

Energy Code Enforcement and Compliance Process Makes Perfect

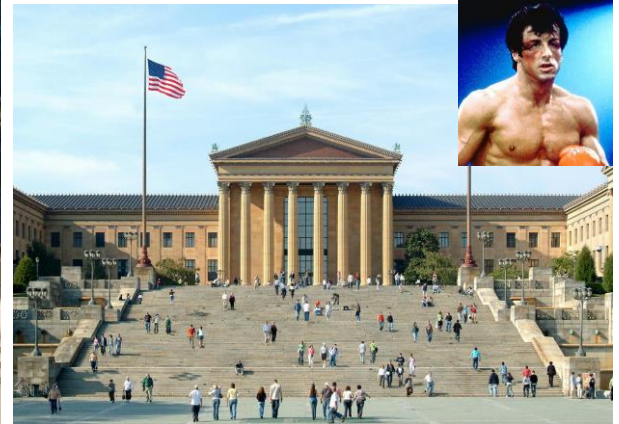
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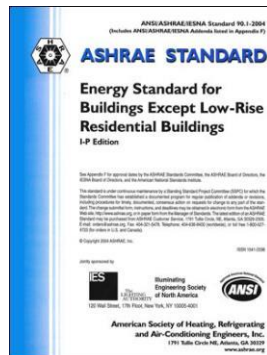
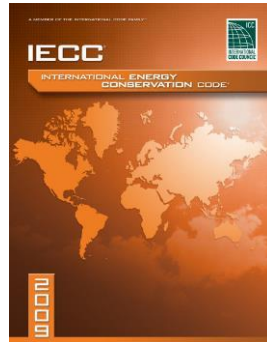
- USDOE – Pennsylvania Residential Energy Code Field Study
- Pennsylvania Construction Codes Academy (PCCA)
- NYSERDA – Energy Codes Training
- Illinois Building Energy Codes Enhancement Project
- Massachusetts Codes and Standards Compliance and Support (CSCS) Initiative
- **Green Building United – Commercial Energy Code Assessment + Training**
- **City of Philadelphia Licenses & Inspections – Energy Code Transition Support**





Tales from the City of Brotherly Love

Philadelphia Energy Code Transition

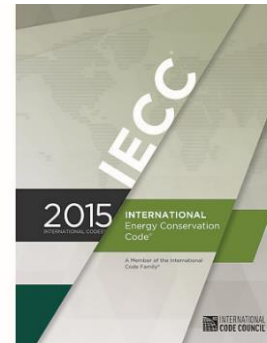


**2009 IECC with reference to
ASHRAE 90.1-2007**

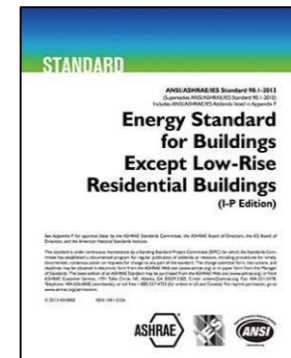
**Effective
October 1, 2018**



**Philadelphia L&I
concurrency
period until
April 1, 2019**



Residential



**2018 IECC with reference to
ASHRAE 90.1-2016**

Commercial



- Concerns about industry pushback and economic development
- The energy code is complex and expanding in scope
- Pace of change is rapid compared to other disciplines
- Feasibility of getting detail from applicants
- Silos for plumbing and electrical plan reviews and inspections
- Energy code is one of many codes



#1 Make the Energy Code a Priority



Tie to jurisdiction's climate and sustainability goals/plans



Partner with Office of Sustainability, City Energy Manager, etc.



Identify champions in the jurisdiction and building department

#2 Ensure the Building Department is Adequately Supported

Does your jurisdiction provide adequate support for the building department, including energy code enforcement?

Determine appropriate staffing levels

Revisit building permit fee schedule and revise if necessary

Evaluate expertise of existing staff

Hire and train new staff

Eliminate political interference

#3 Identify Energy Code Changes



What are the energy code changes?



Assess overlooked items from previous code cycles



Prioritize by impact and feasibility of enforcement

#4 Make Code Interpretations and Create Enforcement Policies

The code official *may* deem participation in above code programs as meeting the energy code

- What are acceptable programs?
- What documentation is required? When?

The code official *may* accept or require the use of an *approved* third party

- Residential: Plan reviews, insulation and air barrier inspections, blower door tests, duct leakage tests(?)
- Commercial: Plan reviews and energy inspections

Existing buildings

- Change in occupancy that results in increase in fossil fuel demand → full compliance like new construction
- How is this determined?



General

- What Code Do I Use?
- Energy Code Compliance Path Flowchart

Residential

- HVAC Design Form
- Insulation & Air Barrier Inspection Form
- Duct & Envelope Testing Form

Commercial


- Information Sheet: Commercial Energy Code Compliance
- Architectural Plan Review Checklist
- Mechanical Plan Review Checklist
- Commissioning Compliance Checklist

A screenshot of the Philadelphia Department of Licenses & Inspection website. The header includes navigation links for City of Philadelphia, Mayor's Office, City Council, Courts, District Attorney, and Sheriff. Below the header is a banner image with three people (a man in a suit, a man in a hard hat, and a woman) and labels for Business, Construction, and Tenants & Landlords. A navigation bar below the banner lists various services: Licenses, Permits & Certificates, Zoning, Appeals, Codes and Regulations, and Floodplain Management. The main content area is titled "Licenses and Inspections" and features a "NEED A PERMIT?" banner. A "What's New" section on the right mentions a new e-newsletter. A large blue-bordered box in the foreground contains the text "Updated Energy Code Compliance Information" and provides details about new documents issued by L&I for permit holders, including contractors and design professionals. It also mentions that these documents highlight new certifications required by professionals and provide links to the Commercial and Residential Energy Code Compliance Fact Sheets.

Residential Energy Code Compliance Information Sheet



- Links to other information and forms
- ERI path and required documentation
- Above code programs
- Duct & Envelope Testing credential requirements
- Third-party Insulation & Air Barrier requirement and credentials



Department of
Licenses and Inspections
CITY OF PHILADELPHIA

Information Sheet:
Residential Energy Code Compliance

This document applies to any building under the scope of the Residential Energy [RE] provisions of the 2015 or 2018 International Energy Conservation Code (IECC). New one- and two-family dwellings and townhouses three stories or less in height above grade must fully comply with the requirements of the 2015 International Residential Code (IRC) and the 2015 IECC [RE]. New one- and two-family dwellings and townhouses four stories or greater in height above grade and Group R-2, R-3, and R-4 buildings three stories or less in height above grade must fully comply with the International Building Code (IBC) and the 2018 IECC [RE]. For a visual representation, refer to the [What Code Do I Use? flowchart](#).

All dates contained in this document refer to the date of permit application.

I. Compliance Path Options
For buildings types described above, permit applicants may choose between five main energy code compliance paths: Prescriptive, Prescriptive with Envelope Tradeoffs, Performance, Energy Rating Index, and Above Code Programs. Regardless of which compliance path is chosen, the applicant must meet all requirements in the IECC that are designated as "mandatory". For a visual representation, refer to the [Energy Code Compliance Path flowcharts](#).

A. Optional Simulated Performance Alternative
To receive a building permit under this path, the permit application shall be accompanied by a preliminary 2015 or 2018 (as applicable) IECC Report produced using REM/Rate, Ekotrope, or other RESNET-accredited Simulated Performance Path software program. To be eligible for a certificate of occupancy, permit applicants choosing this optional compliance path shall provide a final 2015 or 2018 (as applicable) IECC Report calculated based on performance testing results and as-built conditions.

B. Optional Energy Rating Index (ERI) Compliance Alternative
When following the optional Energy Rating Index (ERI) Compliance Alternative, all verification shall be performed by a RESNET-certified HERS Rater following RESNET/ICC Standard 301. Field data may be collected by a RESNET-certified Ratings Field Inspector (RFI). To receive a building permit under this path, the permit application shall be accompanied by a preliminary HERS or ERI Report produced using REM/Rate, Ekotrope, or other RESNET-accredited HERS Rating software programs. To be eligible for a certificate of occupancy, the HERS Rater or permit holder must submit to the inspector an ERI Report¹ and a completed, software-generated Energy Code Inspection Checklist.

C. Optional Above Code Programs Alternative
To receive a building permit under this path, the permit application shall be accompanied by a preliminary HERS or ERI Report produced using REM/Rate, Ekotrope, or other RESNET-accredited HERS Rating software programs. To be eligible for a certificate of occupancy, permit applicants choosing this optional compliance path shall provide an ENERGY STARTM certificate or [PECO New Home Rebates](#) certificate to the inspector.²

¹ When using a HERS Rating software program that does not incorporate Pennsylvania-specific amendments, the ERI Report shall be a 2015 IECC ERI Report and may show a failing result provided the only failing items are the ERI score and building envelope air leakage. In such cases, the ERI score shall be 62 or lower and the air leakage rate shall be 5.0 ACH50 or less.
² A temporary certificate of occupancy may be issued to allow for completion of final certification paperwork.

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Page 1 of 2

individuals performing the inspection(s) shall hold one of the following certifications:

- RESNET-Certified HERS Rater
- RESNET-Certified Rating Field Inspector (RFI)

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Page 2 of 2

will be completed and filing the final inspection. it of all units that are

STM E 1827 on each not exceed 5.0 air

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inspector (RFI)

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ding one of the following

inspector (RFI)

or


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proved third party in > Table R402.4.1.1. on of the building, and

Commercial Energy Code Compliance Information Sheet



- Links to other information
- Mechanical systems commissioning requirements and credentials
- Lighting functional testing requirements



Department of
Licenses and Inspections
CITY OF PHILADELPHIA

Information Sheet:
Commercial Energy Code Compliance

The following applies to buildings other than one- and two-family dwellings, townhouses, and Groups R-2, R-3, and R-4 three stories or less. Work must fully comply with the requirements of the 2018 International Building Code (IBC) and the 2018 International Energy Conservation Code (IECC). To help determine which code applies to your project, refer to the [What Code Do I Use? flowchart](#).

The following requirements apply to all applications submitted on or after April 1, 2019, unless otherwise noted.

I. Compliance Path Options
For building types described above, permit applicants may choose between two major compliance paths: the 2018 IECC or ASHRAE 90.1-2016. Both have additional compliance options including prescriptive and performance-based options. For more information, refer to the [Energy Code Compliance Path flowcharts](#).

A. Optional Above Code Programs Alternative
Acceptable above code programs for IBC-scope buildings are limited to ENERGY STAR™ New Homes and ENERGY STAR Multifamily New Construction certifications.¹ The permit application shall be accompanied by reports per the corresponding section of the [L&I Residential Energy Code Compliance Fact Sheet](#) or an ASHRAE 90.1 modeling report. To receive a certificate of occupancy, permit holders choosing this optional compliance path shall provide an ENERGY STAR certificate or PECO New Home Rebates certificate to the inspector.²

B. Optional Performance Alternative
The permit application shall be accompanied by an ASHRAE 90.1 modeling report in accordance with ASHRAE 90.1-2016 Section 11 or Appendix G.

II. Information on Construction Documents

A. Mechanical Systems Commissioning (Cx) (C408.2)
If mechanical systems and service water heating commissioning will not be performed, construction document notes shall clearly indicate total building cooling equipment capacity and combined mechanical systems and service water heating equipment capacity. If the total building cooling equipment capacity is $\geq 400,000$ Btu/h, or the combined mechanical systems and service water heating equipment capacity is $\geq 600,000$ Btu/h, construction document notes shall clearly indicate provisions for mechanical systems commissioning and completion requirements in accordance with IECC Section C408.2. Systems included in Section C403.5 that serve individual dwelling units are not required to be commissioned. Effective July 1, 2019, the company name and contact information of an approved commissioning agent shall be included on the construction document notes.

B. Reporting Specifications
A system balancing report and final commissioning report shall be provided to the owner within 90 days of the date of receipt of the certificate of occupancy. The final Cx report shall include:

- Results of functional testing;
- Disposition of deficiencies found during testing, including details of corrective measures used or proposed;
- Functional performance test procedures used during the commissioner process including measurable criteria for test acceptance.

¹ Other building certifications may be deemed acceptable by the department when the applicant provides an ASHRAE 90.1-2016 modeling report demonstrating the building is designed to use less energy than the budget building design.
² A temporary certificate of occupancy may be issued to allow for completion of final certification paperwork.

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Page 1 of 2

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WHAT CODE DO I USE?



Single Family

One- and two-family dwellings and townhouses



Three stories or less



2015 IRC



2015 IECC [RE]
(with PA amendments)



Four stories or more and two-family (duplex)



2018 IBC



2018 IECC [RE]
(with PA amendments)



Multifamily

Group R-2, R-3, R-4



Three stories or less



2018 IBC



2018 IECC [RE]
(with PA amendments)



Four stories or more



2018 IBC



2018 IECC [CE] or
ASHRAE 90.1-2016

Code Links:

2015 IRC: <https://codes.iccsafe.org/content/IRC2015>

2015 IECC: <https://codes.iccsafe.org/content/IECC2015>

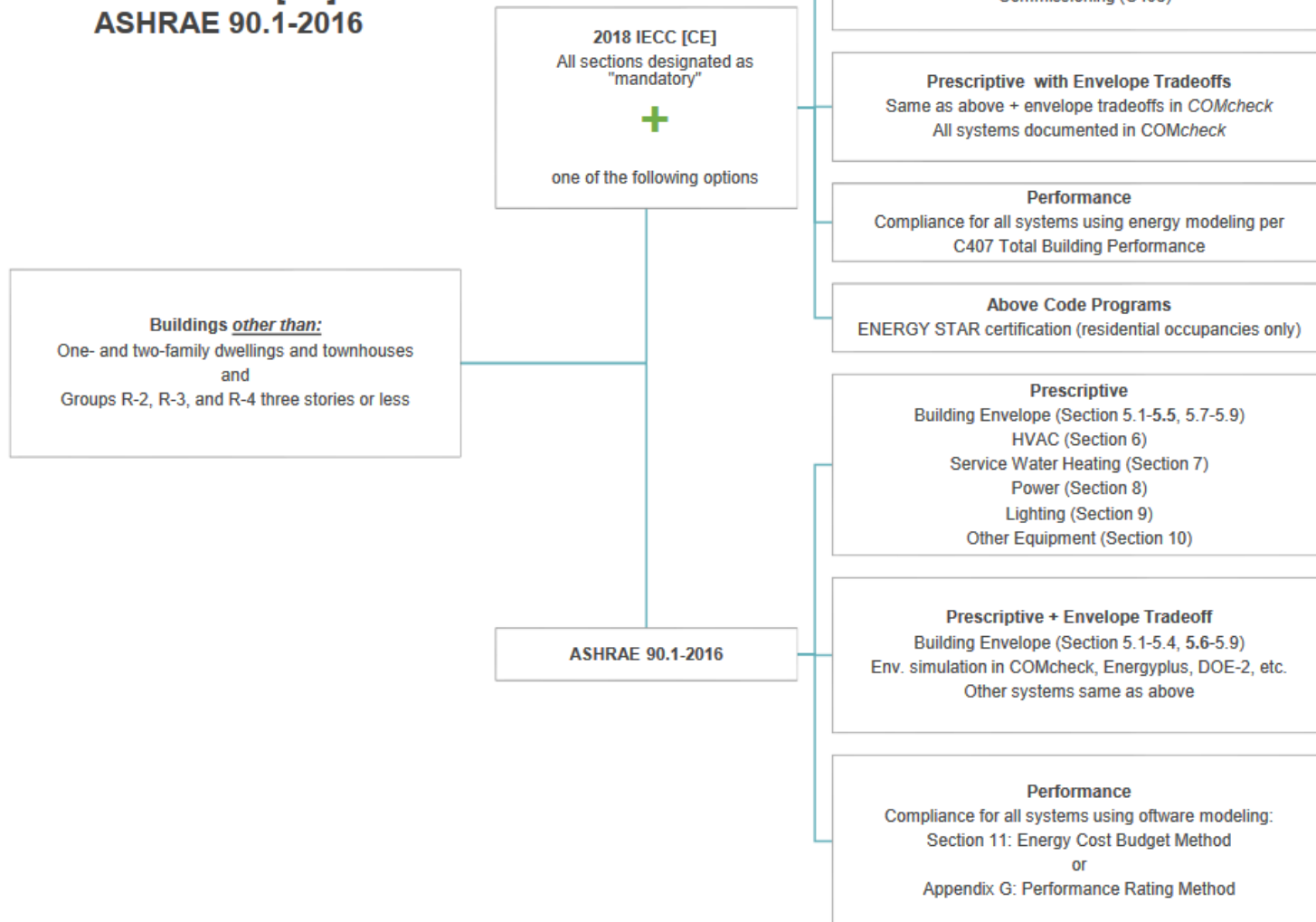
2018 IBC: <https://codes.iccsafe.org/content/IBC2018>

2018 IECC: <https://codes.iccsafe.org/content/IECC2018P2>

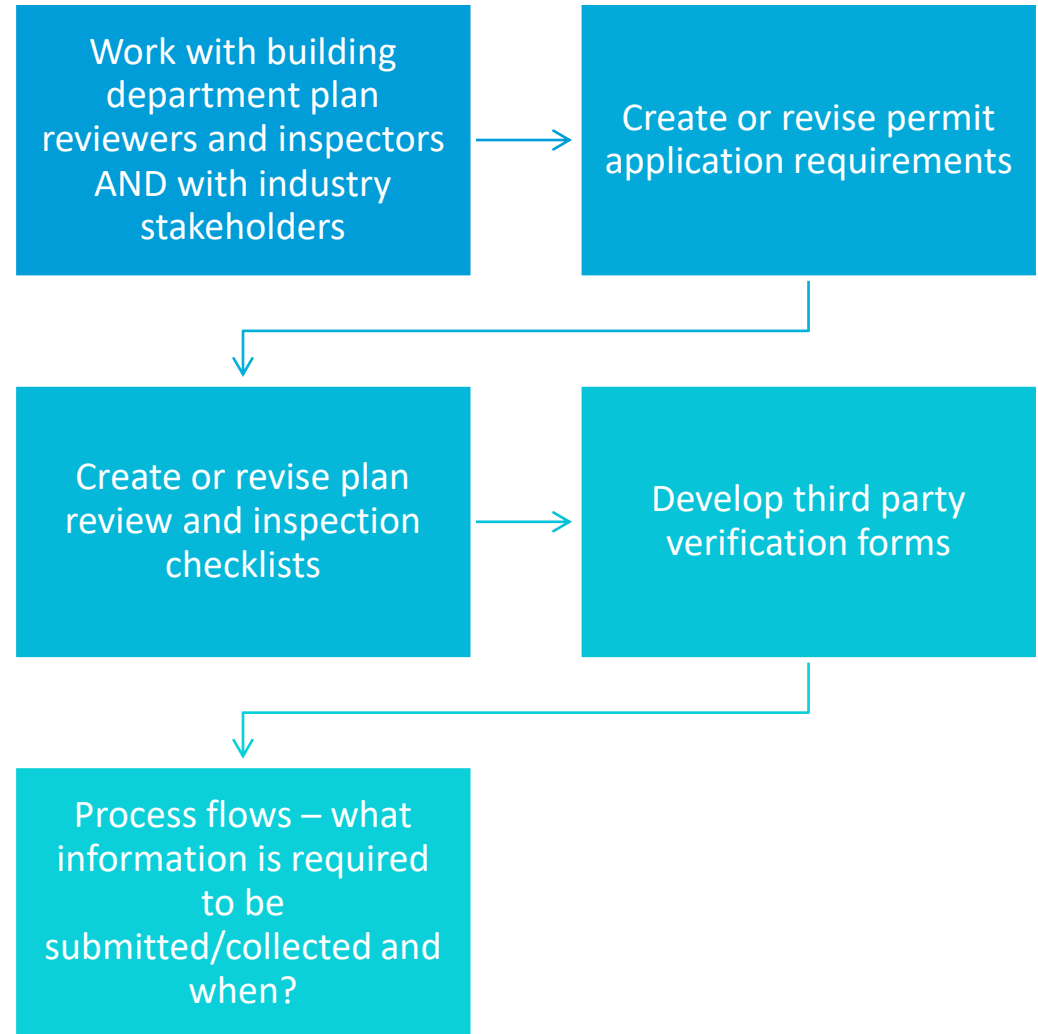
PA Amendments: <https://www.dli.pa.gov/ucc/Documents/Official-Record-of-2015-Code-Review-Amended%2007232018.pdf>

ASHRAE 90.1 2016: <https://www.ashrae.org/technical-resources/standards-and-guidelines/read-only-versions-of-ashrae-standards>

IBC Scope/IECC Commercial 2018 IECC [CE] ASHRAE 90.1-2016



#5 Develop Enforcement Processes



INTERNAL USE ONLY

Date Received _____

Application Number _____

Air Barrier & Insulation Checklist
(Based on IECC 2015 and 2015 Table R402.4.1.1)

This checklist must be completed and provided to the inspector prior to the wallboard inspection.¹

Property Address Enter the house location.	1	Address _____
Owner/Owner's Agent Provide the contact information for the owner/owner's agent and the associated permit number.	2	Name _____ Permit Number _____ Email _____ Phone _____
Inspecting Company The company responsible for conducting the inspection and completing the checklist must complete this section.	3	Inspecting Company _____ Tester Name _____ Email _____ Phone _____ Tester Signature _____ Date _____ BPI or HERS Certification #: BPI #: _____ HERS Rater #: _____

Find a qualified professional at:

Find a qualified professional at:

<https://peconewhomes.com/builders/in-participating-raters/>

<http://www.bpi.org/sites/default/files/Locator.html>

Checklist

General	<input type="checkbox"/>	A continuous air barrier is installed in the building envelope.
	<input type="checkbox"/>	The exterior thermal envelope contains a continuous air barrier.
	<input type="checkbox"/>	Breaks or joints in the air barrier are sealed.
	<input type="checkbox"/>	Air-permeable insulation shall not be used as a sealing material.
Ceiling/attic	<input type="checkbox"/>	The air barrier in any dropped ceiling/soffit are aligned with the insulation and any gaps in the air barrier are sealed.
	<input type="checkbox"/>	Recessed lighting fixtures installed in the building envelope are air tight & IC rated.

¹ Choosing the ENERGY STAR certification path, a complete thermal enclosure system water Checklist may be attached in lieu of completing this checklist.

² Exception: R-19 (minimum) cavity insulation is permitted if the wall framing factor is 20% or less and/or walls are framed at 24" o.c.

³ Exception: Values match those listed in an approved REScheck, Simulated Performance, or ERI report.

INTERNAL USE ONLY

Date Received _____

Application Number _____

Rim joists	<input type="checkbox"/>	Rim joists are insulated and sealed to the floor joists, subfloor, and wall plate.
	<input type="checkbox"/>	Wall cavity insulation is R-20 or greater or a combination of cavity and continuous insulation is installed with R-13 or greater cavity + R-5 or greater continuous. ²
	<input type="checkbox"/>	Insulation is installed in all floor assemblies that separate conditioned space from unconditioned space or the outside.
Floors (including above garage and cantilevered floors)	<input type="checkbox"/>	Floor insulation is R-19 or greater. ³
	<input type="checkbox"/>	The air barrier is installed at any exposed edge of insulation.
	<input type="checkbox"/>	Floor framing cavity insulation is installed to maintain permanent contact with the underside of subfloor decking. ⁴
Unvented crawl space walls	<input type="checkbox"/>	Exposed earth in unvented crawl spaces are covered with a Class I vapor retarder with overlapping joints taped.
	<input type="checkbox"/>	R-10 or greater continuous insulation or R-13 or greater cavity insulation is installed ² and is permanently attached to the crawlspace walls.
Shafts and penetrations	<input type="checkbox"/>	Duct shafts, utility penetrations, and flue shafts opening to exterior or unconditioned space are sealed.
Narrow cavities	<input type="checkbox"/>	Batts in narrow cavities are cut to fit, or narrow cavities are filled by insulation that on installation readily conforms to the available cavity space.
Garage separation	<input type="checkbox"/>	Air sealing are provided between the garage and conditioned spaces.
Plumbing and wiring	<input type="checkbox"/>	Batt insulation is cut neatly to fit around wiring and plumbing in exterior walls, or insulation that on installation readily conforms to available space shall extend behind piping and wiring.
Shower/tub on exterior wall	<input type="checkbox"/>	Exterior walls adjacent to showers and tubs are insulated.
	<input type="checkbox"/>	The air barrier installed at exterior walls adjacent showers and tubs shall separate them from the showers and tubs.
Electrical/phone lines on exterior	<input type="checkbox"/>	The air barrier is installed behind electrical or communication boxes or concealed boxes are installed.

⁴ Exception: Continuous Insulation is installed on the underside of the floor joists.

INTERNAL USE ONLY

Date Received _____

Application Number _____

Residential Duct & Envelope Testing (DET) Certification Form

Use this form to provide test results and certify the DET performed on your property.

Property Address

Enter the house location.

1

Address _____

Owner/Owner's Agent

Provide the contact information for the owner/owner's agent and the associated permit number.

2

Name _____

Permit Number _____

Email _____

Phone _____

Building Envelope Air Leakage Information

Use this section to provide details about the mandatory Building Envelope Air Leakage testing.

(a) Provide the results of the mandatory Blower Door Test.

(b) Confirm the mandatory Visual Inspection.

(c) The testing company responsible for performing the testing/inspection must complete this section.

(a) Blower Door Test Results

Fan Flow at 50 Pascals

CFM50

Total Conditioned Volume

ft³

ACH50 = CFM50 x 60 / Volume

ACH50

(b) Visual Inspection

☐ Air Barrier and Insulation Installation Final Inspection Checklist (on reverse) has been completed and signed.

(c) Testing Company Information

Testing Company _____

Tester Name _____

Email _____

Phone _____

Tester Signature _____

Date _____

BPI or HERS Certification #: BPI # _____

HERS Rater #: _____

HERS RFI #: _____

Heating and Cooling System Duct Leakage Information

(a) Duct Certification

☐ I certify that all portions of the ducts are located entirely within the building thermal envelope. Testing is not required.

Owner/owner's representative signature _____

Date _____

(b) Total Duct Leakage Test

Use this section to provide details about the mandatory Building Envelope Air Leakage testing.

(a) Provide the results of the mandatory Blower Door Test.

(b) Confirm the mandatory Visual Inspection.

(c) The testing company responsible for performing the testing/inspection must complete this section.

(d) Provide the results of the mandatory Blower Door Test.

(e) Confirm the mandatory Visual Inspection.

(f) The testing company responsible for performing the testing/inspection must complete this section.

(g) Provide the results of the mandatory Blower Door Test.

(h) Confirm the mandatory Visual Inspection.

(i) The testing company responsible for performing the testing/inspection must complete this section.

(j) Provide the results of the mandatory Blower Door Test.

(k) Confirm the mandatory Visual Inspection.

(l) The testing company responsible for performing the testing/inspection must complete this section.

(m) Provide the results of the mandatory Blower Door Test.

(n) Confirm the mandatory Visual Inspection.

(o) The testing company responsible for performing the testing/inspection must complete this section.

(p) Provide the results of the mandatory Blower Door Test.

(q) Confirm the mandatory Visual Inspection.

(r) The testing company responsible for performing the testing/inspection must complete this section.

(s) Provide the results of the mandatory Blower Door Test.

(t) Confirm the mandatory Visual Inspection.

(u) The testing company responsible for performing the testing/inspection must complete this section.

(v) Provide the results of the mandatory Blower Door Test.

(w) Confirm the mandatory Visual Inspection.

(x) The testing company responsible for performing the testing/inspection must complete this section.

(y) Provide the results of the mandatory Blower Door Test.

(z) Confirm the mandatory Visual Inspection.

Final Inspection Details

Check each box to confirm all inspections were performed.

Use the lines to provide any additional details about the inspection.

3



INTERNAL USE ONLY

Date Received _____

Application Number _____

Air Barrier and Insulation Installation Final Inspection Checklist

Property Address

Enter the house location.

1

Address _____

Owner/Owner's Agent

Provide the contact information for the owner/owner's agent and the associated permit number.

2

Name _____

Permit Number _____

Email _____

Phone _____

Final Inspection Details

Check each box to confirm all inspections were performed.

Use the lines to provide any additional details about the inspection.

3

Ceiling/Attic

☐

Recessed light fixtures installed in the building thermal envelope are sealed to the drywall.

☐

Insulation is installed in each ceiling assembly that separates conditioned space from unconditioned space or outdoors.

☐

Insulation R-value is R-49 or greater.¹ (A minimum of R-38 insulation is allowed if the full height of uncompressed insulation extends over the top of the walls.)

☐

Access openings, drop down stairs, or knee wall doors to unconditioned attic spaces are sealed.

¹ Exception: Values match those listed in an approved REScheck, Simulated Performance, or ERI report.

Notes:

Testing Company

The testing company responsible for performing the inspection must complete this section.

Testing Company _____

Tester Name _____

Final Inspection

Ceiling/Attic

☐

Recessed light fixtures installed in the building thermal envelope are sealed to the drywall.

☐

Insulation is installed in each ceiling assembly that separates conditioned space from unconditioned space or outdoors.

☐

Insulation R-value is R-49 or greater.¹ (A minimum of R-38 insulation is allowed if the full height of uncompressed insulation extends over the top of the walls.)

☐

Access openings, drop down stairs, or knee wall doors to unconditioned attic spaces are sealed.

¹ Exception: Values match those listed in an approved REScheck, Simulated Performance, or ERI report.



Department of

Licenses and Inspections

CITY OF PHILADELPHIA

Commissioning Compliance Checklist

Note: This form applies only to new construction projects.

Project Information: _____ Project Name: _____

Project Address: _____

Approved Commissioning Agency: _____

- ☐ Owner or owner's representative understands that they must be provided with a manual, record documents, and operations and maintenance personnel training completion report within 90 days of receipt of the certificate of occupancy per Section C106.3.
- ☐ Lighting Controls Functional Testing has been executed per Section C408.3. If applicable, deferred and follow-up testing is scheduled to be provided on: _____

The following items apply only to projects with a total building cooling capacity of $\geq 480,000$ Btu/h or a combined heating and service water heating capacity of $\geq 600,000$ Btu/h.¹ If this project is below these thresholds, initial here, leave the remaining items unchecked, and sign and date below. **Initial:** _____

- ☐ Commissioning Plan was used during construction and includes all items required by Section C408.2.1
- ☐ Systems Adjusting and Balancing has been completed per Section C408.2.2

_____ HVAC Equipment Functional Testing has been executed per Section C408.3.4. If applicable, deferred and follow-up testing is scheduled to be provided on: _____

#6 Train Building Department Staff



Certification training



Departmental policy
and document use
training



Continuing
education

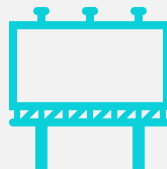
#7 Outreach to and Training for the Industry



Post information and document to building department website



E-Newsletters



Attend and present at industry association events (e.g. HBAs, ASHRAE)

#8 Enforce Requirements and Continuous Improvement



Stick to your guns



Be consistent



Monitor and assess what's working and what's not



Revise processes as necessary





QUESTIONS

Mike Turns

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