

FLORIDA SOLAR



ENERGY CENTER<sup>®</sup>

# Standards for Clean Air Florida Homes

## Authors

Subrato Chandra

## Original Publication

Chandra, Subrato, "Standards for Clean Air Florida Homes", March 2004.

## Publication Number

FSEC-GP-254-04

## Copyright

Copyright © Florida Solar Energy Center/University of Central Florida  
1679 Clearlake Road, Cocoa, Florida 32922, USA  
(321) 638-1000  
All rights reserved.

## Disclaimer

The Florida Solar Energy Center/University of Central Florida nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the Florida Solar Energy Center/University of Central Florida or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the Florida Solar Energy Center/University of Central Florida or any agency thereof.

A Research Institute of the University of Central Florida  
1679 Clearlake Road, Cocoa, FL 32922-5703 • Phone: 321-638-1000 • Fax: 321-638-1010  
[www.fsec.ucf.edu](http://www.fsec.ucf.edu)

## **Standards for Clean Air Florida Homes®**

### **Florida Solar Energy Center of the University of Central Florida (FSEC/UCF)**

#### **SCOPE and DISCLAIMER**

These standards should result in a house with excellent indoor air quality where allergy or asthma sufferers can breathe easier. However, the indoor air quality is also highly dependent on occupant lifestyle and household management practices e.g. changing air filters and maintaining the heating, cooling, dehumidifying and ventilating equipment per manufacturer instructions, maintaining sanitary conditions inside the house and related factors. Therefore FSEC/UCF gives any assurances, or will be held liable, regarding the actual indoor air quality that will result. Likewise, no assurance can be given that a person will feel better living in such a house.

#### **THE STANDARDS**

These standards are designed for **new, slab on grade** homes built in Florida. Changes to the standards may be necessary for other house construction types.

These standards are not meant to be exclusionary. The home builder may submit alternative materials or design details which will result in equivalent performance. These standards complement all building codes and do not supersede any codes.

#### **Flood and Rain control**

- Finished floor level at least 12" above the 100 yr. flood level.
- Bottom of slab at least 8" above the top of backfilled dirt which is graded for proper drainage.
- Garage floor and driveway properly sloped to drain out. Garage floor must be at least 3 inches lower than the living area floor.
- Roof pitch at least 3 in 12.
- All roof valleys and penetrations properly flashed and all flashing details shown on drawings.
- All windows must be carefully installed and sealed to avoid rain and moisture intrusion. Submit details to FSEC for approval.
- Walls must be designed to dry to the inside. Complete wall section drawings including details must be submitted which clearly show intended air barriers, vapor retarders, and thermal barriers.

#### **Central Vacuum Cleaner**

- Must have central vacuum cleaner installed. Preferably the kind with electrical power to the brush/vacuum wand. The central vac must be ducted to the outside. The unit should be in an unconditioned space.

#### **Floor Plan**

- Must have space for HVAC and dehumidification equipment inside the conditioned space. Recommended dimension is 4 ft. x 8 ft. x 8 ft. high for each air handler. Insulate all walls around airhandler closet for noise control. Air handler not allowed in the garage.
- Laundry rooms if inside conditioned spaces must have an operable window to the exterior or alternate means to provide direct make-up air to the dryer.
- Air handlers are not allowed in attics (unless unvented attic with roof line insulation).
- Provide a well defined area inside the garage near the entry door to the house where shoes, umbrellas and outerwear can be conveniently removed and hung. This will reduce tracking of dirt and pollen inside the house.
- Should be clearly defined separation and barrier from garage to house.
- Plan for all the exhaust and intake vents so that they are not in each others way:
  - The fresh air intake(s) should not be over driveways or locations where exhaust fumes from cars or dirt or pollen can easily enter. The intake must be at least 10 ft. away from any other exhaust points and at least 6 ft. above ground level.
  - The dryer vent must exhaust to outside through the wall (no vertical dryer vents through the roof). Also the vent must be at least 10 ft. away from any air conditioning condensers or the inlet for the fresh air supply to the house.
  - The Bathroom and kitchen vents must exhaust to outside
  - The central vacuum should exhaust to outside, not in the garage.
- All bathrooms must have operable windows.
- The inside door to the garage must have spring loaded hinges or equivalent so that it cannot stay in the open position for extended periods of time.

### **Central Dehumidification / Ventilation System**

- Must have central dehumidification system with separate RH controller so that RH can be controlled year round to stay below 55% independent of temperature
- Must have central ventilation system providing **positive** or neutral (rather than negative) pressure ventilation distributing ventilation air to at least 3 different points in the house 24 hrs/day. The ventilation rate should be at least 30 cfm for the master bedroom and an additional 15 cfm for each additional bedroom. **Must have visible indication** of system status and failure.
- The air intake vent must have a damper which can be closed during episodes of bad outdoor air (e.g. road work, forest fires etc.)

### **Air Filtration**

- The central house filter must have an ASHRAE dust spot efficiency of 35% or better.
- The ventilation air filter must have an ASHRAE dust spot efficiency of 35% or better.
- All filters must be certified by the manufacturer to be usable for low pressure residential air handling systems.
- All filter housings must be airtight so that there is **no air bypass** around the filter.
- Air filtration equipment must not produce any ozone.

### **Insulation and Air Sealing**

#### *General*

- Blown dry insulation which may enter the house by air movement is NOT allowed.

- Sill sealant between bottom plates and foundation.
- Tub drains and other floor drain areas sealed to prevent radon and other soil gas entry.
- Careful detailing at wall corners, band joists, and garage areas to assure air tightness and uniform insulation coverage.
- Air and water seal between wall and door/window assembly.
- Vapor retarders, if applied, should be on the exterior side of the wall/ceiling assembly.

#### *Vented Attics*

- Minimum of R-30 insulation on all surfaces that is mated to the attic.
- Eave detailed to allow insulation over top plate and good ventilation from soffit vents.
- All top plate penetrations sealed. Care should be taken to preclude any air movement to or from the attic space and the conditioned space. This would include non-uniform framing details, varying ceiling heights, electrical boxes, etc..
- All dropped ceiling areas and tray ceilings to be uniformly insulated. If insulation follows the bottom chord of the truss and not the top surface of the ceiling, then a mechanical support system must be used to hold the insulation in place. (Paper is not a support system.)
- All kneewall areas to have insulation tightly held in place
- Batted insulation in ceiling areas must be detailed carefully to prevent air convection around insulation.

#### *Unvented Attics*

- Minimum of R-19 insulation on all surfaces between the “conditioned attic” space and the exterior.
- The thermal and air barriers must be continuous as it transitions from the wall assembly to the attic assembly

### **Fireplaces and Combustion appliances**

- Any fireplace used must be direct vent, sealed combustion type preferably on an exterior wall. No wood burning fireplace.
- All combustion appliances should be sealed combustion devices or located in spaces with provisions for outside air so that the spaces cannot go to severe negative pressures (i.e. <- 2.5 pa).
- If the house has any combustion appliances install a continuous reading line powered (with battery backup) CO sensor.

### **HVAC Ductwork and Air Handler:**

- Must meet current state duct sealing code requirements.
- Air tight supply and return ducts. Duct leakage (including air handler) to outside not to exceed 30cfm25 per 1000 sq. ft. of house.
- All bedrooms to have individual jump ducts or return ducts or transfer grills so that positive

pressures in bedrooms do not exceed +2.5 Pa when interior doors are closed. This criteria is achieved by using at least 50 square inches of free return or transfer grill area per 100 cfm of supply air. The free area at a door undercut can be counted in the return area calculations.

- The airhandler closet when closed must maintain a slight positive or neutral pressure with respect to the attic and neutral with respect to rest of the house.
- All return air stream surfaces must be metal or other reasonably tough surface which is easy to clean by duct cleaning methods.
- All fiberglass duct work and register boots must be made of coated or lined fiberglass duct board. Also seal fiberglass cut lines on the inside to prevent loose fiberglass from entering the air stream.
- Duct collar to register boots and all duct joints and seams sealed with mesh and mastic. No tapes or ties as primary air seal.
- Register boot to ceiling drywall sealed with mastic or caulked with acrylic water based caulk.
- Building cavities may not be used as part of the forced air distribution system for heating, cooling or ventilation.
- Condensate drain trap with adequate design for cleanout and verified trap performance.
- Air handler to have smooth insulation on surfaces contacting the air stream.
- The condensate drain pan must have a good slope to assure good drainage. It should be installed such that air in the drainage line is at a positive pressure relative to the ambient.
- Size the air conditioner correctly per industry accepted manual J procedure. Calculations must be provided upon request.
- Air handler return air flow at design conditions must meet manufacturer specified air flow over the cooling coil.
- Thermostat and other HVAC system controls must **NOT** operate the blower for a few minutes after the compressor shuts off in the cooling mode. OK to do it in the heating mode.

### **Electrical**

- All recessed can lights must be IC rated **and** airtight (unless unvented attic with roofline insulation)
- All bathrooms must have exhausts vented to outside with 30 or 60 min crank timers. The timers should work just the exhaust fan. The lights should be separately controlled.
- Kitchen must have direct vent to outside with the hood capturing fumes from all burners. For kitchen exhausts with a exhaust flow >200 cfm, provide fresh make up air.
- Install a line powered (not battery powered) CO sensor with a continuous readout.

### **Minimize VOC**

- Use low VOC caulks and adhesives and sealers
- Use Zero VOC interior paint
- All wood cabinets preferred, particle board ok if coated on all sides.
- solid pine or plywood for flooring on second floor (rather than OSB) and stairs.
- No OSB to be used for built in areas
- Minimize carpets, all carpets must be 100% Nylon and have CRI green label, low pile preferred

- Carpet pad **not** to be "rebond". Use synthetic fibre or virgin urethane with no glues.
- Hardwood or other wood type flooring to be carefully screened to have low VOC emissions (including low VOC during installation)
- No vinyl wall paper any where on an exterior wall surface.

### **Landscaping**

- Avoid siting the house on the down wind side of large empty fields of grasses, weeds or near large stands of oak trees.
- Minimize pollen producing trees near the house. Avoid Oaks, Cypress, Cedar and Elm trees.
- Avoid large amounts of flowering and pollinating plants inside or outside the house.

### **Home Owners Manual**

- In addition to manuals provided by equipment manufacturers, the home builder must provide a comprehensive home owners manual listing all recommended cleaning and maintenance required for a long lasting home with excellent indoor air quality.

For more information regarding the technical aspects of the standard please contact:

Subrato Chandra, Ph.D.  
Florida Solar Energy Center  
1679 Clearlake Rd  
Cocoa, Fl 32922

Phone: 321-638-1412      Fax:321-638-1439  
Email: [subrato@pegasus.cc.ucf.edu](mailto:subrato@pegasus.cc.ucf.edu)

Filename=cleanair3-04.wpd