



AMERICAN LUNG ASSOCIATION



HEALTH HOUSE[®]

Healthier Home Environments

Benefit Everyone



ALA Health House Mission

- To improve the way homes are built, renovated and maintained in America to be:
 - Healthier
 - More energy efficient
 - More resource efficient
 - More durable

National Media Attention

- **Over 900 Million Impressions**



Building a Health House



Health House Program

- A Health House is NOT
 - An allergy free house
 - Medical advice or alternative
 - Finite Program
- A Health House IS
 - About systems
 - Sets standards
 - Control of indoor environments
 - Choices, choices, choices

Health House Program

- Developed for builders
 - Standards development team included builders, HVAC contractors, building science industry, medical professionals, researchers
- Benefits for builders include:
 - Market differentiation
 - Less call backs (lower costs)
 - Happier clients (more referrals)
 - Reduced risk
- Call to Action
 - Attend regional Health House training
 - Partner with HVAC contractor
 - Develop a business plan to market exemplary product

Program Outline

- **Basic Building Science**
- **Standards Overview**
 - **1 SITE**
 - **2 BUILDING ENVELOPE**
 - **3 FINISHES & FURNISHINGS**
 - **4 MECHANICAL EQUIPMENT**
 - **5 COMMISSIONING**
 - **6 CONTRACTOR REQUIREMENTS**
 - **7 MARKETING**

What makes a home unhealthy?

- **Radioactive waste?**
- **Deadly levels of toxic gases?**
- **Biological contaminants?**
- **Systems that do not function as designed?**
- **Unplanned system interactions?**
- **Unplanned water/moisture movement?**

What makes a home healthy?

- Bulk water control?
- Water vapor control?
- Tight construction?
- Loose construction?
- Ventilation?
- Filtration?
- No carpeting?
- Low VOC products?

What goes into a Health House?

Foundation	Capillary breaks	Water proofing
Framing	House wraps	Thermal integrity
Air barriers	Vapor retarder	Sealed combustion appliances
Filtration	Ventilation	Testing

What do we have as standard?

- Footings
- Foundations
- Framing
- Thermal
- Capillary break
- Water proof with drainage board
- Minimize thermal bridging
- Condensation resistant surfaces including glass

What do we have as standard?

- Air Barriers
- Vapor Retarders
- Sealed Combustion
- Continuous inside and outside the walls
- Continuous on all exterior walls and ceilings
- All combustion appliances are sealed or power vented

What do we have as standard?

- Filtration
- Ventilation
- MERV 8 minimum efficacy
- Minimum continuous with, or without, heat or energy recovery.
- Distributed with low energy, low speed air handler to all habitable rooms

What do we have as standard?

- Low VOC Products
- Site Inspections
- Paints, stains carpet
- 2 independent site inspection, above those required by code during construction.

What do we have as standard?

- Duct Tightness Test
- House Tightness Test
- Less than 5% of flow
- Less than .25 CFM/FT²@50 Pascal's

Pass/Fail Criteria

- If fails must be corrected!

Site Considerations

- Review ambient air quality records, previous uses
- Conduct water or soil sampling as needed depending on the information gathered.
- Avoid sites near landfills, highways, abandoned gas stations and other uses that may pose air quality problems for the home.
- Keep shrubs and bushes a minimum of three and a half feet from the foundation

Foundations

- Provide liquid water protection (prevent water entering the soil near the foundation from above, the side or below, and/or drain water away from the foundation)
- For example, slab-on-grade foundations do not require footing drains but shall have grading and site work that will carry water away from the house

Crawl Spaces

- Include any crawlspaces as part of the conditioned space
 - If crawlspaces must be vented to the outdoors, the floor separating the occupied space from the crawlspace should be constructed like exterior walls with impermeable insulating sheathing
- Use radon resistant construction methods

Capillary Breaks

- Capillary breaks are barriers such as damp proof coatings and films or large-pored materials such as drainage mats or gravel beds (a layer of stone pebbles $>1/2$ inch diameter aggregate).
 - Exterior surface of below-grade walls
 - Beneath slabs
 - Between sills and foundation materials
 - Between footings and the materials they support (e.g., foundation walls or slabs)
- Use radon resistant construction methods

Capillary breaks

What

- Capillary breaks on footings
- Poly under slab

Why

- Does not allow soil moisture or bulk water to wick up through the foundations walls and into the indoor environment.
- Allows additional options for slab floor coverings.
- Eliminates damp walls.

Wall Assemblies

- Design exterior walls to intercept and drain rain water to the outside.
 - This is accomplished using cladding, air gaps and drainage material
- Walls must be designed and constructed to dry to the interior, the exterior, or both, depending on climate conditions. In heating climates materials used in the wall exterior should be 5 times as permeable as the interior. In cooling climates the interior should be twice as permeable as the exterior

Windows

- Install windows and doors to protect moisture sensitive materials from rain water intrusion.
 - Install head flashing over tops of windows and doors.
 - Wrap shingled drainage paper into the rough opening on sides and bottom.
 - Install pan flashing at window bottoms.

House wraps

What

- Continuous drainage plane for exterior bulk water
- Drainage plane for fenestration's

Why

- Water entering walls systems will degrade sheathing, framing and insulation values.
- Water entering walls will promote biological contaminant growth.

Thermal Integrity

What

- Full depth, high density insulation in walls
- High R-value windows

Why

- Energy efficiency. Gives full thermal coverage to walls and ceilings. Minimizes condensation on wall and ceiling systems
- Minimizes window condensation in heating months

Air Barriers

What

- Continuous air stops between conditioned space and unconditioned walls and attic systems

Why

- Eliminates air movement from walls and attics into home environments. Minimizes condensation in heating months in wall and attic systems

Vapor retarder

What

- Continuous, sealed, vapor retarder on all interior wall and attic systems.

Why

- Minimizes moisture movement into wall and attic systems during heating seasons. Minimizes condensation in walls and attic systems during heating seasons.

HVAC

- All combustion appliances (including furnaces, boilers, water heaters and fireplaces) shall be sealed combustion or power vented.
 - Do not use any unvented gas appliances, including fireplaces, ranges, and ovens.
 - Install CO monitor that complies with Canadian Standard CSA 6.19

Sealed combustion appliances

What

- Sealed combustion furnaces and boilers
- Sealed combustion water heaters
- Sealed combustion fireplaces

Why

- Eliminates combustion byproducts from home. More energy efficient. Able to withstand both interior and exterior pressures without spilling gases into home.

Filtration

- Filter efficiencies for recirculated air and fan powered outdoor air shall be:
- Minimum of;
 - MERV 8Preferred:
 - MERV 10 or greater

Filtration

What

- High efficiency filtration required
- Continuous air handler operation

Why

- Removes particulates from the indoor environment
- Continuous, low speed, air handler operation facilitates filtration throughout the home. Energy efficient

Ventilation

- **Continuous, and general ventilation:**
 - **At least 0.1 cfm per 100 square foot of floor area plus at least 15 cfm for the first bedroom and 7.5 cfm for each additional bedroom.**
 - **At least 110 cfm intermittent per kitchen**
 - **Kitchen ranges shall have exhaust hoods vented directly to the outdoors. The fan shall operate quietly, at less than 3 sones.**
 - **Make-up air shall be provided if the exhaust is greater than 200 CFM**
 - **At least 50cfm intermittent or 20 CFM continuous in bathrooms/toilets**
 - **Outdoor air shall be distributed to or exhaust air drawn from; at least three locations including all bedrooms.**

Ventilation

What

- Continuous ventilation, with either heat or energy recovery.
- Measured and balanced flows
- Sized for house volume.

Why

- Supplies fresh outside air with a minimum energy penalty. Supplies fresh air with minimum comfort penalty. Exhausts stale air from kitchens and bathrooms. Filters incoming air.

Garages

- Make the garage fully detached
 - simple and effective OR
- Air seal the garage wall so that when the house is depressurized by 50 pascals to the outside and the garage door is closed, there is no more than 1 pascal pressure drop between the house and garage.
- OR

Garage connections

- Exhaust ventilate the garage for 15 minutes at 250 cfm after the car has been started or turned off, OR
- Keep the house continuously pressurized e.g., using fan-powered filtered outdoor air, OR
- Isolate the garage by creating a continuously-depressurized cavity between the house and garage

HVAC

- Duct Systems in unconditioned space
 - No ductwork, air handlers, or conditioning equipment shall be placed in the attic. Further, no fans shall be installed to exhaust air from the attic to outdoors. Ductwork may be located inside the thermal envelope but above a false ceiling.
 - NOTE: exhaust systems that are part of the conditioned space ventilation system may be placed in the attic as long as they meet the requirements in the mechanical section

Air handling systems

- Seal all duct connections with mastic and mesh
 - Duct leakage within conditioned space shall be less than 10%.
 - Building cavities shall not be used as part of forced air distribution system

Furnishings and Finishes

- Reduce VOC emissions by airing/ventilating the product. Ideally this “preconditioning” of the product
 - e.g., carpets, carpet cushions can be accomplished by the manufacturer at the plant location or storage facility prior to delivery.

Furnishings and Finishes

- Use “zero” or “very low” VOC interior latex *or 100% acrylic* paint products for interior wall/ceiling applications. Select products that meet these standards:
 - Greater than 1000 cycles on ASTM D2486 (scrubbing durability)
 - Greater than 50% stain removal on ASTM D3450 (washability)
 - Greater than 0.95 contrast ration on ASTM D2805 (hiding power)

Ventilate VOC's

- Specific ventilation guidance for paints, varnishes, adhesives, vinyl flooring and carpeting
 - Greater than 2 ACH for a minimum of 3 days
 - Ventilation must be fan powered
 - Ventilation must be used during application, and for two days afterwards
- **Do not use the air handling equipment to ventilate during construction. Seal and protect ductwork and air handling mechanical equipment from contamination during construction activities.**

Furnishings and Finishes

- Isolate and ventilate during and shortly after the installation of materials and products that are strong sources of contaminants and are amenable to ventilation conditioning; that is, materials with high material-phase diffusion rates.
- These materials include:
 - Gypsum board taping
 - Floorings
 - Paints, varnishes, adhesives and wall coverings

Flooring material on slabs

- Concrete must meet the water vapor emission and pH levels specified by flooring product manufacturers.
 - Test to confirm proper conditions before installing flooring products.
 - If a carpet product with any type of vinyl backing is laid over concrete, the slab must be tested to ensure that the moisture content and the alkalinity of the concrete meets the product manufacturer's specifications

Carpeting

- Carpet products can be used if they meet the following criteria:
 - Carpet Rug Institute (CRI) IAQ label
 - No wall-to-wall carpet in bathrooms, kitchens, utility rooms, basements or entryways

CONSTRUCTION HYGIENE, SAFETY & HEALTH

- **There are two reasons to pay attention during construction.**
 - First, the ultimate homeowner is not the only occupant at risk.
 - **Many indoor air contaminant exposures happen to workers during construction**
 - Second, keeping the inside of walls, ceilings, ductwork, appliances and drainage pipes clean during construction makes the house far safer for occupants over the long term.
 - Dust and debris may be a contaminant itself or may provide food and shelter for bacteria, fungi, insects and rodents.

Testing and site inspections

What

- Testing for house tightness
- Testing for house pressures
- Testing ventilation air flows and duct tightness
- Testing series leakage from garage

Why

- Site inspections find problems before they are “built in”!
- Testing assures that the systems work as designed and installed
- Testing identifies issues or problems before they become an issue.

Consumer Education

- www.healthhouse.org website
- National Toll-Free 1-877-521-1491
- National Media Campaigns
- Workshops