

**MARSHALL FIRE RESIDENTIAL REBUILD**  
**DESIGN CRITERIA / PRESCRIPTIVE ENERGY CODE**  
**Based on 2018 Codes or 2021 IECC or 2021 IECC Appendix RC**

**Qualified Marshall Fire homes can choose between three Energy Path options:**

**OPTION 1:** Residential 2018 IECC Prescriptive Code

**OPTION 2:** Residential 2021 IECC Energy Code HERS Rating of 50 or Prescriptive Path

**OPTION 3:** Residential 2021 IECC Appendix RC

**Snow Load:** 30 lbs/sf non-reducible  
**Wind speed:** 145 mph for 3 second gust (Based on 700 year recurrence, ASCE 7-10)  
**Wind Exposure:** "C" until proven otherwise for greater restrictions  
**Seismic Zone:** B  
**Frost line depth:** 36" below finished grade (LMC 15.05.050)  
**Weathering:** Severe – Climate Zone 5B  
**Termite:** Slight  
**Decay:** Slight  
**Winter Design Temp:** 1 degree  
**Anticipated Snow:** 6"  
**Ice & Water Shield:** Required on ALL Shingled Roofs – Eaves only  
*Must extend from the lowest edges to a point at least 24" inside the exterior wall line of the building.*  
**Drip Edge:** Required on both eaves and rakes of roof.  
**Air Freezing Index:** <1000  
**Mean Annual Temp:** 47 degrees  
**Elevation:** 5,337 feet above sea level  
**Zero Energy Building:** A zero energy building is a building that produces as much energy as it consumes, resulting in net zero energy consumption over the course of a year.

**Current codes:** 2018 IBC, IRC, IFC, IPC, IFGC, IMC, 2021 IECC, IEBC, IPMC, 1997 Uniform Code for the Abatement of Dangerous Building Code and NEC as adopted by the State of Colorado

**REMEMBER:**

**Sump Pumps:** Can NOT drain into sanitary or storm sewer.  
Daylight into lawn away from foundation.  
Perimeter foundation systems go to sump pit then sump pump and sump pump to lawn.

**Drainage from House:** Slope at least 6" in the 1<sup>st</sup> 10 feet.

**Retaining Walls:** Less than 48" from the bottom of the footing to top the retaining wall with no surcharge does not require a building permit but will require.  
Over 48" from the bottom of the footing to top the retaining wall, or ANY wall with surcharge, requires stamped engineered plans.

**Backflow Preventer:** Required on residential irrigation systems. (See cross connection control manual)

**Hot Water Heaters:** Require expansion tanks for ALL hot water heaters.  
Required to have a drain pan if placed on a wood floor.

**Solar:** Hi Temp 2% average 34 Degrees C; Extreme Minimum -23 Degrees C

## **OPTION 1: Residential 2018 IECC Prescriptive Code**

- **Residential Prescriptive Insulation:**
  - R-49 Ceilings
  - R-21 Walls
  - R-19 Basement, Crawlspace Walls
  - R-38 Floors over unheated areas
  - R-3 Hot water pipes
  - R-8 Air Ducts
  - R-10 Unheated slabs 4 ft down
  - R-15 Heated slab 4 ft down
- **Windows and Glazing U Factors for additions and remodels:**
  - U- .30 on Glazing Windows/Doors
  - U- .50 on Skylights
- **Mechanical:**
  - Programed Thermostat Required
  - 90% Plus Furnaces, 90% Plus Boilers
  - A/C Units-14 SEER
  - Manual J and D will be required
- **Electrical:**
  - Structures shall be built to be Solar Ready
  - Timers on Bathroom Exhaust Residential
  - Recessed luminaires installed in the building thermal envelope shall be sealed to limit air leakage
  - 90% or more of all light fixtures shall contain high-efficiency lamps
  - 1 EV Capable space per dwelling
    - EV capable includes a space in the panel for a circuit, conduit and labeling for future EV Charging use.
- **Air Changes**
  - All new residential shall be tested to verify air leakage rate does not exceed 3 air changes an hour and shall have whole house mechanical ventilation with section M1505.4

## **OPTION 2: Residential 2021 IECC Energy Code**

### **HERS Rating of 50 or use the Prescriptive Path**

- **Residential Prescriptive Insulation:**
  - R-60 Ceilings
  - R-21 Walls
  - R-21 Basement, Crawlspace Walls
  - R-38 Floors over unheated areas
  - R-5 Hot water pipes
  - R-8 Air Ducts
  - R-10 Unheated slabs 4 ft. down
  - R-15 Heated slab 4 ft. down and R-5 under slab
- **Windows and Glazing U Factors for additions and remodels:**
  - U- .30 on Glazing Windows/Doors
  - U- .50 on Skylights
- **Residential Mechanical for additions and remodels and replacement:**
  - Programed Thermostat Required
  - 96% Plus Furnaces, 90% Plus Boilers, 92% plus on demand water heaters on all new and replaced equipment.
  - Manual J and D will be required
- **Electrical:**
  - 2 Electric vehicle charging spaces 1 EV ready, 1 EV capable for new residential buildings and additions greater than 50%.
    - EV Ready Space- Minimum of 40 AMP 240- volt circuit that terminates at receptacle, plug, junction box next to parking space
    - EV Capable Space- Supplied with conduit sized to handle the parking space
    - Existing Residential Homes Comply with Chapter 5 of the 2021 IECC
    - Additions and New Builds: Shall meet the Prescriptive Insulation Standards, Additional EV charging spaces on additions greater than 50%
  - New residential shall be structures shall be solar ready
  - New residential homes shall have a dedicated circuit breaker for a branch circuit for future electric appliance replacement at all gas appliances within 6 feet of appliance.

**Table R401.3**  
**Mandatory requirements for residential buildings – 2021 IECC/Appendix RC**

| <b>Title</b>                                                 | <b>IECC Section</b>                                                   |
|--------------------------------------------------------------|-----------------------------------------------------------------------|
| Vapor retarder                                               | R402.1.1                                                              |
| Eave baffle                                                  | R402.2.3                                                              |
| Access hatches and doors                                     | R402.2.4.1                                                            |
|                                                              |                                                                       |
| Maximum fenestration U-factor and SHGC                       | <b>.30</b> Doors and windows, <b>.50</b> Skylights                    |
| Mechanical Controls                                          | R403.1                                                                |
|                                                              |                                                                       |
| Ducts                                                        | <b>R-8 Min</b>                                                        |
| Mechanical system piping insulation                          | <b>R-5 Min</b>                                                        |
| Heated water circulation and temperature maintenance systems | R403.5.1                                                              |
| Drain Water heat recovery units                              | R403.5.3                                                              |
| Mechanical ventilation                                       | R403.6 including E403.6.1                                             |
| Equipment sizing and efficiency rating                       | <b>96% Furnaces, 90% Boilers, 92% on demand water heaters. R403.7</b> |
| Systems serving multiple dwelling units                      | R403.8                                                                |
| Snow melt and ice systems                                    | R403.9                                                                |
| Energy consumption of pools and spas                         | R403.10                                                               |
| Portable spas                                                | R403.11                                                               |
|                                                              |                                                                       |
| Residential pools and permanent residential spas             | R403.12                                                               |
| Lighting equipment                                           | R404.1                                                                |
| Interior lighting controls                                   | R404.2                                                                |

### **OPTION 3: Residential 2021 IECC – Appendix RC**

## **New Residential Building shall be Zero Energy per Appendix RC**

- **Electrical:**
  - New Residential and New Accessory Residential Buildings: Shall be Zero Energy and can use high efficient gas appliances, Energy Rating Index of 47 Max not including onsite power production (Appendix RC of 2021 IECC) 2 Electric vehicle charging spaces 1 EV ready, 1 EV capable for new residential buildings and additions greater than 50%.
  - EV Ready Space- Minimum of 40 AMP 240- volt circuit that terminates at receptacle, plug, junction box next to parking space
  - EV Capable Space- Supplied with conduit sized to handle the parking space
  - New construction shall be wired for all electric capabilities. Circuits shall be provided for all appliances such as furnace and range regardless of fuel source.
- **2021 IECC Appendix RC**
  - All New homes must have an ERI (Energy Rating Index) of 47 before OPP (Onsite Power Production)
  - New Homes will be required to have a Final ERI of 0 after OPP is installed
  - New Homes will need to be designed, inspected and signed off that home meets ERI of 0 by a licensed RESNET rating consultant
  - To find a RESNET rater and designer <https://www.resnet.us/raters/>