2018 Building and Fire Code Adoption and Amendments

CITY OF FLAGSTAFF · ARIZONA · ESTABLISHED 1882

TEAM FLAGSTAFF
WE MAKE THE CITY BETTER

2018 Building and Fire Code Adoption and Amendments

City Council Work Session

May 14, 2019

Amy Palmer, Building Official

Victoria St. Clair, Building Plans Examiner

Jerry Bills, Fire Chief

TEAM FLAGSTAFF

WE MAKE THE CITY BETTER

What is a Model Code?

- Developed and maintained by a standards organization independent of the jurisdiction
- Local governments (state, city, county) can choose to adopt a model building code as their own.
- Saves local governments the expense and trouble of developing their own codes.

Update and Adoption Frequency

International Code Council (ICC)

- 3-year update cycle (2009, 2012, 2015, 2018, etc.)

City of Flagstaff

- 6-year adoption cycle
- Most recent adoption: 2013
  - 2012 International Codes, 2009 IECC, 2011 NFPA 70/National Electrical Code (NEC) and A117.1-2009 Standard for Accessible and Useable Buildings and Facilities

Proposed Model Codes

Title 4: Building Regulations

2018 International Building Code (IBC)

2018 International Residential Code (IRC)

2018 International Existing Building Code (IEBC)

2018 International Mechanical Code (IMC)

2018 International Plumbing Code (IPC)

2018 International Fuel-Gas Code (IFGC)

2018 International Energy Conservation Code (IECC)

2018 International Solar Energy Provisions (ISEP)

2018 International Swimming Pool & Spa Code (ISPSC)

2017 NFPA 70 - National Electrical Code (NEC)

A117.1-2017 Standard for Accessible and Useable Buildings and Facilities

Title 5: Fire Code

2018 International Fire Code (IFC)

Why adopt an updated code?

- Improve health, reduce emissions, create jobs
- Protect public health, safety, and welfare
- Energy and cost saving
- Provide consistent minimum standards in construction
- Protect consumers and support grid reliability
- Contribute to the well-being of the community
- Help control or lower cost of insurance premiums

****Codes are effective only if they are enacted into law and enforced by state and local governments****

Code Updates vs. Local Amendments

Update

- Generated by the code publisher through code hearing process
- Addresses new technology, clarifications or modifications to existing code sections

Local Amendment

- Generated by the adopting jurisdiction
- Reflect local practices and laws
- Unique site conditions affecting foundation design or applied snow loads

Adoption Timeline

3/2018 -11/2018: Analyze code changes and create draft amendments

7/2018 – 3/2019: Code update trainings for staff, design community, developers, public

11/2018 – 4/2019: Boards & Commissions meetings & public outreach

5/2019 – 6/2019: City Council adoption process

7/2019: 2018 Building and Fire Codes Adoption becomes effective

7/2019 – 12/2019: Accept submittals under both codes ("Grace Period")

1/2020: Full implementation of 2018 codes

Public Outreach

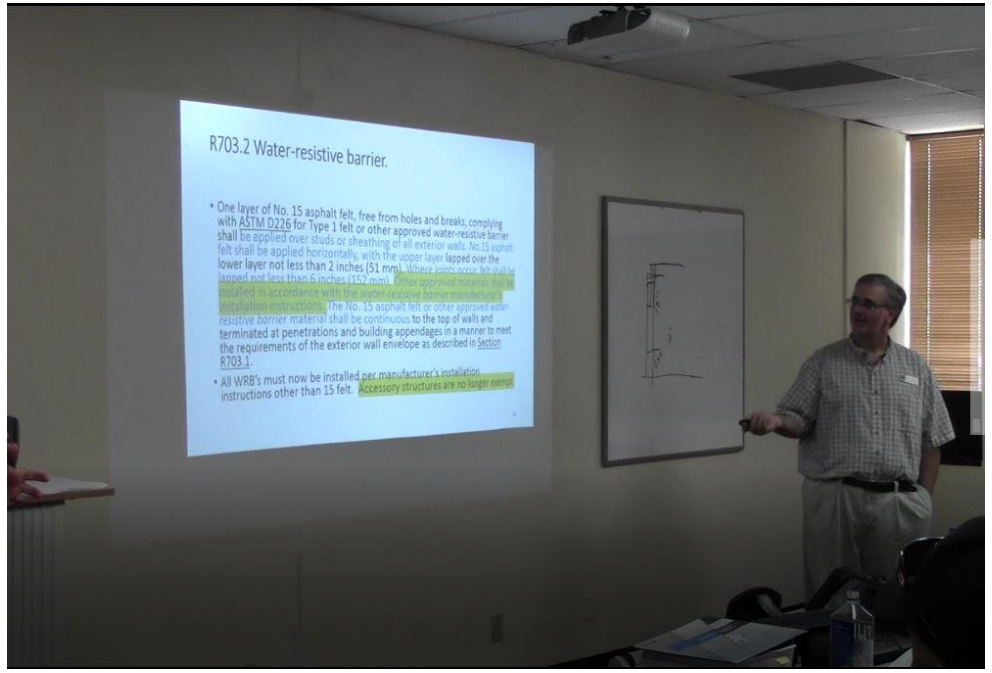
Target audience: Design community (architects, engineers, home designers), contractors, any interested community members

- **Advertising**
  - **Posters & flyers**
    - Coconino County / Building Safety website
    - Local businesses: home improvement center, coffee shop bulletin boards
    - Social media (Facebook, LinkedIn, etc.)
    - Inspection staff handout to subcontractors
    - Northern Arizona Builders Association (NABA)
  - **Radio interview:** KAFF, January 25, 2019 Flagstaff City Hall / Building Safety website
  - **AZ Daily Sun**

Public Outreach

Training Sessions

- **07/25/2018:** IRC - **33** attendees
- **08/09/2018:** IRC - **53** attendees
- **08/22/2018:** IBC + IEBC – **34** attendees
- **09/13/2018:** IECC + ISEP – **18** attendees
- **10/03/2018:** IPC + IFGC – **24** attendees
- **10/18/2018:** NFPA 70/NEC – **16** attendees
- **11/04/2018:** IMC + ISPSC – **15** attendees
- **12/13/2018:** IFC – **35** attendees
- **01/30/2019:** IRC – **17** attendees
- **03/07/2019:** IECC **12** attendees



TOTAL ATTENDEES: 257

Boards & Commissions

November 8, 2018: Building and Fire Code Board of Appeals #1

December 4, 2018: Building and Fire Code Board of Appeals #2

January 22, 2019: Commission on Inclusion and Adaptive Living

February 13, 2019: Planning & Zoning Commission

February 28, 2019: Sustainability Commission

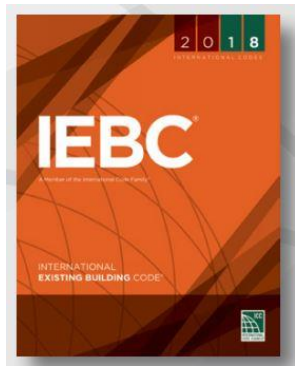
April 2, 2019: Building and Fire Code Board of Appeals #3

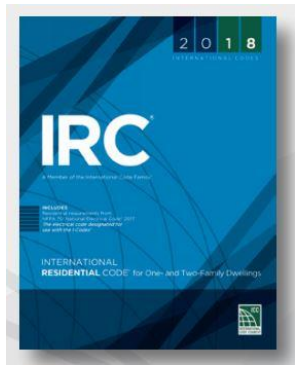
Boards & Commissions

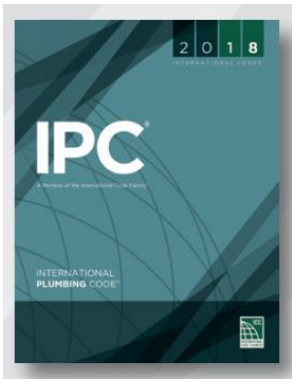
All boards and commissions recommended the adoption and proposed amendments to move forward with the exception of:

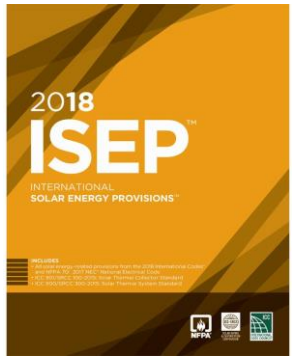
- Building and Fire Code Board of Appeals
  - Blower door testing
  - EV vehicle charging

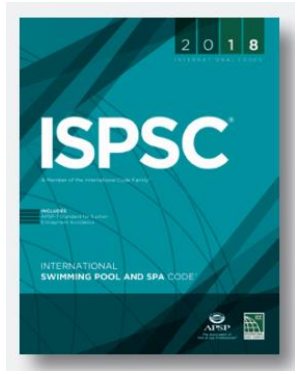
Code Updates and Amendments

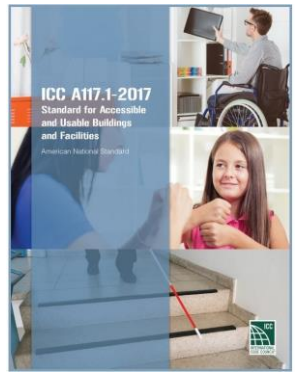


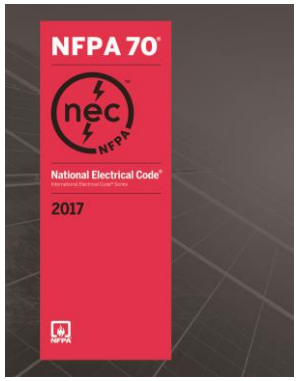


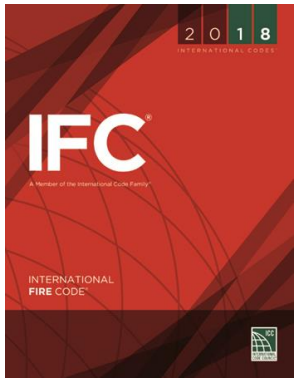












International Building Code (IBC)

AMENDMENT

Section 429 Electric Vehicle (EV) Charging

- Requires EV-ready parking spaces for all **new commercial, multi-family, and industrial structures** providing 20 or more parking spaces

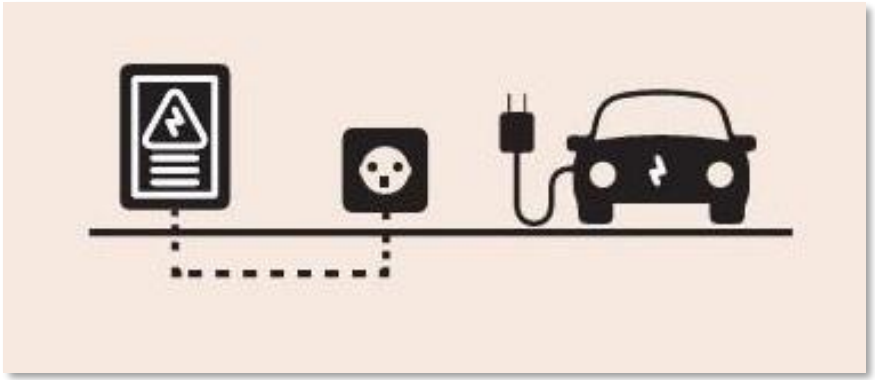
Parking Spaces Provided	EV-ready Parking Spaces Required
1-19	0
20-50	1
51-100	2
100+	3

IBC

SECTION 429 Electric Vehicle (EV) Charging

What is “EV-ready”?

- Panel capacity – 208/240V, 50 amp circuit with overcurrent device (circuit breaker)
- Conduit with conductor/wiring
- Receptacle (similar to domestic electric clothes dryer)



IBC

1110.4.13 Play Areas

- "Play areas containing play components designed and constructed for children shall be located on an *accessible route*."

Children's playground

iStock.com/natureexplorer2

IBC

1507.18 Building-integrated photovoltaic roof panels.

- Building-integrated photovoltaic panel systems have specific requirements as a roof-covering material:
  - Deck requirements
  - Deck slope
  - Underlayment
  - High wind attachment
  - Ice barrier
  - Material standards

BIPV panels

iStock.com/Kwangmoozaa

IBC

2902.3 Public Toilet Facilities

- 2015 IBC Change
- Limited-size quick service tenant spaces are no longer required to provide toilet facilities for public customers:

  Exceptions: Public toilet facilities shall not be required for:

  2. Structures and tenant spaces intended for quick transactions, including takeout, pickup and drop-off, having a public access area less than or equal to 300 square feet.

International Existing Building Code (IEBC)

405.2.1.1 Snow Damage

- Structural components whose damage was caused by or related to snow load effects shall be repaired, replaced or altered to satisfy the requirements of Section 1608 of the *International Building Code*.

Damage to roof due to large snow loads

nikolpetr/Shutterstock.com

IEBC

505.4, 701.4 Emergency Escape Opening Operation

“Emergency escape and rescue openings are required to be operational from the inside the room without the use of keys or tools.”

Emergency escape and rescue opening operation in existing b

International Residential Code (IRC)

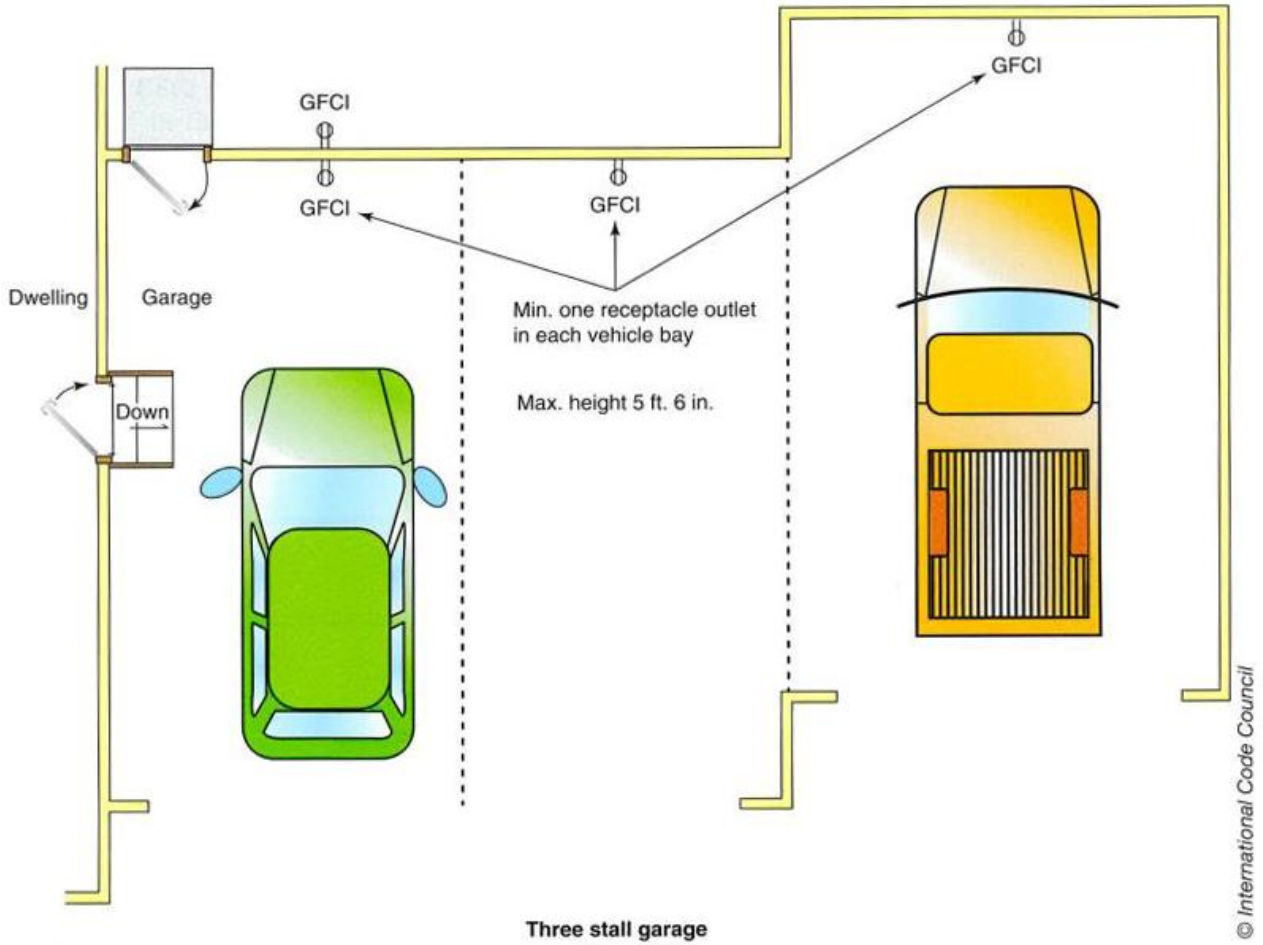
Significant Changes Regarding Seismic Provisions

- The National Association of Home Builders (NAHB) report on the 2018 Significant Changes and Cost Impacts:
  - Change in Wall Bracing and Foundation Costs for Reference House 4:
    - Seismic Design Category D2 to a Seismic Design Category C
    - 2-story 2,607 SF with attached 2-car garage.
    - **$11,950** in approx. savings!

IRC

E3901.9 Garage receptacle outlet location

- A receptacle outlet must be located in each vehicle bay in a garage.



IRC

AMENDMENT: E3901.9 EV Charging

- At least one required garage receptacle shall be a 208/240-volt individual branch circuit for purposes of electric vehicle (EV) charging. The service panel or subpanel circuit directory shall provide a 50-ampere minimum dedicated branch circuit and a branch circuit overcurrent device. Electric vehicle supply equipment shall be installed in accordance with 2017 NFPA 70/NEC.
- Exception: Additions and alterations to existing one- or two-family dwellings and townhouses constructed per the IRC are exempt from the EV charging requirement.

IRC

PROPOSED APPENDICES

- **Appendix Q** Tiny Houses
- **Appendix R** Light Straw-Clay Construction
- **Appendix S** Strawbale Construction
- **Appendix T** Solar-ready Provisions

Element	General requirement
Egress roof access window	A skylight or roof window for emergency escape from a loft
Loft	Open on one side with a ceiling height of less than 6 feet 8 inches
Tiny house	Maximum area 400 square feet excluding lofts
Ceiling heights	Generally 6 feet 8 inches or less
Minimum loft area	35 square feet with 5-foot minimum dimension
Stairway	Width: 17 to 25 inches Headroom: 6 feet 2 inches Risers: 7 to 12 inches Treads: Calculated based on riser height
Ladders	Width: 12 inches Rung spacing: 10 to 14 inches Incline 70 to 80 degrees
Loft guard height	One-half of the clear height to ceiling Not required to be over 36 inches

International Mechanical Code (IMC)

Chapter 14 Solar Thermal Systems

- Substantially rewritten for consistency with current technology
- Applies only to solar thermal systems as opposed to solar photovoltaic systems
- References two solar product standards
  - ICC 900/SRCC 300 Solar Thermal System Standard
  - ICC 901/SRCC 100 Solar Thermal Collector Standard

International Plumbing Code (IPC)

403.2 Separate facilities

- “Where plumbing fixtures are required, separate facilities shall be provided for each sex.”
- Exception #4 added:
  - Separate facilities shall not be required in business occupancies in which the maximum occupancy load is 25 or fewer.

IPC

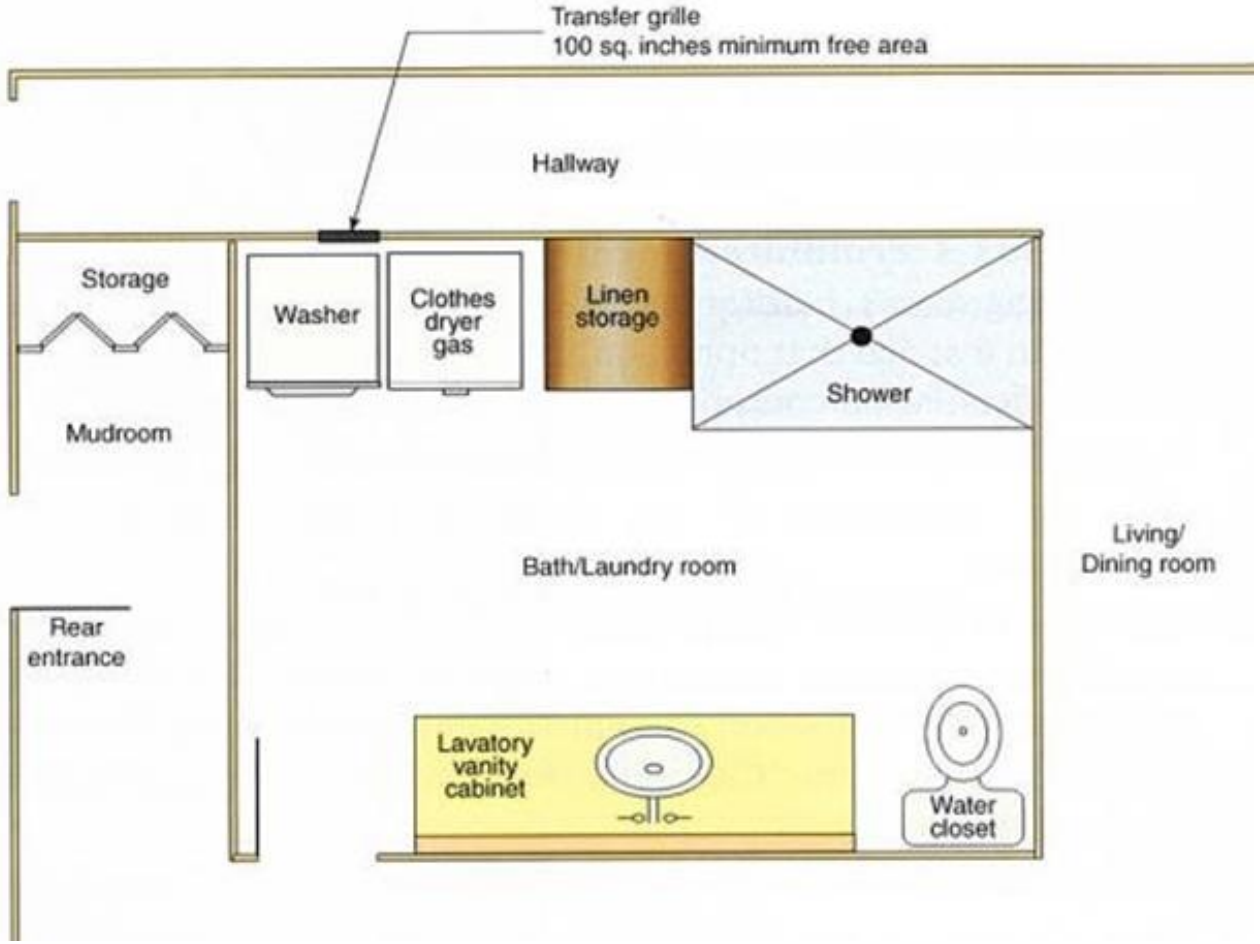
Section 202 Definitions / 410 Drinking Fountains

- Definitions and language included for water dispensers and water coolers

International Fuel-Gas Code (IFGC)

303.3 Prohibited Locations

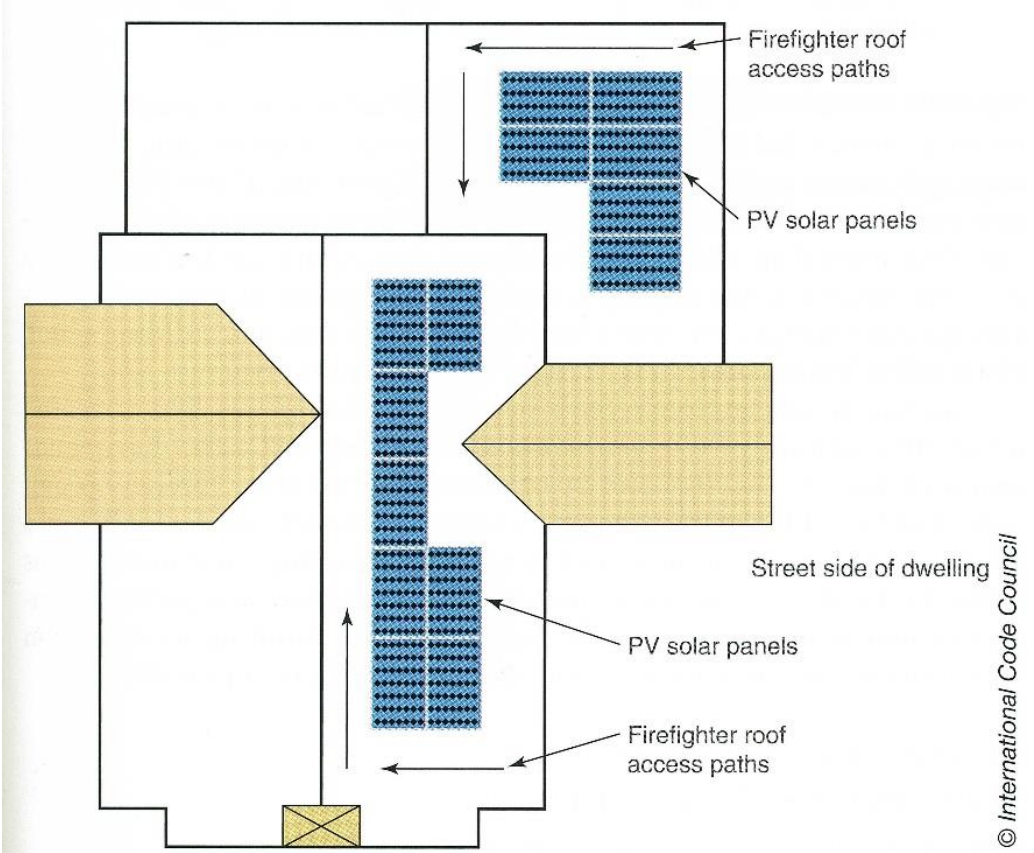
New Exception #6: Clothes dryers are permitted in residential bathrooms where a permanent opening at least 100 sq. inches, communicating with a space outside of a sleeping room, bathroom, toilet room, or storage closet is provided



International Solar Energy Provisions (ISEP)

RS402.4 Roof Access and Pathways

- First appeared in 2012 International Fire Code (IFC); subsequently modified in 2015, 2018 IFC
- Emergency access to the roof
- Pathways to specific areas
- Smoke-ventilation opportunity areas
- Emergency egress from the roof



Required roof access and pathways for firefighters for roof-mounted PV solar systems

International Swimming Pool & Spa Code (ISPSC)

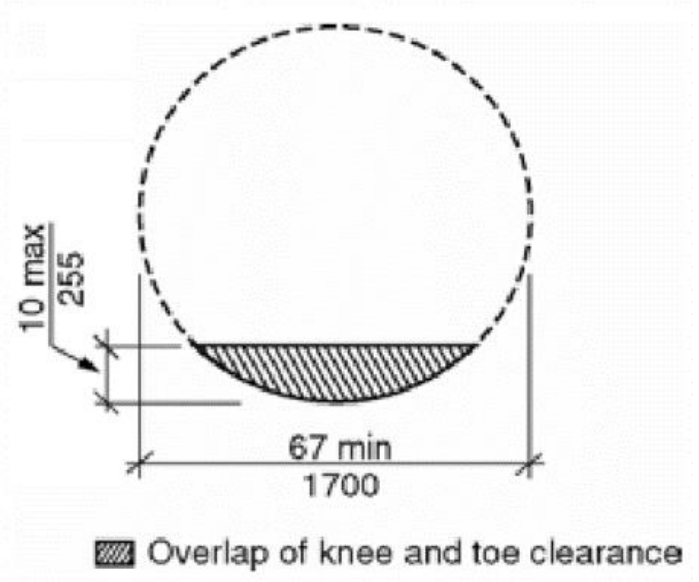
- Swimming pool, spa, and hot tub provisions removed from the IBC and IRC. These codes now reference ISPSC.
- City of Flagstaff amendments created to align with Arizona State Statutes.

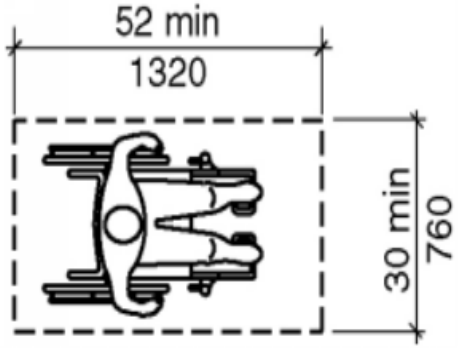
ICC A117.1-2017

Standard for Accessible and Usable Buildings and Facilities

Chapter 3 Building Blocks

- Section 304 Turning Space – Circular Space
- Section 305 Clear Floor Space



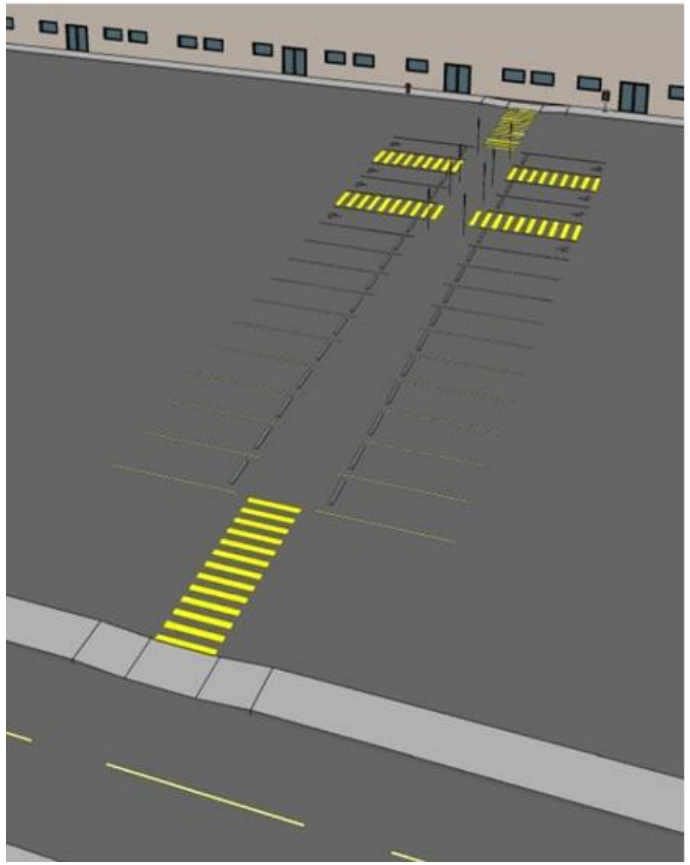


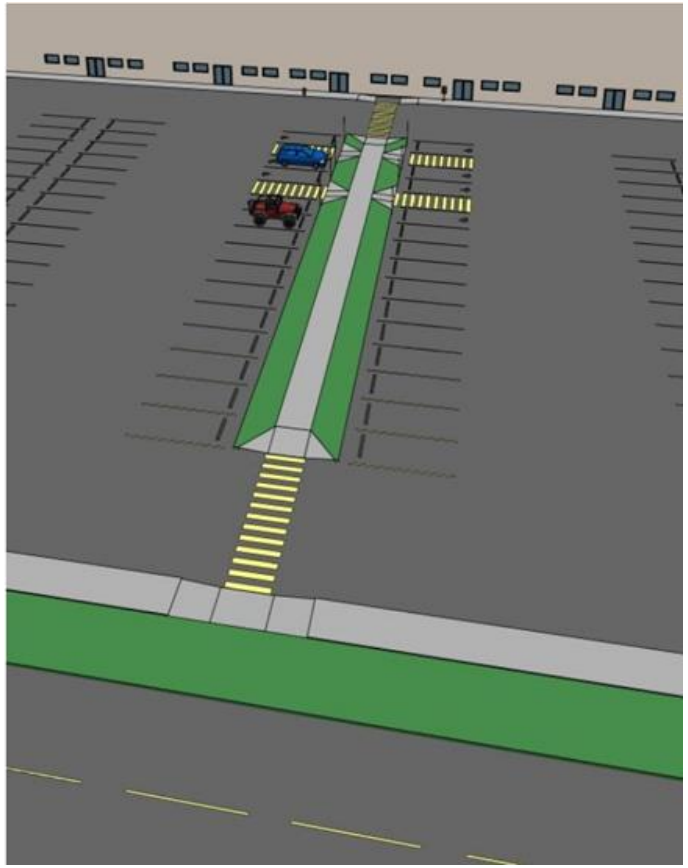
ICC A117.1-2017

Chapter 5 General Site and Building Elements

Section 507 Accessible Routes through Parking:

"Where accessible routes pass through parking facilities they shall be physically separated from vehicular traffic."





2017 NFPA 70/National Electrical Code (NEC)

Article 210.12(C) AFCI Protection in Guest Rooms and Suites

- AFCI = Arc-Fault Circuit Interrupter
- Prior to 2017 NEC no AFCI requirements existed for guest rooms/suites of hotels lacking “permanent provisions for cooking”

International Energy Efficiency Code (IECC)

Residential Provisions: Compliance Paths (R401.2)

- Prescriptive "Component R-value" R402.1.2/Table 402.1.2
  - Simplest means of compliance; no calculations or computer analysis required
- "Total UA Alternative" R402.1.5
  - UA = sum of U-factors X assembly area
  - Allows one portion of the building thermal envelope to make up for another
  - FREE calculation software: REScheck from U.S. Department of Energy; using "UA trade-off" in the compliance method menu

IECC – Residential Provisions

Residential Provisions: Compliance Paths (R401.2)

- "Simulated Performance" R405
  - Requires a ***proposed design*** be shown to have an **annual energy cost** that is less than or equal to the annual energy cost of the ***standard reference design*** (a version of the proposed design meeting min. code requirements)
  - Calculation software must meet specific criteria and reference approved energy pricing sources
- **"Energy Rating Index (ERI)" R406** – New to 2015 IECC
  - Demonstrate compliance to Table R406.4 by providing documentation from an **approved third party**
  - Software tools used approved in accordance with RESNET/ICC 301 standard.

IECC – Residential Provisions

Rating Index (ERI) Compliance Alternative

- Table R406.4 Maximum Energy Rating Index (ERI)
  - Lower score = less energy consumption
  - Climate Zone 5
    - 2009: **82***
    - 2012: **80***
    - 2015: **55**
    - 2018: **61**

* Home constructed to minimum prescriptive requirements of respective IECC edition

IECC – Residential Provisions

R406 Energy Rating Index (ERI) Compliance Alternative

IECC 2018 Energy Rating Index Report

Property
[redacted]
Flagstaff , AZ 86001

Organization
[redacted]

ERI
Preconstruction

Annual Energy Consumption

	Rated Home Calculated Energy Use (MBTU)	Rated Home Cost ($/yr)
Heating	29.7	146
Cooling	0.8	32
Water Heating	13.5	58
Lights & Appliances	16.0	615
Photovoltaics	-0.0	-0
Total	60.0	1125

Projected Rating: Based on Plans - Field Confirmation Required.

Annual Estimates

Electric(kWh):	5111	C02 Emissions(Tons):	5
Natural gas(Therms):	426	Energy Savings ($)**:	463

*Based on standard operating conditions
**Based on the 2018 IECC Energy Rating Index Reference Design Home

TARGET ERI: 61 | 2018 ERI: 58 | PASS

This home MEETS the 2018 Energy Rating Index requirements of Sections 406.3 and 406.4 of the 2018 IECC for climate zone 5B. This 2015 ERI is calculated per ANSI/RESNET/ICC Standard 301-2014, as published January 2016 with Addenda A & B.

Name [redacted]
Organization

Signature
Date 19 February 2019

Mandatory Requirements

2018 ERI Target	PASS	Duct Insulation (Ducts outside R-6, inside is R-0)	PASS
2009 IECC UA	PASS	Maximum Fenestration U-factor/SHGC (R402.5)	PASS
Duct Testing (2015)	PASS	Air Leakage (5 ACH50 for CZ1-2, 3 ACH50 for CZ3-8)	PASS
Mechanical Ventilation	PASS	High efficacy lights installed (90%)	PASS
Hot water pipe insulated to R-3	PASS	Mandatory Requirements Checkbox (2018 IECC)	PASS
Mechanical Ventilation Efficacy	PASS		

Emissions Data		Provider Data and Seal
Pollution Prevented		TITLE
Carbon Dioxide (CO2) - tons/year	3.2	Company
Sulfur Dioxide (SO2) - lbs/year	1.7	Address
Nitrogen Oxides (NOx) - lbs/year	7.5	City, State, Zip
		Phone #

REM/Rate - Residential Energy Analysis and Rating Software v15.7.1
This information does not constitute any warranty of energy costs or savings.
© 1985-2018 NORESCO, Boulder, Colorado.

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**Based on the 2018 IECC Energy Rating Index Reference Design Home

IECC – Residential Provisions

Table R402.1.1 (Prescriptive)

TABLE R402.1.2
INSULATION AND FENESTRATION REQUIREMENTS BY COMPONENT[a]

CLIMATE ZONE	FENESTRATION *U*-FACTOR[b]	SKYLIGHT[b] *U*-FACTOR	GLAZED FENESTRATION SHGC[b, e]	CEILING *R*-VALUE	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
2009										
5	0.35	0.60	NR	38	20 or 13+5*	13/ 17	30	10/ 13	10, 2ft	10/ 13
2009 AMENDED										
5	0.45				19/15 **					
2018										
5	0.30	0.55		49	20 or 13+5*			15/ 19		15/ 19

*First value = cavity insulation + second value = continuous insulation

**R-19 cavity insulation for 2x6, R-15 high density cavity insulation for 2x4; no cavity + continuous option offered

IECC – Residential Provisions

R402.4 Air Leakage (Mandatory)

R402.4.1.2 Testing

- **Blower door testing** to confirm number of air changes per hour
  - Air change: A measure of the air volume added to or removed from a space divided by the volume of the space
  - Climate Zone 5 – Maximum 3 air changes/hour
- 2009 IECC: One of two options
- 2012 IECC: Became mandatory testing method

IECC – Residential Provisions

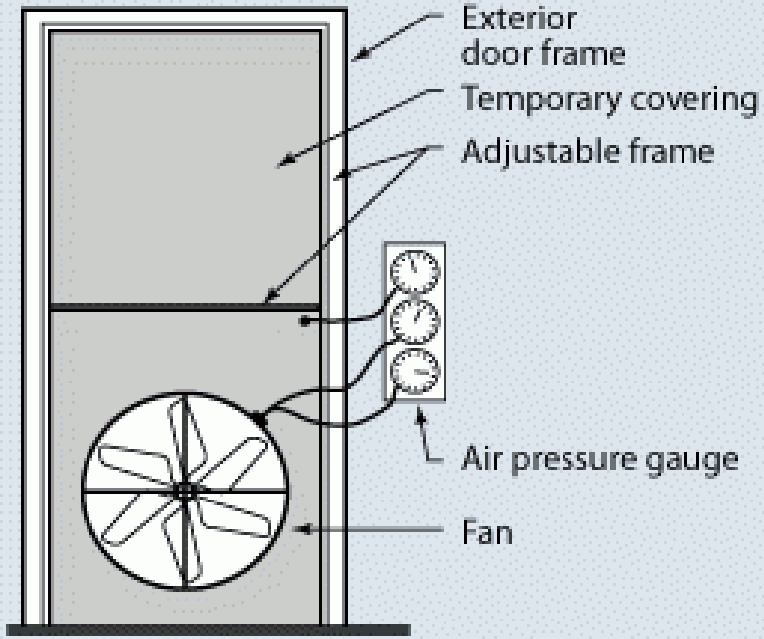
R402.4 Air Leakage (Mandatory)

R402.4.1.2 Testing

Credit: Holtkamp Heating & A/C, Inc.

Diagnostic Tools

Testing the airtightness of a home using a special fan called a blower door can help to ensure that air sealing work is effective. Often, energy efficiency incentive programs, such as the DOE/ EPA ENERGY STAR Program, require a blower door test (usually performed in less than an hour) to confirm the tightness of the house.



Credit: United States Department of Energy

IECC – Residential Provisions

R403.3 Ducts

R403.3.3 Testing

- “Rough-in” or “postconstruction” tests to confirm duct tightness/leakage
- Appears in 2009 IECC
- Was not amended out in 2013 adoption: “not enforced”

IECC – Residential Provisions

R403.5 Service hot water systems

R403.5.1.1 Circulation systems

- Requires circulation pump

R404.1 Lighting Equipment (Mandatory)

- 2009: 50% high-efficacy
- 2012 & 2015: 75% high-efficacy
- 2018: 90% high-efficacy

Commercial Costs for Energy Provisions

EV-Ready Parking	$2050 - $11,000
Solar-ready	$1000 +
	$3050 - $12,000+

Residential Costs for Energy Provisions

Solar-ready	$150 - $300
Blower door testing	$300 – $500
Duct testing	$200 - $250
Circulation pump	$350 – $500
EV Charging	$300 – $500
	$1300 -$2050

Residential
"Seismic" Savings
$11,950 - $2,050 =
$9,900
net savings

Fire Code 2012 to 2018 Changes

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2012 IFC to 2018 changes/new

- Update of NFPA standards to the latest versions.
- Addition of Chapter 12!
- First time 2018 Family of codes!
- Emergency Preparedness in schools
- New Standard on Commercial Hood/cleaning and documentation of such.
- Dust Hazard analysis Chapter 22
- Grow Facilities- Chapter 39.

2012 IFC to 2018 changes

- Bar and restaurant Fire Protection System-occupancy loads.
- Fire Sprinkler required occupancy the serve Alcohol and have occupancy loads of 300.
- 2 in the city and both fall in the Exception for Historical Buildings.

2012 IFC to 2018 Not Changed

- All current Amendments except those relayed to Solar panel installations
- Moved- Solar/alternative power. -new Chapter 12
- Includes Fire Access requirement (match Engineering Standards)
- Moved-Tents-3105- Tents over 400 Square feet.
- Event Safety Update- require exit plan, weather monitoring, outdoor cooking requirement all are in current Amendments, but now have there own chapter.

2012 IFC to 2018 IFC

Questions?