

Project Name
Address

PASSIVE HOUSE VERIFICATION PLAN | V0
PREPARED FOR THE CITY OF VANCOUVER
DATE

INTRODUCTION & BACKGROUND

Project Description

Project Name	Name
Address	Address Vancouver, BC
Building Use	Use
Maximum Occupancy	Occupants
Airtightness Target	0.6 ACH per Passive House Standards

Document Scope

This document is intended to help all involved to understand the required Passive House verification activities during the construction stage of the project. Simply stated, our goal is to help assure that this building achieves the set Passive House goals as presented to the Building Certifier during the Design Stage Review. However, we are not the Professional of Record, nor do we manage or undertake the construction. We are dependent on others to take the necessary actions resulting from our quality assurance reviews and to assist with necessary documentation related to Passive House Certification. This document briefly describes our services during construction, including the limitations of our work, and the roles of others as it relates to our work. It is important to note that our construction phase services assume that construction is based on the IFC drawing set and reviewed shop drawing documents. Where changes or updates to the design are made during the construction phase (RFI's, requested consideration of product substitutions), the impact to the Passive House Certification and the energy model must be considered. As such, the architect and construction team should relay product substitutions and RFI's to the Passive House Consultant so that the impact on certification can be assessed. Communication among the construction team and Passive House Consultant is critical as the energy model will be updated based on site observations and as-built drawings.

Key construction stage activities include:

- Submittal Review
 - Items include insulation products, window shop drawings, heat recovery ventilators, heating/cooling equipment and service water heating equipment for Passive House compliance. Refer to Attachment 1 – “Building Site Photos for the Passive House Certification” for more information.
- Field Review (5 Site Visits)
- Airtightness Testing
 - Qualitative Mid-construction Airtightness Test
 - Quantitative Whole Building Airtightness Test for Compliance

- Ventilation Commissioning
- Occupant Training
- Photo Documentation
- Submission for Final Certification

The following sections provide a description of each of these activities as well as our field review plan.

References

- Architectural drawings issued construction and dated December 22nd, 2026
- Architectural specification issued for construction and dated December 22nd, 2026
- Mechanical drawings issued for tender and dated July 14th, 2026
- Electrical drawings issued for tender and dated July 14th, 2026

CONSTRUCTION STAGE ACTIVITIES

Submittal Review

The Architect will review submittals and shop drawings for items including assemblies, components, and products, relevant to Passive House Certification.

We recommend reviewing the following key submittals:

- One iteration of shop drawings for the glazing systems consisting of:
 - Curtain wall and glazed door shop drawings
 - Skylight shop drawings
 - Punched window shop drawings
 - Shop drawings must include thermal modelling reports for each unique Insulated Glazing Units and each unique frame profile.
- One iteration of shop drawings for the heat recovery ventilators, space conditioning plant and Service Water Heating plant. Heat pump data to be provided for PHPP modelling.

There are other submittals that are required for Passive House Certification that will be reviewed as needed, however, these submittals must be submitted for certification.

These submittals include:

- Insulation products used for all building assemblies.
- Insulation products used for ventilation ducts and service water heating systems.
- Circulation/booster pumps for service water heating.
- All fitness equipment
- Appliances in the kitchen
- Laptops/computers/monitors for the reception/office is applicable.
- Lighting fixtures and bulbs specifications
- Submittals for all appliances that will be installed at occupancy

If the project team is aware of other submittals which should be reviewed, they should communicate these to the Architect.

Field Review

We are anticipating roughly 24 months of construction and 12-18 months of RDH involvement. We have listed the key passive house verification site visits in Table 1 and the purpose of the site visit. Note that these activities are not intended to be an exhaustive list, rather it is to outline the key reviews required for Passive House Certification. The Construction team is responsible for scheduling the site visit. While we understand that these may change as the project progresses, we expect that mock-ups and contractor requests for reviews are roughly planned around these visits. Reviews may also be combined depending on project progress. Our reviews fundamentally provide quality assurance, and we rely on the contractor to provide quality control prior to our review. The contractor and architect are primarily responsible for addressing our observations.

During site visits we will:

- Confirm that the building enclosure construction is in general conformance with the IFCs and the PHPP model as it relates to Passive House Certification.
- Review on-site mock-ups in relation to the PHPP and thermal bridging models.



Figure 1: Mock-up wall illustrating window installation.

- Meet with the designated general contractor representative during each site visit.
- Prepare and submit a site visit report (SVR) to summarize our observations and list unresolved deficiencies.
- Review and document Passive House compliance. This includes reviewing materials and products for compliance with our PHPP energy model and, where applicable, that products are Passive House certified.



Figure 2: Installation of insulation. Poor installation will result in derating of the as-built PHPP model.

- In order to assist with our review and the certification process, we request photo documentation and measurements of critical items be provided by the contractor, including but not limited to the following:
 - Insulation types and thicknesses for typical assemblies, framing spacing and key thermal bridging details.
 - Review of identified thermal bridging to confirm compliance with thermal modelling and IFC documentation.
 - Air barrier documentation and review of typical details.
 - Conformance of mechanical systems (i.e. ventilation, DHW, space conditioning, and electrical) with the IFC documentation and for conformity with our PHPP energy model.



Figure 3: Use of oversized pipe hangers to ensure continuous insulation of service water heating pipes.

A list of building site photo requirements for Passive House Certification has been included as an attachment.

TABLE 1 SITE VISIT PLAN (APPROXIMATELY 5 SITE VISITS FOR PASSIVE HOUSE ITEMS)		
Site Visit	Primary Purpose	Est. Scheduled Date (Week No.)
1.	<ul style="list-style-type: none"> Review the Passive House Verification Plan with the construction team. Review the Air Barrier Monitoring Plan and Insulation Documentation Plan. Site meeting regarding suspended slab Review foundation submittal requirements. Review field review plan, including distribution of SVRs and action lists. Review mock-up plan and quality control plan of subtrades. Review air barrier implementation plan and discuss Air Barrier Supervisor. 	TBD
2.	<ul style="list-style-type: none"> Review suspended slab, slab insulation, and related thermal bridges. Review perimeter of foundation for insulation. 	TBD
3.	<ul style="list-style-type: none"> Site meeting regarding above grade building enclosure construction. Review comments from the IFCs (both from RDH's review and other team members) relevant to above grade structure. Review mock-up plan (discuss potential locations for mock-ups). Review field testing plan (water and airtightness testing). 	TBD
4.	<ul style="list-style-type: none"> Above Grade wall and window installation Mock-ups: <ul style="list-style-type: none"> → Penetration mock-up → Meet with glazing contractors and review mock-up locations 	TBD

TABLE 1 SITE VISIT PLAN (APPROXIMATELY 5 SITE VISITS FOR PASSIVE HOUSE ITEMS)		
	<ul style="list-style-type: none"> Site meeting to discuss ventilation commissioning plan. Review Passive House requirements, commissioning methodology and equipment with the Construction team and the Testing and Balancing Contractor. 	
5.	<ul style="list-style-type: none"> Review of roof insulation installation prior to roofing membrane installation. Review mock-up of vertical wall insulation <ul style="list-style-type: none"> → Corner (Inside and Exterior) → Transition to vertical wall → Parapet transition → Mechanical room vertical transition → Skylight transition → Roof penetration mock-up Review installation of mechanical systems <ul style="list-style-type: none"> → Space conditioning, ventilation, DHW, and product conformity → Measure all HRV outdoor air and exhaust duct lengths. → Measure all HRV outdoor air and exhaust insulation thicknesses. → Confirm continuity of HRV duct insulation. → Deficiencies in mechanical insulation → Electrical equipment reviews → Piping (DHW and plumbing) compliance with IFC's → Confirm continuity of DHW insulation. 	TBD

Airtightness Testing

This section outlines the plan for performing airtightness testing to satisfy the Passive House Certification requirements. A detailed test plan will be prepared outlining the specific test zones, fan layout, building preparation requirements, schedule and environmental condition requirements by the testing agency. Test pressures will be adjusted to account for height and temperature differences per “Airtightness measurements of high-rise buildings” published by PHI.

The building will conform to the following airtightness metrics:

- V_{n50} - Whole building airtightness of 0.6 air changes per hour at 50 pascals of pressure (0.283L/s/m²@ 50Pa), when tested in accordance with ISO 9972 standard. The building volume will be calculated to the Passive House Institute (PHI) requirements and other minor testing protocol modifications as prescribed by PHI. This is an average between positive and negative pressure, in deviation from the standard. Please see “Criteria for the Passive House, EnerPHit and PHI Low Energy Building Standard” document for details.

We recommend that the construction team appoint an “Air Barrier Supervisor”. The likelihood of achieving success is greatly increased with a dedicated team member focused on the goal of airtightness. Due to the numerous trades and tasks on site maintaining airtightness in all components can be overlooked. Having a dedicated individual reviewing subtrade work and who is also able to answer subtrade questions will greatly contribute to achieving airtightness. We recommend that they review the “Illustrated Guide to Achieving Airtight Buildings” document as published by BC Housing and have a good understanding of the airtightness requirements of Passive House. Also see the attachment “Air Barrier Monitoring Plan” for the specific responsibilities of the Air Barrier Supervisor. We recommend a separate meeting with the Air Barrier Supervisor to review the plan.

Mid-Construction Airtightness Test

We recommend that a mid-construction ‘whole building’ airtightness be completed including qualitative testing such as smoke tracer testing and infrared thermography to ensure Passive House compliance is achievable and when air barrier materials are still exposed for repairs if required. This would include testing a section of the building. The test zone has not been selected at this time. We recommend a meeting to discuss with the construction team the test zone and scheduling the test date.

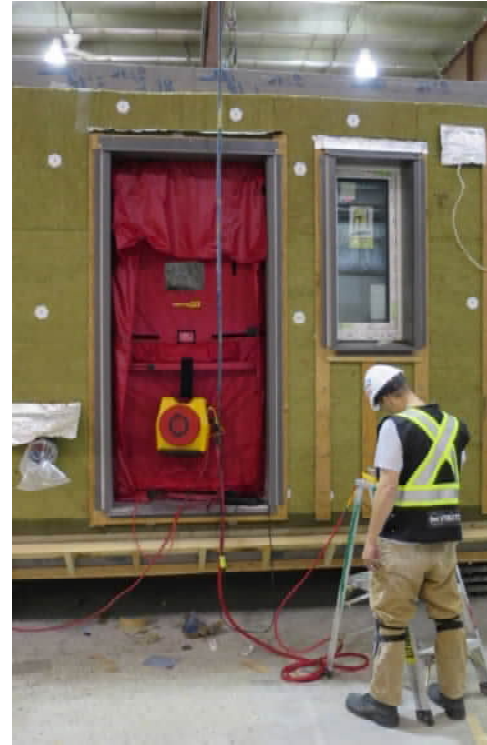


Figure 4: Mid-construction airtightness testing conducted when air barrier is accessible.

This testing can help to reduce the risk of air leakage problems by providing quality assurance of critical locations and can also reduce the risk of non-compliance. Any identified deficiencies may be corrected prior to installation of the remaining windows and penetrations.



Figure 5: Qualitative smoke tracer testing of a parapet.

Whole Building Airtightness Test

An airtightness testing agency will be retained to perform airtightness testing of the building to demonstrate compliance with the Passive House Certification requirements and commissioning of the air barrier system.

Methodology

For Passive House Certification, the testing methodology will comply with standard ISO 9972 standard. Testing will be conducted under both pressurization and depressurization. This quantitative test will be submitted for Passive House Certification.



Figure 6: Whole building airtightness test boundary outlined in red for Passive House compliance. (section view)



Figure 7: Whole building airtightness test boundary outlined in red for Passive House compliance. (Plan view)

Reporting

Based on this testing a test report will be prepared, including documentation of the methodology and results, as required for Passive House Certification. These parameters will be submitted in the report at a minimum (see attachment “Checklist: Test reports of airtightness Measurements” for reference):

- Building and site details:
 - Building address
 - Testing agency contact information
 - Test boundary description
 - Building height and test boundary enclosed surface area
- Test arrangement:
 - Condition of all intentional openings and fenestration with photo documentation
 - Location of testing equipment with photo documentation
 - Verification of the single zone condition
 - Equipment calibration certificates
 - Wind speed, outdoor air temperature, and building interior temperature at the time of testing.
 - Configuration of internal and external pressure tubes.
- Results:
 - Recorded airflow, pressure differences, duration of readings.
 - Recorded indoor and outdoor air temperature before and after the measurements.
 - Calculated air leakage coefficient, flow exponent, correlation coefficient.
 - Air change rate at 50 Pa for pressurization and depressurization scenarios, as well as the average of the two methods demonstrating achievement of the performance target.
 - Indicate whether the airtightness test target as stipulated in the energy model has been met.

Ventilation Commissioning

This section outlines the requirements of ventilation commissioning for Passive House Certification.

Methodology

To ensure Passive House compliance, the following tasks must be performed (PHI strongly recommends that a zero-pressure compensation device be used for flow measurements):

- The supply and extract shall be adjusted, balanced, and recorded on the normal flow rate.
- The adjusted normal flow rates shall meet the minimum ventilation rates as per mechanical plans but no higher than 10% of design flow rates.
- The maximum ventilation rates at each supply and extract grille shall be recorded.



Figure 8: All supply and extract grilles to be adjusted, balanced and recorded at the normal ventilation rate.

- The measured outdoor air and exhaust air flow at the ERV should be within 10% of design air flow as indicated on mechanical drawings.
- Confirm DCV is working as designed.
- The disbalance of the air flow volumes between outdoor air intake and exhaust air may not exceed 10% at the standard ventilation rate.
- Check filter grade, direction of installation, and filter fit.

Reporting

As outlined in the “Criteria for the Passive House, EnerPHit and PHI Low Energy Building Standard” document as maintained by the Passive House Institute, a ventilation commissioning report must be provided. The commissioning report must include the following:

- Description of the property.
- Address of the building.
- Name and address of the tester / balancing company.
- Balancing agent shall be 3rd party certified (NEBB, AABC, or TABB).
- Time of adjustment.
- Balancing methodology
- Equipment used for testing and balancing and calibration certificates for all measurement equipment.
- Ventilation system manufacturer and type of device.
- Design and commissioned volume flow rates for normal operation at each supply and extract grille.
- Mass flow / volumetric flow balance for outdoor and exhaust air (maximum imbalance of 10% at all speed flow settings).
- Mass flow / volumetric flow balance for supply and extract air grille.
- The type of valve and its adjustment setting should be documented.
- Filter check (filter grade, direction of installation and filter fit)

Occupant Training

Occupant education is critical to ensure the performance is realized. For this reason, RDH understands that Introba has been retained to develop an occupant operation guide, providing guidance on operation and maintenance of the facility, including but not limited to:

- Operation of windows.
- Summary of heating, cooling and ventilation system.
- An occupant guide of what to do when it is too hot or too cold and what to do during extreme weather events such as blackouts, forest fires, and heat waves.
- Site visit and interview with building occupants to discuss intended operation of the building.

Photo Documentation

Photo documentation is a critical component of the certification process. RDH will be supporting the construction team in collecting the necessary photo documentation required for certification. We recommend setting up a shared folder where progress photos can be uploaded and reviewed as construction progresses. The following folder structure shall be created:

1. Assemblies
2. Thermal Bridges
3. Windows and Doors
4. Ventilation Systems
5. Heating and Cooling systems
6. DHW Systems
7. Electrical equipment
8. Shading
9. Completed Building

Once the shared folders is created, RDH will populate each folder with subfolders with headings to match specific model inputs such as ERV-1 and EW1 External Wall assembly etc. The construction team can use the folders as a check list for photo documentation. The construction team is responsible for collecting, organizing and maintaining the photo shared folder under the direction of RDH.

Submission for Final Certification

The PHPP energy model will be updated upon project completion if required. The energy model update will be based on as-built conditions and include information passed along via RFI's, site instructions, and on field review. This will be the final update of the energy model prior to submission to the Passive House certifier. Key activities in this phase are:

- Ensuring all photo documentation has been collected.
- Update PHPP model to reflect as-built conditions such as measured airtightness, as-commissioned air flows and the specific window package.
- Review the ventilation commissioning report for Passive House compliance.
- Review the airtightness testing report for Passive House compliance.
- Ensure the Construction Manager has signed the declaration. See attachment "Construction Manager Declaration".
- Submit final certification package and respond to up to two (2) rounds of comments and questions from the Building Certifier.

Closure

We trust that this letter clarifies the process for Passive House Verification as part of the construction stage of the project. We look forward to working with you and the rest of the project team on delivering a high-quality building that achieves the prestigious Passive House Certification.

Yours truly,

Written by:

Name | P.Eng., CPHC, PHI Building Certifier
Associate, Passive House Consultant
e-mail

Reviewed by:

Name | P.Eng, CPHD
Associate, Building Science Specialist
e-mail

- Attachment 1 – Insulation Documentation Plan
- Attachment 2 – Air Barrier Monitoring Plan
- Attachment 3 – Checklist: Test reports of airtightness measurements
- Attachment 4 – Construction Manager's Declaration

INSULATION DOCUMENTATION PLAN

This project has been designed and will be constructed to achieve the International Passive House standard. This document outlines the methodology and the parties responsible for ensuring that the insulation installation process is per the specifications and contract documents.

We understand that the construction team will be responsible for reviewing and documenting insulation installation and amounts. They are responsible for verifying that all assemblies, insulation materials, and components (including windows, doors, ventilation equipment, hot and chill water pipes) are installed as per the specifications. We recommend that one person be tasked with ensuring that all documentation is completed correctly.

Photo documentation will enable the certifier to verify insulation installation thicknesses for various assemblies and details without attending the site. Certifiers will reduce the value of insulation when poorly installed; therefore, it is important for the site superintendent to continuously monitor installation practices to ensure project specifications are met.

Examples of how insulation thicknesses and key thermal bridges should be documented are shown below.



Figure 9: Below grade insulation



Figure 2: Photo demonstrating insulation thickness installed on site.

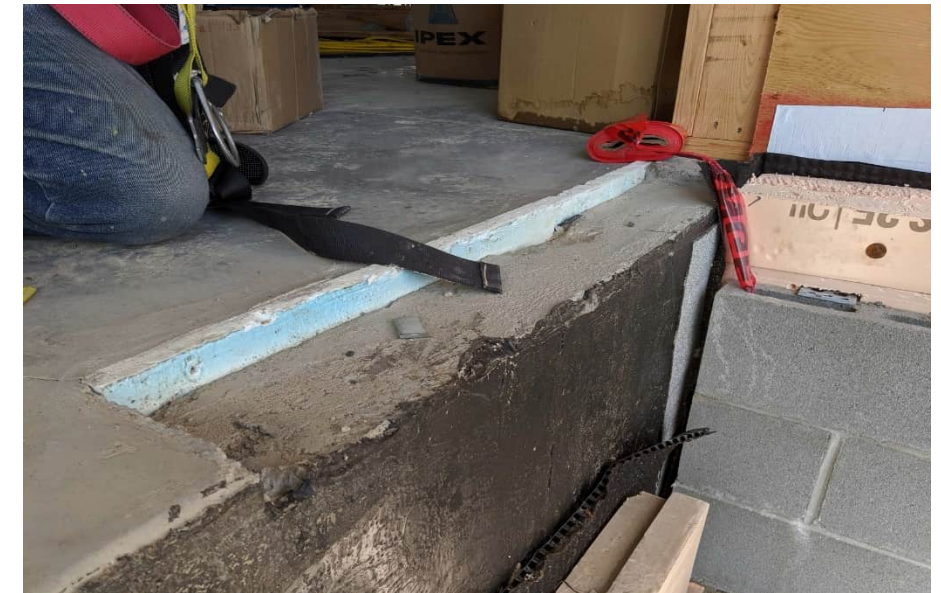


Figure 4: Photo of door sill installation at grade.



Figure 3: Photo of insulation of batt insulation filling stud cavity without air pockets (left) and over insulation of the window jamb (right).



Figure 5: Photo of oversized pipe hangers (left) and documentation of domestic hot water pipe insulation thickness.

AIR BARRIER MONITORING PLAN

This project has been designed and will be constructed to achieve the International Passive House standard. This document outlines the method and the parties responsible for ensuring that the air barrier is installed per the specifications and contract documents.

To increase the chance of success, the designation of an Air Barrier Supervisor is recommended. This person is a member of the construction team who will be specifically responsible for the air barrier. This person should be appropriately trained on and knowledgeable of air barrier strategies, the specific system being used on this project, and the requirements for airtightness testing. The Air Barrier Supervisor is responsible for the following items during construction:

- Understand the specific air barrier system being used on this project.
- Understand how the weather and substrate preparation can influence the specific air barrier installation process.
- Understand common air barrier deficiencies and challenging areas for the specific project. These include:
 - Structural and service wall penetrations

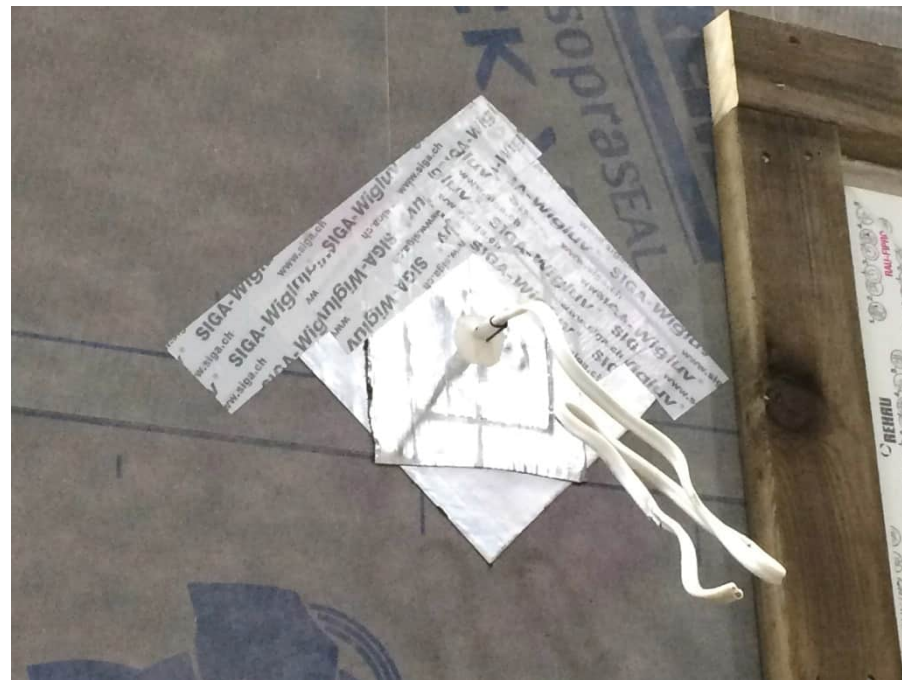


Figure 1: Mock up of air sealing around electrical penetrations.

- Wrinkled/fish-mouth/incomplete membrane laps
 - Roof to wall and other interface where various transition materials are used
 - Roof/ceiling penetrations
 - Window membrane and perimeter sealing
 - Interior ceiling penetrations and partition wall at an interior air barrier
 - Slab penetrations
- Coordinating with the enclosure consultant during a start-up meeting to determine which details require mock-ups.

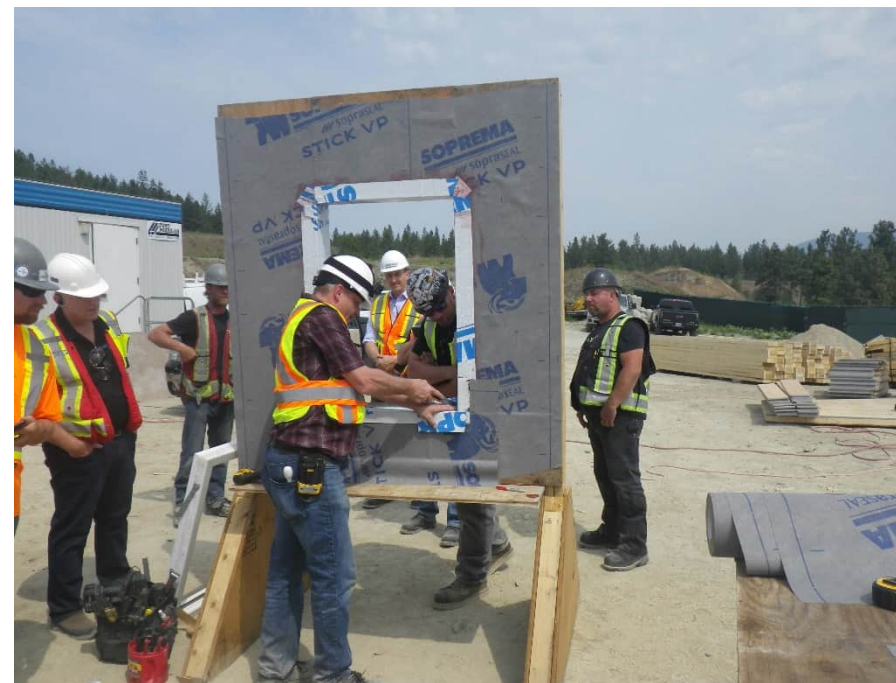


Figure 2: Air Barrier Supervisor should understand the specific air barrier system being used on the project.

- Provide regular group briefings and 1-on-1 guidance for trades.
- Regular review of the installation of all air barrier components, especially at penetrations, details, and interfaces.
- Offering air barrier installation guidance and instructions when appropriate.



Figure 3: Mock up of typical air barrier penetrations.

- Tracking all air barrier penetrations, details, and interfaces that require further attention from the building enclosure consultant, where applicable.
- Implementing and overseeing modifications and repairs as needed to meet airtightness requirements.
- Coordinating with the enclosure consultant for regular site review to ensure the work is done per project specifications and contract documents.
- Overseeing all repairs and ensuring the work is done per contract documents.
- Coordinating and assisting in both qualitative and quantitative airtightness testing.

Checklist: Test reports of airtightness measurements

This checklist can be used to confirm that the report of the airtightness measurement includes all the necessary information:

- Airtightness measurement performed in accordance with ISO 9972 (Method 1, in Germany, method 3 is also possible, according to the “national annex”)
- The general information about the test and the building is complete
 - Tester: name, address and signature
 - Object (including full address)
 - Date of test
 - Device used for testing
 - Measurement standard (norm)
 - Indoor and outdoor temperatures
 - Wind velocity
 - Flow coefficient (C_{env})
 - Leakage coefficient (C_L)
- The room-by-room calculation of the air volume of the building (V_{n50}) is included and carried out according to the method described in the [criteria for buildings](#).
- The location of the device (fan) is documented. Installation location (e.g. front door) checked for airtightness after measurement, e.g. by visual inspection.
- Temporary sealing of the thermal envelope are documented (e.g. outdoor and exhaust air ducts for units used continuously).
- Series of measurements at positive AND negative pressure, including for each series of measurements:
 - Measurements of the natural pressure (ΔP_{01+} , ΔP_{01-} , ΔP_{02+} , ΔP_{02-} , and ΔP_{01} , ΔP_{02}) before and after each series. Each individual measurement must be between -5 and 5 Pa.
Note: natural pressure will usually be outside of this range if the wind speed is greater than 6 m/s (21.6 km/h) or the wind force is higher than 3 Beaufort. A high temperature difference between inside and outside also leads to a greater natural pressure difference.
 - At least 5 measuring points at different pressure differences, including the corrected value based on the average natural pressure, and with the highest value being at least ± 50 Pa
 - Recommended: total error (%)
Note: this value factors errors in the measurements of wind velocity, atmospheric pressure, temperature, volume calculation, etc. for the detailed explanation please refer to the ISO 9972. It is important for assessing the quality of a measurement (e.g. shows unfavorable wind conditions).
 - Flow exponent “n” between 0.5 and 1.0.
Note: a value outside this range indicates a measurement error due to a change in the envelope (e.g.: a window left open). In such cases, the causes should be investigated.

- If there are significant differences between the positive and negative pressure values (n_{50}): a plausible explanation of these differences should be given in the report.
Note: in general, the positive and negative pressure values should be relatively close to each other. But as a rule, they are never the same.
- Leakage detection is documented:
 - For EnerPHit and PHI Low Energy Buildings, with n_{50} values between 0.6 1/h and 1.0 1/h: written and signed confirmation that an extensive leakage detection was carried out and all Individual leakages which may cause structural damage or impair comfort were identified and remedied. Sample text for the confirmation:
I hereby confirm that air infiltration leak detection was carried out at negative pressure. All rooms within the airtight building envelope were inspected during this process. All points known to be prone to leakage were checked for leaks (including locations that were difficult to access such as tall ceilings). Any large leakages with a significant share of the total leakages or affecting thermal comfort were sealed.
 - For other buildings, and according to the ISO 9972, all large individual leakages must be documented. Remedying these leakages is strongly recommended, but not required for certification.

For instructions to carry out the airtightness test, see: [Airtightness measurements in Passive Houses](#).

For the measurement of tall buildings (e.g. high-rise buildings) special boundary conditions apply. Please review the procedure described in the [guideline for airtightness measurement of high-rise buildings](#). In case of questions please contact your certifier.

For an example of an airtightness test see: [sample documents for building certification](#).

This checklist is available for download as PDF [here](#).

See also:

[Overview of the Passipedia articles on airtightness](#)

Click [here](#) to go back to the overview of Guides and Aids in passipedia

Project name:	
Location:	
Project name on Certification platform:	
Construction manager (First name, Surname):	
Project manager (First name, Surname):	

Construction manager declaration

In order for the quality inspection to award the "Certified Passive House" seal for the above mentioned construction project, we hereby assure that the on-site execution is in accordance with the planning documents, technical documents and textual descriptions that have been uploaded to the Passive House Institute's certification platform up to and including / / (and not marked as "obsolete").

This has been checked through regular site visits.

Construction management Date, Signature	Project management Date, Signature

Sample