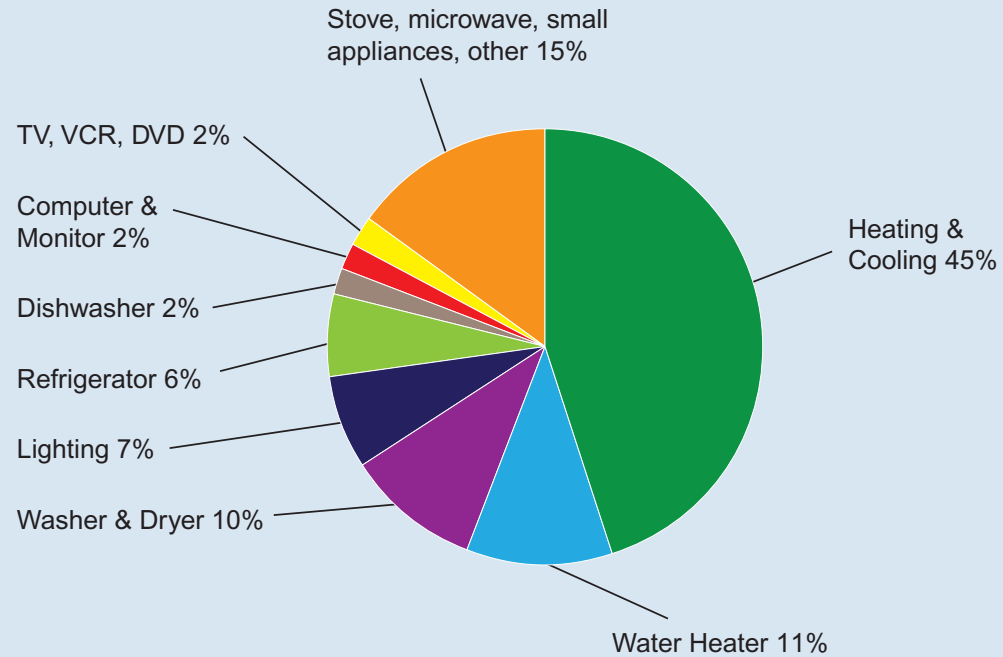


## Save money with energy efficient equipment, appliances and lighting

Heating and cooling a home accounts for the biggest portion of the typical utility bill. Energy efficient heating and cooling equipment uses less energy to operate and can be more quiet, reduce indoor humidity, and improve the overall comfort of the home. Typically, energy efficient equipment is also more durable and requires less maintenance than standard models.



You can save even more on your monthly utility bill with energy efficient water heaters and ENERGY STAR qualified products such as lighting fixtures, compact fluorescent bulbs or LEDs, ventilation fans and appliances, (such as refrigerators, dishwashers and washing machines). For example, refrigerators may have the same capacity and features, but you could save 10-50 percent on monthly operating costs by purchasing an ENERGY STAR model.

### Compare your costs and savings

To compare the operating costs for heating and air conditioning systems, water heating and lighting, use the Home Energy Suite Tool on [www.nppd.com](http://www.nppd.com). Select "Save Energy For Your Home," click "Home Energy Suite" then choose the tool and input your equipment specifications.

To perform a complete home analysis for yourself choose the "Home Energy Calculator" to pinpoint possible energy savings.

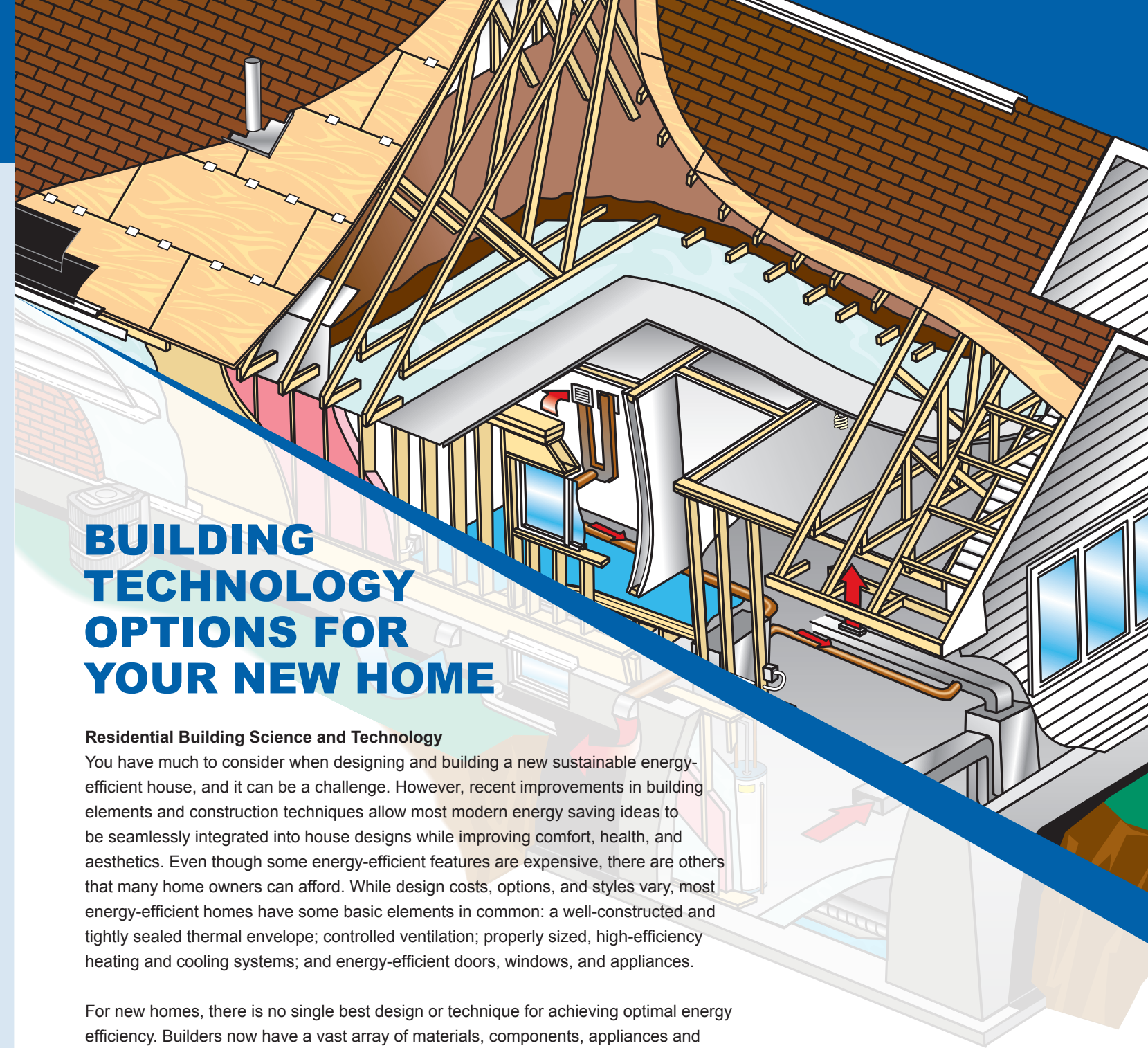
### Why NPPD supports energy conservation

Energy efficient home construction reduces peak demand for electricity, as well as year-round electricity use. This efficiency delays the need for NPPD to build more power plants, keeping rates low for NPPD customers.

An NPPD Energy Efficiency Consultant can assist you or your builder with identifying what approach will meet your needs. This service is available by calling 1-877-ASK-NPPD (1-877-275-6773).



23E16D60



## BUILDING TECHNOLOGY OPTIONS FOR YOUR NEW HOME

### Residential Building Science and Technology

You have much to consider when designing and building a new sustainable energy-efficient house, and it can be a challenge. However, recent improvements in building elements and construction techniques allow most modern energy saving ideas to be seamlessly integrated into house designs while improving comfort, health, and aesthetics. Even though some energy-efficient features are expensive, there are others that many home owners can afford. While design costs, options, and styles vary, most energy-efficient homes have some basic elements in common: a well-constructed and tightly sealed thermal envelope; controlled ventilation; properly sized, high-efficiency heating and cooling systems; and energy-efficient doors, windows, and appliances.

For new homes, there is no single best design or technique for achieving optimal energy efficiency. Builders now have a vast array of materials, components, appliances and techniques. Quality work and good materials have always been hallmarks of a well-built home but an understanding of how a house operates as a system is essential in building an energy efficient home. Knowing how to properly integrate all of the building components and understanding that they all interact is necessary in order to produce a high performance home.

Build an ENERGY STAR Qualified Home for more comfort and savings. An ENERGY STAR home is built to be more efficient than the current International Energy Conservation Code (IECC) and is backed by the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Energy (DOE). To qualify, the home must be evaluated by a nationally-accredited Home Energy Rating Systems rater. For more information on ENERGY STAR homes please view: [www.energystar.gov](http://www.energystar.gov), and to find Raters view <http://www.neo.ne.gov/hers/HERraters.pdf>



Nebraska Public Power District  
Always there when you need us



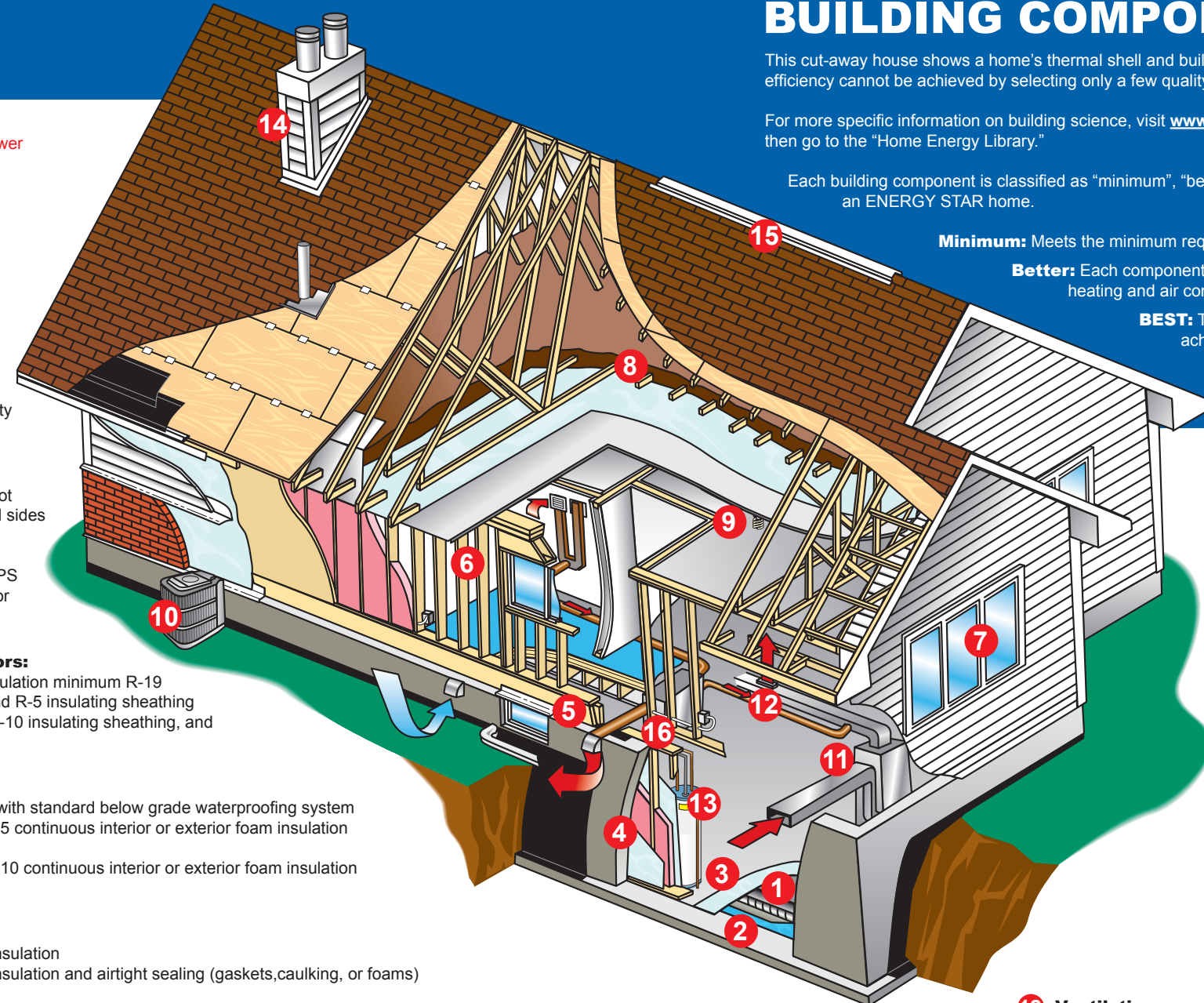


# BUILDING COMPONENTS CHECKLIST

This cut-away house shows a home's thermal shell and building components - the "Systems Approach" to building a new home. Optimum efficiency cannot be achieved by selecting only a few quality components. The overall plan must be considered.

For more specific information on building science, visit [www.nppd.com](http://www.nppd.com), select "Saving Energy – For Your Home", select "Home Energy Suite", then go to the "Home Energy Library."

Each building component is classified as "minimum", "better", and "best". The "better" and "best" construction indicated may qualify towards an ENERGY STAR home.



## Air Tight Testing:

- Minimum:** IECC 2009 Code compliance - Air Barrier Check List or Blower Door Testing
- Better:** Blower door testing
- BEST:** Certified Home Energy Rating following 3.0 Energy Star criteria or higher.

## 1 Basement Floor:

- Minimum:** 4-inch concrete floor
- Better:** 4-inch concrete floor with drain tile and sump pit, min 6-mil poly with taped seams
- BEST:** 4-inch concrete floor, exterior / interior drain tile sealed radon mitigation sump pit system, 4-6 inches of aggregate, min R-10 XPS (Under-Slab) insulation on all edges and beneath entire floor area, 6-mil high-density poly with taped seams

## 2 Slab on grade including walkout basements:

- Minimum:** 4-inch concrete floor, R-10 insulation from slab edge two foot vertical or insulate slab edge and two feet horizontal - on all sides
- Better:** 4-inch concrete floor, R-10 insulation on all slab edges and beneath entire floor area, min. 6-mil poly with taped seams
- BEST:** 4-inch concrete floor, 4-6 inches of aggregate, min. R-10 XPS (Under-Slab) insulation on all edges and beneath entire floor area, 6-mil high-density poly with taped seams

## 3 Floors over unconditioned space including cantilevered floors:

- Minimum:** R-30 cavity insulation with subfloor contact or full cavity insulation minimum R-19
- Better:** R-30 cavity blown insulation with contact on all six sides and R-5 insulating sheathing
- BEST:** R-30 cavity blown insulation with contact on all six sides, R-10 insulating sheathing, and airtight sealing

## 4 Basement Concrete Walls:

- Minimum:** 8-inch concrete walls with R-10 continuous or R-13 cavity with standard below grade waterproofing system
- Better:** 8-inch concrete walls with R-13 insulation and minimum R-5 continuous interior or exterior foam insulation with water proofing membrane
- BEST:** 8-inch concrete walls with R-13 insulation and minimum R-10 continuous interior or exterior foam insulation with hydroscopic water proofing system

## 5 Sill-box – Band Joist Area:

- Minimum:** R-20 cavity insulation or R-13 cavity with R-5 continuous insulation
- Better:** R-20 cavity insulation or R-13 cavity with R-5 continuous insulation and airtight sealing (gaskets, caulking, or foams)
- BEST:** R-20 spray foam

## 6 Stud Walls:

- Minimum:** 2 X 6 Walls with R-20 cavity insulation or 2 X 4 wall with R-13 cavity with R-5 continuous insulation
- Better:** 2 X 6 Walls with R-20 cavity blown insulation and R-5 insulating sheathing
- BEST:** 2 X 6 Walls with R-20 cavity blown insulation and R-10 insulating sheathing, with OVE framing, 24" oc, insulated headers, ladder blocking, 2 stud corners

## 7 Windows & Glass Doors:

- Minimum:** U-Factor .35 or less, with proper flashing and slope drainage
- Better:** U-Factor .30 or less, Low "E" coating, gas filled, with proper flashing, and slope drainage
- BEST:** Triple-pane glass, Low "E" coating, gas filled, with proper flashing, and slope drainage

## 8 Ceiling Areas:

- Minimum:** R-38 blown insulation, with insulation contact - air tight (IC-AT) recessed can lights, sealing all penetrations
- Better:** R-45 blown insulation, with insulation contact - air tight (IC-AT) recessed can lights, use of energy trusses, advanced sealing all penetrations from living space into unconditioned areas
- BEST:** R-60 blown insulation, with insulation contact - air tight (IC-AT) recessed can lights, use of energy trusses, advanced sealing all penetrations from living space into unconditioned areas

## 9 Lighting:

- Minimum:** High efficiency lighting in at least 50% of the permanently installed light fixtures, CFLs or LEDs
- Better:** High efficiency lighting in at least 75% of the permanently installed light fixtures, CFLs or LEDs
- BEST:** High efficiency lighting in at least 75% of the permanently installed light fixtures, CFLs or LEDs plus motion sensing CFLs, LEDs, and advanced sealing of any penetrations in envelope used for lighting

**Minimum:** Meets the minimum requirement of the Nebraska State Energy Code, IECC 2009.

**Better:** Each component is upgraded to higher R-Values, better construction techniques and/or higher heating and air conditioning equipment efficiencies.

**BEST:** The latest building science principles and products are used in all components to achieve the highest possible R-Values with advanced air sealing applied to the thermal enclosure, highest heating and air conditioning equipment efficiencies, moisture control, and mechanical ventilation.

## 10 HVAC:

- Minimum:** Furnace with minimum 13 SEER central air conditioner or 8 HSPF heat pump
  - Better:** 16 SEER, 9 HSPF air source heat pump with variable speed air handler or 90% AFUE sealed combustion fossil furnace with variable speed blower
  - BEST:** Variable capacity geothermal heat pump
- Note: Proper sizing required, Manual J or equivalent in all applications*

## 11 Ductwork:

- Minimum:** All ducts, air handlers, filter boxes, and building cavities used as ducts shall be sealed and if any duct work is outside of conditioned space, insulated R-8 supply, R-6 for all others, and duct leakage test
  - Better:** Combination of mastic and UL181 foil tape. Supply and return duct systems should be within the confines of conditioned space with little or no flex duct
  - BEST:** All duct work, supply and return hard ducted and sealed. Supply and return duct systems should be within the confines of conditioned space with little or no flex duct, air leakage tested, sized correctly, and balanced
- Note: Proper fabrication/sizing according to Manual D or equivalent in all applications*

## 12 Ventilation:

- Minimum:** Bath fans that meet ASHRAE 62.2
  - Better:** Exhaust or Supply only ventilation low sone (sound) rating and that meet performance criteria of the bathroom's required exhaust
  - BEST:** Source point whole house ventilation with a Heat Recovery Ventilator (HRV) or Energy Recovery Ventilator (ERV)
- Note: All ventilation must meet ASHRAE 62.2*

## 13 Water Heaters:

- Minimum:** Standard storage electric or fossil fuel water heater
- Better:** Heat pump or high efficient fossil fuel sealed combustion water heater
- BEST:** Desuperheater water heater with geothermal heat pump applications

## 14 Fireplaces:

Fireplaces are not recommended but if used consider fireplaces with airtight glass doors and outdoor combustion air or electric fireplaces.

## 15 Roof/Attic Ventilation:

Attic ventilation is required for moisture removal during the winter months and heat removal during the summer months. Proper ventilation sizing requires 1/150th of the square footage of attic area, one-half in high roof and one-half in soffits.

## 16 Electrical & Plumbing:

Electrical, plumbing, and utility penetrations in exterior walls or through the ceiling should be sealed with airtight construction practices. Recessed lighting fixtures that extend into unconditioned areas include airtight enclosures. Electrical outlets and switches on exterior walls and ceiling light fixtures should be airtight.