2021 Code Implementation: Philadelphia Energy Conservation & Mechanical Code

Department of
Licenses and Inspections
CITY OF PHILADELPHIA

Disclaimer

This listing of codes, standards or any other regulations within this presentation is for informational purposes only. They do no constitute the full scope of provisions that may be applicable to your project and cannot be relied upon as evidence of compliance or enforcement.

Any related code provision not mentioned in this presentation does not alleviate the person responsible for the design (owner, designer, etc.) from full compliance with necessary codes and standards nor does it diminish the importance of any specific accessible feature or element.

Code Adoption

As of 6/25/2025, State Adoption of 2021 I-Codes currently **delayed** as regulation will need to be reviewed by the PA Independent Regulatory Review Commission.

~~July 13, 2025~~

2021 I-Codes Adopted

6-month transition

~~January 13, 2026~~

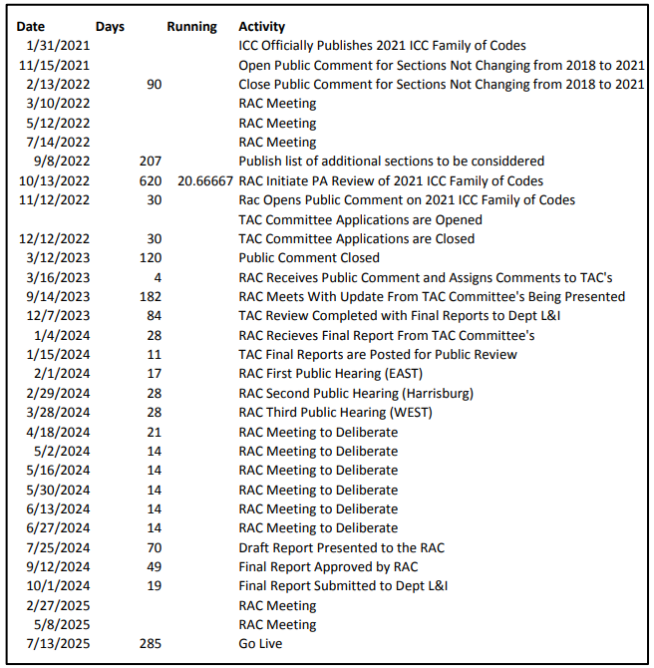
Mandatory application of I-Codes

- Applications filed on or after ~~July 13, 2025~~, may apply the 2018 or 2021 I-Codes.
- Applications filed on or after ~~January 13, 2026~~, MUST apply the 2021 I-Codes.

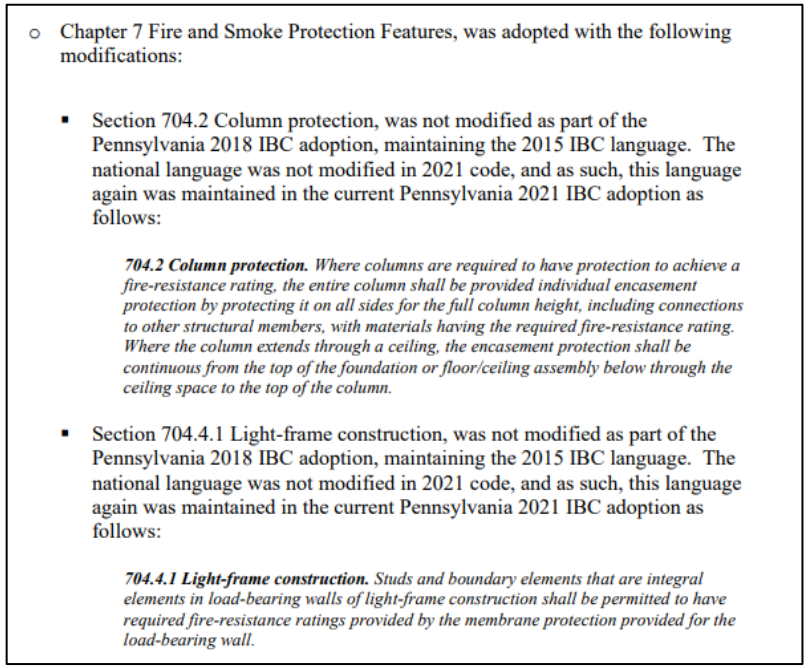
Implementation

- Regulation on Permit Filing Date.
- Can’t mix code editions.
- Permit Application Extensions- will only authorize one extension for RFI. More stringent rules on pick-up.
- Master Approvals- individual permit applications must be filed by application date. If missed, will need to resubmit
- Preliminary plan reviews, including variances, will not carry over.
- Need to act on permits issued under the 2018 I-Codes within expiration period.

Pa Uniform Construction Code (UCC)



Date	Days	Running	Activity
1/31/2021			ICC Officially Publishes 2021 ICC Family of Codes
11/15/2021			Open Public Comment for Sections Not Changing from 2018 to 2021
2/13/2022	90		Close Public Comment for Sections Not Changing from 2018 to 2021
3/10/2022			RAC Meeting
5/12/2022			RAC Meeting
7/14/2022			RAC Meeting
9/8/2022	207		Publish list of additional sections to be considdered
10/13/2022	620	20.66667	RAC Initiate PA Review of 2021 ICC Family of Codes
11/12/2022	30		Rac Opens Public Comment on 2021 ICC Family of Codes
			TAC Committee Applications are Opened
12/12/2022	30		TAC Committee Applications are Closed
3/12/2023	120		Public Comment Closed
3/16/2023	4		RAC Receives Public Comment and Assigns Comments to TAC's
9/14/2023	182		RAC Meets With Update From TAC Committee's Being Presented
12/7/2023	84		TAC Review Completed with Final Reports to Dept L&I
1/4/2024	28		RAC Recieves Final Report From TAC Committee's
1/15/2024	11		TAC Final Reports are Posted for Public Review
2/1/2024	17		RAC First Public Hearing (EAST)
2/29/2024	28		RAC Second Public Hearing (Harrisburg)
3/28/2024	28		RAC Third Public Hearing (WEST)
4/18/2024	21		RAC Meeting to Deliberate
5/2/2024	14		RAC Meeting to Deliberate
5/16/2024	14		RAC Meeting to Deliberate
5/30/2024	14		RAC Meeting to Deliberate
6/13/2024	14		RAC Meeting to Deliberate
6/27/2024	14		RAC Meeting to Deliberate
7/25/2024	70		Draft Report Presented to the RAC
9/12/2024	49		Final Report Approved by RAC
10/1/2024	19		Final Report Submitted to Dept L&I
2/27/2025			RAC Meeting
5/8/2025			RAC Meeting
7/13/2025	285		Go Live



- Chapter 7 Fire and Smoke Protection Features, was adopted with the following modifications:
  - Section 704.2 Column protection, was not modified as part of the Pennsylvania 2018 IBC adoption, maintaining the 2015 IBC language. The national language was not modified in 2021 code, and as such, this language again was maintained in the current Pennsylvania 2021 IBC adoption as follows:

    704.2 Column protection. *Where columns are required to have protection to achieve a fire-resistance rating, the entire column shall be provided individual encasement protection by protecting it on all sides for the full column height, including connections to other structural members, with materials having the required fire-resistance rating. Where the column extends through a ceiling, the encasement protection shall be continuous from the top of the foundation or floor/ceiling assembly below through the ceiling space to the top of the column.*
  - Section 704.4.1 Light-frame construction, was not modified as part of the Pennsylvania 2018 IBC adoption, maintaining the 2015 IBC language. The national language was not modified in 2021 code, and as such, this language again was maintained in the current Pennsylvania 2021 IBC adoption as follows:

    704.4.1 Light-frame construction. *Studs and boundary elements that are integral elements in load-bearing walls of light-frame construction shall be permitted to have required fire-resistance ratings provided by the membrane protection provided for the load-bearing wall.*

Review & Advisory Council Site

includes complete info on regulatory process, including minutes of meetings.

Full Adoption Timeline

2024 adoption timeline will be posted here, with public comment period of unchanged sections in 2025.

Final Report

View full report of amendments to the 2021 I-Codes to be adopted through PA DLI regulation.

Local Philadelphia Modifications

- Philadelphia Energy Conservation Code Ordinance introduced to City Council in June 2025, proposed as follows:

NOTE: Proposed legislation pending City Council approval. Status update for legislation may be available in Fall 2025.

IECC- Residential Code Section (IRC section in parentheses, where applicable)	Code Provision
R401.2.5, R408.1, R408.2 (N1101.13.5, N1108.1, N1108.2)	Require an additional energy package to improve efficiency. The developer/ builder can select from 5 options, allowing for the most economical solution for the project.
R403.3.5, R403.3.6 (N1003.3.5, N1103.3.6)	Require air leakage testing for ducts within the building thermal envelope.
R404.1 (N1104.1.)	Increase required percentage of high efficacy lamps from 90% to 100%.
R404.1.1	Sets limits for exterior lighting loads serving multi-family buildings.
R404.2 (N1104.2)	Require rooms with permanently installed lights to be controlled by dimmers or occupancy sensors.
R404.3 (N1104.3)	Require automatic shut-off or light-sensing controls for exterior lighting exceeding 30 watts.

Guidance Documents & Form Updates

Assistance in Understanding Changes

- Publish list of changes, by Code, as they will be applied in Philadelphia.
- New forms will be available for 2021 Codes.
- Both 2018 and 2021 will be posted. Must select the correct form.
- All FAQs, bulletins, info sheets, EZ permits etc. will be updated as needed.
  - Most will be revised but not re-issued.

Department of Licenses and Inspections
CITY OF PHILADELPHIA

Reference Code(s):
International Building Code

FAQ:
What are the significant changes between the 2018 and 2021 Building Code?

This document includes a summary of significant changes to the Building Code (IBC) and includes the PA Uniform Construction Advisory Council (RAC) Report Amendments. This document a information for the identified code changes

Disclaimer: This document shall be utilized as guidance professional is responsible for reviewing the provisions of the I associated reference Standards, and the directives of the PA D and Industry. The Department of Licenses and Inspections decision in response to a formal application for a const preliminary review.

Summary of changes between the 2018 and 2021 International
(Items marked with an asterisk (*) are identified as major code change

Administration

Chapter 2:

- Definition- Atrium
- Definition- Change of Occupancy *
- Definition- Impact Protective System
- Definition- Mass Timber *
- Definition- Nailable Substrate
- Definition- Penthouse
- Definition- Puzzle Room *
- Definition- Structural Members

Building Planning

Chapters 3 through 6:

- Section 306.2- Group F-1 Occupancy Classification

PB_020_FAQ

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Return Home

Reference Code(s):
International Building Code

Summary of Changes between the 2018 and 2021 Building Code

Administration

Chapter 2 (Definitions)

- **Definition of "Atrium"** has been simplified by the elimination of some previous language to clearly define vertical enclosures and the number of stories connected by an atrium.

[BG] ATRIUM. A vertical space that is closed at the top, connecting two or more stories in Group I-2 and I-3 occupancies or three or more stories in all other occupancies.

- **Definition of "Change of Occupancy"** narrows the scope of a change of occupancy where no classification change takes place.

[A] CHANGE OF OCCUPANCY. Either of the following shall be considered as a change of occupancy where this code requires a greater degree of safety, accessibility, structural strength, fire protection, means of egress, ventilation or sanitation than is existing in the current building or structure:

1. Any change in the occupancy classification of a building or structure.
2. Any change in the purpose of, or a change in the level of activity within, a building or structure.

- **NEW Definition of "Impact Protective System"** has been added for assemblies that are designed to withstand windborne debris.

[BS] IMPACT PROTECTIVE SYSTEM. Construction that has been shown by testing to withstand the impact of test missiles and that is applied, attached or locked over exterior glazing.

- **Definition of "Mass Timber"** has been amended to specifically define mass timber as representative of both the large wood building elements historically recognized as Heavy Timber (now Type IV-HT) constructions and the three new construction types of IV-A, IV-B and IV-C.

[BG] MASS TIMBER. Structural elements of Type IV construction primarily of solid, built-up, panelized or engineered wood products that meet minimum cross-section dimensions of Type IV construction.

[BF] NONCOMBUSTIBLE PROTECTION (FOR MASS TIMBER). Noncombustible material, in accordance with Section 703.6, designed to increase the fire-resistance rating and delay the combustion of mass timber.

- **Definition of "Nailable Substrate"** has been amended to clarify what materials should be expected to provide withdrawal resistance for roof or wall cladding assemblies.

[BF] NAILABLE SUBSTRATE. A product or material such as framing, sheathing or furring, composed of wood, wood-based materials or other materials providing equivalent fastener withdrawal resistance.

PB_020_FAQ Page 6 of 54

Future Information Sessions

2021 Code Questions

Answers to your questions

- Request that L&I issue an interpretation on a specific code section. This form, linked in our newsletter, can also be used for 2021 code issues/ concerns.
- Look out for future newsletters or trainings for public response.

Note: Continue to use www.phila.gov/get-help for direct responses to code questions.

Code Corner

2021 I-Code transition materials

Beginning in January 2026, all new permit applications must conform to the 2021 I-Codes. This page includes forms and documents to prepare for the transition.

Filter documents by title or description

Name	Description	Released	Format
2021 I-Code- Q&A	Questions and answers regarding the 2021 I-Code transition.	January 24, 2025	PDF
2021 ICC Code Adoption Final Report	This report is issued by the Pennsylvania Department of Labor and Industry Review and Advisory Council for modifications to the 2021 I-Codes, to be adopted throughout PA as part of the Uniform Construction Code.	September 20, 2024	PDF
2021 IPC Changed Sections	This document lists sections that were changed under the 2021 International Plumbing Code.	September 20, 2024	PDF
2018 Philadelphia Plumbing Code Changes	This document provides guidance that highlights the impacts of the 2021 changes and proposed local changes to the 2018 Philadelphia Plumbing Code.	September 20, 2024	PDF
Proposed Phila Changes to the 2021 IPC Provisions	This document provides recommendations by the Plumbing Advisory Board (PAB) to better accommodate local conditions. This document excludes those changes already adopted by ordinance.	September 20, 2024	PDF
2021 I-Code changes webinar slides	These slides provide an overview of the timeline, what to expect in the coming year, and examples of significant changes from the 2021 I-Code adoption.	December 18, 2024	PDF

2021 Energy Conservation & Mechanical Provisions

1. 2021 Commercial Energy Conservation Provisions
2. 2021 Residential Energy Conservation Provisions
3. 2021 Mechanical Provisions

Note: Philadelphia Energy Conservation Code currently pending legislation. Provisions presented may undergo revision upon finalized adopting ordinance.

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ENERGY CONSERVATION CODE-- COMMERCIAL BUILDINGS

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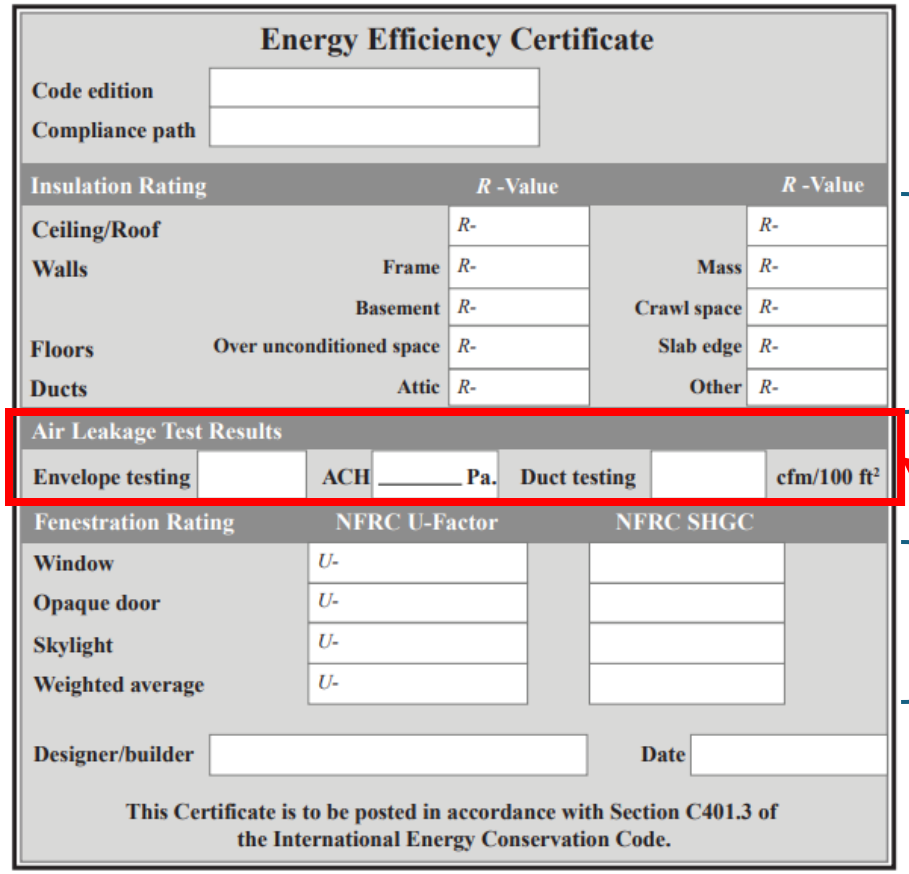
C401.2 Commercial Compliance Paths

- 2021 IECC removes reference to the term “mandatory” throughout code
- Revision in the language under C401.2 replaces “mandatory” provision to recognize all provisions to be met under the IECC through the following Compliance methods:
  - C401.2.1(1): Prescriptive Path: Must meet Section C402 through C406 and Section C408.
    - Additional guidance for dwelling units & sleeping units in Group R-2
  - C401.2.1(2): Total Building Performance: Must meet Section C407
  - C401.2.2: ANSI/ASHRAE/IESNA 90.1

C401.3 Commercial Envelope Certificate



Energy Efficiency Certificate

Code edition	
Compliance path	

Insulation Rating		*R* -Value		*R* -Value
Ceiling/Roof		R-		R-
Walls	Frame	R-	Mass	R-
	Basement	R-	Crawl space	R-
Floors	Over unconditioned space	R-	Slab edge	R-
Ducts	Attic	R-	Other	R-

Air Leakage Test Results					
Envelope testing		ACH _____ Pa.	Duct testing		cfm/100 ft²

Fenestration Rating	NFRC U-Factor	NFRC SHGC
Window	U-	
Opaque door	U-	
Skylight	U-	
Weighted average	U-	

Designer/builder		Date	

This Certificate is to be posted in accordance with Section C401.3 of the International Energy Conservation Code.

- New provision introduced under 2021 IECC to require Thermal Envelope Certificate to be permanently posted for Commercial Scopes
  - Shall be located on a wall in the space where the space conditioning equipment, utility room or other approved location
  - Shall include U-value & R-value ratings for building envelope
  - Shall include results of building envelope air leakage testing on the building

Additional Energy Efficiency Package

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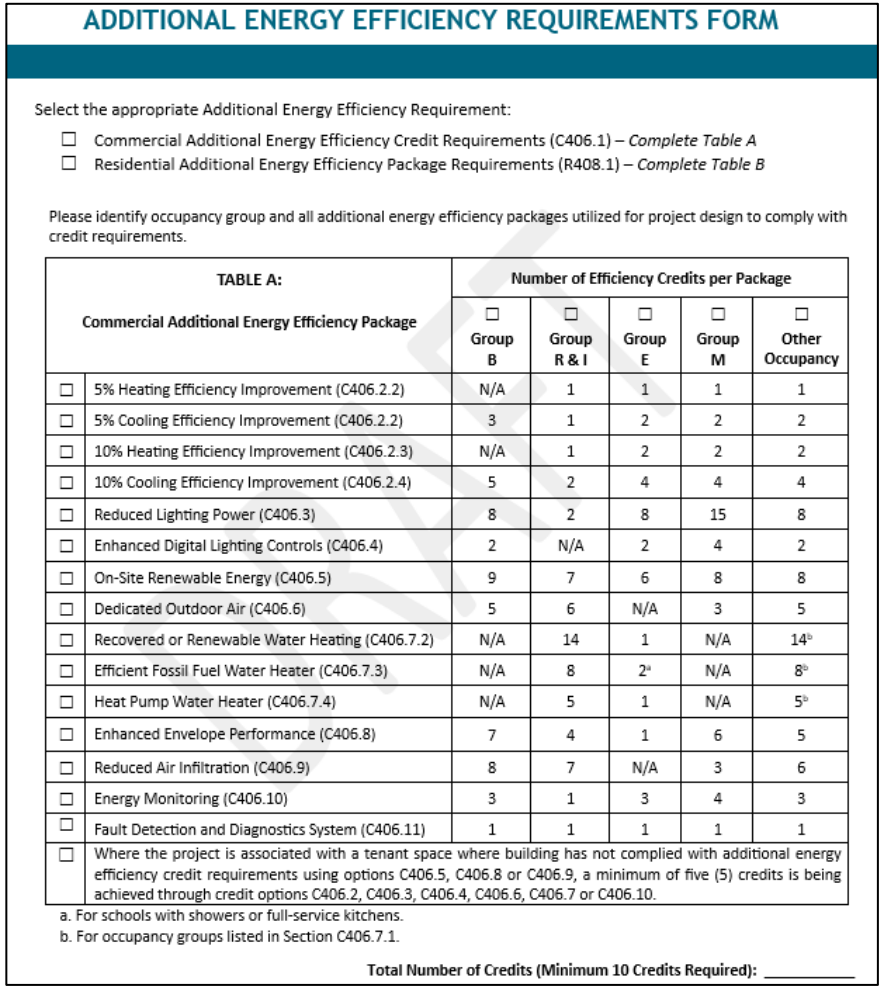


ADDITIONAL ENERGY EFFICIENCY REQUIREMENTS FORM

Select the appropriate Additional Energy Efficiency Requirement:

☐ Commercial Additional Energy Efficiency Credit Requirements (C406.1) – *Complete Table A*
☐ Residential Additional Energy Efficiency Package Requirements (R408.1) – *Complete Table B*

Please identify occupancy group and all additional energy efficiency packages utilized for project design to comply with credit requirements.

	TABLE A: Commercial Additional Energy Efficiency Package	Number of Efficiency Credits per Package				
		☐ Group B	☐ Group R & I	☐ Group E	☐ Group M	☐ Other Occupancy
☐	5% Heating Efficiency Improvement (C406.2.2)	N/A	1	1	1	1
☐	5% Cooling Efficiency Improvement (C406.2.2)	3	1	2	2	2
☐	10% Heating Efficiency Improvement (C406.2.3)	N/A	1	2	2	2
☐	10% Cooling Efficiency Improvement (C406.2.4)	5	2	4	4	4
☐	Reduced Lighting Power (C406.3)	8	2	8	15	8
☐	Enhanced Digital Lighting Controls (C406.4)	2	N/A	2	4	2
☐	On-Site Renewable Energy (C406.5)	9	7	6	8	8
☐	Dedicated Outdoor Air (C406.6)	5	6	N/A	3	5
☐	Recovered or Renewable Water Heating (C406.7.2)	N/A	14	1	N/A	14[b]
☐	Efficient Fossil Fuel Water Heater (C406.7.3)	N/A	8	2[a]	N/A	8[b]
☐	Heat Pump Water Heater (C406.7.4)	N/A	5	1	N/A	5[b]
☐	Enhanced Envelope Performance (C406.8)	7	4	1	6	5
☐	Reduced Air Infiltration (C406.9)	8	7	N/A	3	6
☐	Energy Monitoring (C406.10)	3	1	3	4	3
☐	Fault Detection and Diagnostics System (C406.11)	1	1	1	1	1
☐	Where the project is associated with a tenant space where building has not complied with additional energy efficiency credit requirements using options C406.5, C406.8 or C406.9, a minimum of five (5) credits is being achieved through credit options C406.2, C406.3, C406.4, C406.6, C406.7 or C406.10.					

a. For schools with showers or full-service kitchens.
b. For occupancy groups listed in Section C406.7.1.

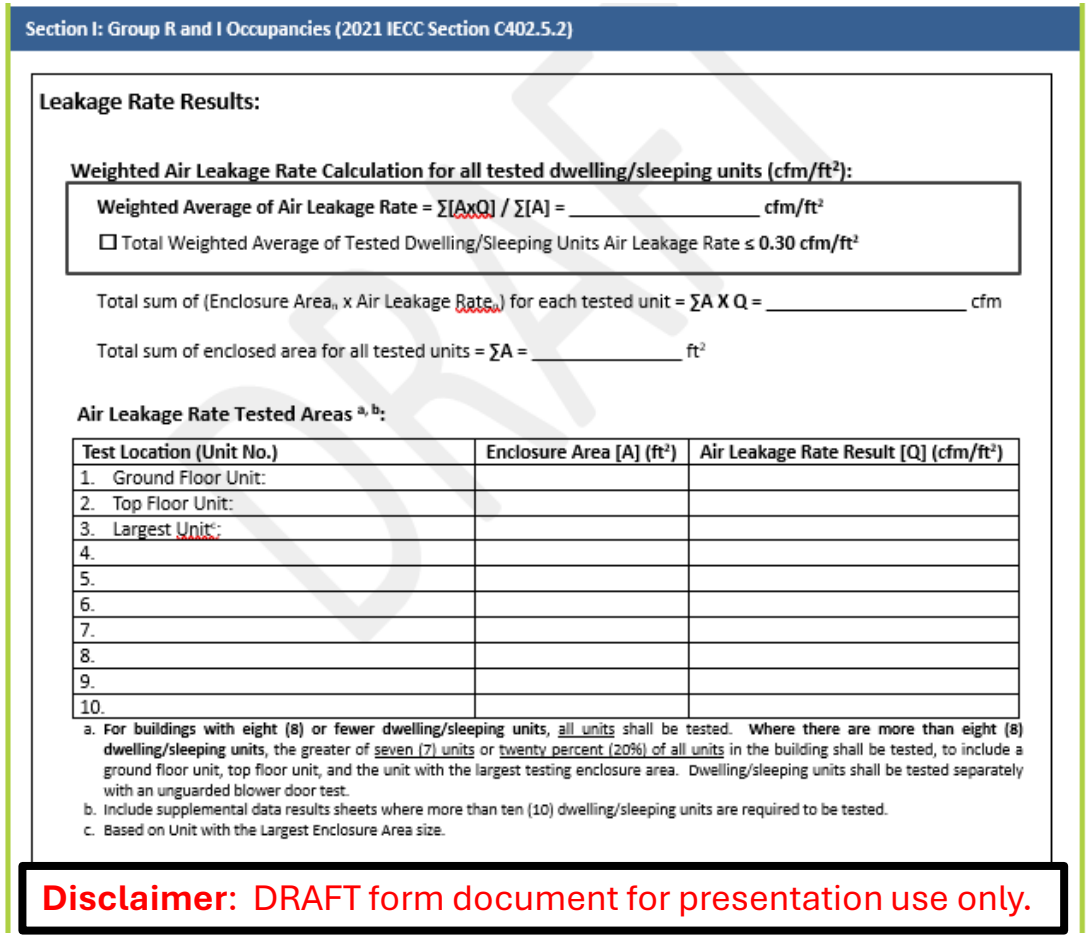
Total Number of Credits (Minimum 10 Credits Required): _____

- Section C406 revised with regard to Additional Energy Efficiency Package compliance
- Now requires multiple efficiency package selections based on credit-based compliance
  - Minimum total of ten (10) credits required to be achieved
    - Where space is associated with a tenant space in a building, minimum total of five (5) credits to be met
  - Credit values for packages vary based on occupancy classification
- Department will be launching a new form document to support review of project designs and additional energy efficiency requirement compliance.

Commercial Air Leakage Testing

- Section C402.5 Commercial Air Leakage Testing requirements revised under 2021 IECC to reflect separate testing requirements & procedures for:
  - Group R/I dwelling units
  - All Occupancies other than Group R/I dwelling units
- Specific areas and location of testing to be provided based on code requirements
- Where air leakage tests are portioned out between different enclosure areas, air leakage rate result shall be area-weighted

Commercial Air Leakage Testing-- Dwelling & Sleeping Units



Section I: Group R and I Occupancies (2021 IECC Section C402.5.2)

Leakage Rate Results:

Weighted Air Leakage Rate Calculation for all tested dwelling/sleeping units (cfm/ft²):

Weighted Average of Air Leakage Rate = ∑[AxQ] / ∑[A] = _____ cfm/ft²

☐ Total Weighted Average of Tested Dwelling/Sleeping Units Air Leakage Rate ≤ **0.30 cfm/ft²**

Total sum of (Enclosure Area$_n$ x Air Leakage Rate$_n$) for each tested unit = **∑A X Q** = _____ cfm

Total sum of enclosed area for all tested units = **∑A** = _____ ft²

Air Leakage Rate Tested Areas [a, b]:

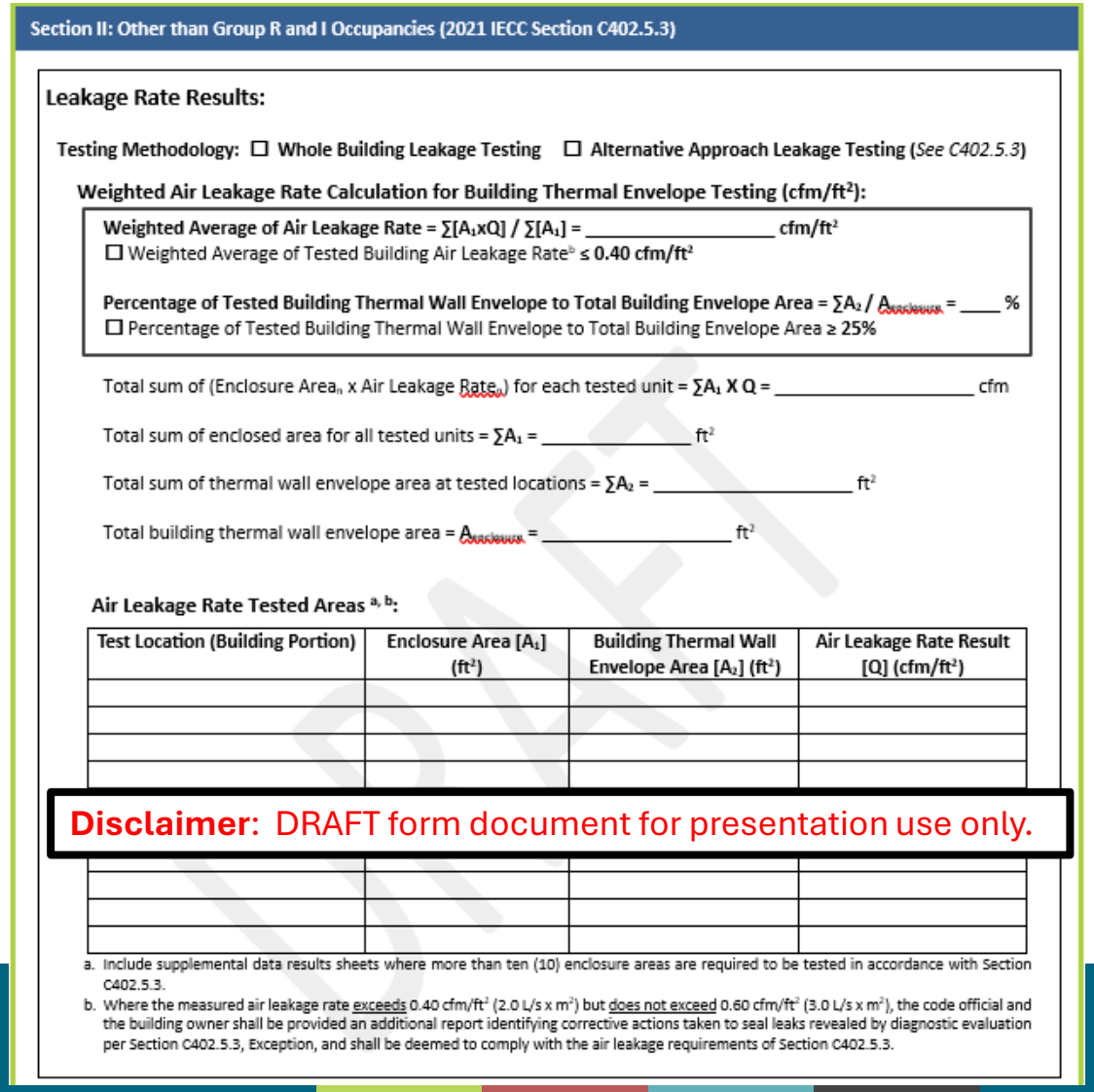
Test Location (Unit No.)	Enclosure Area [A] (ft²)	Air Leakage Rate Result [Q] (cfm/ft²)
1. Ground Floor Unit:		
2. Top Floor Unit:		
3. Largest Unit[c]:		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

a. **For buildings with eight (8) or fewer dwelling/sleeping units,** all units shall be tested. **Where there are more than eight (8) dwelling/sleeping units,** the greater of seven (7) units or twenty percent (20%) of all units in the building shall be tested, to include a ground floor unit, top floor unit, and the unit with the largest testing enclosure area. Dwelling/sleeping units shall be tested separately with an unguarded blower door test.
b. Include supplemental data results sheets where more than ten (10) dwelling/sleeping units are required to be tested.
c. Based on Unit with the Largest Enclosure Area size.

Disclaimer: DRAFT form document for presentation use only.

- Air leakage testing to be performed on dwelling & sleeping units per Section C402.5.2
  - Where buildings < 8 units, each dwelling/sleeping unit shall be tested
  - Where buildings > 8 units, the greater of 7 units or 20% of total units shall be tested. Testing units shall include:
    - A top floor unit
    - A ground floor unit
    - A unit with the largest testing unit enclosure area
  - Air Leakage Rates for tested units must not exceed 0.30 cfm/ft^2 of the testing unit enclosure area at a pressure differential of 50 Pa

Commercial Air Leakage Testing—Building Thermal Envelope Testing



Section II: Other than Group R and I Occupancies (2021 IECC Section C402.5.3)

Leakage Rate Results:

Testing Methodology: ☐ **Whole Building Leakage Testing** ☐ **Alternative Approach Leakage Testing** (*See C402.5.3*)

Weighted Air Leakage Rate Calculation for Building Thermal Envelope Testing (cfm/ft²):

Weighted Average of Air Leakage Rate = ∑[A_1xQ] / ∑[A_1] = _____ cfm/ft²
☐ Weighted Average of Tested Building Air Leakage Rate[b] **≤ 0.40 cfm/ft²**

Percentage of Tested Building Thermal Wall Envelope to Total Building Envelope Area = ∑A_2 / $A_{enclosure}$ = ____ %
☐ Percentage of Tested Building Thermal Wall Envelope to Total Building Envelope Area **≥ 25%**

Total sum of (Enclosure $Area_n$ x Air Leakage $Rate_n$) for each tested unit = **∑A_1 X Q** = _____ cfm

Total sum of enclosed area for all tested units = **∑A_1** = _____ ft²

Total sum of thermal wall envelope area at tested locations = **∑A_2** = _____ ft²

Total building thermal wall envelope area = $A_{enclosure}$ = _____ ft²

Air Leakage Rate Tested Areas [a, b]:

Test Location (Building Portion)	Enclosure Area [A_1] (ft²)	Building Thermal Wall Envelope Area [A_2] (ft²)	Air Leakage Rate Result [Q] (cfm/ft²)

a. Include supplemental data results sheets where more than ten (10) enclosure areas are required to be tested in accordance with Section C402.5.3.
b. Where the measured air leakage rate exceeds 0.40 cfm/ft² (2.0 L/s x m²) but does not exceed 0.60 cfm/ft² (3.0 L/s x m²), the code official and the building owner shall be provided an additional report identifying corrective actions taken to seal leaks revealed by diagnostic evaluation per Section C402.5.3, Exception, and shall be deemed to comply with the air leakage requirements of Section C402.5.3.

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- For non-residential portions of a structure, air leakage testing to be performed on the building thermal envelope per C402.5.3
  - Where alternative approach is utilized to test portions of the structure for an area weighted average, the tested portions shall include:
    - Entire Envelope area of all stories with spaces directly under a roof
    - Entire envelope area of all stories that have a building entrance, exposed floor, loading dock, or are below grade
    - Representative above-grade sections of the building totaling at least 25 percent of the wall area enclosing the remaining conditioned space.
  - Measured Air Leakage Rate must not exceed 0.40 cfm/ft^2 of the testing unit enclosure area at a pressure differential of 75 Pa

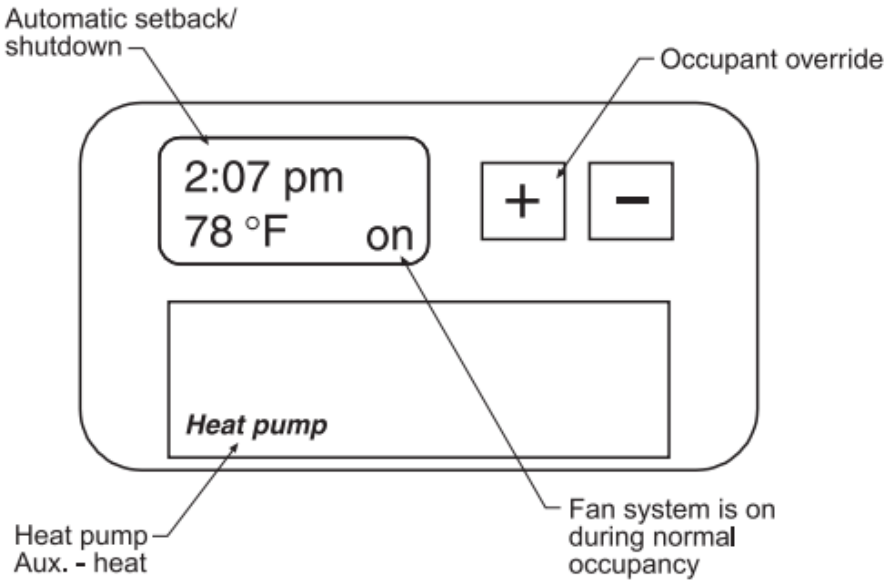
Commercial Air Leakage Testing

- Air Leakage Testers Certification
  - Certification requirements for Commercial Air Leakage Testing will generally follow similar certification requirements to Residential Air Leakage testing:
    - RESNET Certified HERS Raters & Rating Field Inspector (RFI)
    - BPI Building Analyst Technician, Building Analyst Professional, Energy Auditor, Infiltration & Duct Leakage, Quality Control Inspectors
  - Large projects may be categorized into a different inspector tier based on level of experience with testing larger footprint structures

Insulation & Fenestration Ratings

- Revised Insulation Rating Minimum Requirements per Section C402.1.3
  - Attic & Other Roof System: R-49
  - Metal Building Walls: R-13 + R-13ci
  - Metal Framed Buildings: R-13 + R-7.5 ci
  - Wood-Framed Wall (& Other) Buildings: R-13 + R3.8 ci OR R-20
  - Below-Grade Walls: R-7.5ci
  - Floors: R-30
  - Unheated Slab-on-Grade Floors: R-15 for 24-inches below

Mechanical System Requirements



- C403.4.2.3 Automatic Start & Stop
  - Additional provisions introduced for automatic stop controls where *direct digital control* of individual zones are provided to HVAC systems
  - Automatic stop controls shall be set to:
    - Reduce heating temperature setpoints by not less than 2° F
    - Increase cooling temperature setpoints by not less than 2° F
    - Activate before scheduled unoccupied periods based upon thermal lag and acceptable drift in space temperature within comfortable limits

Mechanical System Requirements

- C403.8.3 Fan Efficiency
  - Revised provisions for Fan Efficiency moves away from the Fan Efficiency Grade (FEG) metric
  - Utilizes Fan Efficiency Index (FEI) based on **AMCA 208** standards to align with ASHRAE 90.1 and DOE standards
    - Fan & Fan Arrays to meet a **1.00 FEI**
    - Variable Air Volume (VAV) Systems to be provided, with a minimum **0.95 FEI**
    - Must be labelled with **AMCA 208** by manufacturer, with FEI verified by approved independent testing laboratories.
  - A number of exceptions to FEI labelling are permitted under code for smaller fans, ceiling fans, and fans utilized in parts of equipment packages
    - Powered Roof Ventilators **no longer exempt** and will require FEI compliance

Mechanical System Requirements

- C403.8.5 Low-Capacity Ventilation Fans
  - New Requirements for minimum efficacy rates of **low-capacity fans** used for mid-rise residential and small commercial buildings

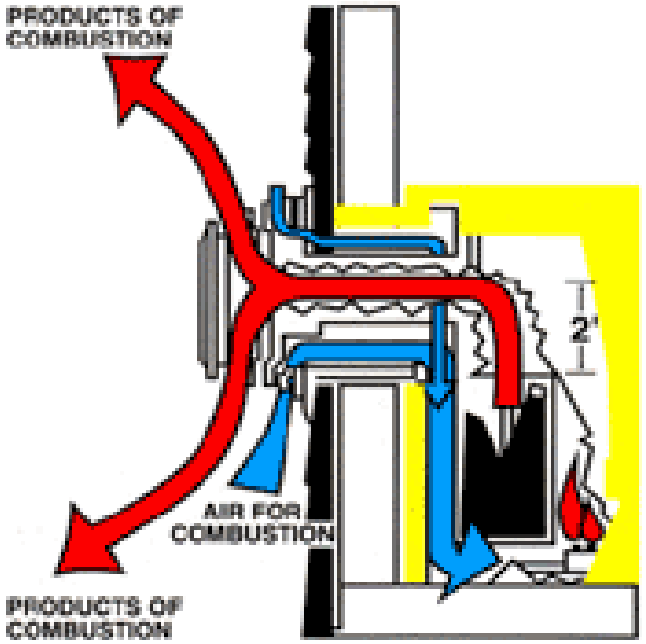
TABLE C403.8.5 LOW-CAPACITY VENTILATION FAN EFFICACY[a]

FAN LOCATION	AIRFLOW RATE MINIMUM (CFM)	MINIMUM EFFICACY (CFM/WATT)	AIRFLOW RATE MAXIMUM (CFM)
HRV or ERV	Any	1.2 cfm/watt	Any
In-line fan	Any	3.8 cfm/watt	Any
Bathroom, utility room	10	2.8 cfm/watt	< 90
Bathroom, utility room	90	3.5 cfm/watt	Any

For SI: 1 cfm/ft = 47.82 W.

a. Airflow shall be tested in accordance with HVI 916 and listed. Efficacy shall be listed or shall be derived from listed power and airflow. Fan efficacy for fully ducted HRV, ERV, balanced and in-line fans shall be determined at a static pressure not less than 0.2 inch w.c. Fan efficacy for ducted range hoods, bathroom and utility room fans shall be determined at a static pressure not less than 0.1 inch w.c.

Mechanical System Requirements



Direct Vent

- C402.5.5 Rooms Containing Fuel Burning Appliances
  - PA UCC RAC modifies language for appliance locations to maintain both exceptions found under the 2015 IECC
  - Exceptions allowed for **direct vent appliances** to be located within the building thermal envelope
    - Both intake and exhaust vents must be installed continuous to the outside

C405.12 Energy Monitoring

- New requirements under the 2021 IECC to provide Energy Monitoring for all new buildings with a gross conditioned floor area ≥ **25,000 sf**.
- Exceptions are permitted for:
  - Group R-2 occupancies
  - Tenant spaces < 5,000 sf with its own utility services and meters
- Note where energy monitoring is required per C405.12, credit will **not** be admissible for additional energy efficiency package compliance.

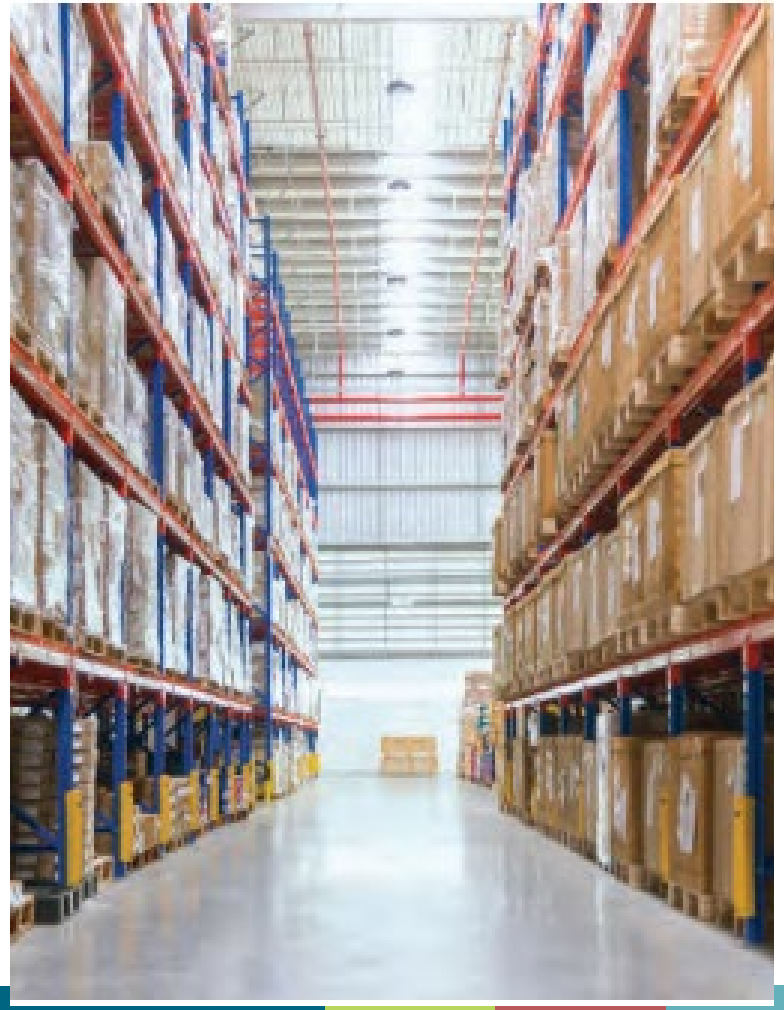
C405.12 Energy Monitoring (cont'd)

- Metering must be provided for the following:
  - Electrical Metering, to include Site Lighting, Parking, Recreational Facilities, and other areas that serve the building and its occupants
  - End Use Metering to be provided for Total HVAC System, Interior Lighting, Exterior Lighting, Plug Loads, Process Loads, and Building Operations
    - **Exceptions** to End Use Metering permitted for:
      - HVAC and water heating equipment serving individual dwelling units
      - Fire pumps, Stair Well Pressurization Fans, or Systems that Operate during Testing or Emergencies
      - Individual Tenant Spaces having a floor area < 2,500 sf with dedicated source meters
- Monitoring must at least collect hourly data, and must maintain data for a minimum of 36 months.

C402.5.11 Operable Openings Interlocking

- New provisions included under 2021 IECC to require operable opening > **40 sf** in area to be interlocked with heating and cooling systems
  - **Cooling** systems setpoints shall be raised to **90° F**
  - **Heating** systems setpoints shall be lowered to **55° F**
- Setpoint changes shall occur within **10-minutes** of opening of operable opening
- **Exception** permitted for the following:
  - **Warehouses**, where overhead doors are a function of occupancy
  - Separately zoned areas associated with **food preparation** with appliances that contribute to the HVAC loads
  - First entrance doors located in exterior walls and part of **vestibule** system

Lighting Requirements



- C405.2.1.2—Occupant Sensors in Warehouse Storage Areas
  - Updated provisions in 2021 IECC to address clarity for use of warehouse occupant sensors
    - **Lighting of aisleways** shall be controlled independently of all other aisleways and open areas.
    - Where lights are **not** turned off by occupant sensors, time-switch controls shall be provided
      - Choice of method to controls now left up to design professional
    - Time Delay or “Time Out” for turning off or reducing lighting is **20 minutes**
      - Timing delay now aligns with other occupancy sensor spaces and open plan office space lighting power controls
    - **Manual controls** to be provided to allow occupants to turn the lighting **off**

Lighting Requirements

- C405.2.8 Parking Garage Lighting Control
  - New provision introduced to recognize unique conditions of parking garage lighting designs
    - Shall be provided with either occupant sensors or time-switch controls
    - Lighting zone power to be reduced by at least **30%** following 20 minutes of no activity detected
      - Lighting zones shall **not** be larger than **3,600 sf**
    - Covered vehicle entrances and exits shall be separately controlled
      - Automatic lighting power **reduction** by **50%** from sunset to sunrise
    - Luminaires within 20 feet of perimeter wall openings must **reduce** power use by at least **50%** in response to daylight
  - **Exceptions** recognized for any obstructed daylight openings

Lighting Requirements

- C405.4 Lighting for Plant Growth
  - New provisions added for lighting requirements associated with indoor plant growth and maintenance facilities
  - Luminaires must comply with **ANSI/ASABE S640** to maintain a photon efficiency of **1.6 µmol/J**
    - Photon Efficiency shall be provided for **not less than 95%** of permanently installed luminaires used for plant growth and maintenance

Lighting Requirements

- C405.11 Automatic Receptacle Controls
  - PA UCC RAC modifies requirements associated with automatic receptacle controls, where installations are now optional

C405.11 Automatic receptacle control. *The following ~~shall~~ may have automatic receptacle control complying with Section C405.11.1:*

  - PA UCC RAC also modifies the time delay associated with automatic receptacle control functions under C405.11.1
    - Time activation for automatic receptacle shut-off by controls extended from 20 minutes to **120 minutes**

2.2. An occupant sensor control that shall turn off receptacles within ~~20~~ 120 minutes of all occupants leaving a space.

2.3. An automated signal from another control or alarm system that shall turn off receptacles within ~~20~~ 120 minutes after determining that the area is unoccupied.

ENERGY CONSERVATION CODE
RESIDENTIAL BUILDINGS

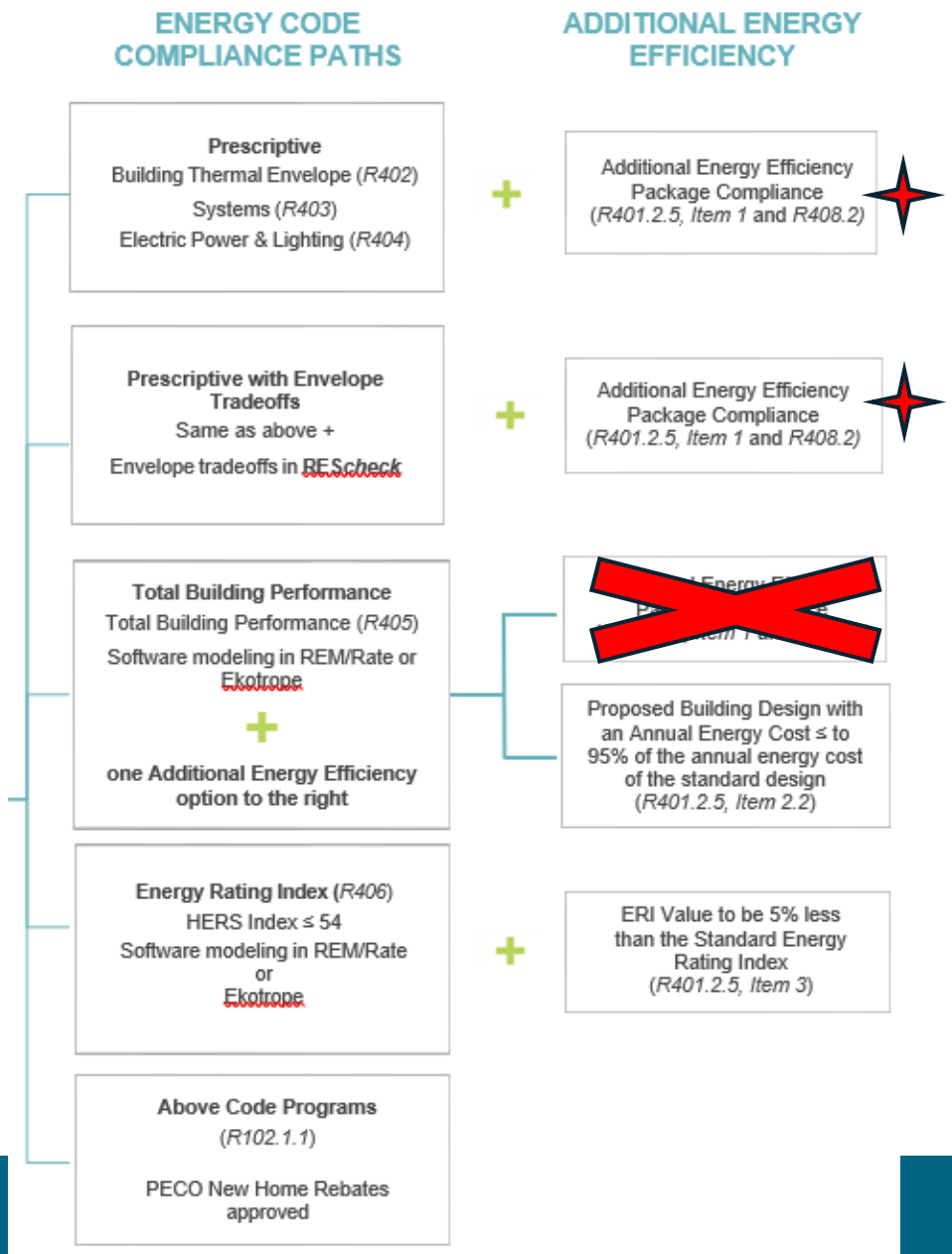
Department of
Licenses and Inspections
CITY OF PHILADELPHIA

2021 IRC, N1101.13

R401.2 Residential Compliance Paths

- 2021 IECC removes reference to the term “mandatory” throughout code
- Maintains 2018 IECC Residential Energy Conservation Compliance Paths
- New Additional Energy Efficiency Package requirements introduced for residential scope
    - Compliance with Add’l Energy Efficiency Package requirements differ based on Code Compliance path

NOTE: Additional Energy Efficiency Package Requirements adoption is currently pending legislation at local municipal level.



2021 IRC, N1108

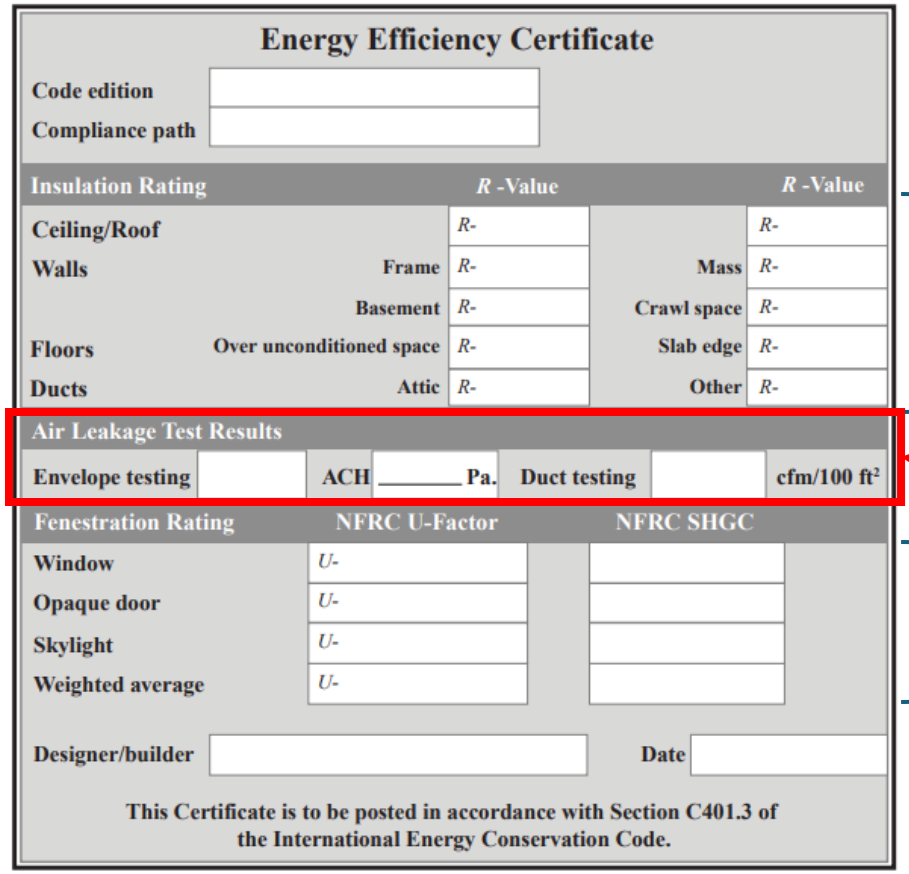
R408 Additional Energy Efficiency Packages

- Prescriptive Additional Energy Efficiency Package options for Residential requirements, similar to 2018 Commercial Requirements
  - Only one (1) option selection required under this provision
    - Enhanced Envelope Performance
    - More Efficient HVAC Equipment Performance
    - Reduced Energy Use In Service Water-Heating
    - More Efficient Duct Thermal Distribution System
    - Improved Air Sealing & Efficient Ventilation System

NOTE: Additional Energy Efficiency Package Requirements adoption is currently pending legislation at local municipal level.

2021 IRC, N1101.14

R401.3 Residential Envelope Certificate



Energy Efficiency Certificate

Code edition	
Compliance path	

Insulation Rating		R-Value		R-Value
Ceiling/Roof		R-		R-
Walls	Frame	R-	Mass	R-
	Basement	R-	Crawl space	R-
Floors	Over unconditioned space	R-	Slab edge	R-
Ducts	Attic	R-	Other	R-

Air Leakage Test Results					
Envelope testing		ACH _____ Pa.	Duct testing		cfm/100 ft²

Fenestration Rating	NFRC U-Factor	NFRC SHGC
Window	U-	
Opaque door	U-	
Skylight	U-	
Weighted average	U-	

Designer/builder _____ Date _____

This Certificate is to be posted in accordance with Section C401.3 of the International Energy Conservation Code.

- New provision introduced under 2021 IECC to require Thermal Envelope Certificate to be permanently posted for Residential Scopes
  - Shall be located on a wall in the space where the space conditioning equipment, utility room or other approved location
  - Shall include U-value & R-value ratings for building envelope
  - Shall include results of building envelope air leakage testing on the building

2021 IRC, N1103.1

Insulation & Fenestration Ratings

- PA UCC RAC modifies the insulation rating requirements for Residential with rating requirement reductions
- Note that ResCheck Software will **not** be adapted to the 2021 Philadelphia Energy Conservation Code.
  - Any use of ResCheck for UA trade-off compliance will require compliance with the baseline (**non-modified**) 2021 IECC provisions for Insulation & Fenestration Ratings
  - Alternative software analysis for UA trade-off compliance will be required to be evaluated by Dept.

TABLE R402.1.3 (N1102.1.3)
INSULATION MINIMUM R-VALUES AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION U-FACTOR[b]	SKYLIGHT[b] U-FACTOR	GLAZED FENESTRATION SHGC[b,e]	CEILING R-FACTOR	WOOD FRAME WALL R-VALUE	MASS WALL R-VALUE[i]	FLOOR R-VALUE	BASEMENT[c] WALL R-VALUE	SLAB[d] R-VALUE & DEPTH	CRAWL SPACE[c] WALL R-VALUE
4 except Marine	0.32	0.55	0.40	49	20 or 13 + 5[h]	8/13	19	10/13	10, 2ft	10/13

2021 IRC, N1102.4.1.2

R402.4.1.2 Air Leakage Testing

- Revised provisions for Residential Air Leakage Testing
  - Per R402.4.1.3, where Prescriptive compliance path (and/or UA Trade-off) is selected under R401.2.1, maximum air leakage rate = **3.0 ACH**
    - For all other compliance paths, maximum air leakage rate = **5.0 ACH** per R402.4.1.2
  - Alternative compliance per exception allotted for air leakage rate results not to exceed **0.30 cfm/sf of dwelling unit enclosure area**
    - Introduced to recognize difficulties to achieve required air leakage rates for small volume homes due to exterior enclosure leakage.
    - Alternative compliance permitted for the following occupancies only:
      - **Attached single & multi family building dwelling units**
      - Buildings or dwelling units that are **≤ 1,500 SF**
  - Heated attached & detached garages exempt from air leakage testing where **air barrier and insulation installation** criteria are met per Table R402.4.1.1

Note: *Enclosure Testing Form documentation* & *Residential Energy Conservation Information Sheet* will be updated to reflect new air leakage testing provisions under 2021 IECC.

Applicants will be required to identify air leakage testing compliance path if prescriptive method is not used.

Duct Leakage Testing

- R403.3.5 Duct Leakage testing provisions
  - Modified through the PA UCC RAC to include additional exemptions
  - Exempts duct air-leakage testing for ducts serving heat or energy recovery ventilators that are not integrated with ducts serving heating or cooling systems
- R403.3.6 Duct Leakage
  - Modified through the PA UCC RAC to remove duct air leakage limitations for ducts located within the building thermal envelope

NOTE: Air Leakage Testing exemption removed from pending Phila Energy Conservation Code Ordinance. Legislative language will reintroduce duct leakage testing req'mts under R403.3.5 & R403.3.6.

2021 IRC, N1103.3.1

Mechanical System Requirements

- R403.3.1 Duct Locations & Insulation
  - Ducts are permitted be located in the following locations:
    - **Outside Conditioned Space** with Insulation
      - **R-8** rating for duct diameter **> 3-inches**
      - **R-6** rating for duct diameter **< 3-inches**
    - **Inside Conditioned Space**
      - Minimum **R-19 insulation** rating where ductwork in floor cavities are located over unconditioned space
      - Minimum **R-10 insulation** rating where ductwork is located in exterior wall cavities of the building thermal envelope
      - Where installed in ventilated attic spaces, ductwork to be buried within ceiling insulation
    - **Buried within ceiling insulation**
      - Minimum **R-8 rating** for duct insulation at supply and return ducts
      - Minimum **effective R-19 rating** for ceiling insulation against & above/below ductwork, **EXCLUDING ductwork insulation values**

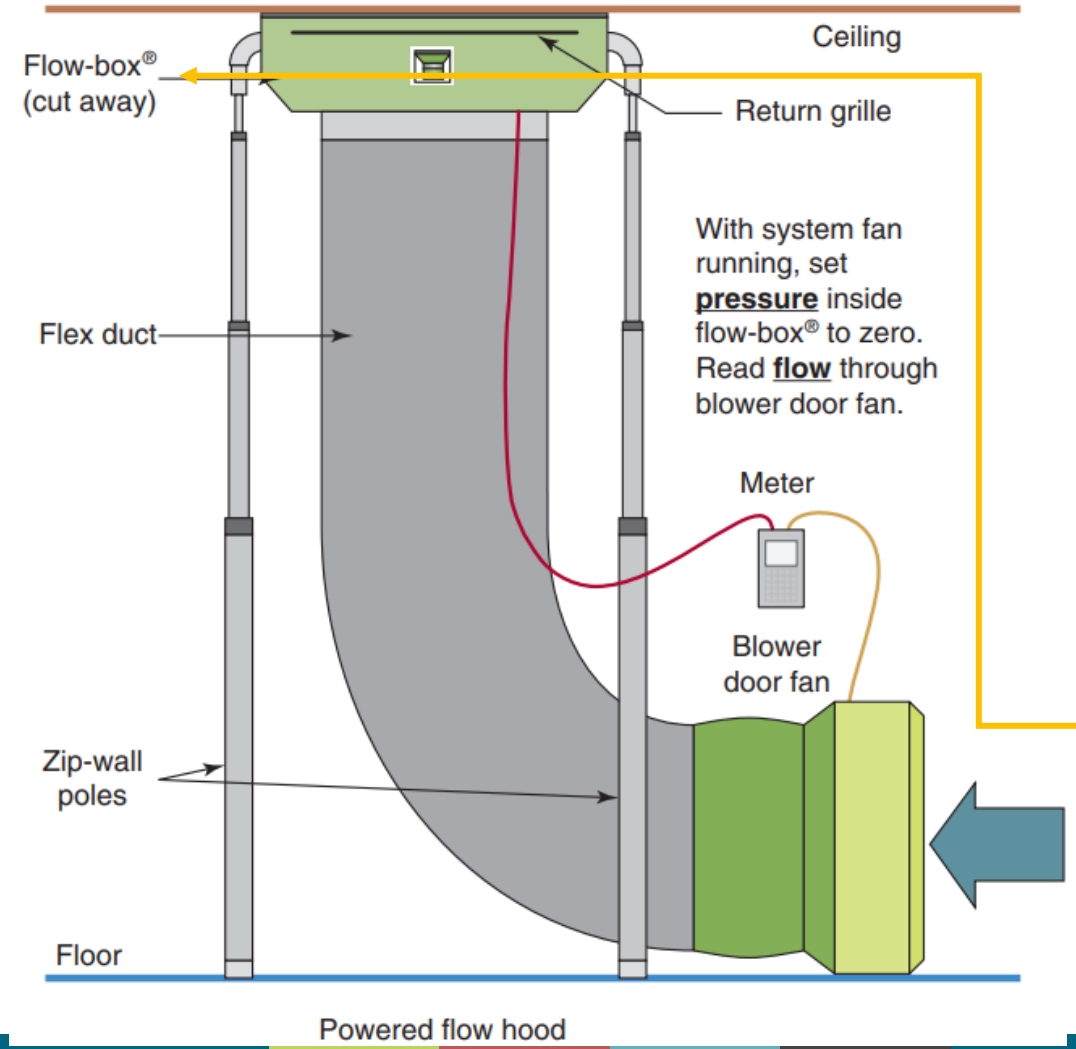
Mechanical System Requirements

2021 IRC, N1103.3.5, N1103.3.6, N1103.3.7, N1103.5.1.1

- R403.3.5 Duct Testing
  - PA UCC RAC modifications maintain language from the 2018 IECC, and will duct testing requirements will remain the same.
- R403.3.6 Duct Leakage
  - PA UCC RAC modifications maintain language from the 2018 IECC, and will duct leakage limits will remain the same for rough-in and post-construction.
- R403.3.7 Building Cavities
  - PA UCC RAC modifications maintain language from the 2015 PA adoption to expressly **prohibit** the use of Building Framing cavities to be used as supply ducts.
- R403.5.1.1 Circulation Systems
  - PA UCC RAC modifications introduces exception to heat water circulation system control requirements
    - Exempts control installations where the **entire** hot water piping system is insulated with a minimum **R-3 insulation** on supply and return sides

2021 IRC, N1103.6.3

Mechanical System Requirements



- R403.6.3 Mechanical Ventilation System Testing
  - New provisions added to 2021 IECC to verify quality of ventilation duct installations, from fan to the termination of the duct, to the outside.
  - Testing to be performed in accordance with the ventilation equipment manufacturer's instructions
    - May alternatively use a flow hood or box, flow grid or other airflow measuring device
  - Written report of test results to be made available to the code official

2021 IRC, N1102.4.1.2

Electrical Power & Lighting Systems

- R404.1 Lighting Equipment
  - PA UCC RAC modifications revises section in its entirety
  - Maintains the 2018 IECC language to require **not less than 90%** of permanently installed lighting fixtures to be high efficacy lamps **only**.
- R404.1.1 Lighting Equipment (Fuel Gas)
  - PA UCC RAC modifications maintain the 2018 IECC language to **prohibit** the use of continuously burning pilot lights in fuel gas lighting systems

NOTE: Phila Pending Ordinance Legislation to require 100% of permanent lighting fixtures to be high efficacy lamps

2021 IRC, N1104.2 & N1104.3

Electrical Power & Lighting Systems

- R404.2 Interior Lighting Controls
  - Provision removed by PA UCC RAC modifications
  - Interior lighting control requirements introduced for residential occupancies
  - To be controlled through dimmers, occupant sensors, or other control installed or built into fixture
    - Not required to be provided at bathrooms, hallways, and lighting designed for safety or security

Note: Provisions reintroduced locally thru pending Phila Ordinance Legislation.

- R404.3 Exterior Lighting Controls
  - Provisions removed by PA UCC RAC modifications
  - Exterior lighting control requirements introduced for residential occupancies where total exterior lighting power **> 30 Watts**
    - Lighting shall be controlled by a manual on and off switch that permits **automatic shut off** actions
      - **Exception** for any lighting serving multiple dwelling units
    - Must automatically shut off when daylight is present
    - Any override of controls must **automatically** return automatic control to normal operation within **24 hours**

2021 IRC, N1105

Total Performance Compliance Method

- PA UCC RAC modifications revises a number of provisions under R405 for consistency of reference design to the prescriptive path requirements
    - Revisions to reference design envelope requirements consistent with PA UCC RAC modifications to prescriptive method
    - PA UCC RAC Modifications also remove reference to additional energy efficiency requirements from the total building performance method
- Refer to PA UCC RAC Report for revisions to Compliance Report requirements

2021 IRC, N1106

Energy Rating Index

- PA UCC RAC modifications revises a number of provisions under R406 for ERI compliance
  - Removes reference to additional energy efficiency requirements from the ERI path
  - Revisions to reference design envelope requirements consistent with PA UCC RAC modifications to prescriptive method
  - On-site renewable requirements were not adopted by the PA UCC RAC modifications
  - Reference removed to RESNET/ICC 301 for calculation input values, opting for approved source per AHJ.

MECHANICAL CODE

Department of
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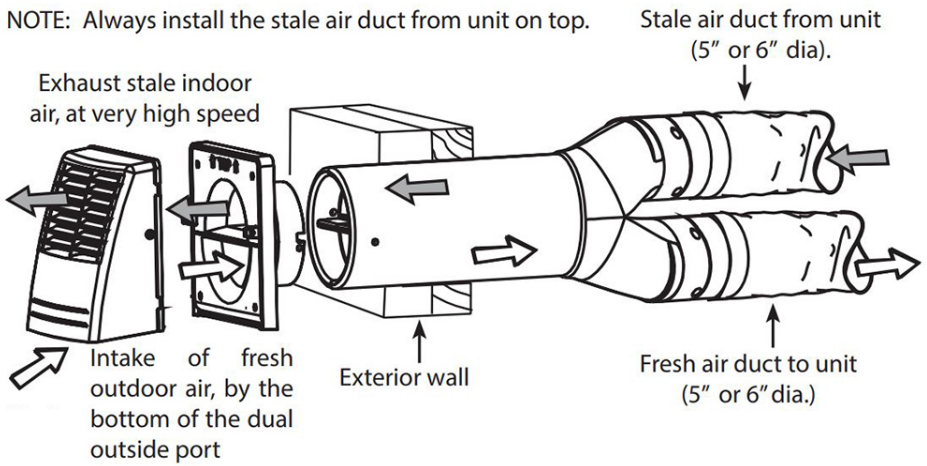
Ventilation Requirements

- Section 401.2 & 403.1 Mechanical Ventilation for Dwelling Units
  - Revised language under 2021 IMC clarifies the intent of mechanical ventilation requirements for **all dwelling units** based on air leakage requirements of the IECC.
  - Provision also generally references IECC & ASHRAE 90.1 to avoid unintended interpretation under 2018 IECC of applicability to residential provisions only



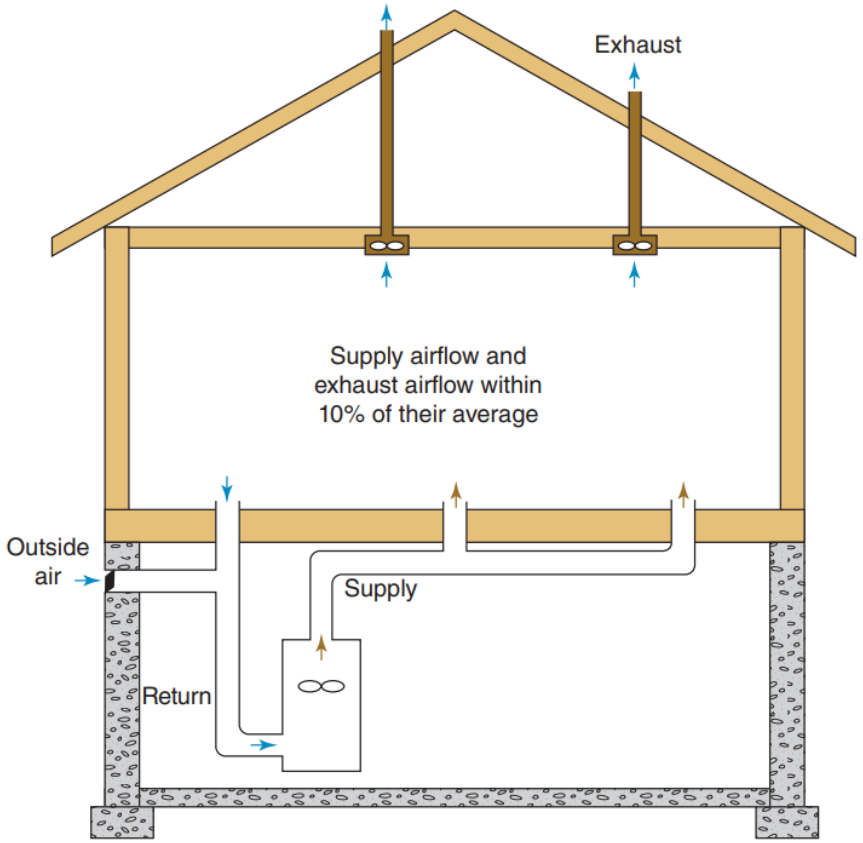
Combination exhaust & air intake fitting

- 401.4 & 501.3.1 Intake Opening & Exhaust Outlet Location
  - Revised language under the 2021 IMC now permits intake air opening and living space exhaust air opening locations to be non-separated
    - Must utilize an **approved factory-built intake/exhaust combination termination fitting** used to separate air streams in accordance with Manufacturer's instructions.

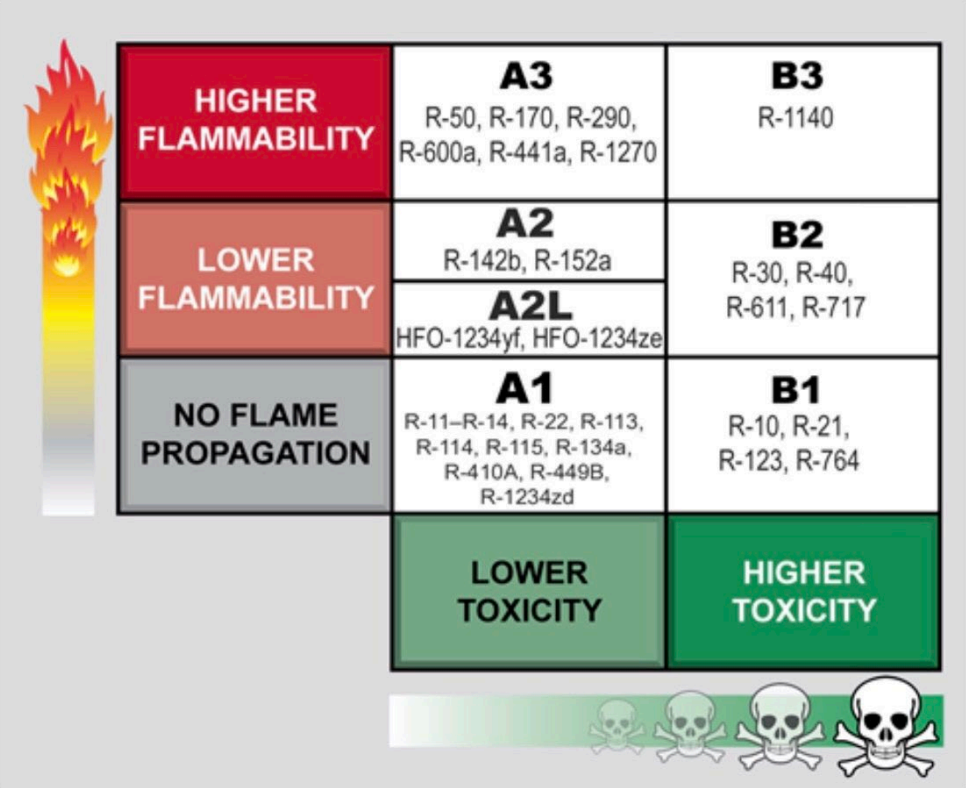
2021 IRC, M1505

Ventilation Requirements

- 403.3.2.1 Outdoor Air for Dwelling Units
  - Added new exceptions to permit **30% reduction of ventilation rates** where *balanced ventilation system* is demonstrated
    - New Term for *Balanced Ventilation System*, defined as:
      - System where the total supply airflow and total airflow are simultaneously within 10 percent of their average.



Refrigeration Requirements



- Refrigerant Piping (1107 thru 1110)
  - Comprehensive revisions of refrigeration piping provisions to address changes in commercially available refrigerants
    - Use of Group A1 refrigerants **phased out** under the Clean Air Act
    - Alternative refrigerant compounds available are defined by **toxic** and **flammable** characteristics
      - Protections to be required to provide fire separation, leak detection, and ventilation for refrigerant piping installations

Refrigeration Requirements

Note: As the Commonwealth has not modified the 2021 refrigerant provisions, all applications must demonstrate compliance or equivalent compliance under this Code.

Reference to ASHRAE 15-2024 for refrigerant piping at this time is not permitted by code as 2021 IMC equivalent protection cannot be demonstrated.

- 1109.2 Refrigerant Piping Installation Locations
  - Piping penetrating two or more floor/ceiling assemblies shall be **enclosed** in a fire-resistance rated **shaft enclosure**
  - Piping shall be protected within building elements or within protective enclosures
    - Piping installed in concrete floors to be **encased** in pipe, conduit or ducts
  - Exposed piping in open space must be located at a **minimum height of 7'-3"** above the finished floor
  - Piping must be **identified** with the refrigerant designation and safety group classification

Refrigeration Requirements

- 1109.2 Refrigerant Piping Installation Locations
  - **Prohibited** locations of Refrigerant Piping Installations
    - Exposed within a fire-resistance rated exit access corridor
    - Within an interior exit stairway
    - Within an interior exit ramp
    - Within an exit passageway
    - Within an elevator, dumbwaiter, or other shaft containing a moving object
- 1110 Refrigerant Piping System Testing
  - **Pressure-testing** for strength and **leak testing** for tightness where refrigerant piping system has been erected in the field
    - Test to be performed after installation & before being placed in operation

Refrigeration Piping Requirements

Note: Dept will be evaluating use of 2024 IMC provisions governing Group A2L use, either thru PA Act 123 for expanded refrigerant use or thru local legislative ordinance.

Requirements	Group A2L & B2L	Group A2, A3, B2, B3
Piping Material	-Aluminum, Steel or Copper Tube -16 gage protective steel shield plates to be provided for pipe protection (1109.3.1)	-Copper, Brass, or Steel Pipe -Joints must be welded (Section 1109.4.1)
Shaft Ventilation*	-**Natural** or **Mechanical** ventilation for Refrigerant Pipe Shafts -**Natural ventilated** shafts to maintain 4-inch diameter pipe/duct/conduit; Must connect to lowest point of the shaft and extend outdoors -**Mechanical ventilated** shaft must be continuously operated OR activated by refrigerant detection; Shall operate at minimum ventilation rates per Table 1109.3.2 (Section 1109.3.2)	-Must be provided with **continuous** mechanical ventilation -Shall operate at minimum ventilation rates per Table 1109.3.2 (Section 1109.4.2)
Leak Detection	-Where used, **activation** of mechanical ventilation to be set at maximum refrigerant concentration of 25% of the lower flammable limit of the refrigerant -Detector or sampling tube shall be located in an area where refrigerant from a leak will concentrate (Section 1109.3.2)	Not Applicable

*** Note**: Shaft Ventilation not required for double-wall refrigerant pipe where interstitial space is vented to outdoors

Refrigeration Requirements

- 1105.9 Machinery Room Means of Egress
  - Carries over language from 2021 IBC for means of egress requirements with machinery rooms > **1000 sf** in area for refrigeration requirements
  - Minimum **two (2) exits** or exit doorways to be provided
- Ammonia Refrigeration Systems (1101 & 1108)
  - Revisions to address redundancy in the IMC for Ammonia-based refrigeration
  - Defers to use of **IIAR Standard** for consistency with ASHRAE 14

Ventilation Requirements

- 403.3.1.1 Recirculation of Mechanical Exhaust Prohibited
  - Provisions under Footnote ‘g’ revised to **explicitly prohibit** recirculation of mechanical exhaust for spaces with product conveying and environmental air exhaust
    - **Exception** to recirculation clarified to accommodate air leakage from use of wheel-type energy recovery ventilation units, not to exceed **10%** of outdoor airstream volume.
- 403.3.1.3 Demand Controlled Ventilation
  - Revised provisions requires a **minimum area outdoor airflow rate** per Table 403.3.1.1, where ventilation rate is designed to be adjusted based on the actual number of occupants present
    - **Minimum airflow rate** shall be maintained during periods when the building is expected to be occupied

Exhaust Requirements

- 502.20 Manicure & Pedicure Station Exhaust Stations
  - Revised provisions require manicure & pedicure stations to provide **continuous** exhaust
    - Exhaust system controls to operate system when space is occupied
- 504.4.1 Termination Location for Dryer Exhaust
  - Modified language to insure minimum separation distance **> 3'-0"** between building openings and clothes dryer exhaust terminations
    - Separation distance must be maintained in **any** direction of bldg opening

Exhaust Requirements

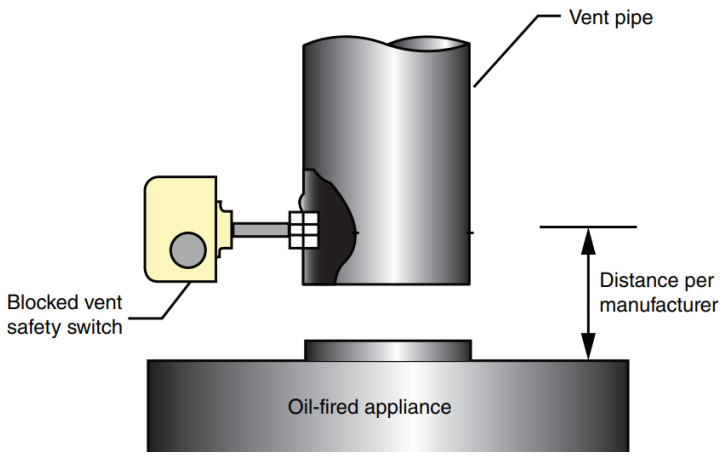
- 506.3.7 Factory-Built Grease Duct Slope
  - New exception included to **allow** factory-built grease ducts to be sloped in accordance with listing and manufacturer's installation instructions
- 507.1 Smoker Ovens with Integral Exhaust
  - New exception **exempts** kitchen exhaust hood installations for **smoker ovens** where integral exhaust is provided and installed per manufacturer's installation instructions
- 514.2 Energy Recovery Ventilation Systems
  - Revised provisions for prohibited applications of ERV systems
  - Now **lifted** for Type II kitchen exhaust hoods
    - Recognizing Type II Hood effluent to be safe for ERV system operations

Duct System Requirements

- 602.2.1.8—Pipe & Duct Insulation Within Plenums
  - Language revised to address flame spread and smoke-developed indices of pipes and ducts where insulation is installed
    - Insulation **shall not reduce** maximum indices except where pipe/duct and its related insulation, coatings & adhesives are **tested as a composite assembly**
- 607.5.2—Duct Penetrations of Fire Barriers
  - Non-Metallic flexible air connectors installations without fire dampers **allowed** for fully ducted systems at Fire Barrier walls for:
    - Duct connections to an air handling unit or equipment within a mechanical room
    - Overhead metal ducts connections to a ceiling diffuser where duct & diffusers are located in the same room
  - Ducted system must be constructed of sheet steel not less than **26 gage thickness**
  - Maximum length of flexible air connectors **< 14'-0"** per 603.6.2.1

Fuel-Fired Appliances

2021 IRC, M1802.4



- Section 801.21 Blocked Vent Switch for Oil-Fired Appliances
  - Revised provisions to require **blocked (obstructed) vent switches** to be provided to oil-fired appliances in order to address appliance **shut-off** for air quality safety.
- Section 905.1 Wood-Burning Residential Hydronic Heaters
  - Now addressed by code to require EPA Certification
- Section 929 Unvented Alcohol Fuel-Burning Decorative Appliances
  - Now addressed by Code to require listing and labelling per UL 1370. To be installed per manufacturer's instructions and listing.

Questions?

Department of
Licenses and Inspections
CITY OF PHILADELPHIA

2021 Code Updates
Stay Informed and Up-To-Date

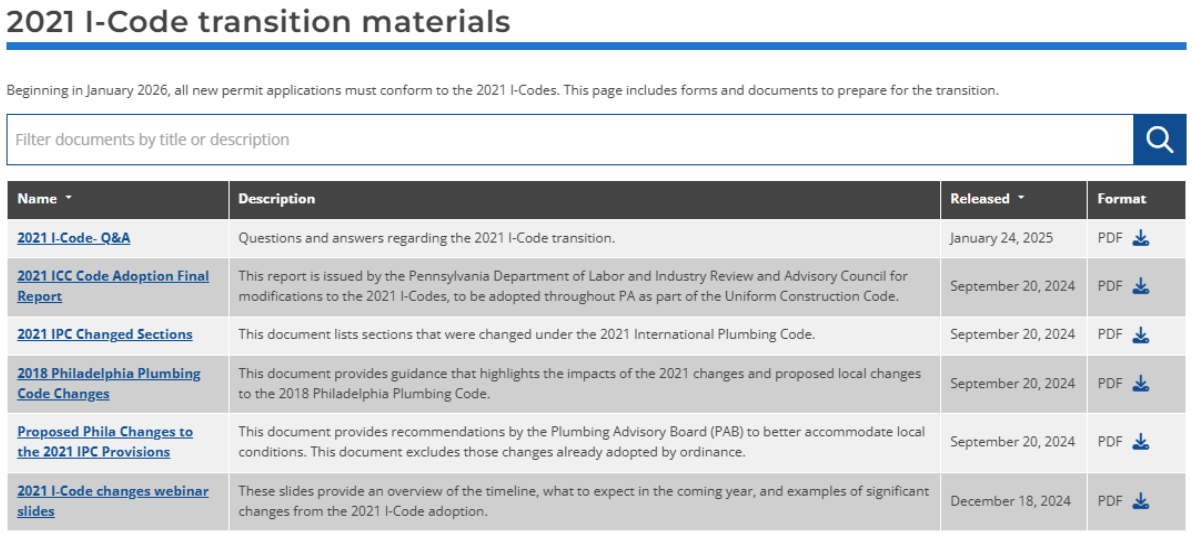
- **Submit any issues/concerns on a specific 2021 code sections**. This form, linked in our newsletter, can also be used for 2021 code issues/ concerns.
  - Recommendations Suggestion Link: https://form.jotform.com/PhillyLI/recommendations-form

- **Sign up for L&I newsletters or upcoming trainings** for public response and change tracking for 2021 Code adoption.

- **FAQ Page with 2021 Significant Code Changes**
  - Link: https://www.phila.gov/departments/department-of-licenses-and-inspections/resources/li-frequently-asked-questions/#/

Note: Continue to use www.phila.gov/get-help for direct responses to code questions.

Code Corner



2021 I-Code transition materials

Beginning in January 2026, all new permit applications must conform to the 2021 I-Codes. This page includes forms and documents to prepare for the transition.

Filter documents by title or description

Name	Description	Released	Format
2021 I-Code- Q&A	Questions and answers regarding the 2021 I-Code transition.	January 24, 2025	PDF
2021 ICC Code Adoption Final Report	This report is issued by the Pennsylvania Department of Labor and Industry Review and Advisory Council for modifications to the 2021 I-Codes, to be adopted throughout PA as part of the Uniform Construction Code.	September 20, 2024	PDF
2021 IPC Changed Sections	This document lists sections that were changed under the 2021 International Plumbing Code.	September 20, 2024	PDF
2018 Philadelphia Plumbing Code Changes	This document provides guidance that highlights the impacts of the 2021 changes and proposed local changes to the 2018 Philadelphia Plumbing Code.	September 20, 2024	PDF
Proposed Phila Changes to the 2021 IPC Provisions	This document provides recommendations by the Plumbing Advisory Board (PAB) to better accommodate local conditions. This document excludes those changes already adopted by ordinance.	September 20, 2024	PDF
2021 I-Code changes webinar slides	These slides provide an overview of the timeline, what to expect in the coming year, and examples of significant changes from the 2021 I-Code adoption.	December 18, 2024	PDF

2021 I-Code Transition Materials Link:
https://www.phila.gov/documents/2021-i-code-transition-materials/