ESCS inc.
energy saving comfort systems

Builder Tax Credit Compliance Guideline

The purpose of this document is to provide a general outline of the minimum building standards needed to achieve compliance with the government's $2,000 Energy Star Energy Efficient New Home Tax Credit for builders. Please note that there are many variables concerning how a builder achieves compliance and that this list of recommendations is in no way complete nor does it guarantee that a builder will achieve compliance. REMRate software calculations will provide the final determination as to if a particular building complies with the government's tax credit requirements. **It is also important to remember that a $2,000 tax credit is worth $5,700 to $13,000 in deductions** depending on your tax bracket. That means that if you spend less than $5,700 bringing the home up to Energy Star standards you should actually save money and have a much more desirable home for sale in what is sometimes a tight market. You will also experience fewer comfort issue call-backs, and you can market to your customers that your Energy Star home will save them 30% or more on their energy bills, will be more comfortable with fewer drafts and more even temperatures throughout the home, will be more durable, and will have a significantly higher resale value that will increase even further as energy costs increase. As your certified rater, I will provide you with documents that you can show your customers to prove that the home is certified Energy Star. I will also work with your accountant to show them how to claim the tax credits. Here are some guidelines:

1) The seams and under-floor cavities where the rim joist, joists and sill plate come together need to be sealed with caulk or foam and insulated to at least R-15. A popular technique is to apply a skim coat of 2-part foam that is topped by fiberglass batt or using foam only to the appropriate thickness (3" for foam). This technique also makes it easy to seal utility openings in the rim plate.

2) It is best to insulate the entire foundation wall because the un-insulated portion of the basement wall above grade is a huge energy sink. Concrete and block is thermally transparent at an R-1 at best. ICF systems are a great way to go because of the speed they can be installed and the result of having a super reinforced basement wall with an R-value of around 32. ICF concrete takes much longer to cure than normal concrete and so is 50% or more stronger than regular concrete. Most codes require that the interior inside of the ICF be covered with

wall board but it is a relatively easy job and the worry over moisture getting into the finished basement wall is removed. If hollow block is used, injecting an insulating foam into the block cavities is a good option. If those are not practical options for your company, cover as much foundation wall as possible with a minimum of 2-inch R-10 blue or pink EPS board. Stay away from the beaded white stuff that falls apart. If EPS is applied above grade as recommended, a mesh and mortar stucco covering is needed. I understand that this is not an insignificant cost, but completely insulating the foundation wall will yield large energy savings for your customers over the entire life of the home. This extra effort can be exploited in your marketing efforts and will impress most of your customers.

3) The sump pump basin should be sealed because it is always a source of moisture, a building's biggest enemy, and can be a source of things like Radon and mold spoors. There sits the ever-present dehumidifier, always positioned beside the open and constantly wet sump basin, running like mad to draw moisture out of the basin so that it can dump it right back in, an energy- wasting cycle that can repeat forever and accomplish very little. Sealed covers can be obtained from Radon mitigation product suppliers.

4) Install at least a 92% efficient gas furnace and 13 SEER AC. If electric systems are required use a heat pump or geothermal. If the home has been sealed and insulated correctly, **make sure that the HVAC contractor does proper sizing calculations and the correct sized equipment and ducts are installed**. Smaller equipment and shorter duct runs are needed in tight and well insulated homes. Note that this should save the builder money in this area to help offset the extra costs of shell and duct sealing work. In any case, it is better to have the AC unit slightly under-sized. In hot, humid summer conditions, an over-sized AC unit (very common) will cycle too much and as a result, never remove enough humidity from the home. The number one rule in home durability is "moisture kills houses". Therefore, is important to make sure the HVAC contractor sizes the units carefully and correctly. Humidifiers are not recommended. Humidity levels should be between 30% and 50% in the winter and 40% to 60% in the summer.

5) I also highly recommend the use of a programmable thermostat and a short amount of time educating the customer on how to use it. In the winter, it is recommended that the temperature be set at 77 during the day when the home is occupied and 63 at night and times when no one is home. In the summer, the recommended setting is 77 when occupied and 82 at night and when unoccupied.

6) Also remember that **introducing fresh air into a tight home is very important**. Fresh air must be introduced into the home according to ASHREA 62.2 specifications. A "Heat Recovery Ventilator" is recommended. Estimated cost for the unit is $600 and so is not terribly expensive if installed along with the rest of the conditioning equipment and insures that your customers will enjoy a reliable energy efficient source of filtered fresh air year around. The next best choice

would be a dampered fresh air intake into the return side of the air handler and an upgraded high-efficiency but quiet bath fan that incorporates a timer, motion detector, or both so that it will run the required amount of time per day when the house is closed up. Panasonic's Whisper Green units are popular. And of course, the fans should never vent into the attic. Use solid 4" or 6" duct (NOT flex) and always vent to the outside using the shortest distance possible. The ducts should also be insulated or completely covered in attic insulation to avoid condensation forming inside the ducts in winter. If the bath fan ducts run to a soffit exhaust outlet, seal the soffit at least three feet to either side of the outlet so that the warm, moist air does is not sucked into the attic. I do not recommend installing a fan only in a well sealed house without allowing for some kind of controlled fresh air entry because the air being replaced by the fan exhausted air is quite possibly coming from the attic, sump basin, back-drafting combustion equipment exhaust ducts, and other undesirable sources. See Energy Star Indoor Air Package doc and verification check list at http://www.energystar.gov/index.cfm?c=bldrs_lenders_raters.nh_iap for complete indoor air quality information.

7) Choose a powered vent gas water heater with an EF of at least .62 or higher or an efficient tankless electric model.

8) ***Please Note: Fiberglass and similar insulation products do NOT stop air. They simply filter the air flowing through it!*** *In this industry we sometimes refer to it as "filterglass".* Therefore, the building shell should be sealed tight using caulk or foam with extra care taken to seal gaps around utility entrances and cracks, gaps and openings leading from one floor to the next around plumbing, electrical outlets, duct registers, etc. Also take care to seal leaks from the top floor ceiling and knee walls into the attic. Common problems include ceiling can lights, gaps along the top wall plate, plumbing chases, furnace stacks, cavities around window and door frames, and any other penetrations into walls and the attic. Weather-strip and insulate the attic hatch and knee wall mini doors to at least R-40. Use ENERGY STAR Qualified Homes Thermal Bypass Inspection Checklist (http://www.energystar.gov/ia/partners/bldrs_lenders_raters/downloads/ThrmByChklst_112006.pdf) as a guide as what needs to be done. Some codes require fire-rated caulk or foam in some or all areas.

9) After making sure the exterior walls and ceiling to attic areas have been sealed tight, Install a minimum of R-15 insulation in the walls (R-19 is preferred) and R-40 in the attic.

10) Cold or hot rooms above garages are very common customer complaints. Make sure the areas under any rooms over unconditioned spaces like a garage, cantilevers, etc., are sealed so that attic or other unconditioned air will not circulate under the floor and that space is insulated to at least R-15 and preferably R-19. There should be <u>no space or gaps</u> between insulation and floor deck. It is best to dense-pack cellulose into these areas.

11) Make sure the area around tub and shower inserts are sealed and insulated, especially right behind the tub that is against an exterior wall. It is common to have large air leaks and thermal bypasses in these areas which are also right where your customers spend a lot of time wet and naked.

12) Seal wall and ceiling cavities behind and above pocket doors. I hardly ever find one that doesn't leak a lot of attic and exterior wall air.

13) Use Lo-E windows, preferably with argon or similar, with a U-value of .36 or less and an SHGC of .45 or less.

14) Use exterior doors that have an R value of 2.5 or greater and take care to make sure they are installed and seal correctly. **Do not allow subs to stuff fiberglass in the cavities around doors and windows!** Insist on foam for gaps ¼" or bigger and caulk in cracks ¼" or less.

15) Leaky air ducts...a very common problem that leads to large system inefficiencies and comfort complaints. It is very difficult if not impossible to get metal to metal duct components to air seal. **Include the following in your contract with your HVAC sub:** Supply ducts need to be sealed at all junctions with the plenum with fire-rated caulk and downstream junctions with aluminum tape or duct mastic. Solid ducts should also be used with returns because wall cavities always leak to unconditioned space like attics and walls. Pans installed on joists are notorious leakers and are famous for sucking the basement negative and increasing air and moisture infiltration into the basement. This condition also increases stack effect which happens when unconditioned air is drawn into the de-pressurized basement (which might also come in through combustion equipment exhaust flews or an unsealed sump pump basin and footer drains along with lovely things like Radon and mold spoors), works its way up through the house that is positively pressurized in the top part of the house which in turn forces conditioned air up into the attic though openings around un-sealed can lights and attic hatches, carrying a lot of conditioned air away with it. If the basement is sucked negative enough, it can cause the furnace and hot water equipment fumes to back-draft into the house, a dangerous situation that is not all that uncommon. If pans and wall cavities are used, the pans need to be caulked before they are placed against the joists and floor decks and other leaks need to be sealed with caulk, aluminum tape or mastic. Wall cavities being used for returns need to be caulked as much as possible, especially above the register, in an attempt to keep attic and indirect unconditioned air from being sucked back through the air handler.

16) Use as many CFL and other low-wattage fluorescent light fixtures as possible. Spend a minimum amount of time educating your customers about the effect of owner behavior on their energy use. Things like tuning off lights when leaving a room and turning down the thermostat at night and times when no one is home.

17) If there are crawl spaces, it is usually best to seal, insulate and bring the area into the conditioned space and keep the pressure positive in that space. If the duct system and house are sealed correctly and space conditioning equipment is installed correctly, supply air from the air handler should be introduced into the basement and crawl spaces to keep the lower part of the house pressurized which helps reduce air and moisture infiltration into the basement and crawl spaces. Because uninformed home owners tend to close these vents, I would recommend using registers in these areas that cannot be closed.

18) Always duct the exhaust fan above the stove to the outdoors. Do not try to use recirculation fans. As mentioned above, moisture kills homes and the stove top can be a major source of moisture and pollutants.

Feel free to contact me with any questions that you may have. I look forward to working with you and your company.

Thank you,

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