

Green Building Energy Sustainability Inc.

2018 IECC Residential *NCTCOG version

Zone 3 - DFW area handout

The 2021 IECC will be adopted by several cities in the DFW area in 2022. More cities are expected to adopt this modified version of the 2018 IECC. The modifications were made and recommended by The North Central Texas Council of Governments (NCTCOG). The values in this version use the 2015 IECC values for the most part. This version also incorporates NCTCOG recommendations regarding testing and sampling criteria for multi-family housing. Each North Central Texas city may have made other modifications to their version of the adopted code. Areas of change in the 2018 IECC are noted in the **dark green text**. Behind the section number, there is a **red (M)** or **(P)**. The **(M)** means that this section is **Mandatory** and must be followed regardless of the Energy path selected. The **(P)** means this requirement is **Prescriptive** and may be used or not may not be used depending on the trade-offs allowed by a Performance path demonstrating 2018 IECC compliance. That **(M)** or **(P)** designation will remain in existence on subsequent sub-sections of that section unless otherwise noted.

103.2 Information required on construction documents

1. Designation of the Thermal Building Envelope on the plans
2. Insulation Material and their R-Value
3. Fenestration U and SHGC values
4. Area weighted U factor & SHGC calculations
5. Mechanical system design criteria (Manual J & S)
6. Mechanical and Water heating equipment types, sizes, and efficiencies
7. Equipment and system controls
8. Duct sealing, duct & pipe insulation, and locations
9. Air Sealing details

103.4 Amended construction documents shall be resubmitted for approval

104.2 Required Energy inspections – **It is the duty of the permit applicant to cause the work to remain visible and able to be accessed for inspection purposes until approved.**

- 104.2.1 Footing and foundation inspection for insulation on the foundation and buried plumbing
- 104.2.2 Framing (Predrywall) inspection for air sealing, insulation, U and SHGC values
- 104.2.3 Plumbing insulation and control inspection
- 104.2.4 Mechanical inspection of system size & efficiency, duct insulation, duct leakage testing, programmable thermostat and minimum fan efficiency
- 104.2.5 Final inspection of attic insulation and high-efficacy lamps

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- 303.1.1.1 Attic insulation depth marker every 300 sqft. R value certificate for installed insulation with thickness and R value for SPF included on certificate
- 303.1.3 Fenestration product rating chart on every window with U – factor, SHGC and Visible Transmission
- 303.2 Insulation installation to manufacturer’s instructions and IBC / IRC requirements
- 401.3 **(M)** Certificate posted on a wall where the furnace is located, a utility room or other approved location with system R or U values of system components, SHGC and mechanical efficiencies
- 402.1 **(P)** Log homes will be designed in accordance with ICC 400
- 402.1.1 Building Envelope General exemptions for < 3.4 Btu/h/sqft or 1.0 watt/sqft
- 402.1.2 Prescriptive requirements for assembly components
- | | | |
|------------------------------------|-------------------|-------------------------|
| Fenestration | U – Factor | ≤ 0.35 |
| Skylight | U – Factor | ≤ 0.55 |
| <u>Solar Heat Gain Coefficient</u> | <u>SHGC value</u> | <u>≤ 0.25</u> |
| Ceiling | R – value | R - 38 |
| Walls | R – value | R – 20 or 13 + 5 ci |
| Floors | R – value | R - 19 |
| Crawlspace / Basement | R value | R – 5 ci or R – 13 batt |
- 402.2.1 R-30 ceiling insulation minimum required in all areas (limited to 500 sqft or 20% of total ceiling area). Uncompressed R – 30 insulation over the exterior wall top plate will be deemed to meet the R-38 requirement, **in ceilings without attic spaces.**
- 402.2.3 Eave baffle required in vented attics adjacent to soffit or eave vents and maintain the same size as vent and extend over the top of air-permeable insulation.
- 402.2.4 Attic access hatches and doors must be weather-stripped and insulated to the same level as surrounding spaces. A retainer is required to prevent loose insulation from spilling into the living area. Vertical attic doors must have a U factor on .35 or less.
- 402.2.5 **Above ground mass walls, having a heating capacity of greater than or equal to 6 Btu/ sqft per degree of Fahrenheit may be constructed of materials such as concrete block, concrete, insulated concrete form, masonry cavity, brick (not brick veneer), adobe, compressed earth block, rammed earth, solid timber or solid logs.**
- 402.2.6 Steel framing has increased insulation values. See chart 402.2.6
- 402.2.8 Floor insulation will be installed with permanent contact to the underside of subfloor decking or meet the floor insulation value and completely insulate the floor rim joist area to wall values.

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- 402.2.11 Crawlspaces walls may be insulated if not vented to the exterior using an alternative method with horizontal insulation extending 24 inches and all exposed earth covered with a Class 1 vapor retarder. Joints shall be lapped 6 inches and be taped or sealed. Vapor retarder will extend at least 6 inches up stem wall.
- 402.4 (M) Air leakage will be tested with a Blower Door and limited to 3 ACH (Air Changes per Hour) at 50 Pascals. Written results will be provided to the code official. **Testing will be performed in accordance with RESNET / ICC 380. Exterior or interior terminations for continuous ventilation systems will be sealed.**
- 402.4.2 Woodburning fireplaces will have tight-fitting flue dampers or doors and an outdoor combustion air source. **The door will be tested by the manufacturer and listed for the fireplace.**
- 402.4.4 Rooms containing a fuel-burning appliance with open combustion air ducts, the ducts will be insulated where they pass through conditioned space to a minimum R-8 value.
- 402.4.5 Recessed Lights will be IC rated & Airtight (<2 cfm @ 75 Pa). Seal building envelope penetration using gasket or caulk
- 402.5 The maximum area-weighted average for fenestration SHGC factor is .50
- 402.4.1.1 Cavities within corner and headers or framing walls shall be insulated by completely filling the cavity with a material that has an R-3 per inch value. A continuous air barrier is required on the exterior from the top plate to the foundation ≤ 8 Perms
- 403.1 (M) Programmable thermostat with a daily schedule with set back capabilities with initial programming setpoint no higher than 70° F for heat and 78° F for cooling
- 403.3.1 (P) Duct insulation on supply and return ducts will be a minimum of R-8 on ducts greater than 3 inches in diameter and R-6 on ducts less than 3 inches. Ducts located inside the building envelope are exempted.
- 403.3.2 (M) Ducts, air handlers, and filter boxes shall be sealed per the IRC or IMC. Air Impermeable spray foam products are permitted without additional joint seals.
- 403.3.2.1 Air handlers will have a manufacturer's designation of no greater than 2% leakage at design-rated flow.
- 403.3.3 (M) Duct tightness verification required (@ 25 Pa) Written results will be provided to the code official. **Testing ducts for heat or energy recovery ventilators that are not integrated into the duct system is not required.**

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- 403.3.4 (P) Rough-in test ≤ 4 cfm / 100 Sqft of conditioned area. Where the air handler is not installed, leakage is limited to 3 cfm/100 Sqft
1. Post-construction test ≤ 4 cfm / 100 Sqft of conditioned area
- 403.3.5 (M) Building cavities may not be used as supply ducts
- 403.3.6 Where supply and return ducts are partially or completely buried in ceiling insulation, ducts will have an insulation value of not less than R-8. A minimum R-19 insulation value (excluding the duct insulation) between the duct and the ceiling is required and the top of the duct will be buried with a minimum of R-13 insulation. Section of the Supply ducts within 3 feet of the air handler will not have to comply with this requirement.
- 403.3.6.1 Ducts using this compliance method and using a minimum of R-30 insulation in the attic and have ducts within 5.5 inches or less above the ceiling and 3.5 inches or more below the top of the insulation, may use an effective R-value of R-25 in the simulated performance software.
- 403.7.1 Ducts considered completely within the Building Envelope must be within the continuous air barrier, or
- 403.7.2 Ducts buried with the ceiling insulation are considered inside the conditioned space if all conditions below are met;
- 403.3.7.2.1 The air handler is within the continuous air barrier and
- 403.3.7.2.2 The duct leakage is less than 1.5 CFM/100 sqft of the conditioned floor area and
- 403.3.7.2.3 The ceiling insulation is equal to the ceiling insulation R-value less the duct insulation value.
- 403.4 (M) Mechanical system piping requires R – 3 insulation if carrying fluids above 105° or below 55°
- 403.4.1 Pipe insulation exposed to the weather shall be protected from damage caused by sunlight, moisture, equipment maintenance, and wind.
- 403.5.2 (P) Demand recirculating water systems will have controls that will start the pump upon receiving a signal from the action of a user by sensing the presence of a user or sensing the flow of hot water. The fixture will also limit the temperature of the hot water from being no greater than 104 ° in the cold water line
- 403.5.3 (P) Minimum R-3 insulation will be used on hot water piping $\frac{3}{4}$ " and larger, piping serving more than 1 unit, piping outside the conditioned space, piping from a water heater to a distribution manifold, piping under a slab floor, buried in piping or hot and cold piping on recirculation systems other than demand systems.

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403.6 (M) Mechanical ventilation outdoor intakes and exhaust vents will have automatic or gravity dampers that close when the system is not in operation. The vent fan efficiency will meet the efficiency requirements in Table R403.6.1 except for ECM (Electronically Commutated Motors – high efficiency) motors. Nonducted HVAC system fans will be considered to have an efficiency of 1.0 (compliant) unless designated otherwise by the manufacture (405.2(1) Standard Reference design).

Table R403.6.1 Mechanical Ventilation System Fan Efficacy

Fan Location	CFM flow rate	Min CFM / Watt	Air Flow rate Max CFM
ERV or HRV	Any	1.2 cfm/watt	Any
Range hoods	Any	2.8 cfm/watt	Any
In-line fan	Any	2.8 cfm/watt	Any
Bathroom, Utility room	10	1.4 cfm/watt	<90
Bathroom, Utility room	90	2.8 cfm/watt	Any

- 403.7** (M) Manual J and S calculations are required for HVAC system sizing
- 403.10.1** (M) Electric power to pool and spa heaters will be controlled by a ready accessible on/off switch within 3 feet of the heater.
- 403.10.2** (M) Timer switches shall be installed on pool and spa heaters and pump motors.
- 403.10.3** (M) Outdoor heated pools and permanently installed outdoor spas (hard wired into the electrical system and has a water supply) will have a vapor-retardant cover provided except where 75% of the energy for heating is from a heat pump or onsite energy production.
- 403.10.3.11** (M) Electrically powered portable spas are regulated by APSP 15
- 404.1** (M) Lighting Requirement 90% of lamps are high efficacy lamps
- 404.1.1** (M) Fuel gas lamp shall not have continuous burning pilot lights
- 405.1** Simulated Energy Reports shall include heating, cooling, mechanical ventilation, and service water heating values
- 405.4.2** Upon completion of the building, a compliance report based on the as-built conditions will be submitted to the code official before a certificate of occupancy is issued. A batch sampling of attached multiple-family units is allowed.

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- 405.4.2** **The Energy Reference Index (ERI) will be calculated in accordance of RESNET / ICC 301 and use the following ventilation rate:
CFM = (.01 x total square footage of house) + (7.5 x number of bedrooms = 1).
Energy used to recharge or refuel a vehicle used for transportation on roads will not be included in the ERI rated design**
- 406.4** **ERI based Compliance score for zone 3 after September 1st 2019 is 63**

Existing Buildings

- 501.1.1.1** **Existing Buildings that have Additions, Alterations, or Repairs will have all new work comply with Section 502, R502, and R504. Unaltered portions of existing buildings are not required to comply with the energy code**
- 501.1.5** **New and replacement materials will comply with New Construction requirements**
- 502** **Additions – New HVAC equipment must comply with R403. Extension of new ducts on an existing system is limited to 40 feet**
- 503** **Alterations – New construction will comply with new construction requirements and the altered building is not less energy efficient than the existing building**
- 504** **Repairs – work that covers repairs of damage and damaged components are not considered alterations and generally exempt from the energy code.**
- 505** **Change of Occupancy or Use of the property that increases the energy use of the building must comply with the energy code. Converting one portion of a building to another use will comply with the energy code.**

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Component	Air Barrier Criteria	Insulation Criteria
General requirements	A continuous air barrier shall be installed in the building envelope. The exterior thermal envelope contains a continuous air barrier. Breaks or joints in the air barrier shall be sealed	Air-permeable insulation shall not be used as a sealing method
Ceiling/attic	The air barrier in any drop ceiling/soffit shall be aligned with the insulation and any gaps in the air barrier shall be sealed. Access opening, drop down stairways, or knee wall doors to unconditioned attic spaces shall be sealed	The insulation in any dropped ceiling/soffit shall be aligned with the air barrier.
Walls	The junction of the foundation and sill plate shall be sealed. The junction of the top plate and the top of the exterior wall shall be sealed. Knee walls shall be sealed	Cavities within corners and headers of frame walls shall be insulated by completely filling the cavity with a material having a thermal resistance of <u>R-3 per inch</u> minimum. Exterior thermal envelope insulation for framed walls shall be installed in substantial contact and continuous alignment with the air barrier
Windows, skylights, and doors	The space between window/door jambs and framing and skylights and framing shall be sealed.	
Rim Joist	Rim joist shall include the air barrier	Rim Joist shall be insulated
Floors (including above garage and cantilevered floors)	The air barrier shall be at any exposed edge of insulation	Floor framing cavity insulation shall be installed to maintain permanent contact with the underside of subflooring, or floor framing cavity insulation shall be permitted to be in contact with the top side of the sheathing or continuous insulation on the underside of floor framing and extends from the bottom to the top of all perimeter floor framing members.
Crawl space walls	Exposed earth in unvented crawl spaces shall be covered with a Class 1 vapor retarder with overlapping joints taped	Where provided instead of floor insulation, insulation shall be permanently attached to the crawl space walls.

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Component	Air Barrier Criteria	Insulation Criteria
Shaft, penetrations	Duct shafts, utility penetrations, and flue shafts opening to exterior or unconditioned space shall be sealed	
Narrow Cavities		Batts in narrow cavities shall be cut to fit, or narrow cavities shall be filled by insulation that on installation readily conforms to the available cavity space
Garage separations	Air sealing shall be provided between the garage and conditioned spaces	
Recessed Lighting	Recessed light fixtures installed in the building thermal envelope shall be sealed to the finished surface .	Recessed light fixtures installed in the building thermal envelope shall be airtight and IC rated.
Plumbing and wiring		Batt insulation shall be cut neatly to fit around wiring and plumbing in exterior walls or insulation that on installation readily conforms to available space shall extend behind piping and wiring
Shower/tub on exterior wall	The air barrier installed at exterior walls adjacent to showers and tubs shall separate the wall from the showers and tubs.	Exterior walls adjacent to showers and tubs shall be insulated
Electrical/phone box on exterior walls	The air barrier shall be installed behind the electrical or communication boxes or air-sealed boxes shall be sealed	
HVAC register boots	HVAC register boots that penetrate building thermal envelope shall be sealed to the subfloor, wall covering, or ceiling by the boot	
Concealed sprinklers	When required to be sealed, concealed fire sprinkler shall be sealed in a manner that is recommended by the manufacturer. Caulking or other adhesive sealants shall not be used to fill voids between fire sprinkler cover plates and walls or ceilings	