

Interim Blower Door Best Practices & Considerations During COVID-19

To: All Participating Residential Contractors

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NYSERDA & NYS WAP: INTERIM BLOWER DOOR BEST PRACTICES & CONSIDERATIONS DURING COVID-19

This guidance is not intended to replace any existing applicable local, state, and federal laws, regulations, or standards and is applicable to blower door use in occupied single-family detached buildings receiving program incentives through NYSERDA's Residential Energy Efficiency Market Rate, Moderate and Low-Income programs & NYS Weatherization Assistance Program (WAP). The procedures described are reflective of our best understanding of the SARS CoV-2 virus behavior at the time of publication. Updates will be issued as our understanding of the virus and guidance from public health experts evolves. All New York State workers are required to follow all procedures published by the Department of Health contained within the [Interim Guidance for Construction Activities During the COVID-19 Public Health Emergency](#).

Background

Properly designed ventilation, in principle, assists in improving indoor air quality and worker/occupant safety. To test a building's air tightness, a blower door fan is used to introduce a large amount of moving air into a building. This enables weatherization workers and energy auditors to take advantage of the blower door as a tool to bring ventilation into the homes they are working in during COVID-19. In any pressurization or depressurization test, outdoor air is flowing into the building (or the space being tested, if it's not the whole building) and indoor air is flowing out of the building (or the space being tested).

While bringing dilution air into the building and removing stale indoor air should reduce the concentration of contaminants in the air, it's also important to consider that the blower door fan may cause air to pass through the leaks that occur in a building, sometimes in directions that the air would not normally flow.

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This flow of air between spaces that do not normally have air flow could potentially result in the resuspension of particulates that may be with viral particles. This is possible if there is an asymptomatic carrier in the building who may be shedding virus or if there was a previous infection or transmission in the building. This could result in exposure to the contaminated air by workers and occupants present in the space. For this reason, it is recommended by ASHRAE that it would be best for occupants and all workers on-site who do not need to be in the building to stay out of the building and away from the blower door path during tests and at least an hour from the time the blower door is shut off. If that is not possible for the work crew, they should wear N95 respirators when they re-enter. ASHRAE guidance would include that the auditor and any worker who remains in the building during the blower test wear an N-95 respirator also.

Pressurization vs. Depressurization in Weatherizing Homes

A depressurization test is the traditional option used when weatherizing homes in the U.S. Any potentially infected air is going to be drawn over the fan housing / blades of the blower door kit and those surfaces will need to be properly cleaned and disinfected after each test.

Depressurization may raise concerns about drawing pollutants into a home from fiberglass fibers in the attic, mouse droppings, ashes from a fireplace or woodstove, and mold or mildew from a crawlspace.

A pressurization test, which typically has not been used when weatherizing homes in the U.S., has its own inherent concerns to consider. For example, in some locations it may draw more pollutants into the home such as woodsmoke present in outdoor air or air contaminants in densely populated / developed urban locations. Also, there is a possibility that the air coming through the blower door could be at high enough velocity/pressure to lift previously settled viral particles from surfaces directly in the path of air flow (ex. floors and carpets), making them airborne.

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Additional considerations for pressurization tests include:

- Pressurization tests often result in a higher leakage rate than depressurization tests because pressurization will open backdraft dampers, whereas depressurization closes them.
- Pressurization may also extinguish standing pilot lights.
- If using pressurization tests, the auditor may need to adjust expectations, work orders and typical practices when comparing air tightness numbers Pre and Post air sealing, but the same option must always be used for gathering both Pre and Post numbers, and for QCI / QA purposes.

It is NYSERDA and NYS HCR's position that the option selected by NYSERDA Participating Contractors or the WAP subgrantees (together referred to as Contractors) should be based on the unique conditions present at each site, allowing the auditor to make the careful assessment that is the safest option for both workers on-site and home occupants.

In single family detached buildings where a subgrantee or contractor can run a blower door (BD), Contractors must make the decision based on the conditions they observe and encounter, whether the space is currently occupied or unoccupied, and follow a standardized process consistent with the building situation.

Attached Dwellings and Multi-unit Buildings

As of the time of this publication, it is NYSERDA & NYS HCR's position, consistent with ASHRAE guidance, that **a blower door should not be run on multi-unit buildings** of any size in order to avoid pushing or pulling potentially infected air between attached dwellings and/or across walls, ceilings or floors. In a small building (2-4 unit) or larger multi-family building (5+ units), a blower door **should not** be run. With multiple dwellings that share adjacent walls between dwellings, the moving of air from one building envelope or living space to another is a potential health issue and a blower door test **should not be performed** at this time due to COVID 19 concerns. Blower door numbers in small multifamily buildings can be arrived at for a building or per unit by entering the required data in the NYS WAP Estimated Blower Door Number calculator. Currently NYSERDA is working with NYS WAP on creating a combined calculator for use in both programs. Additional guidance for multi-unit buildings will be issued in a future program notice.

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Safety Considerations for COVID-19:

- Advance communication:
 - Collect as much information about the client's needs and concerns prior to arrival to limit time spent having conversations with the client at the time of the test.
 - Explain safety protocols and determine conditions on-site relative to COVID-19 before running the blower door. Advise occupants to maintain social distancing and wear face coverings.
 - Obtain responses to key questions about possible COVID-19 exposures and "at-risk" occupants.
 - If the building is occupied, notify the client that any occupants present will be asked if they can remove themselves from the premises.
 - If any occupants may have to remain in the space, plan for the use of an isolation area or physical containment.
- Test safety protocols:
 - Follow social distancing guidelines on-site with occupants. Suggest single entryway to be used to limit repeated exposure throughout parts of the building.
 - Wear face coverings.
 - Ideally, the test should take place while the occupants and all workers other than the auditor/blower door operator wait outside the building and away from the path of the blower fan.
 - For any occupants that may have to remain in the space, the use of an 'isolation area' (i.e. a separate room such as a bedroom) and/or a physical containment barrier should be considered to maximize safety for both the occupant(s) and crew members.
 - If an 'at risk' individual is present, or just too many people are present, or other unsafe conditions exist per your reopening / H&S plan, deferral of the project may be necessary
 - To limit potential exposure the auditor/blower door operator and any necessary crew members present inside, must also move away from the fan in the blower door during the test and avoid standing in the main stream of air flow if possible.

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- Additional considerations for worker PPE:
 - Follow ASHRAE guidance – the auditor/blower door operator and any crew members present inside during the blower fan test should wear N95 respirators; they should keep them on for an hour after the fan is shut off. Work crew members who were outside during the test, should also wear N95 respirators if they return to the inside within an hour of the fan shut off.
 - Consider wearing safety glasses or face shields to protect against airborne particles.

General Safety Protocols:

- Perform a risk assessment and always wear appropriate personal protective equipment for general safety as well as for COVID-19. Follow worker health, hand sanitizing, and social distancing guidelines, per CDC, NYS, your local health officials, and your employer. <https://www.cdc.gov/coronavirus/2019-nCoV/index.html> (NYS in-home services guidance)
- Even in unoccupied scenarios all COVID-19 related H&S precautions must still be followed, including, but not limited to:
 - having and using the proper PPE,
 - following health-related screening steps for crew members allowed on site,
 - staying clear of the fan intake and outlet paths during operation, and
 - remaining diligent about following CDC, NYS and local health guidelines around distancing, wearing masks, and disinfecting tools, equipment and other surfaces.
- In general, while the blower door is being run it is better if the building is unoccupied, or if feasible, for occupants and all workers other than the auditor/blower door operator to be outside the home rather than inside.
- Keep unneeded tools and equipment out of the buildings as much as possible. Tools and equipment surfaces should always be cleaned per CDC disinfecting guidelines and according to manufacturer recommendations prior to being packed up. <https://www.cdc.gov/coronavirus/2019-ncov/community/disinfecting-building-facility.html>

Ventilation Purge – Blower Door Process

As soon as feasible upon arrival, we advise initially running the blower door in the building with a few windows open to “purge” the air in the single-family detached home. As a result, indoor air quality should be healthier for everyone prior to conducting the blower door test.

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The exact process of how to do this purge is still under review, but current best practices include opening windows farthest away from the blower door and doors in closable rooms. The goal is to get any possible contaminated air that is in the building out of the building, or at the very least, diluted to the greatest degree possible before beginning any work in the house.

Sample calculations from the Building Performance Association:

Consider a 1500 square foot home with 8 ft ceilings. Volume = 1500 * 8 = 12000 cubic feet. Assume a blower door can move 6000 cubic feet per minute. Then, 12000/6000 = 2 minutes to replace all the air of the house with outdoor air. * If the house was twice as big (3000 square feet) then the volume would be 24000 cubic feet. Then, 24000/6000 = 4 minutes to purge the house air. These times are just guidelines and could be increased as the auditor/work crew chief feel necessary. <https://www.building-performance.org/sites/default/files/BPA%20Blower%20Door%20Position%20-%206.18.20.pdf>

Occupants and any other workers would ideally be outside (weather and other circumstances permitting), following safety protocols for social distancing, and a reasonable distance away from the airflow pathway produced by the blower door. Any work crew member who might have to be inside, due to access to power or site conditions, should be utilizing the appropriate PPE – gloves, masks, eye protection and/or a face shield or other protective eyewear. Once the purge is initiated, the auditor or blower door operator or any work crew member who must remain inside, should follow ASHRAE guidance and wear an N95 respirator.

Following the purge is the blower door 'test in' to include the following steps:

- establish the pre-Wx blower door number
- create the targeted air sealing scope of work,
- use a smoke pen to diagnose leakage pathways (or IR camera if preferred though this might not be as effective in a pressurization scenario),
- test the CAZ and break down the blower door in a minimum amount of time.

Blower Door & Air Sealing Process*

**This information is not all inclusive and as always, follow social distancing and safe work guidelines for construction sites, per CDC, NYS, your local health officials, and your employer.*

<https://www.cdc.gov/coronavirus/2019-nCoV/index.html>

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Complete a health screening of the household (HH), prior to arriving at jobsite. Upon arrival and prior to beginning work inside the home, confirm health screening responses with the customer in accordance with your employer's reopening / H&S plan and DOH guidelines:

Ask the 4 questions of the HH, has anyone:

1. knowingly been in close or proximate contact in the past 14 days with anyone who has tested positive for COVID-19 or who has or had symptoms+ of COVID-19,
2. tested positive for COVID-19 in the past 14 days, or
3. has experienced any symptoms+ of COVID-19 in the past 14 days.
4. Spent more than 24 hours in a state currently the subject of COVID-19 quarantine requirements in the past 14 days.

+According to the CDC guidance on "Symptoms of Coronavirus," the term "symptomatic" includes those who have the following symptoms or combinations of symptoms: fever or chills, cough, shortness of breath or difficulty breathing, fatigue, muscle or body aches, , headache, sore throat, congestion or runny nose, nausea or vomiting, diarrhea, or new loss of taste or smell. This list is evolving as the medical industry learns more about the virus, refer to CDC's website for the most current information: <https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html#self-checker>

The screening must be documented; a 'Yes' response to any of the above would require the auditor / crew leader to determine the best course forward for the project as outlined in the subgrantee's reopening / H&S plan.

Blower door procedures are for single family detached buildings only. Reminder: **Do not run the blower door on multi-unit buildings.**

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- **Auditor:** See blower door best practices; determine best option (depressurize or pressurize) for current conditions and record; all subsequent tests must utilize same.
 - Purge the home by running the BD with at least a few, windows open initially for several minutes (time based on size – see BD process for example),
 - Once the purge is complete close the windows and run the blower door test to measure the CFM50 and establish the Pre-Wx blower door number.
 - The blower door may be used to guide the creation of the air sealing scope of work, helping to diagnose potential discrete sources of air leakage not easily identified by visual inspection.
 - Use a smoke pen (or IR camera) to diagnose leakage pathways and identify areas to be sealed and record for targeted work order & estimating final blower door number for possible ASHRAE ventilation requirements.
 - Perform H&S tests for any CAZ.
- **Crew Leader / Crew:** Follow COVID-19 screening procedures and protocols for worksite.
 - If HH is willing, follow blower door protocols for blower door test to perform a “purge” to improve indoor air quality prior to commencing work scope installations.
 - Following purge, turn off blower door and begin air sealing in accordance with work order and traditional air sealing methodologies and protocols (ex. after any dense pack measures that are to be performed).
 - Leave windows open, if possible, during the installation to allow for continued ventilation of the space while workers are in the home.
 - Do not run interim blower door tests while workers and occupants are in the home.
 - The blower door may be turned on periodically during the installation at a low speed to assist in drawing ventilation air through the home. Fan speeds should be low enough and workers and occupants positioned to avoid creating air currents among people inside the home.

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Air Sealing Procedures

Air sealing measures shall address primary sources of air leakage first, followed by duct leakage in unconditioned spaces, then progress to discrete or secondary leakage sources per work order. Air sealing shall be prioritized beginning with the attic or uppermost areas of the dwelling, followed by the crawlspace or lowest area of the dwelling. Air sealing measures inside the living space should be prioritized to include those with the greatest impact while minimizing the time workers must spend inside the home to the greatest extent possible. (For example, sealing large holes around plumbing penetrations under sinks can be done quickly and is likely to be high impact, while caulking around baseboards can be time consuming and is likely to be lower impact.)

- **Primary Air Sealing**
 - Primary air sealing measures address larger (more primary) sources of air leakage or infiltration that often may be diagnosed through visual inspection.
 - Primary sources of air leakage include, but shall not be limited to:
 - A) Holes in ceilings, walls (including top plates), floors, or doors
 - B) Missing or broken windows
 - C) Missing dampers in chimneys, furnace flues, and exhaust fans
 - D) Leaks around window air conditioners
 - Infiltration sources of this type tend to reflect direct openings between the interior of the dwelling and the outdoors.
- **Discrete or Secondary Air Sealing**
 - Discrete or secondary air sealing measures address smaller (more discrete) sources of air leakage that may not be easily visible but are often cost effective to correct. Secondary or discrete sources of air leakage include, but shall not be limited to:
 - A) Penetrations around chimneys, flues, and exhaust vents
 - B) Penetrations around plumbing and heating pipes
 - C) Penetrations around electrical service entries and wiring
 - D) Other small seams and gaps between conditioned and unconditioned space
 - E) Loose window glazing (where panes are in jeopardy of falling out)

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Discrete or Secondary Air Sealing - continued

- Discrete air sealing measures shall be performed only after all dense pack insulation measures, primary air sealing and duct sealing measures in unconditioned spaces are complete, and only where additional air sealing is determined to be cost effective per the work order as required by program guidelines.

To ensure occupant safety, subgrantees and contractors are still required to perform a comprehensive CAZ test of all combustion appliance zones at the end of each day following any type of air sealing work. This remains a program requirement. Results of these tests must be included in the building file on the appropriate program form.

Alternative Procedures (WAP subgrantees only): For the WAP program blower door numbers in small buildings for Pre-Wx and Post-Wx can be arrived at for a building (or per unit) by entering the required data in the NYS WAP Estimated Blower Door Number calculator.

In those instances where conditions or residents in some units in small buildings make the collection of all the required data from each unit not feasible or advisable from a H&S perspective, auditors are to record the reason(s) (ex: auditor finds the number of people present in a unit is > [number cited in subgrantee H&S plan]), contact their assigned field representative for guidance, and estimated data for that particular unit may be allowed to be entered into the estimated blower door calculator for that unit.