

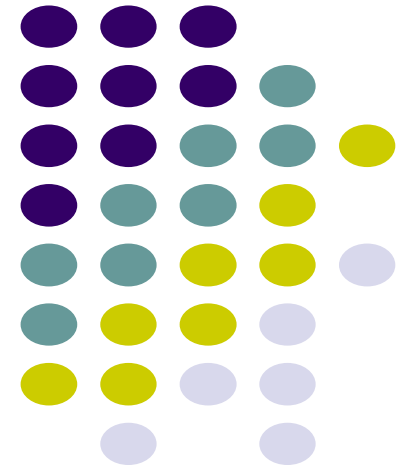
City of Scottsdale Energy Code Adoption



Top 10 Residential Energy Code Changes 2021 International Energy Conservation Code

April 16, 2024

Anthony Floyd, FAIA, LEED BD+C, CEM
Office of Environmental Initiatives
Planning and Development
Community and Economic Development
City of Scottsdale



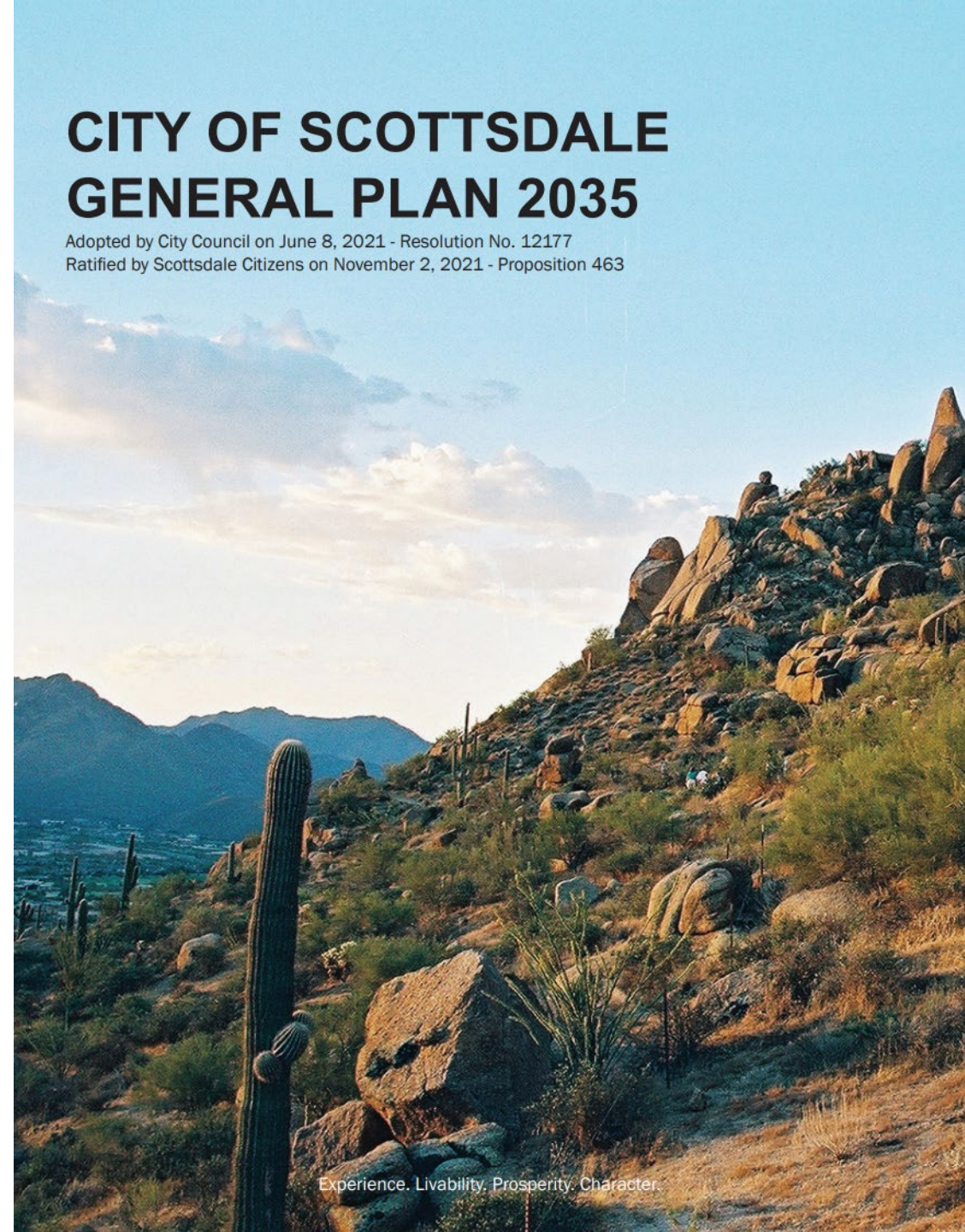
General Plan 2035

General Plan Elements addressed in building code update

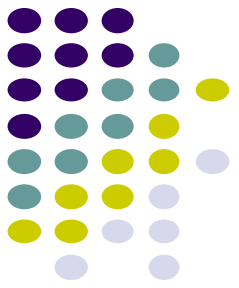
- Safety Element
- Housing Element
- Water Resources Element
- Energy Element
- Environmental Element

CITY OF SCOTTSDALE GENERAL PLAN 2035

Adopted by City Council on June 8, 2021 - Resolution No. 12177
Ratified by Scottsdale Citizens on November 2, 2021 - Proposition 463



Scottsdale Energy and Green Building Trends 1998 – 2022



- **Energy Efficiency**

- Energy code updates with enhanced performance
- Cathedralized attics (insulation at underside of roof decks)
- LED lighting, Energy Star products, and solar ready zones
- Third-party energy raters and building commissioning

- **Indoor Environmental Quality**

- Fresh air ventilation and bathroom exhaust fan controls

- **Water Efficiency**

- Xeriscaping and smart irrigation systems
- High-efficiency plumbing fixtures
- Efficient hot water delivery

- **Heat Island Mitigation**

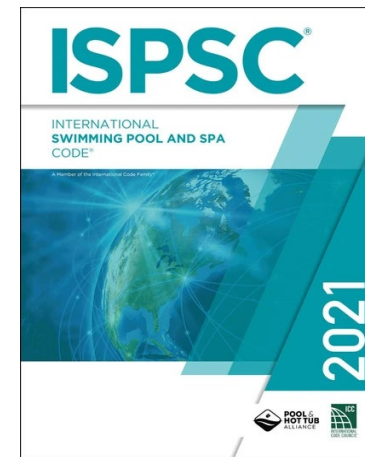
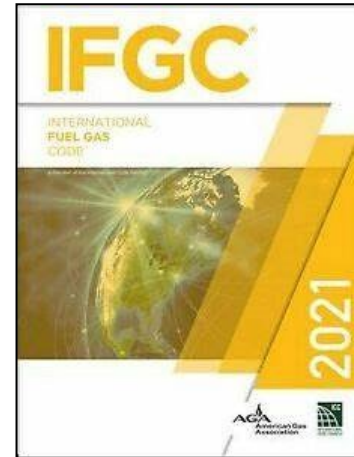
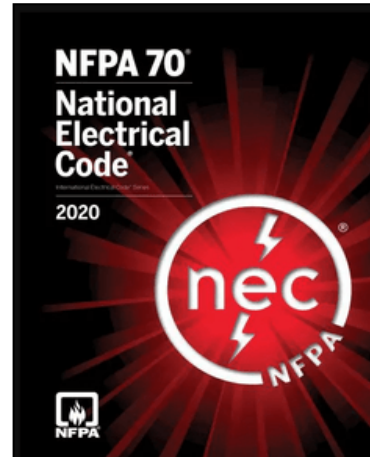
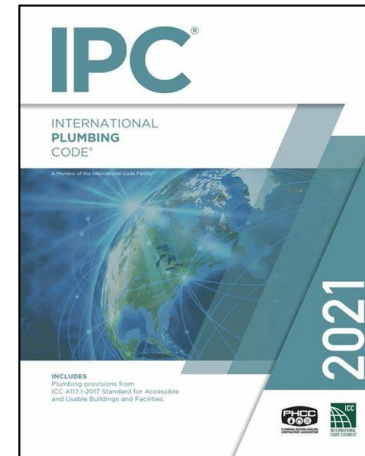
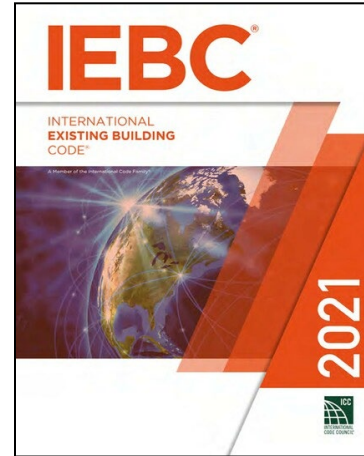
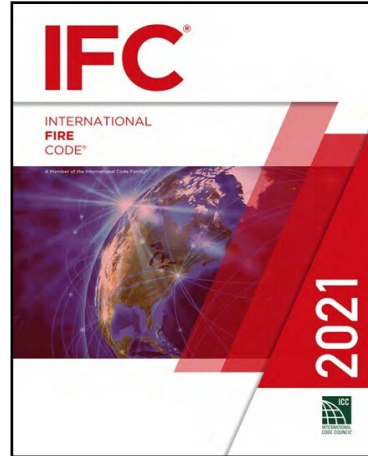
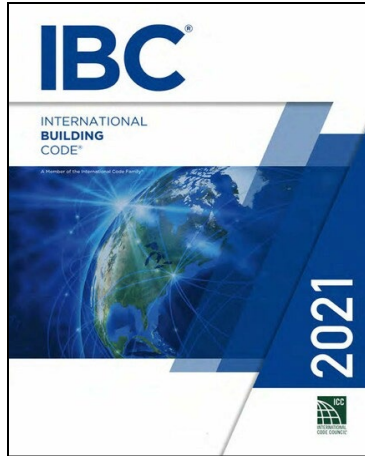
- Cool roofs and shading canopies

- **Distributed Solar Energy Generation**

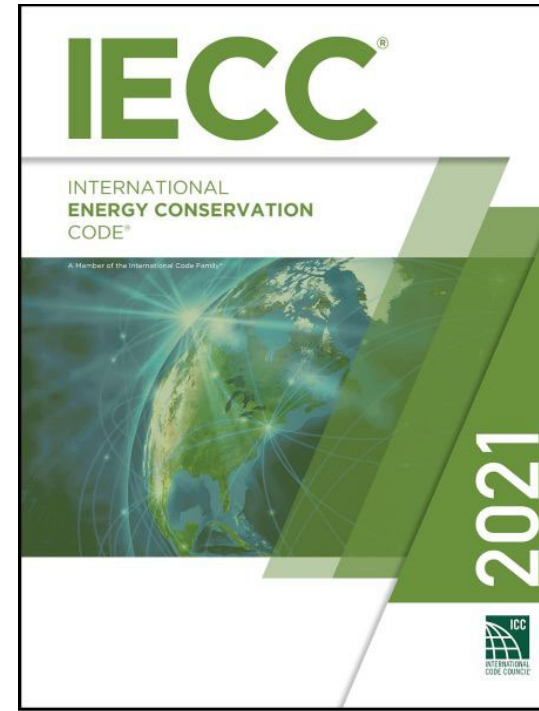
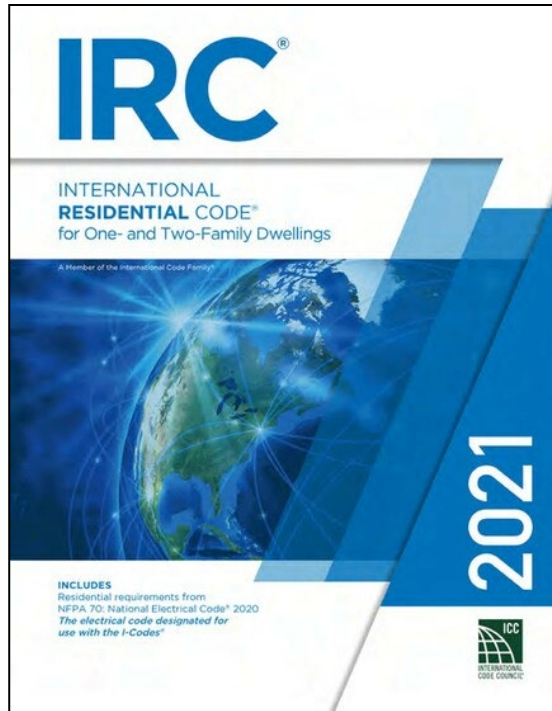
- Significant increase in rooftop solar & battery storage systems

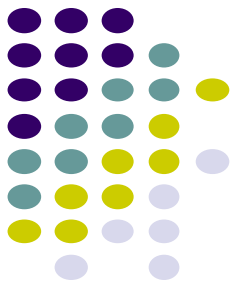


These codes are effective January 1, 2023



The IRC and IECC codes are effective January 7, 2023



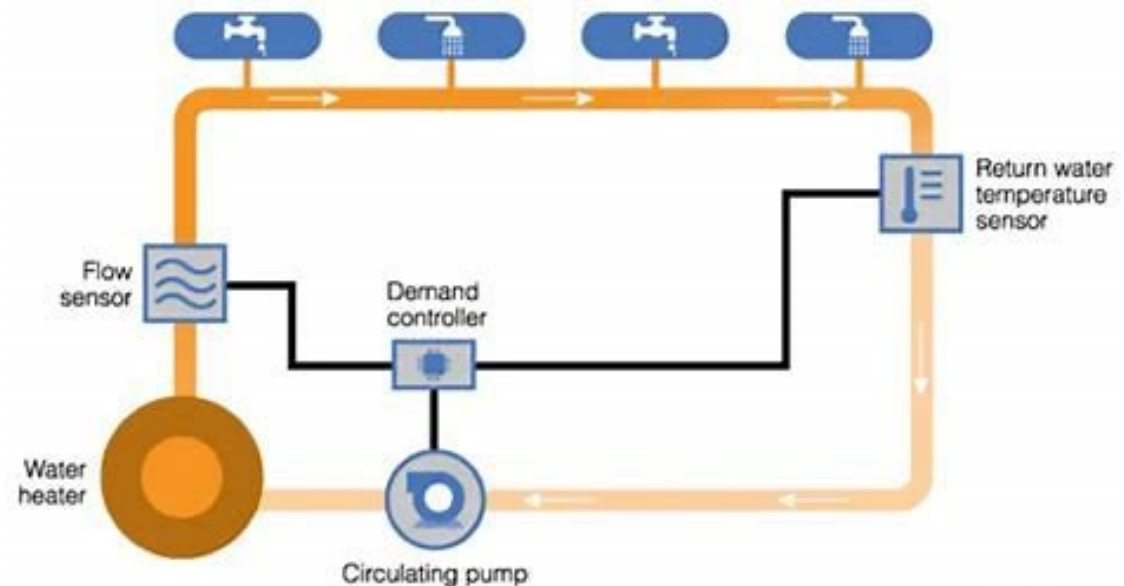


IRC/IPC Amendments

Single, Multifamily and Commercial

Water Efficiency in plumbing and energy provisions

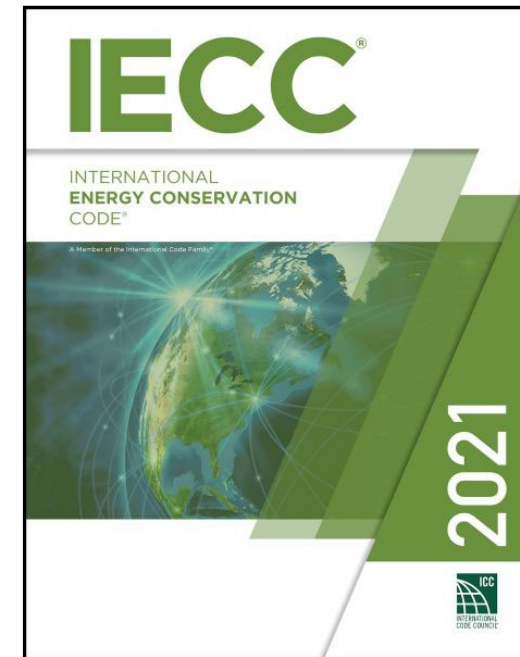
- High-efficiency plumbing fixtures and fittings
 - Water closets, urinals, lavatory faucets, showerheads, kitchen faucets
- Efficient hot water delivery
 - Pipe Insulation
 - Demand controlled circulation pump for remote water heaters



Source: waterbrowser.com

IRC/IECC for Single Family Dwellings

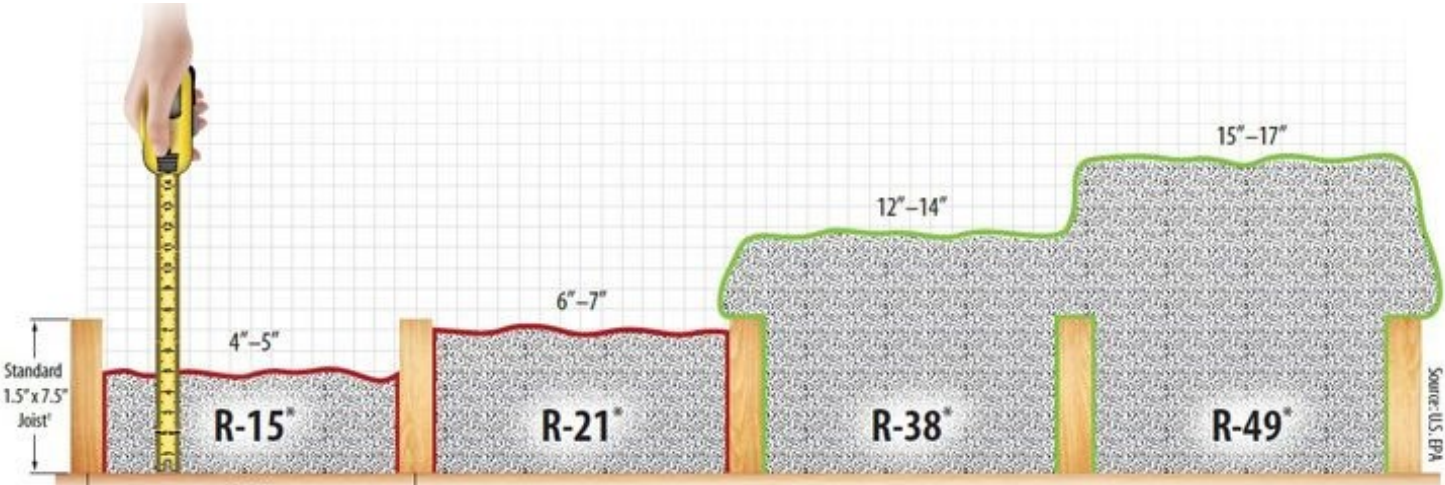
- **Top 10 Energy code Changes**
 1. R-38 ceiling insulation
 2. Cool roofs for low slope roofs
 3. Duct leakage test
 4. Mechanical ventilation flow rate test
 5. High-efficacy lighting (LED or similar)
 6. Interior lighting controls
 7. Exterior lighting controls
 8. Electric vehicle capable charging
 9. Additional efficiency package options
 10. Rooftop solar-ready zones



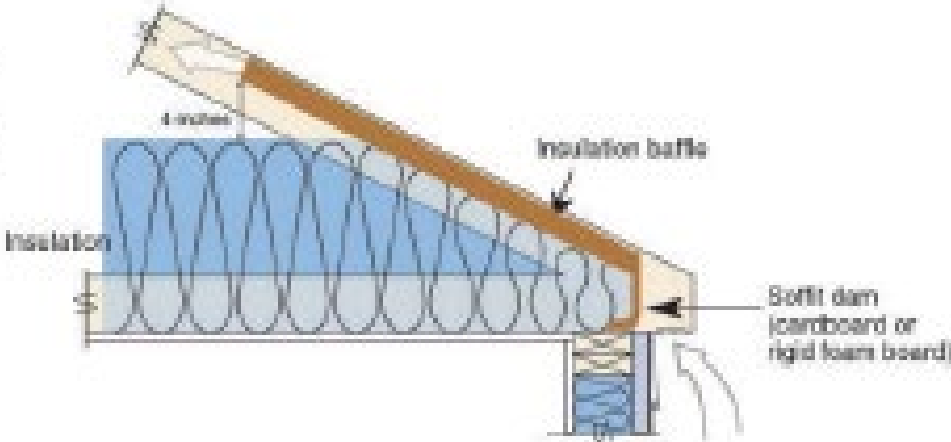
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R-49 Ceiling Insulation – R402.1.3

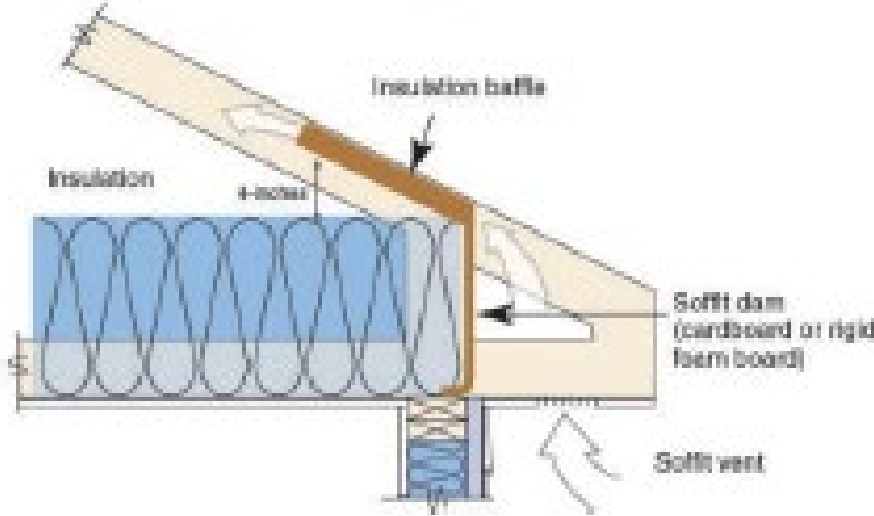
Prescriptive requirement

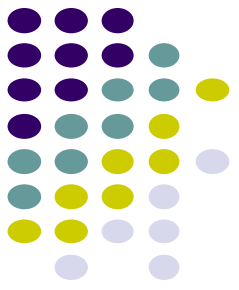


Standard Truss with tapered insulation depth



Energy Truss with full height insulation (recommended)





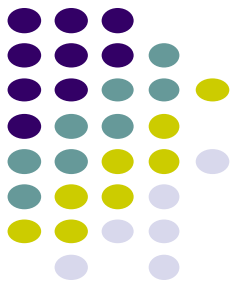
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Cool/Light Reflective Coated Roofs

Low Slope roofs (less than 2 in 12 slope) – R402.6

- Minimum solar reflectance index (SRI) of 64 over conditioned and non-conditioned spaces





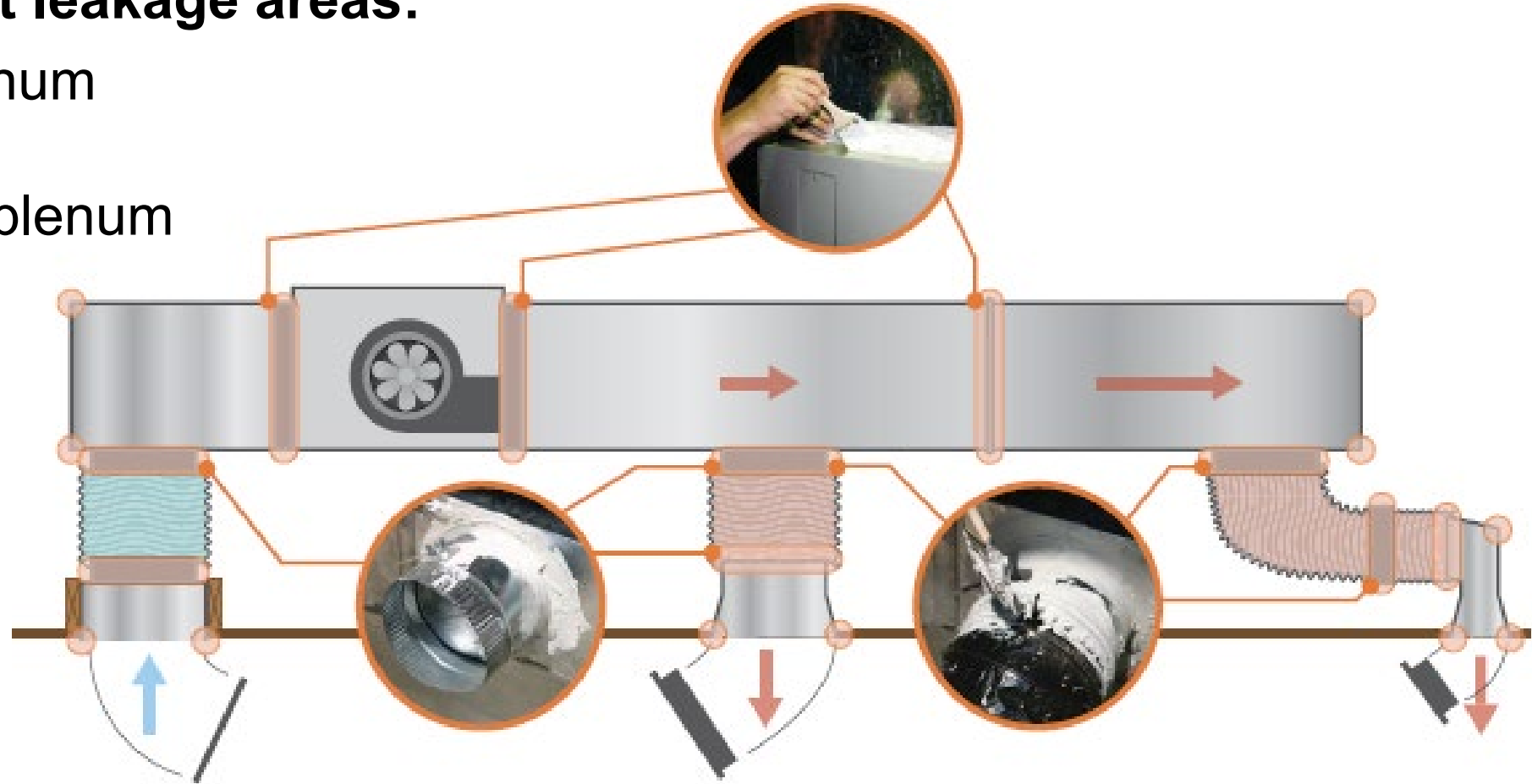
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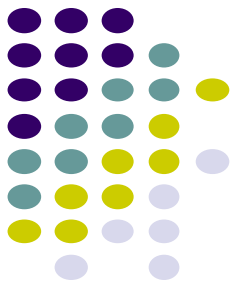
Duct Leakage Testing – R403.3.5

Most common duct leakage areas:

- Air handler to plenum
- Boot to gypsum
- Take-off collar to plenum
- Splices
- Connections
- Return platforms

Applies to ducts in both conditioned and unconditioned spaces.





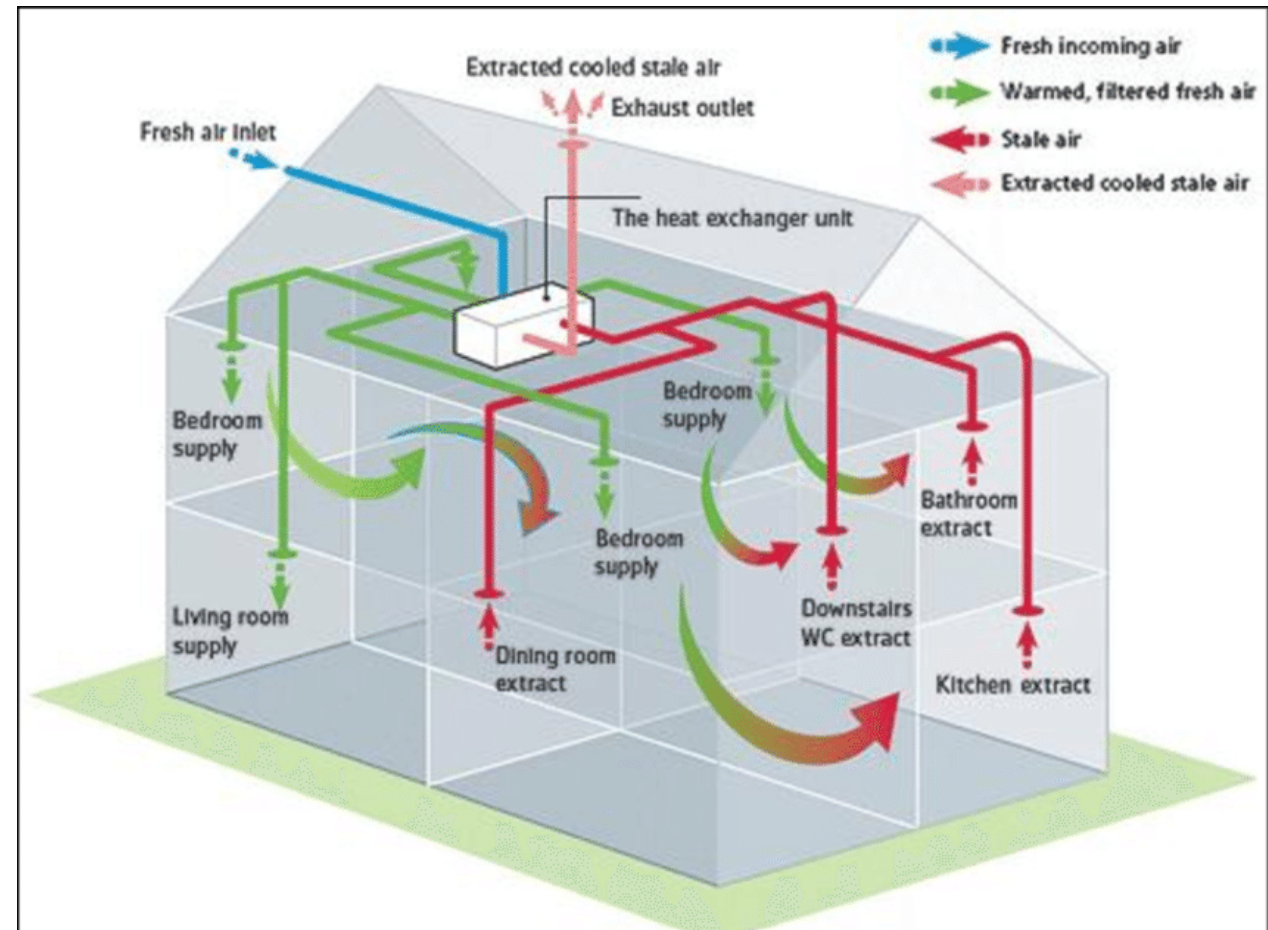
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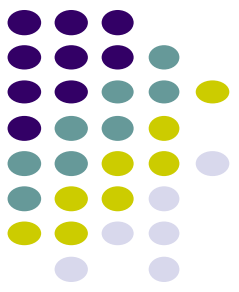
Mechanical Ventilation Flow Rate Testing – R403.6.3

R403.6.3 Testing. Mechanical ventilation systems shall be tested and verified to provide the minimum ventilation flow rates required by Section R403.6.

R403.6 Mechanical ventilation.

Dwelling units shall be provided with ventilation that complies with the Section M1505 of the *International Residential Code*. Outdoor air intakes and exhausts shall have automatic or gravity dampers that close when the *ventilation* system is not operating.



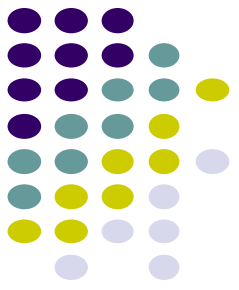


Mechanical Ventilation Airflow Rate

Ventilation rate in cubic feet per minute = $(0.01 \times \text{total square foot area of house}) + [7.5 \times (\text{number of bedrooms} + 1)]$
(Equation 15-1)

TABLE M1505.4.3(1)
CONTINUOUS WHOLE-HOUSE MECHANICAL VENTILATION SYSTEM AIRFLOW RATE REQUIREMENTS

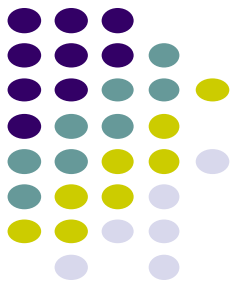
DWELLING UNIT FLOOR AREA (square feet)	NUMBER OF BEDROOMS				
	0-1	2-3	4-5	6-7	> 7
	Airflow in CFM				
< 1,500	30	45	60	75	90
1,501-3,000	45	60	75	90	105
3,001-4,500	60	75	90	105	120
4,501-6,000	75	90	105	120	135
6,001-7,500	90	105	120	135	150
> 7,500	105	120	135	150	165



Energy Efficiency Certificate – R401.3

- A permanent certificate shall be completed by the builder or other *approved* party and posted on a wall in the space where the furnace is located, a utility room or other *approved* location.
 1. *R*-values of insulation in/on ceilings, roofs and walls.
 2. *U*-factors and *solar heat gain coefficient*.
 3. Results from duct leakage and envelope air leakage testing.
 4. Types, sizes and efficiencies of heating, cooling and water-heating equipment.

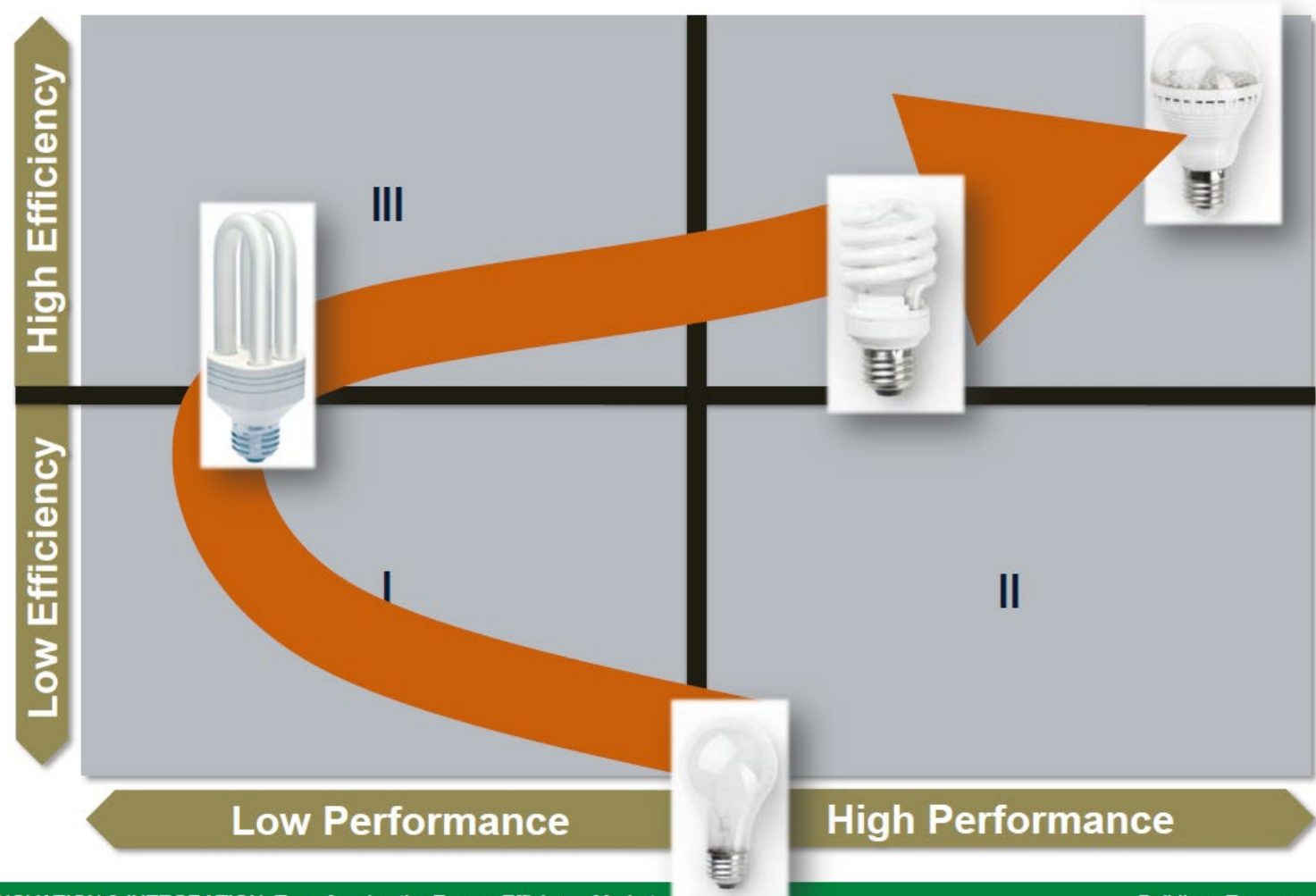
Energy Efficiency Certificate		
Permit No.	_____	
Address	_____	
Insulation Ratings		R-Value
Roof/Ceiling		
	Without attic	<i>R</i> -
Walls	Frame	<i>R</i> -
	Max	<i>R</i> -
	Basement	<i>R</i> -
	Crawlspace	<i>R</i> -
Floors	Over unconditioned space	<i>R</i> -
	Sub-edge (depth)	<i>R</i> - / ft.
Ducts	Frame	<i>R</i> -
Fenestration Ratings		NFRC U-Factor NFRC SHGC
Opaque doors	<i>U</i> -	
Windows	<i>U</i> -	
Skylights	<i>U</i> -	
Equipment Performance		Efficiency
Heating systems	HSPF/AFU _E	
Cooling systems	COP/SEER	
Water Heater/Bolan	EF ₁ / ₂ or <i>E</i> ₁ / ₂	
Builder/Designer	_____	
Certified by	_____	Date: _____
Adopted Code Edition	_____	

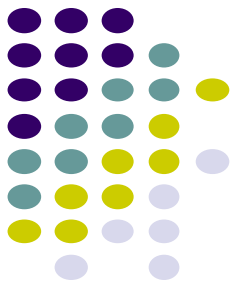


5

High-Efficacy Lighting – R404.1

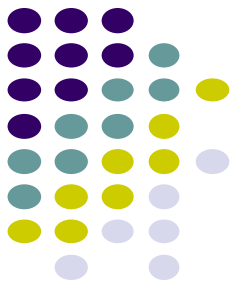
All permanently installed lighting fixtures shall contain only high-efficacy lighting.





HIGH-EFFICACY LIGHT SOURCES. Any lamp with an efficacy of not less than 65 lumens per watt, or luminaires with an efficacy of not less than 45 lumens per watt.





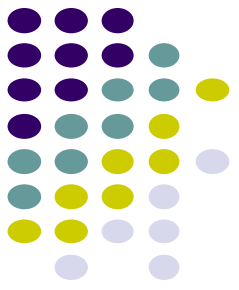
6 Interior Lighting Controls – R404.2

Permanently installed interior lighting fixtures shall be controlled with either a dimmer, an occupant sensor control or other control such as an automatic timer shut-off switch.

Exceptions: Bathrooms, hallways & lighting designed for safety or security



Note: Dimmers and occupant sensors have manual controls to turn the lights on or off.

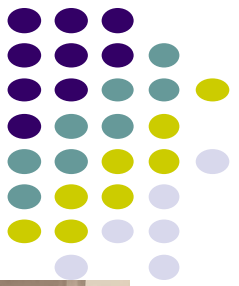


7

Exterior Lighting Controls – R404.3

Where the total permanently installed exterior lighting power is greater than 30 watts, the permanently installed exterior lighting shall have automatic shut-off actions





8 Electric Vehicle Charging Capacity

R404.1

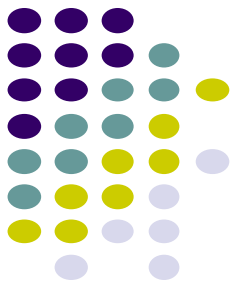
- **EV-capable for new single-family homes**
 - Reserve electrical service panel space for a full size 2-pole circuit breaker labeled “Future EV Charging”
 - A raceway shall be installed from the electrical service panel to a location within the garage, where it shall terminate in a junction box or outlet and be labeled “Future EV Charging”.



9

Additional Efficiency Package Options

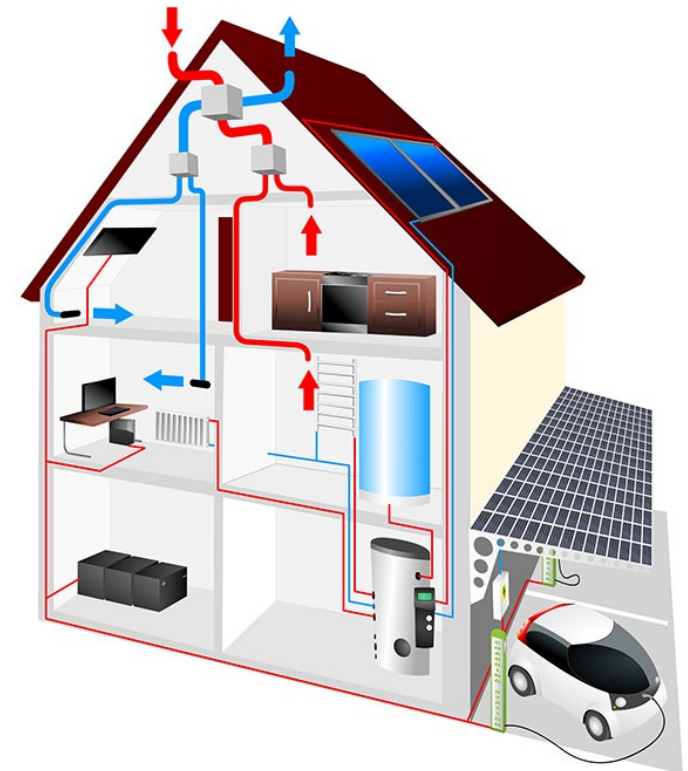
R408.2 – select one option or 5% reduced energy

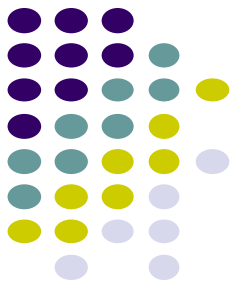


1. Enhanced envelope performance option
2. More efficient HVAC equipment performance
3. More efficient service water-heating
4. More efficient thermal duct distribution system
5. Efficient ventilation system

6. On-site renewable energy

- Generate not less than 2 watts/sq. ft. of total conditioned floor area or 50% of annual estimated energy use





10 Solar-Ready Zones – RB103

- Minimum 10% of roof area but not less than 300 sq. ft. free and clear of obstructions including mechanical equipment and vents
- Provide electrical pathway for conduit run from solar-ready zone to electrical service panel with reserved space for 2-pole circuit breaker
- Capped roof penetration sleeve shall be provided on roofs with a slope of 1 in 12 or less



Credit: Carlisle Roof Foam

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