DOCKETED			
Docket Number:	19-HERS-01		
Project Title:	2019 HERS Providers' Application for the 2019 Building Energy Efficiency Standards		
TN #:	228221-5		
Document Title:	CalCERTS Exhibit G - 2019 Quality Assurance		
Description:	N/A		
Filer:	Holly Walsh		
Organization:	CalCERTS, Inc		
Submitter Role:	Applicant		
Submission Date:	5/9/2019 12:12:53 PM		
Docketed Date:	5/9/2019		



EXHIBIT G

Quality Assurance





QUALITY ASSURANCE POLICY







CalCERTS' Quality Assurance Policy

California's Home Energy Rating System ("HERS") regulations require CalCERTS to have a Quality Assurance Program. (Title 20, California Code of Regulations §1670 *et seq* ("HERS Regulations").) CalCERTS' Quality Assurance Policy ("QA Policy") provides information about CalCERTS' Quality Assurance Program and identifies the rights and obligations of CalCERTS and CalCERTS certified Raters. The QA Policy is designed to promote the HERS Industry and consumer protection by ensuring that all CalCERTS certified Raters are complying with the HERS Regulations.

Quality Assurance Data & Field Reviews

- CalCERTS will conduct quality assurance data and field reviews on CalCERTS certified Raters.
- Quality Assurance reviews will be conducted by CalCERTS' Quality Assurance Reviewers. Data and field reviews are designed to verify the completeness and accuracy of a Rater's work.
- Raters must provide a standardized written notice, regarding the possibility and purpose of a CalCERTS Quality Assurance Review, to the Homeowner on Alterations, and the Superintendent, Builder (or builder's representative) or Homeowner on New Construction.
- Raters must provide CalCERTS with contact information that includes the name and a
 valid phone number of the person authorized to facilitate scheduling and provide access
 for a Quality Assurance Reviews. This contact is usually the Homeowner on Alterations,
 and the Superintendent, Builder (or builder's representative) or Homeowner on New
 Construction. The Rater and Installer are not considered valid contacts.
- Raters may be notified of the quality assurance review results, including measures with significant discrepancies, and those with no significant discrepancies. If CalCERTS Quality Assurance personnel determine that a Rater fails a Quality Assurance Review, the Rater will be given a written notice containing the review results and determination. The Rater will be subject to additional Quality Assurance Reviews pursuant to section 1673(i) of the HERS Regulations and their failure will be noted in the registry.

- Raters will be responsible for the costs of additional Quality Assurance Reviews conducted pursuant to section 1673(i) of the HERS Regulations.
- Raters may contact CalCERTS to ask questions about the Quality Assurance Review process or to ask for help from our Support Team, regarding the Registry or Building Standards/Title 24 compliance.

CalCERTS Quality Assurance

Email: QA@calcerts.com

Office: 916-985-3400 ext. 2009

Support Team

Email: support@calcerts.com
Office: 916-985-3400 ext. *

• If a Rater encounters a problem or unusual circumstances while performing field verification and diagnostic testing, or a home energy rating, the Raters shall contact CalCERTS at support@calcerts.com as soon as possible, and prior to certifying the project so that the problem can be addressed and documented and taken into account during QA review. It is the Rater's obligation to ensure all ratings meet the criteria for truth, accuracy and completeness, set forth in the HERS Regulations.

Complaint Response

- Raters must provide the Homeowner on Alterations, and the Superintendent, Builder (or builder's representative) or Homeowner on New Construction, with a standardized written notice, notifying them they can file a complaint with CalCERTS related to the Rater's ratings and/or field verification and diagnostic testing services.
- CalCERTS will respond to all legitimate and/or verifiable complaints related to ratings and/or field verification and diagnostic testing services performed by a CalCERTS certified Rater.
- CalCERTS will document and retain records of all complaints received, and its response to complaints, for a minimum of five years. A summary of all complaints and action taken is provided annually to the Energy Commission.
- Raters may be notified of complaints issued against them if CalCERTS determines that there is sufficient evidence to warrant an investigation into the Rater's conduct and/or performance.
- CalCERTS may protect the privacy of persons who file a complaint against a Rater by withholding the name of the complainants if CalCERTS has independently verified the information provided by the complainants.

Investigations

- CalCERTS may, at its sole discretion, conduct an investigation of a Rater's conduct and/or performance whether due to complaints received from third parties, Quality Assurance Reviews, or otherwise.
- When appropriate, Rater may be given a written Notice of Investigation, stating the basis of the investigation.
- CalCERTS may temporarily suspend a Rater's Certification during an investigation when further activity by the Rater could interfere with CalCERTS' investigation or continued ratings might jeopardize a consumer's rights to true, accurate and complete Ratings.
 Raters will be given a written Notice of Suspension. CalCERTS will work diligently to minimize the duration of any suspension.
- As part of its investigation, CalCERTS may conduct additional quality assurance field reviews of the Rater in addition to the minimum number otherwise required under the HERS Regulations. Investigations may also include data audits, interviews, and/or any other review of the Rater's conduct and performance that is necessary to resolve the issue being investigated.
- Raters shall be given an opportunity to ask questions about the investigation, and shall
 have an opportunity to submit information and documents related to the substance of
 the investigation before CalCERTS concludes the investigation. Raters will be
 encouraged to submit all questions in writing to avoid confusion and ensure accuracy.
- Raters are required to cooperate with the investigation to help ascertain facts and to gain access to important parties. If a Rater fails to cooperate with an investigation, CalCERTS may terminate the investigation and take appropriate action which may include suspension or decertification of the Rater.
- CalCERTS will review all information gathered in an investigation including information submitted by the Rater to determine if disciplinary action is warranted. If CalCERTS determines that disciplinary action is warranted the Rater shall receive a written notice of CalCERTS' findings and recommended disciplinary actions.
- Raters shall have an opportunity to appeal a recommendation of discipline prior to final imposition of discipline. Appeals must be submitted in writing.
- All investigations are considered confidential to protect all parties involved. Release of any details is at the sole discretion of CalCERTS.

Disciplinary Action & Decertification

- CalCERTS may at its sole discretion impose one or more types of disciplinary action including, but not limited to:
 - A formal written warning to the Rater detailing area(s) of concern and suggesting self-directed corrective actions. For example, CalCERTS may recommend that the Rater attend additional training or receive mentoring.
 - o Imposition of additional field reviews at the Rater's expense.
 - o Imposition of additional education, mentoring or training at the Rater's expense.
 - o Suspension of the Rater's Certification for a determined period of time.
 - o Decertification.
- CalCERTS will document and retain records of all disciplinary action, and may provide this information to the Energy Commission as required by Title 20.
- CalCERTS may publish notifications of Rater discipline on the CalCERTS website.

RATER:		
Ву:		
Print Name:	 	
Dated:		



QUALITY ASSURANCE RATER FIELD PROCEDURES



Quality Assurance Rater Field Procedures

Following are the recommended Quality Assurance (QA) Reviewer field procedures as provided by the Director of Quality Assurance. These procedures may be amended or altered at the discretion of the QA Reviewer if coordinated with, and communicated to, the CalCERTS Quality Assurance Team.

PRE-SITE VISIT – Review project in the Registry.

- 1) Review Notes from Scheduler
 - a) Be aware of homeowner or superintendent requests such as not taping to fresh paint for duct testing, possible accessibility issues, and/or time constraints.
 - b) Location: Many New Construction addresses cannot be located with GPS and will require cross street, sales office address and *likely a web search* for the project location. It's possible that the project will be located in an area with no cellular reception, so it's important that confirm the location in advance.
- 2) Review Rater Results
 - a) The goal is to duplicate the Rater's verifications and notate any variances.
 - b) Identify the type of project and the measures required.
 - c) Note the methods the Rater used to conduct measures (*Duct Leakage: Total Leakage, Leakage to Outside, etc.*).
 - d) Note Rater results and targets.
 - e) Note any potential data entry errors.
- 3) Inform Point of Contact
 - a) Prior to arrival, call Point of Contact, and let them know approximately what time you will be arriving.
 - b) If the Point of Contact is the Superintendent of a large project, there is no need to contact them ahead of time, but upon arrival, give them a call to introduce yourself.

ON SITE VISIT – Relevant questions, visual verification, testing and photos.

- 1) Site Assessment and Scope of Work
 - a. Is the project New Construction, a Performance Addition or a Prescriptive Alteration? If the Rater recorded the project correctly, begin testing measures using same methods as the Rater.
 - b. If there are additional measures that should have been completed, and they are pertinent to this QA Inspection, conduct them as well.
 Note: When available, photograph the Title 24 Documentation on the plan set, particularly with custom homes (documents are generally not available in production homes).
 - c. If it appears that the project is new construction or an addition, and it was incorrectly recorded as a prescriptive alterations project, attempt the following:



 Ask if the construction plans are on site. If available, photograph the Title 24 section of the plans, with a specific focus on the required HERS measures and the Registration number.

CERTIFICATE OF COMPLIANCE - RESIDENTIAL PERFORMANCE COMPLIANCE METHOD CF1R-PRF-01 Page 2 of 9 Project Name: Single Family Residence Calculation Date/Time: 11:04, Wed, Oct 03, 2018 Calculation Description: Title 24 Analysis Input File Name: HIGHLAND 03 OCT.ribd16x ENERGY DESIGN RATING Energy Design Rating (EDR) is an alternate way to express the energy performance of a building using a scoring system where 100 represents the energy performance of the Residential Energy Services (RESNET) reference home characterization of the 2006 international Energy Conservation Code (IECC) with California modeling assumptions. A score of zero represents the energy performance of a building that combines high levels of energy efficiency with renewable generation to zero out? its TDV energy. Because EDR includes consideration of components not regulated by Title 24, Part 6 (such as domestic appliances and consumer electronics), it is not used to show compliance with Part 6 but may instead be used by local jurisdictions pursuing local ordinances under Title 24, Part 11 (CALGreen).

As a Standard Design building under the 2016 Building Energy Efficiency Standards is significantly more efficient than the baseline EDR building, the EDR of the Standard Design building is provided for Information. Similarly, the EDR score of the Proposed Design is provided separately from the EDR value of installed PV so that the effects of efficiency and renewable energy can both be seen EDR of Proposed Efficiency EDR of Standard Efficiency EDR Value of Proposed PV + Battery 48.7 Design meets Tier 1 requirement of 15% or greater code compliance margin (CALGreen A4.203.1.2.1) and QII verification prerequisite Design meets Tier 2 requirement of 30% or greater code compliance margin (CALGreen A4.203.1.2.2) and QII verification prerequisite Design meets Zero Net Energy (ZNE) Design Designation requirement for Single Family in climate zone CZ3 (Oakland) (CALGreen A4.203.1.2.3) including on-site photovoltal (PV) renewable energy generation sufficient to achieve a Final Energy Design Rating (EDR) of zero or less. The PV System must be verified. Excess PV Generation EDR Credit: Bypassing PV size limit may violate Net Energy Metering (NEM) rules REQUIRED SPECIAL FEATURES The following are features that must be installed as condition for meeting the modeled energy performance for this computer analysis Ducts with high level of insulation HERS FEATURE SUMMARY The following is a summary of the features that must be field-verified by a certified HERS Rater as a condition for meeting the modeled energy performance for this computer analysis. Additional detail is rovided in the building components tables below Building-level Verifications: gh quality insulation installation (QII) IAQ mechanical ventilation High R-value Spray Foam Insulation Cooling System Verifications:
Minimum Airflow Verified Refrigerant Charge Fan Efficacy Watts/CFM IVAC Distribution System Verifications: Vec Distribution System Verifications.

Duct Sealing

Verified low-leakage ducts in conditioned space must meet maximum 25 cfm leakage to outside (RA3.1.4.3.8)

omestic Hot Water System Verifications:

 Consider whether the HERS Feature Summary could apply to this home and conduct the additional testing if possible. If there is any doubt, contact your QA Supervisor.

2018-10-03 11:10:15

Registration Date/Time:

2) If there is a significant discrepancy between QA and Rater results, the QA Reviewer should investigate possible mitigating circumstances.

Registration Number: 218-P010272008A-000-000-0000000-0000

CA Building Energy Efficiency Standards - 2016 Residential Compliance

- 3) Take photographs to tell the story. They are the visual description of the QA Inspection. Clear, descriptive photos are extremely helpful, and necessary in explaining possible reasons for any QA discrepancies.
- 4) When the situation permits (altered home, or a custom home) and someone is available to answer questions, use a conversational approach to garner additional information regarding Rater testing procedures, equipment, or previous system condition. Keep in mind that the routine information gathered is intended for our internal use, and even if discrepancies are found, it does not necessarily indicate that there is any problem with the furnace or air conditioner, nor does it indicate there is a problem with the Rater or the Contractor.



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The following are some examples of potential questions:

- a. Superintendent/Construction Manager (New Construction):
 - i. Location of IAQ, mechanical ventilation, if not marked.
 - ii. Location of insulation certificate if not in the attic or garage.
 - iii. Verification of rater testing for QII Framing Stage (usually not entered in the registry at the time of QA).
 - iv. Copy of building plans to verify ducts meet approved design for VLLDCS, Surface area reduction, Buried ducts, and Return duct design.
- b. Customer/Homeowner (Alterations):
 - i. Were you present when the HERS tests were performed? If not, is there someone here that was?
 - ii. What kind of work did the installer do to the HVAC system?
 - iii. Has anyone done any work on or near the ducts since the testing was completed?
 - iv. Has anything been stored or removed from the duct area?
 - v. Has anyone worked on the furnace or A/C since the testing was completed?
 - vi. When was the last time the air filter was replaced?
 - vii. How long did the HERS testing take?
 - viii. Do you recall seeing the types of equipment I'm (QA Reviewer) using?
 - ix. Do you recall seeing any other test equipment being used by the Rater?
 - x. Were you given any indication of their test results?
 - xi. When Rater passed DLT with smoke Do you recall the Rater using theatrical fog/smoke to verify the duct system's integrity and identify leaks?
 - xii. Where did they connect the duct tester which grille?
 - xiii. Did they connect any gauges/equipment to the outside AC unit and run tests?
 - xiv. Note anything unique that the homeowner remembered about the rater's visit protective gear, professionalism, and cleanliness.

TESTING PROTOCOL

- A Reviewer will repeat the rating for each measure following the protocols recorded by the Rater.
- If for any reason this is not possible, the Reviewer will *perform testing using another* valid method as reference.
- If Reviewer finds discrepancies during QA, he will *investigate to determine if there are any apparent mitigating circumstances*.
- See Photo Checklist for photo requirements by measure.



DUCT LEAKAGE

testing.

- 1) Prior to any testing, check for possible asbestos.
- Conduct DL testing NOTE: If system is zonally controlled, make certain all zones are open prior to duct
- 3) If QA Results differ from the Rater's results, investigate to determine if there are any apparent mitigating circumstances:
 - a. Are all supply and return registers sealed? Is it possible you missed one (i.e. closet, pantry, bathroom, behind furniture, garage, behind a door, etc.)?
 - b. Is FAU blower access closed?
 - c. Are there any obvious areas of leakage such as a disconnected duct, gaps between equipment connections, etc.
 - d. Check for hidden supply or return registers:
 - a. Bathroom exhaust fan that has been converted to a supply register
 - b. Closets or hidden closets
 - c. Garage (this is a building code violation, but we've seen it more than once)
 - d. Hidden storage areas. These can be found on older homes where access is only available through the garage or other unordinary means.
 - e. Cabinets/toe kicks
 - f. Behind large furniture
 - g. Behind doors
 - e. Attempt to duplicate the Rater's results by altering the equipment set up. Set the manometer to a smaller ring setting and record measurement. (Example: You initially tested with Duct Tester wide open with manometer set to wide open. Set manometer to Ring A while leaving the Duct Tester wide open and record results)
 - f. Smoke Test: Conduct smoke test and note leakage locations.
 - a. Take note of obvious sources of leakage such as unsealed register boots, gaps between equipment connections, copper to coil intrusions, unsealed up-flow plenums, blower access loose or not sealing correct, etc.
 - g. Note any use of unapproved tape to seal any portion of the equipment.

DUCT LEAKAGE WITH PANCAKE STYLE FAN COIL

- 1) On occasion, you will come across a "pancake" style fan coil with hinged access door, usually on the ceiling of an apartment unit:
 - a. Test using standard protocol.
 - b. If the system fails, tape around the fan coil access panel and measure the DL again. Note the resulting difference in the QA summary.



DUCT LEAKAGE OF A DUCTED MINI SPLIT W/ MULTIPLE HEADS

 Currently the code does not allow the use of the condenser tonnage for a DL target calculation. Each ducted head should be duct tested separately using <u>measured</u> system airflow to calculate DL target.

AIRFLOW

- 1) Note size of return ducts and filter grilles.
- 2) Record furnace and coil model numbers.
- 3) Open all supply grilles.
- 4) Note if blower is PSC, ECM or Variable Speed ECM.
- 5) Set thermostat to cooling
- 6) Measure "start-up" airflow.
- 7) Measure airflow after 15 minutes per standard protocols

 NOTE: Variable Speed ECM blowers often have a different point at which they reach
 their intended high stage. If you are uncertain, review the furnace/fan coil manual if

their intended high stage. If you are uncertain, review the furnace/fan coil manual if available.

- 8) If airflow is significantly lower than Rater airflow, investigate for possible mitigating circumstances.
 - a. Is the blower set to high speed?
 - i. Photograph blower speed chart as well as circuit board and where blower wires are connected to the board. In some rare cases where there are speed DIP switches, photograph the switches and related diagram. The diagram is generally at the rear of the blower door.
 - b. Is filter dirty?
 - i. Remove the air filter, note its condition.
 - ii. Measure airflow without filters installed. Note the resulting difference in the QA summary.
 - c. Do any return or supply ducts appear to be crushed or otherwise damaged?
 - d. Are there any tight or unnecessary bends in the return or supply ducts?
 - e. Is something blocking the airflow pathway to the blower (i.e. blower cabinet insulation coming loose, dirty air filter being sucked into return area, etc.)?
 - f. Is the blower motor drawing air from somewhere other than where it is being measured (i.e. recent leak in return duct or return area)?
 - g. Is it possible the Rater incorrectly recorded method to measure AF on the CF3R? Examples of reasons to attempt an alternative method of measuring AF:
 - i. Did the Rater record use of a flow-grid when there are multiple returns throughout the home?
 - ii. Did the Rater record an unusually high AF result using a Flowhood when the return uses wall cavity and could not be pressurized for Duct Leakage?
 - iii. Did the flowhood fit properly without restrictions in front of the return grille in a hallway platform plenum?



- iv. Did the Rater record use of a flowgrid when there is no HSPP/PSPP installed?
- v. Is there indication the Rater used an unapproved device such as a handheld vane anemometer (Question to ask homeowner/contractor)?
- 9) Airflow w/ Grid inside Blower Housing:
 - a. When conducting a flow-grid AF test where there is no filter slot at the air handler, and the flow grid will be positioned inside the blower cabinet, pull the disconnect at the condenser or turn off the breaker to the condenser.
 - i. NOTE: Having the condenser shut on and off multiple times in a short period time can cause it to shut itself down until pressurizes equalize, which could take up to an hour.
 - ii. Before leaving the home, be sure to replace the disconnect at the condenser and breakers are returned to the ON position.
 - iii. Confirm that the blower access door is correctly replaced and the HVAC system is operable.

10) Zonally Controlled

- a. Note whether condenser has single or multi-speed compressor.
- b. Set <u>all</u> thermostats to cooling (all zones calling), measure <u>all</u> returns and record fan watt draw.
- c. Turn off one thermostat and note what zone remains on. Measure <u>all</u> returns and record fan watt draw.
- d. Turn on the zone that was off, turn off the zone that was on. Measure <u>all</u> returns and record fan watt draw.
- e. Note any obvious issues with zone controls.
- f. Note any zonal testing failures.
- 11) If Airflow Remediation was used
 - a. Perform visual inspection using the remedial action checklist.
 - b. Note if system would likely have passed without remedial actions using another method of measurement.

FAN EFFICACY

- 1) Note the watt draw result.
- 2) If QA Results are significantly different than Rater results, investigate to determine if there are any apparent mitigating circumstances.
 - a. Is there anything else drawing wattage from the dedicated furnace/fan coil circuit (i.e. attic light, condensate pump, UV light, electro static filter, etc.)?
 - b. Attempt to attain FE with only the blower motor in operation. Keep in mind that if the condensate pump is disconnected, depending on conditions, there may be limited time to collect FE numbers before the accumulated moisture must be removed.
 - c. Note filter condition.
 - d. When Rater records use of digital or analog utility meter, note possible errors in calculation.



The formula for determining watt draw is:

$$P = \frac{Kh \times N, Rev \times 3600}{T. Rev}$$

Where P = Power in Watts.

Kh = Is the calibration factor found on the front of the meter.

N,Rev = Number of revolutions in greater than 90 second period. This must be a whole number.

3600 = is a standard number to use for the equation.

T,Rev = Time to complete the next whole revolution.

REFRIGERANT CHARGE VERIFICATION:

IMPORTANT NOTE: Condensers and Heat pumps are designed to restart with a 5 minutes rest period. Generally, the thermostat and circuit board work in unison to make certain that when you remove the blower access door or turn the system on and off, that a 5 minutes time delay will go into effect. There are situations where this has been circumvented or it isn't designed into the system. Make certain you are not continuously turning condenser on and off as you can damage the compressor.

- 1) Use standard charge verification when conducting QA, and if possible, measure with highest AF possible (with filter installed) and/or All Zones Calling.
- 2) Locate MAH and note if labelled (it may be a hole without a label or a label without a hole).
- 3) Note if liquid line filter drier is installed (possible locations are at Evap coil, near service valves of condenser/heat pump, inside condenser).
- 4) If return DB temp and/or condenser DB temp is below required, attempt to heat home to test. If heating is not available, do not test system if outdoor dry-bulb temp is under 55 degrees and indoor dry-bulb temp is under 70 degrees.
- 5) If QA Results are significantly different than Rater results, investigate to determine if there are any apparent mitigating circumstances.
 - a) Has cooling been running a full 15 minutes? Some condensers and their respective TXVs cause a sudden change in SC result; wait an additional 5 minutes and retest.
 - b) Confirm that the Rater used the correct SC target. Note where SC listed (condenser label, inside service panel, installation instructions).
 - c) Evidence of refrigerant leaks (oil near service valves or braising areas)?
 - d) Service port cap missing, or under pressure?
 - e) If using quick disconnect hoses, make certain they are screwed all the way in.
 - f) Is the line-set in direct sun? If so, shade the location where the thermocouples are attached
 - g) Is the area being measured by thermocouples somehow being affected by exiting heat from condenser?
 - h) Is the TXV bulb properly installed and insulated?



BUILDING ENVELOPE (Blower Door):

- 1) Go over QA Collection checklist and prepare home for blower door.
- 2) Take 5 baseline readings with a difference of less than 5 Pa and begin the blower door test.
- 3) Note exterior and interior dry bulb temps.
- 4) If QA Results are significantly different than Rater results, investigate to determine if there are any apparent mitigating circumstances.
 - a) Are there any obvious areas where a significant amount of leakage could be occurring?
 - b) Confirm ring and manometer setting.
 - c) Set manometer to one smaller ring setting and record measurement. (Example: You initially tested with Blower Door fan with B ring setting and manometer set to B. Set manometer to Ring to C while leaving the B ring in the Blower door fan and record result)



PHOTO CHECKLIST

	General		Refrigerant Charge
	Front of house w/ address		Supply Plenum
	Condenser + Specifications tag		Return Plenum
	Furnace + Specifications tag		MAHs
	Indoor coil + Specifications tag		Gauge & Digital Thermometer setup
			Gauge Readings
	Duct Leakage Test		Tsuction / Tliquid
	Duct tester setup with ring configuration		Tcond - DB
	Manometer reading		Treturn - DB
	Ducts		Tsupply
	Air Handler and Plenums		Subcooling Target from Cond. Label
	Examples of duct taping / joints		Subcooling Target from inside panel
	Supply boot (typical)		Superheat Target
	Supply grill (typical)		
	Return Grill		Rated Equipment - SEER, EER
	Inside Return		Condenser + Specifications tag
_	-u.	_	Furnace + Specifications
	Filter		tag
	Accessible Leaks		Indoor coil + Specifications tag
	F F(f)		Thermostat
_	Fan Efficacy		
	Watt Draw reading	_	QII
	Hardwired connection		ENV-21 All Framing Stage Failures
	Utility Meter		ENV-22 All Insulation Stage Failures
			Insulation Certificate
	Airflow		Attic Ruler Depth
	"Startup" Airflow reading		Tape Measure Depth
	Tested Airflow reading		Cookie Cutter
	HSPPs		Scale Insulation Weight
	Supply Plenum		
	Return Plenum		Blower Door Test
	Return Grill		Blower Door setup
	Inside Return		Manometer Reading
	Filter		

