseline, determine the maximum filter pressure drop, without adversely impacting equipment, by adding material to the filter until the measured or calculated airflow drops by no more than 5%.<sup>1</sup></li> <li>Primary Method to verify airflow - Directly measure the change in airflow if accessible and efficient.</li> <li>Secondary Method – Calculate the change in airflow <ul style="list-style-type: none"> <li><math>CFM_N = CFM_O \times \frac{\sqrt{SP_N}}{SP_O}</math></li> </ul> </li> </ul> | In. w.c   |
|  | • With the maximum pressure drop achieved, document static pressure profile, temperature profile, fan RPM, Motor RPM, voltage amps, and note the ability to increase fan speed if needed.  |   |
| ESP Δ =  | TSP Δ =  | Filter SP Δ =                                     |
| Fan RPM =  | Motor RPM =  | Mixed Air (RA+OSA) Temp =                         |
| Supply Temp =  | Voltage =  | Amps =  |

<sup>1</sup> 5% recommendation and maximum pressure drop determination steps derived from: ASHRAE, ASHRAE Epidemic Task Force: Building Readiness (updated May 22, 2020) (<https://www.ashrae.org/file%20library/technical%20resources/covid-19/ashrae-building-readiness.pdf>)

# HVAC ASSESSMENT REPORT WORKSHEET 1

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|  |  |                          |
|--|--|--------------------------|
| Hertz (Hz) =   |  |                          |
| <ul style="list-style-type: none"> <li>• Verify air volume, under maximum pressure drop condition, is within manufacturers specifications. Commonly specified as:</li> <li>• Minimum CFM per ton (or)</li> <li>• Minimum Supply Air Temperature</li> </ul> |  | <input type="checkbox"/> |
| <ul style="list-style-type: none"> <li>• If applicable, document and take any measurements required to increase the filter frames to accommodate deeper filters.</li> </ul>  |  | <input type="checkbox"/> |
| <ul style="list-style-type: none"> <li>• Remove added material and provide documentation in the assessment report so a licensed professional can determine the highest MERV filtration that can be installed with the existing equipment.</li> </ul>       |  | <input type="checkbox"/> |
| <ul style="list-style-type: none"> <li>• Return the unit to normal operation and enable the economizer.</li> </ul>   |  |                          |
| <ul style="list-style-type: none"> <li>• Include relevant photographic documentation</li> </ul>  |  |                          |
| <b>Ultraviolet Germicidal Irradiation</b>  |  |                          |
| Replacement Lamp Wattage:  |  |                          |
| Replacement Lamp Quantity:   |  |                          |

**HVAC ASSESSMENT REPORT WORKSHEET 2****CO2 MONITORING**

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|                                    |   |                                     |  |
|------------------------------------|---|-------------------------------------|--|
| <input type="checkbox"/>           | <b>Verify installation or install a CO<sub>2</sub> monitor.</b> <ul style="list-style-type: none"> <li>All classrooms shall be equipped with a CO<sub>2</sub> monitor.</li> </ul> <b>CO<sub>2</sub> monitors shall:</b> |                                     |  |
| <input type="checkbox"/>           | Be hard-wired or plugged-in and mounted to the wall between 3 – 6 feet above the floor and at least 5 feet away from the door and operable windows.   |                                     |  |
| <input type="checkbox"/>           | Display the CO <sub>2</sub> readings to the occupants through a display on the device or other means such as a web-based application or cell-phone application.   |                                     |  |
| <input type="checkbox"/>           | Notify the building operator through visual indicator on the monitor (e.g. indicator light) or other alert such as e-mail, text, or cell phone application, when the CO <sub>2</sub> levels have exceeded 1,100 ppm.    |                                     |  |
| <input type="checkbox"/>           | Maintain a record of previous data which includes at least the maximum CO <sub>2</sub> concentration measured.  |                                     |  |
| <input type="checkbox"/>           | Have a range of 400 ppm to 2000 ppm or greater.   |                                     |  |
| <input type="checkbox"/>           | Be certified by the manufacturer to be accurate within 75 ppm at 1,000 ppm CO <sub>2</sub> concentration and is certified by the manufacturer to require calibration no more frequently than once every five years.     |                                     |  |
|                                    | <b>Is a CO<sub>2</sub> monitor installed that meets the required features listed above?</b> (Yes or No)   |                                     |  |
| <input type="checkbox"/>           | If installed but lacking required features, what features are missing?  |                                     |  |
| <input type="checkbox"/>           | If installed, document CO <sub>2</sub> monitor nameplate data.  |                                     |  |
| Manufacturer:                      |   | Model:                              |  |
| Serial:                            |   |                                     |  |
| <input type="checkbox"/>           | Include relevant photographic documentation   |                                     |  |
| <b>Fan Output Verification:</b>    |   |                                     |  |
| <b>Pre-Modification Fan Power:</b> |   | <b>Post-Modification Fan Power:</b> |  |