SECTION 014525

AIR TIGHTNESS TESTING REQUIREMENTS

1. GENERAL
   * + 1. GENERAL PROVISIONS
          1. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.
       2. SUMMARY
          1. Work Included: General requirements and procedures for quality assurance and quality control, related to air tightness of building envelope.

Whole Building Testing: Perform a Blower Door Test for the whole building.

Compartmentalization Testing, for Multifamily Housing: Perform Blower Door Tests for each residential unit to meet requirements for airtightness between of individual units.

Test will be performed by Owner's representative (PHIUS Verifier) with cooperation and some preparation by the Contractor.

Additional tests may be required if blower door test does not achieve required ACH rating.

* + - * 1. Sustainable Design Intent: Refer to Section 018115 - PASSIVE HOUSE REQUIREMENTS.
        2. Related Work: The following items are not included in this Section and will be specified under the designated Sections:

Section 019100 - COMMISSIONING for other testing requirements.

Section 072100 - THERMAL INSULATION for insulation at exterior envelope and infrared camera survey requirements.

Section 072700 - AIR BARRIERS for air sealing at exterior envelope.

Division 23 - HVAC for testing and balancing.

* + - 1. DEFINITIONS
         1. Blower Door Test: A blower door test, depressurized and pressurized, is used to quantify building air leakage. The standard blower door test is a depressurization test. This means that air will be blown out from the building, creating a negative pressure in the building.
         2. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
         3. PHIUS Verifier: Individual trained in blower door testing procedures and PHIUS inspection and testing requirements.
      2. PERFORMANCE REQUIREMENTS
         1. Review applicable PHIUS Certification Guidebook and ENERGY STAR and RESNET applicable requirements, including RESNET Guidelines for Multifamily Energy Ratings.

Follow required sampling protocols provided for compartmentalization, duct system tightness, and duct heating, cooling, and ventilation air balancing testing.

* + - * 1. Refer to Whole Building Air Tightness Testing in the applicable PHIUS Certification Guidebook.
      1. SUBMITTALS
         1. Field Test Reports: Prepare and submit certified written reports that include the following:

Date of issue.

Project title and number.

Name, address, and telephone number of testing agency.

Dates and locations of tests and inspections.

Names of individuals making tests and inspections.

Description of the Work and test and inspection method.

For individual residential units, provide unit numbers.

Identification of product and Specification Section.

Complete test or inspection data.

Test and inspection results and an interpretation of test results.

Ambient conditions at time of sample taking and testing and inspecting.

Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.

Name and signature of laboratory inspector.

Recommendations on retesting and reinspecting.

* + - 1. QUALITY CONTROL
         1. Blower Door Testing Requirements: Perform test in accordance with ASHRAE 90.1 or ASTM E 779 "Test Method for Determining Air Leakage by Fan Pressurization" or ANSI/RESNET 380-2019 “Standard for Testing Airtightness of Building, Dwelling Unit, and Sleeping Unit Enclosures; Airtightness of Heating and Cooling Air Distribution Systems; and Airflow of Mechanical Ventilation Systems.”

Refer to applicable PHIUS Guidebook, Appendix F –Procedure to Prepare the Building for Airtightness Testing, and other applicable requirements.

* + - * 1. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.

Notify Architect and Owner’s PHIUS Verifier at least 14 days in advance of test dates.

Schedule times for tests, inspections, obtaining samples, and similar activities.

For Multifamily Housing: Plan at least 4 hours for blower door testing.

For additional fog test and air sealing remediation work, plan for at least one full day.

Consult PHIUS Verifier about test preparation and readiness.

1. PRODUCTS [Not Used]
2. EXECUTION
   * + 1. PRE-TEST PREPARATION
          1. Before conducting the blower door test, the building needs to be placed in its normal heating or cooling configuration. This includes closing operable openings and preparing combustion appliances. Prepare the building as follows:

Mockup: Prepare one corner unit for testing of exterior wall as soon after rough-in of electrical and plumbing as possible. Complete insulation and air sealing and drywall prior to mockup unit blower door testing. Take corrective action as necessary based on test results.

Power: Provide at least one working 20-amp circuit available to power the blower door fan and accompanying fog testing equipment.

Attend a pre-construction air sealing meeting with all subcontractors that can affect air sealing, including, but not limited to, plumbing, electrical, HVAC, gypsum wall board (drywall), and insulation.

Coordinate with subcontractors, vendors, employees, Owner, and design team, to confirm that no one will open doors or windows during testing or otherwise disrupt testing procedures.

* + - * 1. Preparation of Doors, Windows, and Other Openings: Comply with Pre-Test Building Preparations Table.
        2. Preparation of Combustion Appliances and Exhaust Devices:

Adjust combustion appliances so they do not operate during the test. This is usually done by turning off power to the heating system and turning the water heater to the "Pilot" setting.

Note: If vented combustion appliances turn on during a depressurization test, it is possible for flames to be sucked out of the combustion air inlet (flame rollout). This is a fire hazard.

Turn off exhaust fans, vented dryers, air conditioners, and HVAC fans. Close fans with back draft dampers.

Do not seal combustions flues, dryer vents, or ventilation system exhaust or intake vents that are normally open in the winter.

* + - 1. BLOWER DOOR TEST PROCEDURES
         1. Install blower door frame, panel, and fan in an exterior doorway with a clear path to outdoors.
         2. Follow manufacturer's instruction for fan orientation and manometer setup for both pressurization and depressurization.
         3. Connect the building-pressure manometer to measure building with respect to outdoors.
         4. Connect the airflow manometer to measure fan with respect to zone near fan inlet. The zone near the fan inlet is indoors for depressurization and outdoors for pressurization.
         5. Make pretest adjustments to manometer following manufacturer's instruction. Zero manometers as described previously.
         6. Turn on the fan and increase its speed to 50 pascals of pressure difference between indoors and outdoors.
         7. Read the cubic feet per minute (CFM) values off the airflow manometer or from the second channel of a two-channel digital manometer.
      2. ADDITIONAL TEST PROCEDURES
         1. Thermal Imaging: Refer to Section 072100 - THERMAL INSULATION for infrared camera survey requirements.
         2. Fog (Smoke) Testing: Set up a theatrical fog machine in a central location inside building. Fill building interior with fog (smoke), then pressurize the interior with a blower door unit to push fog to the exterior through gaps in air seal.
         3. Additional tests may be required by the Owner's representative.
         4. After leaks are identified, repair and reseal air barriers, at no additional cost to Owner.

END OF SECTION