

Steps to Healthier Homes

- Start with People
- House as a System
- Keep It:

Dry

Pest-Free

Safe

Maintained

Clean

Ventilated

Contaminant-Free

- Making it Work



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In this module emphasize that cleaning is important. But an essential aspect of Keeping It Clean is that it be cleanable. Many surfaces are tough to clean. And corners and cubbyholes are tough to clean too. You could say that the goal is to keep it clean AND CLEANABLE.

These are steps to reduce household hazards. People are not born knowing that they must brush their teeth to prevent decay, they must learn it. So with household hazards, they must learn how to take care of themselves. Occupants know things about the building and themselves that can be learned nowhere else. Start with the people.

The second step is to keep the household in a certain condition:

- limit moisture related problems,
- limit dust and allergens,
- limit pest borne disease,
- provide local exhaust ventilation and general dilution ventilation to control unavoidable air contaminants,
- provide a comfortable space by limiting hazards like slips, falls, electric shock, drowning and poisons.

Third, limit sources of contaminants like lead, asbestos, combustion fumes, VOCs (Volatile organic compounds) and radon.

Fourth, maintain the house so it continues to provide dry, clean, comfortable and safe conditions.

Why do we want homes that are clean and easily cleanable?

- Reduced exposure to:
 - Chemical contaminants
 - Allergens
 - Pest droppings and urine
 - Pesticides and consumer chemicals
 - Heavy metals such as lead and arsenic
- Reduced harborage for pests



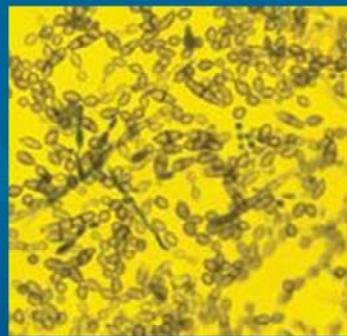
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Many of these contaminants are persistent. They simply will not disappear unless they are cleaned.

Mention that a house mouse will leave 3000 drops of urine wherever it goes.

Environmental Allergens

- Animals
- Dust Mites
- Molds
- Tree Pollen
- Grass Pollen
- Weed Pollen
- Latex
- Foods
- Stinging Insects
- Medications



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Allergens can get into the home from a variety of sources. Therefore, cleaning is important and surfaces need to be cleanable.

The Pediatric Asthma and Allergy Clinic at the Boston Medical Center identifies the following environmental allergens that can be inhaled and tests for them with antigens.

Animals: Dog, Cat, Cockroach, Feather mix (chicken, duck, goose), Gerbil, Guinea pig, Hamster, Horse, Mouse, Parakeet, Rabbit, Rat

Dust Mites: D farinae, D pter., Dust mite mix, House Dust Mix

Molds: Alternaria, Aspergillus, Cladosporium, Epicoccum, Helminthosporium, Penicillium, Mold mix (AHAP)

Tree Pollen: Birch, Oak, Elm, Maple, Ash, Hickory, Tree mix

Grass Pollen: Grass mix (5 Grass Mix, Hollister-Stier)

Weed Pollen: Lamb's quarters, Marsh elder, Plantain, Ragweed, Sagebrush, Yellow dock

Other Allergens: Latex, Foods (aerosolized)

Other: non-inhalant allergens: Foods, Stinging Insects, Medications



Humid buildings may be colonized by dust mites. In dry climates dust mites are limited to porous materials that get humidified.



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Dust mite allergen can cause asthma and triggers asthma attacks. See 2000 Institute of Medicine Report.

Where does house dust come from?

- Brought-In
- Home-Grown
 - Lead Dust
 - Dust Mites
- Resident-Made
 - Garbage
 - Clutter



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About two thirds of the dust in a low rise building is tracked in from outdoors.^[1] The dust can become air borne from people's activities and in fact is found at higher levels nearer to people than in the general room air.^[2] Most house dust contains known contaminants in the form of heavy metals, pesticides and fungal spores^[3,1], therefore controlling dust is a good idea.

Brought In Dust

- Four Steps
 - Hard Surface Walkways
 - Outside Grate-Like Mat
 - Inside Carpet Pad
 - Hard Surface Floor



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Track off systems are crucial to controlling indoor dust. A good track-off system that is kept clean can collect upwards of 80% of the tracked in dirt. A useful residential system consists of four parts:

- Hard surfaced walkways
- A grate-like mat that allows grit to fall through
- A carpet portion to dry and collect fine particles
- An easily damp mopped hard surface floor.



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Here is an example of a fairly inexpensive track-off grate. However, keep in mind, the mesh must be fine enough to avoid trips in high heels.

Shoes Off – Less Dust Enters



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Taking shoes off when entering a building makes a huge difference in the amount of dust collected in buildings.^[1]

Healthy Cleaning

- Don't dry dust or dry sweep
- Vacuuming:
 - Low-emission vacuum with beater bar
 - Very slowly (or use vacuum with dirt finder)
- Wet cleaning:
 - Use "elbow grease"
 - Frequently change water



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It is best to avoid dry dusting or sweeping. You should use a damp cloth for dusting and mist the floor for broom sweeping.

When vacuuming, it is best to use a low-emission vacuum that has a beater bar and vacuum slowly.

It is often better to use wet cleaning methods than dry dusting. It is important to use good technique and "elbow grease" when wet cleaning. In fact it may be more important than what type of product you use. Make sure that you do not contaminate the wash water and frequently change the rinse water and cleaning rags.

What can we do to buildings to make them more cleanable?

- Install dust walk-off systems at entryways
- Keep activities which create dust away from people.
- Provide smooth, cleanable surfaces
- Provide effective storage space (to help avoid clutter)
- Choose flooring that is easy to clean
- Use vacuums that have good filtration and can be emptied quickly and thoroughly



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Here is a list of what we can do to make buildings more cleanable.

Isolate Problems



Keep pets off beds and out of bedroom.



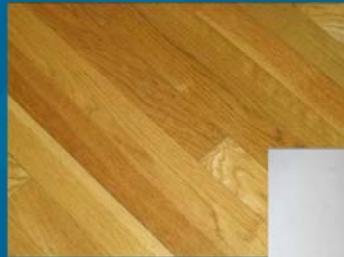
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Pets, allergens and asthma triggers

Pets sleeping in bedrooms and on beds can dramatically increase the occupants' exposure to pet dander and other contaminants and pathogens. This may be a special hardship to those with allergies and asthma. For these individuals, pets should be kept off the beds and out of the bedroom.

Beyond asthma, they also present potential risks of ticks and fleas to residents.

Cleanable Flooring



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Hard surface floors show dust more clearly, can be cleaned faster and can be damp mopped. Textile floor coverings are more complicated. They can collect and hold dust, but often turn into “virtual sources” of air borne particles. [1,3]

What to look for in a vacuum?

- Beater Bar
- Vacuum Strength
- Filter Type
- Dirt Sensor



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Vacuum cleaners are better than sweeping in terms of lessening the amount of particles they put in the air. This is increasingly the case as improved vacuum filters have become widely available. Central vacuums can have the canister placed in garages or vented to the outdoors so particles that pass through the filters are not released into the house. Vacuums with beater bars do a more thorough job of cleaning.

It is important to know whether you have vacuumed long enough. The vacuum on the right has a sensor that turns from red to green when it has collected some fraction of the dirt.

Dust mite control

- hot water
- dehumidifiers

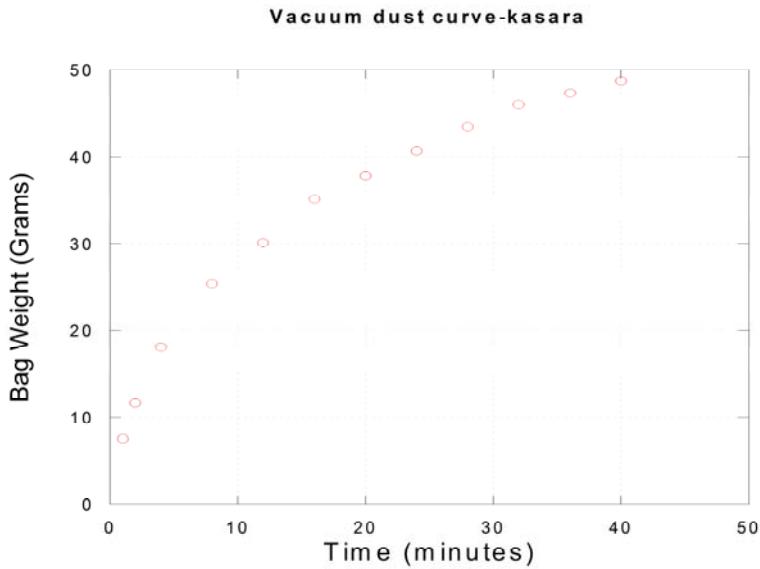


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Hot water should be less than 120 degrees F or people can be scalded. However, water in the washer should be at least 130 degrees F to kill dust mites. This requires safety mixing valves for the sink and tub water lines, with a hot water supply warm enough to get 130 degree water to the washer after heat loss from the pipes.

Some local jurisdictions, such as the city of Philadelphia, have an ordinance that mandates hot water temperatures be no higher than 125 degrees F to prevent scalds.

Older Carpets: Difficult to Clean



This graph shows the weight gain in a vacuum cleaner bag every two minutes as it passes over the same square meter of carpet. The resulting curve is a classic saturation curve. When the bag stops gaining weight all the recoverable dust has been removed from the carpet. The recoverable dust fraction is high for level loop and plush carpet and low for sculptured and shag carpet. [1]

Notice that the vacuum recovered 50 grams of dust from one square meter of carpet and that it took over forty minutes to do it. This is the result of not vacuuming quite long enough for an extended period. Once clean it requires far less time to keep it clean. At this loading the carpet is acting as a virtual source of airborne particles. When carpet is clean, it actually lowers airborne particle levels. It is not yet known at what point carpet changes from being a sink to a source.

Wire Shelving



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Wire shelves are a better idea than particle board shelves. They are easier to clean.

How clean is clean?

- Clearance testing for lead
 - 40 micrograms of lead per square foot on floors
 - 250 micrograms of lead per square foot on window sills.
- Standards for allergens?
- Standards for dust?



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Determining if the house is clean is often difficult because there are very few standards for cleaning.

However, there are standards for lead dust at 40 CFR Section 765. There are also standards for lead in soil.

While not a standard, the federal government established goals to reduce allergens in its Healthy People 2010 program for dust mites and cockroaches. See Page 8 of 29 in Reference Tab Connections Section.

What cleaning measures are problematic?

- Carpet cleaning
- Overuse of anti-microbials
- Sanitizers
- Air fresheners



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Duct Cleaning

EPA recommends duct cleaning when:

- Substantial visible mold on hard surface ducts and other ventilation components.
- Ducts infested with rodents or insects.
- Ducts clogged with excessive dust and debris.
- Ducts actually release particles from supply registers.



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Cleaning ducts and carpet can sometimes be problematic. Another potential problem is overuse of anti-microbials.

See EPA's "Should You Have the Air Ducts in Your Home Cleaned?"

Clutter

- What's the problem?
- What do we do to help? Organize home, shelves and storage bins.
- Hoarding? What's the psychological aspect of this?



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Code Requirements Related to Cleanliness

■ 305.1 General.

- The interior of a structure and equipment therein shall be maintained in good repair, structurally sound and in a sanitary condition.
- Occupants shall keep that part of the structure which they occupy or control in a clean and sanitary condition.
- Every owner of a structure containing a rooming house, housekeeping units, a hotel, a dormitory, two or more dwelling units or two or more nonresidential occupancies, shall maintain, in a clean and sanitary condition, the shared or public areas of the structure and exterior property.



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From the International Property Maintenance Code

Review quickly but raise the question about different interpretations of clean and sanitary.

Code Requirements Related to Cleanliness

- **302.1 Sanitation.**
 - All exterior property and premises shall be maintained in a clean, safe and sanitary condition.
 - The occupant shall keep that part of the exterior property which such occupant occupies or controls in a clean and sanitary condition.
- **307.1 Accumulation of rubbish or garbage.** All exterior property and premises, and the interior of every structure, shall be free from any accumulation of rubbish or garbage.
- **503.4 Floor surface.** In other than dwelling units, every toilet room floor shall be maintained to be a smooth, hard, nonabsorbent surface to permit such floor to be easily kept in a clean and sanitary condition.



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Section 503.4 is a good example of a standard to make sure surfaces are cleanable. However, the IPMC exempts dwellings. It would apply to public and commercial buildings.

Most housing codes require a smooth, hard, nonabsorbent surface in bathrooms. In essence, this would ban carpeting in these areas. One requires it in kitchens. Given activities in bathrooms (and to some extent kitchens), hard, smooth, nonabsorbent surfaces are essential. Throw rugs are OK because they can be washed easily.

Key Messages

- Pesticides, allergens, and general chemicals in the home can cause allergic reactions, asthma and asthma exacerbation, and toxic exposure effects.
- Potential sources of allergens and contaminants in the home come from outdoor and indoor sources.
- Keeping a home clean includes controlling the source, creating smooth and cleanable surfaces, reducing clutter, and using effective cleaning methods.



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Learning Objectives

- List three contaminants or allergens that are frequently found in house dust and their health effects.
- Describe three ways allergens or contaminants get into house dust.
- Identify three strategies to reduce them.



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